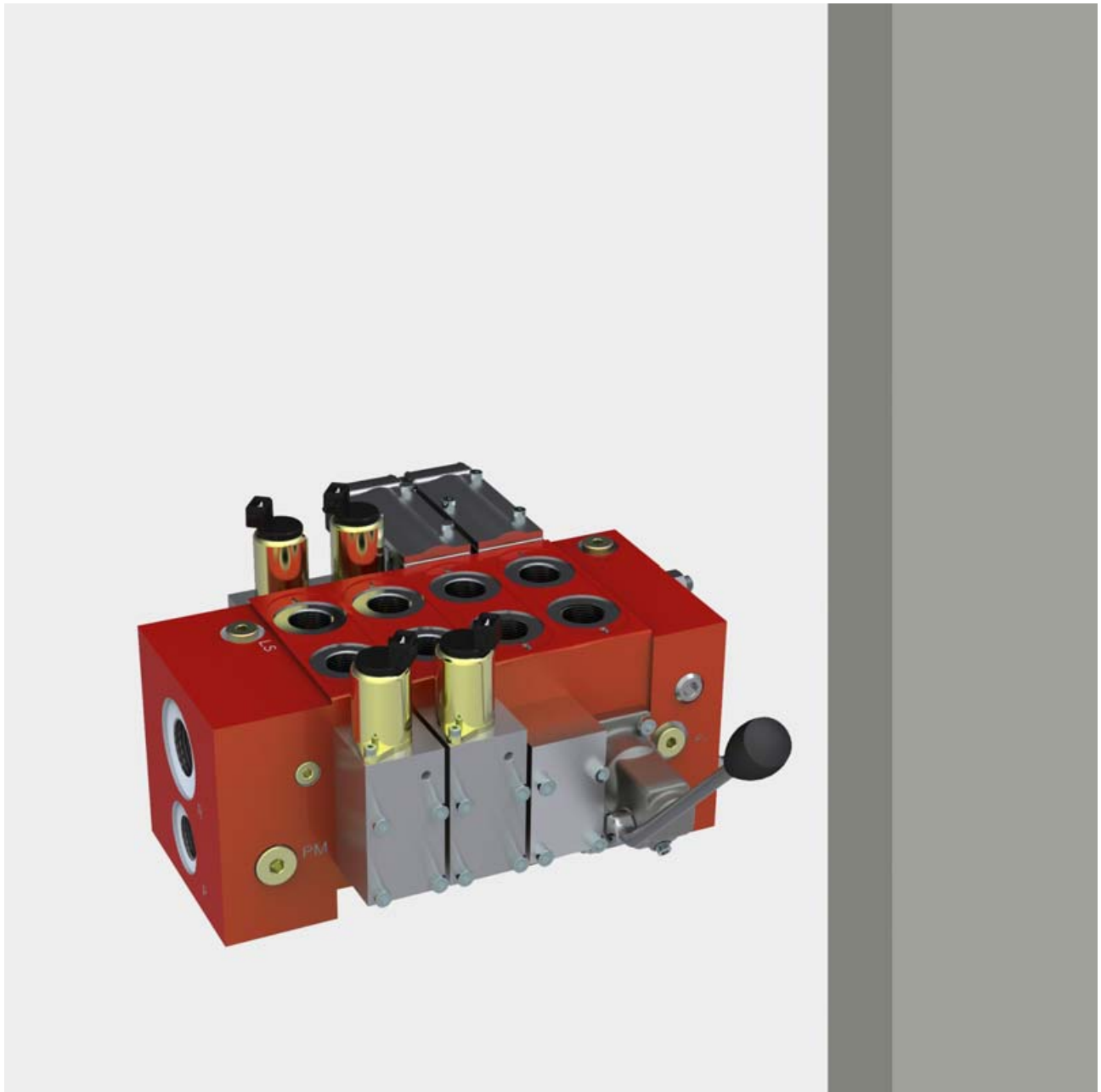


# Proportional Directional Valve System

Series LVS



motion and progress

Reference: 100-P-000089-US-02

# Contents

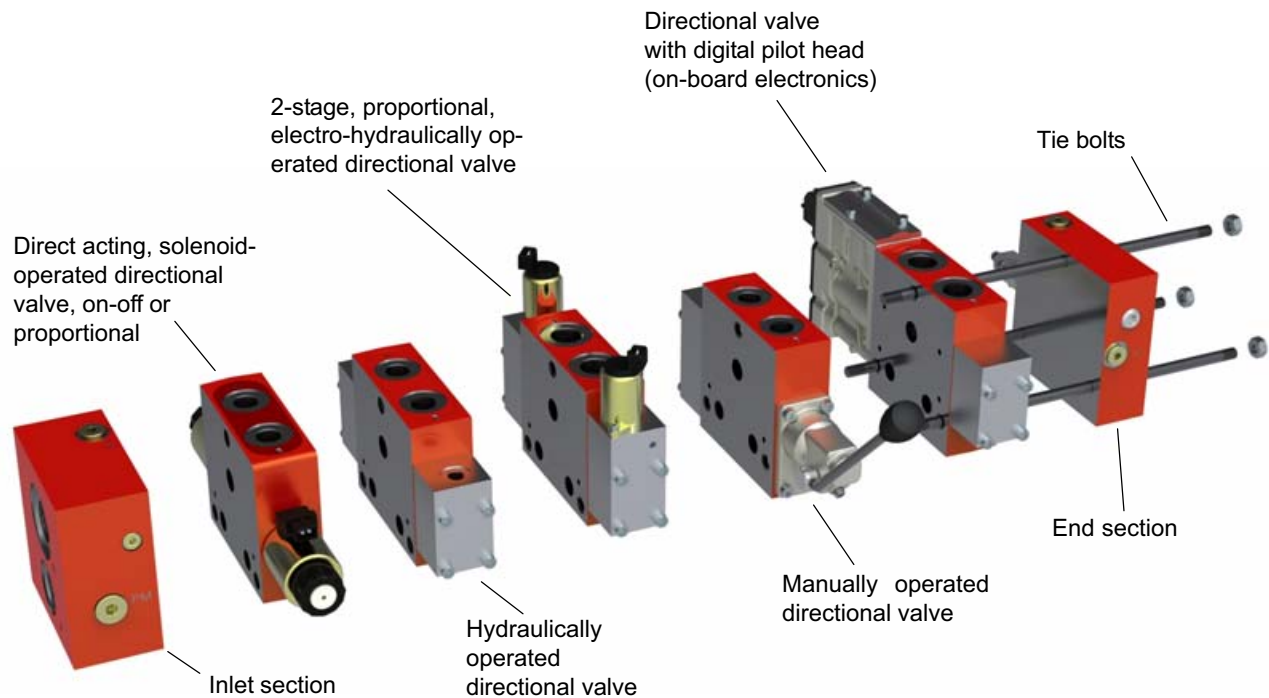
Page

1	General description	3
2	Inlet sections	4
3	Directional valve sections - general information	10
4	Directional sections, LVS08	12
5	Directional sections, LVS12 - operated by hand lever	17
6	Directional sections, LVS12 - hydraulically operated	20
7	Directional sections, LVS12 - two-stage, proportional, electro-hydraulic	23
8	Directional sections, LVS12 - with digital pilot head	27
9	Valve models for the LVS12 directional valve system	31
10	Intermediate sections	33
11	End sections	35
12	Bolt-on plates	37
13	Accessories	40



**IMPORTANT:** All datas in US measures (fluid flow in US GPM). The datas in (..) are SI semanties

# 1 General description



With the LVS hydraulic valve, designers can easily create mobile-machine control systems that, are normally difficult to master. Its systematic design as a family of valve modules offers exceptional adaptability.

All directional sections are designed as load-sensing directional valves with one main bore. The pressure-compensated models are designed as hollow spools with flow-force compensation. The associated, independent individual-section pressure compensators for service ports A and B operate on the principle of proportional flow-sharing. The integral auxiliary functions and high power density make the LVS not only a highly adaptable modular valve, but also a very compact unit.

LVS valve blocks can be configured for both fixed- and variable-displacement pumps.

The basic LVS valve block has 6 control options: hand lever, on/off solenoid, proportional solenoid, hydraulic, proportional electro-hydraulic, and with digital pilot head. With the proportional flow-sharing principle of the LVS directional valves, and in contrast to conventional load-sensing valves, 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.

## 1.1 Pump systems

### 1.1.1 Fixed-displacement pump

The valve block includes a 3-way pressure compensator, directional sections and block termination components. In the neutral position, the 3-way pressure compensator is unloaded to tank and the entire flow being supplied to the valve passes through the 3-way compensator to tank with minimal off-load pressure drop.

When a directional section is operated, the actuator pressure is signalled to the 3-way pressure compensator. The 3-way compensator maintains the  $\Delta p$  at a constant level, so that the flow rate is independent of the load and proportional to the open flow area of the metering orifice in the directional valve.

### 1.1.2 Variable-displacement pump

In systems with a variable-displacement pump (load-sensing control), as well as the normal p-line, the control line is also connected to the pump control. When all directional valves are in the neutral position, the control line is connected to tank and the pump de-strokes. When a directional section is operated, the actuator pressure is signalled to the pump control and the pump goes on-stroke until the defined control  $\Delta p$  is reached.

## 1.2 General technical data

Oil temperature	-13 to 176 °F (-25 °C to 80 °C)
Oil viscosity	for reliable operation, 1750-46 S.U.S. (380-10 cSt); for rated performance, 370-90 S.U.S.(80-20 cSt)
Oil cleanliness	at least 19/16/14 to ISO 4406 or class 9 to NAS 1638
Pressure	LVS08: pump port 3600 PSI (250 bar), actuator ports 4000 PSI (280 bar), tank port 2900 PSI (200 bar) static. LVS12: pump port 5000 (350 bar), actuator ports 5800 PSI (400 bar), tank port 705 PSI (50 bar) static (optional: 200 bar)
Flow rate	$Q_{max.}$ from 1.6-47.5 GPM (6-180 l/min) at max. 175 PSI (12 bar) pressure drop from P port of valve block to LS (maximum allowable pressure drop: 290 PSI (20 bar), theoretical $Q_{max.}$ = 60.7 GPM (232 l/min)
Energy consumption	LVS08: on/off solenoid 6.8 $\Omega$ , 30 W; proportional solenoid 12 VDC / 2.5 A, 24 VDC / 1.25 A at maximum stroke. LVS12 electro-hydraulic: 12 VDC / 1.5 A, 24 VDC / 0.75 A at maximum stroke. Digital pilot head: 0.6 A at 12 Volt, 0,3 at 24 Volt, on/off operation 8 W
On-board voltage	minimum required for on/off solenoids: 10.8 VDC / 21.6 VDC at the coil contact pins
Pressure medium (hydraulic fluid)	recommendation: high-quality fluids with a mineral-oil base, such as HLP oils to DIN 51524 Part 2. For other fluids (e.g. phosphate esters), please consult Bucher Hydraulics
Sections	maximum 10 directional sections per valve block

## 2 Inlet sections



### 2.1 Technical data

	Unit	Value
Inlet pressure	PSI (bar)	max. 5000 (350)
Nominal flow rate / open-centre systems	GPM (l/min)	max. 53 (200)
Nominal flow rate / closed-centre systems	GPM (l/min)	max. 70 (260)
Nominal flow rate, A and B to T	GPM (l/min)	max. 80 (300)

For other values consult Bucher Hydraulics

### 2.2 Functions

#### 2.2.1 LS Unloading

The higher loaded directional valve signals its load pressure to the LS gallery when it is in a working position. In the neutral position, no load is signalled. In the proportional flow-sharing system, all control valves are connected to the same load-sensing pressure. This means that pressure unloading in the neutral position is ensured by a controlled connection to tank [ $Q_{LSmax}$  approx. 0.2 GPM (0.7 l/min)].

#### 2.2.2 $LS_{max}$ pressure relief

The  $LS_{max}$  pressure (pressure relief) at the valve block must be set below the pressure cut-off setting of the pump. Without this pressure-relief function, all activated actuators stop when any actuator reaches its end-stop. If this is not a disadvantage in a system, the  $LS_{max}$  pressure-relief function in the valve block is not required.



**IMPORTANT:** the pressure setting at the LS pump must be higher than  $LS_{max}$  pressure relief by at least the  $LS-\Delta p$  of the pump (see also 3.2.5)

#### 2.2.3 3-way pressure compensator

The 3-way pressure compensator keeps the pressure difference between the pressure and control galleries inside the block at a constant level. The surplus flow passes to tank or to the surplus-flow port.

#### 2.2.4 2-way pressure compensator

The 2-way compensator is a differential-pressure valve. It is situated inside the block, before the pressure gallery. By reducing the inlet pressure to this valve, the control pressure between the pressure and control galleries inside the block is kept at a constant level. If the pressure in the control line

reaches the setting of an upstream pressure-relief valve, the valve shuts off the supply to the block.

### 2.2.5 2-stage pressure relief (only in conjunction with 3-way pressure compensator)

If the pressure in the control line reaches the setting of an upstream pressure-relief valve, the 3-way compensator opens to tank, thus limiting the pressure in the pressure gallery inside the block.

### 2.2.6 External priority function, with “Dynamic Flow” in the LS line

An external actuator always has priority when receiving supply. Only when the external actuator is already being

supplied with the required flow is any surplus flow then fed to the valve block. A defined oil flow runs through the LS line to the priority actuator. This has the effect of shortening the priority function’s reaction time.

### 2.2.7 LS pressure relief in the priority flow

If the pressure in the control line reaches the LS pressure-relief setting, the flow to the priority actuator is reduced until the pressure in the LS line equals the setting of the pressure-relief valve. The flow that is no longer required is now available to other actuators.

### 2.2.8 Pressure control in P

Direct-acting pressure-relief function in the inlet flow in P.

