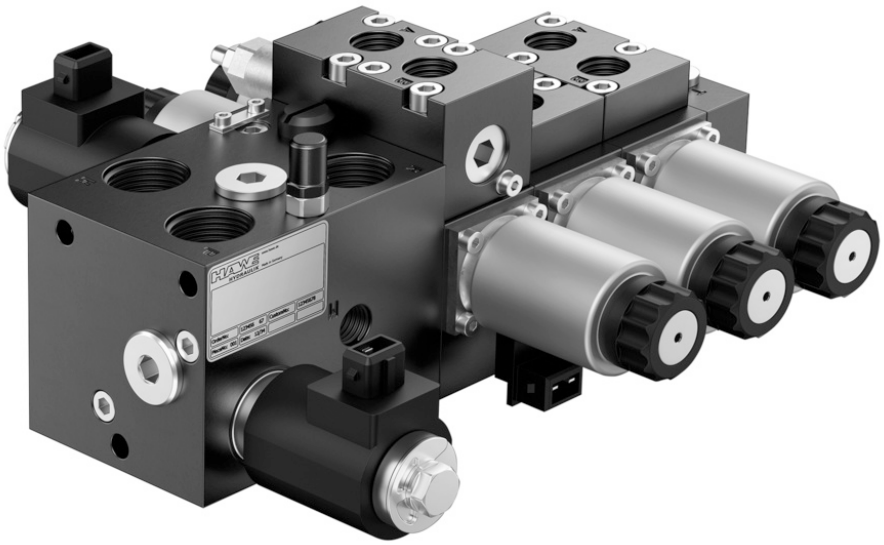
Connection block type HMPL and HMPV for proportional directional spool valve type PSL

Product documentation

Connection blocks for valve bank in series connection

Operating pressure p_{max}:	250 bar
Flow rate Q_{max}:	160 l/min



D 7700 H
02-2026-1.1 en

HAWE HYDRAULIK

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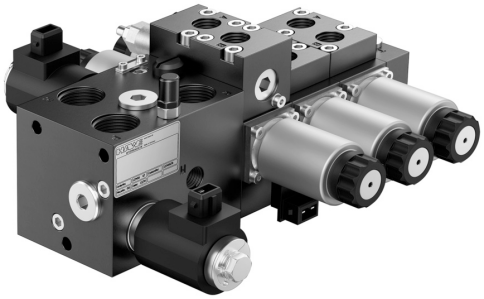
1 Overview of connection block for valve bank in series connection

The connection blocks of type HMPL, HMPV are used to control single-acting cylinders, preferably hydraulic cylinders in lifting units.

This allows additional consumers to be run at the same time and independently of each other at different speeds and pressures, as long as the sum of the partial flow rates required for this is covered by the total delivery flow on the pump side.

The lifting and lowering function is controlled by 2/2-way screw-in proportional seat valves of type EMP. These valves do not require external pilot pressure. The load pressure is reported to the LS chain during lifting.



Connection block Type HMPL

Features and advantages

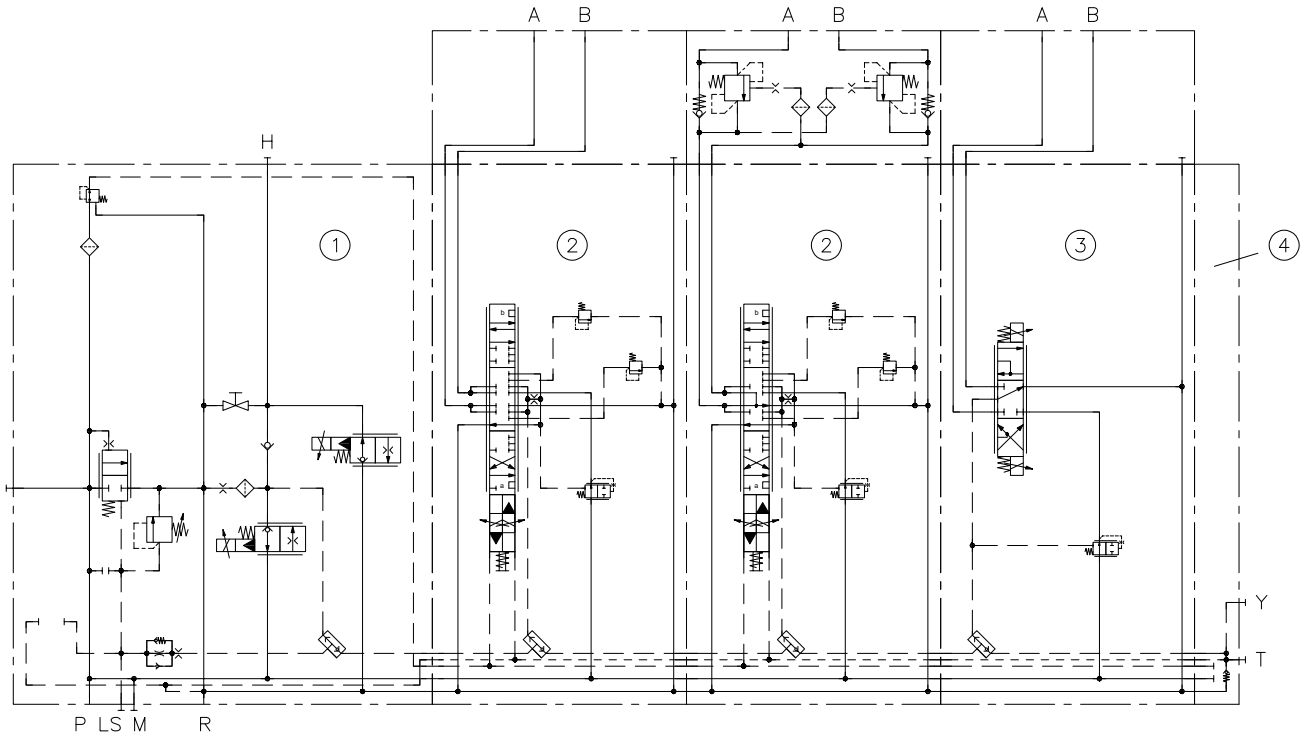
- High flow rates for all functions due to hydraulically pilot-controlled valves
- Low power consumption and/or fuel consumption of the pump drive
- Less heat generation and therefore less thermal stress on all components
- Use in systems with constant or variable pumps
- Excellent fine control of all functions
- Leakage-free seat valve technology instead of spool valves for lifting/lowering function
- No pilot pressure required for lowering function (no pump start-up)

