

Parker VP120 Series Load-Sense Directional Control Valve Service Manual

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding



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General Description

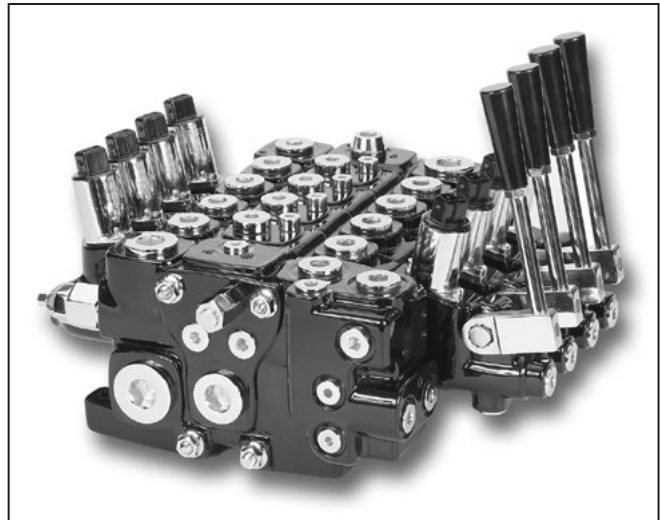
The VP120 can be configured either as pressure compensated load-sense (PCLS) or as load-sense (LS). Both have the flexibility of sectional construction. The PCLS work section has its own compensator, so that speed control of multiple functions is achieved, regardless of changes in pressure. The key technology inherent to the VP120 is flow-sharing. In pump over-demand conditions, flow-sharing benefits machine productivity by maintaining the speed relationship of the selected functions, but at a reduced speed. Thus, the operator can maintain the rhythm of the machine.

A new technology available in the VP120 is post compensation with pressure-limiting. This feature allows for selected functions to operate at pressures lower than the load-sense relief-valve setting. The advantage of using pressure limiters to accomplish this vs. port relief-valves is that less flow is lost – increased efficiency and productivity.

Another new technology developed for the VP120 is called margin control, which can be used to selectively boost or reduce the flow out of a work-section.

The standard inlet/outlet can be installed on both ends of the valve, facilitating the routing of pump/tank flow to both ends of the valve.

The valve can be operated manually, hydraulic-remote and with solenoids. The same solenoid is used for on/off and proportional control. A bypass compensator is available for use with fixed displacement pumps. Also, priority flow control is an option for steering requirements. In addition, low pressure regeneration is an option designed to overcome the damaging affects of cavitation – namely premature component wear and spongy operation.



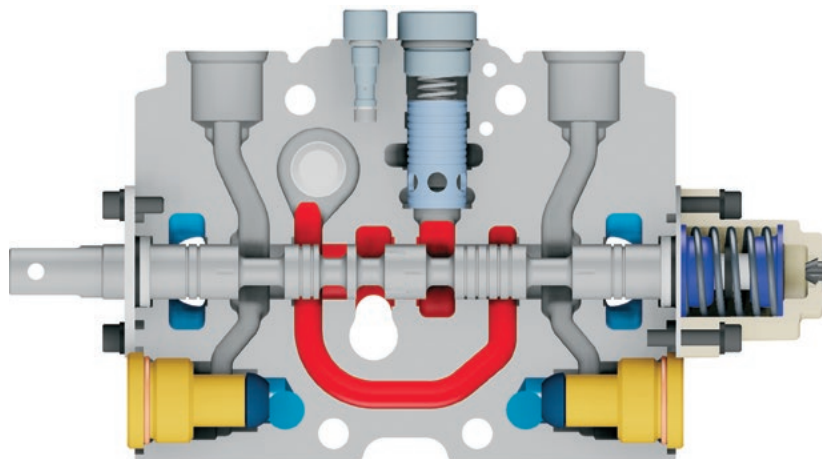
The VP120 uses the same port accessories, load-sense relief valve and pressure-reducing valve that are shared among multiple valve series. The standard spool types are 3-way, 4-way and 4-position float. A full range of flow limited spools are available.

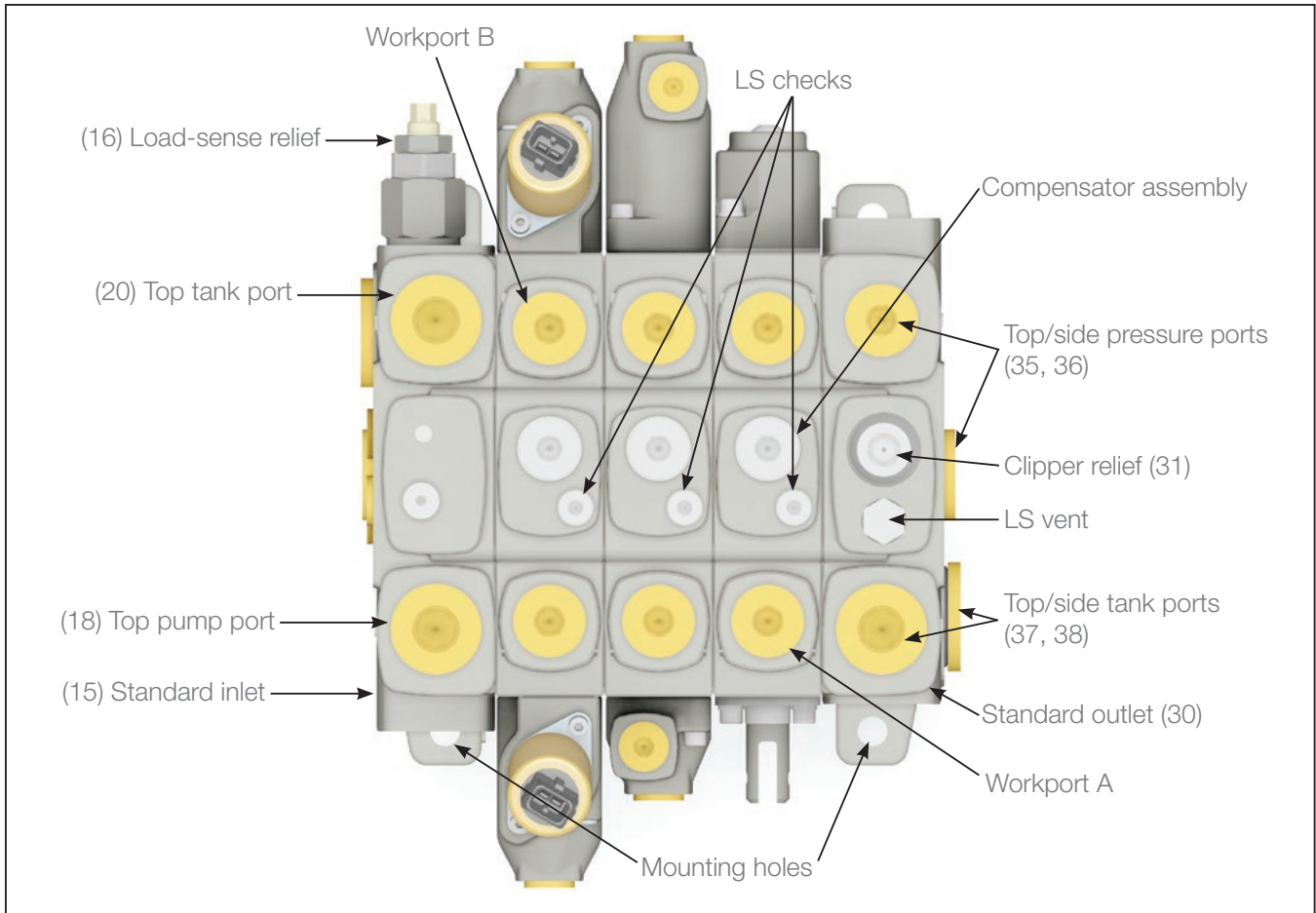
Operation

The VP120 (PCLS) is an individually pressure compensated load-sense valve. For optimum horse-power utilization, it is normally used with a variable displacement pump. However, it does have the flexibility to be interfaced with a fixed displacement pump.

During single function use, the pump control will determine the flow to the valve, based upon the area opening of the spool notch and the load-sense signal being sent back to the pump.

During multi-function operation, the pump control will determine the flow for the highest loaded function, while the work-section compensator will control the flow for the lighter loaded function.





Features

- **Excellent machine controllability** – Individual pressure compensation in each work section delivers predictable metering with single and multi-function operation; regardless of changes in pressure and input flow. This enhances machine control, improves productivity and helps to make every operator an “expert” operator – all of which saves money. This valve type also lends itself to closed-loop control.
- **Improved system efficiency** – Optimized horsepower utilization and heat management are features that are inherent with load-sense pressure compensated valves due to a closer match between horsepower consumption and horsepower demand. Fuel savings of up to 30% can be achieved vs. open-center type systems. Also, better horsepower utilization may enable the use of a smaller engine or elimination of a heat exchanger.
- **Enhanced machine productivity** – The VP120 incorporates flow-sharing technology. This means that during a pump over-demand condition the valve will automatically apportion the available flow to the selected functions, based upon the area openings of the spool notches. The selected functions will maintain their speed relationship, but at a lower overall speed. This automatic adjusting by the valve can improve machine productivity as much as 20% and reduce operator fatigue.
- **Enhanced speed control** – The optional margin control boosts or reduces flow of the selected work sections. This enables the hydraulic circuit designer to better utilize the available pump flow and possibly reduce the size of the engine.
- **Reduced heat generation** – Pressure limiting is a feature not common on valves with flow sharing technology. This feature allows for selected functions to operate at a pressure less than the setting of the load-sense relief-valve, while only passing a few liters of oil to tank. The alternative method for achieving this is with a port relief-valve.
- **Flexible design** – The VP120 is available as a pressure compensated load-sense valve (PCLS) or just as a load-sense (LS) valve. The combination inlet/out casting can be installed on both ends of the valve, which means that pump flows can be routed to both ends of the valve.
- **Ease of service** – The load-sense check and the compensator are located on the top of the work section, making them accessible for trouble-shooting without having to disassemble the valve bank.

Definitions

PCLS = Pressure Compensated Load-Sense, or load-sensing with pressure compensation.

LS = Load-Sensing.

LSRV/PLM = Load-Sense Relief Valve – a small RV that sets maximum LS pressure.

Clipper RV/PA = “Clips” or reduces pressure spikes normally caused when flow demand decreases faster than the pump flow output can decrease.

Margin_{valve} = Pressure at valve pump – pressure at valve LS port = M_v .

Margin_{pump} = Pressure at pump outlet – pressure at pump LS port = M_p .

Margin_{neutral} = M_v or M_p when all valve spools are in neutral.

Margin = M_v or M_p when one valve function is deadheaded and the LSRV relieves.

FLO = Flow Limit Orifice, limits flow over LSRV.

Over-demand = When functions demand flow in excess of pump capacity.

EC = Solenoid controlled spool positioning.

Induced load = Occurs when an actuator tries to force fluid into a valve workport.

Pressure Limiting = Port pressure is limited to a value less than the normal operating pressure. Flow loss during pressure limiting is < 2 LPM (.53 GPM).

Conversion Factors:

1 kg = 2.2 lbs.

1 N = 0.225 lbs. force

1 Bar = 14.5 PSI

1 liter = 0.22 UK gallon

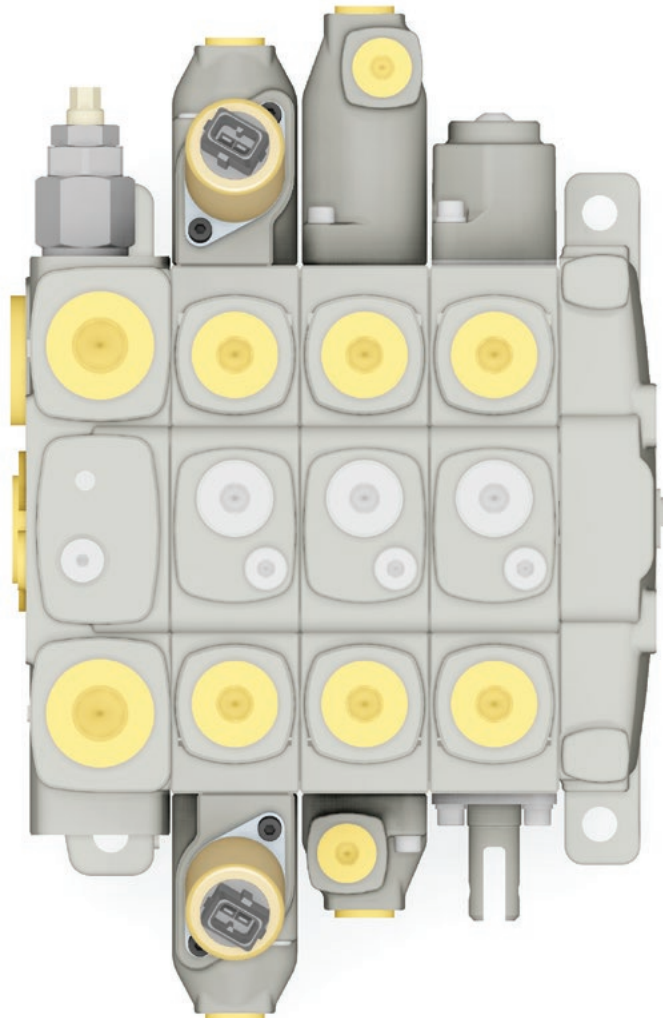
1 liter = 0.264 US gallon

1 cm³ = 0.061 in³

1 m = 3.28 feet

1 mm = 0.039 inches

9/5 °C + 32 = °F



Specifications

Pressures	Pump inlets: 280 Bar (4060 PSI) Service Ports: 345 Bar (5000 PSI) Pilot-EH (input or internal supply): 35 Bar (508 PSI) Tank Return: 15 Bar (220 PSI) Solenoid Drain: 20 Bar (300 PSI) Pilot-Hydraulic Remote: 7-28 Bar (100-315 PSI)
Flow Rates at 17 Bar (250 PSI) Margin	Maximum Input: 160 LPM (42 US GPM) Maximum Flow out of Service Ports: 120 LPM (32 US GPM)
Leakage Performance with mineral oil, 20 cSt (100 SSU) @ 49°C (120°F) at 80 Bar (1100 PSI) differential	Workport w/Steel Plug or no Accessory: 20 cc/min max. Thru reverse flow check only: 150 cc/min max. Load-sense Leakage: 150 cc/min
Hydraulic Fluid	Mineral base oil. For other fluids consult factory. Viscosity, working range: 15-380mm ² /s (15-380 cSt).
Hydraulic Oil Temperature	Recommended Operating Range without Solenoid Operation: -30° to 90°C (-22° to 194°F) Recommended Operating Range with Solenoid Operation: -20° to 80°C (-4° to 176°F)
Filtration (ISO 4406)	20/18/14 in Main Flow Paths 18/16/13 Pilot Supply

Weights

Inlets/Outlets

Std. Combination Inlet/Outlet	4.58 kg (10.1 lb)
EH Combination Inlet/Outlet	5.81 kg (12.8 lb)
Combination Inlet/Outlet with priority flow divider	6.89 kg (15.2 lb)
Combination Inlet/Outlet with bypass compensator	6.94 kg (15.3 lb)
Combination Inlet/Outlet with low pressure regeneration	6.85 kg (15.1 lb)
Simple turnaround cover	3.1 kg (6.8 lb)
Work Sections	
Manual with 2 port access.	4.17 kg (9.2 lb)
Hydraulic Remote with 2 port access.	4.58 kg (10.1 lb)
EH with 2 port access.	6.03 kg (13.3 lb)

Mounting Surface

There is no restriction on orientation.
 Flatness should be at least 0.5 mm (0.020")
 Surface must be stable and not put stress on valve.

