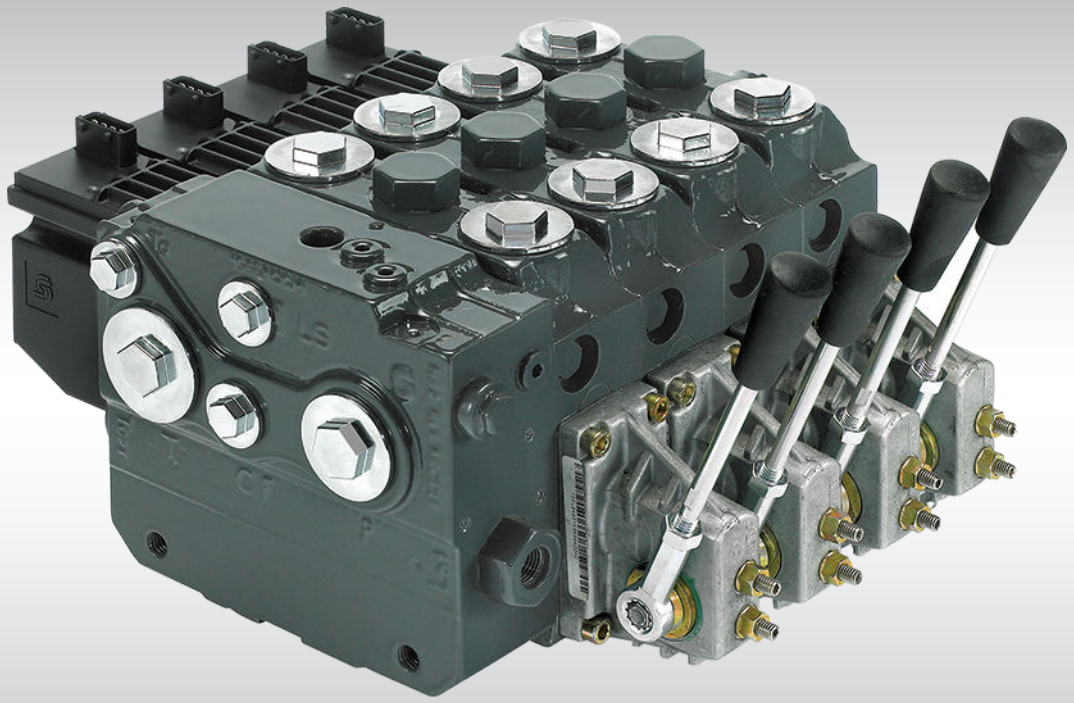
MAKING MODERN LIVING POSSIBLE

Technical Information

Proportional Valve Group

PVG 100



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Revision History

Table of Revisions

Date	Changed	Rev
Jan 2014	Converted to Danfoss layout – DITA CMS	EB
Feb 2006 - Aug 2013	Various changes	BA - EA
Feb 2005	New Edition	AA

Contents

Contents

Contents

General Information

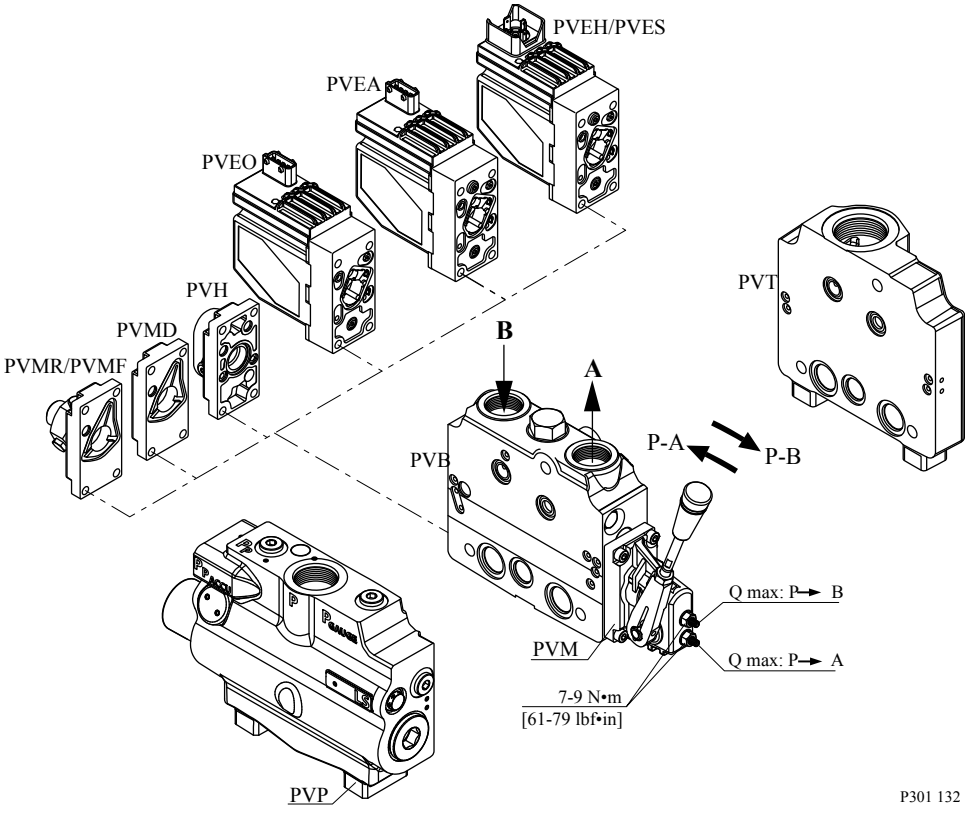
Acronyms

This table provides a definition of some commonly used terms

PVG = Proportional Valve Group			
PVP	Pump Side Module (Inlet)	PVMD	Cover for Mechanical Activation
PVPF	Open Center PVP	PVMF	Cover for Mechanical Float
PVPV	Closed Center PVP	PVMR	Cover for Friction Detent
PVPVP	Closed Center PVP w/Priority	PVH	Cover for Hydraulic Actuation
PVPP	Electrical Pilot Shut-Off Valve	PVE	Electrical Actuator
PVPE	Electrical Unloading Valve	PVEA	Electrical Actuator-Fine Proportional
PVB	Basic Module (Body)	PVEH	Electrical Actuator-High Proportional
PVBZ	Basic Module (Body) Zero Leak	PVES	Electrical Actuator-Super Proportional
PVBS	Main Spool for PVB	PVEO	Electrical Actuator-ON/OFF
PVLP	Shock Valve	PVT	Tank Side Module
PVLA	Anti-Cavitation Valve	PVAS	Assembly (Tie Rod) Kit
PVM	Mechanical Actuator		

General

Standard, oil flow direction and setting of max. flow



General Information

Valve system

PVG 100 is a hydraulic load sensing valve, designed to fulfill efficiency requirements.

From a simple load sensing directional valve to an advanced electro hydraulic controlled load independent proportional valve the PVG 100 modular system makes it possible to build up a valve group to fulfill customer requirements. The compact external dimensions of the valve remain unchanged whatever combination is specified.

General features PVG 100, load independent flow control

- Flow sharing for maximum controllability and safety
- Load-independent flow control for precise operation and improved productivity
  - Oil flow to an individual function is independent of the load pressure of this function regardless of sufficient or insufficient pump flow.
  - Oil flow to one function is independent of the load pressure of other functions regardless of sufficient or insufficient pump flow.
- Load-sensing technology for higher efficiency, safety, reduced energy consumption, and longer system lifetime
- Configurable as an advanced electrical, hydraulic or mechanically operated proportional load-sensing valve
- Open spool-ends for system integrating mechanical cable or linkage actuation
- Modular design providing a wide range of configuration possibilities
- Up to eight different sections per valve group (maximum flow per section: 240 l/min [63.4 gal/min])
- Can be configured in combination with PVG 32 (with T0) for maximum flexibility (up to 20 basic valve modules per valve group)
- Optimized return flow characteristics, which minimizes pressure loss
- Low weight
- Compact design and installation
- BSP and UNF connection threads

PVP - pump side module

- Build in load sense relief valve
- System pressure up to 350 bar (5075 psi)
- Full Flow dump valve (open center only)
- Pilot supply shut off (optional) ••Accumulator gauge connection
- Pressure gauge connection
- Pilot gauge connection
- Integrated pilot supply valve
- Versions:
  - Open center version for systems with fixed displacement pumps
  - Closed center versions for systems with variable displacement pump
  - Integrated priority valve for dynamic steering integration

General Information

PVB – basic module

- Integrated pilot operated check valves in A and B work ports for low internal leakage
- Integrated pressure compensator
- Interchangeable spools
- Single and Dual Shock/suction valves for A and B ports
- Different interchangeable spool variants
- All versions suitable for mechanical, hydraulic and electrical actuation
- Versions:
  - PVG100-HF (High Flow) version for less total pressure loss at increased flow
  - End module version for extra space savings
  - Open spool-end version for extended mechanical actuation possibilities

Actuation module

The basic module is always fitted with mechanical actuator PVM, which can be combined with the following as required:

- Electrical actuator (11 – 32 $V_{AC/DC}$):
  - PVES – proportional, Super
  - PVEH – proportional, high performance
  - PVEH-F – proportional high performance, Float
  - PVEA – proportional low hysteresis (not recommended for PVG 100-HF High Flow)
  - PVEM – proportional, medium performance
  - PVEO – ON/OFF
  - PVEU – proportional, voltage control, 0-10 V
  - PVED-CC – Digital CAN controlled J1939/ISOBUS
  - PVED-CX – Digital CAN controlled CAN open extra vehicle system safety
  - PVEP – PVM controlled (11-32 V)
  - PVHC – High Current actuator for PVG
- PVMD, cover for Mechanical actuation
- PVMR, cover for Mechanical detent (not compatible with PO check modules)
- PVMF, cover for Mechanical Float (not compatible with PO check modules)
- PVH, cover for Hydraulic actuation.

General Information

Remote control units

- Electrical remote control units:
  - PVRE, PVRET
  - PVREL
  - PVRES
  - Prof 1
  - Prof 1 CIP
  - JS120
  - JS1000 Ball grip
  - JS1000 PRO grip
  - JS2000
  - JS6000
  - JS7000
- Hydraulic remote control unit:
  - PVRHH

PVG 100 function

PVG 100 with open center PVPF

When the pump is started and the main spools in the individual basic modules are in the neutral position, oil flows from the pump, through connection P, across the pressure matching spool (11) to tank. The oil flow led across the pressure matching spool determines the pump pressure (stand-by pressure).

When one or more of the main spools are actuated, the highest load pressure is fed through the shuttle valve circuit (4, 7) to the spring chamber (10) behind the pressure matching spool, and completely or partially closes the connection to tank. Pump pressure is applied to the opposite side of the pressure matching spool. The pressure relief valve (1) will open should the load pressure exceed the set value, diverting pump flow back to tank.

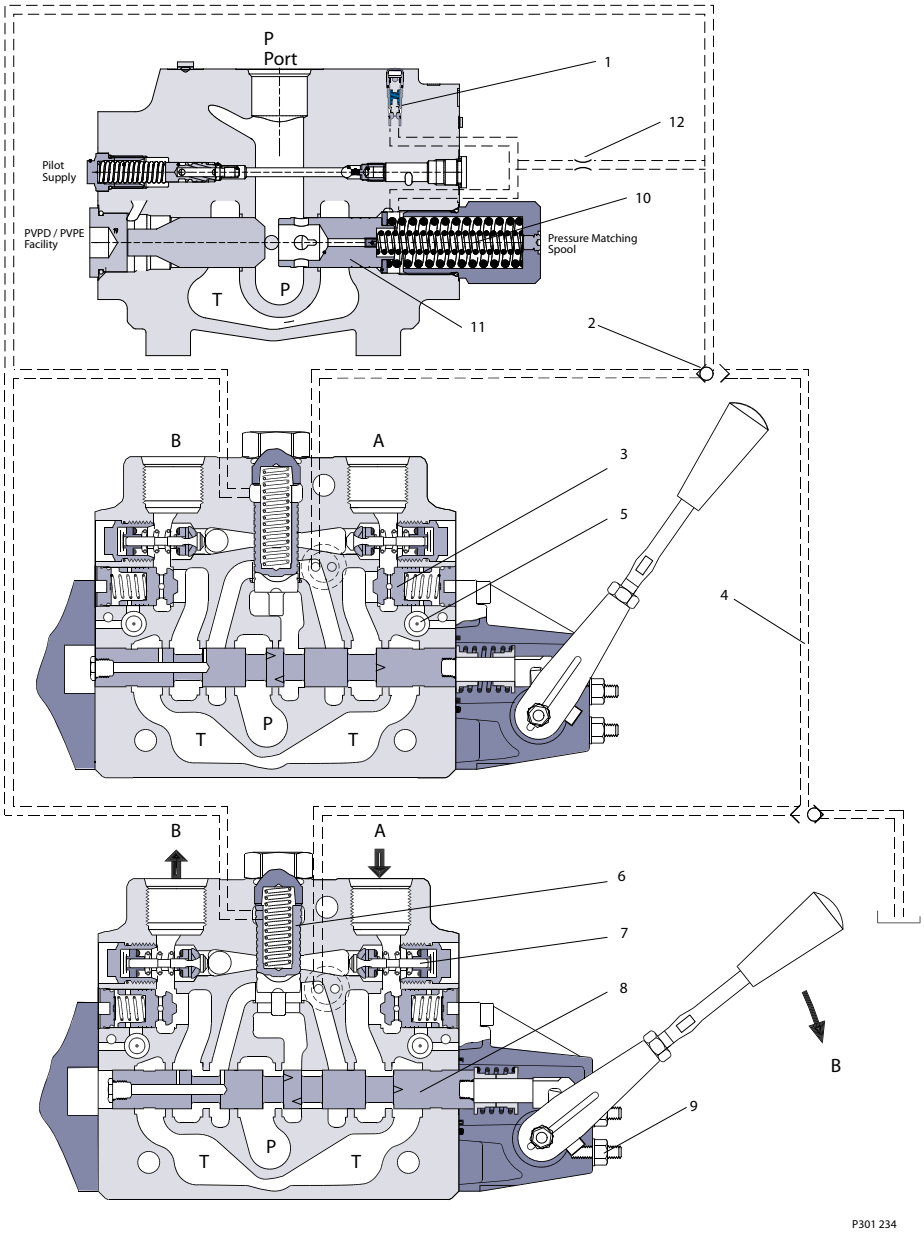
Optional PVPC with check valve option may be used in systems where it is necessary to operate the PVG 100 valve by means of the electrical remote control without pump flow.

For additional information about PVPC refer to the publication **520L0344**.

Optional electrically actuated pilot shut off valve PVPP provides additional functional system safety by removing pilot oil from the electrical actuation or hydraulic actuation system, disabling main spool actuation. When the PVPP is used with the PVBZ P.O. check valve system it is possible to disable actuation during mechanical actuation

PVG 100 function

PVG 100 sectional view PVP with open center



Legend:

1 – LS relief valve

2 – Shuttle valve

3 – Pilot operated check valve, POC

4 – LS line

5 – Logic cartridge for POC

6 – Pressure compensator

7 – Shock and suction valve, PVLP

8 – Main spool, PVBS

9 – Max. oil flow adjustment screws for ports A and B

10 – Spring 12 or 20 bar

11 – Pressure matching spool

12 – Orifice

PVG 100 function

PVG 100 with closed center PVPV / PVPVP / PVPVM

In load sensing systems the load pressure is led to the pump control via the LS connection (2 in the diagram below). When the work functions are in the spring neutral position the LS pressure is drained to tank via the PVG valve. In this condition the pump control sets the displacement so that leakage in the system is compensated for, to maintain the set stand-by pressure (pump margin). When a main spool is actuated the pump control will adjust the displacement so that the set differential pressure between P and LS is maintained.

The PVG100 Inlet LS relief valve (1) is specifically designed to ensure a constant margin pressure across the main spool, providing demanded regulated flow during maximum load pressure conditions. This relief adjustment is critical when there are two or more functions being operated together. An incorrectly adjusted Inlet relief could result in a vast reduction in regulated flow from the adjacent functions that operate at a lower load pressure. To accurately adjust the inlet LS relief, the pump standby pressure must be known in addition to the maximum operating load pressure.

Example

Pressure comp pressure level	172 bar [2500 psi]
LS standby pressure requirement that delivers the desired flow	-20 bar [-290 psi]
Maximum load pressure requirement	152 bar [2210 psi]
Inlet relief pressure setting	152 bar [2210 psi]

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For additional information about PVPC refer to publicaton 520L0344.

Optional electrically actuated pilot shut off valve PVPP provides additional functional system safety by removing pilot oil from the electrical actuation or hydraulic actuation system, disabling main spool actuation. When the PVPP is used with the PVBZ P.O. check valve system it is possible to disable actuation during mechanical actuation.

PVG 100 closed center priority steering PVPVP module

The priority steering version of the PVPV will accommodate pump flows up to 250 l/min [66 US gal/min] and Control Flow (CF) up to 60 l/min [16 US gal/min] for dynamic steering systems. Additional return port is included with the PVPVP module.

PVG 100 closed center PVPVM module

The mid-inlet version of the PVPV will accommodate pump flows up to 400 l/min [106 US gal/min] providing greater efficiency and flexibility when combined with standard and high flow work function modules.

PVG 100 basic modules PVB

In the pressure-compensated basic module the compensator (9) maintains a constant pressure drop across the main spool (11) - both when the load changes and when a module with a higher load pressure is actuated.

Besides independent flow the other advantage of post-compensated work sections is the ability to control multifunction operation when flow demand exceeds pump capacity. This means that all work sections will continue to function regardless of differences in their load and regardless of the pump flow. The flow relationships specified between functions will be maintained over the full flow range of the pump.