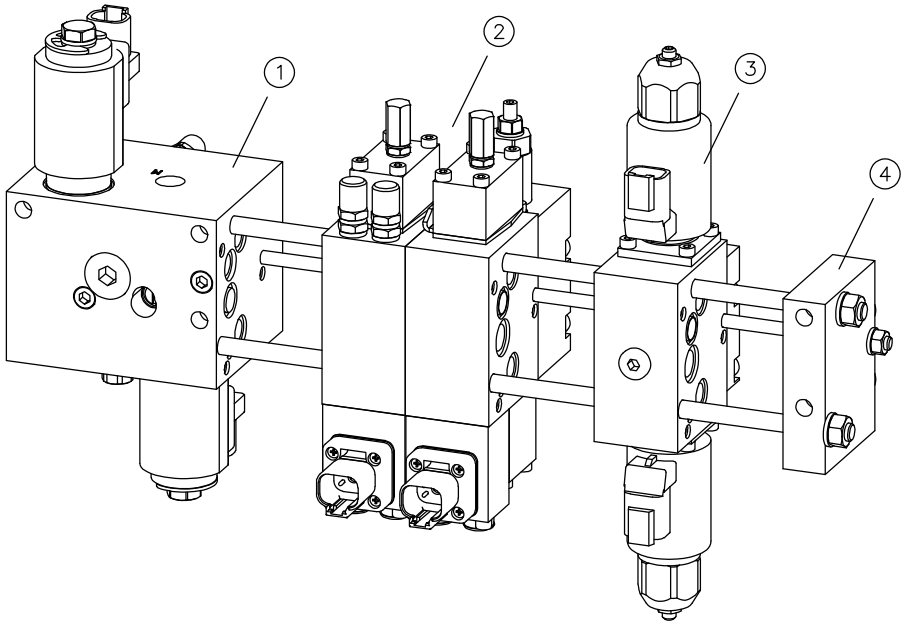
Intended applications

- Industrial vehicles

1.1 Configuration example

HMPL 4 S 1/PV80PV80/200-2
-A2 L 16/16 A150 B150/E/2
-A2 H 10/6/E/2 AL-0-C 4-200-BL-0-D 4-200
-DA2 L 10/10/E/2
-E 4-DT 24



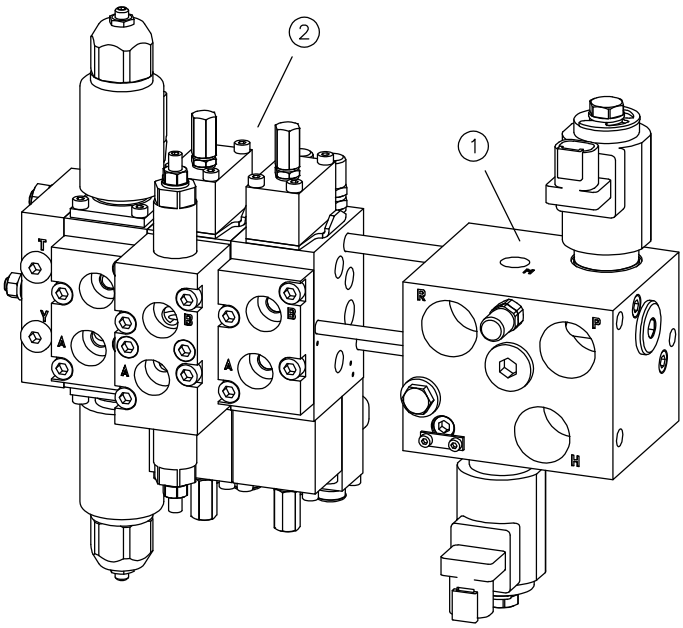


1 HMPL Connection block
2 PSL 2 valve sections
3 EDL Valve section
4 End plate

2 Available versions

Ordering example

HMPL 4 S 1/PV80PV80/200-2	Connection block (see Chapter 2.1, "Connection block")
-A2 L 16/16 A150 B150/E/2 **-A2 H 10/6/E/2 AL-0-C 4-200-BL-0-D 4-200** **-DA2 L 10/10/E/2** **-E 4-DT 24**	For valve sections, see: ▪ D 7700-2 ▪ D 7700-3



1 Connection block (Chapter 2.1)
2 Valve sections and end plate (D 7700-2 or D 7700-3)

A single manifold can merge up to 14 valve sections of size 2 or 12 valve sections of size 3.

Limits to the maximum possible number of valve sections result from:

a) tension rod strength
b) internal control oil supply for the electro-hydraulic actuation
c) the available control pressure difference for supply to the rear valve sections

2.1 Connection block

Connection blocks come in two basic variants:

- **HMPL:** Connection block for use in open-centre systems with constant pumps
- **HMPV:** Connection block for use in closed-centre systems with variable pumps or for simultaneous supply of two or more manifolds from a shared constant pump

Ordering example

HMPL 4	S	1	Z	/VV	/200	-2	-DT 24

-DT 24 — **Solenoid version, for version without valve bank** — 2.2.1 "Standard solenoid versions"

-2 — 2.1.10 "Size"

/200 — 2.1.9 "System pressure limitation"

/VV — 2.1.8 "Lifting and lowering function"

Z — 2.1.7 "LS relief"

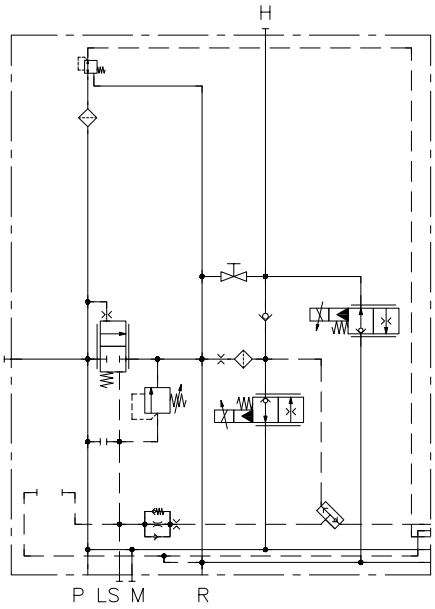
1 — 2.1.6 "Internal control oil supply"

S — 2.1.5 "LS damping elements"

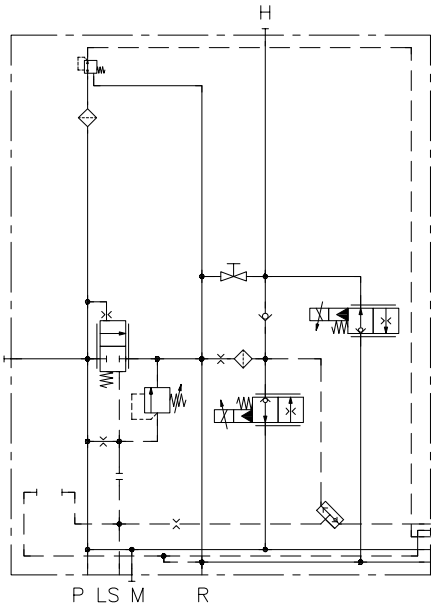
Basic type

- 2.1.1 "Basic version"
- 2.1.2 "Ports for P and R"
- 2.1.3 "Connection block basic types"
- 2.1.4 "Additional elements for 3-way controller"

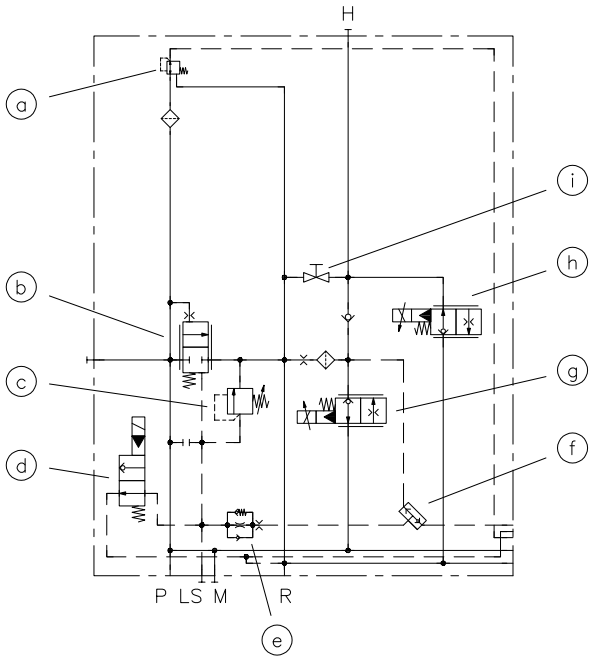
HMPL

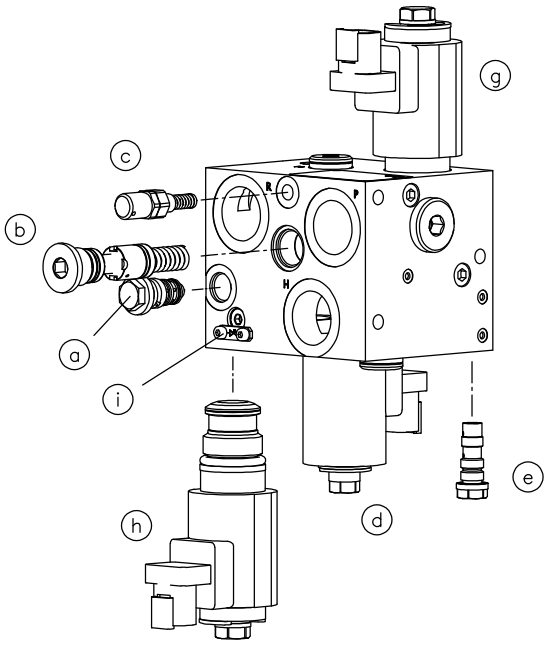


HMPV



Depending on the configuration, the connection blocks incorporate:





a. Pressure reducing valve for internal control oil supply
b. 3-way controller for open-centre system with constant pump
c. LS pressure-limiting valve to ensure maximum system pressure
d. LS relief or LS pressure-limiting valve
e. Damping element to reduce LS signal oscillation
f. Shuttle valve
g. Proportional 2/2-way directional valve for lifting
h. Proportional 2/2-way directional valve for lowering
i. Emergency release valve

2.1.1 Basic version

Type	Description
HMPL	Connection block for use in open-centre systems with constant pumps
HMPV	Connection block for use in closed-centre systems with variable pumps or for simultaneous supply of two or more manifolds from a shared constant pump

2.1.2 Ports for P and R

Coding	Description of P and R port
4	G 3/4 (ISO 228-1)
5	G 1 (ISO 228-1)
UNF 4	SAE-12 or 1 1/16-12 UN-2B (SAE J 514)
UNF 5	SAE-16 or 1 5/16-12 UN-2B (SAE J 514)