Connections

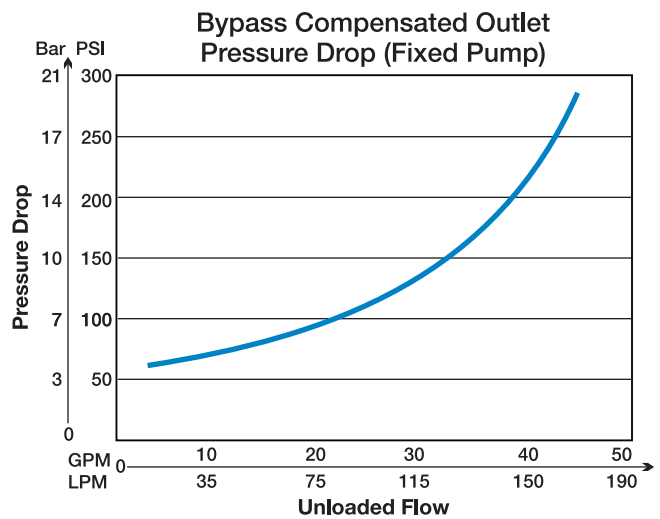
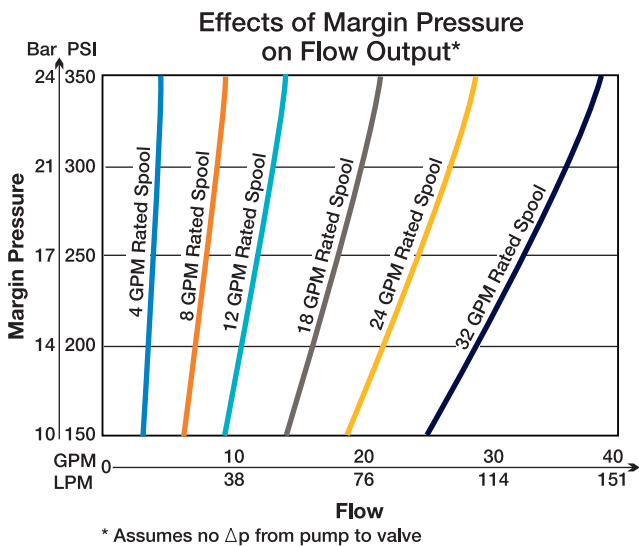
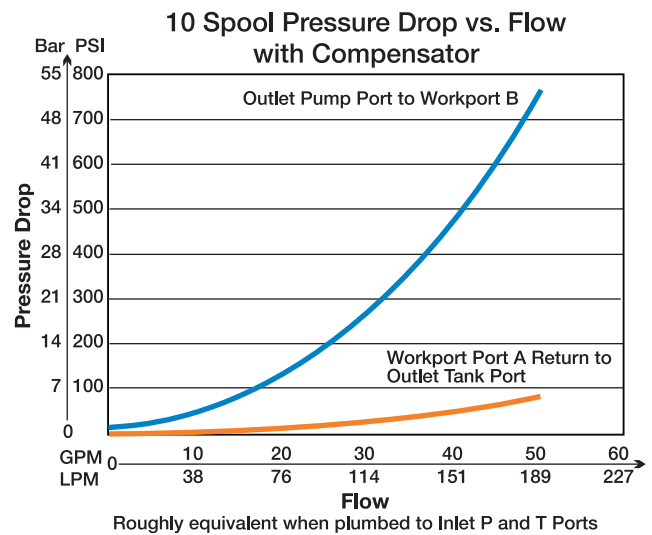
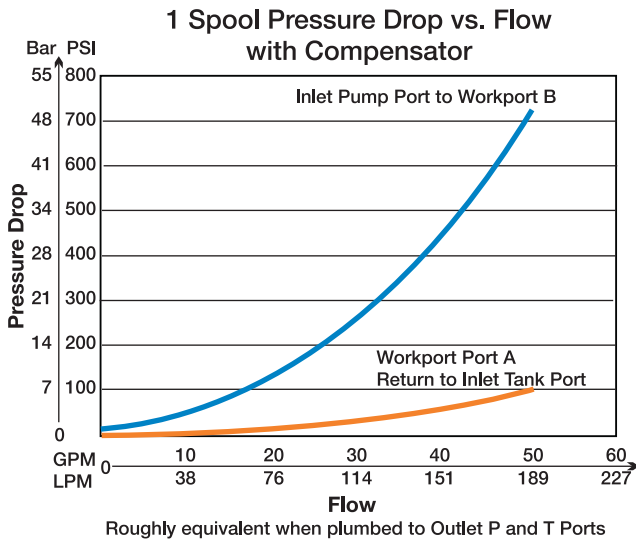
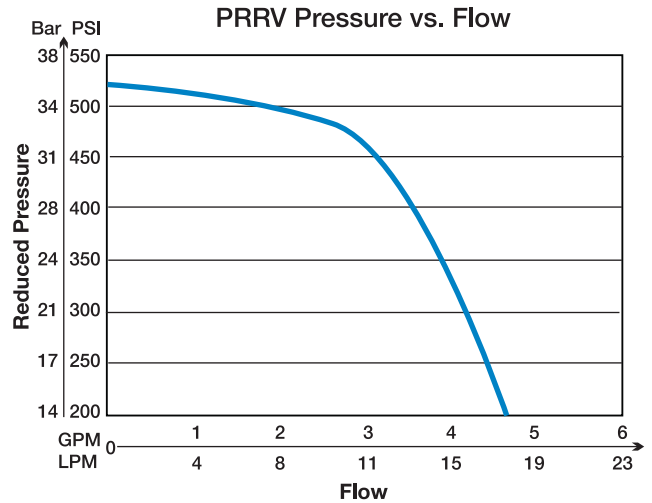
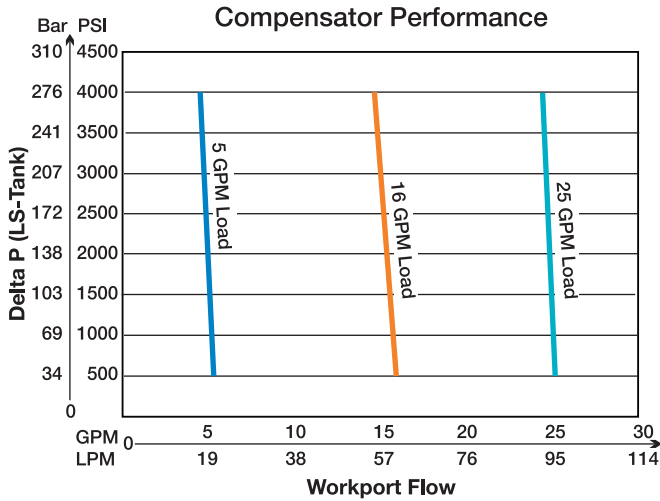
O-ring boss ports SAE-J1926-1
 BSPP ports ISO 1179-1

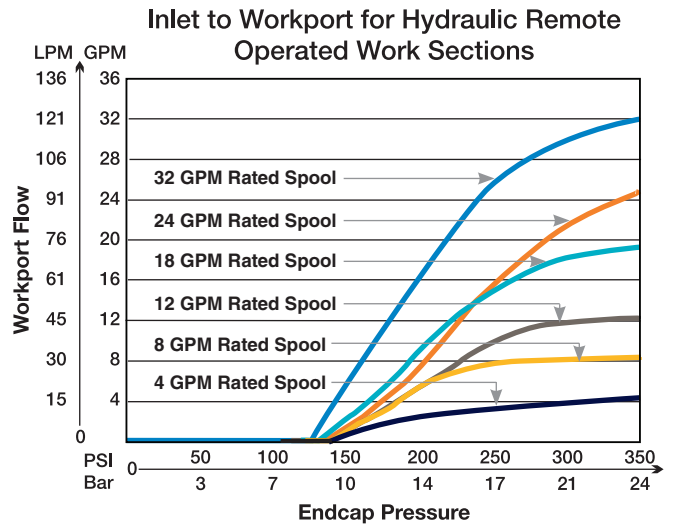
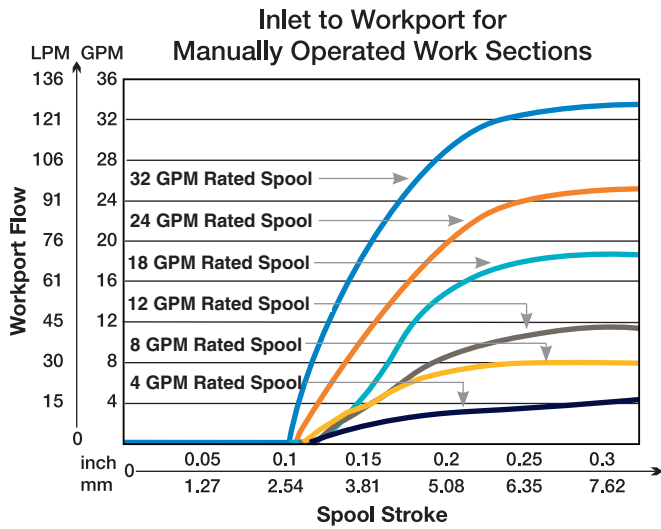
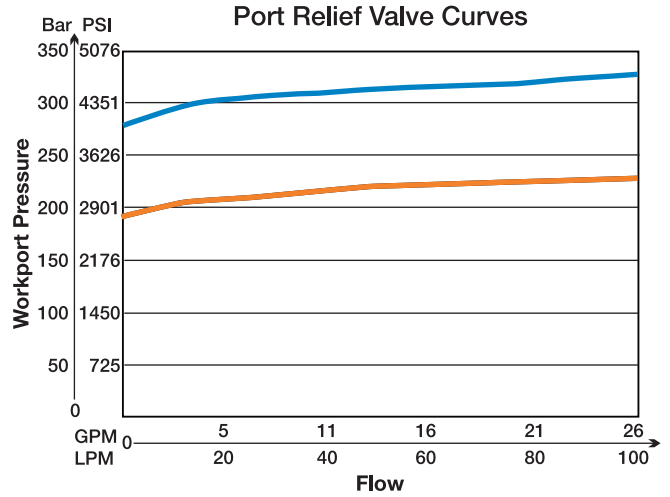
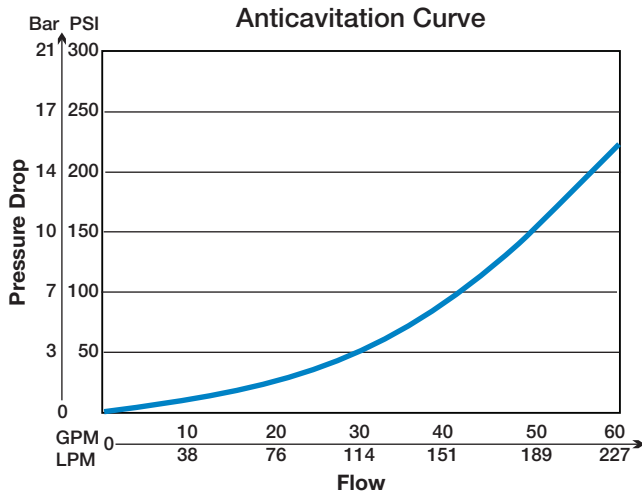
Description	SAE #	Thread Size	
		O-ring Boss (UNF)	BSPP
inlet, top	12	1 1/16-12	3/4"-14
inlet, side	12	1 1/16-12	3/4"-14
EH inlet, pilot	6	9/16-18	1/4"-19
outlet, top	12	1 1/16-12	3/4"-14
outlet, side	16	1 5/16-12	1"-11
work section	8	3/4-12	(none)
work section	10	7/8-14	1/2"-14

Solenoid Specifications

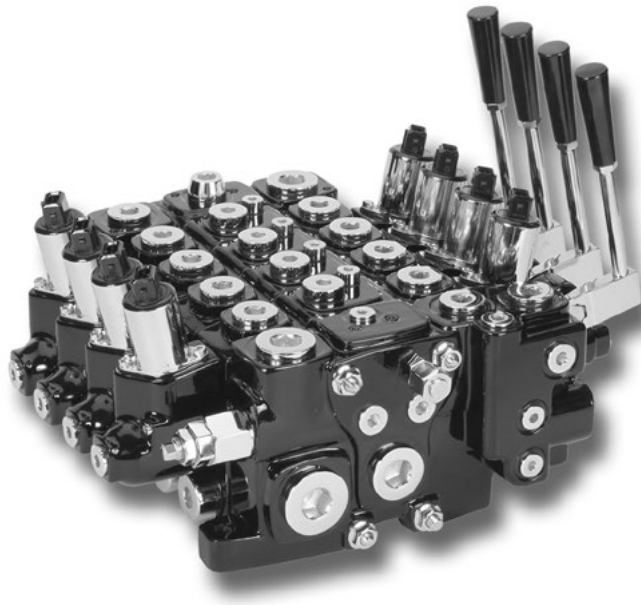
Voltage	12 or 24 VDC		
Pilot	35 Bar (508 PSI), 15-23 LPM (4-6 GPM)		
Current Input (I)	1.5A for 12 VDC 0.75A for 24 VDC		
Current (mA) for Spool Shift		12V	24V
	Start Shift	500	250
	Full Shift	1250	625
Insulation Material	Class H		
IP Rating	Connector IP67, Coil IP69		
Duty Cycle	100%		
R20 Ohm	5.3 (±5%) for 12 VDC 21.2 (±5%) for 24 VDC		
PWM Frequency	100hz ±10%		
Fluid Cleanliness (Pilot)	17/14 per ISO 4406		
Ambient Temperature	-30° to 80°C (-22° to 176°F)		
Fluid Temperature	-20° to 80°C (-4° to 176°F)		

VP120 Pre-Configured Module is Available in IQAN software package.





Note: Spool curves produced with nominal margin pressure of 17 Bar (250 PSI)



Major Valve Options

I. Circuits:

- A) LS – when individual pressure compensation isn't needed.
- B) PCLS with compensator. Also, both types of valves contain the load check which serves as a low leak transition check or when "induced loads"* are anticipated.

* Induced loads are actuators trying to force fluid back into valve.

II. Inlets:

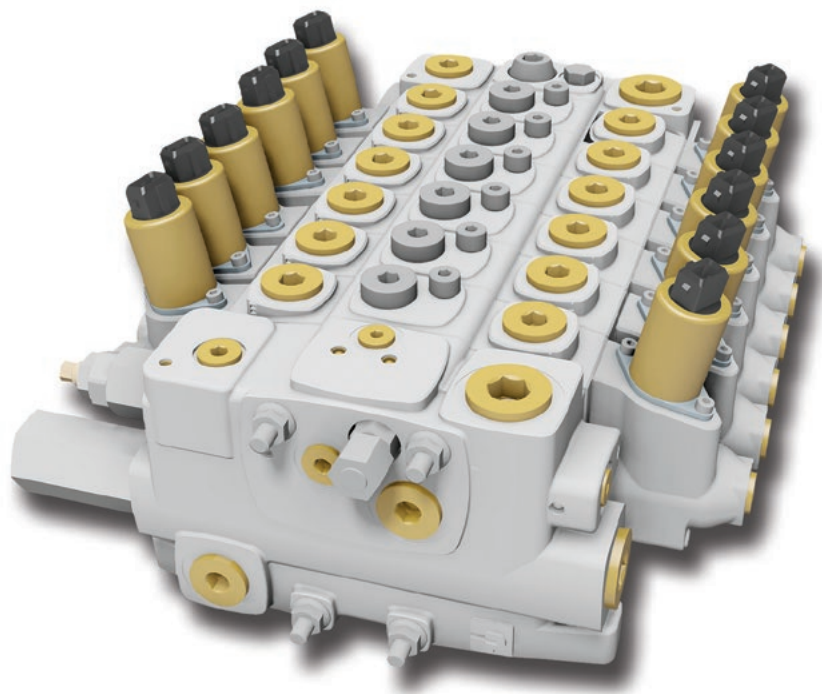
A) Combo – all spool operators. This also has the option for an external pilot supply in port if there is pilot supply available external to the valve for the solenoids.

B) "EC" – "external supply" to solenoids – port for connecting external supply to solenoids and drain port.

- Internal supply – reduced PSI to solenoids via internal pilot gallery.
 - Internal supply to solenoid operators.
- Joystick supply – reduced PSI to external port to supply joystick(s).
 - No internal pilot supply.
- Kidney loop – reduced PSI to an external pilot port. The pilot flow can then be routed to a filter and back into the valve. The signal is then routed to the solenoids via internal pilot gallery.