## 2.3 Ordering code

Inlet section	L V S - E - C F * - U 1 1 0 J 1 2 A 0 0 /	Pressure setting in PSI or (bar) P = ... P1 = ... P2 = ... P3 = ...
<b>Functions</b>		<b>Options</b>
No control function, no ports	= CA*	<b>Design stage</b>
No control function / P, R and LS ports	= CAP	<b>Solenoid voltage + sol. connector</b>
LS unloading / P, R and LS ports	= CB*	AMP Junior Timer, 12 V = J12
LS <sub>max</sub> pressure relief <sup>1)</sup> (P1=) / P, R and LS ports	= CC*	AMP Junior Timer, 24 V = J24
LS <sub>max</sub> pressure relief <sup>1)</sup> (P1=) / electrical LS-disable via 2/2 seat valve / de-energised open / P, R and LS ports	= CCL	Not required for models without electrical connections
LS <sub>max</sub> pressure relief <sup>1)</sup> (P1=) / LS unloading / P, R and LS ports	= CE*	<b>Port threads to ISO 11926 (DIN 3852 on request)</b>
LS <sub>max</sub> pressure relief <sup>2)</sup> (P1=) / LS unloading / pressure relief in P (P=) / P, R and LS ports	= CD*	P and R 1 5/16" -12 UNF-2B - 16SAE
3-way compensator / LS unloading / two-stage pressure relief (P1=) / P and R ports	= CF*	LS 9/16" -18 UNF-2B - 16SAE
3-way compensator / LS unloading / two-stage pressure relief (P1=) / reduced off-load pressure (control Δp = 9 bar) / P and R ports	= CFE	Priority flow 9/16" -18 UNF-2B - 16SAE = U110
3-way compensator / LS unloading / two-stage pressure relief (P1=) / electrical LS-disable via 2/2 seat valve / de-energised open / P and R ports	= CFL	Without threaded ports = ****
2-way compensator / flow cut-off (P1=) / LS unloading / P, R and LS ports	= CF2	Dyn. LS <sub>max</sub> pr. relief in prio. flow <sup>2)</sup> (P2=) / LS <sub>max</sub> pr. relief in surplus flow (P3=) / external prio. function / LS unloading / P, PL, R, LS and LSL ports = CG*
		3-way compensator / 2-stage pressure relief (P1=) / mechanical switchover, OC - CC / LS unloading / P, R and LS ports = CH*
		3-way compensator / 2-stage pressure relief (P1=) / mechanical switchover, OC - CC / LS unloading / reduced off-load pressure [(control Δp = 130 PSI (9 bar))] / P, R and LS ports = CHE

P = pressure setting for the pressure relief in the P inlet

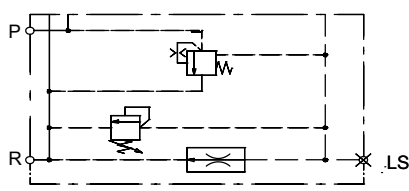
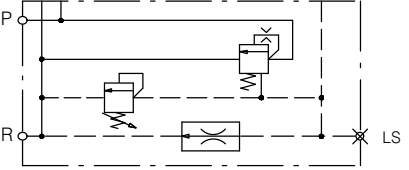
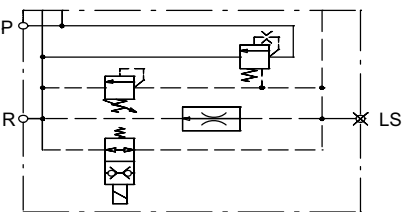
P1 = pressure setting for the LS max pressure relief (inlet pressure = P1+Δp)

<sup>1)</sup> fixed pressure settings in bar available for the pressure-relief function (measured at 10 l/min test flow) 25, 32, 40, 50, 63, 80, 100, 125, 140, 160, 175, 190, 210, 230, 250, 280, 300, 330, 350 (for other pressures, consult Bucher Hydraulics) <sup>2)</sup> adjustable pressure


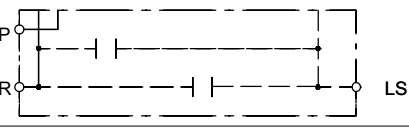
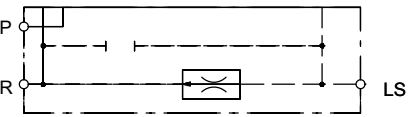
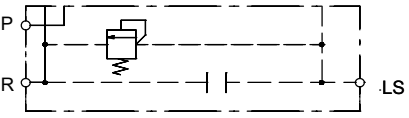
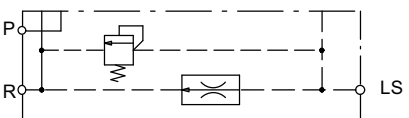
P2 = pressure setting for the pressure relief in the priority flow

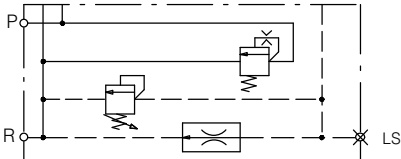
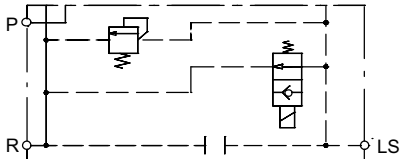
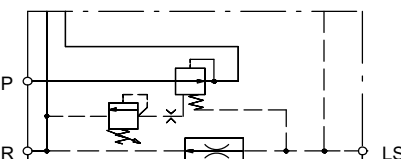
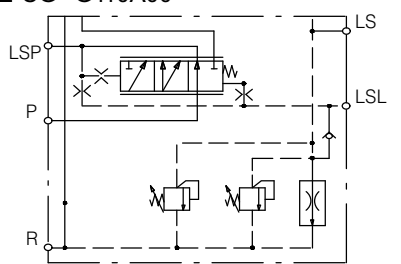
P3 = pressure setting for the pressure relief in the surplus flow

## 2.4 Inlet sections for systems with fixed-displacement pump (open centre)

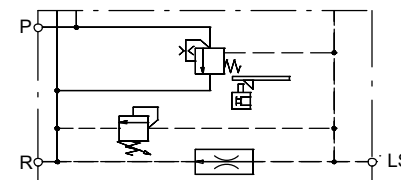
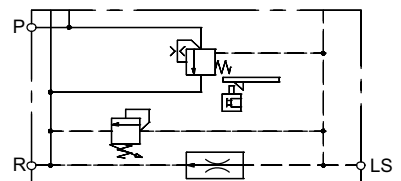
Model code and symbol	Description
LVS-E-CF*-G110A00 	<ul style="list-style-type: none"> <li>- 3-way compensator</li> <li>- two-stage pressure relief (P1 = ...)</li> <li>- LS unloading</li> <li>- control <math>\Delta p = 175</math> PSI (12 bar)</li> <li>- threaded ports for P and R (1 <math>\frac{5}{16}</math>" -12 UNF-2B - 16 SAE)</li> </ul> Specify pressure setting in bar at the end of the ordering code (P1 = inlet pressure + $\Delta p$ )
LVS-E-CFE-G110A00 	<ul style="list-style-type: none"> <li>- 3-way compensator</li> <li>- two-stage pressure relief (P1 = ...)</li> <li>- LS unloading</li> <li>- reduced off-load pressure (control <math>\Delta p = 130</math>PSI (9 bar))</li> <li>- threaded ports for P and R (1 <math>\frac{5}{16}</math>" -12 UNF-2B - 16 SAE)</li> </ul> Specify pressure setting in bar at the end of the ordering code (P1 = inlet pressure + $\Delta p$ )
LVS-E-CFL-G110J..A00 	<ul style="list-style-type: none"> <li>- 3-way compensator</li> <li>- two-stage pressure relief (P1 = ...)</li> <li>- LS unloading</li> <li>- control <math>\Delta p = 175</math> PSI (12 bar)</li> <li>- electrical LS-disable via 2/2 seat valve, de-energised open</li> <li>- threaded ports for P and R (1 <math>\frac{5}{16}</math>" -12 UNF-2B - 16 SAE)</li> </ul> Specify pressure setting in bar at the end of the ordering code

## 2.5 Inlet sections for systems with load-sensing pump (closed centre) and block combinations

Model code and symbol	Description
LVS-E-CA*-****A00 	<ul style="list-style-type: none"> <li>- no control function</li> <li>- no ports</li> </ul>
LVS-E-CAP-G110A00 	<ul style="list-style-type: none"> <li>- no control function</li> <li>- threaded ports for P and R (1 <math>\frac{5}{16}</math>" -12 UNF-2B - 16 SAE), LS (<math>\frac{9}{16}</math>" -18 UNF-2B - 16 SAE)</li> </ul>
LVS-E-CB*-G110A00 	<ul style="list-style-type: none"> <li>- LS unloading</li> <li>- threaded ports for P and R (1 <math>\frac{5}{16}</math>" -12 UNF-2B - 16 SAE), LS (<math>\frac{9}{16}</math>" -18 UNF-2B - 16 SAE)</li> </ul>
LVS-E-CC*-G110A00 	<ul style="list-style-type: none"> <li>- LS<sub>max</sub> pressure relief, fixed setting</li> <li>- threaded ports for P and R (1 <math>\frac{5}{16}</math>" -12 UNF-2B - 16 SAE), LS (<math>\frac{9}{16}</math>" -18 UNF-2B - 16 SAE)</li> </ul> Specify pressure setting in bar at the end of the ordering code
LVS-E-CE*-G110A00 	<ul style="list-style-type: none"> <li>- LS<sub>max</sub> pressure relief (P1 = ...), fixed setting</li> <li>- LS unloading</li> <li>- threaded ports for P and R (1 <math>\frac{5}{16}</math>" -12 UNF-2B - 16 SAE), LS (<math>\frac{9}{16}</math>" -18 UNF-2B - 16 SAE)</li> </ul> Specify pressure setting in bar at the end of the ordering code

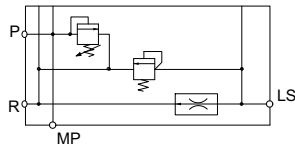
<p><b>LVS-E-CD*-G110A00</b></p> 	<ul style="list-style-type: none"> <li>- pressure relief in P (P = ...)</li> <li>- LS<sub>max</sub> pressure relief (P1 = ...), adjustable</li> <li>- LS unloading</li> <li>- threaded ports for P and R (1 5/16" -12 UNF-2B - 16 SAE), LS ( 9/16" -18 UNF-2B - 16 SAE)</li> </ul> <p>Specify pressure setting in bar at the end of the ordering code</p>
<p><b>LVS-E-CCL-G110J..A00</b></p> 	<ul style="list-style-type: none"> <li>- LS<sub>max</sub> pressure relief (P1 = ...), fixed setting</li> <li>- electrical LS-disable via 2/2 seat valve, de-energised open</li> <li>- threaded ports for P and R (1 5/16" -12 UNF-2B - 16 SAE), LS ( 9/16" -18 UNF-2B - 16 SAE)</li> </ul> <p>Specify pressure setting in bar at the end of the ordering code</p>
<p><b>LVS-E-CF2-G110A00</b></p> 	<ul style="list-style-type: none"> <li>- 2-way compensator</li> <li>- flow cut-off</li> <li>- LS unloading</li> <li>- control Δp = 175 PSI (12 bar)</li> <li>- threaded ports for P and R (1 5/16" -12 UNF-2B - 16 SAE), LS ( 9/16" -18 UNF-2B - 16 SAE)</li> </ul>
<p><b>LVS-E-CG*-G110A00</b></p> 	<ul style="list-style-type: none"> <li>- external priority function</li> <li>- dynamic LS<sub>max</sub> pressure relief in the priority flow (P2 = ...)</li> <li>- LS<sub>max</sub> pressure relief in the surplus flow (P3 = ...), adjustable</li> <li>- LS unloading</li> <li>- control Δp = 200 PSI (14 bar)</li> <li>- threaded ports for P and R (1 5/16" -12 UNF-2B - 16 SAE), LS, LSL, and LSP ( 9/16" -18 UNF-2B - 16 SAE)</li> </ul> <p>Specify pressure setting in bar at the end of the ordering code</p>

## 2.6 Inlet sections with switchover for systems with LS or fixed-displacement pumps

Model code and symbol	Description
<p><b>LVS-E-CH*-G...***</b></p> 	<ul style="list-style-type: none"> <li>- 3-way compensator</li> <li>- two-stage pressure relief (P1 = ...)</li> <li>- LS unloading</li> <li>- control Δp = 175 PSI (12 bar)</li> <li>- mechanical switchover, open centre - closed centre</li> <li>- threaded ports for P and R (1 5/16" -12 UNF-2B - 16 SAE), LS ( 9/16" -18 UNF-2B - 16 SAE)</li> </ul> <p>Specify pressure setting in bar at the end of the ordering code</p>
<p><b>LVS-E-CHE-G...***</b></p> 	<ul style="list-style-type: none"> <li>- 3-way compensator</li> <li>- two-stage pressure relief (P1 = ...)</li> <li>- LS unloading</li> <li>- mechanical switchover, open centre - closed centre</li> <li>- reduced off-load pressure [control Δp = 130 PSI (9 bar)]</li> <li>- threaded ports for P and R (1 5/16" -12 UNF-2B - 16 SAE), LS ( 9/16" -18 UNF-2B - 16 SAE)</li> </ul> <p>Specify pressure setting in bar at the end of the ordering code</p>

## 2.7 Options

Model code	Description
LVS-E-C...-....01	- LS <sub>max</sub> pressure relief, adjustable
LVS-E...-....02	- threaded ports for external pilot pressure
LVS-E-C.*-....19	- measuring threaded ports, M16 x 1,5 for system pressure (P inlet)
LVS-E-C.*-....20	- measuring threaded ports, M16 x 1,5 for system pressure (P inlet) - threaded ports for P and T on the top, like A and B of the directional control valve
LVS-E-C...-....22	- pressure relief valve for inlet pressure
LVS-E-CE*-....29	- threaded ports for P and T on the top, like A and B of the directional control valve
LVS-E-CE*-....30	- LS <sub>max</sub> pressure relief, adjustable - threaded ports for P and T on the top, like A and B of the directional control valve



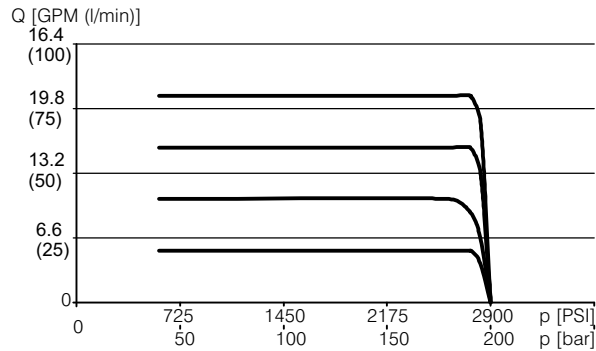
## 2.8 Performance graphs

### 2.8.1 Priority valve

residual flow to internal actuators

Q = priority flow

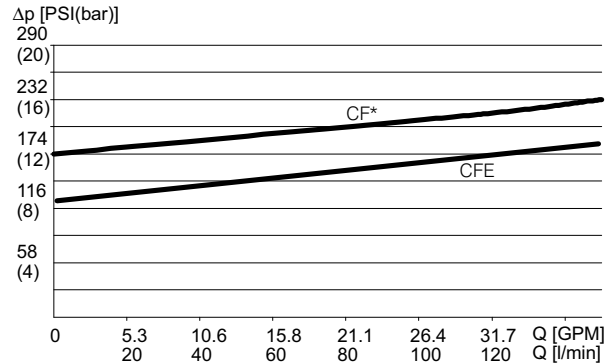
p = load pressure at priority actuator



### 2.8.2 Control curve for the 3-way compensator in the inlet plate

Q = flow rate through the block

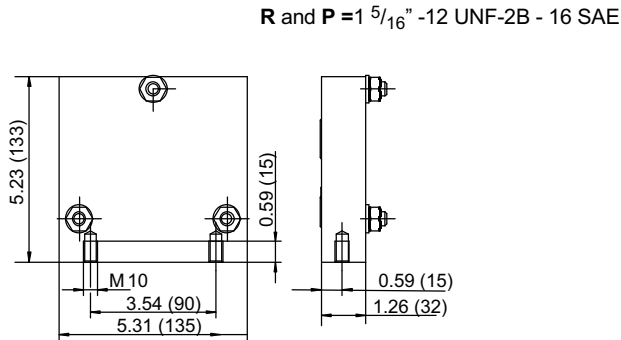
$\Delta p$  = pressure drop from P to LS