2.1.3 Connection block basic types

HMPL Connection blocks

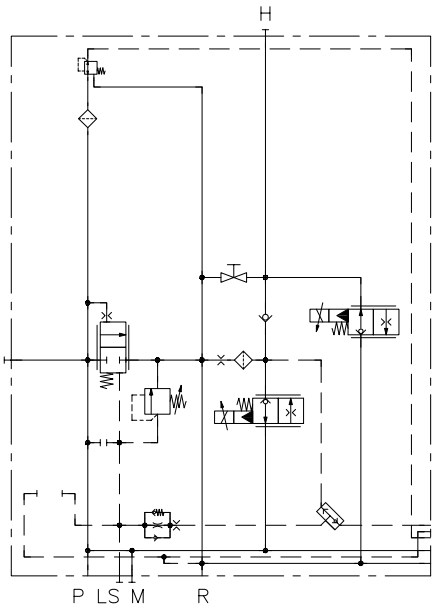
Coding	Description
HMPL 4...-2 **HMPL UNF 4...-2**	Standard connection block with integrated 3-way controller – Pressure-limiting valve: pilot-controlled – Compatible with valve sections PSL 2 as per D 7700-2
HMPL 4 U...-2	With integrated 3-way controller and additional idle circulation valve for automatic reduction of the circulating pressure. – In order to reliably close the idle circulation valve, the LS pressure must be at least 20 bar. If the LS pressure then falls below 25% of the pump pressure, the valve returns to idle circulation and the pump gallery is relieved to the reflux. – Electro-hydraulic actuation with internal control oil supply requires a pump flow rate of at least 60 l/min; otherwise, there will not be enough pilot pressure available to actuate the spool valves. – Pressure-limiting valve: pilot-controlled – Compatible with valve sections PSL 2 as per D 7700-2
HMPL 5...-3 **HMPL UNF 5...-3**	Standard connection block with integrated 3-way controller – Pressure-limiting valve: pilot-controlled – Compatible with valve sections PSL 3 as per D 7700-3
HMPL 5 U...-3 **HMPL UNF 5 U...-3**	With integrated 3-way controller and additional idle circulation valve for automatic reduction of the circulating pressure. – In order to reliably close the idle circulation valve, the LS pressure must be at least 20 bar. If the LS pressure then falls below 25% of the pump pressure, the valve returns to idle circulation and the pump gallery is relieved to the reflux. – Electro-hydraulic actuation with internal control oil supply requires a pump flow rate of at least 80 l/min; otherwise, there will not be enough pilot pressure available to actuate the spool valves. – Pressure-limiting valve: pilot-controlled – Compatible with valve sections PSL 3 as per D 7700-3

HMPV connection blocks

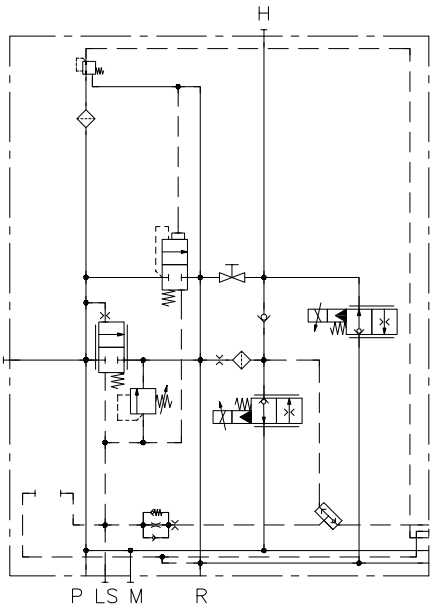
Coding	Description
HMPV 4...-2 **HMPV UNF 4...-2**	Standard connection block without 3-way controller – Pressure-limiting valve: pilot-controlled – Compatible with valve sections PSL 2 as per D 7700-2
HMPV 5...-3 **HMPV UNF 5...-3**	Standard connection block without 3-way controller – Pressure-limiting valve: pilot-controlled – Compatible with valve sections PSL 3 as per D 7700-3

Circuit symbols

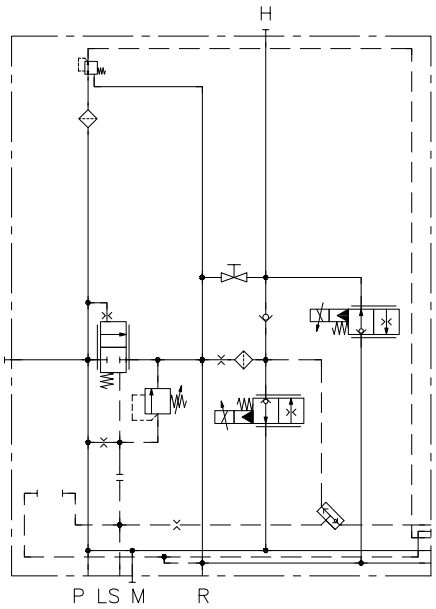
HMPL 4...-2



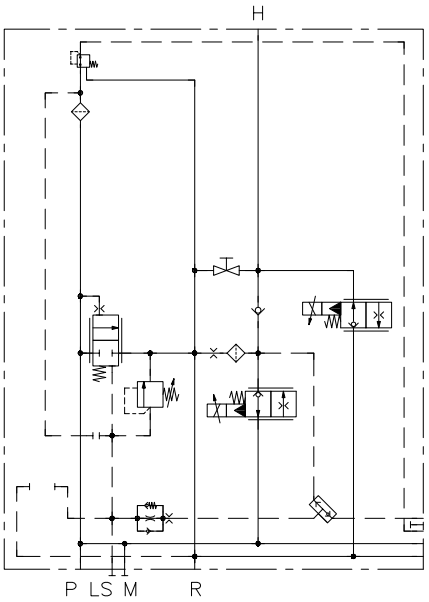
HMPL 4 U...-2



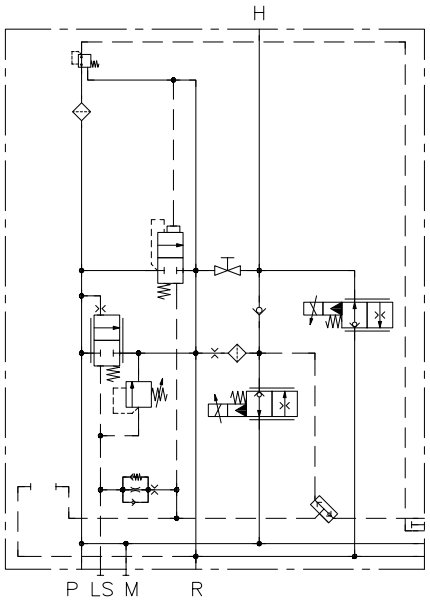
HMPV 4...-2



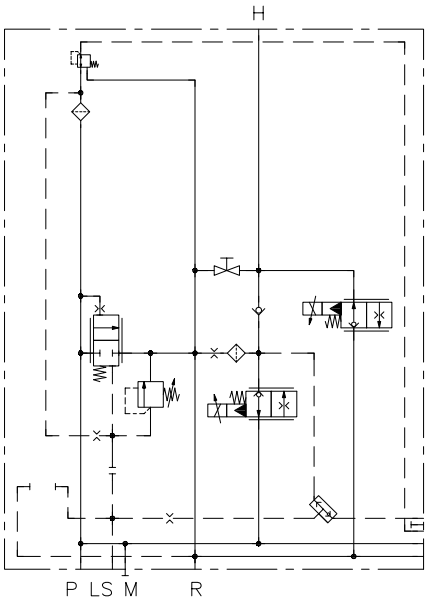
HMPL 5...-3



HMPL 5 U...-3



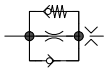
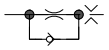
HMPV 5...-3



2.1.4 Additional elements for 3-way controller

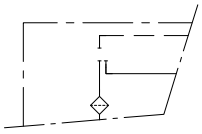
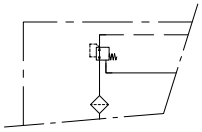
Coding	Description
without coding	Standard version 3-way controller with 9 bar circulation pressure
H	Special version 3-way controller with higher circulation pressure (14 bar)

2.1.5 LS damping elements

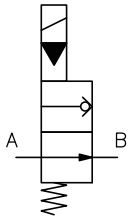
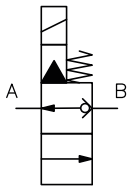
Coding	Description	Circuit symbol
B	∅ 0.8 mm orifice	
B 4 **B 5** **B 6** **B 7**	∅ 0.4 / 0.5 / 0.6 / 0.7 mm orifice	
B 55	Two ∅ 0.5 mm orifices in series	
S	Pre-load and damper valve (pre-load pressure: 25 bar)	
W	Pre-load and damper valve with increased throttle effect (pre-load pressure: 25 bar)	
E	Damper valve without pre-load valve Because there is no pre-load valve, LS relief with all directional spool valves in neutral position occurs with a slight delay, system pressure drops only slowly. Common applications include consumers with a tendency to oscillate at low frequencies.	
G	Damper valve with increased throttle effect without pre-load valve (Throttle cross-section smaller than for coding E) Because there is no pre-load valve, LS relief with all directional spool valves in neutral position occurs with a slight delay, system pressure drops only slowly. Common applications include consumers with a tendency to oscillate at low frequencies.	

NOTICE
Never operate the connection block without an additional damping element (malfunction of the pressure-limiting valve is otherwise possible).

2.1.6 Internal control oil supply

Coding	Description	Circuit symbol
without coding	Without internal control oil supply For valve sections with manual, hydraulic or pneumatic actuation. Or for external control oil supply (required pilot pressure: 20 to 40 bar).	
1, 2	With internal control oil supply For valve sections with electro-hydraulic actuation. Optionally, a small quantity of control oil can be siphoned from the Z port to supply externally connected additional valves. In this case, the maximum permissible flow rate is 2 l/min. ▪ 1: 20 bar pilot pressure ▪ 2: 40 bar pilot pressure **NOTICE** If multiple valve sections need to be actuated simultaneously, we recommend a pilot pressure of 40 bar.	