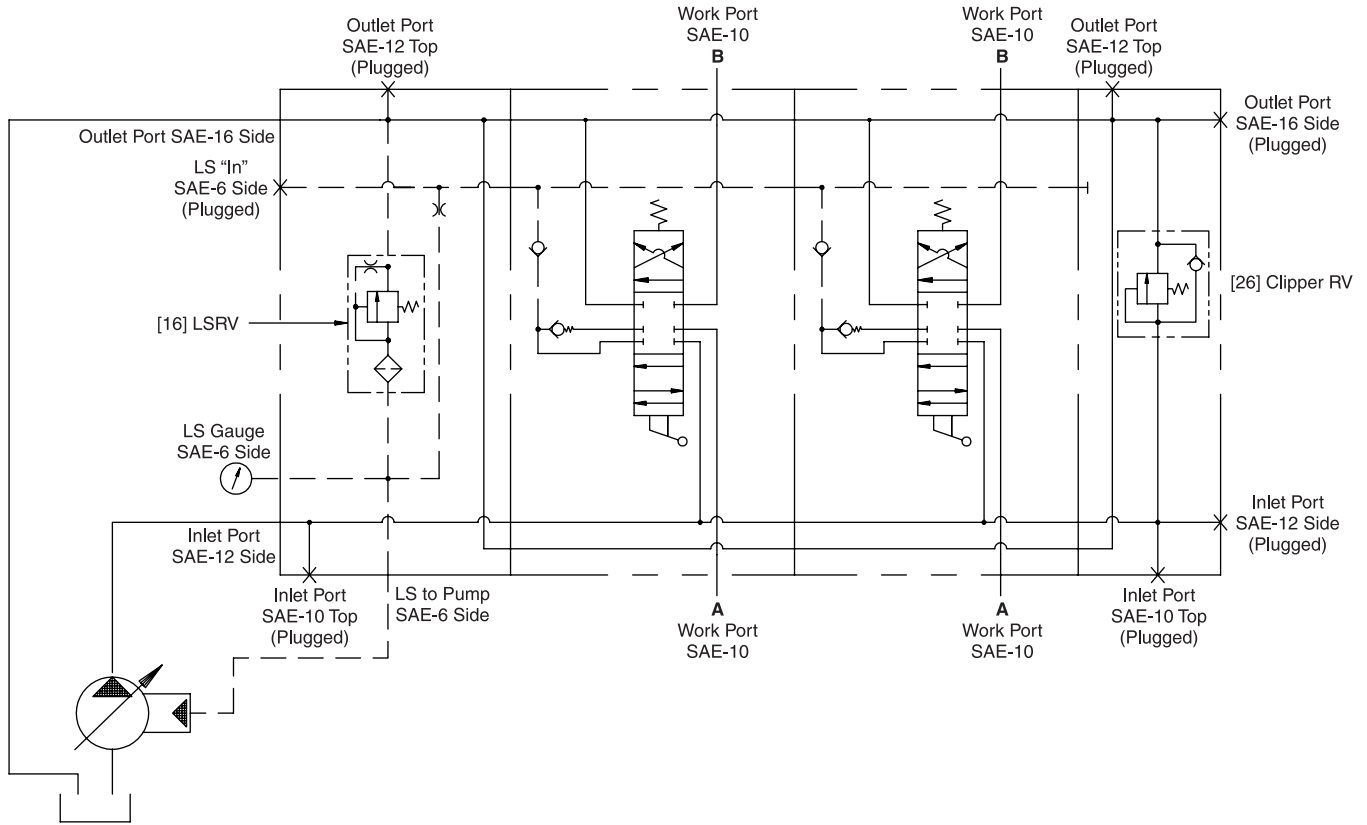
All 3 options have:

- a) PRRV and screen upstream of it.
- b) Accumulator port and check valve.
- c) Drain port for connection of solenoid drains.

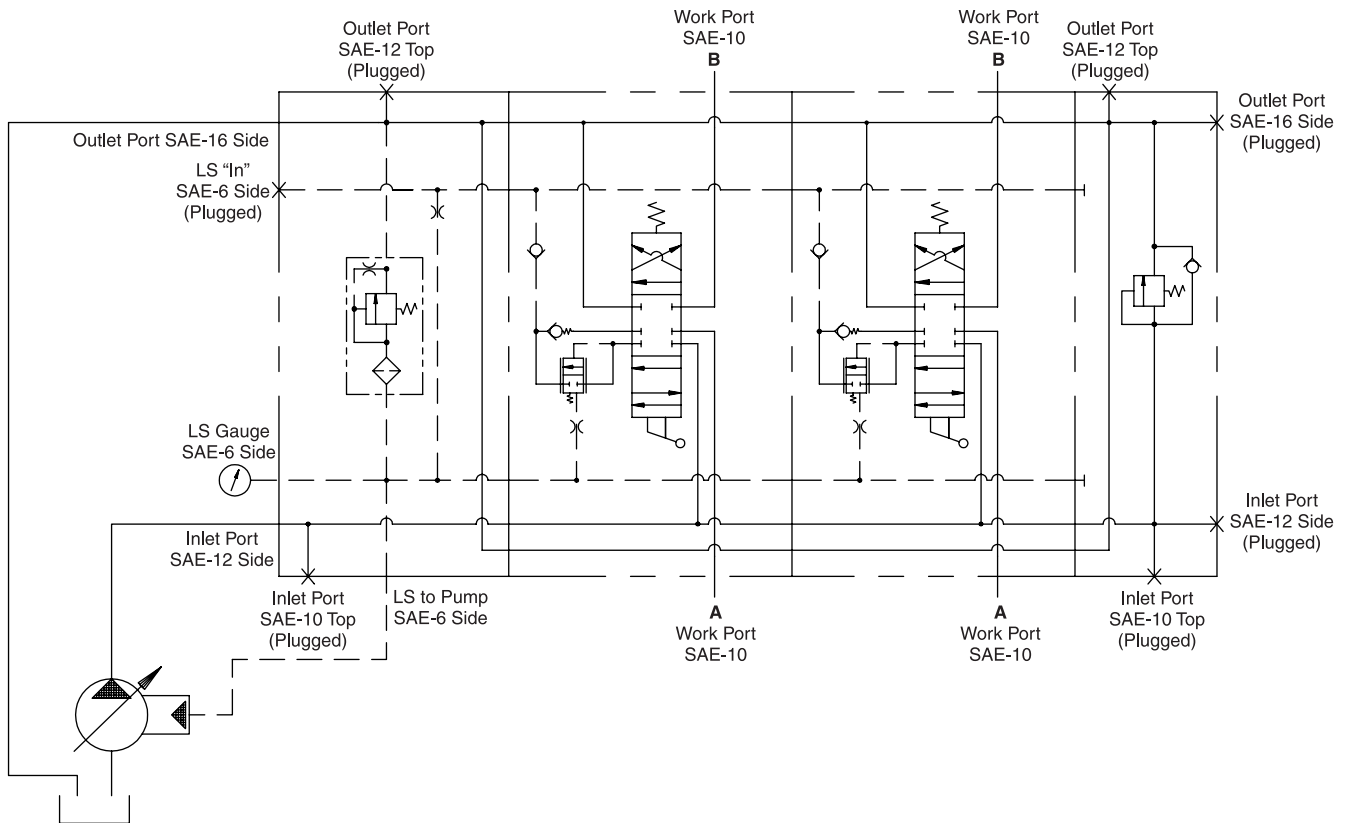


How VP120 May Be Arranged

Load-Sense Valve

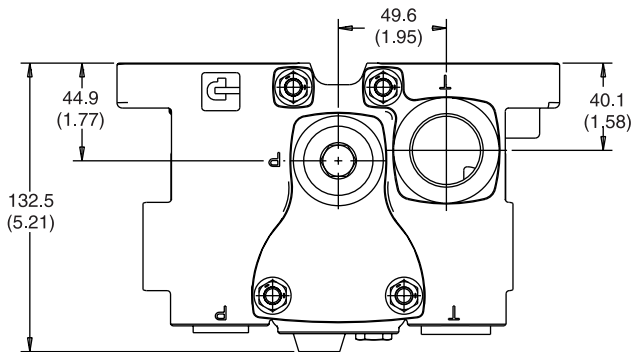


Pressure Compensated Load-Sense (PCLS)

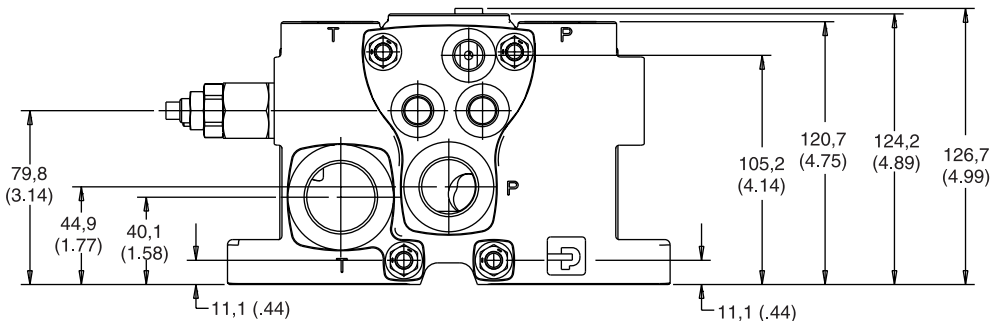
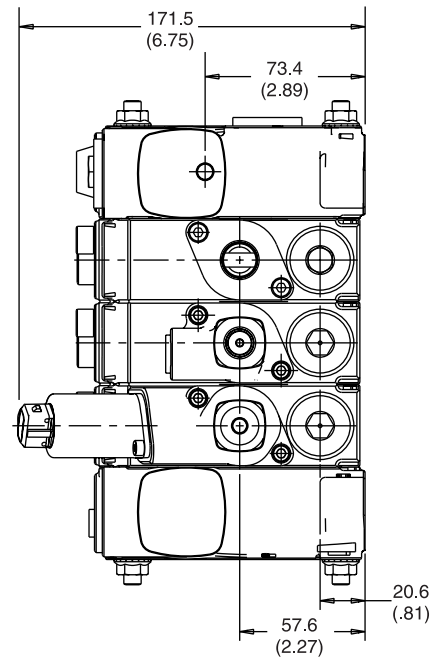
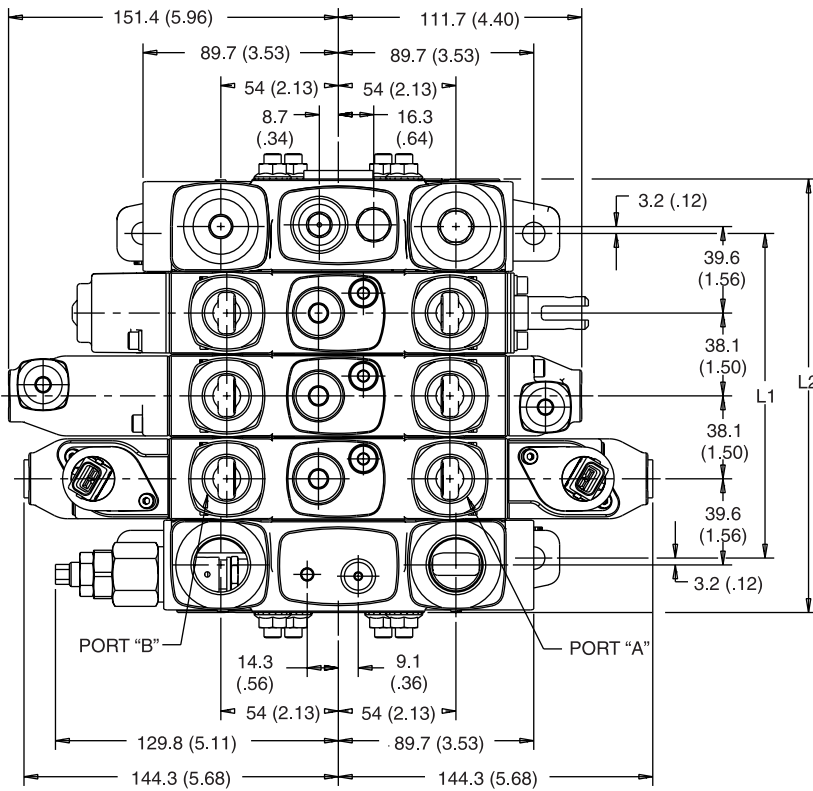


VP120 with Combination Inlet / Combination Outlet

Inch equivalents for millimeter dimensions are shown in (**)

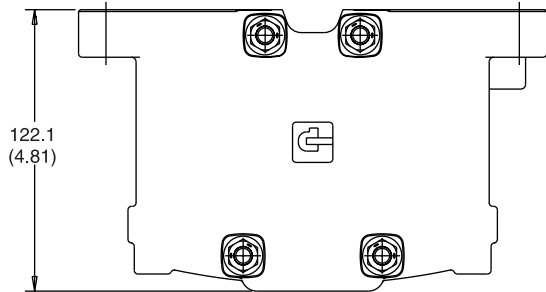


No. of Sections	L1 mm (inch)	L2 mm (inch)
1	72.8 (2.87)	122.8 (4.83)
2	110.9 (4.37)	160.9 (6.33)
3	149 (5.87)	199.0 (7.83)
4	187.1 (7.37)	237.1 (9.33)
5	225.2 (8.87)	275.2 (10.83)
6	263.3 (10.37)	313.3 (12.33)
7	301.4 (11.87)	351.4 (13.83)
8	339.5 (13.37)	389.5 (15.33)
9	377.6 (14.87)	427.6 (16.83)
10	415.3 (16.37)	465.7 (18.33)

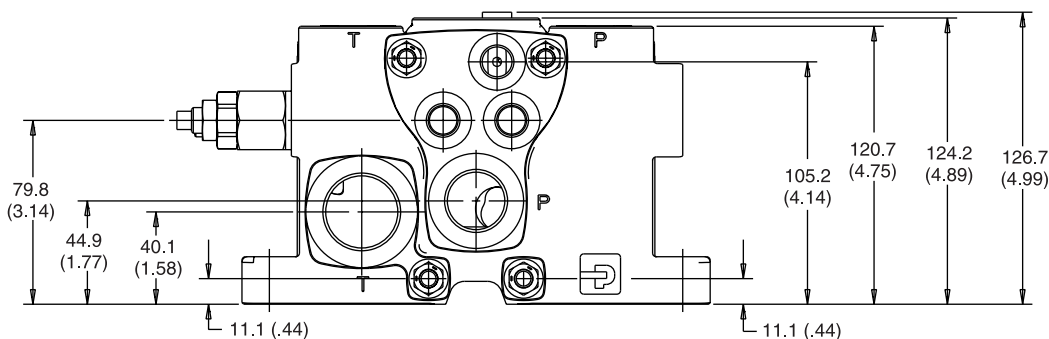
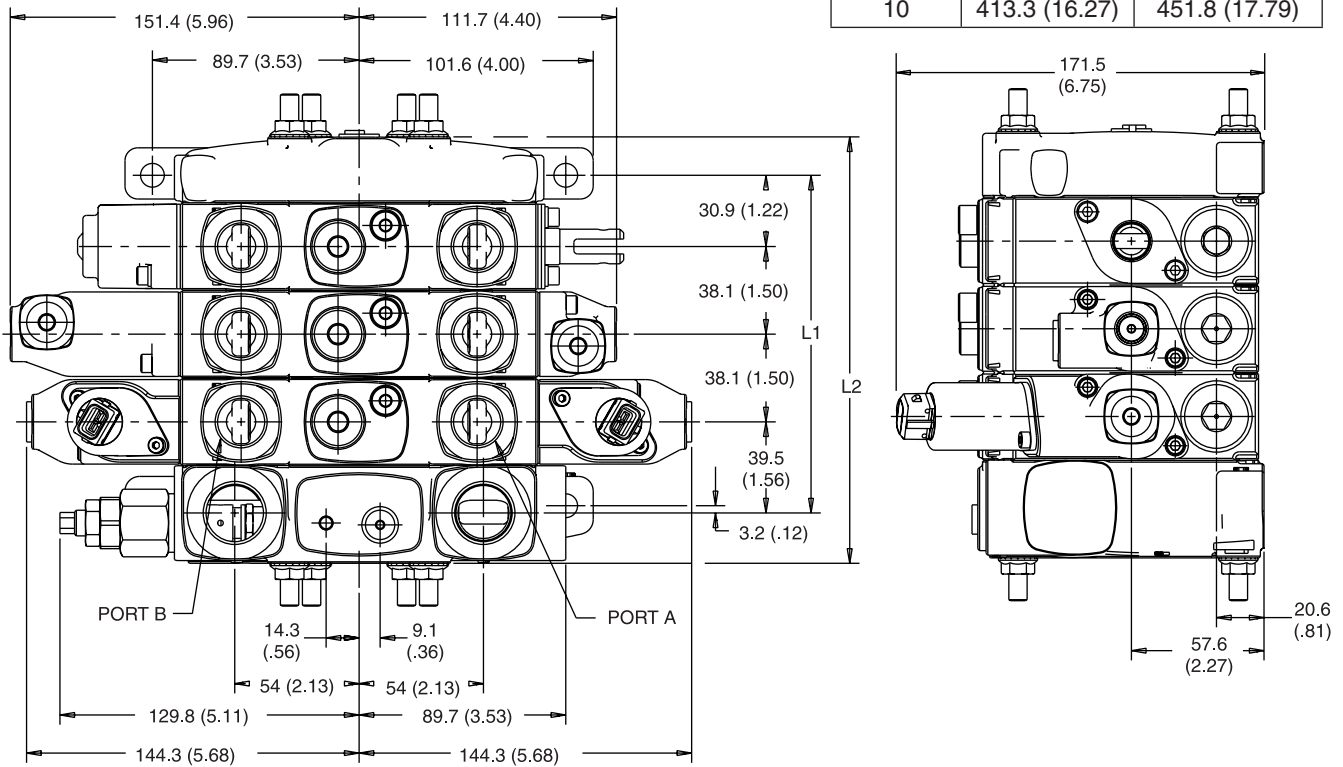


VP120 with Combination Inlet / Simple Outlet

Inch equivalents for millimeter dimensions are shown in (**)



No. of Sections	L1 mm (inch)	L2 mm (inch)
1	70.4 (2.77)	108.9 (4.29)
2	108.5 (4.27)	147.0 (5.79)
3	146.6 (5.77)	185.1 (7.29)
4	184.7 (7.27)	223.2 (8.79)
5	222.8 (8.77)	261.3 (10.29)
6	260.9 (10.27)	299.4 (11.79)
7	299.0 (11.77)	337.5 (13.29)
8	337.1 (13.27)	375.6 (14.79)
9	375.2 (14.77)	413.7 (16.29)
10	413.3 (16.27)	451.8 (17.79)



How to Configure a Valve Assembly

There are three choices available to configure a valve assembly: a hard copy specification sheet that is shown on page 32, an MS Excel spreadsheet version of this specification sheet and eSyber which is web based. Please contact your Parker representative or local distributor for additional information regarding these options.