The shock valves PVLP (10) with fixed setting and the suction valves PVLA on ports A and B are used for the protection of the individual working function against intermittent pressure overload and/or

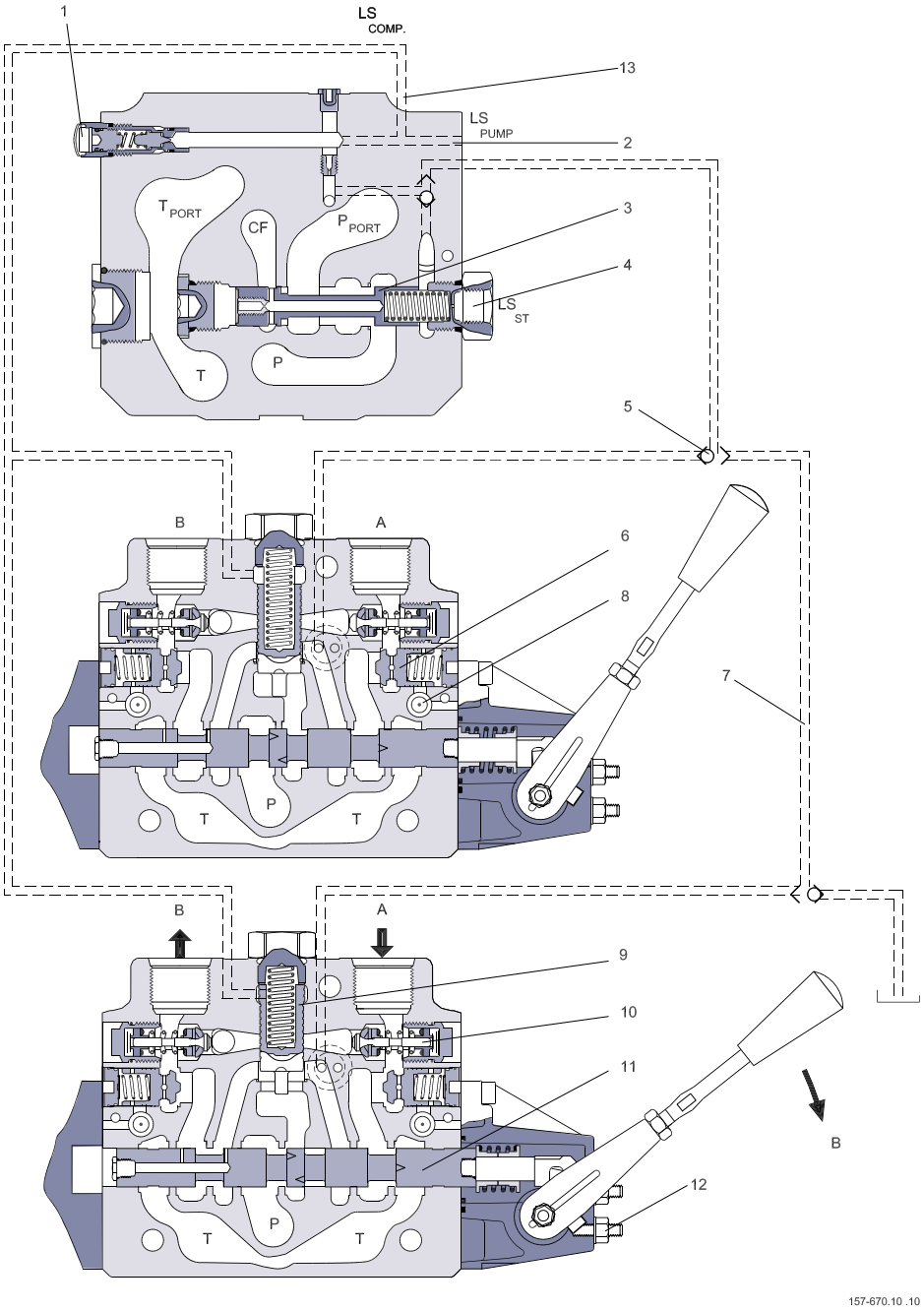
PVG 100 function

cavitation. Optional facilities for dual shock valves for ports A and B provide extra passage area reducing pressure drop for anti-cavitation applications.

Pilot operated check valve system PVBZ option (6, 8) on ports A and B are uses to reduce the work port to tank leakage eliminating the need for external actuator load holding in non-critical load holding applications. All PVG 100 modules contain an integrated T0 drain system to insure optimal performance for PVBZ and all electrical actuation offerings. T0 is most effective when connected directly to the hydraulic system reservoir independent of the main Tank return system.

PVG 100 tank modules

Designed for low pressure drop at high return flows all PVT modules include facilities for PVLP shock valves insuring pressure passage spike protection during pump starvation recovery.



PVG 100 function

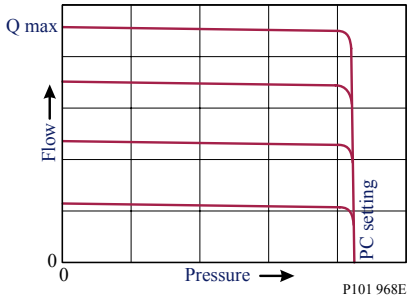
Legend:

1 – LS relief valve
2 – LS connection
3 – Priority spool for CF
4 – LS connection for steering unit
5 – Shuttle valve
6 –Pilot operated check valve, POC
7 – LS line
8 – Logic cartridge for POC
9 – Pressure compensator
10 – Shock and suction valve, PVLP
11 – Main spool, PVBS
12 – Max. oil flow adjustment screws for ports A and B
13 – LS comp (LS signal sent back to compensators)

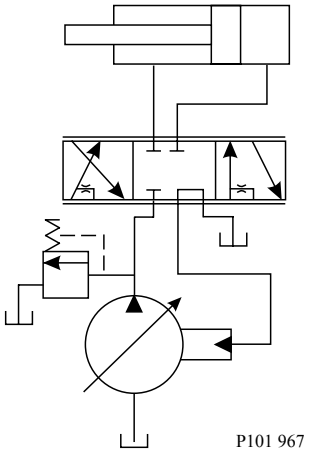
Load sensing controls

The LS control matches system requirements for both pressure and flow in the circuit regardless of the working pressure. Used with a closed center control valve, the pump remains in low-pressure standby mode with zero flow until the valve is opened. The LS setting determines standby pressure.

Typical operating curve



Load sensing circuit



Most load sensing systems use parallel, closed center, control valves with special porting that allows the highest work function pressure (LS signal) to feed back to the LS control. *Margin pressure* is the difference between system pressure and the LS signal pressure. The LS control monitors margin pressure to read system demand. A drop in margin pressure means the system needs more flow. A rise in margin pressure tells the LS control to decrease flow.

LS control with bleed orifice (do not use with PVG valves)

The load sense signal line requires a bleed orifice to prevent high-pressure lockup of the pump control. Most load-sensing control valves include this orifice. An optional internal bleed orifice is available, for use with control valves that do not internally bleed the LS signal to tank.

Integral PC function

The LS control also performs as a PC control, decreasing pump flow when system pressure reaches the PC setting. The pressure compensating function has priority over the load sensing function.

For additional system protection, install a relief valve in the pump outlet line.

PVG 100 function

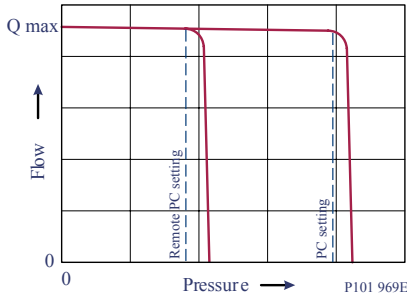
Load sensing system characteristics:

- Variable pressure and flow
- Low pressure standby mode when flow is not needed
- System flow adjusted to meet system requirements
- Lower torque requirements during engine start-up
- Single pump can supply flow and regulate pressure for multiple circuits
- Quick response to system flow and pressure requirements

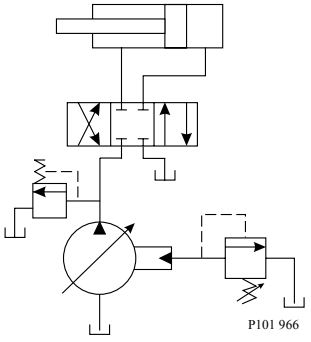
Remote pressure compensated controls

The remote PC control is a two-stage control that allows multiple PC settings. Remote PC controls are commonly used in applications requiring low and high pressure PC operation.

Typical operating curve



Closed center circuit with remote PC



The remote PC control uses a pilot line connected to an external hydraulic valve. The external valve changes pressure in the pilot line, causing the PC control to operate at a lower pressure. When the pilot line is vented to reservoir, the pump maintains pressure at the load sense setting.

When pilot flow is blocked, the pump maintains pressure at the PC setting. An on-off solenoid valve can be used in the pilot line to create a low-pressure standby mode. A proportional solenoid valve, coupled with a microprocessor control, can produce an infinite range of operating pressures between the low pressure standby setting and the PC setting.

Size the external valve and plumbing for a pilot flow of 3.8 l/min [1 US gal/min]. For additional system protection, install a relief valve in the pump outlet line.

Remote pressure compensated system characteristics:

- Constant pressure and variable flow
- High or low pressure standby mode when flow is not needed
- System flow adjusts to meet system requirements
- Single pump can provide flow to multiple work functions
- Quick response to system flow and pressure requirements

PVG 100 function

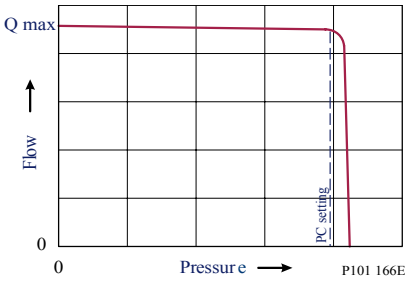
Typical applications for remote pressure compensated systems:

- Modulating fan drives
- Anti-stall control with engine speed feedback
- Front wheel assist
- Road rollers
- Combine harvesters
- Wood chippers

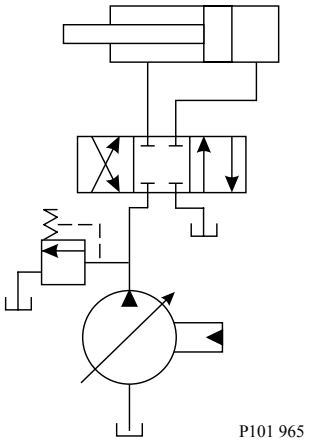
PVG 100 main spool with pressure compensated control

The PC control maintains constant system pressure in the hydraulic circuit by varying the output flow of the pump. Used with a closed center control valve, the pump remains in high pressure standby mode at the PC setting with zero flow until the function is actuated.

Typical operating curve



Simple closed-center circuit



Once the closed center valve is opened, the PC control senses the immediate drop in system pressure and increases pump flow by increasing the swashplate angle.

The pump continues to increase flow until system pressure reaches the PC setting. If system pressure exceeds the PC setting, the PC control reduces the swashplate angle to maintain system pressure by reducing flow.

The PC control continues to monitor system pressure and changes swashplate angle to match the output flow with the work function pressure requirements.

If the demand for flow exceeds the capacity of the pump, the PC control directs the pump to maximum displacement. In this condition, actual system pressure depends on the actuator load.

For additional system protection, install a relief valve in the pump outlet line. * Do not use the PVG 32 with bleed down load sense control.

PVG 100 function

Pressure compensated system characteristics

- Constant pressure and variable flow
- High pressure standby mode when flow is not needed
- System flow adjusts to meet system requirements
- Single pump can provide flow to multiple work functions
- Quick response to system flow and pressure requirements

Typical applications for pressure compensated systems

- Constant force cylinders (bailers, compactors, refuse trucks)
- On/off fan drives
- Drill rigs
- Sweepers
- Trenchers

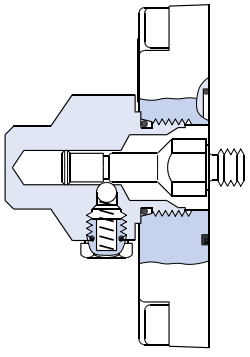
PVMR, friction detent

The friction detent PVMR allows the directional spool to be held in any position, resulting in infinitely variable, reversible, pressure compensated flow.

This can be sustained indefinitely without having to continue to hold the mechanical lever.

Friction detent spool position may be affected by high differential actuator flow forces and system vibration resulting in work function flow reduction.

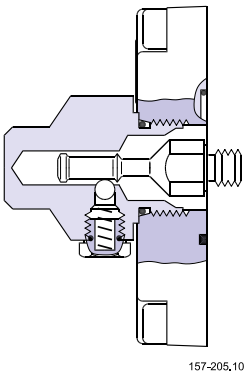
PVMR



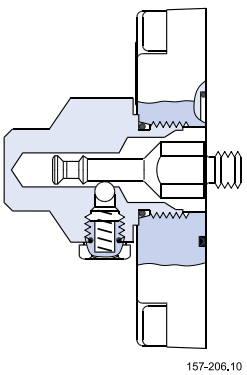
PVMF, mechanical float position lock

Allows the float spool to be held in the float position after release of the mechanical handle.

PVMF, standard mount only



PVMF, optional mount only



PVG 100 function

P → A → F (Push-in)

P → A → F (Pull-out)

PVBS, main mpools for flow control (standard)

With post-compensated valves, the A and B work port flow will depend on the pressure drop across the main spool PVBS.

In open center systems, this pressure drop (standby-pressure) is determined by the volume of fixed pump flow led to tank across the pressure adjusting spool in the inlet PVPF and the pressure adjusting spool bias spring pressure. Since the pressure drop varies with pump flow volume led to tank, the A and B work port flow will vary.

In closed center systems, the pressure drop across the main spool equals the standby setting of the pump, measured at the P-port of the valve. The A and B work port flow will remain unchanged as long as the standby is unchanged.

PVBS, main spools for flow control (with linear characteristic)

PVBS main spools with linear characteristic deliver a higher flow gain directly proportional to the linear spool travel beyond the dead band.

Safety in application

Building in safety

All makes and all types of control valves (including proportional valves) can fail. Thus the necessary protection against the serious consequences of function failure should always be built into the system. For each application an assessment should be made for the consequences of pressure failure and uncontrolled or blocked movements.

To determine the degree of protection that is required to be built into the application, system tools such an FMEA (Failure Mode and Effect Analysis) and Hazard and Risk Analysis can be used.

FMEA (Failure Mode and Effect Analysis) IEC EN 61508

FMEA is a tool used for analyzing potential risks. This analytical technique is utilized to define, identify, and prioritize the elimination or reduction of known and/or potential failures from a given system before it is released for production.

Please refer to IEC FMEA Standard 61508.

Hazard and risk analysis ISO 12100-1/14121

This analysis is a tool used in new applications as it will indicate whether there are special safety considerations to be meet according to the machine directives EN 13849.

Dependent on the determined levels conformety this analysis will determine if any extra requirements for the product design, development process, production process or maintenance, i.e. the complete product life cycle.

⚠ Warning

All makes/brands and types of directional control valves – inclusive proportional valves – can fail and cause serious damage. It is therefore important to analyze all aspects of the application.

Because the proportional valves are used in many different operation conditions and applications, the manufacturer of the application is alone responsible for making the final selection of the products – and assuring that all performance, safety and warning requirements of the application are met.

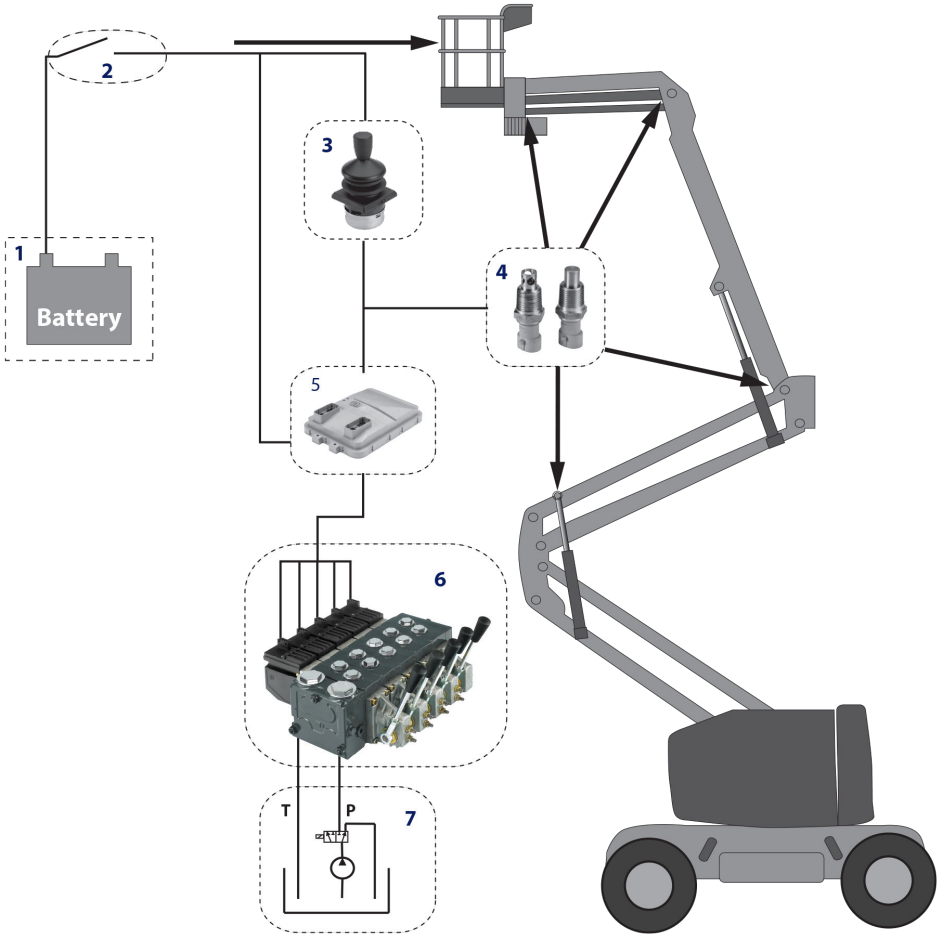
The process of choosing the control system – and safety levels – is governed by the machine directives EN 13849 (Safety related requirements for control systems).

Control system example

Example of a control system for manlift using PVE Fault monitoring input signals and signals from external sensors to ensure the PLUS+1® main controllers correct function of the manlift.

Safety in application

Control system example



Legend:

1 – Main power supply

2 – Emergency stop/man present switch

3 – HMI/Joystick control

4 – Movement detection sensors

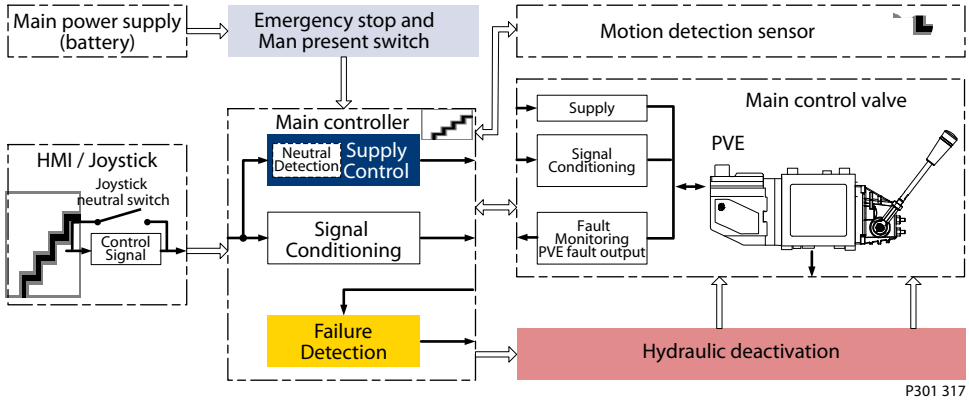
5 – Main controller

6 – PVG control valve

7 – Hydraulic deactivation

Safety in application

Electrical block diagram for above illustration



Warning

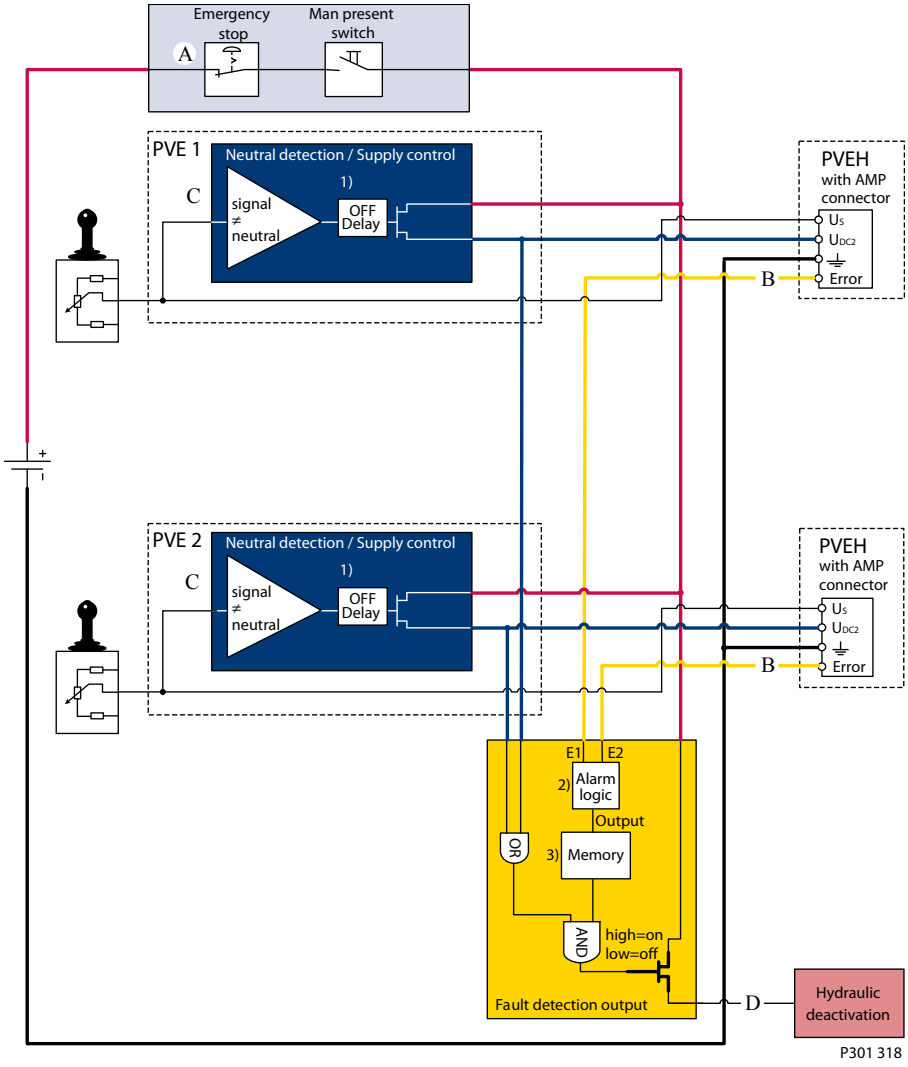
It is the responsibility of the equipment manufacturer that the control system incorporated in the machine is declared as being in conformity with the relevant machine directives.