2.1.7 LS relief

Coding	Description	Circuit symbol
Z	LS relief, open when unpowered, EM 11 S as per D 7490/1	
V	LS relief, closed when unpowered, EM 11 V as per D 7490/1	

2.1.8 Lifting and lowering function

Coding	Description
HMPL 4...-2 **HMPL UNF 4...-2** **HMPL 4 U...-2** **HMPV 4...-2** **HMPV UNF 4...-2**	For lifting and lowering, 2/2-way directional seated valves as per D 7490/1 are used. ▪ **V:** EM 31 V (s/w) ▪ **PV80:** EMP 31 V80 (proportional) ▪ **PV100:** EMP 31 V100 (proportional) The specified variants can be freely combined. HMPL 4... **/PV80** **/PV80** /...-2 **Lowering** **Lifting**
HMPV 5...-3 **HMPV UNF 5...-3** **HMPL 5 U...-3** **HMPL UNF 5 U...-3**	For lifting and lowering, 2/2-way directional seated valves as per D 7490/1 are used. ▪ **V:** EM 41 V (s/w) ▪ **PV:** EMP 41 (proportional) The specified variants can be freely combined. HMPL 5... **/PV80** **/PV80** /...-3 **Lowering** **Lifting**

NOTICE

- Counterbalance valves must be provided on the consumer side to limit the maximum speed.
- To avoid uncontrolled lifting functions, the load pressure at H must always be higher than the return pressure in R.

2.1.9 System pressure limitation

Coding	Description
/...	With pressure-limiting valve (Adjustment range 50 to 250 bar)

2.1.10 Size

Coding	Description
-2	Size 2
-3	Size 3

2.1.11 Variants and potential combinations

HMPL Connection blocks

Type	P and R port as per ISO 228-1 or SAE J 514	Max. recommended flow rate (l/min)	Pressure-limiting valve, pilot-controlled
HMPL 4...-2	G 3/4	80	●
HMPL UNF 4...-2	SAE-12 or 1 1/16-12 UN-2B		●
HMPL 4 U...-2	G 3/4	100	●
HMPL 5...-3	G 1	160	●
HMPL UNF 5...-3	SAE-20 or 1 5/16-12 UN-2B		●
HMPL 5 U...-3	G 1		●
HMPL UNF 5 U...-3	SAE-20 or 1 5/16-12 UN-2B		●

HMPV Connection blocks

Type	P and R port as per ISO 228-1 or SAE J 514	Max. recommended flow rate (l/min)	Pressure-limiting valve, pilot-controlled
HMPV 4...-2	G 3/4	100	●
HMPV UNF 4...-2	SAE-12 or 1 1/16-12 UN-2B		●
HMPV 5...-3	G 1	160	●
HMPV UNF 5...-3	SAE-20 or 1 5/16-12 UN-2B		●

2.2 Solenoid voltage and connector

2.2.1 Standard solenoid versions

Coding	Electrical connection	Nominal voltage	Protection class (IEC 60529)	HMPL / HMPV				
				Size 2		Size 3		Size 2 and 3
				V (EM 31 V)	PV 80 PV 100 (EMP 31..)	V (EM 41 V)	PV (EMP 41)	S / V (EM 11)
X 12, G 12	EN 175 301-803 A ▪ **X:** without line connector ▪ **G:** with line connector MSD3-309 ▪ **L:** with LED connector ▪ **WG:** with alternating rectifier in line connector	12 V DC	IP 65	●	●	●	●	●
X 24, G 24		24 V DC		●	●	●	●	●
X 48, G 48		48 V DC		●	●	●		●
X 98, G 98		98 V DC		●	●	●		●
X 205, G 205		205 V DC		●	●	●		●
L 12		12 V DC		●	●	●		●
L 24		24 V DC		●	●	●		●
WG 110		110 V AC 50/60 Hz		●	●	●		●
WG 230		230 V AC 50/60 Hz		●	●	●		●
AMP 12	AMP Junior Timer	12 V DC	IP 65	●	●	●	●	●
AMP 24		24 V DC		●	●	●	●	●
AMP 48		48 V DC		●	●	●	●	●
DT 12	DEUTSCH (DT 04-2P)	12 V DC	IP 69	●	●	●	●	●
DT 24		24 V DC		●	●	●	●	●
K 12	KOSTAL (M27x1)	12 V DC	IP 67	●	●	●		●
K 24		24 V DC		●	●	●		●
S 12	SCHLEMMER (bayonet PA 6)	12 V DC	IP 67	●	●	●		●
S 24		24 V DC		●	●	●		●
M 24	M12x1	24 V DC	IP 65	●	●	●		●
DTL 24	MIL-DTL-38999 series III	24 V DC	IP 67	●				●

3 Parameters

3.1 General data

Designation	Connection block type HMPL and HMPV for proportional directional spool valve
Design	Connection blocks for combination with PSL/PSV valve sections D 7700-2 and D 7700-3
Material	Steel; Nitrocarburised surfaces (anti-corrosion), Hardened and ground functional inner parts, surface of the magnets as per D 7490/1
Attachment	Valve bank: M8, see Chapter 4, "Dimensions"
Tightening torque	see Chapter 4, "Dimensions"
Installation position	As desired
Ports/connections	▪ **P** = Pump ▪ **R** = Reflux ▪ **H** = Consumers ▪ **M** = Pressure gauge port (pump side) ▪ **LS** = Load pressure signal – P, R, H = as per type designation – M, LS = G 1/4 (ISO 228-1) or SAE-4, or 7/16-20 UNF-2B (SAE J 514) according to type and size
Hydraulic fluid	Hydraulic fluid, according to DIN 51524 Parts 1 to 3; ISO VG 10 to 68 according to DIN ISO 3448 Viscosity range: 10 - 400 mm²/s Also suitable for biologically degradable hydraulic fluids type HEPG (polyalkylene glycol) and HEES (synthetic ester) at operating temperatures up to approx. +70°C. Not suitable for HETG such as rapeseed oil and water-glycol solutions, e.g. HFA and HFC.
Cleanliness level	**ISO 4406** 20/17/14
Temperatures	Environment: approx. -40 to +80 °C, hydraulic fluid: -25 to +80 °C, pay attention to the viscosity range. Start temperature: down to -40 °C is permissible (take account of the start viscosities!), as long as the steady-state temperature is at least 20 K higher during subsequent operation. Biologically degradable hydraulic fluids: note manufacturer specifications. With consideration for the seal compatibility, not above +70°C.

3.2 Pressure and volumetric flow

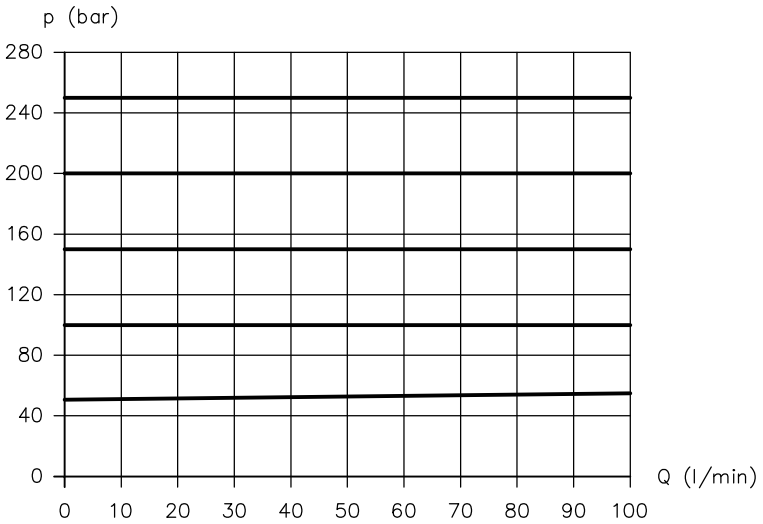
Operating pressure p_{max}	▪ **P** = 250 bar ▪ **H** = 280 bar ▪ **R** = 10 bar