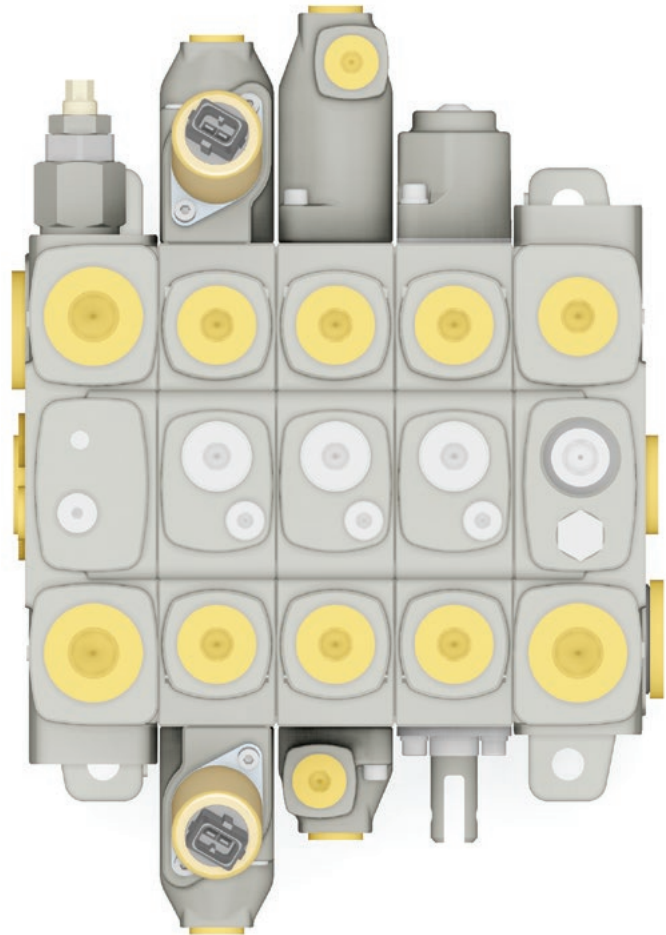
All of these choices involve selecting attributes or features for the system – inlet, work section and outlet. Each of the attributes is associated with a number or position that is shown in brackets [].

Customer Information

Position Code	Description
[D01]	Type of Market
[D02]	Market Segment
[D06]	Application
[D08]	Customer Product ID
[D19]	Customer Name
[D21]	Customer Contact

System Options

Position Code	Description
[P01]	Valve Type
PCLS	Pressure compensated load-sense
LS	Load-sense
[P03]	Margin Pressure Setting (Bar)
[P04]	Port Type
U	SAE
G	BSPP
[P05]	System Voltage
12	12 VDC
24	24 VDC
\	No solenoids
[P06]	Solenoid Connector Type
D	Deutsch
A1	Amp Jr.
A2	Amp Jr. with push pin override
\	No solenoids
[P07]	Surface Finish
X	No paint
P	Painted black
[P08]	Pump Flow to Inlet (LPM)
[P09]	Pump Pressure to Inlet (Bar)



PSI to Bar Reference Table

PSI	Bar
145	10
290	20
435	30
580	40
725	50
870	60
1015	70
1160	80
1305	90
1450	100
1595	110
1740	120
1885	130
2030	140

PSI	Bar
2175	150
2320	160
2465	170
2610	180
2755	190
2900	200
3045	210
3190	220
3335	230
3480	240
3625	250
3770	260
3916	270
4060	280

PSI	Bar
4205	290
4350	300
4495	310
4640	320
4785	330
4930	340
5075	350
5220	360
5365	370
5510	380
5655	390
5800	400

Inlet/Outlet Options

Inlets

[P15]	Inlet Section Type (ref. pages 15 – 17)
I	Standard Inlet
IEH	Pilot Generating Inlet
IPFD	Priority Flow Divider Inlet
[P16]	Load-Sense Relief Valve (ref. page 22)
LRSV1	Load-Sense Relief Valve with LS Drain
LRSV2	Load-Sense Relief Valve without LS Drain
LSRVY	Load-Sense Relief Valve Plug
[P17]	Load-Sense Relief Valve Setting
[P18]	Top Pump Port
P1B	Top Pump Port with a Steel Plug
P1	Top Pump Port Open
\	Top Pump Port Not Machined
[P19]	Side Pump Port
P2B	Side Pump Port with a Steel Plug
P2	Side Pump Port Open
[P20]	Top Tank Port
T1B	Top Tank Port with a Steel Plug
T1	Top Tank Port Open
PF	Priority Flow Port
[P21]	Side Tank Port
T2B	Side Tank Port with a Steel Plug
T2	Side Tank Port Open
[P22]	Load-Sense in Port (ref. page 22)
ILSPB	Load-Sense in Port with a Steel Plug
ILSP	Load-Sense in Port Open
ILSPCK	Load-Sense in Port with an Integrated Shuttle Check
\	Not Machined
[P23]	Pilot Supply in Port
IPSB	Pilot Supply in Port with a Steel Plug
IPS	Pilot Supply in Port Open
\	Not Machined
[P24F]	Priority Flow Setting in LPM
[P24]	Priority Flow Load-Sense Relief Valve
PFLS	Priority Flow Load-Sense Relief Valve
\	Not Machined
[P24S]	Priority Flow Load-Sense Relief Setting in Bar
[P25]	Pilot Out Port
IPOB	Pilot Out Port with a Steel Plug
IPO	Pilot Out Port Open
\	Not Machined
[P26]	Pilot Supply Accumulator Port
IACB	Pilot Supply Accumulator Port Plugged
IAC	Pilot Supply Accumulator Port Open
\	Not Machined
[P27]	Inlet Pilot Drain
ISDP	Inlet Pilot Drain Plugged
ISD	Inlet Pilot Drain Open

Outlets

[P30]	Outlet Section Type (ref. pages 18 – 21)
O	Standard Outlet
OS	Simple Outlet
OEH	Pilot Generating Outlet
OBC	Bypass Outlet
[P31]	Clipper Relief Valve
CRVY	Clipper Relief Valve Plugged
CRV	Fixed Clipper Relief Valve
[P31S]	Clipper Relief Setting (see chart on page 22)
[P33]	Solenoid Drain
SDB	Solenoid Drain with a Steel Plug
SD	Solenoid Drain Open
\	Not Machined
[P35]	Top Pump Port
P3B	Top Pump Port with a Steel Plug
P3	Top Pump Port Open
\	Not Machined
[P36]	Side Pump Port
P4B	Side Pump Port with a Steel Plug
P4	Side Pump Port Open
\	Not Machined
[P37]	Top Tank Port
T3B	Top Tank Port with a Steel Plug
T3	Top Tank Port Open
\	Not Machined
[P38]	Side Tank Port
T4B	Side Tank Port with a Steel Plug
T4	Side Tank Port Open
\	Not Machined
[P39]	Load-Sense in Port
OLSPB	Load-Sense in Port with a Steel Plug
OLSP	Load-Sense in Port Open
\	Not Machined
[P40]	Pilot Supply in Port
OPSB	Pilot Supply in Port with a Steel Plug
OPS	Pilot Supply in Port Open
\	Not Machined
[P43]	Pilot Out Port
OPOB	Pilot Out Port with a Steel Plug
OPO	Pilot Out Port Open
\	Not Machined
[P44]	Pilot Supply Accumulator Port
OACB	Pilot Supply Accumulator Port Plugged
OAC	Pilot Supply Accumulator Port Open
\	Not Machined

Note: Porting availability for inlet/outlet may be referenced on the page corresponding to the specific cover type.

Port Descriptions

Top Pump Port: The Top Pump Port is a direct pump to valve supply port and is used to connect the pressurized oil supply to the valve.

Side Pump Port: The Side Pump Port is a direct pump to valve supply port and is used to connect the pressurized oil supply to the valve.

Top Tank Port: The Top Tank Port is an oil exhaust port and is used to evacuate oil back to the system tank.

Side Tank Port: The Side Tank Port is an oil exhaust port and is used to evacuate oil back to the system tank.

Load-Sense in Port: The Load-Sense in Port is used when connecting two load-sensing valves together in the same system. This port can be configured to be open, plugged, or accept a shuttle check cartridge. The shuttle check cartridge will alleviate the need for an external shuttle check valve which is needed to communicate to the pump which valve assembly in the circuit is communicating the highest load-sense pressure.

Pilot Supply Port: The Pilot Supply Port can be configured to be open or plugged. Pilot flow and pressure is needed when using electrohydraulic solenoids to move the section spool. Often when pilot flow is needed the pilot generating inlet, which has an integrated pressure reducing valve to create the needed flow and pressure for the solenoids, is used and the pilot supply port is commonly used to return flow back to the VP120 assembly once it has been diverted through a kidney loop filter. However, in some instances when pilot flow and pressure is available from another component in the hydraulic system the pilot flow and pressure can be supplied to the valve assembly through pilot supply port configured with a non-pilot generating inlet or outlet.

Pilot Out Port: The Pilot Out option is available on the pilot generating inlet and will provide up to 8 LPM (2 GPM) at 35 Bar (500 PSI) for kidney loop filtration or auxiliary functions needing pilot flow.

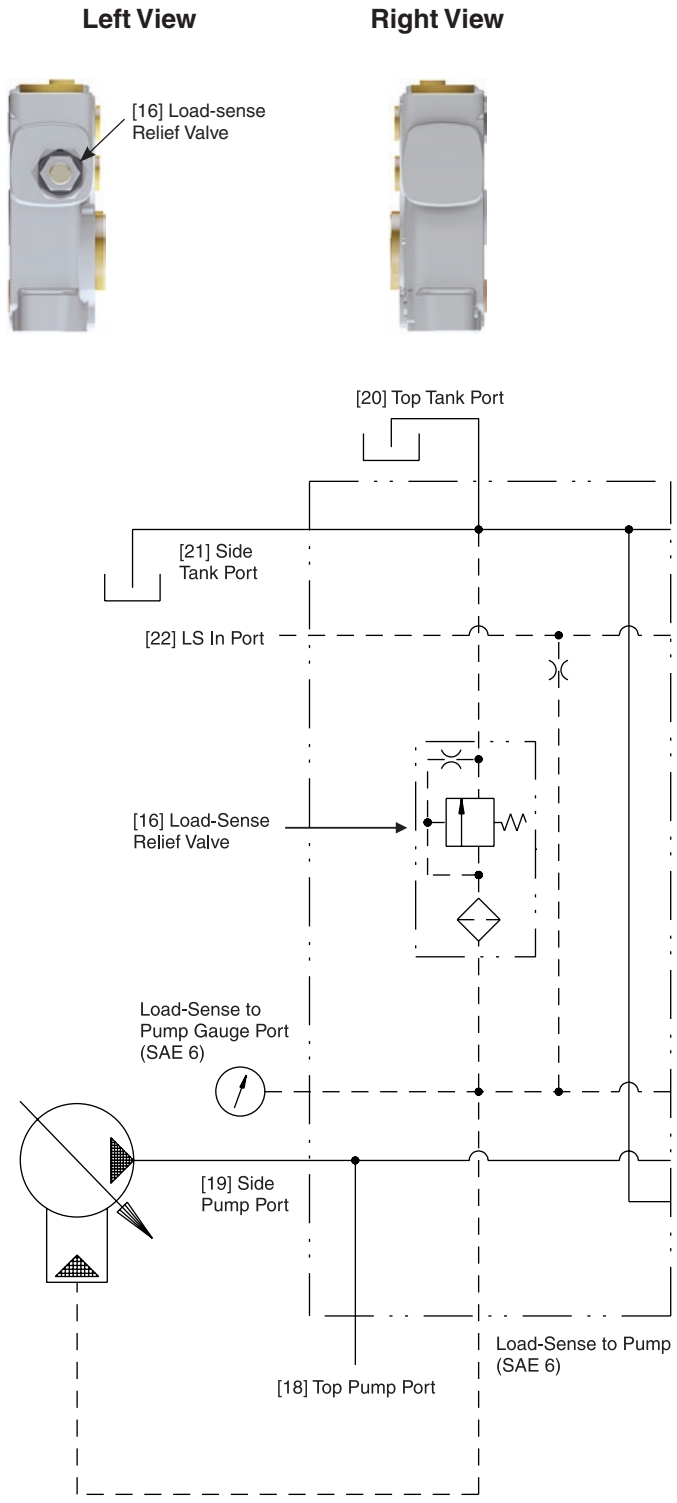
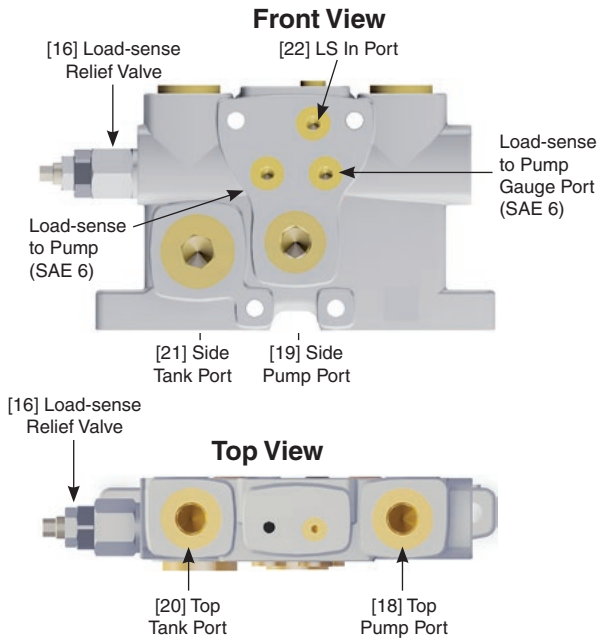
Accumulator Supply Port: The optional Accumulator Supply Port with check valve is meant for use with a standard accumulator for certain situations where standby flow and pressure may be needed.

Solenoid Drain Port: The Solenoid Drain Port is needed when using electrohydraulic solenoids with the VP120 and comes unplugged when the assembly is configured for electrohydraulic actuation. This port allows low pressure oil which is being removed from the solenoid end cap opposite of the end cap being supplied with pilot flow and pressure to drain. If this port is not used, pilot drain flow will become trapped within the valve assembly and the spool will not continue to shift properly. The solenoid drain port should be routed directly back to the tank and should not go through any kind of a return filter or other possible restriction as back pressure can cause damage to the VP120 solenoids.

I – [P15] Inlet Section Type

Standard Inlet

The standard inlet can be used with manual, hydraulic pilot, and electrohydraulic configurations. The pilot in port allows for solenoid pilot generation flow to be brought into the VP120 valve assembly from an external source.