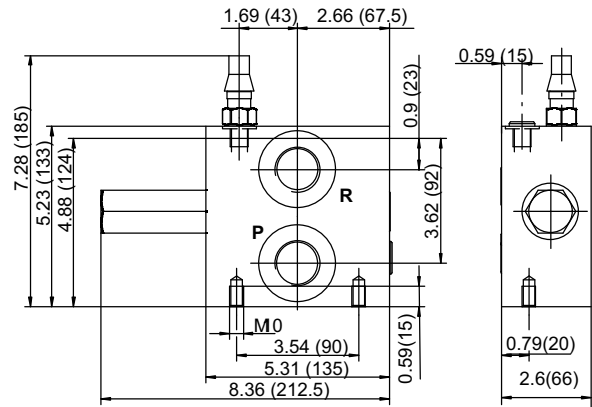


## 2.9 Dimensions / in (mm)

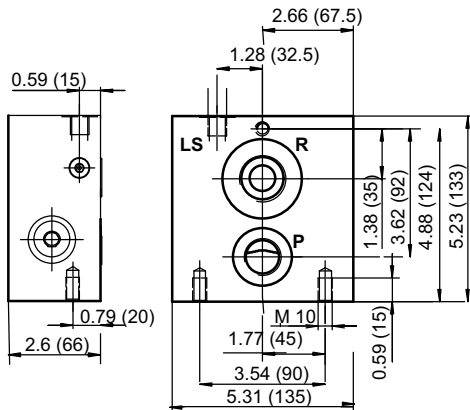
LVS-E-CA\*-\*\*\*00



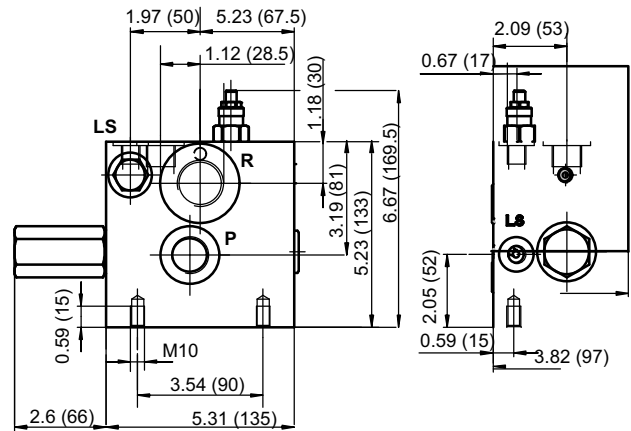
LVS-E-CF\*-G110A00



LVS-E-CE\*-G..\*\*\*



LVS-E-CG\*-G..\*\*\*



R and P =  $1 \frac{5}{16}$ " -12 UNF-2B - 16 SAE, LS =  $\frac{9}{16}$ " -18 UNF-2B - 16 SAE

### 3 Directional valve sections - general information

The LVS modular valve system includes the nominal sizes 08 and 12. The valve bodies are the same size and can be directly combined with each other.

#### 3.1 Technical data

	LVS08	LVS12
Control types		
- direct acting on/off solenoid	X	-
- direct acting proportional solenoid	X	-
- hand lever operated	-	X
- hydraulically operated	-	X
- two-stage, proportional, electro-hydraulically operated	-	X
- digital pilot head with On Board Electronics	-	X
Nominal flow rate in GPM (l/min)	13.2 (50)	47.5 (180)
Maximum inlet pressure in PSI (bar)	3600 (250)	5000 (350) *
Maximum pressure at the actuator ports A and B in PSI (bar)	4000 (280)	5800 (400) *
Option		
- 2 proportional flow-control functions for A and B		X
- downstream compensator	X	X
- anti-shock and make-up function	X	X
- electrically operated seat valves (integral)	X	-
- manual override by pin	X	X
- manual override by hand lever	X	X
- spool-stroke limiter	-	X
- port for external control pressure	-	X
- bolt-on plate with seat valves	X	X
- bolt-on plate with load-control valves	X	X

\* For inlet pressure < 4350 PSI (300 bar) and actuator pressure < 4640 PSI (320 bar) contact Bucher Hydraulics

#### 3.2 Functions

##### 3.2.1 Directional function

3-way valves have only one actuator port. 4-way valves are designed for double-acting actuators.

Spool types 6A(5) and 6D(5) are designed to supply 2 motor drives.

In spool type 6A(4), the spool is divided in two parts. The supply and return flows act on one actuator. The load pressure can be defined by means of the opening ratio.

##### 3.2.2 Two independent 3/2 prop. directional valves

By dividing the control spool [6A(5)], 2 motor drives can be implemented in parallel, and independently of one another, in one valve body.

##### 3.2.3 Load-independent operation

When several valves are operated simultaneously, the highest actuator pressure is signalled to the 3-way pressure compensator or to the pump control. The control pressure-difference of the system pressure control (3-way pressure compensator, variable-delivery pump) acts directly on the most highly loaded actuator and ensures load-independent control. The lower loaded actuators can be made load-independent by using individual section compensators.

##### 3.2.4 LS-max pressure relief

If no oil flows out from an actuator port although the valve is in an operated position (ex. cylinder at end-stop), the P pressure is signalled in the LS ring circuit behind all compensators. The compensators in the individual functions would now also close due to their spring forces, and all actuators would remain stationary.

To prevent this from happening, the LS<sub>max</sub> pressure is limited by a pressure-relief function. The discharge of LS flow reduces the pressure before the LS ring circuit, which results in the planned  $\Delta p$  being kept constant. The actuators in the system now operate without any malfunction.

##### 3.2.5 Downstream compensator

When a valve system that is designed to the proportional flow-sharing principle is receiving sufficient pump flow and has adequately-sized supply lines, it functions like a system with upstream compensators.

For the most highly loaded actuator, the pressure drop across the spool orifice is determined by the system pressure control (pump controller or system pressure compensator). On the individual compensators of the other actuators, the highest system load is reproduced behind the spool metering orifice and thus the system pressure control also applies to these actuators, and the pressure compen-

sators counteract the effects of the different load pressures on each section.

If the flow demand is more than the pump can supply, the pump pressure simply falls. With the principle of proportional flow-sharing, the flow rate to all actuators is reduced.

### 3.2.6 Anti-shock and make-up function

The anti-shock valves protect actuators from unacceptably large pressure peaks when the actuator is operated or when external forces act on the actuator. The make-up (anti-cavitation) function supplies oil to the actuator when the tank pressure is higher than the actuator pressure.

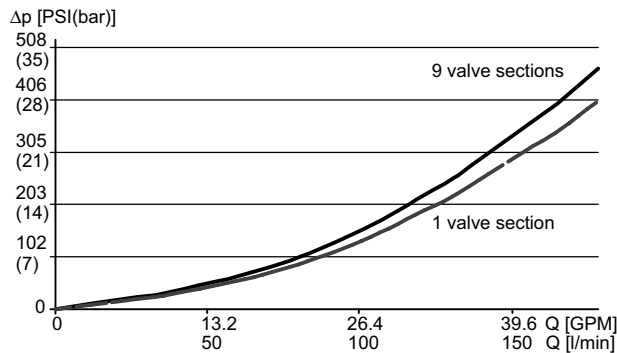
### 3.2.7 Load sensing

By means of the load sensing system, the highest prevailing actuator pressure is signalled to all proportional flow-sharing valves.

## 3.3 Performance graphs

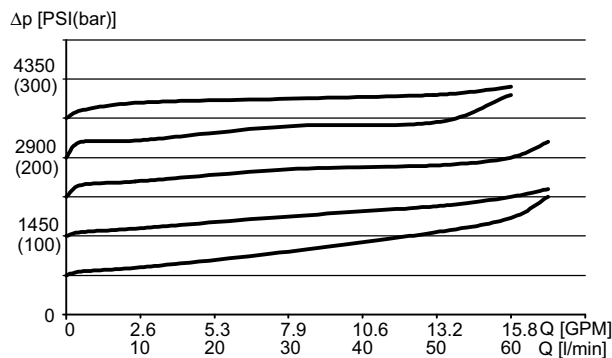
### 3.3.1 Pressure drop with individual operation

Measured with spool type O = 47.5 GPM (180 l/min)  
 Q = flow rate from block inlet to actuator  
 $\Delta p$  = pressure difference from block inlet to actuator



### 3.3.2 Anti-shock valve

Q = flow rate from actuator to tank  
 $\Delta p$  = pressure difference from actuator to tank



For flow rates < 15.8 GPM (60 l/min) contact Bucher Hydraulics

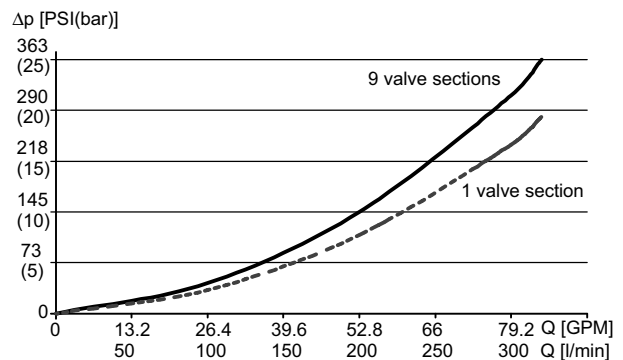
### 3.2.8 Conversion factors

For a given spool position, the flow rate at the actuator ports can be changed by altering the LS  $\Delta p$  setting at the compensator or pump controller. The corresponding conversion factors are shown in the table below.

LS $\Delta p$	Conversion factor
85 PSI (6 bar)	0.7
115 PSI (8 bar)	0.8
145 PSI (10 bar)	0.9
175 PSI (12 bar)	1.0
200 PSI (14 bar)	1.05
230 PSI (16 bar)	1.15
260 PSI (18 bar)	1.25
290 PSI (20 bar)	1.30

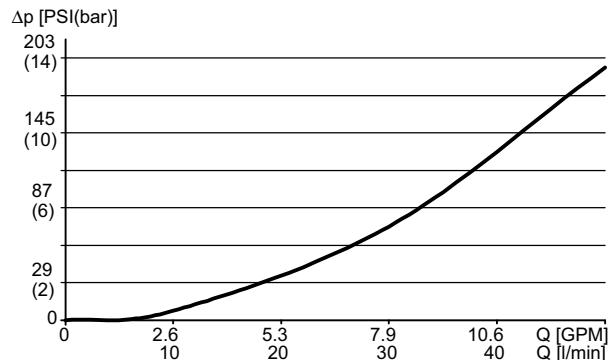
### 3.3.3 Pressure drop with individual operation

Measured with spool type O = 47.5 GPM (180 l/min)  
 Q = flow rate from actuator to tank  
 $\Delta p$  = pressure difference from actuator to tank



### 3.3.4 Make-up valve

Q = flow rate from tank to actuator  
 $\Delta p$  = pressure difference from tank to actuator



## 4 Directional sections, LVS08



### 4.1 Ordering code

**L V S 0 8 D D 4 A 5 A J 4 1 A 0 0 B - M M**

<b>Dir. valve section</b>			
<b>Size</b>	= 08		
<b>Flow rate</b>			
Actuator port	A	B	
1.6 GPM (6 l/min)	= A	= A	
2.6 GPM (10 l/min)	= B	= B	
4.2 GPM (16 l/min)	= C	= C	
6.6 GPM (25 l/min)	= D	= D	
8.5 GPM (32 l/min)	= E	= E	
10.6 GPM (40 l/min)	= F	= F	
13.2 GPM (50 l/min)	= P	= P	
With 3-way function	= *		
<b>Spool function</b>			
3-way function	= 3		
4-way function	= 4		
<b>Spool type</b>	= A, D, F, J		
Symbols and combinations, see section. 4.6			
<b>Compensator</b>			
in actuator port B (only with LVS08..3)	= 4		
in actuator ports A + B	= 5		
<b>Pilot head</b>			
On/off solenoid 12V	= A		
On/off solenoid 24V	= B		
Proportional solenoid 12V	= C		
Proportional solenoid 24V	= D		
<b>Plug type</b>			
AMP Junior Timer	= J		
Deutsch DT04-2P-EP04	= T		
<b>Options</b>			
<b>Design stage</b>			
<b>Pressure setting</b> in PSI (bar)			
P <sub>A</sub> =	....		
P <sub>B</sub> =	....		
<b>Anti-shock and make-up function</b>			
Actuator A = pos. 1, B = pos. 2	[A, B]		
Without =	*		
Make-up valve	= C		
Anti-shock and make-up valve			
- adjustable, 1000-3300 PSI (70-230 bar)	= A		
- adjustable, 2150-5500 PSI (150-380 bar)	= B		
- Fixed setting (values in bar)			
25 = D 32 = E 40 = F 50 = G 63 = H			
80 = I 100 = K 125 = L 140 = M 160 = N			
175 = O 190 = P 210 = Q 230 = R 250 = S			
280 = T 300 = U 330 = V 350 = W 380 = X			
400 = Y 420 = Z Cavity prepared = #			
<b>Seat valves, solenoid operated</b>			
Plug type AMP			
Q <sub>max</sub> 5.3 GPM (20 l/min), de-energised closed			
- double-acting seat valve in B	= J5		
- dbl.-acting seat valve in A+B	= J6		
Q <sub>max</sub> 13.2 GPM (50 l/min), de-energised closed			
- single-acting seat valve in B	= J3		
- sgl.-acting seat valve in A+B	= J4		
- double-acting seat valve in B	= J7		
- dbl.-acting seat valve in A+B	= J8		
<b>Manual override, etc.</b>			
Override pin (standard)	= A		
<b>Port threads to ISO 11926 (DIN 3852 on request)</b>			
Actuator ports A and B, 7/8"-14UNF-2B-16SAE	= 41		
Prepared for bolt-on plate	= 00		

### 4.2 Accessories

Description	Ordering code	Data sheet
Plug for AMP Junior Timer with 2 metres of cable	100152575	-
Plug kit for AMP Junior Timer for DIY installation	100152579	-
Plug for Deutsch DT04-2P-EP04 with 2 metres of cable	100153209	-
Electrical joystick (demand-signal source)	FGE	100-P-700051
Electronic controller for 1 axis + 1 on/off solenoid	ELSK107	100-P-700033
Electronic controller for 2 axes	ELSK208	100-P-700001

### 4.3 Technical data

	Unit	On-off solenoid	Proportional solenoid
Maximum flow rate	GPM (l/min)	13.2 (50)	
Maximum inlet pressure	PSI (bar)	3600 (250)	
Maximum pressure at the actuator ports	PSI (bar)	4000 (280)	
Spool increments by actuator flow rates at 175 PSI (12 bar) $\Delta p$	GPM (l/min)	1.6 (6), 2.6 (10), 4.2 (16), 6.6 (25), 8.5 (32), 10.6 (40), 13 (50)	
Power consumption	W	30	max. 30 at 2.5 A + 12 V max. 30 at 1.25 A + 24 V
Current	A		0.8 - 2.5 at 12 V 0.4 - 1.25 at 24 V
Duty cycle	%	100% at 2.5 A + 12 V or 1.25 A + 24 V	
Protection class		IP65 (DIN 40050)	
Standard configuration	<ul style="list-style-type: none"> <li>- compensator for actuator ports A + B, and A or B</li> <li>- override pin</li> </ul>		
Options	<ul style="list-style-type: none"> <li>- anti-shock and make-up function for actuator ports A + B or B only, adjustable or fixed setting (cannot be combined with seat valves)</li> <li>- electrically oper. single-acting seat valves in A + B, or B only</li> <li>- electrically op. double-acting seat valves in A + B, or B only</li> </ul>		