3.3 Characteristic lines

Viscosity of the hydraulic fluid approx. 50 mm²/s

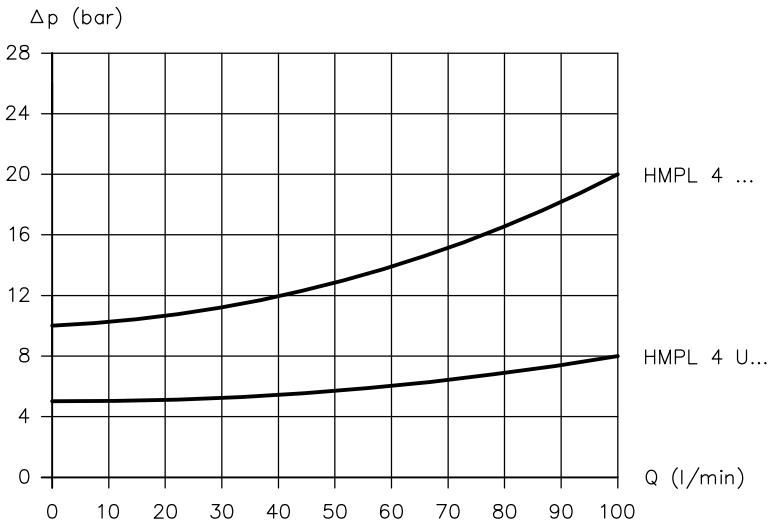
HMPL, HMPV Size 2

Pressure-limiting valve in connection block **P** → **R**



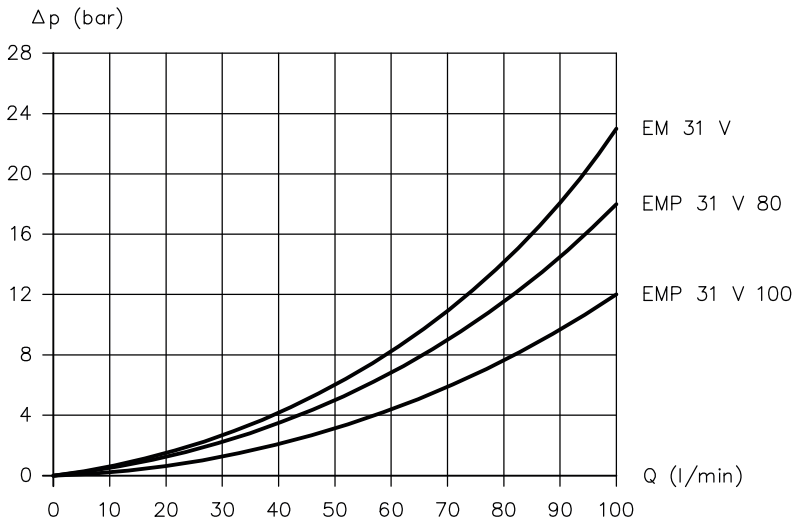
Q Flow rate (l/min); p Pressure setting (bar)

Circulating pressure **P** → **R**



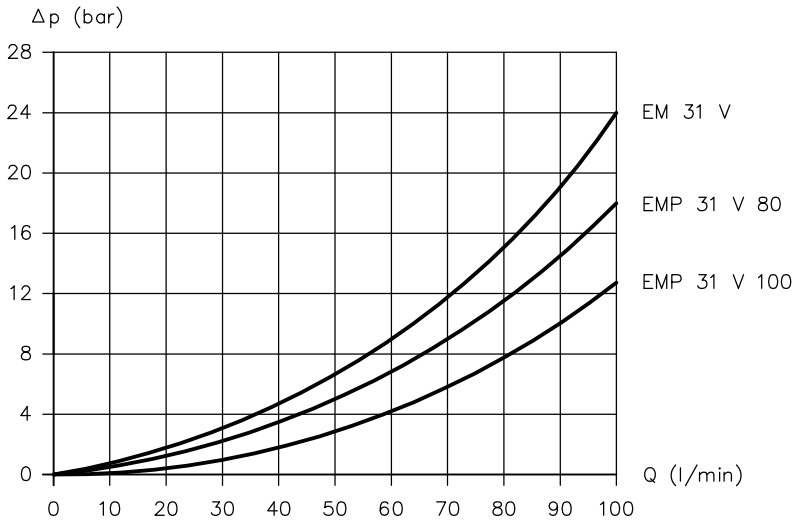
Q Flow rate (l/min); Δp Flow resistance (bar)

Lifting flow resistance (valve 100% open) **P** → **H**



Q Flow rate (l/min); Δp Flow resistance (bar)

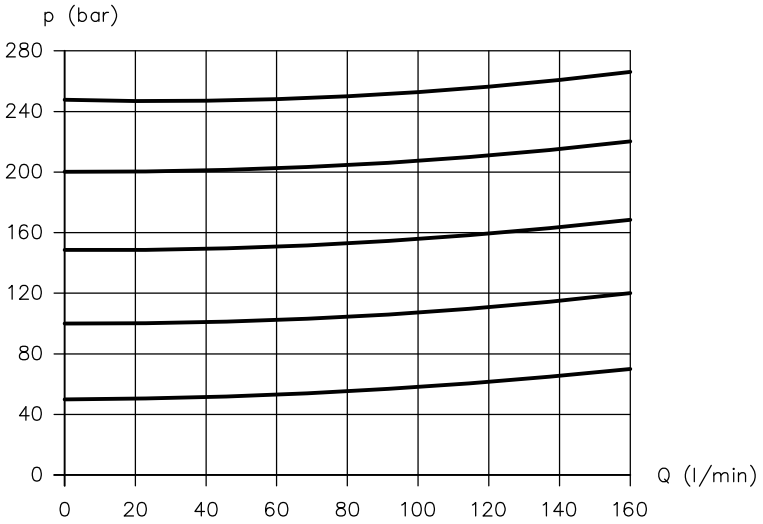
Lowering flow resistance (valve 100% open) H → R



Q Flow rate (l/min); Δp Flow resistance (bar)

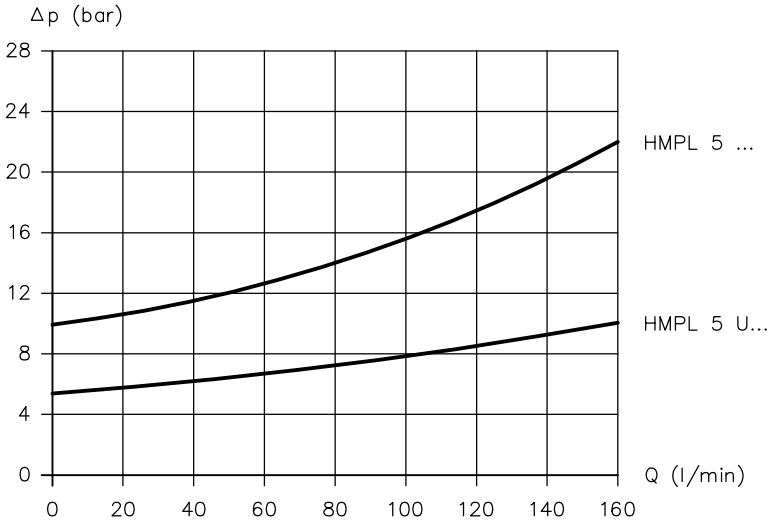
HMPL, HMPV size 3

Pressure-limiting valve in connection block **P** → **R**



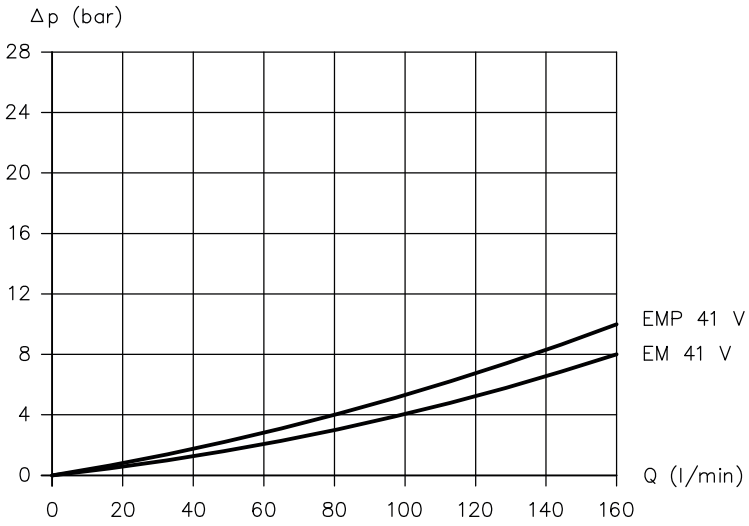
Q Flow rate (l/min); p Pressure setting (bar)

Circulating pressure **P** → **R**



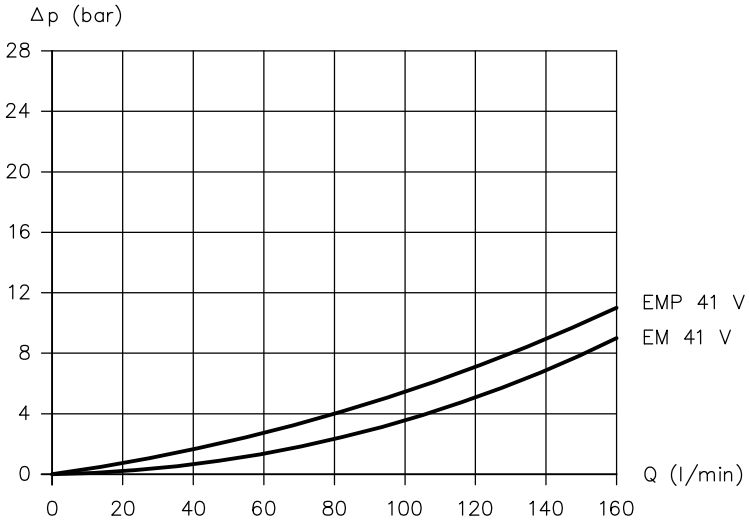
Q Flow rate (l/min); Δp Flow resistance (bar)