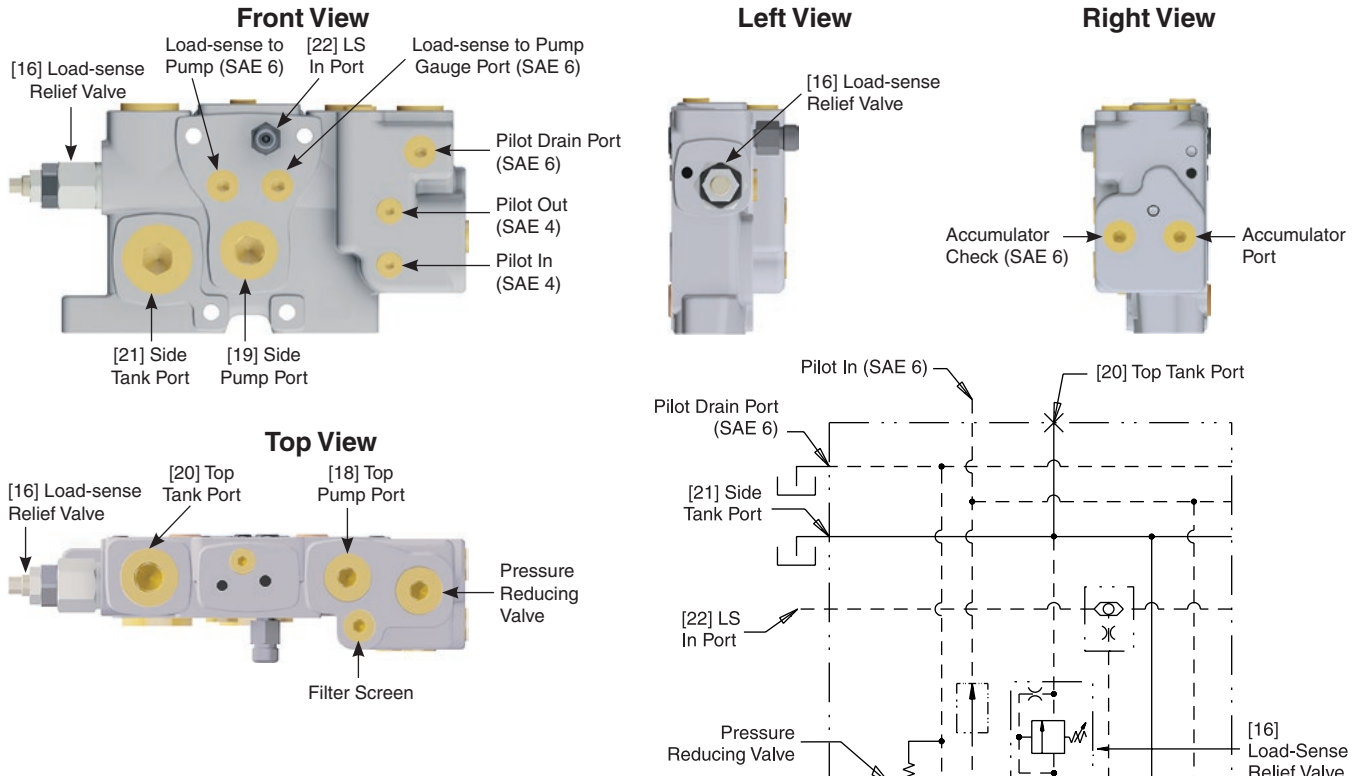
Port Options Available

[P18]	Top Pump Port SAE 10
P1B	Top Pump Port with a Steel Plug
P1	Top Pump Port Open
[P19]	Side Pump Port SAE 12
P2B	Side Pump Port with a Steel Plug
P2	Side Pump Port Open
[P20]	Top Tank Port SAE 12
T1B	Top Tank Port with a Steel Plug
T1	Top Tank Port Open
[P21]	Side Tank Port SAE 16
T2B	Side Tank Port with a Steel Plug
T2	Side Tank Port Open
[P22]	Load-Sense in Port SAE 6
ILSPB	Load-Sense in Port with a Steel Plug
ILSP	Load-Sense in Port Open
ILSPCK	Load-Sense in Port with an Integrated Shuttle Check
[P23]	Pilot Supply in Port SAE 6
IPSB	Pilot Supply in Port with a Steel Plug
IPS	Pilot Supply in Port Open
[P25]	Pilot Out Port
\	Not Machined
[P26]	Pilot Supply Accumulator Port
\	Not Machined

IEH – [P15] Inlet Section Type

Pilot Generating Inlet

The pilot generating inlet is mainly used when electrohydraulic sections are in use to provide pilot flow and pressure to the section solenoids. Other reasons for the inlet with internal pilot generation could be to generate pilot flow and pressure for external operations (i.e., hydraulic pilot controllers) or for kidney loop filtration. The inlet with internal pilot generation also contains an optional accumulator porting with check valve to provide a stand by flow and pressure for certain situations.



Port Options Available

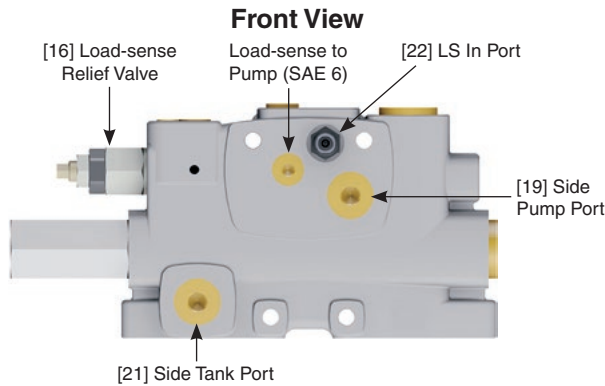
[P18]	Top Pump Port SAE 10
P1B	Top Pump Port with a Steel Plug
P1	Top Pump Port Open
[P19]	Side Pump Port SAE 12
P2B	Side Pump Port with a Steel Plug
P2	Side Pump Port Open
[P20]	Top Tank Port SAE 12
T1B	Top Tank Port with a Steel Plug
T1	Top Tank Port Open
[P21]	Side Tank Port SAE 16
T2B	Side Tank Port with a Steel Plug
T2	Side Tank Port Open
[P22]	Load-Sense in Port SAE 6
ILSPB	Load-Sense in Port with a Steel Plug
ILSP	Load-Sense in Port Open
ILSPCK	Load-Sense in Port with an Integrated Shuttle Check
[P23]	Pilot Supply in Port SAE 6
IPSB	Pilot Supply in Port with a Steel Plug
IPS	Pilot Supply in Port Open

[P25]	Pilot Out Port SAE 6
IPOB	Pilot Out Port with a Steel Plug
IPO	Pilot Out Port Open
[P26]	Pilot Supply Accumulator Port SAE 6
IACB	Pilot Supply Accumulator Port Plugged
IAC	Pilot Supply Accumulator Port Open
[P27]	Inlet Pilot Drain
ISDP	Inlet Pilot Drain Plugged
ISD	Inlet Pilot Drain Open

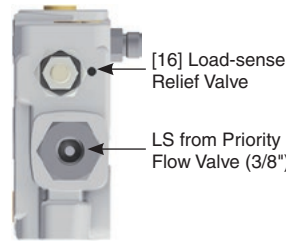
IPFD – [P15] Inlet Section Type

Priority Flow Inlet (Steering/Braking)

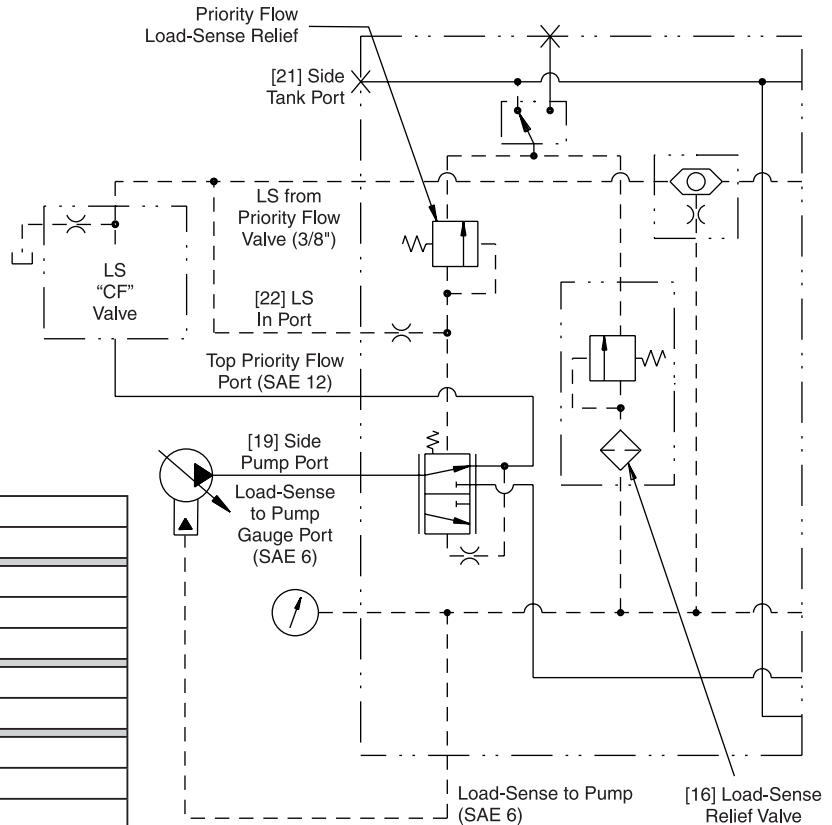
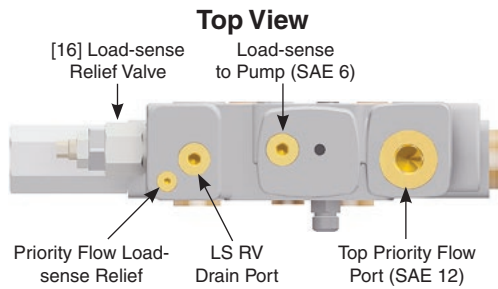
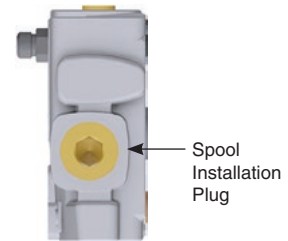
The priority flow inlet is used when an auxiliary function from the VP120 valve requires priority flow. The priority flow will always be used first and the remaining flow will be sent to the VP120 sections for use. The priority flow's pressure can be controlled either by an external relief valve or a built in load-sense relief valve which will limit the pressure for just the priority flow being diverted from the VP120 assembly. If choosing the priority flow inlet please use the notes section at the bottom of the specification sheet to note what priority flow rate is required and if a priority LS relief is required (pressure should be included).



Left View



Right View



Port Options Available

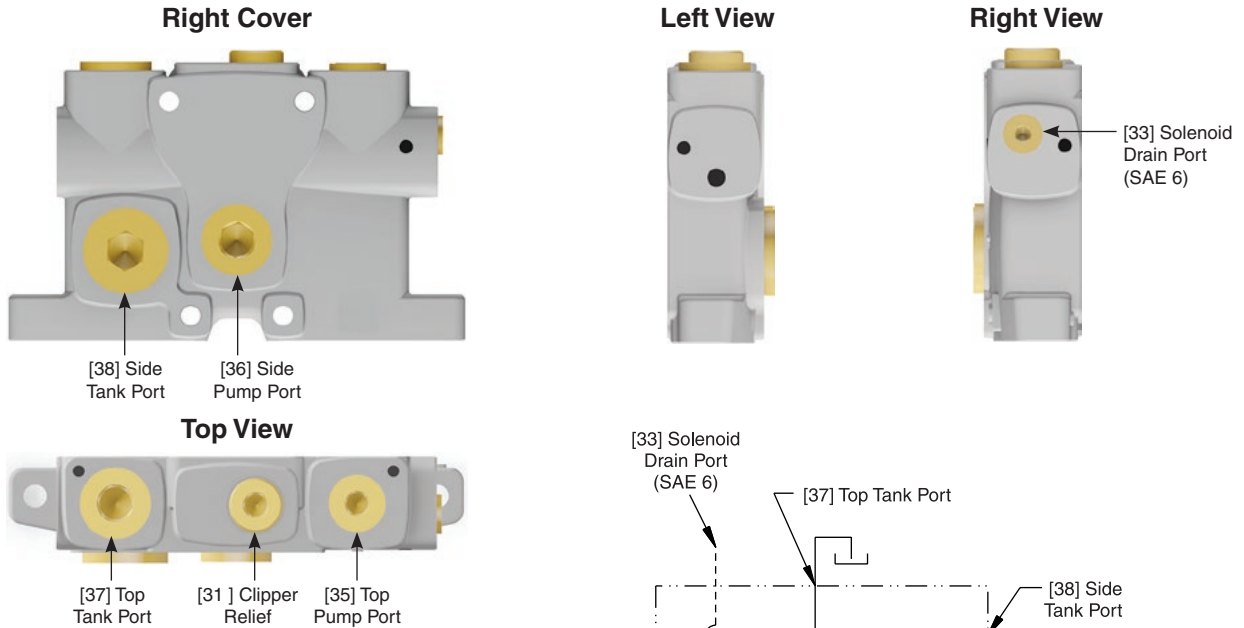
[P18]	Top Pump Port
\	Top Pump Port Not Machined
[P19]	Side Pump Port SAE 12
P2B	Side Pump Port with a Steel Plug
P2	Side Pump Port Open
[P20]	Top Tank Port SAE 12
PF	Priority Flow Port
[P21]	Side Tank Port SAE 12
T2B	Side Tank Port with a Steel Plug
T2	Side Tank Port Open
[P22]	Load-Sense in Port SAE 6
ILSPB	Load-Sense in Port with a Steel Plug
ILSP	Load-Sense in Port Open
ILSPCK	Load-Sense in Port with an Integrated Shuttle Check
[P23]	Pilot Supply in Port SAE 6
IPSB	Pilot Supply in Port with a Steel Plug
IPS	Pilot Supply in Port Open
[P24F]	Priority Flow Setting in LPM

[P24]	Priority Flow Load-Sense Relief Valve
PFLS	Priority Flow Load-Sense Relief Valve
\	Not Machined
[P24S]	Priority Flow Load-Sense Relief Setting in Bar
[P25]	Pilot Out Port
\	Not Machined
[P26]	Pilot Supply Accumulator Port
\	Not Machined

O – [P30] Outlet Section Type

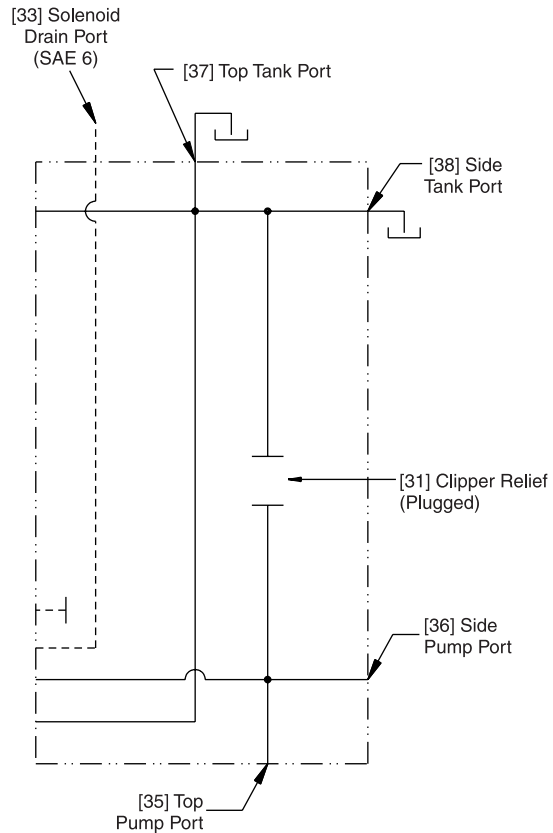
Standard Outlet

The standard outlet can be used with manual, hydraulic pilot, and electro-hydraulic actuation. All standard outlets contain a mandatory pilot drain port in the cover, which can be plugged if pilot flow will be drained from an inlet cover.



Port Options Available

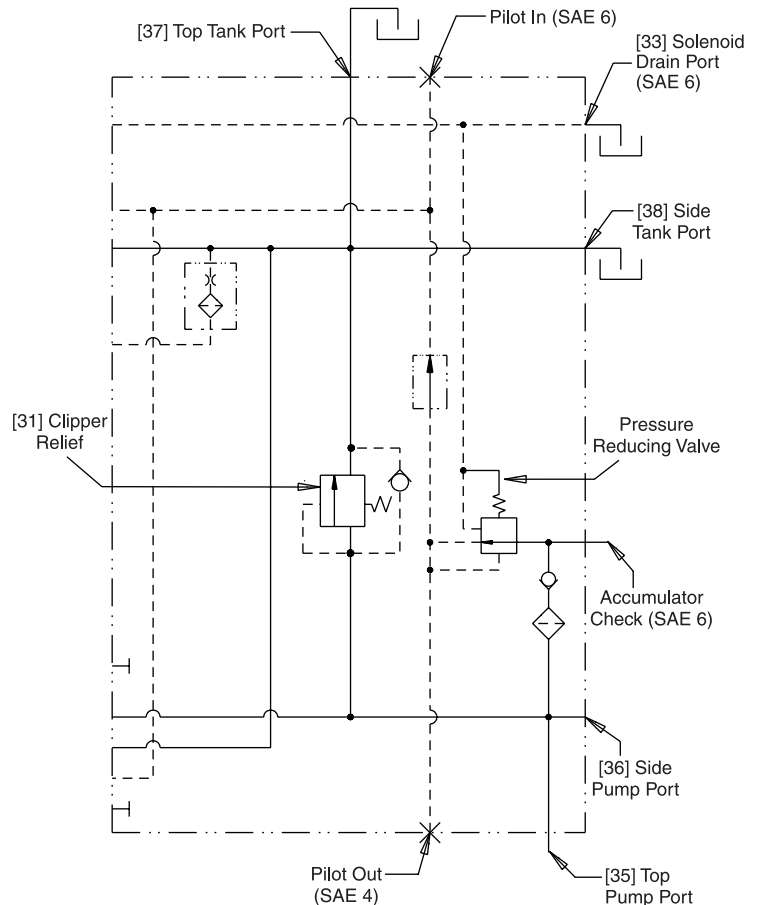
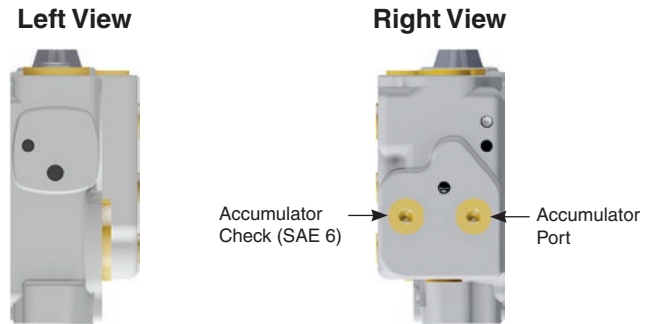
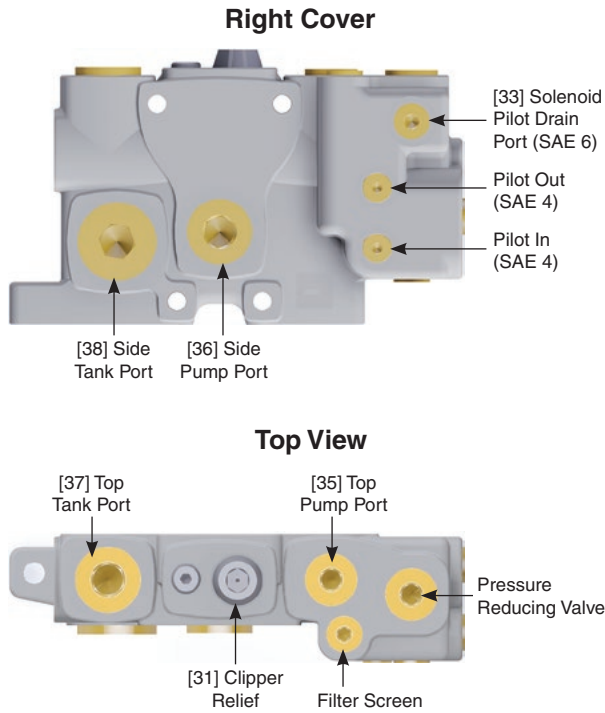
[P33]	Solenoid Drain SAE 6
SDB	Solenoid Drain with a Steel Plug
SD	Solenoid Drain Open
[P35]	Top Pump Port SAE 10
P3B	Top Pump Port with a Steel Plug
P3	Top Pump Port Open
[P36]	Side Pump Port SAE 12
P4B	Side Pump Port with a Steel Plug
P4	Side Pump Port Open
[P37]	Top Tank Port SAE 12
T3B	Top Tank Port with a Steel Plug
T3	Top Tank Port Open
[P38]	Side Tank Port SAE 16
T4B	Side Tank Port with a Steel Plug
T4	Side Tank Port Open
[P39]	Load-Sense in Port
\	Not Machined
[P40]	Pilot Supply in Port
\	Not Machined
[P43]	Pilot Out Port
\	Not Machined
[P44]	Pilot Supply Accumulator Port
\	Not Machined