Typical wiring block diagram example

Example of a typical wiring block diagram using PVEH with neutral power off switch and fault monitoring output for hydraulic deactivation.

Safety in application

Typical wiring block diagram example



A– Emergency stop / man present switch

B– PVE Faultmonitoring signals

C– Neutral signal detection.

D– Hydraulic deactivation

System Control Logic e.g. PLUS+1® for signal monitoring and triggering signal for deactivation of the hydraulic system.

Warning

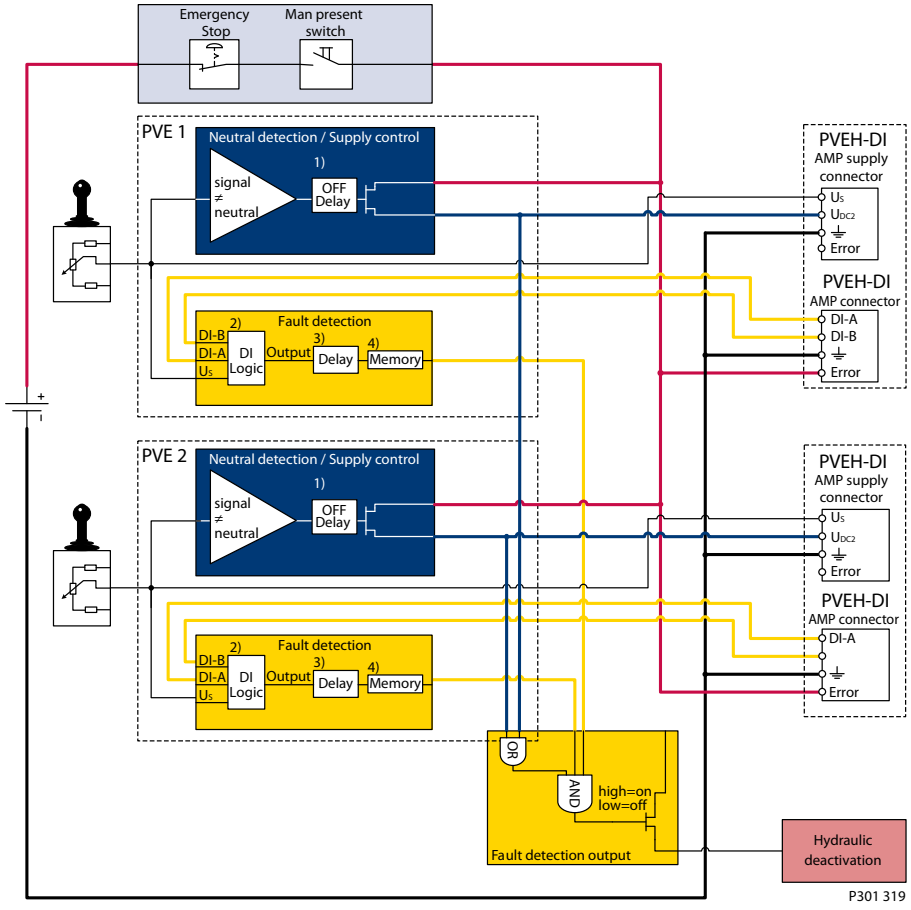
It is the responsebilty of the equipment manufacturer that the control system incorporated in the machine is declared as being in confirmity with the relevant machine directives.

Safety in application

Example of fault monitoring

Similar to previous example using fault monitoring for deactivation of the hydraulic system with extra fault inputs using the PVE's with DI (Direction Indication) function.

Example of fault monitoring for deactivation of the hydraulic system



System Control Logic e.g. PLUS+1® for signal monitoring and triggering signal for deactivation of the hydraulic system.

Warning

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Other non-electrical modules which can be used in connection with hydraulic deactivation at different levels.

PVG 32 – Mainly used in system with fixed displacement pumps

- PVSK, commonly used in crane application - full flow dump
- PVPX, LS dump to tank

Safety in application

PVG 100 – Alternative LS dump or pilot supply disconnect

- PVPP, pilot oil supply shut off
- External cartridge valve connecting LS Pressure to Tank
- External cartridge valve connecting main Pressure to Tank

PVG 120 – Pump disconnect/block for variable pumps

- PVPE, full flow dump for the PVG 120

Technical data

PVG 100 technical data

The technical data for PVG 100 are typical measured results. For the hydraulic system a mineral based hydraulic oil with a viscosity of 21 mm2/s [102 SUS] and a temperature of 50 °C [122 °F] was used.

PVG 100 technical data

Max. pressure	Port P continuous	350 bar	[5075 psi]
	Port P intermittent [1]	400 bar	[5800 psi]
	Port A/B [2]	350 bar	[5075 psi]
	Port T, static / dynamic	25 bar/40 bar	[365/580 psi]
	Port T0, static / dynamic	5 bar/10 bar	[75/145 psi]
Oil flow, rated (See characteristics)	Port P (PVPV / PVPVM)	250/400 l/min	[66/106 US gal/min]
	Port A/B, with press. comp. @15 bar [217psi][3]	180 l/min 240 l/min	[47.6 US gal/min] [63.4 US gal/min]
Spool travel, standard		± 7 mm	[±0.28 in]
Spool travel, float position spool P→A→F	Proportional range	A: 5.5 mm B: 7.0 mm	A: [±0.22 in] B: [±0.28 in]
	Float position	8 mm	[±0.32 in]
Dead band, flow control spools	Standard	± 1.5 mm	[±0.06 in]
Max. spool leakage at 100 bar [1450 psi] and 21 mm^2/s [102 SUS]	A/B→T, without shock valve[3]	20/30 cm^3/min	[1.22/1.85 in^3/min]
	A/B→T, with shock valve[3]	25/35 cm^3/min	[1.53/2.14 in^3/min]
Max. internal leakage with pilot operated check valve at 200 bar [2900 psi] and 21 mm^2/s [102 SUS]	A/B→T, without shock valve	1 cm^3/min	[0.06 in^3/min]
	A/B→T, with shock valve	6 cm^3/min	[0.37 in^3/min]
Oil temperature (inlet temperature)	Recommended temperature	30 → 60°C	[86 → 140°F]
	Min. temperature	-30°C	[–22°F]
	Max. temperature	+90°C	[194°F]
Oil viscosity	Operating range	12 - 75 mm^2/s	[65 - 347 SUS]
	Min. viscosity	4 mm^2/s	[39 SUS]
	Max. viscosity	460 mm^2/s	[2128 SUS]
Ambient temperature		-30 → +60°C	[–22 → +140°F]
Filtration / Max. contamination (ISO 4406)		23/19/16	

[1] Intermittent operation: the permissible values may occur for max. 10% of every minute.

[2] PVG 100-HF - 350 bar [5075 psi] rated for 250 000 cycles, max. continuous pressure 320 bar [4640 psi].

[3] PVG 100-HF - High Flow option work section.

PVH, hydraulic actuation

PVH, hydraulic actuation data

Regulation pressure range	5 – 15 bar	[75 – 220 psi]
Max. pilot pressure	30 bar	[435 psi]
Max. pressure on port T [1]	10 bar	[145 psi]

[1] The PVRHH remote control (hydraulic joystick) lever should be connected directly to tank.

Technical data

PVM, mechanical actuation

PVM operating force

	Actuation		Neutral position	Max. spool travel
Operating force	PVM + PVMD, PVM + PVE (PVE without voltage applied)		22 ± 3 N [5 ± 0.7 lbf]	28 ± 3 N [6.3 ± 0.7 lbf]
	PVM + PVH		27 ± 3 N [6 ± 0.7 lbf]	83 ± 3 N [18.7 ± 0.7 lbf]
	PVM + PVMR	Spool displacement from neutral position		34 N [7.6 lbf]
		Spool displacement from any other position		12 N [2.7 lbf]
	PVM + PVMF	Spool displacement from neutral position		22 N [5.0 lbf]
		Spool displacement into float position		60 N [13.5 lbf]
		Spool displacement away from float position		28 N [6.3 lbf]
Proportional regulation range, control lever, standard spool			±19.5°	
Proportional regulation range Float position			±15.3° 22.3°	
Control lever positions			No. 2 × 6	

PVE, electrical actuation

PVE reaction time (s)

Voltage	Reaction time function		PVEO ON/OFF	PVEA [2] Prop. fine	PVEH Prop. high	PVES Prop. super
Neutral switch	From neutral position to max. spool travel	Max.	0.235	0.500	0.230	0.230
		Rated	0.180	0.320	0.150	0.150
		Min.	0.120	0.250	0.120	0.120
	From max. spool travel to neutral position	Max.	0.175	0.550	0.175	0.175
		Rated	0.090	0.400	0.090	0.090
		Min.	0.065	0.300	0.065	0.065
Constant voltage	From neutral position to max. spool travel	Max. Rated Min.	– – –	0.500 0.320 0.250	0.200 0.120 0.050	0.200 0.120 0.050
	From max. spool travel to neutral position	Max. Rated Min.	– – –	0.250 0.200 0.150	0.100 0.090 0.065	0.100 0.090 0.065
Hysteresis [1]		Rated	-	2%	4%	<1%

[1] Hysteresis is indicated at rated voltage and f = 0.02 Hz for one cycle. A cycle including N > full A > N > full B > N.
[2] For standard PVG 100 spools.

PVE oil consumption, l/min [US gal/min]

Voltage	Function		PVEO ON/OFF	PVEA [1] Prop. fine	PVEH Prop. high	PVES Prop. super
Without voltage	Pilot oil flow per PVE	Neutral	0			
With voltage		Locked	0.1 [0.026]	0.5 [0.132]	0.1 [0.026]	0.2 [0.053]
		1 actuation	0.002 [0.053]			
		Actuations	0.7 [0.185]	0.75 [0.2]	1.1 [0.29]	1.1 [0.29]

Technical data

[1] For standard PVG 100 spools.

PVEO

Supply voltage U_{DC}	rated	12 V_{DC}	24 V_{DC}
	range	11 V to 15 V	22 V to 30 V
	max. ripple	5%	
Current consumption at rated voltage		0.65 A @ 12 V	0.33 A @ 24 V
Input impedance in relation to 0.5 • U_{DC}		12 KΩ	
Power consumption		8 W	

PVEA, PVEH and PVES

Supply voltage U_{DC}	rated	11 V to 32 V	
	range	11 V to 32 V	
	max. ripple	5%	
Current consumption at rated voltage	PVEH/PVES (PVEA)	0.57 (28) A @ 12 V	0.3 (15) A @ 24 V
Signal voltage	neutral	0.5 • U_{DC}	
	A-port ↔ B-port	0.25 • U_{DC} to 0.75 • U_{DC}	
Signal current at rated voltage		0.25 mA to 0.70 mA	
Input impedance in relation to 0.5 • U_{DC}		12 KΩ	
Input capacitor		100 ηF	
Power consumption	PVEH/PVES (PVEA)	7 (3.5) W	

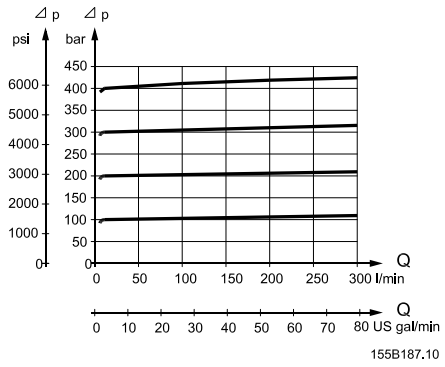
For detailed information, see PVE actuator catalog, **520L0553**.

Technical characteristics

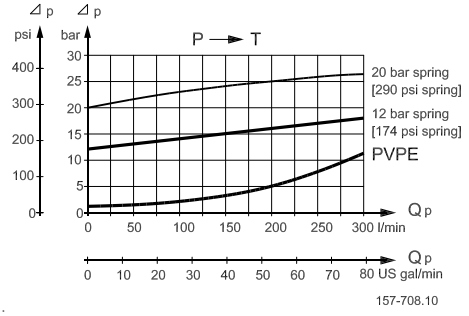
The characteristics in this catalog are typical measured results. During measuring a mineral based hydraulic oil with a viscosity of 21 mm^2/s [102 SUS] at a temperature of 50°C [122°F] was used.

PVPF, pump side module

Pressure relief valve characteristic in PVP



Neutral flow pressure in PVP, open center



The pressure relief valve is set at an oil flow of 15 l/min [4 US gal/min]. Setting range: 30 to 350 bar [435 to 5075 psi]

Open center flow rating

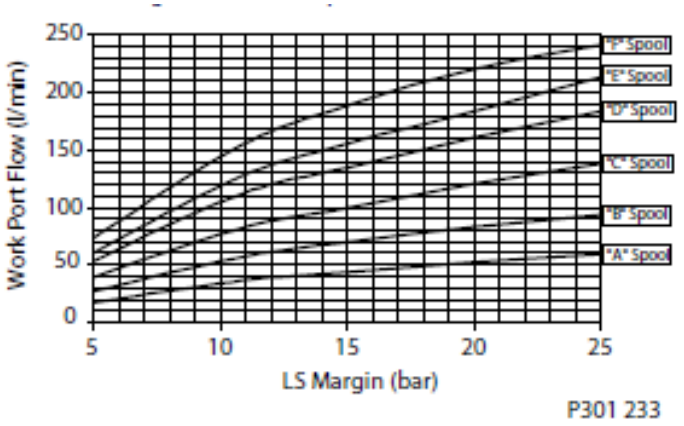
The flow rating of the different main spools will depend on the standby pressure available. In open center systems, the standby pressure equals the pressure drop P–>T, see *the diagram above*. A pump flow of 150 l/min led to tank across the pressure adjusting spool, will generate a standby pressure of app. 15 bar (PVP with 12 bar spring). The according main spool flow ratings will correspond to the curves.

For PVPs with a 20 bar spring, the standby pressure available will be 20 bar or higher. Hence the according main spool flow ratings will correspond.

Closed center flow rating

The flow rating of a the different main spools, PVBS, is dependent upon the Load Sense margin (pump margin pressure). The nominal flows specified for each PVBS is specified at 15 bar [218 psi] Ls margin pressure. If Ls margin is increased above 15 bar [218 psi], the PVBS will deliver more flow then the nominal rating. The following curves show the relationship between Ls margin and work port flow.

Flow vs. LS margin @ maximum spool shift



Technical characteristics

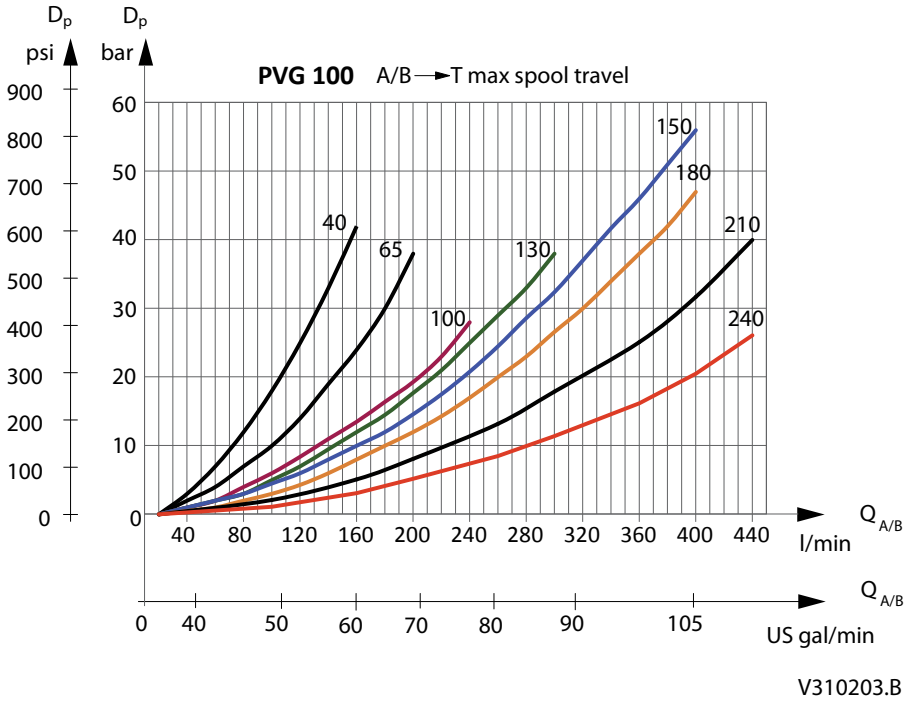
Caution

Because of flow forces, cylinder differential areas, Danfoss recommends Ls margins under 25 bar [360 psi].

As noted above, work port flow is dependent upon the Ls margin set on the pump. PC pumps maintain a constant discharge pressure which is equal to the PC setting on the pump. Hence the Ls margin for PC pumps can be thought of as the difference between the PC setting and the load pressure. Therefore work port flow will change with load pressure, thus, pressure compensated flow will not be obtained.