Lifting flow resistance (valve 100% open) P → H



Q Flow rate (l/min); Δp Flow resistance (bar)

Lowering flow resistance (valve 100% open) H → R



Q Flow rate (l/min); Δp Flow resistance (bar)

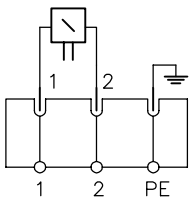
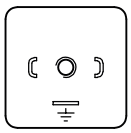
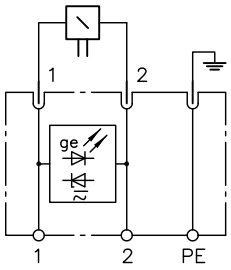
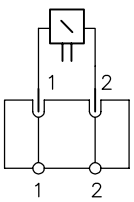
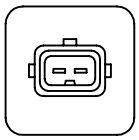
3.4 Weight

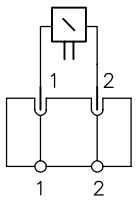
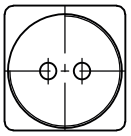
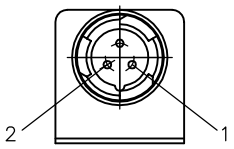
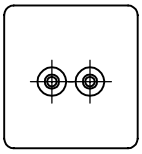
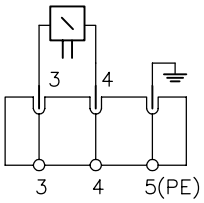
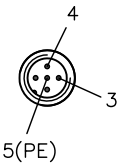
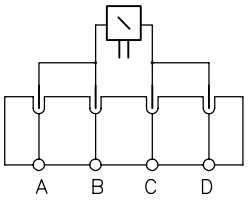
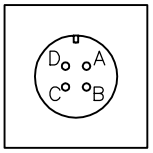
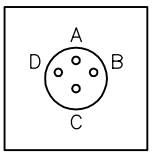
Size 2	**Type**	
	HMPL, HMPV	= 4.9 kg
Size 3	**Type**	
	HMPL, HMPV	= 5.8 kg

3.5 Electrical data

Nominal power U_N	Coding	12 V DC	24 V DC	48 V DC	96 V DC	205 V DC
Nominal power P_N	V - EM 31 V with HMPL/V 4...	21 W	21 W	21 W	21 W	21 W
	PV - EMP 31 V with HMPL/V 4...	32 W	32 W	32 W	32 W	32 W
	V - EM 41 V with HMPL/V 5...	32 W	32 W	32 W	32 W	32 W
	PV - EMP 41 V with HMPL/V 5...	30 W	30 W	30 W	30 W	30 W
Current, cold I_{20}	V - EM 31 V with HMPL/V 4...	1.75 A	0.89 A	0.44 A	0.2 A	0.1 A
	PV - EMP 31 V with HMPL/V 4...	2.67 A	1.33 A	0.67 A	0.3 A	0.15 A
	V - EM 41 V with HMPL/V 5...	2.67 A	1.33 A	0.67 A	0.3 A	0.15 A
	PV - EMP 41 V with HMPL/V 5...	2.5 A	0.88 A	--	--	--
Limit current I_G	V - EM 31 V with HMPL/V 4...	1.23 A	0.62 A	0.31 A	--	--
	PV - EMP 31 V with HMPL/V 4...	1.87 A	0.93 A	0.47 A	--	--
	V - EM 41 V with HMPL/V 5...	1.87 A	0.93 A	0.47 A	--	--
	PV - EMP 41 V with HMPL/V 5...	1.75 A	0.88 A	--	--	--
Further information	D 7490/1					

Electrical connection

Coding	Specification	Connection	Plug
X 12, G 12 X 24, G 24 X 48, G 48 X 98, G 98 X 205, G 205 WG 110 WG 230	▪ EN 175 301-803 A ▪ 2-pin ▪ IP 65 (IEC 60529)		
L 12 L 24			
AMP 12 AMP 24 AMP 48	▪ AMP Junior Timer ▪ 2-pin ▪ IP 67 (IEC 60529)		
DT 12 DT 24	▪ DEUTSCH (DT 04-2P) ▪ 2-pin ▪ IP 69k (IEC 60529)		

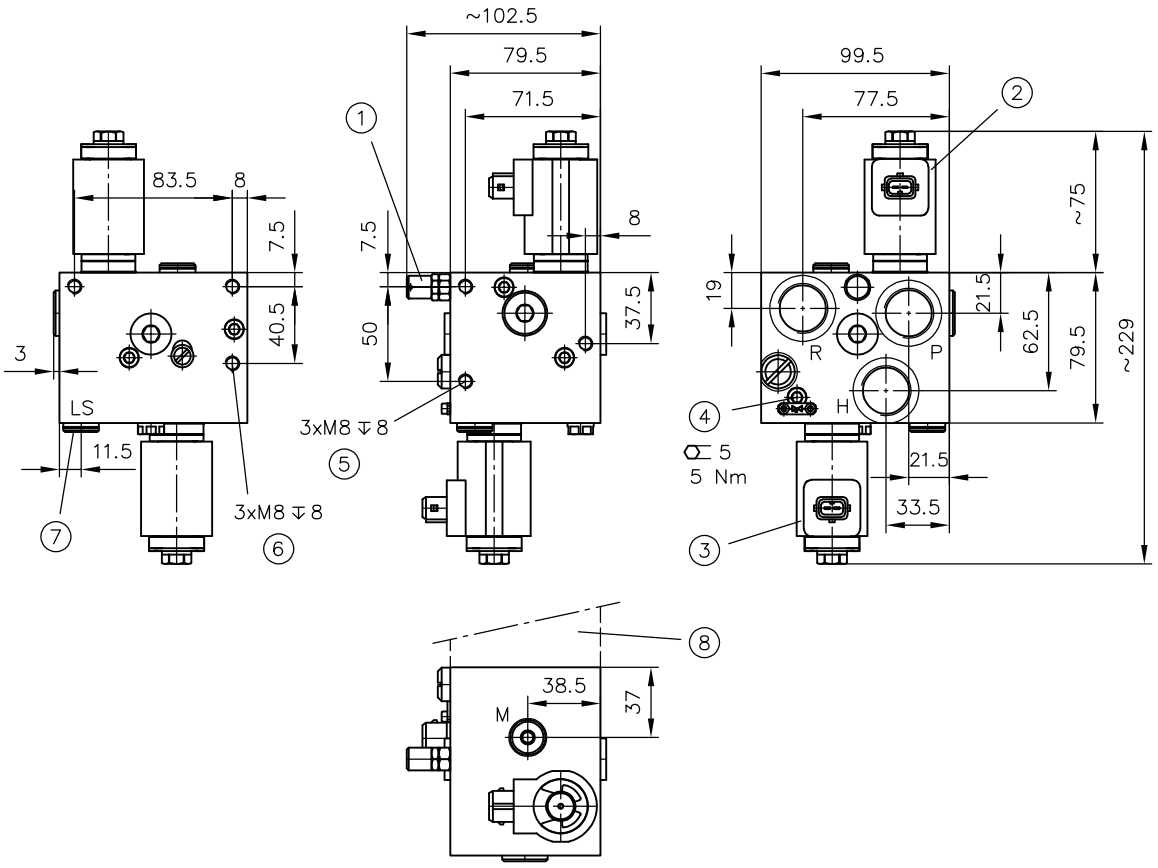
Coding	Specification	Connection	Plug
K 12 **K 24**	▪ KOSTAL (M27x1) ▪ 2-pin		
S 12 **S 24**	▪ Bayonet coupling PA6 Schlemmer ▪ 2-pin ▪ IP 67 (IEC 60529)		
F 24	▪ Free cable ends 600 mm		
M 24	▪ M12x1		
ITT 24	▪ VG 95234 MIL ▪ 4-pin ▪ IP 67 (IEC 60529)		
DTL 24	▪ MIL-DTL 38999 series III ▪ 4-pin ▪ IP 67 (IEC 60529)		

Further information see D 7490/1

4 Dimensions

All dimensions in mm, subject to change.