### 4.4 Pilot heads and override

A / B



On/off solenoid with override pin

C / D

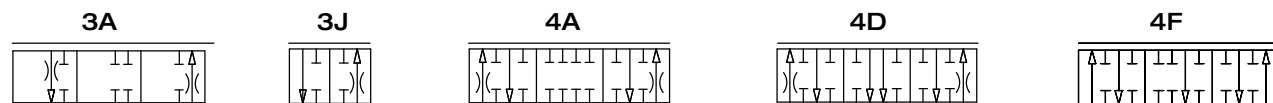


Proportional solenoid with override pin and starting point adjustment

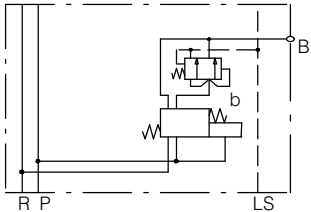

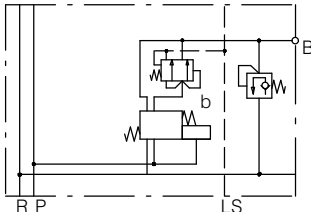

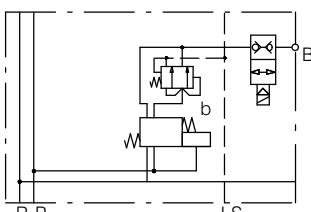

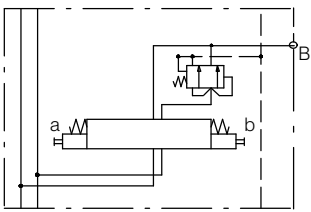
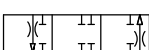
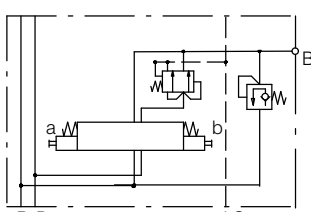
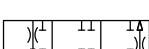
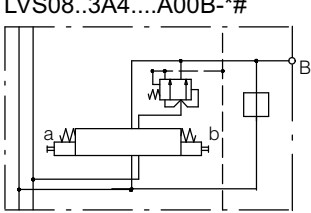

### 4.5 Solenoid connector types

AMP Junior Timer	Deutsch plug DT04-2P-EP04

### 4.6 Spool types and functions



## 4.7 Valve models, LVS08

Basic module	Spool type	Control type	Description	Bolt-on plate option with code 00
LVS08..3J4.... 	<b>3J</b> 	On/off solenoid Proportional solenoid	Compensator for actuator port B	Seat valve in B
LVS08..3J4....A00B-*. 	<b>3J</b> 	On/off solenoid Proportional solenoid	Compensator for actuator port B. Anti-shock and/or make-up valve for actuator port B, fixed setting or adjustable	Seat valve in B
LVS08..3J4....A00B-J. 	<b>3J</b> 	On/off solenoid Proportional solenoid	Compensator for actuator port B. Electrically operated seat valve for actuator port B. As single- or double-acting seat valve	
LVS08..3A4....A00B 	<b>3A</b> 	On/off solenoid Proportional solenoid	Compensator for actuator port B	Seat valve in B or Load-control valve in B
LVS08..3A4....A00B-*. 	<b>3A</b> 	On/off solenoid Proportional solenoid	Compensator for actuator port B. Anti-shock and/or make-up valve for actuator port B, fixed setting or adjustable	Seat valve in B
LVS08..3A4....A00B-# 	<b>3A</b> 	On/off solenoid Proportional solenoid	Compensator for actuator port B. Cavity prepared and plugged, for anti-shock and/or make-up valve	Seat valve in B

<p>LVS08..3A4....A00B-J.</p>	<p>3A </p>	<p>On/off solenoid Proportional solenoid</p>	<p>Compensator for actuator port B. Electrically operated seat valve for actuator port B, as single- or double-acting seat valve</p>	
<p>LVS08..4.5....A00B</p>	<p>4A  4D  4F </p>	<p>On/off solenoid Proportional solenoid</p>	<p>Compensator for actuator ports A and B</p>	<p>Seat valve or Load-control valve in A and B, or B only</p>
<p>LVS08..4.5....A00B-*</p>	<p>4A  4D  4F </p>	<p>On/off solenoid Proportional solenoid</p>	<p>Compensator for actuator ports A + B. Anti-shock and/or make-up valve for actuator port B, fixed setting or adjustable</p>	<p>Seat valve or Load-control valve in A and B, or B only</p>
<p>LVS08..4.5....A00B-..</p>	<p>4A  4D  4F </p>	<p>On/off solenoid Proportional solenoid</p>	<p>Compensator for actuator ports A + B. Anti-shock and/or make-up valve for actuator ports A + B, fixed setting or adjustable</p>	<p>Seat valve or Load-control valve in A and B, or B only</p>
<p>LVS08..4.5....A00B-##</p>	<p>4A  4D  4F </p>	<p>On/off solenoid Proportional solenoid</p>	<p>Compensator for actuator ports A + B. Cavity prepared and plugged, for anti-shock and/or make-up valves</p>	<p>Seat valve or Load-control valve in A and B, or B only</p>
<p>LVS08..4.5....A00B-J.</p>	<p>4A  4D  4F </p>	<p>On/off solenoid Proportional solenoid</p>	<p>Compensator for actuator ports A + B. Electrically operated seat valve for actuator port B, as single- or double-acting seat valve</p>	
<p>LVS08..4.5....A00B-J.</p>	<p>4A  4D  4F </p>	<p>On/off solenoid Proportional solenoid</p>	<p>Compensator for actuator ports A + B. Electrically operated seat valve for actuator ports A + B, as single- or double-acting seat valve</p>	

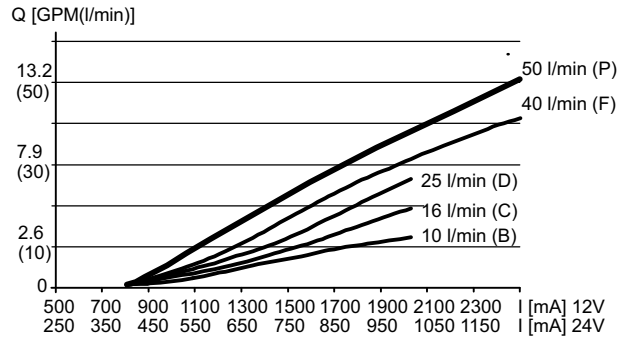
## 4.8 Performance graphs

### 4.8.1 Control characteristics

Valve with proportional solenoid and 175 PSI (12 bar) pressure drop at the orifice

Q = flow rate at the actuator outlet port

I = current at the proportional solenoids

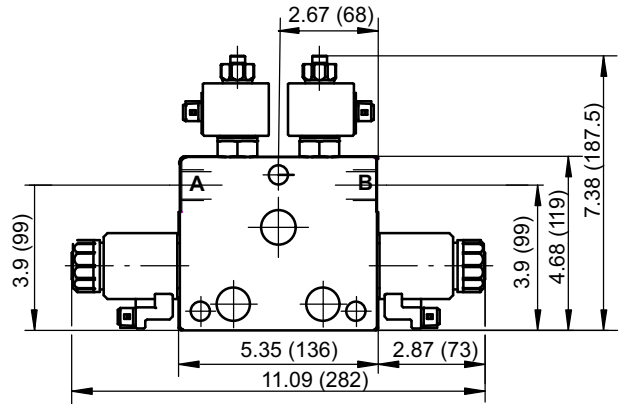
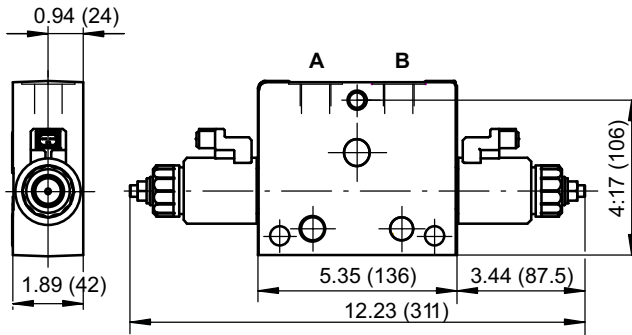


## 4.9 Dimensions / in (mm)

LVS08.....J21A00B

LVS08.....J21A00B-J4

A and B = 7/8"-14UNF-2B-16SAE





## 5 Directional sections, LVS12 - hand lever operated



### 5.1 Ordering code

	L	V	S	1	2	K	K	4	A	5	M	R	4	2	*	0	0	B	-	M	M	
<b>Directional valve</b>																						
<b>Size</b>	= 12																					
<b>Flow rate</b>																						
Actuator port											A											B
4.2 GPM (16 l/min)											= C											= C
6.6 GPM (25 l/min)											= D											= D
10.6 GPM (40 l/min)											= F											= F
13 GPM (50 l/min)											= P											= P
16.6 GPM (63 l/min)											= G											= G
21.1 GPM (80 l/min)											= H											= H
26.4 GPM (100 l/min)											= K											= K
33 GPM (125 l/min)											= L											= L
39.6 GPM (150 l/min)											= M											= M
47.5 GPM (180 l/min)											= O											= O
With 3-way function											= *											
<b>Spool function</b>																						
3-way function	= 3																					
4-way function	= 4																					
3-way function (x2)	= 6																					
<b>Spool type</b>	= A, D, J																					
Symbols and combinations, see section 5.4																						
<b>Compensator</b>																						
for actuator ports A + B	= 5																					
for actuator port A (only in conjunction with 3A)	= 8																					
for actuator port B (only in conjunction with 3J)	= 4																					
<b>Pilot head</b>																						
Hand lever	= M																					
<b>Options (see 9.1)</b>																						
<b>Design stage</b>																						
<b>Pressure setting</b> in PSI (bar) P <sub>A</sub> = .... P <sub>B</sub> = ....																						
<b>Anti-shock and make-up function</b>																						
Actuator A = pos. 1, B = pos. 2	[A, B]																					
Without = *																						
Make-up valve	= C																					
Anti-shock and make-up valve																						
- adjustable, 1000-3300 PSI (70-230 bar)	= A																					
- adjustable, 2150-5500 PSI (150-380 bar)	= B																					
- fixed setting (values in bar)																						
25 = D 32 = E 40 = F 50 = G 63 = H																						
80 = I 100 = K 125 = L 140 = M 160 = N																						
175 = O 190 = P 210 = Q 230 = R 250 = S																						
280 = T 300 = U 330 = V 350 = W 380 = X																						
400 = Y 420 = Z Cavity prepared = #																						
<b>Manual override, etc.</b>																						
Spool-stroke limiter feature	= F																					
Without	= *																					
not in combination with Detented																						
<b>Port threads to ISO 11926 (DIN 3852 on request)</b>																						
Actuator ports A + B, 1 1/16"-12UNF-2B-16SAE	= 42																					
Prepared for bolt-on plate	= 00																					
<b>Detent type</b>																						
Detented position in B	= B																					
Detented positions in A + B	= R																					
Friction detent for A + B	= D																					
Spring return (standard)	= *																					

## 5.2 Technical data

	Unit	LVS12 - hand lever operated
Maximum flow rate	GPM (l/min)	47.5 (180)
Maximum inlet pressure	PSI (bar)	5000 (350) *
Maximum pressure at the actuator ports	PSI (bar)	5800 (400) *
Spool increments by actuator flow rates at 175 PSI (12 bar) $\Delta p$	GPM (l/min)	4.2 (16) = C, 6.6 (25) = D, 10.6 (40) = F, 13.2 (50) = P, 16.6 (63) = G, 21.1 (80) = H, 26.4 (100) = K, 33 (125) = L, 39.6 (150) = M, 47.5 (180) = O
Operating force on hand lever	Nm	38
Standard configuration	- compensator for actuator port A and/or B	
Options	<ul style="list-style-type: none"> <li>- anti-shock and make-up function for actuator ports A and B or B only, adjustable or fixed setting</li> <li>- spool-stroke limiter feature</li> <li>- detent or friction detent</li> </ul>	

\* For inlet pressure < 4350 PSI (300 bar) and actuator pressure < 4640 PSI (320 bar) contact Bucher Hydraulics

## 5.3 Pilot heads and override



Hand lever

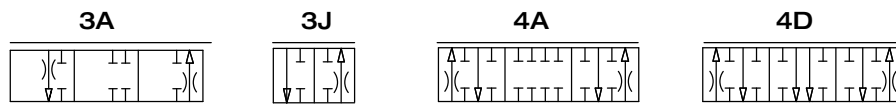


Standard end cover plate



End cover plate with spool-stroke limiter

## 5.4 Spool types and functions



## 5.5 Symbols

Basic module	Description
	<ul style="list-style-type: none"> <li>- the flow rate at the actuator outlet ports is varied - up to the predefined maximum flow - by the position of the hand lever</li> <li>- valve models, see section 9</li> </ul>

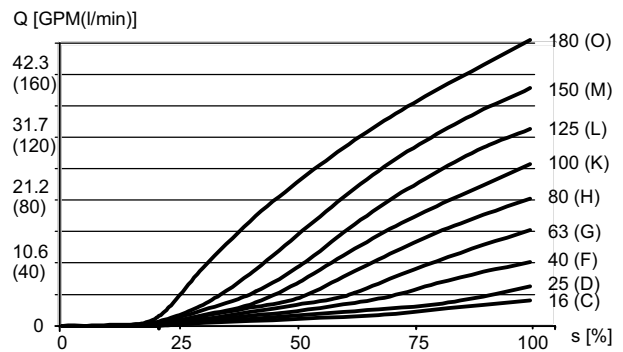
## 5.6 Performance graphs

### 5.6.1 Control characteristics

Hand-lever operated valve with 175 PSI (12 bar) pressure drop at the orifice

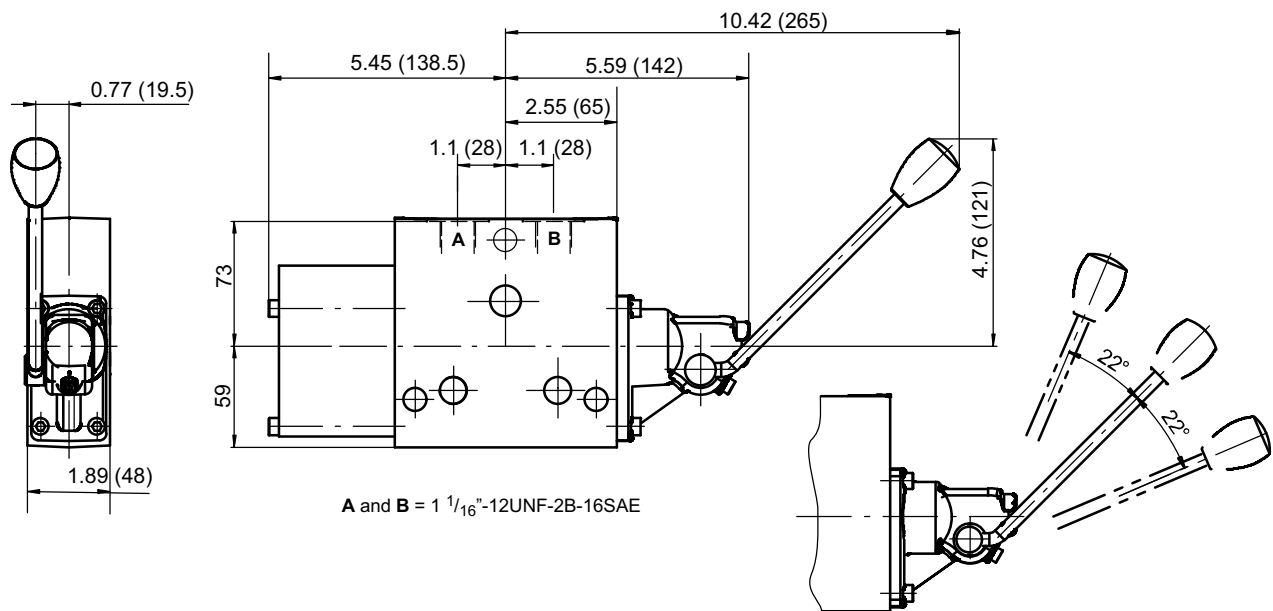
Q = flow rate at the actuator outlet port