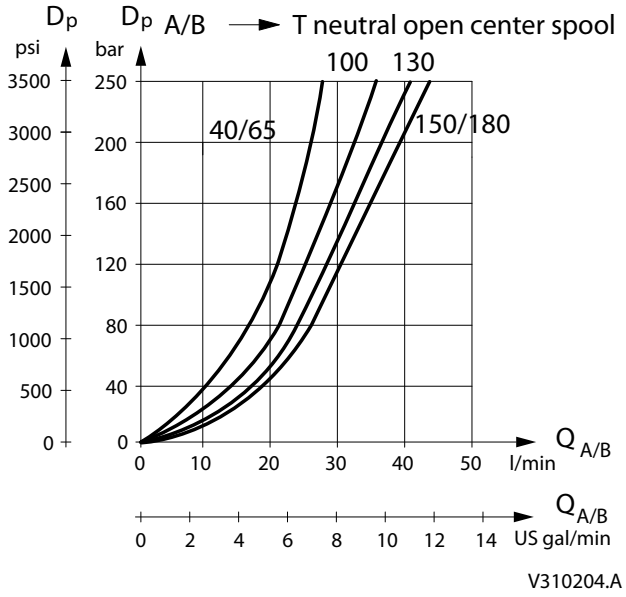
PVB, basic module

Pressure drop PVB at max. main spool travel



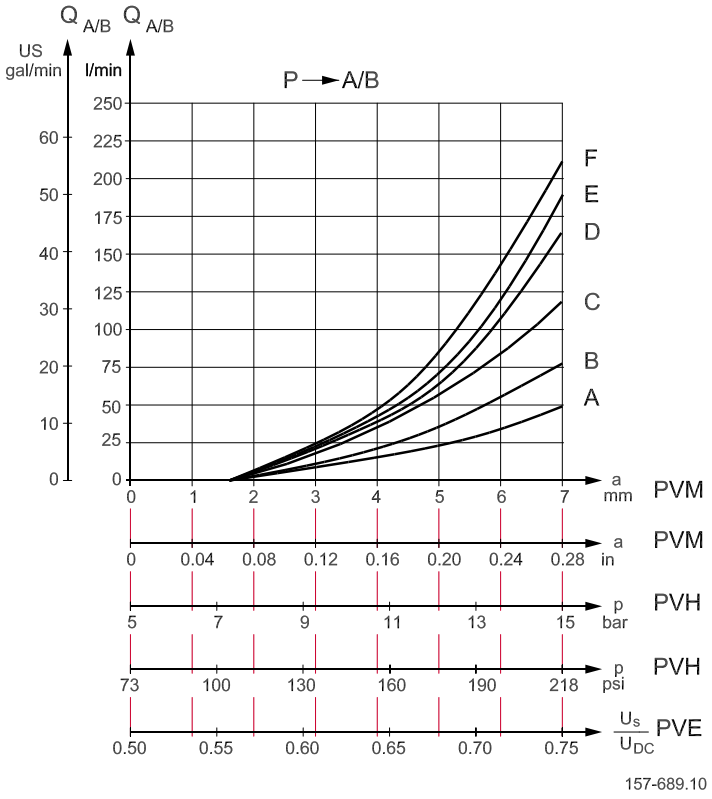
Technical characteristics

Pressure drop PVB for open spool in neutral position



PVB with pressure compensation, closed center PVP

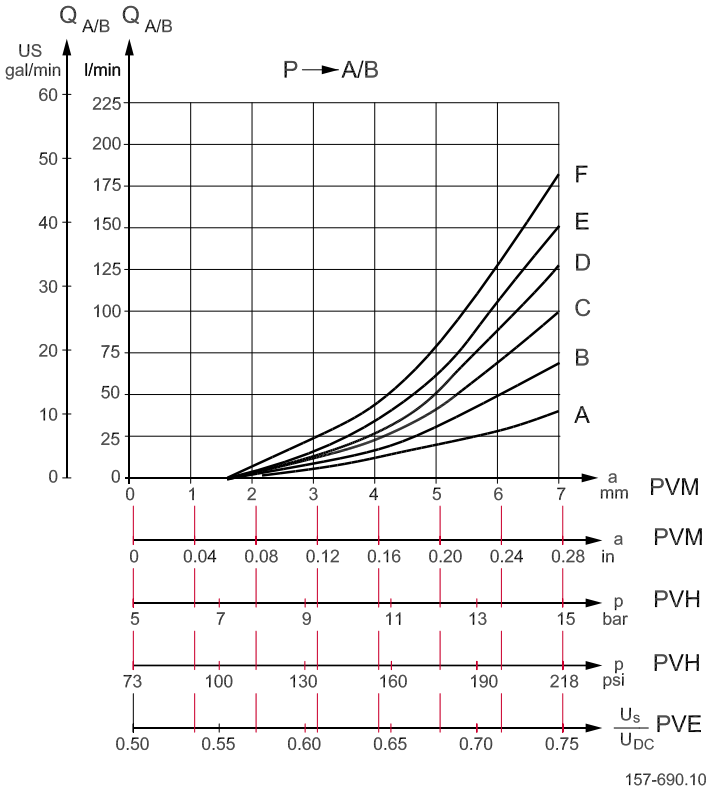
Oil flow as a function of spool travel for spools A to F - 20 bar [290 psi]



Set pressure difference between pump pressure and LS signal = 20 bar [290 psi] measured at the P-port of the valve.

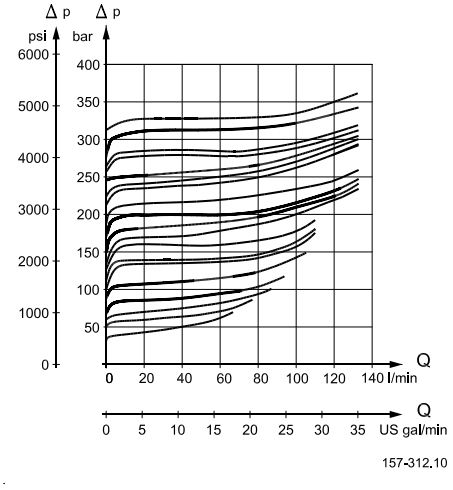
Technical characteristics

Oil flow as a function of spool travel for spools A to F - 15 bar [218 psi]

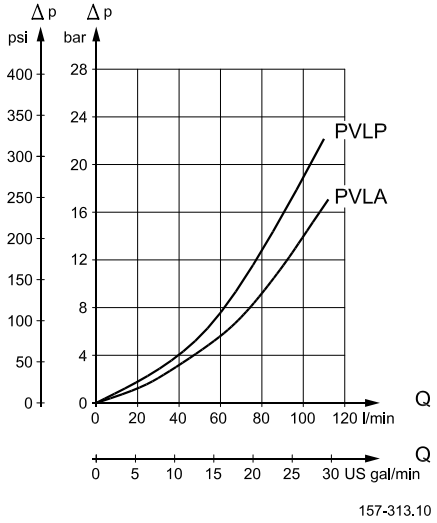


Set pressure difference between pump pressure and LS signal = 15 bar [218 psi] measured at the P-port of the valve.

PVLP, shock and suction valve



PVLP/PVLA, suction valve

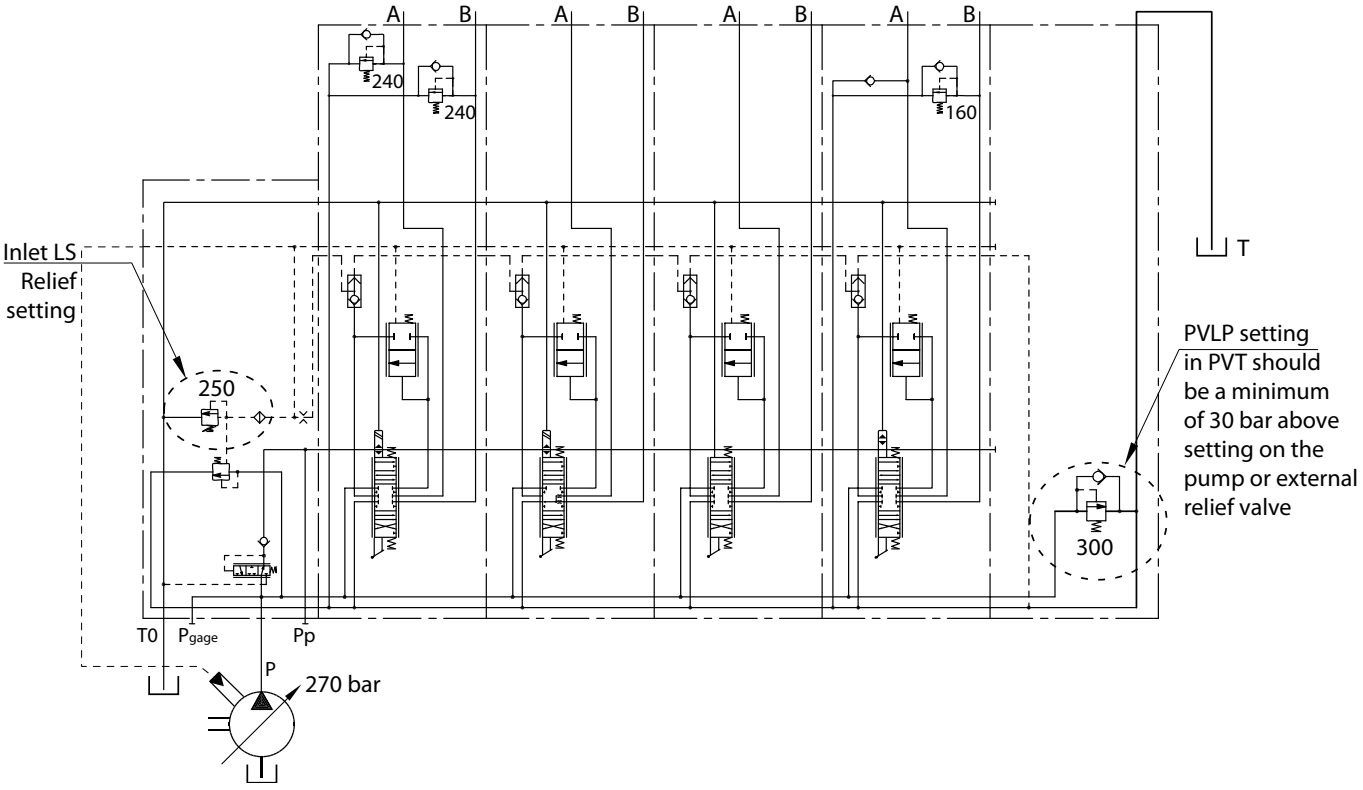


The shock valve PVLP is designed to absorb shock effects. Consequently, it should not be used as a pressure relief valve. PVLP is set at an oil flow of 10 l/min [2.6 US gal/min].

Technical characteristics

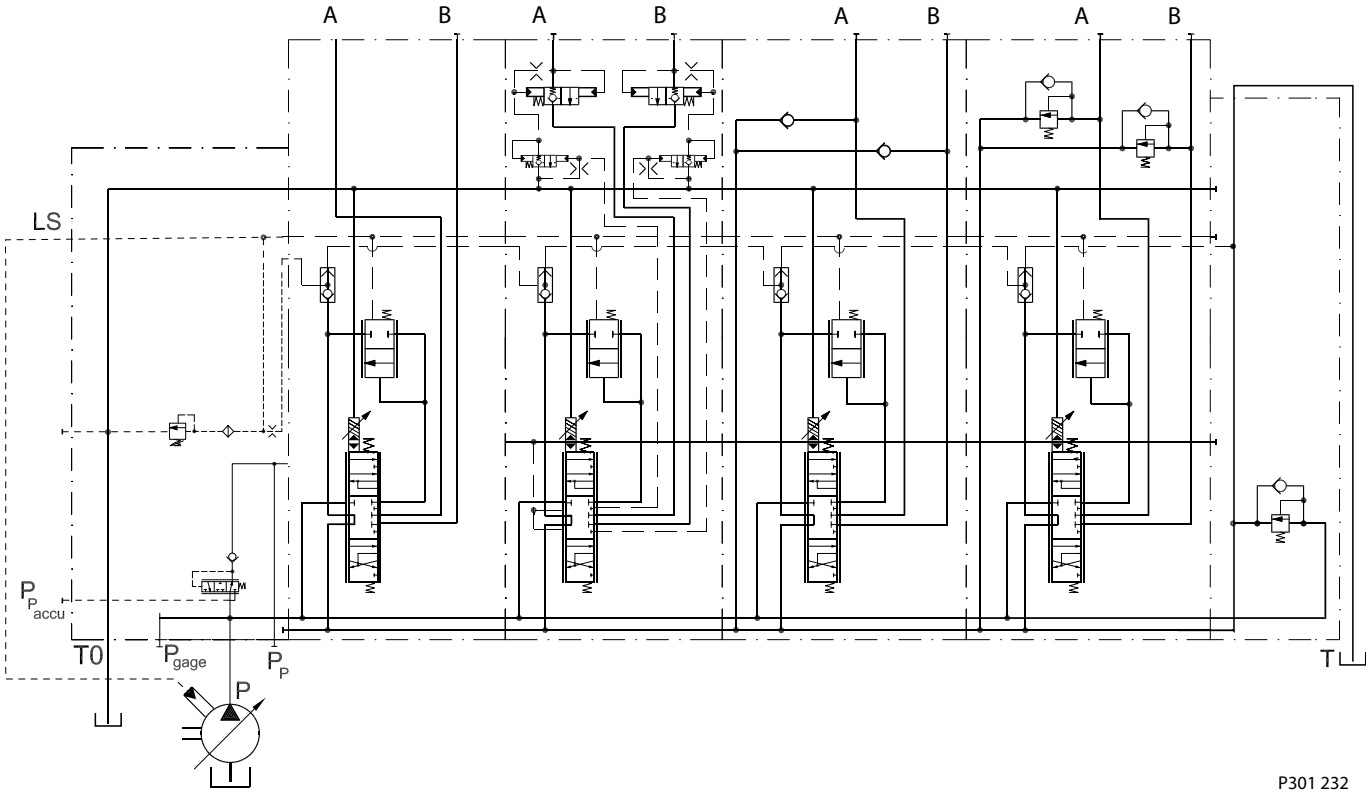
Hydraulic systems

PVG 100 with variable displacement pump schematic example



Hydraulic systems

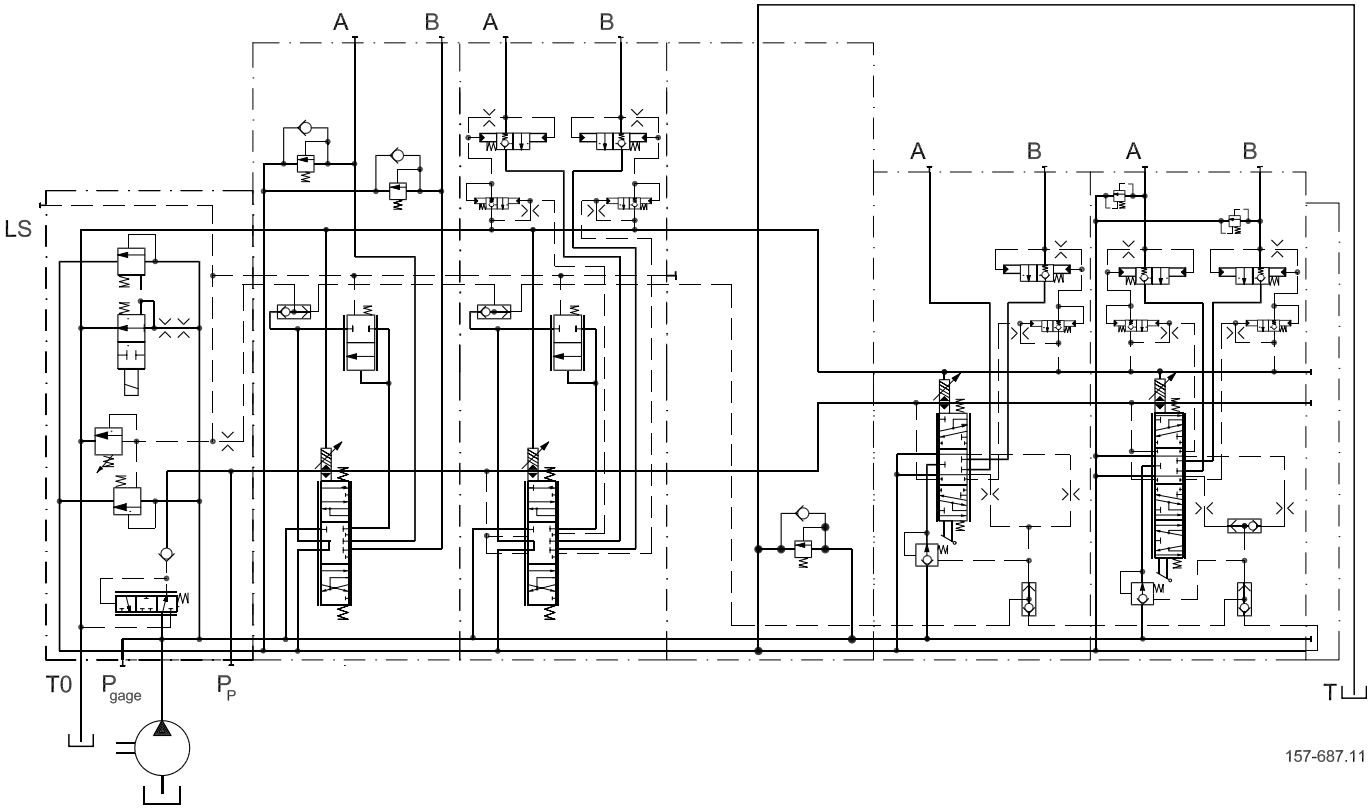
Electrically actuated PVG 100, variable displacement pump, PVB 100 with integrated pilot operated check valves



P301 232

Hydraulic systems

Electrically actuated PVG 100/32, fixed displ. pump, PVB 100/32 with integrated pilot operated check valves



Other operating conditions

Oil

The main duty of the oil in a hydraulic system is to transfer energy; but it must also lubricate the moving parts in hydraulic components, protect them against corrosion, and transport dirt particles and heat out of the system. It is therefore important to choose the correct oil with the correct additives. This gives normal operation and long working life.

Mineral oil

For systems with PVG 100 valves Danfoss recommends the use of mineral-based hydraulic oil containing additives: Type HLP (DIN 51524) or HM (ISO 6743/4).

Non-flammable fluids

Phosphate-esters (HFDR fluids) can be used without special precautions. However, dynamic seals must be replaced with FPM (Viton) seals. Please contact the Danfoss Sales Organization, if the PVG 100 valve is to be used with phosphate-esters.

The following fluids should only be used according to agreement with the Sales Organization for Danfoss:

- Water-glycol mixtures (HFC fluids)
- Water-oil emulsions (HFB fluids)
- Oil-water emulsions (HFAE fluids)

Biodegradable oils

PVG 100 valves can be used in systems with rapeseed oil.

The use of rapeseed oil is conditioned by:

- complying with the demands on viscosity, water content, temperature and filtering etc. (see chapters below and technical data page 7).
- adapting the operating conditions to the directions of the oil supplier.

Before using other biodegradable fluids, please consult the Danfoss Organization.

Particle content, degree of contamination

Oil filtration must prevent particle content from exceeding an acceptable level, i.e. an acceptable degree of contamination.

Maximum contamination for PVG 100 is 23/19/16 (see ISO 4406. Calibration in accordance with the ACFTD method).