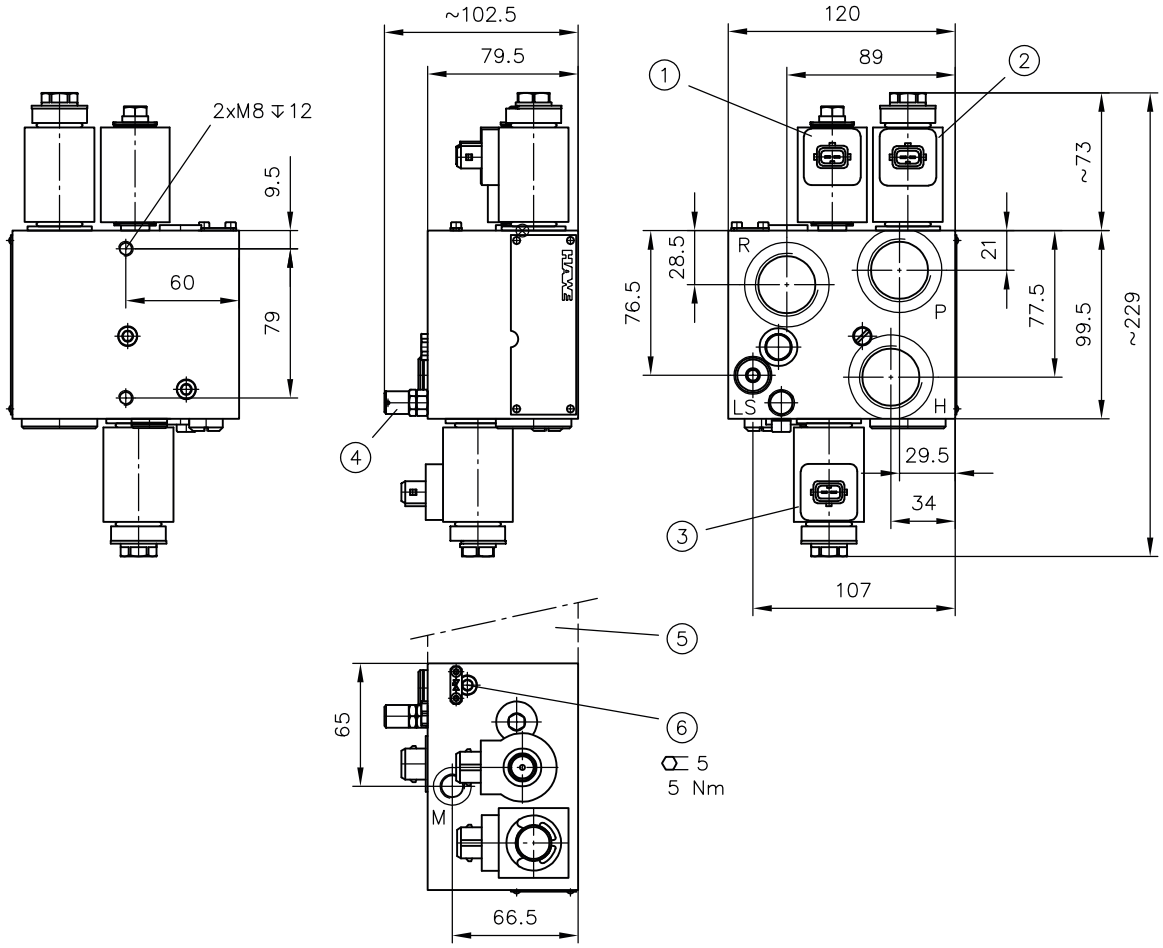
4.1 Type HMPL and HMPV size 2



1 Pressure limitation setting
2 Lifting
3 Lowering
4 Emergency release
5 for vertical installation
6 for horizontal and vertical installation
7 Connection LS with type HMPV open
8 Directional valve segments

Type	Connections		
	P, R, H	LS, M	
HMPL 4..-2 HMPV 4..-2	G 3/4	G 1/4	ISO 228-1
HMPL UNF 4..-2 HMPV UNF 4..-2	1 1/16-12UN-2B (SAE-12)	7/16-20UNF-2B (SAE-4)	SAE J 514

4.2 Type HMPL and HMPV size 3



1 Pump direction switching
2 Lifting
3 Lowering
4 Pressure limitation setting
5 Directional valve segments
6 Emergency release

Type	Connections		
	P, R, H	LS, M	
HMPL 5..-3 HMPV 5..-3	G 1	G 1/4	ISO 228-1
HMPL UNF 5..-3 HMPV UNF 5..-3	1 5/16-12UN-2B (SAE-20)	7/16-20UNF-2B (SAE-4)	SAE J 514

5 Installation, operation and maintenance information

Observe the document B 5488 “General operating instructions for assembly, commissioning, and maintenance.”

5.1 Intended use

This product is intended exclusively for hydraulic applications (fluid technology).

The user must observe the safety measures and warnings in this document.

Essential requirements for the product to function correctly and safely:

- ► All information in this documentation must be observed. This applies in particular to all safety measures and warnings.
- ► The product must only be assembled and put into operation by specialist personnel.
- ► The product must only be operated within the specified technical parameters described in detail in this document.
- ► All components must be suitable for the operating conditions when using an assembly.
- ► The operating instructions for the components, assemblies and the specific complete system must also always be observed.

If the product can no longer be operated safely:

1. Remove the product from operation and mark it accordingly.
   ✓ It is then not permitted to continue using or operating the product.

5.2 Assembly information

The product must only be installed in the complete system with standard and compliant connection components (screw fittings, hoses, pipes, fixtures etc.).

The product must be shut down correctly prior to disassembly (in particular in combination with hydraulic accumulators).

⚠ **DANGER**
Sudden movement of the hydraulic drives when disassembled incorrectly
Risk of serious injury or death

- ► Depressurise the hydraulic system.
- ► Perform safety measures in preparation for maintenance.

5.2.1 Attachment

The valve bank must be mounted to the frame or base of the machine in such a way that no stress is induced. Three screws and elastic washers between the bank and the frame are recommended for attachment.

5.2.2 Piping

All fittings used must utilise deformable seals. The recommended tightening torque values must not be exceeded.

5.3 Operating instructions

Observe product configuration and pressure/flow rate.

The statements and technical parameters in this document must be strictly observed.
The instructions for the complete technical system must also always be followed.

NOTICE

- ► Read the documentation carefully before usage.
- ► The documentation must be accessible to the operating and maintenance staff at all times.
- ► Keep documentation up to date after every addition or update.

CAUTION

Overloading components due to incorrect pressure settings.
Risk of minor injury. Parts may burst or fly off, and uncontrolled leakage of hydraulic fluid.

- Pay attention to the maximum operating pressure of the pump, valves and fittings.
- Always monitor the pressure gauge when setting and changing the pressure.

Purity and filtering of the hydraulic fluid

Fine contamination can significantly impair the function of the product. Contamination can cause irreparable damage.

Examples of fine contamination include:

- Swarf
- Rubber particles from hoses and seals
- Dirt due to assembly and maintenance
- Mechanical debris
- Chemical ageing of the hydraulic fluid

NOTICE

New hydraulic fluid from the manufacturer may not have the required purity.
Damage to the product is possible.

- ► Filter new hydraulic fluid to a high quality when filling.
- ► Do not mix hydraulic fluids. Always use hydraulic fluid that is from the same manufacturer, of the same type, and with the same viscosity properties.

For smooth operation, pay attention to the cleanliness level of the hydraulic fluid (cleanliness level see Chapter 3, "Parameters").

Additionally applicable document: D 5488/1 oil recommendations

5.4 Maintenance information

Check regularly (at least once a year) by visual inspection whether the hydraulic connections or the surfaces of the valve blocks are damaged. If damage or external leakages are found, shut down and repair the system.

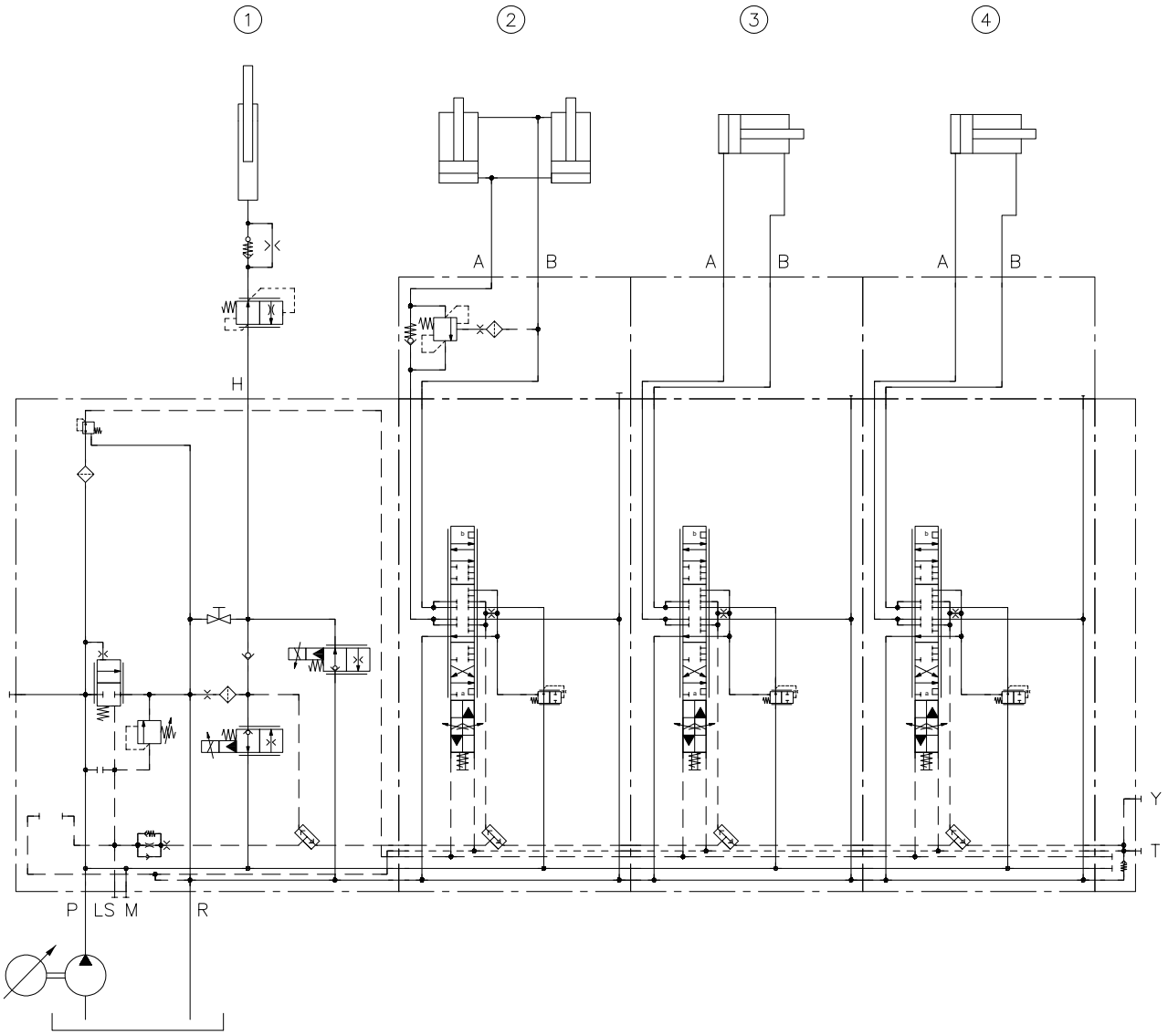
Clean the surface of the device regularly (at least once a year) (dust deposits and dirt).