OEH – [P30] Outlet Section Type

Pilot Generating Outlet

The pilot generating outlet is mainly used when electrohydraulic sections are in use to provide pilot flow and pressure to the section solenoids. Please note only one pilot generating outlet should be used, if already used as an inlet then the outlet option is not available. Other reasons the outlet with internal pilot generation could be to generate pilot flow and pressure for external operations (i.e., hydraulic pilot controllers) or for kidney loop filtration. All pilot generating outlets contain a mandatory pilot drain port in the cover which can be plugged if pilot flow will be drained from an inlet cover.



Port Options Available

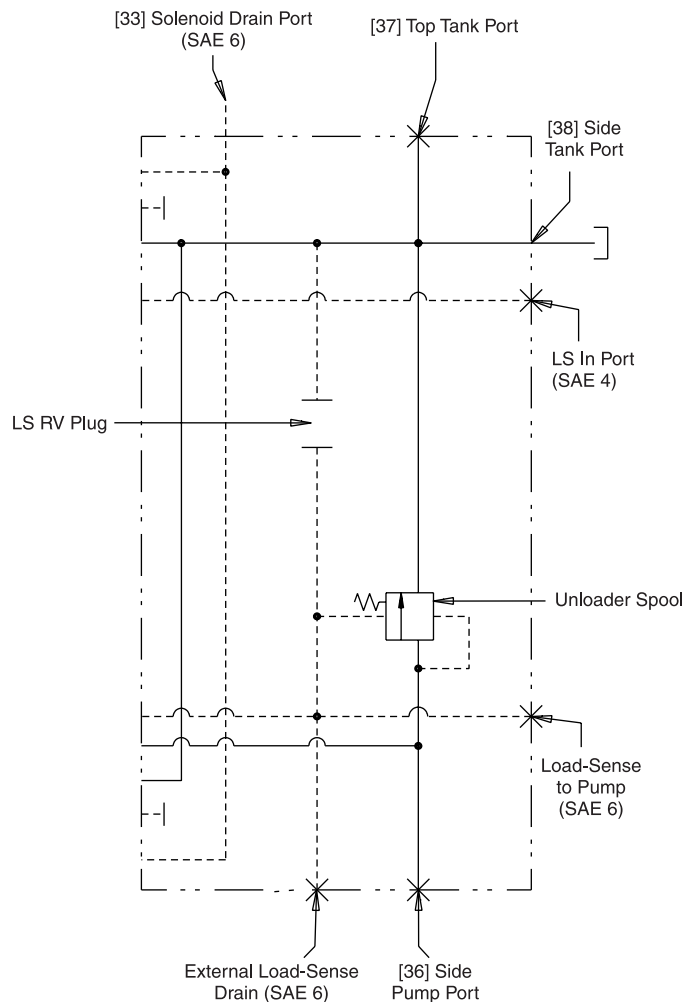
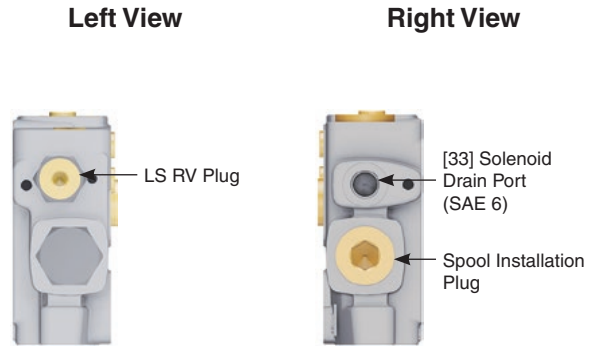
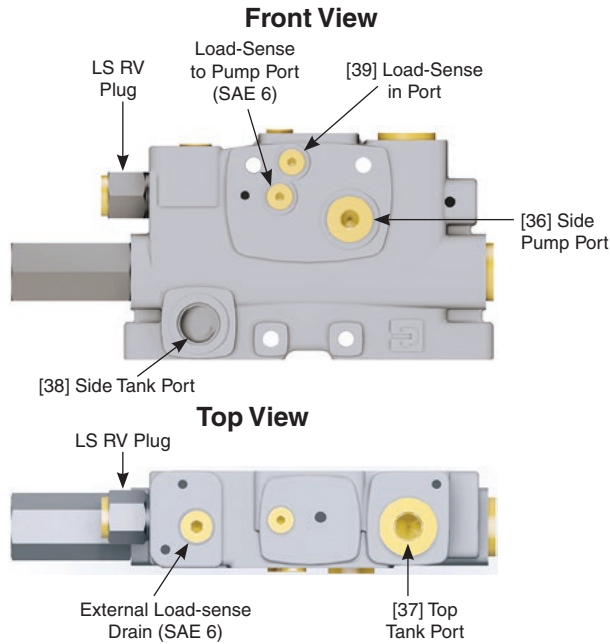
[P33]	Solenoid Drain SAE 6
SDB	Solenoid Drain with a Steel Plug
SD	Solenoid Drain Open
[P35]	Top Pump Port SAE 10
P3B	Top Pump Port with a Steel Plug
P3	Top Pump Port Open
[P36]	Side Pump Port SAE 12
P4B	Side Pump Port with a Steel Plug
P4	Side Pump Port Open
[P37]	Top Tank Port SAE 12
T3B	Top Tank Port with a Steel Plug
T3	Top Tank Port Open
[P38]	Side Tank Port SAE 16
T4B	Side Tank Port with a Steel Plug
T4	Side Tank Port Open
[P39]	Load-Sense in Port
\	Not Machined
[P40]	Pilot Supply in Port SAE 6
OPSB	Pilot Supply in Port with a Steel Plug
OPS	Pilot Supply in Port Open

[P43]	Pilot Out Port SAE 6
OPOB	Pilot Out Port with a Steel Plug
OPO	Pilot Out Port Open
[P44]	Pilot Supply Accumulator Port SAE 6
OACB	Pilot Supply Accumulator Port Plugged
OAC	Pilot Supply Accumulator Port Open

OBC – [P30] Outlet Section Type

Bypass Compensator Outlet

Bypass compensated outlets allow for the use of a fixed displacement pump with a closed center load sensing VP120 assembly. The spool type designed bypass compensator will proportionally unload the unneeded flow to the tank galley of the VP120 assembly when only a portion or no flow is required by the sections. All bypass compensated outlets contain a mandatory pilot drain port in the cover which can be plugged if pilot flow will be drained from an inlet cover.



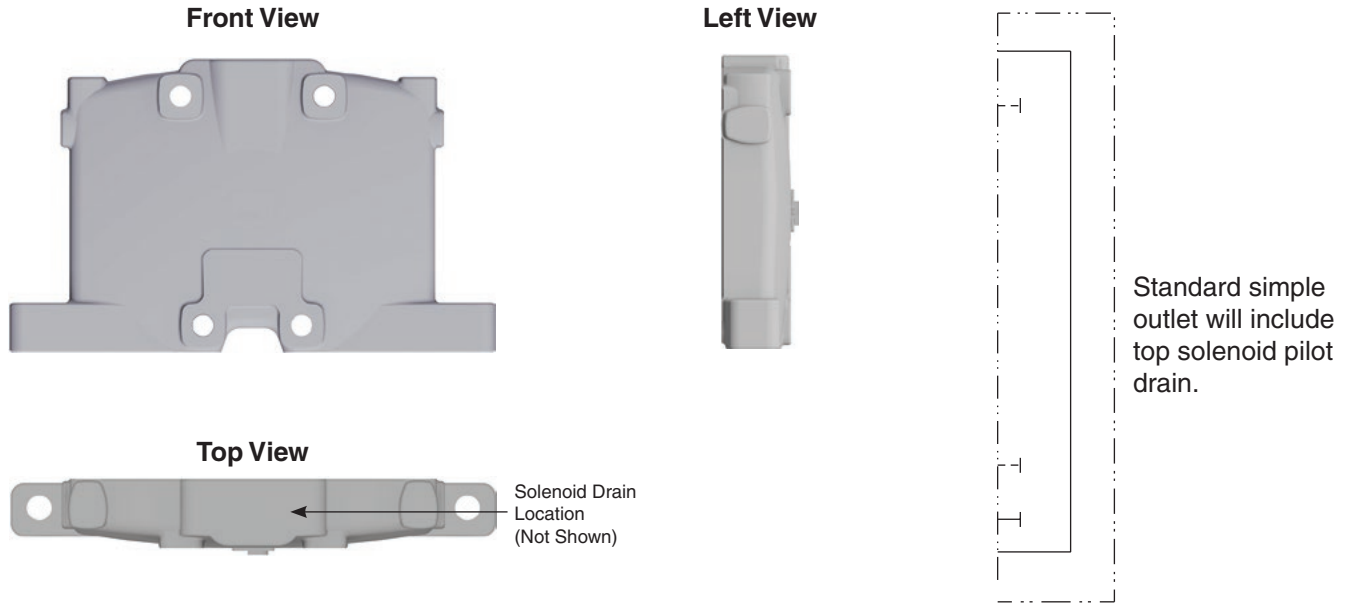
Port Options Available

[P33]	Solenoid Drain SAE 6
SDB	Solenoid Drain with a Steel Plug
SD	Solenoid Drain Open
[P35]	Top Pump Port
\	Not Machined
[P36]	Side Pump Port SAE 10
P4B	Side Pump Port with a Steel Plug
P4	Side Pump Port Open
[P37]	Top Tank Port SAE 12
T3B	Top Tank Port with a Steel Plug
T3	Top Tank Port Open
[P38]	Side Tank Port SAE 12
T4B	Side Tank Port with a Steel Plug
T4	Side Tank Port Open
[P39]	Load-Sense in Port SAE 6
OLSPB	Load-Sense in Port with a Steel Plug
OLSP	Load-Sense in Port Open
[P40]	Pilot Supply in Port
\	Not Machined
[P43]	Pilot Out Port
\	Not Machined
[P44]	Pilot Supply Accumulator Port
\	Not Machined

OS – [P30] Outlet Section Type

Simple Outlet

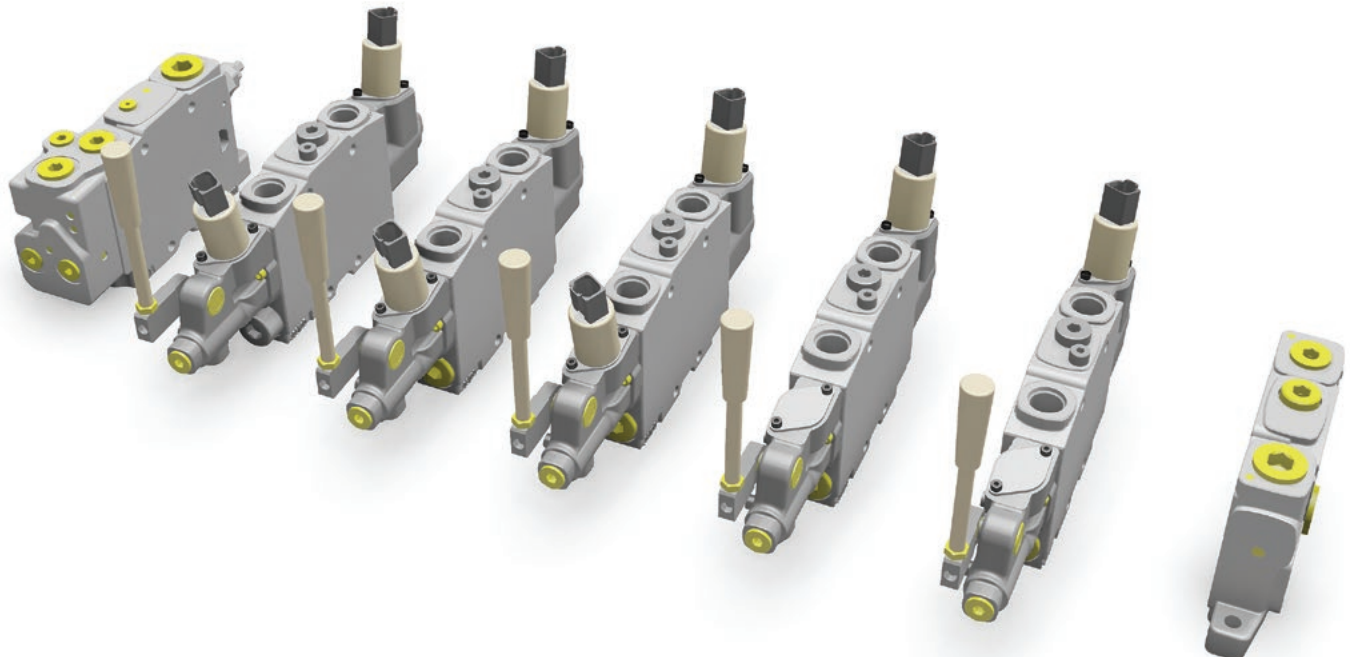
Simple outlets blank off the outlet side of the valve and force the flow to enter and exit the valve in the inlet cover.



[P35-P38] Pressure/ Porting Options

Code	Description
/	No port options available

Pilot Drain Port is standard on simple outlets and must be used in one location on the VP120 assembly to relieve pilot drain flow.



Load-Sense Relief Valve

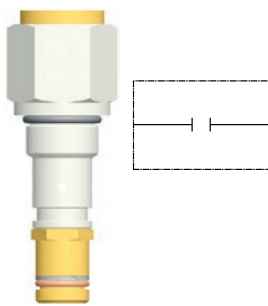
The Load-Sense Relief Valve limits the load-sense pressure which will limit the pressure the valve assembly is able to achieve. The load-sense relief pressure should be set to the pressure desired at the workport.

The load-sense relief valve comes in three standard configurations, as shown below.

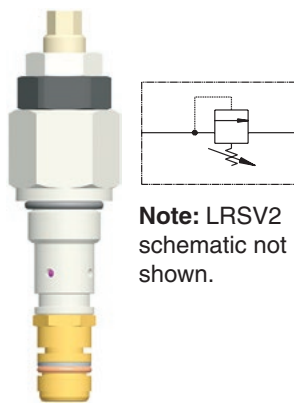
Code	Description
LSRV1	Pressure adjustable and includes an integrated load-sense bleed or drain.
LSRV2	Pressure adjustable but does not include an integrated load-sense bleed or drain.
LSRVY	A load-sense defeat plug and should be combined with another load-sense relief somewhere in the hydraulic system.

[P16] Load-Sense Relief Valve

Code Y



Codes LSRV and LSRV2



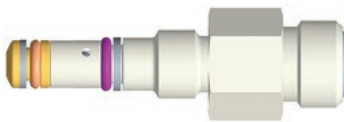
Adjustable Pressure Setting Range Reference (Use Bar for coding)

Bar (PSI)	Bar (PSI)
180 (2600)	220 (3200)
185 (2700)	230 (3300)
195 (2800)	235 (3400)
200 (2900)	240 (3500)
205 (3000)	250 (3600)
215 (3100)	255 (3700)
	260 (3800)

Example: If the LSRV is set at 260 Bar (3800 PSI) plus 17 Bar (250 PSI) (pump margin) then the pump is at 277 Bar (4017PSI).