s [%] = hand-lever way



## 5.7 Dimensions / in (mm)

LVS12.....M\*



## 6 Directional sections, LVS12 - hydraulically operated



### 6.1 Ordering code

L V S 1 2 K K 4 A 5 E * 4 2 F 0 0 B - M M		Pressure setting in PSI (bar)
<b>Dir. valve section</b>		$P_A = \dots$ $P_B = \dots$
<b>Size</b>	= 08 or 12	
<b>Flow rate in l/min</b>		
Actuator port	A B	
4.2 GPM (16 l/min)	= C = C	
6.6 GPM (25 l/min)	= D = D	
10.6 GPM (40 l/min)	= F = F	
13 GPM (50 l/min)	= P = P	
16.6 GPM (63 l/min)	= G = G	
21.1 GPM (80 l/min)	= H = H	
26.4 GPM (100 l/min)	= K = K	
33 GPM (125 l/min)	= L = L	
39.6 GPM (150 l/min)	= M = M	
47.5 GPM (180 l/min)	= O = O	
With 3-way function 3J	= *	
With 3-way function 3A	= *	
<b>Spool function</b>		
3-way function	= 3	
4-way function	= 4	
3-way function (x2)	= 6	
<b>Spool type</b>	= A, D, F, J	
Symbols and combinations, see section 6.5		
<b>Compensator</b>		
for actuator ports A + B	= 5	
for actuator port A (only with LVS12..3A)	= 8	
<b>Pilot head</b>		
Hydraulic (standard)	= E	
Hydraulic (port horizontal)	= I	
Hydraulic (Duo head)	= K	
Hydraulic (Duo head + man. op.)	= L	
<b>Options (see 9.1)</b>		
<b>Design stage</b>		
<b>Anti-shock and make-up function</b>		
Actuator A = pos. 1, B = pos. 2	[A, B]	
Without = *		
Make-up valve	= C	
Anti-shock and make-up valve		
- adjustable, 1000-3300 PSI (70-230 bar) = A		
- adjustable, 2150-5500 PSI (150-380 bar) = B		
- fixed setting (values in bar)		
25 = D 32 = E 40 = F 50 = G 63 = H		
80 = I 100 = K 125 = L 140 = M 160 = N		
175 = O 190 = P 210 = Q 230 = R 250 = S		
280 = T 300 = U 330 = V 350 = W 380 = X		
400 = Y 420 = Z Cavity prepared = #		
<b>Spool-stroke limiter feature</b>		
Only in conjunction with control type E	= F	
Without	= *	
<b>Port threads to ISO 11926 (DIN 3852 on request)</b>		
Actuator ports A + B, 1 1/16" -12UNF-2B-16SAE	= 42	
Prepared for bolt-on plate	= 00	

### 6.2 Accessories

Description	Ordering code	Data sheet
Hydraulic joystick	FGH	100-P-70029

### 6.3 Technical data

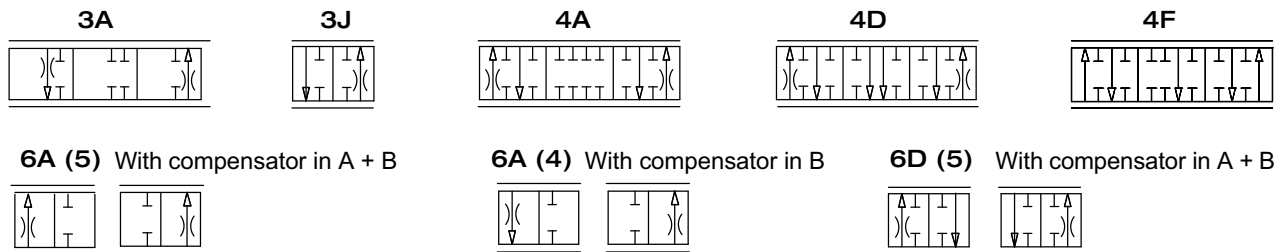
	Unit	LVS12 - hydraulically operated
Maximum flow rate	GPM (l/min)	47.5 (180)
Maximum inlet pressure	PSI (bar)	5000 (350) *
Maximum pressure at the actuator ports	PSI (bar)	5800 (400) *
Spool increments by actuator flow rates at 175 PSI (12 bar) $\Delta p$	GPM (l/min)	4.2 (16) = C, 6.6 (25) = D, 10.6 (40) = F, 13.2 (50) = P, 16.6 (63) = G, 21.1 (80) = H, 26.4 (100) = K, 33 (125) = L, 39.6 (150) = M, 47.5 (180) = O
Pilot pressure	PSI (bar)	85 - 330 (6 - 23)
Standard configuration	- compensator for actuator port A and/or B	
Options	<ul style="list-style-type: none"> <li>- anti-shock and make-up function for actuator ports A and B or B only, adjustable or fixed setting</li> <li>- spool-stroke limiter feature</li> </ul>	

\* For inlet pressure < 4350 PSI (300 bar) and actuator pressure < 4640 PSI (320 bar) contact Bucher Hydraulics

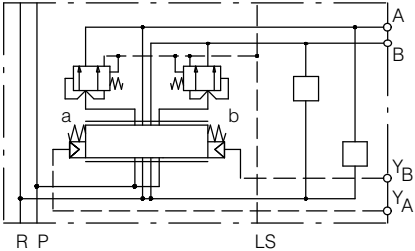
### 6.4 Pilot heads and override



### 6.5 Spool types and functions



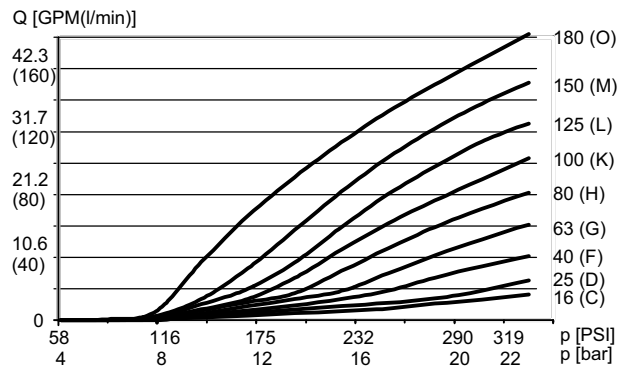
## 6.6 Symbols

Basic module	Description
	<ul style="list-style-type: none"> <li>- the flow rate at the actuator outlet ports is varied - up to the predefined maximum flow - by the level of the pilot pressure</li> <li>- valve models, see section 9</li> </ul>

## 6.7 Performance graphs

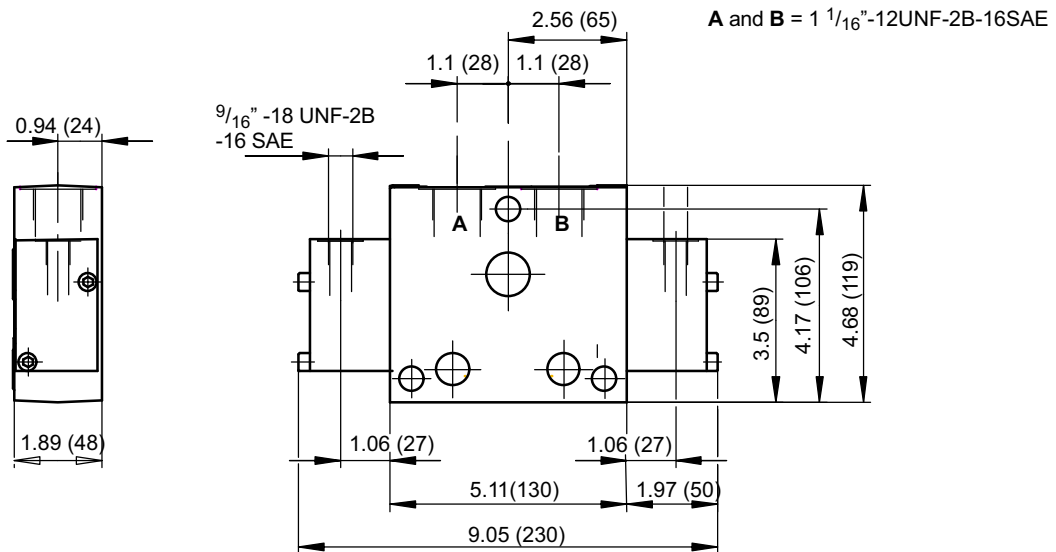
### 6.7.1 Control characteristics

Hydraulically-operated valve with 175 PSI (12 bar) pressure drop at the orifice  
 Q = flow rate at the actuator outlet port  
 p = pilot pressure



## 6.8 Dimensions / in (mm)

LVS12....5E.22\*00B



## 7 Directional sections, LVS12 - two-stage, proportional, electro-hydraulic



### 7.1 Ordering code

L V S		1 2		K K		4	A	5	F	J	4	2	*	0 0	B	-	M	M
<b>Dir. valve section</b>																		
<b>Size</b> = 12																		
<b>Flow rate in l/min</b>																		
Actuator port		A		B														
4.2 GPM (16 l/min)	=	C		C														
6.6 GPM (25 l/min)	=	D		D														
10.6 GPM (40 l/min)	=	F		F														
13 GPM (50 l/min)	=	P		P														
16.6 GPM (63 l/min)	=	G		G														
21.1 GPM (80 l/min)	=	H		H														
26.4 GPM (100 l/min)	=	K		K														
33 GPM (125 l/min)	=	L		L														
39.6 GPM (150 l/min)	=	M		M														
47.5 GPM (180 l/min)	=	O		O														
With 3-way function 3J	=	*		*														
With 3-way function 3A	=	*		*														
<b>Spool function</b>																		
3-way function	=	3																
4-way function	=	4																
3-way function (x2)	=	6																
<b>Spool type</b>																		
= A, D, F, J																		
Symbols and combinations, see section 7.6																		
<b>Compensator</b>																		
for actuator ports A + B	=	5																
for actuator port A (only with LVS12..3A)	=	8																
<b>Pilot head</b>																		
Prop. electro-hyd. 12 V (standard)	=	F																
Prop. electro-hyd. 24 V (standard)	=	G																
Prop. electro-hyd. 12 V (horizontal)	=	T																
Prop. electro-hyd. 24 V (horizontal)	=	U																
Prop. electro-hyd. 12 V (rotated 180°)	=	V																
Prop. electro-hyd. 24 V (rotated 180°)	=	W																
Prop. electro-hyd. 12 V (Duo head)	=	R																
Prop. electro-hyd. 24 V (Duo head)	=	S																
Prop. electro-hyd. 12 V (Duo head + man. op.)	=	Y																
Prop. electro-hyd. 24 V (Duo head + man. op.)	=	Z																
<b>Options (see 9.1)</b>																		
<b>Design stage</b>																		
<b>Pressure setting</b>																		
in PSI (bar)																		
P <sub>A</sub> = ... bar																		
P <sub>B</sub> = ... bar																		
<b>Anti-shock and make-up function</b>																		
Actuator A = pos. 1, B = pos. 2 [A, B]																		
Without = *																		
Make-up valve = C																		
Anti-shock and make-up valve																		
- adjustable, 1000-3300 PSI (70-230 bar) = A																		
- adjustable, 2150-5500 PSI (150-380 bar) = B																		
- fixed setting (values in bar)																		
25 = D 32 = E 40 = F 50 = G 63 = H																		
80 = I 100 = K 125 = L 140 = M 160 = N																		
175 = O 190 = P 210 = Q 230 = R 250 = S																		
280 = T 300 = U 330 = V 350 = W 380 = X																		
400 = Y 420 = Z Cavity prepared = #																		
<b>Manual override, etc.</b>																		
Override pin = A																		
Override pin + spool-stroke limiter = C																		
Without = *																		
<b>Port threads to ISO 11926 (DIN 3852 on request)</b>																		
Actuator ports A + B, 1 1/16" - 12UNF-2B-16SAE = 42																		
Prepared for bolt-on plate = 00																		
<b>Plug type</b>																		
AMP Junior Timer = J																		
Deutsch DT04-2P-EP04 = T																		

## 7.2 Accessories

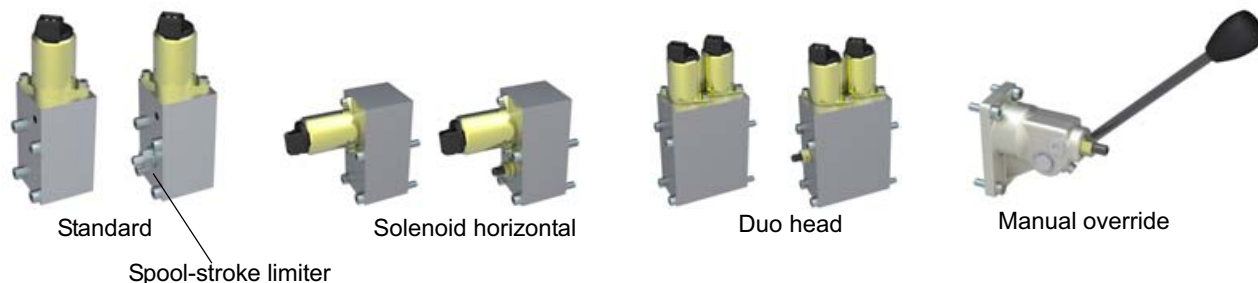
Description	Ordering code	Data sheet
Plug for AMP Junior Timer with 2 metres of cable	100152575	-
Plug kit for AMP Junior Timer for DIY installation	100152579	-
Plug for Deutsch DT04-2P-EP04 with 2 metres of cable	100153209	-
Electrical joystick (demand-signal source)	FGE	100-P-700051
Electronic controller for 1 axis + 1 on/off solenoid	ELSK107	100-P-700033
Electronic controller for 2 axes	ELSK208	100-P-700001

## 7.3 Technical data

	Unit	LVS12 - 2-stage, proportional, electro-hydraulic
Maximum flow rate	GPM (l/min)	47.5 (180)
Maximum inlet pressure	PSI (bar)	5000 (350) *
Maximum pressure at the actuator ports	PSI (bar)	5800 (400) *
Spool increments by actuator flow rates at 175 PSI (12 bar) $\Delta p$	GPM (l/min)	4.2 (16) = C, 6.6 (25) = D, 10.6 (40) = F, 13.2 (50) = P, 16.6 (63) = G, 21.1 (80) = H, 26.4 (100) = K, 33 (125) = L, 39.6 (150) = M, 47.5 (180) = O
Nominal voltage	V DC	12 or 24
Power consumption	W	max. 18 (at 1.5 A + 12 V or 0.75 A + 24 V)
Energising current	A	0.6 - 1.5 at 12 V 0.3 - 0.75 at 24 V
Duty cycle	%	100
Protection class		IP65 (DIN 40050)
Standard configuration		- compensator for actuator port A + B, and A or B
Options		- anti-shock and make-up function for actuator ports A and B or B only, adjustable or fixed setting - spool-stroke limiter feature