In our experience a degree of contamination of 23/19/16 can be maintained by using a filter fineness as described in the next section.

Filtration

Effective filtration is the most important precondition in ensuring that a hydraulic system performs reliably and has a long working life. Filter manufacturers issue instructions and recommendations. It is advisable to follow them.

System filters

Where demands on safety and reliability are very high a pressure filter with bypass and indicator is recommended. Experience shows that a 10 µm nominal filter (or finer), or a 20 µm absolute filter (or finer) is suitable. It is our experience that a return filter is adequate in a purely mechanically operated valve system.

Other operating conditions

The fineness of a pressure filter must be selected as described by the filter manufacturer so that a particle level of 23/19/16 is not exceeded.

The filter must be fitted with pressure gauge or dirt indicator to make it possible to check the condition of the filter.

In systems with differential cylinders or accumulators the return filter must be sized to suit the max. return oil flow. Pressure filters must be fitted to suit max. pump oil flow.

Internal filters

The filters built into PVG 100 are not intended to filter the system but to protect important components against large particles. Such particles can appear in the system as a result of pump damage, hose fracture, use of quick-couplings, filter damage, starting up, contamination, etc.

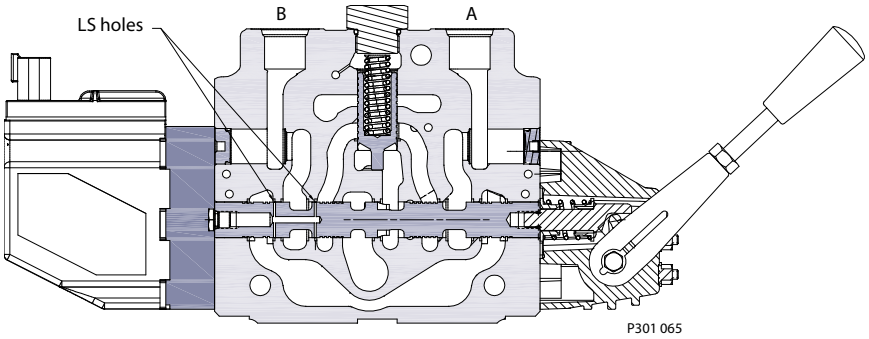
The filter in the electrical actuator PVE protecting the solenoid valves has a mesh of 150 µm.

Bursting pressure drop for internal filters is 25 bar [360 psi].

Mounting, PVBS spool sub-assemblies

Standard mounting vs. option mounting

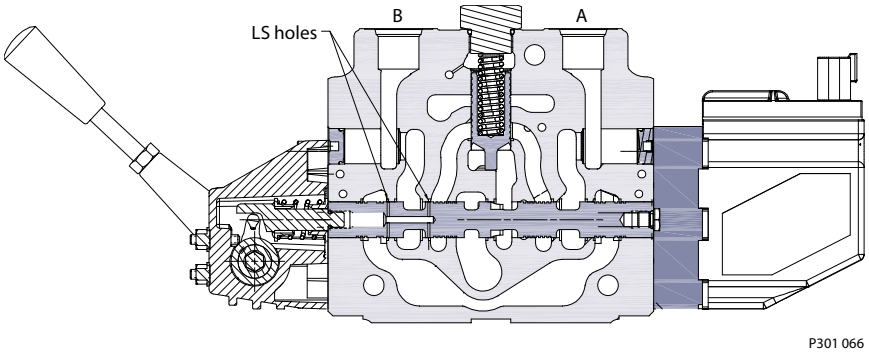
Standard mounting – the PVM on the "A" port side of the PVB



Standard Mounted Work Section

Standard mounting is defined as installing the PVM on the "A" port side of the PVB. Because of this, the PVE or PV cover (PVH, PVMD, PVMR, PVMF or PVHC) would be on the "B" port side of the valve.

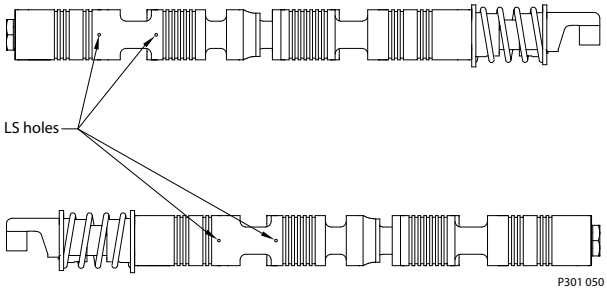
Option mounting – the PVM on the "B" port side of the PVB



Option mounting is defined as installing the PVM on the "B" port side of the PVB. Because of this, the PVE or PV cover (PVH, PVMD, PVMR, PVMF or PVHC) would be on the "A" port side of the valve.

The PVBS in PVG 100 are not symmetric. Because of this the "Load Sense" (Ls) holes in the PVBS main spool must be installed so that they are on the "B" port side of the PVB.

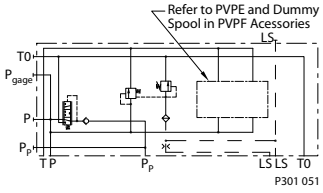
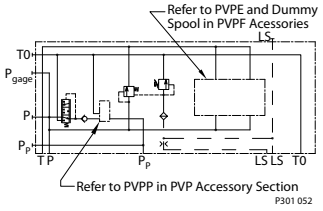
Standard mounting spool (upper PVBS) vs. Option mounting spool (below PVBS)



Before determining spool part numbers, determine whether the section will be standard or option mounted. Standard and Option mounting only applies to a work section. Standard and option mounted section can be used together in the same stack.

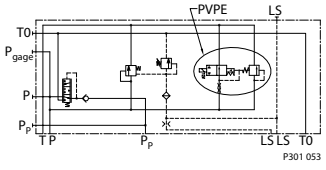
Modules and Code Numbers

PVPF (Open Center) Inlet Modules - for Pumps with Fixed Displacement

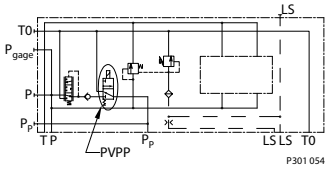
Symbol	Description		BSP port G1	SAE Port 1 5/16-12
	Open center pump side module for pumps with fixed displacement. Max pump flow 250 l/min [66 US gal/min]. With pilot supply for PVE actuation. With pilot gauge port.	12 bar spring*	161B5110	161B5510
		20 bar spring*	161B5112	161B5512
	Open center pump side module for pumps with fixed displacement. Max pump flow 250 l/min [66 US gal/min]. With pilot supply for PVH/PVHC actuation. With pilot gauge port.	12 bar spring*	11013065	11013066
		20 bar spring*	11013067	11013068
	Open center pump side module for pumps with fixed displacement. Max pump flow 250 l/min [66 US gal/min]. With pilot supply for PVE actuation. Accumulator port and facility for pilot shut-off valve (PVPP).	12 bar spring*	161B5140	161B5540
		20 bar spring*	161B5142	161B5542
	Open center pump side module for pumps with fixed displacement. Max pump flow 250 l/min [66 US gal/min]. With pilot supply for PVH/PVHC actuation. Accumulator port and facility for pilot shut-off valve (PVPP).	12 bar spring*	11013071	11013072
		20 bar spring*	11013073	11013074

* Spring for pressure matching spool - PVPF only.

PVPF Accessories for Pump Side Modules

Symbol	Description		Code Number
—	Dummy Spool		155G5041
	PVPE Electrically actuated normally open, unloading valve If PVPE is not required the “Dummy Spool” must be specified	12 V	155G5052
		24 V	155G5054

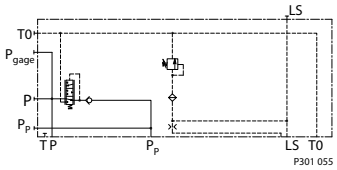
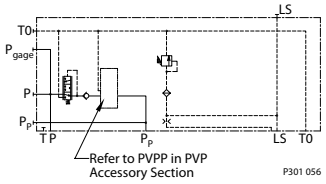
PVP (Open and Closed) Accessories for Pump Side Modules

Symbol	Description		Code Number
	PVPP Electrically Actuated Pilot Shut Off Valve Normal Closed Solenoid Valve	12 V	800572719
		24 V	800572819

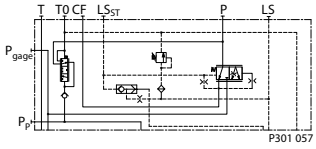
PVPV (Closed Center) Inlet Modules

Symbol	Description	BSP port G1	SAE Port 1 5/16-12
	Closed Center Pump Side Module for pumps with variable displacement.	161B5111	161B5511

Modules and Code Numbers

Symbol	Description	BSP port G1	SAE Port 1 5/16-12
	Max pump flow 250 l/min [66 US gal/min]. With pilot supply for PVE actuation. With pilot gauge port.		
	Closed Center Pump Side Module for pumps with variable displacement. Max pump flow 250 l/min [66 US gal/min]. With pilot supply for PVH/PVHC actuation. With pilot gauge port.	11013069	11013070
	Closed Center Pump Side Module for pumps with variable displacement. Max pump flow 250 l/min [66 US gal/min]. With pilot supply for PVE actuation. With pilot gauge port. Accumulator port and facility for pilot shut off valve.	161B5141	161B5541
	Closed Center Pump Side Module for pumps with variable displacement. Max pump flow 250 l/min [66 US gal/min]. With pilot supply for PVH/PVHC actuation. With pilot gauge port. Accumulator port and facility for pilot shut off valve.	11013075	11013076

PVPVP, Closed Center Priority Side Modules - for Pumps with Variable Displacement

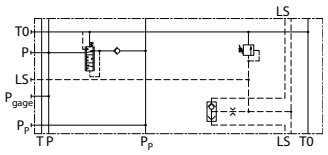
Symbol	Description	Code Number	
		BSP port P: G¾ T: G1 CF: G½	SAE port P: 1 1/16-12 T: 1 5/16-12 CF: ¾-16
	PVPVP Closed Center Pump Side Modules for pumps with variable displacement Max pump flow 250 l/min [66 US gal/min] Max CF flow 60 l/min [15.9 US gal/min] With integrated priority function With pilot supply for PVE actuation	161B5211	161B5611
	PVPVP Closed Center Pump Side Modules for pumps with variable displacement Max pump flow 250 l/min [66 US gal/min] Max CF flow 60 l/min [15.9 US gal/min] With integrated priority function With pilot supply for PVH/PVHC actuation	11013077	11013078

PVPVM, Closed Center Mid Inlet Modules - for Pumps with Variable Displacement

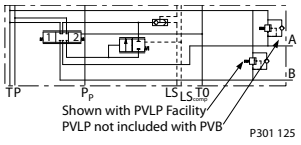
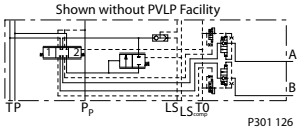
* requires two PVAS kits

Symbol	Description	Code Number	
		BSP port: P = 1¼ Code 62 Metric flange LS, TO, Pg, Pp = G ¼	SAE port: P = 1¼ Code 62 Metric flange LS, TO, Pg, Pp = 9/16-18 UNF
	PVPVM	11130086*	11133048*

Modules and Code Numbers

Symbol	Description	Code Number	
		BSP port: P = 1¼ Code 62 Metric flange LS, TO, Pg, Pp = G ¼	SAE port: P = 1¼ Code 62 Metric flange LS, TO, Pg, Pp = 9/16-18 UNF
	Mid modules for pumps with variable displ. Max. pump flow 400 l/min [106 US gal/min] With pilot supply for PVE actuation		
	PVPVM Mid modules for pumps with variable displ. Max. pump flow 400 l/min [106 US gal/min] With pilot supply for PVH / PVHC actuation	11133046*	11133047*

PVB 100 Basic Modules - for use with standard spools

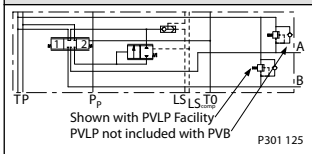
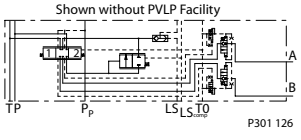
Symbol	Description		Code Number	
			BSP port G¾	SAE port 1 1/16-12 UNF
	PVB Post Compensated	Without PVLP	161B6250	161B6650
		With PVLP	161B6260	161B6660
	PVB End Module Post Compensated	Without PVLP With PVLP	11006889***	11036948*** 11070866***
	PVB with tank port in bottom of PVB Post Compensated	With PVLP	11006887*	-
	PVBZ Post Compensated With pilot Operated check valve on work Port A and B	Without PVLP	161B6252**	161B6652**
		With PVLP	161B6262**	161B6662**

* To be used with PVB end modules

** Not compatible with PVMR or PVMF Spools

*** Only compatible with PVPVP, PVB, PVPVM and PVT (insure that shock valve is allowed to drain to a tank)

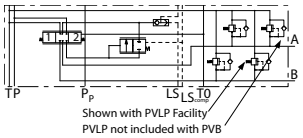
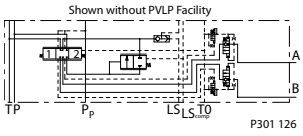
PVB 100 Basic Modules - for use with exposed spools; seal plate on "A" port side included

Symbol	Description		Code Number	
			BSP port G¾	SAE port 1 1/16-12 UNF
	PVB Post compensated	Without PVLP	11051707	11051708
		With PVLP	11051709	11051710
	PVBZ Post compensated With pilot operated check valve on work Port A and B	Without PVLP	11051711*	11051712*
		With PVLP	11051713*	11051714*

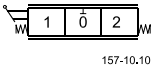
Modules and Code Numbers

* Not compatible with PVMR or PVMF Spools.

PVB 100 Basic Modules - for use with High Flow Spools

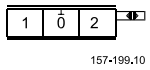
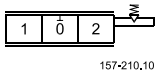
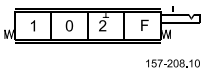
Symbol	Description	Code Number	
		BSP port A, B = G ¾	SAE port 1 3♦16-12 UNF
	PVB Without facility for PVLP	11102180	11102181
	PVB With facility for PVLP (2x for A and B)	11102178	11101825
	PVB with PVBZ on A and B Without facility for PVLP	11102184	11102185
	PVB with PVBZ on A and B With facility for PVLP (2x for A and B)	11102182	11102183

PVM, Mechanical Actuation

Symbol	Description	Code Number	
		with stop screws*	without stop screws
	PVM, aluminum housing Standard, spring centered	157B3171	157B3191
	PVM, aluminum housing Without actuation lever and base Shaft for mounting of actuation lever	157B3173	157B3193
	PVM, cast Iron housing Standard, spring centered	157B3161	-
	PVM, anodized aluminum housing Standard, spring centered	157B3184	-

* Stop screws provide Individual flow adjustment on ports A and B.

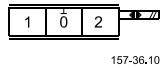
PVM / PVH, Covers

Symbol	Description		Code Number
—	PVMD*, Cover for purely mechanical actuation	aluminum	157B0001
		cast iron	157B0021
	PVH, Cover for hydraulic remote control	G¼	157B0008
		9/16-18 UNF	157B0007
	PVMR*, Cover for friction detent		157B0015
	PVMF*, Mechanical float position lock, P -> A -> F		157B0005

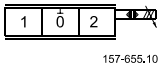
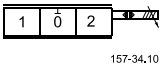
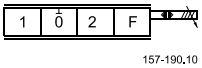
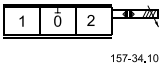
* Opposite of PVM, not compatible with PVG 100 PVBZ.

Modules and Code Numbers

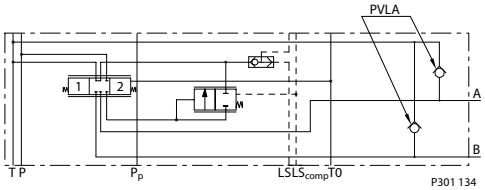
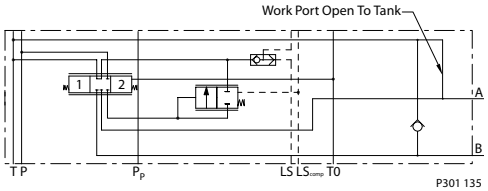
PVEO, ON/OFF Actuation

Symbol	Description		Hirschmann		AMP		Deutsch	
			12 V	24 V	12 V	24 V	12 V	24 V
 157-36.10	PVEO	ON/OFF	157B4216	157B4228	157B4901	157B4902	157B4291	157B4292
		ON/OFF with ramp	157B4217	157B4229	157B4903	157B4904	-	-
		ON/OFF anodized	157B4266	157B4268	-	157B4272	-	-

PVEA/PVEH/PVES, Proportional Actuation

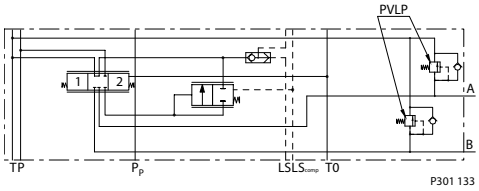
Symbol	Description		Hirschmann	AMP	Deutsch
			11 - 32 V	11 - 32 V	11 - 32 V
 157-655.10	PVEA	Standard, active fault monitoring	-	157B4734	157B4792
		Standard, passive fault monitoring	-	157B4735	-
	PVEA-DI	Standard, active fault monitoring	-	157B4736	157B4796
		Standard, passive fault monitoring	-	157B4737	-
 157-34.10	PVEH	Standard, active fault monitoring	157B4032	157B4034	157B4092
		Standard, passive fault monitoring	157B4033	157B4035	157B4093
		Float, passive fault monitoring	-	-	157B4392
		Standard, passive, anodized	-	157B4073	-
		Float, active fault monitoring	157B4332	157B4034	-
 157-190.10	PVEH-DI	Standard, active fault monitoring	-	157B4036	157B4096
		Standard, passive fault monitoring	-	157B4037	-
 157-34.10	PVES	0% hysteresis, active fault monitoring	157B4832	157B4834	157B4892
		0% hysteresis, passive fault monitoring	157B4833	157B4835	-
	PVEP	PVEP, voltage PWM, active fault monitoring	-	-	157B4752
	PVED	Can-Bus interface	-	157B4943	157B4944

PVLA, Anti-Cavitation Valve Fitted into PVB

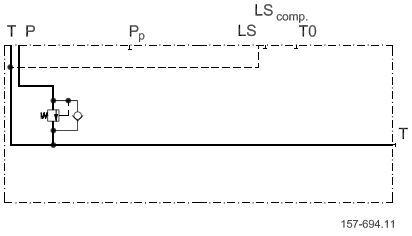
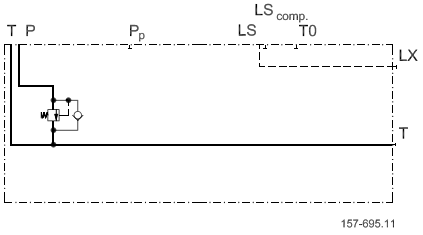
Symbol	Description	Code number
	PVLA Anti-cavitation valve installed in PVLP cavity of PVB	157B2001
	Cap For connecting non-active work port to tank	157B2002

Modules and Code Numbers

PVLP, Shock / Anti-Cavitation Valve Fitted into PVB

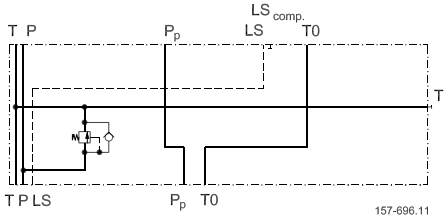
Symbol	Description	Setting		Code number
		bar	psi	
	PVLP Shock and anti-cavitation valve (Not adjustable)	32	460	157B2032
		50	725	157B2050
		63	914	157B2063
		80	1160	157B2080
		100	1450	157B2100
		125	1813	157B2125
		140	2031	157B2140
		150	2175	157B2150
		160	2320	157B2160
		175	2538	157B2175
		190	2755	157B2190
		210	3045	157B2210
		230	3335	157B2230
		240	3480	157B2240
		250	3625	157B2250
		265	3843	157B2265
		280	4061	157B2280
		300	4351	157B2300
		320	4641	157B2320
		350	5075	157B2350

PVT 100, Tank Module

Symbol	Description	Port size	Code number
	PVT Without active elements With T-port PVLP shock valve facility	G 1¼	161B2500
		15⁄8-UNF	161B2520
	PVT Without active elements With T-port PVLP shock valve facility With LX connection G1/4 [9/16 in – 18 UNF]	G 1¼	161B2505
		15⁄8-UNF	161B2525

Modules and Code Numbers

PVTI 100/32, Interface Module*

Symbol	Description	Port size	Code number
	PVTI Without active elements With T-port PVLP shock valve facility	G 1¼	161B2200
		15⁄8-UNF	161B2220

* Must use T0 equipped PVG32 Modules, for details see Danfoss Technical Information Basis Modules PVBZ, 520L0721.