[P22] Load-Sense in Port

The External LS in cavity can be configured to be open, plugged, or accept a shuttle check cartridge. The shuttle check cartridge can be used when connecting two LS valves and will alleviate the need for an external shuttle check valve in the circuit. (Available on Standard, EH, and PBL Inlet Covers)



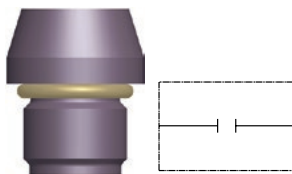
Code	Description
LSP	SAE 6 LS In Open
LSPCK	SAE 6 LS In with Shuttle Cartridge
LSPB	SAE 6 LS In Port Steel Plug

Clipper Relief Valve

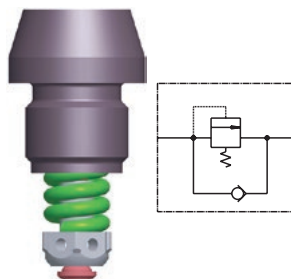
The clipper relief valve is used for additional protection against pressure spikes in the pump supply line.

[P31] Clipper Relief Valve

Code Y



Code PA



Pressure Setting (Use Bar for coding)

Bar (PSI)	Bar (PSI)	Bar (PSI)
25 (363)	140 (2030)	260 (3770)
32 (464)	160 (2320)	270 (3915)
40 (580)	175 (2538)	280 (4060)
50 (725)	190 (2755)	300 (4350)
63 (914)	210 (3045)	330 (4785)
80 (1160)	225 (3263)	
100 (1450)	230 (3335)	
125 (1813)	250 (3625)	

Note: Not available on simple or OBC outlets.

Work Section Attributes

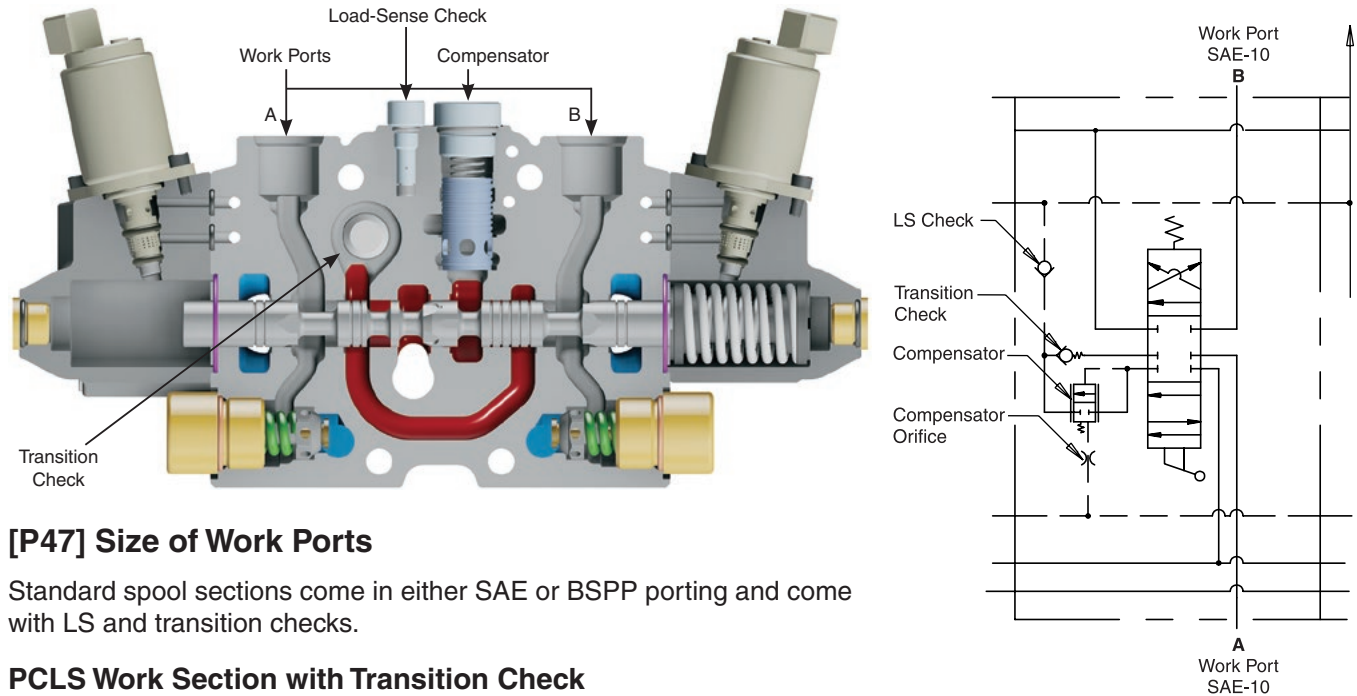
[P47]	Size of Work Ports (ref. page 24)
WP2001	SAE 10 Work Ports
WP2002	1/2" BSPP Porting
[P50]	Spool Positioner (ref. pages 24 – 25)
C1	Manual 3-Position Spring Centered
C2	Manual 3-Position Detent
C3	Manual Detent Port A
C4	Manual Detent Port B
C5	Manual 4th Position Float Port A
PC	Hydraulic Remote 3-Position
PCF	Hydraulic Remote 4th Position Float A Port
PCH	Hydraulic Remote 3-Position with Handle
EC	Electrohydraulic 3-Position
ECF	Electrohydraulic 4th Position Float
ECH	Electrohydraulic 3-Position with Handle
[P51]	Manual Operator (ref. page 25)
L1	Lug End Only
L3	Bonnet Style Manual Handle
L4	ECH/PCH Handle
L5	ECH/PCH No Handle
\	Not Applicable
[P55A]/ [P55B]	Solenoid Orifice (ref. page 26)
0.6	Solenoid Pilot Orifice 0.6 mm
0.7	Solenoid Pilot Orifice 0.7 mm
0.8	Solenoid Pilot Orifice 0.8 mm
0.9	Solenoid Pilot Orifice 0.9 mm
1.0	(Std) Solenoid Pilot Orifice 1.0 mm
1.1	Solenoid Pilot Orifice 1.1 mm
1.2	Solenoid Pilot Orifice 1.2 mm
1.3	Solenoid Pilot Orifice 1.3 mm
2.0	Solenoid Pilot Orifice 2.0 mm (No Restriction)
\	Not Applicable
[P60]	Spool Function (ref. page 27)
D	Double-Acting 3-Position, 4-Way Cylinder Spool
M	Double-Acting 3-Position, 4-Way Motor Spool
DEB	Double-Acting 3-Position, 4-Way Cylinder Spool
MEB	Double-Acting 3-Position, 4-Way Motor Spool
MA	Single-Acting 2-Position, 3-Way Motor Spool (Port A)

Continued in next column

[P60]	Spool Function (ref. page 27) [Continued]
MB	Single-Acting 2-Position, 3-Way Motor Spool (Port B)
F	Double-Acting 4th Position Float Spool (Port B)
R	Double-Acting 3-Position Regeneration Spool
B	Double-Acting 3-Position, 4-Way Bleeder Spool Ports A and B
BA	Double-Acting 3-Position, 4-Way Bleeder Spool Port A
BB	Double-Acting 3-Position, 4-Way Bleeder Spool Port B
[P64]	Spool Force Feedback (ref. page 27) (Available in Custom Spool List)
[P69]	Spool Flow Rate at Full Stroke
15/4	15 LPM (4 GPM)
30/8	30 LPM (8 GPM)
45/12	45 LPM (12 GPM)
68/18	68 LPM (18 GPM)
90/24	90 LPM (24 GPM)
120/32	120 LPM (32 GPM)
Full	Full Flow
(Code)	Spool code from spool list
[P70]	Custom Spool Code (Please see Custom Spool List)
[P72A]/ [P72B]	Stroke Limiters (ref. page 27)
Qset	Stroke Limiter A and B Side
QsetA	Stroke Limiter on A Side
QsetB	Stroke Limiter on B Side
Y	No Stroke Limiters
[P76A]/ [P76B]	Port Accessory (ref. page 28)
PA	Port Relief Valve with Anti-Cavitation Check
N2	Anti-Cavitation Check
Y2	Relief Cavity Plug (Closed to Tank)
X2	Relief Cavity Plug (Open to Tank)
[P76AS]/ [P76BS]	Port Relief Valve Setting (Please See Port RV Setting Options on page 28)
[P77]	Pressure Limited Flow (ref. pages 28 – 29)
PLQ	Pressure Limited Flow
PLQN	No PLQ
[P77S]	PLQ Setting (Please see PLQ Setting Options on page 29)

Work Section Attributes

Work sections are available in 3-way, 3-position (cylinder and motor), a 4-way, 3-position (cylinder and motor), and a 4-position float. There are six flow ranges available for each spool type. These spools are based upon a valve margin pressure of 17 Bar (250 PSI). Spool positioners are manual, hydraulic remote and solenoid.



[P47] Size of Work Ports

Standard spool sections come in either SAE or BSPP porting and come with LS and transition checks.

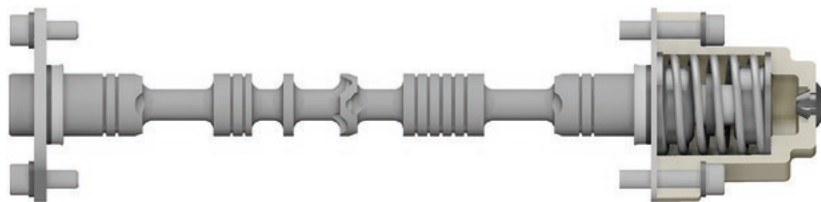
PCLS Work Section with Transition Check

[P50] Spool Positioner

The section positioner refers to the section bonnet options and what options are available in the bonnet. All sections come with a spring pack to create a default to neutral setting if no actuation is occurring and the spool is not being influenced by the bonnet (example, detented positioners).

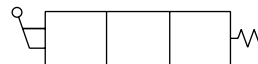
Code C*

Basic Function: Return spool to neutral position from either work port position when handle is released. Manual handle operation.



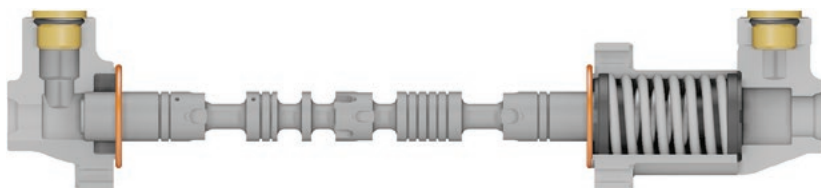
Code C* Options

Code	Description
C1	Manual 3-Position Spring Return
C2	Manual 3-Position Detent
C3	Manual 3-Position Detent In (Port A Flow)
C4	Manual 3-Position Detent Out (Port B Flow)
C5	Manual 4-Position Float with Detent (Port A Flow)



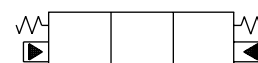
Code PC = Hydraulic Remote (Proportional)

Basic Function: Proportional hydraulic pilot PSI is admitted to port (PCL4) and balances against metering/return springs. Use metering band of PCL4 for best match.



Code PC* Options

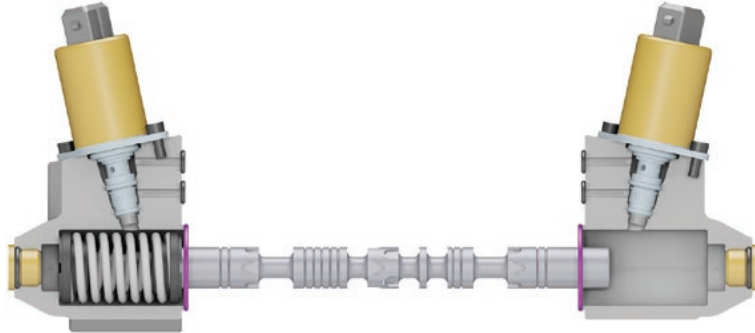
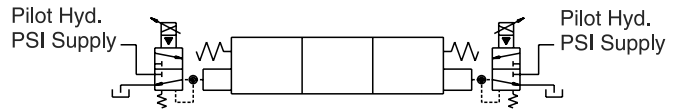
Code	Description
PC	Hydraulic Remote
PCF	Hydraulic Remote with 4th Position Float
PCH	Hydraulic Remote with Manual Handle



[P50] Spool Positioner (Continued)

Code EC = Proportional Solenoid, 3-Position

Basic Function: Proportional spool movement via proportional current to solenoid (ref. IQAN).

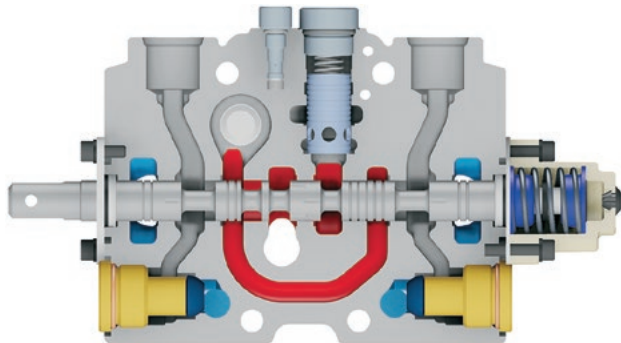


Code EC* Options

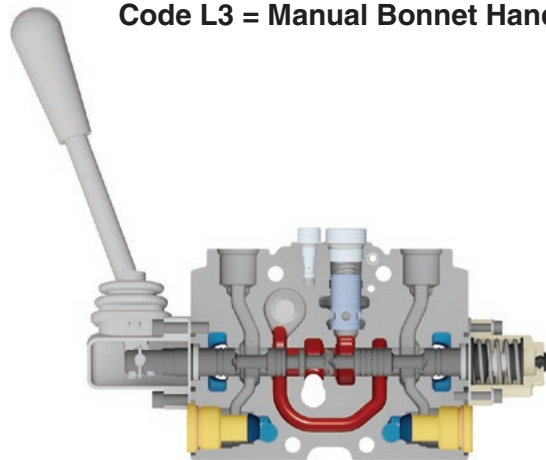
Code	Description
EC	Proportional Solenoid, 3-Position
ECF	Electrohydraulic with 4th Position Float
ECH	Electrohydraulic with Manual Handle

[P51] Manual Operator

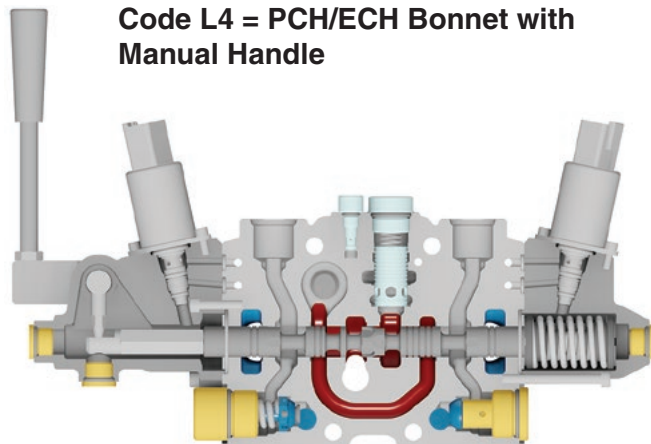
Code L1 = Lug End



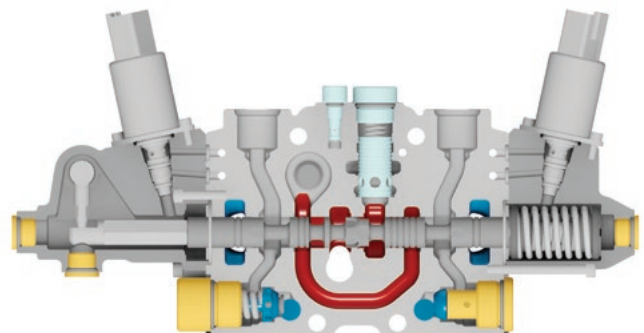
Code L3 = Manual Bonnet Handle



Code L4 = PCH/ECH Bonnet with Manual Handle

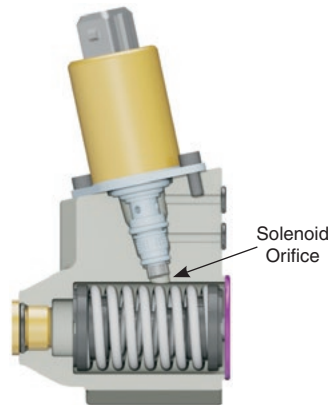


Code L5 = PCH/ECH No Handle



[P55A/P55B] Solenoid Orifice

Solenoid driven sections may require pilot flow orifices to meter flow at different rates into the solenoid bonnet to help with functional performance. The standard size is 1.0mm.