\* For inlet pressure < 4350 PSI (300 bar) and actuator pressure < 4640 PSI (320 bar) contact Bucher Hydraulics

## 7.4 Pilot heads and override

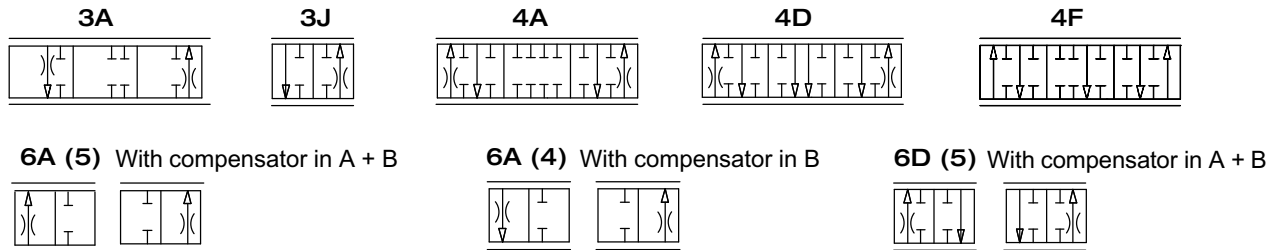




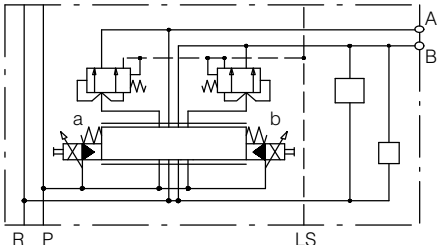
## 7.5 Solenoid connector types

AMP Junior Timer	Deutsch plug DT04-2P-EP04
	

## 7.6 Spool types and functions



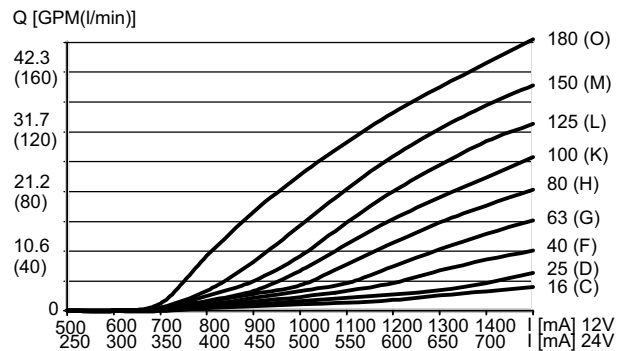
## 7.7 Symbols

Basic module	Description
	<ul style="list-style-type: none"> <li>- the pilot valves are internally supplied with pump pressure</li> <li>- The flow is varied - up to the predefined maximum flow - by the proportional change in the electrical current.</li> <li>- valve models, see section.9</li> </ul>

## 7.8 Performance graphs

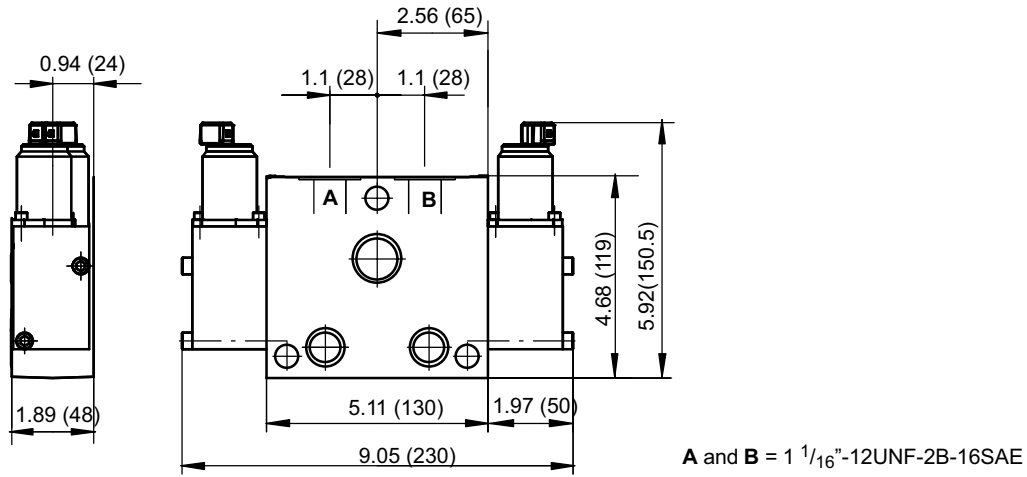
### 7.8.1 Control characteristic

Proportional, electro-hydraulically operated valve with 175 PSI (12 bar) pressure drop at the orifice  
 $Q$  = flow rate at the actuator outlet port  
 $I$  = current at the solenoids

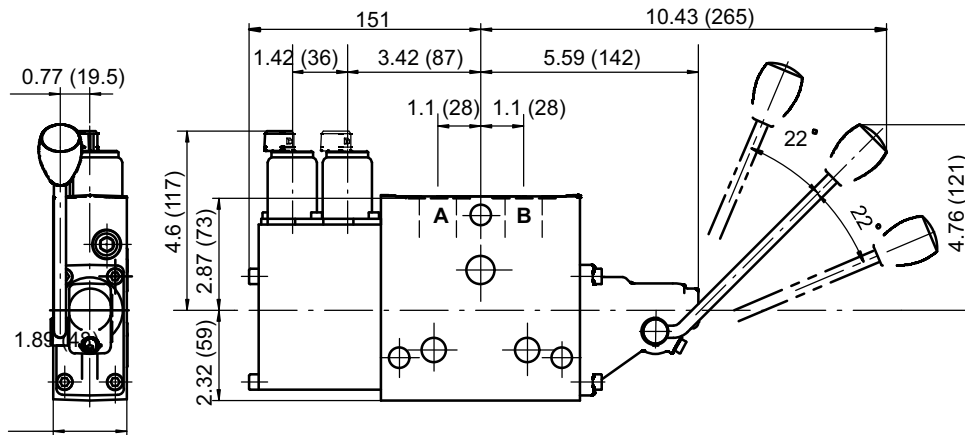


## 7.9 Dimensions / in (mm)

LVS12....5FJ22\*00B



LVS12....5YJ22\*00B



## 8 Directional sections, LVS12 - with digital pilot head



### 8.1 Ordering code

L V S		1 2	K K	4	A	5	H	T	4 2	*	0 0	B	-	M M
<b>Dir. valve section</b>												<b>Pressure setting</b> in PSI (bar) P <sub>A</sub> = .... P <sub>B</sub> = ....		
<b>Size</b>		= 12										<b>Options (see 9.1)</b> <b>Design stage</b>		
<b>Flow rate in l/min</b>														
Actuator port	A	B												
4.2 GPM (16 l/min)	= C	= C												
6.6 GPM (25 l/min)	= D	= D												
10.6 GPM (40 l/min)	= F	= F												
13 GPM (50 l/min)	= P	= P												
16.6 GPM (63 l/min)	= G	= G												
21.1 GPM (80 l/min)	= H	= H												
26.4 GPM (100 l/min)	= K	= K												
33 GPM (125 l/min)	= L	= L												
39.6 GPM (150 l/min)	= M	= M												
47.5 GPM (180 l/min)	= O	= O												
With 3-way function 3J	= *	= *												
With 3-way function 3A	= *	= *												
<b>Spool function</b>												<b>Anti-shock and make-up function</b>		
3-way function	= 3											Actuator A = pos. 1, B = pos. 2 <b>[A, B]</b>		
4-way function	= 4											Without = *		
3-way function (x2)	= 6											Make-up valve = C		
												Anti-shock and make-up valve		
												- fixed setting (values in bar)		
												25=D 32=E 40=F 50=G 63=H		
												80=I 100=K 125=L 140=M 160=N		
												175=O 190=P 210=Q 230=R 250=S		
												280=T 300=U 330=V 350=W 380=X		
												400=Y 420=Z Cavity prepared = #		
<b>Spool type</b>		= A, D, F, J										<b>Port threads</b> to ISO 11926 (DIN 3852 on request)		
		Symbols and combinations, see section 8.6										Actuator ports A + B, 1 1/16"-12UNF-2B-16SAE = 42		
<b>Compensator</b>												<b>Plug type</b>		
for actuator ports A + B	= 5											Deutsch DT 6 pole = T		
for actuator port A (only with LVS12..3A)	= 8													
<b>Pilot head</b>														
Digital pilot head	= H													
Digital pilot head + manual operation	= P													

## 8.2 Accessories

### 8.2.1 Analogue systems

Description	Ordering code	Data sheet
Electrical joystick (demand-signal source)	FGE	100-P-700051
Plug set (contact pins and socket housing right and left)	100153228	

## 8.2.2 CAN bus systems

Description	Ordering code	Data sheet
Electrical joystick	FCE/JS3	100-P-700051
Master board (parameterisation and service terminal)	ELBE201	100-B-700016
Slave module ELMR201	ELMR201	100-P-700053
Plug (socket housing) DT16-6SA-K002, right	100153228	
Cable harness for connecting the pilot heads in a valve block, 0.12 m	100153222	
CAN terminating resistor (150 ohm)	100153223	
Connecting lead for the valve block, 2 m	100153221	

## 8.3 Description

In the digital pilot head (electro-proportional operation), an electrical signal (demand signal) is amplified by using a pilot oil flow that, in turn, moves the control spool in the directional valve section. The position of the spool is detected by integral position transducers and this actual value is compared with the demand signal by the on-board electronics. By varying the pilot flow, the position of the spool is adjusted to correspond to the demand signal.

### 8.3.1 Advantages

#### Flexible

- Simple parameter changes
- Machine-specific configuration
- Easily extended

#### Cost-effective

- No adjustments during start-up
- Reduced cabling costs
- Simple, time-saving diagnostics

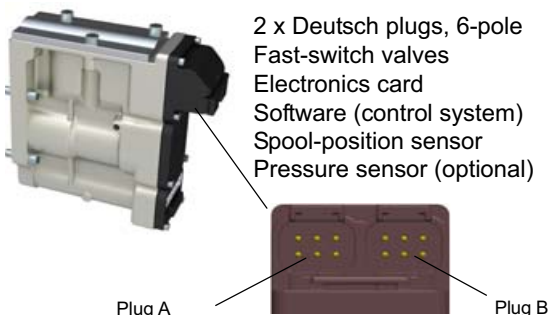
#### Coordinated system

- Integral sensors
- Proven, high-performance software
- Supported by application know-how

#### Safe

- Protection class IP67
- Sensors monitor the functionality
- Complies with safety regulations

### 8.3.2 On-board electronics



### 8.3.3 Analogue systems

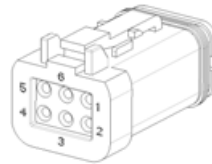
#### Functionality

- Analogue communication
- Each on-board electronic unit supplied by a separate control cable
- Power supply can be connected serially from pilot head to pilot head
- No interdependency between the individual valves
- Signal from spool-position sensor is available externally if required
- Control signal  $2.5 \pm 2V$

#### Configuration via CAN bus interface

- Flow limiting
- Flow characteristic
- Changing the maximum flow
- Ramps (rate of rise/fall can be adjusted)
- Diagnostics via CAN bus

#### Plug pin layout



Plug A, left	Plug A, right
1 = power signal	1 = Signal from spool-position sensor
2 = Ground	2 = $V_{\text{Reference}}$ , 5V (20 mA)
3 = Ground Reference	3 = Ground
4 = CAN low	4 = CAN low
5 = CAN high	5 = CAN high
6 = $V_{\text{Battery}}$	6 = $V_{\text{Battery}}$

### 8.3.4 CAN bus systems

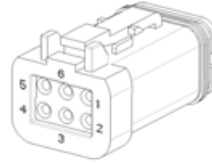
#### Functionality

- Communication via CAN bus interface and master board
- CAN bus and power supply are looped from pilot head to pilot head
- Intelligent system control
- Signal from spool-position sensor (available externally if required) analogue or CAN protocol
- Analogue sensor can be adapted

#### Communication via CAN bus

- Flow limiting
- Flow characteristic
- Ramps (rate of rise/fall can be adjusted)
- Diagnostics via CAN bus
- System intelligence
- Master board (parameterisation and service terminal)

#### Plug pin layout



Plug A, left	Plug B, right
1 = not active	1 = signal from spool-position sensor
2 = ground	2 = V <sub>Reference</sub> , 5V (20 mA)
3 = Ground <sub>Reference</sub>	3 = ground
4 = CAN low	4 = CAN low
5 = CAN high	5 = CAN high
6 = V <sub>Battery</sub>	6 = V <sub>Battery</sub>

### 8.4 Technical data

	Unit	LVS12 with digital pilot head
Maximum flow rate	GPM (l/min)	47.5 (180)
Maximum inlet pressure	PSI (bar)	5000 (350) *
Maximum pressure at the actuator ports	PSI (bar)	5800 (400) *
Spool increments by actuator flow rates at 175 PSI (12 bar) Δp	GPM (l/min)	4.2 (16) = C, 6.6 (25) = D, 10.6 (40) = F, 13.2 (50) = P, 16.6 (63) = G, 21.1 (80) = H, 26.4 (100) = K, 33 (125) = L, 39.6 (150) = M, 47.5 (180) = O
Nominal voltage	V DC	12 or 24
Power consumption	W	7.2
Current	A	0.6 at 12 V / 0.3 at 24 V
Duty cycle	%	100
Protection class		IP67 (DIN 40050)
Configuration options		- flow limiting                      - flow characteristic - changing the maximum flow - ramps (rate of rise/fall can be adjusted) - Diagnostics via CAN bus
Options		- anti-shock and make-up function for actuator ports A and B or B only, adjustable or fixed setting
Protection class		maximum 10 units per cable harness for 24V, 6 units for 6V

\* For inlet pressure < 4350 PSI (300 bar) and actuator pressure < 4640 PSI (320 bar) contact Bucher Hydraulics

### 8.5 Pilot heads and override

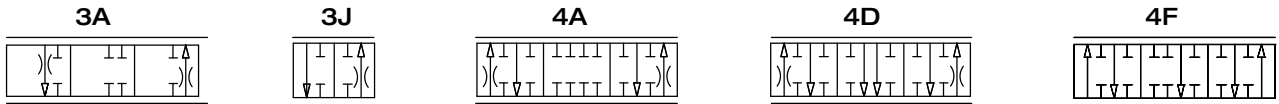
Digital pilot head



Manual override



## 8.6 Spool types and functions

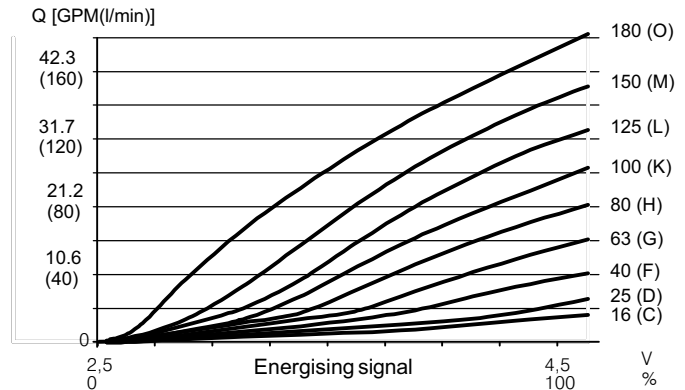


## 8.7 Symbols

Basic module	Description
	<ul style="list-style-type: none"> <li>- the pilot valves are internally supplied with a reduced control pressure of 435 PSI (30 bar) max. The flow is varied - up to the predefined maximum flow - by the proportional change in the electrical current.</li> <li>- valve models, see section.9</li> </ul>