6 Other information

6.1 Application examples

Counterbalance forklift with speed-controlled electric motor

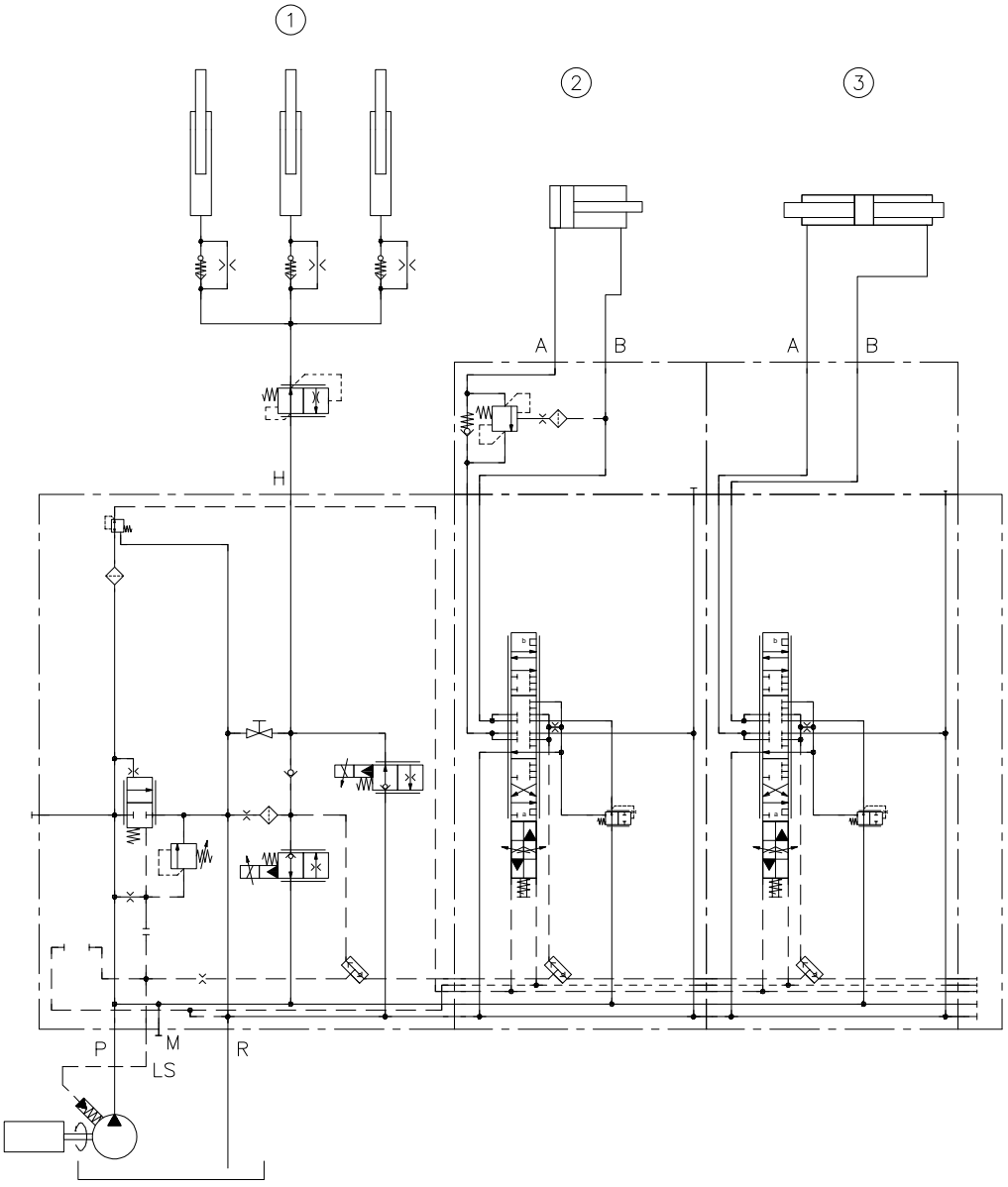
HMPL 4 S 1 /PV80PV80 /250 -2
-A 2 L 10/10 /E /2 AL -8 -C 110
-A 2 L 16/16 /E /2
-A 2 L 25/25 /E /2
-E4 -AMP 24 K 4



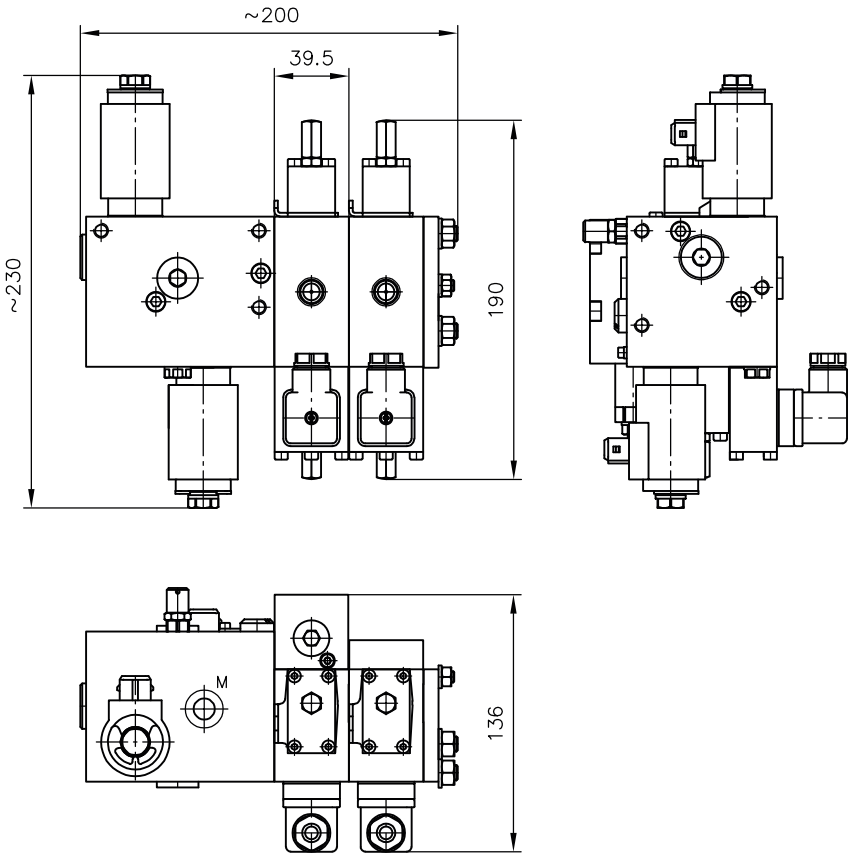
1 Lifting
2 Tilt
3 Addition 1
4 Addition 2

Counterbalance forklift with combustion engine and variable pump

HMPV 4 S 1 /PVPV /250 -2	-A 2 L 10/10 /E /2 AL -8 -C 110 -A 2 L 25/25 /E /2 -E0 -AMP 24 K 4



1 Lifting
2 Tilt
3 Addition 1


~200
39.5
~230
190
M
136

References

Additional versions

- Proportional directional spool valve type PSL, PSV size 2 and EDL: D 7700-2
- Proportional directional spool valves types PSL/PSV/PSM, size 3: D 7700-3

HAWE Hydraulik SE
Einsteinring 17 | 85609 Aschheim/Munich | P.O. Box 11 55 | 85605 Aschheim | Germany
Phone +49 89 379100-1000 | info@hawe.de | www.hawe.com

hawe.com/contact

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