PVG 100 PVSI / PVT, Assembly Kit

Description	Code number 161B....							
	1 PVB	2 PVB	3 PVB	4 PVB	5 PVB	6 PVB	7 PVB	8 PVB
Tie bolts and seals	8001	8002	8003	8004	8005	8006	8007	8008

PVBE (End Bodies), Assembly Kit

Description	Code number							
	1 PVB	2 PVB	3 PVB	4 PVB	5 PVB	6 PVB	7 PVB	8 PVB
Tie bolts and seals	11081671	11017005	11017006	11017007	11017008	11017009	11017010	11017011

PVG 100 / PVTI, Interface Module Assembly Kit

Description	Code number 161B....							
	1 PVB	2 PVB	3 PVB	4 PVB	5 PVB	6 PVB	7 PVB	8 PVB
Tie bolts and seals	8021	8022	8023	8024	8025	8026	8027	8028

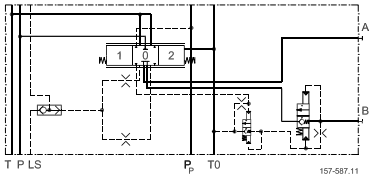
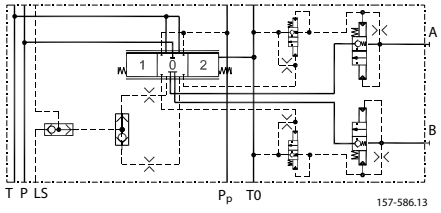
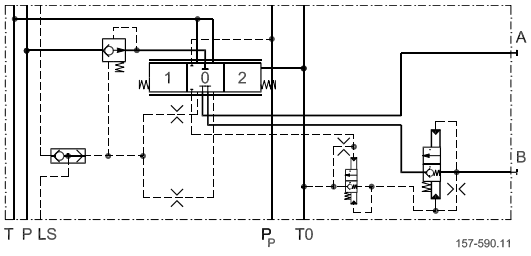
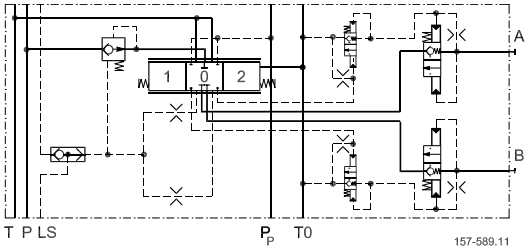
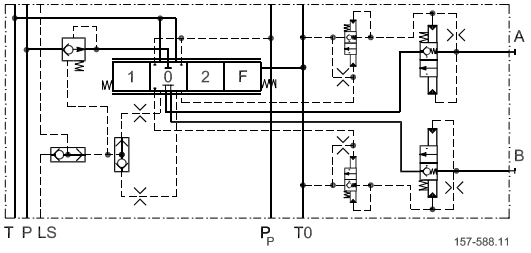
PVB 32, Assembly Kit

Description	Code number 157B....									
	1 PVB	2 PVB	3 PVB	4 PVB	5 PVB	6 PVB	7 PVB	8 PVB	9 PVB	10 PVB
Tie bolts and seals	8000	8001	8002	8003	8004	8005	8006	8007	8008	8009

PVG 32 Basic Modules with T0, PVBZ (Compatible with PVG 100)

Symbol	Description PVBZ	Without thermal relief valve 157B...		With thermal relief valve 157B...	
		BSP	SAE	BSP	SAE
	Without compensator and load drop check valve With pilot operated check valves on work port B Max. work port pressure = 210 bar [3045 psi]	6051	6451	-	-

Modules and Code Numbers

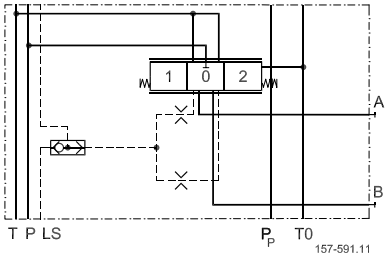
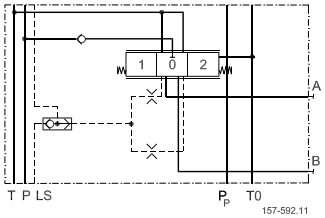
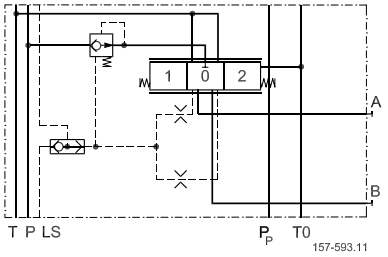
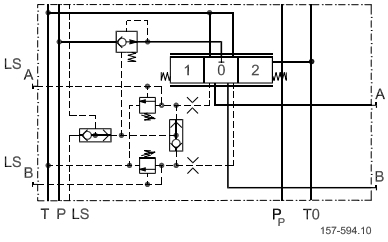
Symbol	Description PVBZ	Without thermal relief valve 157B...		With thermal relief valve 157B...	
		BSP	SAE	BSP	SAE
					
	Without compensator and load drop check valve With pilot operated check valves on work port A and B Max. work port pressure = 210 bar [3045 psi]	6052	6452	-	-
	With compensator With pilot operated check valves on work port B Compensated work port flow A/B = 100 l/min [26.4 US gal/min] Max. work port pressure = 210 bar [3045 psi]	6251	-	6261	6661
	With compensator With pilot operated check valves on work port A and B Compensated work port flow A/B = 100 l/min [26.4 US gal/min] Max. work port pressure 210 bar [3045 psi]	6252	6652	6262	6662
	With compensator With pilot operated check valves on work port A and B LSA/B shuttle valve for float and shuttle pin Compensated work port flow A/B = 100 l/min [26.4 US gal/min] Max. work port pressure 210 bar [3045 psi]	-	-	6266	6666

Connection: A and B-port G 1/2 [7/8 in - 14]

Please refer to Publications 520L0344 for PVBZ spool selection and to 520L0721 for the PVBZ modules with P.O. check.

Modules and Code Numbers

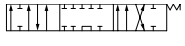
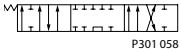
PVG 32 Basic Modules with T0, PVB (Compatible with PVG 100)

Symbol	Description PVB	Code number 157B.....			
		Without PVLP 63		With PVLP 63	
		BSP	SAE	BSP	SAE
	Without load drop check valve and pressure compensator. Can be used where load holding valves prevent oil from floating back through the channel P.	6010	6410	-	-
	Load drop check valve	6110	6909	6140	6904
	With compensator valve	6210	6922	6240	6906
	With compensator valve Adjustable LS A/B limiting valves. External LS connection port A/B. Also used for float position spools.	6213	6613	6243	6643

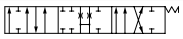
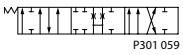
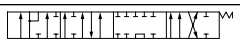
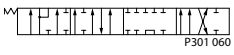
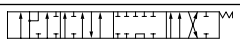
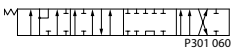
Connection: A and B-port G 1/2 [7/8 in –14]

Refer to Publication **520L0344** for PVB spool selection.

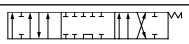
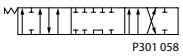
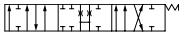
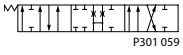
Standard Spools for Electrical and Mechanical Actuation

Symbol		Pressure Compensated Flow (Specified flow is at 15 bar pump margin pressure) l/min [US gal/min]					
		A 40 [10.6]	B 65 [17.2]	C 100 [26.4]	D 130 [34.4]	E 150 [39.6]	F 180 [47.6]
4-way, 3 position, Closed Neutral Position		161B7022	161B7023	161B7024	161B7025	161B7026	161B7027
Standard Mount							
Option Mount		11013079	11013080	11013081	11013082	11013083	11013084

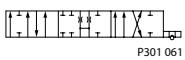
Modules and Code Numbers

Symbol		Pressure Compensated Flow (Specified flow is at 15 bar pump margin pressure) l/min [US gal/min]					
		A 40 [10.6]	B 65 [17.2]	C 100 [26.4]	D 130 [34.4]	E 150 [39.6]	F 180 [47.6]
4-way, 3-position, Throttled Open Neutral Position		161B7122	161B7123	161B7124	161B7125	161B7126	161B7127
Standard Mount							
Option Mount	 P301 059	11013085	11013086	11013087	11013088	11013089	11013090
4-way, 4-position, Closed Neutral Position, Electric float P –> A –> F		161B7622	161B7623	161B7624	161B7625	161B7626	161B7627
Standard Mount							
Option Mount	 P301 060	11013091	11013092	11013093	11013094	11013095	11013096
4-way, 3-position, Throttled Open Neutral Position Electric Float P –> A –> F		11016865	11016866	11016867	11016868	11016869	11016870
Standard Mount							
Option Mount	 P301 060	11016871	11016872	11016873	11016874	11016875	11016876

Standard Spools for Hydraulic Actuation

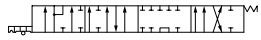
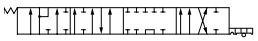
Symbol		Pressure Compensated Flow (Specified flow is at 15 bar pump margin pressure) l/min [US gal/min]					
		A 40 [10.6]	B 65 [17.2]	C 100 [26.4]	D 130 [34.4]	E 150 [39.6]	F 180 [47.6]
4-way, 3 position, Closed Neutral Position		161B9522	161B9523	161B9524	161B9525	161B9526	161B9527
Standard Mount							
Option Mount	 P301 058	11013097	11013098	11013099	11013100	11013101	11013102
4-way, 3-position, Throttled Open Neutral Position		161B9622	161B9623	161B9624	161B9625	161B9626	161B9627
Standard Mount							
Option Mount	 P301 059	11013103	11013104	11013105	11013106	11013107	11013108

Spools for Friction Detent, PVMR (not compatible with PVBZ 100)

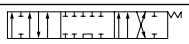
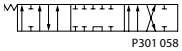
Symbol		Pressure Compensated Flow (Specified flow is at 15 bar pump margin pressure) l/min [US gal/min]					
		A 40 [10.6]	B 65 [17.2]	C 100 [26.4]	D 130 [34.4]	E 150 [39.6]	F 180 [47.6]
4-way, 3-position, Throttled Open Neutral Position		161B9732	161B9733	161B9734	161B9735	161B9736	161B9737
Standard Mount							
Option Mount	 P301 061	11013109	11013110	11013111	11013112	11013113	11013114

Modules and Code Numbers

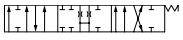
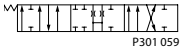
Spools for Mechanical Float position, PVMF (not compatible with PVBZ 100)

Symbol		Pressure Compensated Flow (Specified flow is at 15 bar pump margin pressure) l/min [US gal/min]					
		A 40 [10.6]	B 65 [17.2]	C 100 [26.4]	D 130 [34.4]	E 150 [39.6]	F 180 [47.6]
4-way, 3 position, Throttled Open Neutral Position		161B9822	161B9823	161B79824	161B9825	161B9826	161B9827
Standard Mount							
Option Mount	 P301 062	11013115	11013116	11013117	11013118	11013119	11013120

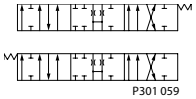
Standard Spools Linear Flow Characteristics (Electrical and Mechanical Actuation)

Symbol		Pressure Compensated Flow (Specified flow is at 15 bar pump margin pressure) l/min [US gal/min]					
		A 40 [10.6]	B 65 [17.2]	C 100 [26.4]	D 130 [34.4]	E 150 [39.6]	F 180 [47.6]
4-way, 3 position, Closed Neutral Position		11016852	11016853	11016854	11016855	11016857	11016858
Standard Mount							
Option Mount	 P301 058	11016859	11016860	11016861	11016862	11016863	11016864

Standard Spools (Electrical and Mechanical Actuation), Linear Flow Characteristics

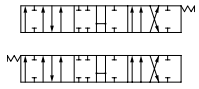
Symbol		Pressure Compensated Flow (Specified flow is at 15 bar pump margin pressure) l/min [US gal/min]					
		A 40 [10.6]	B 65 [17.2]	C 100 [26.4]	D 130 [34.4]	E 150 [39.6]	F 180 [47.6]
4-way, 3-position, Throttled Open Neutral Position		11116606	11116607	11116608	11116609	11116610	11116611
Standard Mount							
Option Mount	 P301 059	-	-	11090529	11090653	-	-

Standard Spools (Hydraulic and Mechanical Actuation), Linear Flow Characteristics

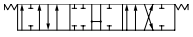
Symbol		Pressure Compensated Flow (Specified flow is at 15 bar pump margin pressure) l/min [US gal/min]					
		A 40 [10.6]	B 65 [17.2]	C 100 [26.4]	D 130 [34.4]	E 150 [39.6]	F 180 [47.6]
4-way, 3 position, Throttled Open Neutral Position		11116612	11116613	11116614	11116615	11116616	11116617
Standard Mount	 P301 059						

Modules and Code Numbers

Standard Spools (Electrical and Mechanical Actuation), Full Open A/B → T and Neutral; Progressive Flow Characteristics

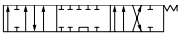
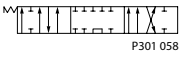
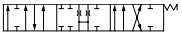
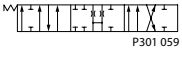
Symbol		Pressure Compensated Flow (Specified flow is at 15 bar pump margin pressure) l/min [US gal/min]					
		A 40 [10.6]	B 65 [17.2]	C 100 [26.4]	D 130 [34.4]	E 150 [39.6]	F 180 [47.6]
4-way, 3 position, Open Neutral Position		11121597	11121598	11121599	11121600	11121601	-
Standard Mount							

Standard Spools (Hydraulic and Mechanical Actuation), Full Open A/B → T and Neutral; Progressive Flow Characteristics

Symbol		Pressure Compensated Flow (Specified flow is at 15 bar pump margin pressure) l/min [US gal/min]					
		A 40 [10.6]	B 65 [17.2]	C 100 [26.4]	D 130 [34.4]	E 150 [39.6]	F 180 [47.6]
4-way, 3 position, Open Neutral Position		11121602	11121603	11121604	11121605	11121606	11005747
Standard Mount							

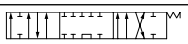
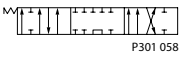
High Flow Spools (Electrical and Mechanical Actuation)

High Flow Spools (Electrical and Mechanical Actuation)

Symbol		Pressure Compensated Flow (Specified flow is at 15 bar pump margin pressure)	
		210 l/min [55.4 US gal/min]	240 l/min [63.4 US gal/min]
4-way, 3 position, Closed Neutral Position		11102188	11102192
Standard Mount			
Option Mount	 P301 058	11102200	11102205
4-way, 3-position, Throttled Open Neutral Position		11102189	11102193
Standard Mount			
Option Mount	 P301 059	11102201	11102206

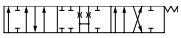
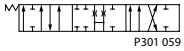
High Flow Spools (Hydraulic and Mechanical Actuation)

High Flow Spools (Hydraulic and Mechanical Actuation)

Symbol		Pressure Compensated Flow (Specified flow is at 15 bar pump margin pressure)	
		210 l/min [55.4 US gal/min]	240 l/min [63.4 US gal/min]
4-way, 3 position, Closed Neutral Position		11102186	11102190
Standard Mount			
Option Mount	 P301 058	11102198	11102202
4-way, 3-position, Throttled Open Neutral Position		11102187	11102191

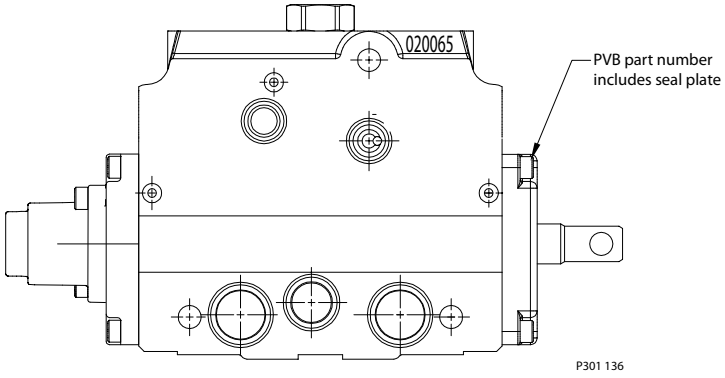
Modules and Code Numbers

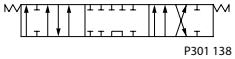
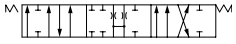
High Flow Spools (Hydraulic and Mechanical Actuation) (continued)

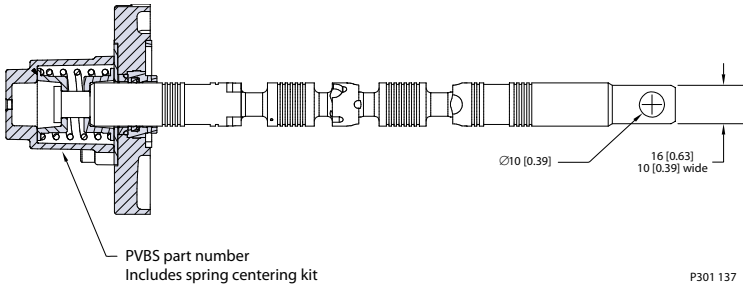
Symbol		Pressure Compensated Flow (Specified flow is at 15 bar pump margin pressure)	
		210 l/min [55.4 US gal/min]	240 l/min [63.4 US gal/min]
Standard Mount			
Option Mount	 P301 059	11102199	11102203

Exposed Spools

The following spools are available with an exposed tang for mechanical actuation. These spools are only available for standard mounting.