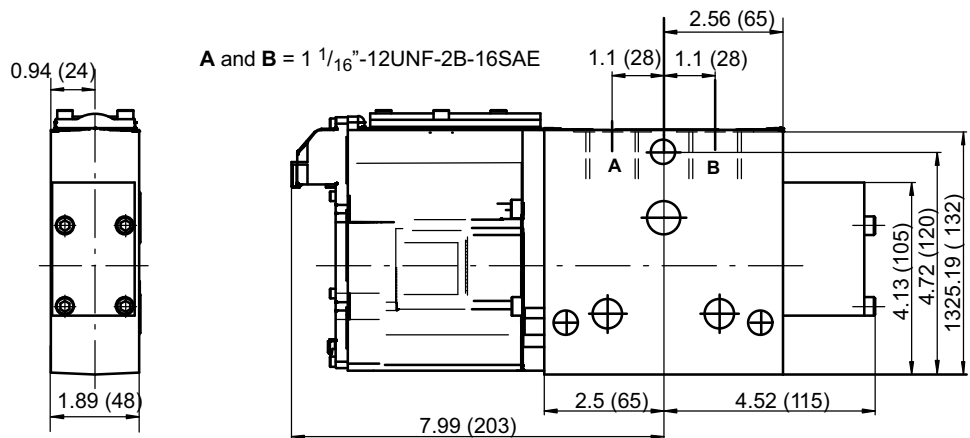
## 8.8 Performance graphs

Operated by a digital pilot head, with 175 PSI (12 bar) pressure drop at the orifice

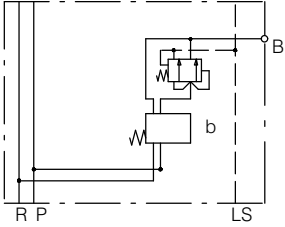

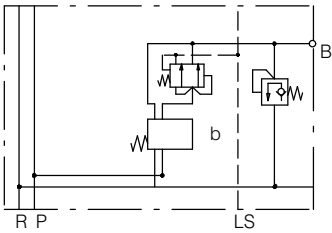

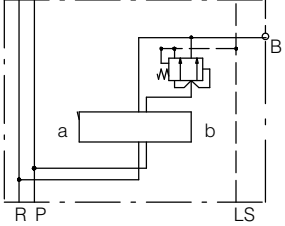
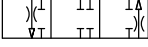
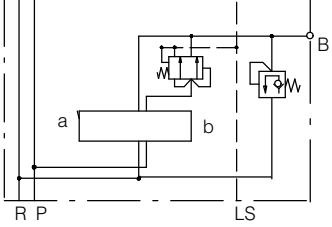
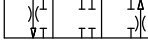
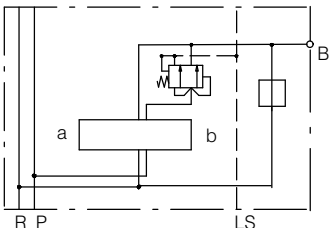
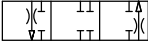


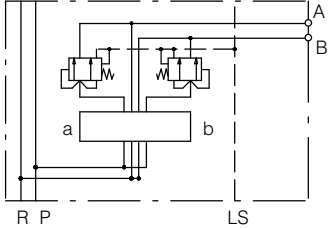
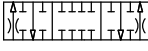
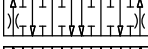
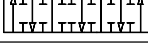
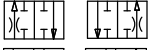


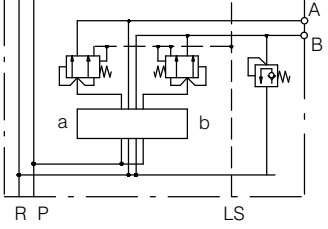
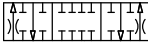
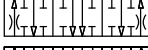
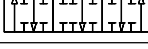

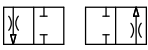

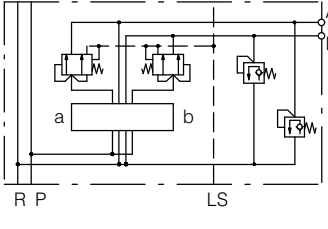
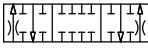

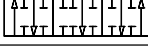
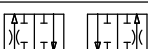


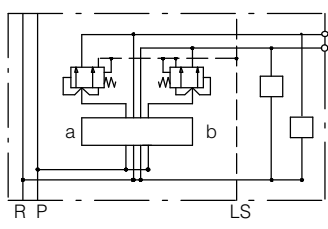
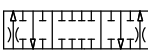

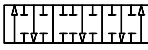

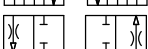

## 8.9 Dimensions / in (mm)

LVS12....5HT22\*00B

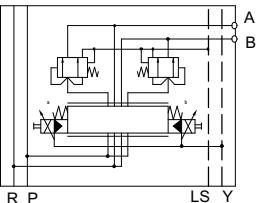


## 9 Valve models for the LVS12 directional valve system

Model code and symbol	Spool type	Control type	Description	Bolt-on plate with code 00
LVS12..3J4 	3J		<ul style="list-style-type: none"> <li>- hand lever</li> <li>- hydraulic</li> <li>- prop. electro-hyd.</li> <li>- digital pilot head</li> </ul>	Compensator for actuator port B Seat valve in B (not for digital pilot head)
LVS12 	3J		<ul style="list-style-type: none"> <li>- hand lever</li> <li>- hydraulic</li> <li>- prop. electro-hyd.</li> <li>- digital pilot head</li> </ul>	Compensator for actuator port B Anti-shock and/or make-up valve for actuator port B, fixed setting or adjustable Seat valve in B (not for digital pilot head)
LVS12 	3A		<ul style="list-style-type: none"> <li>- hand lever</li> <li>- hydraulic</li> <li>- prop. electro-hyd.</li> <li>- digital pilot head</li> </ul>	Compensator for actuator port B Seat valve or Load-control valve in B (not for digital pilot head)
LVS12 	3A		<ul style="list-style-type: none"> <li>- hand lever</li> <li>- hydraulic</li> <li>- prop. electro-hyd.</li> <li>- digital pilot head</li> </ul>	Compensator for actuator port B Anti-shock and/or make-up valve for actuator port B, fixed setting or adjustable Seat valve or Load-control valve in B (not for digital pilot head)
LVS12 	3A		<ul style="list-style-type: none"> <li>- hand lever</li> <li>- hydraulic</li> <li>- prop. electro-hyd.</li> <li>- digital pilot head</li> </ul>	Compensator for actuator port B. Cavity prepared and plugged, for anti-shock and/or make-up valve Seat valve or Load-control valve in B (not for digital pilot head)

<p>LVS12</p> 	<p>4A </p> <p>4D </p> <p>4F </p> <hr/> <p>6D </p> <p>6A(4) </p> <p>6A(5) </p>	<p>- hand lever - hydraulic - prop. electro-hyd. - digital pilot head</p> <hr/> <p>- hydraulic - prop. electro-hyd.</p>	<p>Compensator for actuator port B</p>	<p>Seat valve or Load-control valve in A and B, or B only (not for digital pilot head)</p>
<p>LVS12</p> 	<p>4A </p> <p>4D </p> <p>4F </p> <hr/> <p>6D </p> <p>6A(4) </p> <p>6A(5) </p>	<p>- hand lever - hydraulic - prop. electro-hyd. - digital pilot head</p> <hr/> <p>- hydraulic - prop. electro-hyd.</p>	<p>Compensator for actuator ports A + B. Anti-shock and/or make-up valve for actuator port B, fixed setting or adjustable</p>	<p>Seat valve or Load-control valve in A and B, or B only (not for digital pilot head)</p>
<p>LVS12</p> 	<p>4A </p> <p>4D </p> <p>4F </p> <hr/> <p>6D </p> <p>6A(4) </p> <p>6A(5) </p>	<p>- hand lever - hydraulic - prop. electro-hyd. - digital pilot head</p> <hr/> <p>- hydraulic - prop. electro-hyd.</p>	<p>Compensator for actuator ports A + B. Anti-shock and/or make-up valve for actuator ports A + B, fixed setting or adjustable</p>	<p>Seat valve or Load-control valve in A and B, or B only (not for digital pilot head)</p>
<p>LVS12</p> 	<p>4A </p> <p>4D </p> <p>4F </p> <hr/> <p>6D </p> <p>6A(4) </p> <p>6A(5) </p>	<p>- hand lever - hydraulic - prop. electro-hyd. - digital pilot head</p> <hr/> <p>- hydraulic - prop. electro-hyd.</p>	<p>Compensator for actuator ports A + B. Cavity prepared and plugged, for anti-shock and/or make-up valve</p>	<p>Seat valve or Load-control valve in A and B, or B only (not for digital pilot head)</p>

## 9.1 Options

Model code and symbol	Description
<p>LVS12.....A02B</p> 	<p>- threaded ports for external pilot pressure Only for control type elektrohydraulic</p>
<p>LVS12.....A05B</p>	<p>-Pilot head, max. T-pressure = 200 bar For electrohydraulic control only</p>



LVS12.....A06B		- External poert for pilot pressure, actuater port A - Port threads G1/4" , e. g. for load control valves Only for control type elektrohydraulic
LVS12.....A13B		- Tank notch control at actuater port A
LVS12.....A14B		- Tank notch control at actuater port B Specify pressure setting in bar at the end of the ordering code
LVS12.....A15B		- Tank notch control at actuater port A and B Specify pressure setting in bar at the end of the ordering code
LVS12.....A39B		- No drop befor lift function - Tank notch control at actuater port A and B
LVS12.....A47B		- External poert for pilot pressure, actuater port A and B - Port threads G1/4" , e. g. for load control valves Only for control type elektrohydraulic

## 10 Intermediate sections



### 10.1 Functions

#### 10.1.1 Pressure-reducing valve

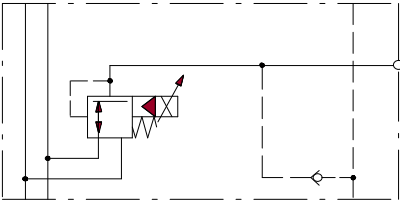
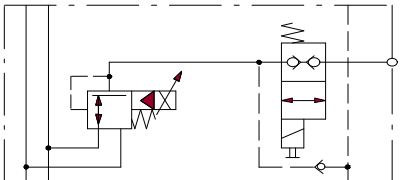
The 3-way pressure-reducing valve holds the pressure at the actuator port at a constant level, as set by the solenoid

current. Via the LS signal, this function can work with all pressure compensators and pump systems.

### 10.2 Ordering code

<b>L V S - Z - P D R A 4 F J - U 7 / 8 A 0 0</b>	
<b>Intermediate section</b>	
3-way pressure-reducing valve = <b>PDR</b>	
<b>Functions</b>	
No auxiliary valve [Q <sub>max.</sub> 580 GPM (40 l/min)] = <b>A</b>	
Seat valve on the actuator side [Q <sub>max.</sub> 360 PSI (25 l/min)] = <b>B</b>	
Seat valve on actuator side and unloading valve [Q <sub>max.</sub> 360 PSI (25 l/min)] = <b>C</b>	
<b>Pressure range</b>	
175-1450 PSI (12-100 bar) = <b>4</b>	
220-2320 PSI (15 - 160 bar) = <b>6</b>	
290-2180 PSI (20 - 150 bar) = <b>8</b>	
<b>Special feature</b>	
<b>Design stage</b>	
<b>Port threads to ISO 11926 (DIN 3852 on request)</b>	
Actuator $\frac{7}{8}$ "-14UNF-2B-16SAE = <b>U7/8</b>	
<b>Nominal voltage and plug type</b>	
12 Volt DC, AMP Junior Timer = <b>FJ</b>	

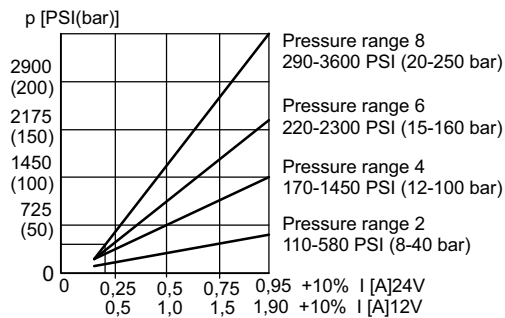
### 10.3 Valve models

Model code and symbol	Description
<p>LVS-Z-PDRA</p> 	- threaded ports = G1/2"
<p>LVS-Z-PDRB</p> 	- seat valve on actuator side - threaded ports = G1/2"

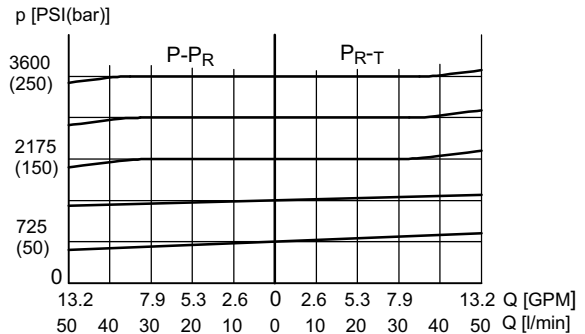
### 10.4 Performance graphs

#### 10.4.1 Adjustment ranges 3-way prop. pressure-control valve

I [A] = solenoid current



#### 10.4.2 Control characteristic as a function of flow rate

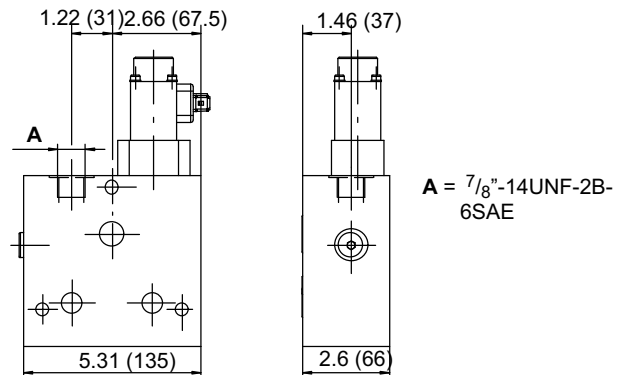


#### 10.4.3 Leakage in working position incl. pilot flow

Primary pressure	PSI (bar)	725 (50)	1450 (100)	1900 (200)	4350 (300)
$Q_{LV}$	in <sup>3</sup> /min (cm <sup>3</sup> /min)	14.7 235	15.3 245	15.6 250	16.2 260

### 10.5 Dimensions / in (mm)

LVS-Z.PDRA-FJ-G12A00



# 11 End sections



## 11.1 Functions

A valve block must be completed with an end section.