Code	Description
0.6	0.6 mm
0.7	0.7 mm
0.8	0.8 mm
0.9	0.9 mm
1.0	1.0 mm (Standard)
1.1	1.1 mm
1.2	1.2 mm
1.3	1.3 mm
2.0	2.0 mm (No Dampening)

[P60] Spool Function

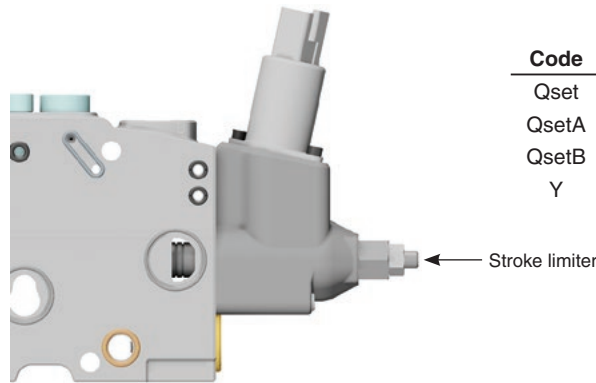
D	Double-Acting 3-Position, 4-Way Cylinder Spool	Double-acting cylinder spools are generally used when a cylinder is being operated with power extend and retract.
M	Double-Acting 3-Position, 4-Way Motor Spool	Double-acting motor spools are generally used when a motor is being operated in a bi-directional manner.
DEB	Double-Acting 3-Position, 4-Way Cylinder Spool	Double-acting cylinder spools are generally used when a cylinder is being operated with an outside force to either retract or extend the non-power port.
MEB	Double-Acting 3-Position, 4-Way Motor Spool	Double-acting motor spool generally used when power in one position is needed and free spin in the opposite direction.
MA	Single-Acting 2-Position, 3-Way Motor Spool (Port A)	Single-acting 3-way motor spool generally used when a motor is single direction with return flow going directly to tank. Flow is generated from Port A.
MB	Single-Acting 2-Position, 3-Way Motor Spool (Port B)	Single-acting 3-way motor spool generally used when a motor is single direction with return flow going directly to tank. Flow is generated from Port B.
F	Double-Acting 4th Position Float Spool (Port B)	4th position float spools are used when an application requires flow and pressure to extend and retract a cylinder function, but in addition needs to have a floating position where A and B ports are open to tank, creating no resistance against the load causing it to move when influenced by outside forces.
R	Double-Acting 3-Position Regeneration Spool	Regeneration spools use the return flow from port B to add flow to port A for increased speed for the implement connected to port A.
B	Double-Acting 3-Position, 4-Way Bleeder Spool Ports A and B	Bleeder spools use an orificed spool notch to control the flow in and out of A and B ports, as opposed to a cylinder spool which blocks flow from work ports to tank or motor spools which are completely open from work ports to tank.
BA	Double-Acting 3-Position, 4-Way Bleeder Spool Port A	Port A bleeder spools use an orificed spool notch to control the flow in and out of A and B port is connected to tank as opposed to a cylinder spool which blocks flow from both work ports to tank or motor spools which are completely open from both work ports to tank.
BB	Double-Acting 3-Position, 4-Way Bleeder Spool Port B	Port B bleeder spools use an orificed spool notch to control the flow in and out of B and A port is connected to tank as opposed to a cylinder spool which blocks flow from both work ports to tank or motor spools which are completely open from both work ports to tank.

[P64] Spool Force Feedback

With force feedback, the operator is better able to sense the increase in machine load, for example when a hard obstacle is met, and thereby avoid damage. Force feedback also gives a kind of ramp function, which results in more gentle transitions during speed changes. This in turn has a stabilizing effect on the hydraulic system, and the machine operating characteristics become smoother. Both of these characteristics are important, especially for slewing functions and similar movements. With force feedback, machine wear is reduced and efficiency increases. The section can be equipped with force feedback for workports A and B, individually. The higher level of force feedback, the greater the reduction in the function's speed upon increasing resistance for the same lever stroke. It follows from this that the lever must be moved further in order for the speed to remain the same. If force feedback is desired please use FF as the option code; otherwise use \ or leave blank.

[P72A/P72B] Stroke Limiters

Stroke Limiters are used to manually limit the full flow capability of the spool. It is an adjustable bonnet option which can be adjusted to prevent full spool movement in either direction. Stroke limiters are available on Hydraulic Pilot and EH Sections.



Code	Description
Qset	Stroke Limiter A and B Side
QsetA	Stroke Limiter on A Side
QsetB	Stroke Limiter on B Side
Y	No Stroke Limiters

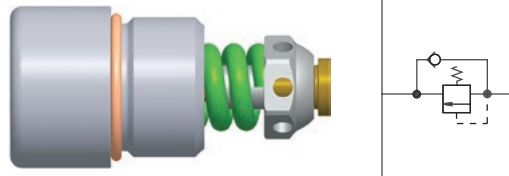
[P76] and [P77] Accessory Options

PA	Relief Valve with Anti-Cavitation Check	Port relief valves are pre-set to the designated pressure setting selected and come with anti-cavitation protection which will use flow from the the tank galley to supply extra oil to the work port should cavitation of the function begin to occur.
N2	Anti-Cavitation Check	Anti-cavitation protection only will use flow from the the tank galley to supply extra oil to the work port should cavitation of the function begin to occur.
Y2	Relief Cavity Plug Closed to Tank	The relief cavity plug is a port defeat plug and will block flow from returning to the tank galley through the port accessory flow path and force the oil to go to the tank galley from the work port.
X2	Relief Cavity Open to Tank	Relief valve cavity machined and filled with a short plug which leaves a passage open to the tank.

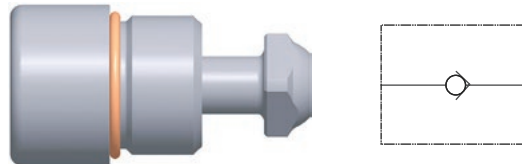
[P76A] and [P76B]

Code	Description
N2	Anticavitation check
Y2	Relief Cavity Plug (Closed to Tank)
X2	Blanking Plug (Open to Tank)
25	25 Bar (363 PSI)
32	32 Bar (464 PSI)
40	40 Bar (580 PSI)
50	50 Bar (725 PSI)
63	63 Bar (914 PSI)
80	80 Bar (1160 PSI)
100	100 Bar (1450 PSI)
125	125 Bar (1813 PSI)
140	140 Bar (2030 PSI)
160	160 Bar (2320 PSI)
175	175 Bar (2538 PSI)
190	190 Bar (2755 PSI)
210	210 Bar (3045 PSI)
225	225 Bar (3263 PSI)
230	230 Bar (3335 PSI)
250	250 Bar (3625 PSI)
265	265 Bar (3843 PSI)
270	270 Bar (3915 PSI)
280	280 Bar (4060 PSI)
300	300 Bar (4350 PSI)
330	330 Bar (4785 PSI)
350	350 Bar (5075 PSI)

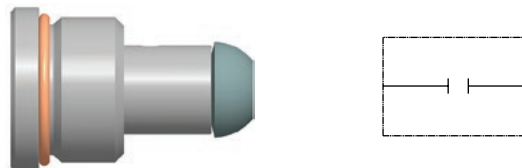
Code PA – Relief with Anticavitation Check



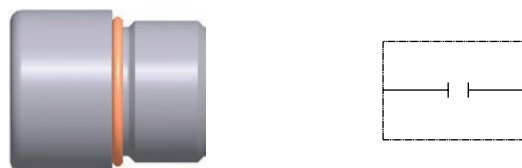
Code N2 – Anticavitation Check



Code Y2 – Relief Cavity Plug Closed to Tank



Code X2 – Relief Cavity Plug Open to Tank

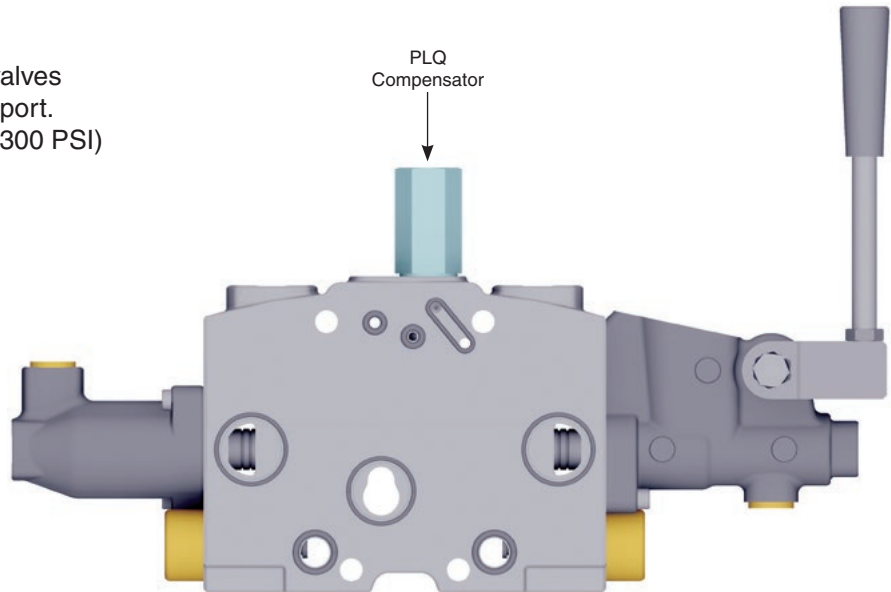


[P77] PLQ

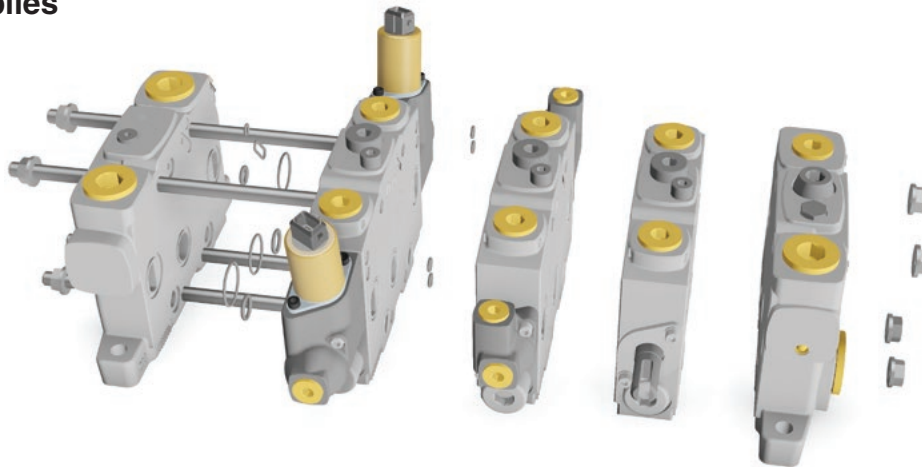
General Application Concept

Constant Force or Torque: Any application that requires a constant force or torque via deadheading a workport can use PLQ. This assumes the PLQ regulated workport pressure is less than maximum system pressure. The PLQ work section consumes a very insignificant flow of less than 2.8 LPM (0.75 GPM). Working at only the essential pressure and minimum flow maximizes energy efficiency. Pressure range available: 17 Bar (250 PSI) to 240 Bar (3500 PSI).

Note: When using PLQ, port relief valves must be selected for corresponding port. Recommended selection is 25 Bar (300 PSI) above PLQ setting.



Stud Assemblies



**For use with Combo-In + Combo-Out OR
 Combo-In + Simple-Out OR PBL-In + Simple-Out**

Number of Work Sections	Length "L" (±.030)	Number of Work Sections	Length "L" (±.030)
1	5.75	7	14.75
2	7.25	8	16.25
3	8.75	9	17.75
4	10.25	10	19.25
5	11.75		
6	13.28		

**For use with PBL-In + PBL-Out OR
 PBL-In + Combo-Out OR Combo-In + PBL-Out**

Number of Work Sections	Length "L" (±.030)	Number of Work Sections	Length "L" (±.030)
1	6.50	7	15.50
2	8.00	8	17.00
3	9.50	9	18.50
4	11.00	10	20.00
5	12.50		
6	14.00		



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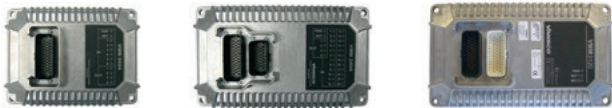
The VP120 valve can achieve fine proportional control when paired with electronic control systems from Parker. Several types of systems from basic to complex can be utilized depending on the desired functionality of your equipment.



Basic Valve Driver module

Controls up to 2 valve sections.

Valve Driver Module	Inputs	Outputs
IQAN-TOC2	4	2 (dual)



Programmable Multiplexing modules

Controls valve sections and other machine functions. More than 1 module can be combined into a multiplexed system. Programmed with Ladder Logic software.

Multiplexing Module	Inputs	Outputs
VMM0604	6	4
VMM2404	24	4
VMM3120	31	20



Programmable Controller modules

Controls valve sections and other machine functions. Can be combined with other controller modules or multiplexing modules to create a complex control system. Programmed with C or Matlab software.

Controller Module	Inputs	Outputs
CM0711	7	11
CM3620	36	20
CM3626	36	26

Contact the Electronic Controls Division:

Parker Hannifin Corporation
Electronic Controls Division
 850 Arthur Avenue
 Elk Grove Village, IL 60007 USA
 phone 800 221 9257



Levers and Joysticks for Electronic Control

Single axis input devices like the IQAN-LST paddle and IQAN-LSL lever can each control a valve section when paired with any valve driver or controller module. More functions are controlled from a multi-axis joystick like the IQAN-LC5 or -LC6.

Master Display Module	Prop Axis	Buttons
IQAN-LST paddle	1	—
IQAN-LSL lever	1	up to 1
IQAN-LC5 large joystick	up to 4	up to 8
IQAN-LC6 small joystick	up to 4	—



Programmable Master Controllers

Controls valve sections and other machine functions. More than 1 master module can be combined or expansion modules added to create a complex control system. Programmed with IQAN software.

Master Controller Module	Inputs	Outputs
IQAN-MC2	5	8 dual
IQAN-MC31	16	4 dual



Programmable Master Displays

Displays and monitors machine status and provides HMI. Commands outputs on master controllers or expansion modules to control valve sections and other machine functions in a complex control system. Programmed with IQAN software.

Master Display Module	Inputs	Outputs
IQAN-MD3 3.5" Color TFT	7	—
IQAN-MD4-7 7" Color touchscreen	7	—
IQAN-MD4-5 5.7" Color touchscreen	7	—

Customer Info		
[D01]	Type of Market	
[D02]	Market Segment	
[D06]	Application	
[D08]	Customer Product ID	
[D19]	Customer Name	
[D21]	Customer Contact	

Customer Notes

System Options		
[P01]	Valve Type	
[P03]	Margin Pressure Setting (Bar)	
[P04]	Port Type	
[P05]	System Voltage	
[P06]	Solenoid Connector Type	
[P07]	Surface Finish	
[P08]	Pump Flow to Inlet (LPM)	
[P09]	Pump Pressure to Inlet (Bar)	

Inlet Options		
[P15]	Inlet Section Type	
[P16]	Load-Sense Relief Valve	
[P17]	Load-Sense Relief Valve Setting	
[P18]	Top Pump Port	
[P19]	Side Pump Port	
[P20]	Top Tank Port	
[P21]	Side Tank Port	
[P22]	Load-Sense in Port	
[P23]	Pilot Supply in Port	
[P24F]	Priority Flow Setting (LPM)	
[P24]	Priority Flow LS Relief Valve	
[P24S]	Priority Flow LS Relief Setting (Bar)	
[P25]	Pilot Out Port	
[P26]	Pilot Supply Accum Port	
[P27]	Inlet Pilot Drain	

Outlet Options		
[P30]	Outlet Section Type	
[P31]	Clipper Relief Valve	
[P31S]	Clipper Relief Setting	
[P33]	Solenoid Drain	
[P35]	Top Pump Port	
[P36]	Side Pump Port	
[P37]	Top Tank Port	
[P38]	Side Tank Port	
[P39]	Load-Sense in Port	
[P40]	Pilot Supply in Port	
[P43]	Pilot Out Port	
[P44]	Pilot Supply Accum Port	

System Notes

Work Sections											
		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
[P47]	Size of Work Ports										
[P50]	Spool Positioner										
[P51]	Manual Operator										
[P55A]	Solenoid Orifice A Side										
[P55B]	Solenoid Orifice B Side										
[P60]	Spool Function										
[P64]	Spool Force Feedback										
[P69]	Spool Flow Rate at Full Stroke										
[P70]	Custom Spool Code										
[P72A]	Stroke Limiters A Side										
[P72B]	Stroke Limiters B Side										
[P76A]	Port Accessory A										
[P76AS]	Port Relief Valve A Setting										
[P76B]	Port Accessory B										
[P76BS]	Port Relief Valve B Setting										
[P77]	Pressure Limited Flow										
[P77S]	PLQ Setting										

Assembly Notes