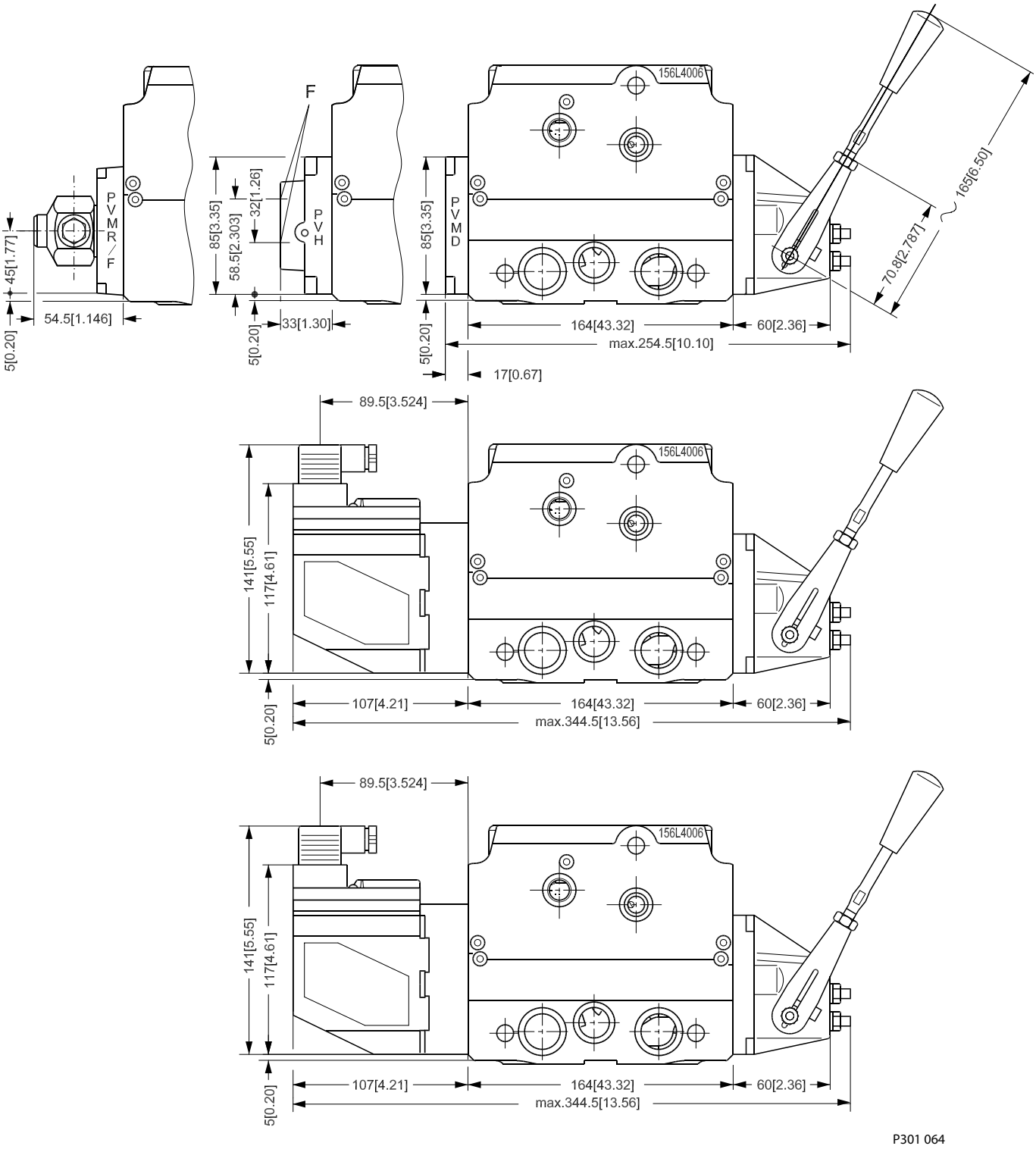


Symbol	Pressure compensated flow l/min [US gal/min]*					
	A 40 [10.6]	B 65 [17.2]	C 100 [26.4]	D 130 [34.4]	E 150 [39.6]	F 180 [47.6]
4-Way, 3-Position, Closed Neutral Position Standard Mount  P301 138	11051695	11051696	11051697	11051698	11051699	11051700
4-Way, 3-Position, Throttled Open Standard Mount  P301 139	11051701	11051702	11051703	11051704	11051705	11051706



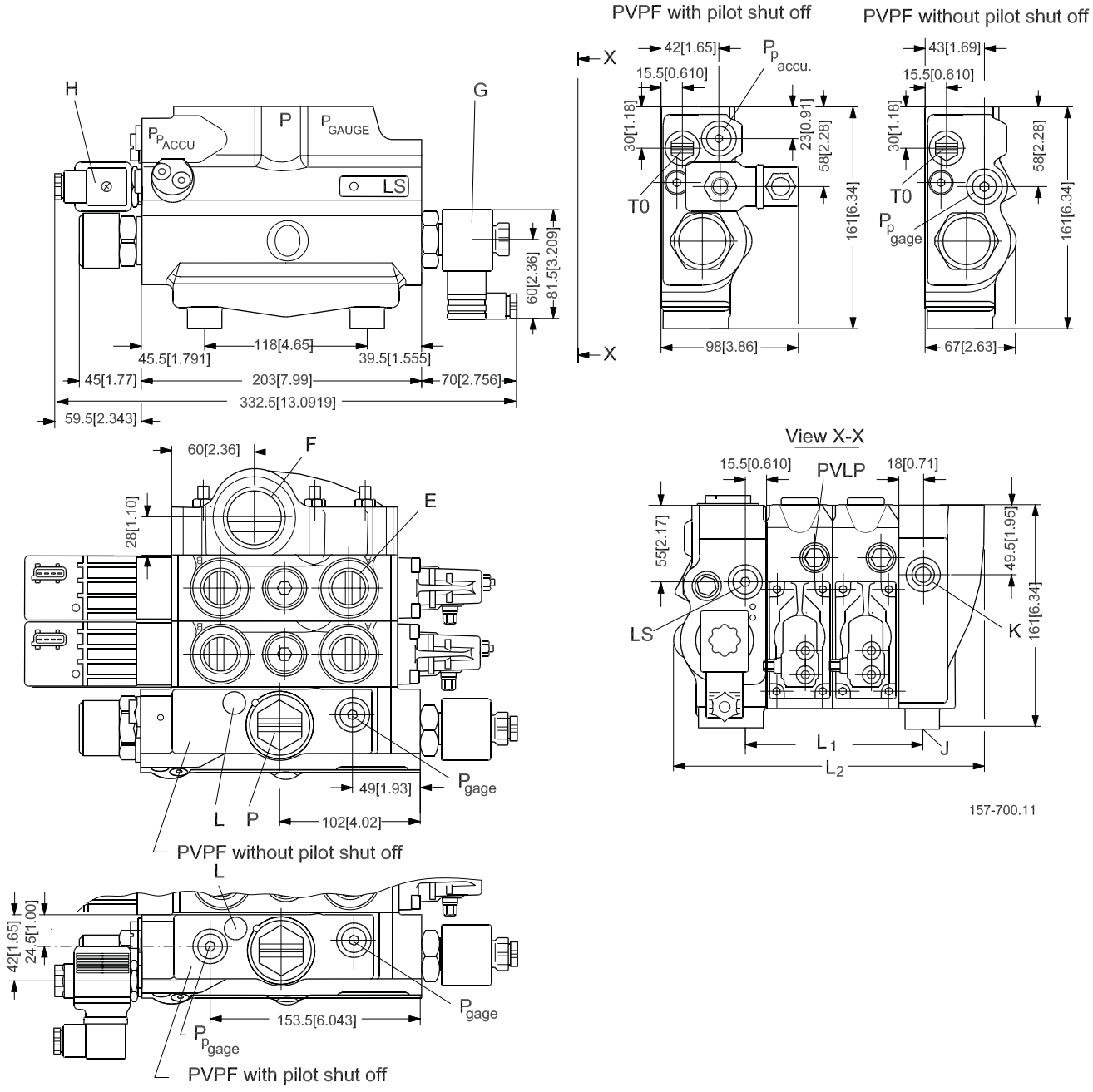
Dimensions

PVG 100 dimensions in general



Dimensions

PVG 100 with open center PVPF



Legend:

Pp accumulator: G¼ [9⁄16 in-18UNF]

T0 and LS: G¼ [9⁄16 in-18UNF]

P and Pp gauge: G¼ [9⁄16 in-18UNF]

K: LX: G¼ [9⁄16 in-18UNF]

F: Tank port: G1 [15⁄16 in-12UNF]

P: Pump port: G1 [15⁄16 in-12UNF]

L: LS relief valve

G: PVPE unloading valve

H: PVPP pilot shut off valve

J: Mounting thread; M12 x 14 mm deep

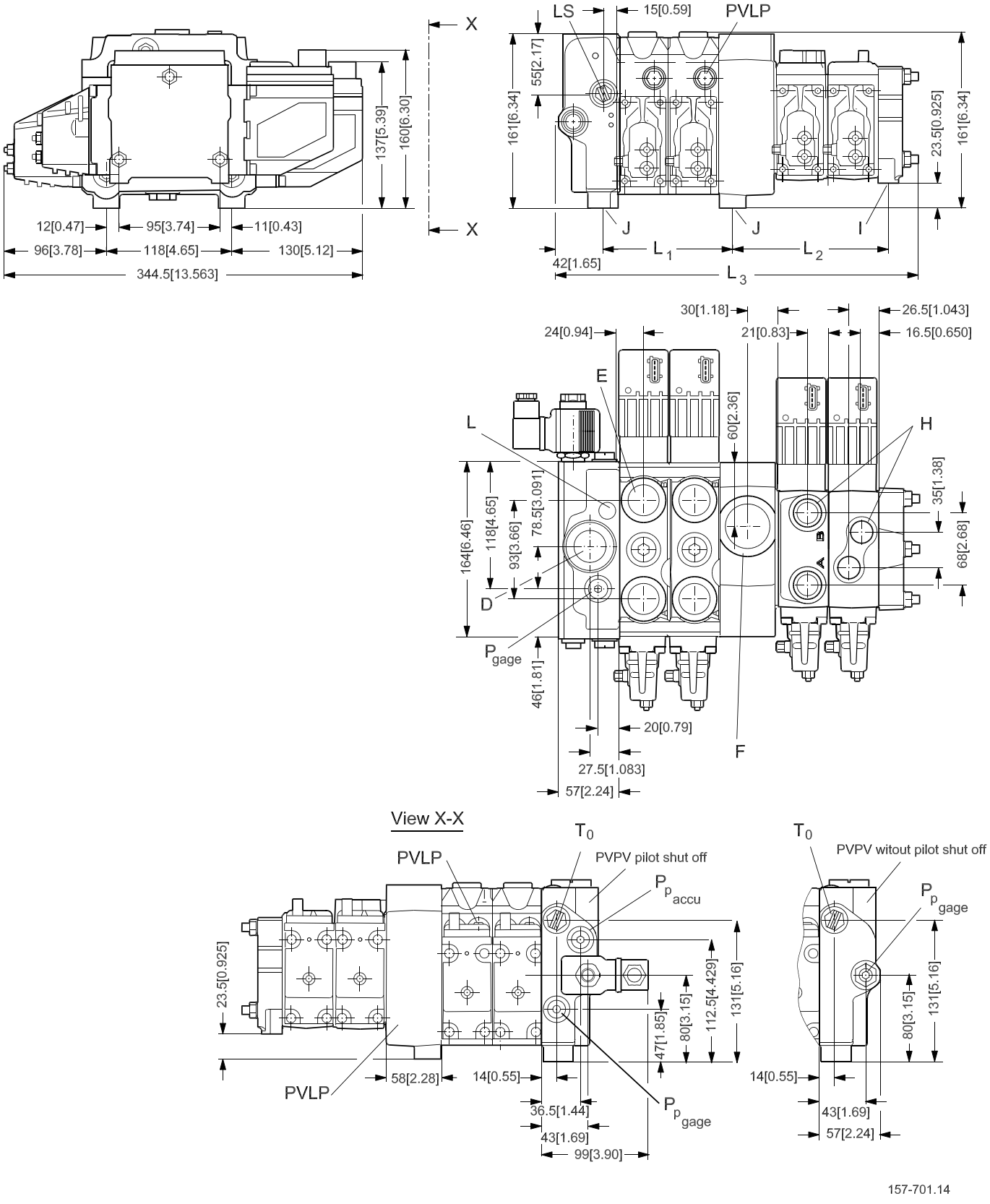
Dimensions

To avoid spool bind or leakage between sections caused by uneven mounting surfaces it is recommended to only use 3 of 4 mounting holes provided.

	1 PVB	2 PVB	3 PVB	4 PVB	5 PVB	6 PVB	7 PVB	8 PVB
L1 mm	80	128	176	224	272	320	368	416
[in]	[3.15]	[5.04]	[6.93]	[8.82]	[10.71]	[12.60]	[14.49]	[16.38]
L2 mm	176	224	272	320	368	416	464	512
[in]	[6.93]	[8.82]	[10.71]	[12.60]	[14.49]	[16.38]	[18.27]	[20.16]

Dimensions

PVG 100/32, closed center PVPV



157-701.14

Dimensions

Legend:

Pp accumulator: G¼ [9⁄16 in-18UNF]

T0 and LS: G¼ [9⁄16 in-18UNF]

P and Pp gauge: G¼ [9⁄16 in-18UNF]

D: Pump port; G1 [15⁄16 in-12UNF]

F: Tank port; G1¼ [15⁄8 in - 12 UNF]

E: Port A and B PVB 100; G¾ [11⁄16 inin - 12 UNF]

H : Port A and B PVB 32; G½ [7⁄8 in - 14 UNF]

I : Mounting thread ; M8 x 15 mm deep [5⁄16 in - 18 UNC]

J: Mounting thread; M12 x 14 mm deep

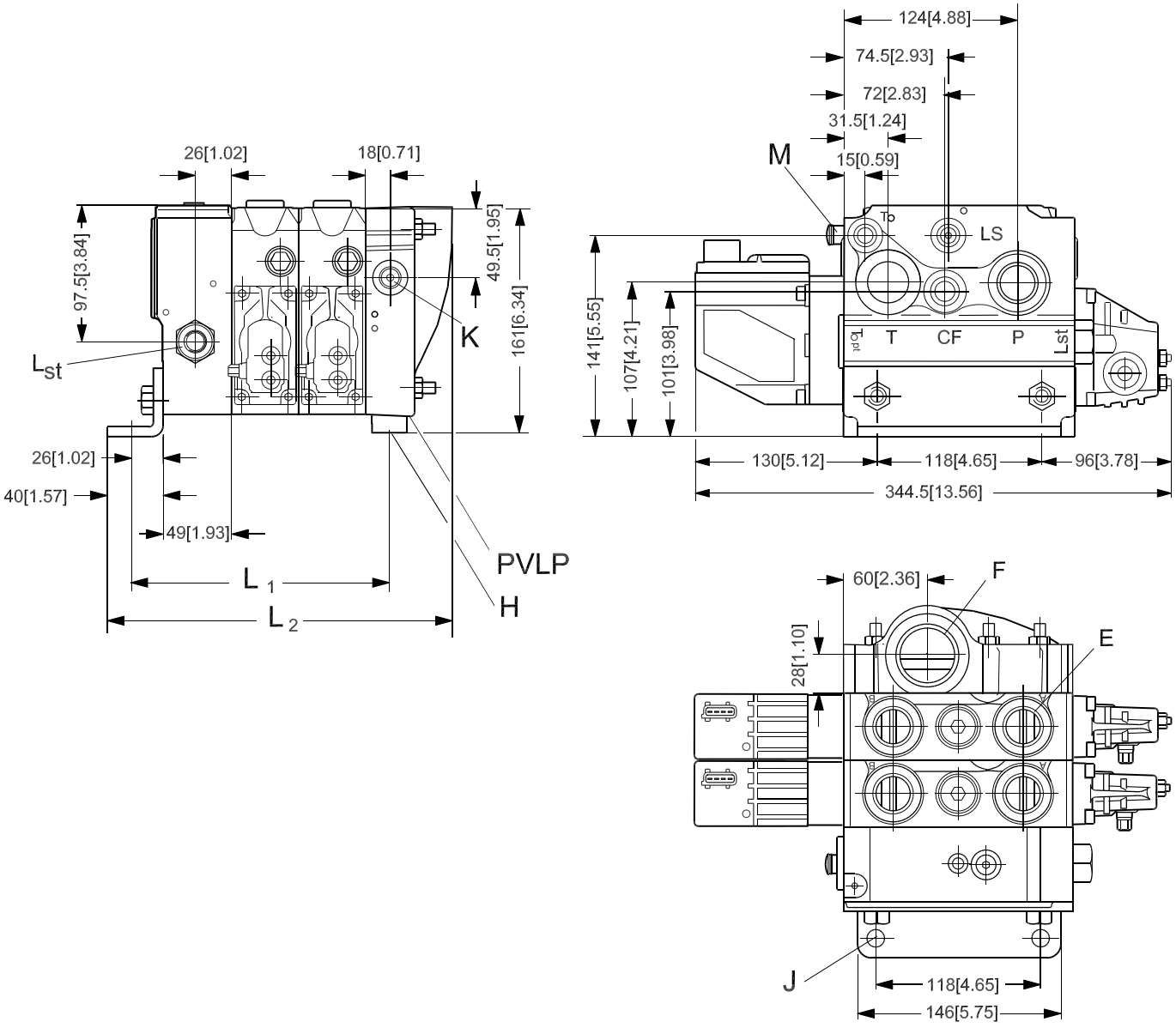
L: LS relief valve

	1 PVB	2 PVB	3 PVB	4 PVB	5 PVB	6 PVB	7 PVB	8 PVB	9 PVB	10 PVB
L1 mm	80	128	176	224	272	320	368	416	-	-
[in]	[3.15]	[5.04]	[6.93]	[8.82]	[10.71]	[12.60]	[14.49]	[16.38]	-	-
L2 mm	100	148	196	244	292	340	388	436	484	532
[in]	[3.94]	[5.83]	[7.72]	[9.61]	[11.50]	[13.39]	[15.28]	[17.16]	[19.05]	[20.94]
L3 mm	-	245	293	341	389	437	485	533	581	629
[in]	-	[9.64]	[11.54]	[13.43]	[15.31]	[17.20]	[19.09]	[20.98]	[22.87]	[24.76]

It is recommended not to exceed 10 PVB 100/32 in a valve group.