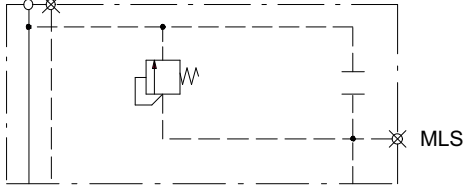
## 11.2 Ordering code

<b>L V S</b>	<b>A</b>	<b>C A L</b>	<b>U 1 0 0</b>	<b>A</b>	<b>0 0</b>	<b>Pressure setting</b> in PSI (bar) P = ... P1 = ...
<b>End section</b>						
<b>Functions</b>						
No control function, no ports			=	<b>CA*</b>		<b>Design stage</b>
LS - LS connection, R port			=	<b>CAL</b>		
LS unloading			=	<b>CB*</b>		
LS <sub>max</sub> pressure relief (P1= ...)			=	<b>CC*</b>		
LS unloading, LS <sub>max</sub> pressure relief (P1= ...)			=	<b>CE*</b>		
Reduced pilot-pressure for internal and external use Pressure relief for the reduced pressure (P=...) Pressure setting for the reduced pressure (P1= ...)			=	<b>CS*</b>		
<b>Port threads to ISO 11926 (DIN 3852 on request)</b>						
R	7/8"-14UNF-2B-16SAE		=	<b>U7/8</b>		
R	1 1/16"-12UNF-2B-16SAE		=	<b>U100</b>		
R	1 5/16"-12UNF-2B-16SAE		=	<b>U110</b>		
Without threaded port			=	<b>****</b>		

## 11.3 Valve models

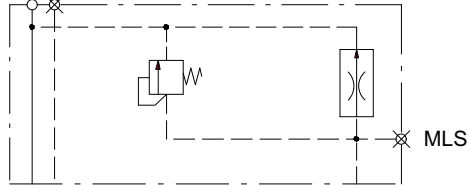
Model code and symbol	Description
LVS-A-CA*-****A00 	- no control function
LVS-A-CAL-....A00 	- threaded port for R
LVS-A-CB*-****A00 	- LS unloading threaded port for R

LVS-A-CC\*-\*\*\*\*A00  
R MP



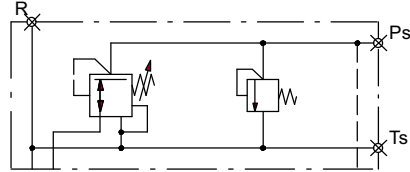
- LS<sub>max</sub> pressure relief (**P1**= ...)
  - threaded port for R
- Specify pressure setting in bar at the end of the ordering code

LVS-A-CE\*  
R MP





- LS<sub>max</sub> pressure relief (**P1**= ...)
  - LS unloading
  - threaded port for R
- Specify pressure setting in bar at the end of the ordering code

LVS-A-CS\*



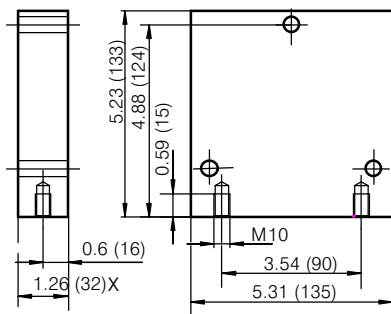
- reduced pilot-pressure for internal and external use
  - pressure relief for the reduced pressure (**P** = ...)
  - pressure setting for the reduced pressure (**P1** = ...)
- Specify pressure setting in bar at the end of the ordering code

## 11.4 Options

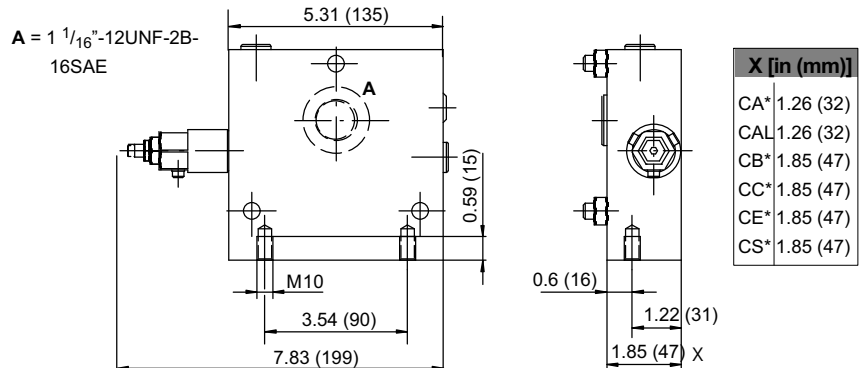
Model code and symbol	Description
LVS-A-...-G.A07 	- threaded ports for MR (G1/2"), MP and MLS (G1/4")
LVS-A-...-G.A10 	threaded ports for P and R (G1"), MP and LS (G1/4")

## 11.5 Dimensions / in (mm)

LVS12-A-CA\*-\*\*\*\*A00



LVS12-A-CS\*-G34A00



## 12 Bolt-on plates

### 12.1 General technical data

	Unit	Value
Inlet pressure	PSI (bar)	5000 (350)
Nominal flow rate, load-control valve	GPM (l/min)	LVS08 = 13.2 (50), LVS12 = 31.7 (120)
Nominal flow rate, DVA and ZVA seat valves (LVS12 only)	GPM (l/min)	39.6 (150)
Nominal flow rate, PEC seat valves (LVS12 only)	GPM (l/min)	15.9 (60)

### 12.2 Functions

#### 12.2.1 Load-control valves

These bolt-on load control valves, with integral anti-shock function, ensure load-independent lowering motion at speeds determined by the inlet flow, with leak-free shut-off when the directional valve is in its neutral position. The anti-shock valve setting should preferably be between 100% and 200% of the highest load pressure. Turning the adjusting screw in the clockwise direction reduces the setting, and this can also be used for emergency lowering of the load.

#### 12.2.2 Seat valves (pilot operated check valves)

Seat valves with electrical override shut off the actuator lines with zero leakage.

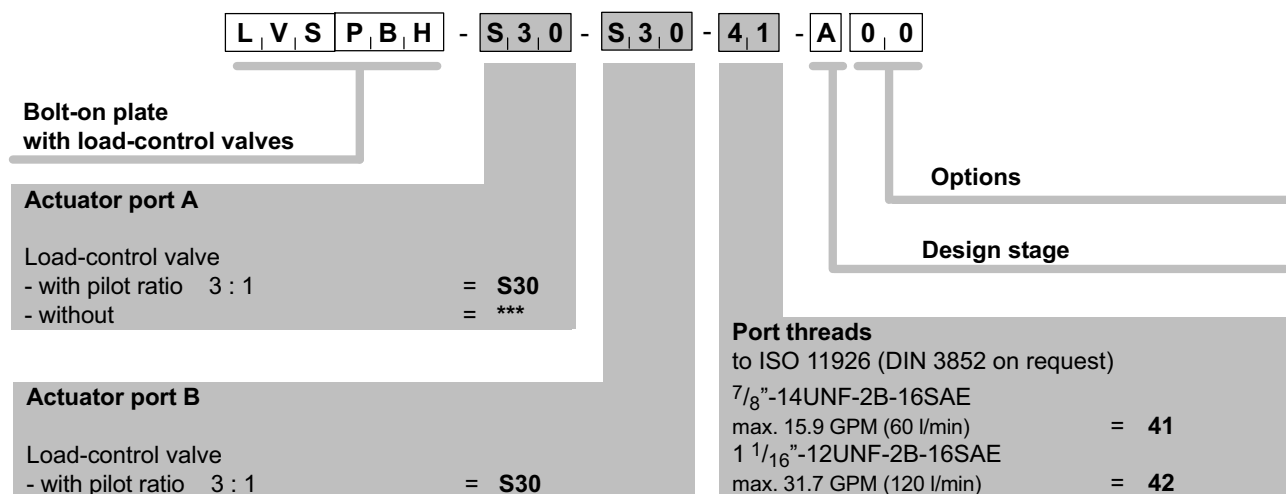
Directional valve must carry code 00, see box port threads in ordering code

#### 12.2.3 Seat valves with anti-shock/make-up vv. (overrideable check valves with pressure relief on the actuator side)

Bolt-on seat valves with service line anti-shock/make-up valves shut off the actuator lines with zero leakage and protect the actuator from unacceptably large pressure peaks.

### 12.3 Ordering code

#### 12.3.1 Load-control valves



### 12.3.2 Seat valves



L V S P R E - D V A - D V B - 4 1 - J 1 2 - A 0 0

**Bolt-on plate  
with seat valves**

**Options**

**Design stage**

#### Actuator port A

Seat valve with electrical override

- single-acting seat valve = **DVA**
- double-acting seat valve = **ZVA**
- without = **\*\*\***

#### Nominal voltage and plug type

- 12 Volt DC, AMP Junior Timer = **J12**
- 24 Volt DC, AMP Junior Timer = **J24**

#### Actuator port B

Seat valve with electrical override

- single-acting seat valve = **DVB**
- double-acting seat valve = **ZVB**

#### Port threads

to ISO 11926 (DIN 3852 on request)

- 7/8"-14UNF-2B-16SAE  
max. 15.9 GPM (60 l/min) = **41**
- 1 1/16"-12UNF-2B-16SAE  
max. 31.7 GPM (120 l/min) = **42**

### 12.3.3 Seat valves, pressure-relief/make-up check valve



L V S P E C - 1 6 0 - 1 6 0 - 4 1 - J 1 2 - A 0 2

**Bolt-on plate**

**Seat valves  
with electrical override**

- Sgl-act. seat valves in A+B = **00**
- Dbl-act. seat valves in A+B = **02**

**Design stage**

#### Actuator port A

Pressure-relief and make-up check valve

- press. setting e.g. 210 bar <sup>1)</sup> = **210**
- make-up check valve only = **NVO**
- without = **\*\*\***

#### Nominal voltage and plug type

- 12 Volt DC, AMP Junior Timer = **J12**
- 24 Volt DC, AMP Junior Timer = **J24**

#### Actuator port B

Pressure-relief and make-up check valve

- press. setting e.g. 210 bar <sup>1)</sup> = **210**
- make-up check valve only = **NVO**

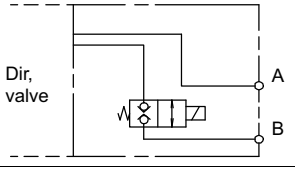
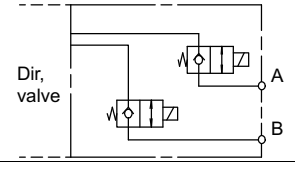
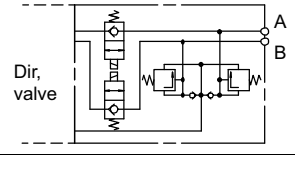
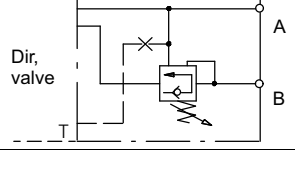
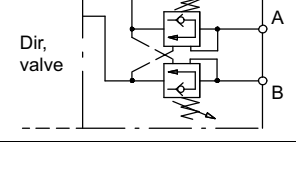
#### Port threads

to ISO 11926 (DIN 3852 on request)

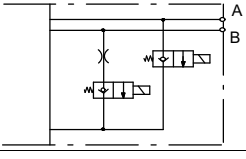
- 7/8"-14UNF-2B-16SAE  
max. 15.9 GPM (60 l/min) = **41**

<sup>1)</sup> Pressure settings in bar available for the pressure-relief function (measured at 10 l/min test flow) 25, 32, 40, 50, 63, 80, 100, 125, 140, 160, 175, 190, 210, 230, 250, 280, 300, 330, 350 (for other pressures, consult BUCHER)

## 12.4 Valve models

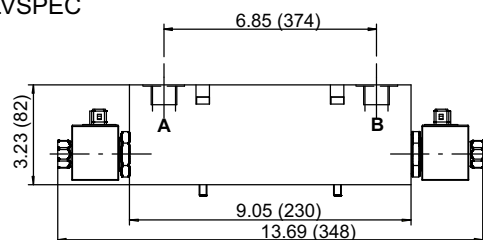
Model code and symbol	Description
LVSPRA-***-DVB 	- seat valve with electrical override (check valve) in actuator port B
LVSPRE-DVA-DVB 	- seat valve with electrical override (check valve) in actuator ports A and B
LVSPEC-....-21-J..A00 	- seat valve with electrical override with service line anti-shock/ make-up valves (overrideable check valve and pressure relief on the actuator side) in actuator ports A and B
LVSPBH-***-S30 	- load-holding valve in actuator port B
LVSPBH-S30-S30 	- load-holding valve in actuator ports A and B

## 12.5 Options

Model code and symbol	Description
LVSPRE-....A01 	- Float function - Orifice Ø 5

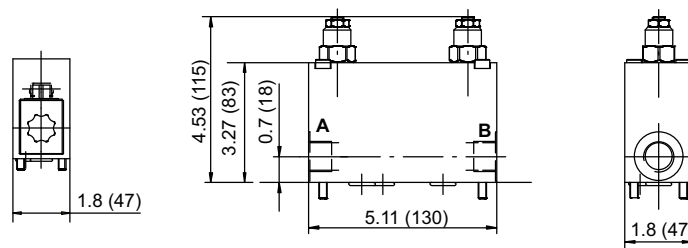
## 12.6 Dimensions / in (mm)

LVSPEC



A and B =  $7/8$ "-14UNF-2B-16SAE

LVSPBH-S30-S30-21A00



## 13 Accessories

### 13.1 Assembly kit

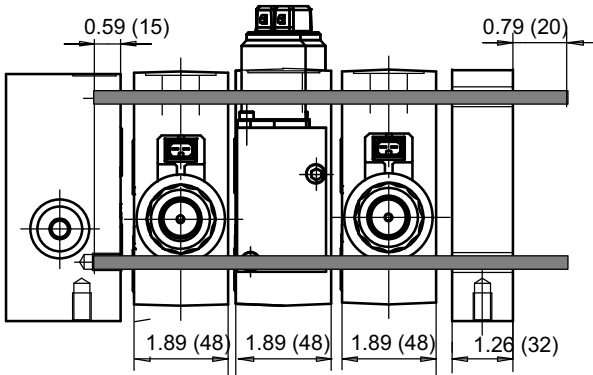
To assemble the individual valve sections with assured functional reliability, 3 tie bolts and hex. nuts are necessary.

Tightening torque = max. 30 Nm in 3 steps (6, 16 and 30 Nm)

#### 13.1.1 Ordering code

3 pcs. tie bolt M10 x ..... (required length in in or mm)

3 pcs. hex. nut M10, Part No.: 100243580



#### Calculating the tie bolt length in in (mm):

$0.59 (15) + [1.89 (48) \times \text{no. of directional valve sections}] + \text{width of the end section} + 0.79 (20)$

#### Example:

$0.59 + (1.89 \times 3) + 1.26 + 0.79 = 8.31 \text{ in}$   
 $15 + (48 \times 3) + 32 + 20 = 211 \text{ mm}$

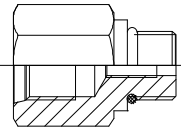
For ordering purposes, always round up the calculated tie bolt length to the next 10 mm.

In our example, we therefore need to order 3 pcs of tie bolt with 8.31 in (220 mm).



**IMPORTANT:** maximal 10 directional sections in one valve block

### 13.2 Pipe fittings and orifices

Model code	Description
Order number: 100116462	 <ul style="list-style-type: none"> <li>- Pipe fitting <math>\frac{9}{16}</math>" -18 UNF-2B - 16 SAE for use with max. two orifices M5 (TN3001, Form B) Application: Dampening LS signal for system stabilisation</li> <li>- Orifice : <math>\varnothing 0,5 \text{ mm} = 100219282</math>  <math>\varnothing 0,6 \text{ mm} = 100209791</math>  <math>\varnothing 0,8 \text{ mm} = 100216052</math>  <math>\varnothing 1,0 \text{ mm} = 100225419</math></li> </ul>