Dimensions

PVG 100, Closed Center PVP with Integrated Priority Valve



Legend:

CF: G½ [¾ in - 16 UNF]

LS: G¼ [9⁄16 in - 18 UNF]

P gauge: G¼ [7⁄16 in - 24 UNF]

T0 port: G¼ [9⁄16 in - 18 UNF]

Pp gauge: G¼ [7⁄16 in - 24 UNF]

P pump: G¾ [1 1⁄16 in - 12 UNF]

F: G¼ [1 1⁄16 in]

K: LX connection G¼ [9⁄16 in - 18 UNF]

Lst: LS for steering unit; G¼ [9⁄16 in - 18 UNF]

E: Port A and B PVB 100; G¾ [1 1⁄16 in - 12 UNF]

H: Mounting thread M12 x 14 mm deep

J: Mounting bracket with holes for M12 screws

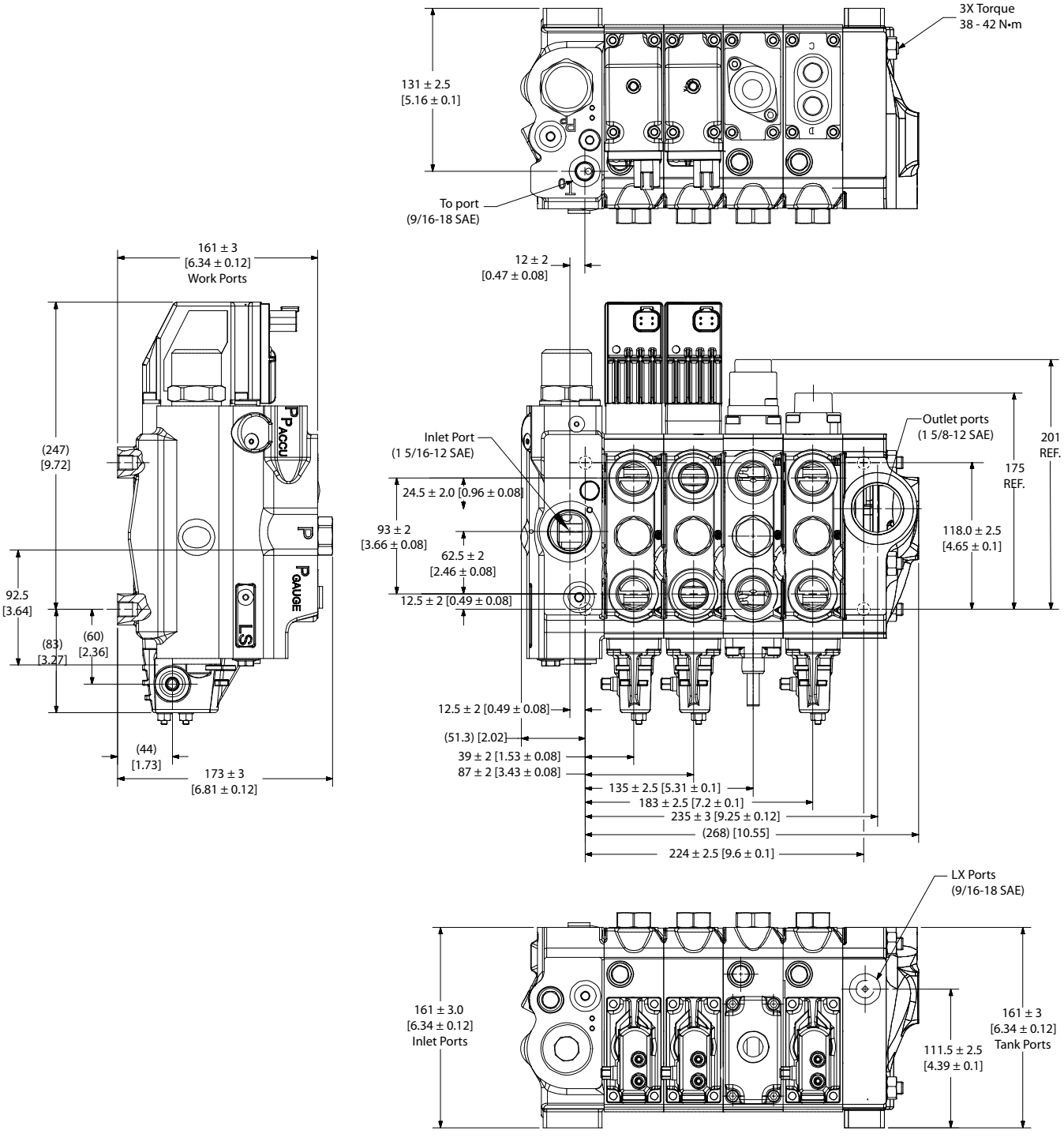
M: LS relief valve

Dimensions

	1 PVB	2 PVB	3 PVB	4 PVB	5 PVB	6 PVB	7 PVB	8 PVB
L1 mm	140	188	236	284	332	380	428	476
[in]	[5.51]	[5.12]	[9.29]	[11.18]	[9.13]	[14.96]	[16.85]	[18.74]
L2 mm	198	246	294	342	390	438	486	534
[in]	[7.80]	[9.69]	[11.57]	[13.46]	[15.35]	[17.24]	[19.13]	[21.02]

Dimensions

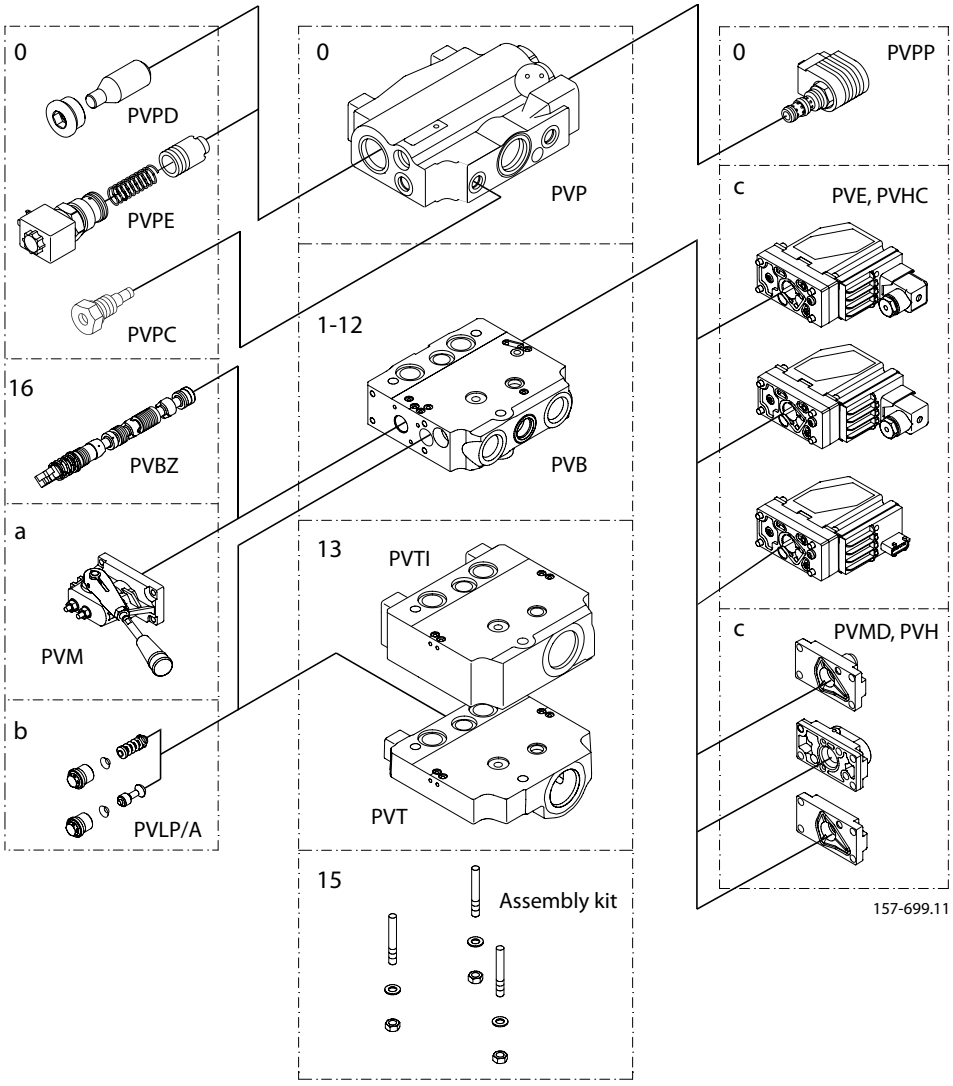
Example: PVG 100 with variable displ. pump



P301 140E

Module selection chart

Exploded view for module selection



PVP 100, Pump Side Module – Open center, PVPF with pilot supply (excludes PVPD/PVPE)

Port	Open center, PVPF with pilot supply							
	for PVE		for PVE and facility for pilot shut off		for PVH/PVHC		for PVH/PVHC and facility for pilot shut off	
	12 bar	20 bar	12 bar	20 bar	12 bar	20 bar	12 bar	20 bar
P = G 1	161B5110	161B5112	161B5140	161B5142	11013065	11013067	11013071	11013073
P = 15/16 UNF	161B5510	161B5512	161B5540	161B5542	11013066	11013068	11013072	11013074
Weight	8.5 kg [12.3 lb]							

Module selection chart

PVP 100, Pump Side Module – Closed center, PVPV with pilot supply

Port	Closed center, PVPV with pilot supply					
	for PVE	for PVE and facility for pilot shut-off	for PVE with integrated priority function	for PVH/PVHC	for PVH/PVHC and facility for pilot shut-off	for PVH/PVHC with integrated priority function
P = G 1	161B5111	161B5141	-	11013069	11013075	-
P = $1^{5}/_{16}$ UNF	161B5511	161B5541	-	11013070	11013076	-
P = G ¾; T = G 1	-	-	161B5211	-	-	11013077
P = G $1^{1}/_{16}$ UNF; T = $1^{5}/_{16}$ UNF	-	-	161B5611	-	-	11013078
Weight	8.5 kg [12.3 lb]					

PVP 100, Pump Side Module – Closed center, PVPVM with pilot supply

Port	Closed center, PVPVM with pilot supply	
	for PVE	for PVH/PVHC
P = 1 ¼ in Metric flange BSP	11130086	11133046
P = 1 ¼ in Metric flange SAE	11133048	11133047

PVB, Basic Module

Code no.		Without facilities for shock valves A and B		With facilities for shock valves A and B	
		G ¾	11/16 in-14	G ¾	11/16 in-14
Without pilot operated check valve		161B6250	161B6650	161B6260	161B6660
With pilot operated check valve		161B6252	161B6652	161B6262	161B6662
Exposed spools PVB		11051707	11051708	11051709	11051710
Exposed spools PVBZ		11051711	11051712	11051713	11051714
End module		-	11036948	11006889	11070866
Module with tank port in bottom		-	-	11006887	-
PVB module, twin shock valve		-	-	-	11077581
Weight	kg [lb]	5.5 kg [12.13 lb]			

PVB, Basic Module – High Flow 20 mm

Code no.	Without facilities for shock valves A and B		With facilities for shock valves A and B	
	G ¾	11/16 in-14	G ¾	11/16 in-14
Without pilot operated check valve	11102180	11102181	11102178	11101825
With pilot operated check valve	11102184	11102185	11102182	11102183

PVPD, Accessory Module for PVP 100

Code no.		Weight
Plug, PVPD	155G5041*	0.4 kg [0.9 lb]

* For PVPF only

Module selection chart

PVPE, Accessory Module for PVP 100

Code no.	12 V	24 V	Weight
PVPE, Elec. unloading valve	155G5052*	155G5054*	0.7 kg [1.1 lb]

* For PVPF only

PVPC, External pilot supply

Code no.	G¼	9⁄16-18 UNF	Weight
Without check valve	157B5400	157B5425	0.05 kg [0.1 lb]
With check valve	157B5600	-	

Not available for PVPV 157B5211 and 157B5611, (for details see catalog, 520L0344)

PVM, mechanical actuation

Code No.	With stop screw	Without stop screw	Lever position angle
Standard	157B3171* 157B3161**	157B3191	22.5°
Standard, with base, without arm and button	157B3174	157B3194	37.5°
Standard, without base, arm and button	157B3173	157B3193	–
Weight kg [lb]	0.4 [0.9]		

* Anodized 157B3184

** Cast iron

PVB, PVBZ Spools

Code no.	Without facilities for shock valves A and B		With facilities for shock valves A and B	
	G ¾	11◆16 in-14	G ¾	11◆16 in-14
Exposed spools PVB	11051707	11051708	11051709	11051710
Exposed spools PVBZ	11051711	11051712	11051713	11051714

PVLA, Anti-Cavitation Valve

PVLA	Code No.	Weight
Cap A or B	157B2002	0.04 kg [0.09 lb]
Valve A or B	157B2001	0.05 kg [0.1 lb]

PVLP, shock/and anti-cavitation valves

Code no. 157B....		2032	2050	2063	2080	2100	2125	2140	2150	2160	2175	2190	2210	2230	2240	2250	2265	2280	2300	2320	2350
Setting	bar	32	50	63	80	100	125	140	150	160	175	190	210	230	240	250	265	280	300	320	350

Module selection chart

PVLP, shock/and anti-cavitation valves (continued)

Code no. 157B....		2032	2050	2063	2080	2100	2125	2140	2150	2160	2175	2190	2210	2230	2240	2250	2265	2280	2300	2320	2350
	[psi]	460	725	914	1160	1450	1813	2031	2175	2320	2538	2755	3045	3335	3480	3625	3845	4061	4351	4641	5075
Weight [kg [lb]		0.05 kg [17 lb]																			

Accessory Module for PVP 100

Code no.	12 V	24 V	Weight
PVPP, Pilot shut off valve	800572719	800572819	0.3 kg [0.7 lb]

PVE, Electrical Actuation

Code No.		Hirsch	AMP	Deutsch	Weight
PVEO, ON/OFF	12 V 24 V	157B4216 157B4228	157B4901 157B4902	157B4291 157B4292	0.6 kg [1.3 lb]
PVEO-R, ON/OFF	12 V 24 V	157B4217 157B4229	157B4903 157B4904	11109080 11109092	
PVEA, active fault mon. PVEA, passive fault mon.		- -	157B4734 157B4735	157B4792 11107365	0.9 kg [2 lb]
PVEA-DI, active fault mon. PVEA-DI, passive fault mon.		- -	157B4736 157B4737	157B4796 -	
PVEH active fault mon. PVEH passive fault mon.		157B4032 157B4033	157B4034 157B4035	157B4092 157B4093	1 kg [2.2 lb]
PVEH-F float pos. act. fault		157B4332	-	157B4392	
PVEH-DI active fault mon. PVEH-DI passive fault mon.		- -	157B4036 157B4037	157B4096 -	
PVEP active fault mon.		-	-	11033842	
PVES, active fault mon. PVES, passive fault mon.		157B4832 157B4833	157B4834 157B4835	157B4892 11089276	
PVED-CC, Can-Bus interface		-	157B4943	157B4944	

PVHC, High Current PWM Actuator

Code No.	12 V	24 V
Amp	11112037	11112036
Deutsch	11112038	11112039

PVMD, PVH, PVMR, PVMF Covers

Code No.			Weight	
Cover for PVM		157B0001	0.1 kg	0.2 lb
PVH, Hydraulic actuation	G 1/4	157B0008	0.2 kg	0.4 lb
	9/16 -18 UNF	157B0007	0.9 kg	2.0 lb
PVMR (friction detent)		157B0015	0.3 kg	0.6 lb
PVMF (mech. float position)		157B0005		

Module selection chart

PVTI 100/32 interface module

Code no.	BSP	SAE	Weight
PVTI, with T-port and PVLP facility	161B2200	161B2220	8.7 kg [19.18 lb]

T-connection G 1¼ [15⁄8 UNF]

Tank Module, PVT

Code no.	BSP	SAE	Weight
PVT, with T-port and PVLP facility	161B2500	161B2520	6.3 kg [13.89 lb]
PVT, with LX connection, T-port and PVLP facility	161B2505	161B2525	

T-connection G 1¼ [15⁄8 UNF]

Assembly Kit PVG 100 / PVPT

Description	Code No.							
	1 PVB	2 PVB	3 PVB	4 PVB	5 PVB	6 PVB	7 PVB	8 PVB
Tie bolts and seals	161B8001	161B8002	161B8003	161B8004	161B8005	161B8006	161B8007	161B8008

Assembly Kit PVG 100 / PVT Interface Module

Description	Code No.							
	1 PVB	2 PVB	3 PVB	4 PVB	5 PVB	6 PVB	7 PVB	8 PVB
Tie bolts and seals	161B8021	161B8022	161B8023	161B8024	161B8025	161B8026	161B8027	161B8028

Assembly Kit PVG100 for PVB End module (must be used with bottom tank ported PVB)

Description	Code No.							
	1 PVB	2 PVB	3 PVB	4 PVB	5 PVB	6 PVB	7 PVB	8 PVB
Tie bolts and seals	11081671	11017005	11017006	11017007	11017008	11017009	11017010	11017011

Assembly Kit PVB 32

Description	Code No.									
	1 PVB	2 PVB	3 PVB	4 PVB	5 PVB	6 PVB	7 PVB	8 PVB	9 PVB	10 PVB
PVB's	157B8000	157B8001	157B8002	157B8003	157B8004	157B8005	157B8006	157B8007	157B8008	157B8009
Weight [kg [lb]	0.1 [0.2]	0.15 [0.3]	0.25 [0.6]	0.3 [0.7]	0.4 [0.9]	0.45 [1]	0.5 [1.1]	0.6 [1.3]	0.65 [1.4]	0.7 [1.6]

Order specification

An order form for Danfoss PVG 100 hydraulic valve is shown on the next page. The form can be obtained from the Danfoss Sales Organization.

Both the module selection chart on the previous pages and the order form are divided into fields 0, 1-10, 11, 12, 13, a, b, and c.

Each module has its own field:

0: Pump side module PVP

Plug for external pilot oil supply PVPC

Electrical unloading valve PVPE

Electrical pilot shut off valve PVPE

1-10: Basic valves PVB

13: Main spool PVBS

a: Mechanical actuator PVM

c: Cover for mechanical actuation PVMD

Cover for hydraulic actuation PVH

Electrical actuators PVE

b: Shock and suction valve PVLP

Suction valve PVLA

11: End plate PVSI

Tank module PVT

Interface module PVTI

12: Assembly kit PVAS

Please state

- Code numbers of all modules required
- Required setting (P) for pump side module

Standard and option assembly

The PVG 100 valve group is assembled the way the module selection chart shows if the code number for PVM is written in field a, and the code number for PVMD, PVE or PVH in field c.

The valve group is assembled so that the mechanical actuator is mounted on the opposite end of the basic module, if the code number for PVM is written in field c of the order form and the code numbers for PVMD, PVE or PVH in field a.

Reordering

The space at the top right-hand corner of the form is for Danfoss to fill in.

The code number for the whole of the specified valve group (PVG No.) is entered here.

In the event of a repeat order all you have to do is enter the number Danfoss has given on the initial confirmation of order.

Specification sheet

Specification Form

PVG 100
Specification Sheet

Subsidiary / Dealer	PVG No.
Customer	Customer No.
Application	Revision No.

	Function	A-port		B-port
0	Inlet		161B P = bar	
1		a b	f 13 LS_A = bar LS_B = bar	c b
2		a b	f 13 LS_A = bar LS_B = bar	c b
3		a b	f 13 LS_A = bar LS_B = bar	c b
4		a b	f 13 LS_A = bar LS_B = bar	c b
5		a b	f 13 LS_A = bar LS_B = bar	c b
6		a b	f 13 LS_A = bar LS_B = bar	c b
7		a b	f 13 LS_A = bar LS_B = bar	c b
8		a b	f 13 LS_A = bar LS_B = bar	c b
9		a b	f 13 LS_A = bar LS_B = bar	c b
10		a b	f 13 LS_A = bar LS_B = bar	c b
11		a b	f 13 LS_A = bar LS_B = bar	c b
12		a b	f 13 LS_A = bar LS_B = bar	c b
13	End section			
14	PVAS section			

Comments	
Filled in by	Date

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