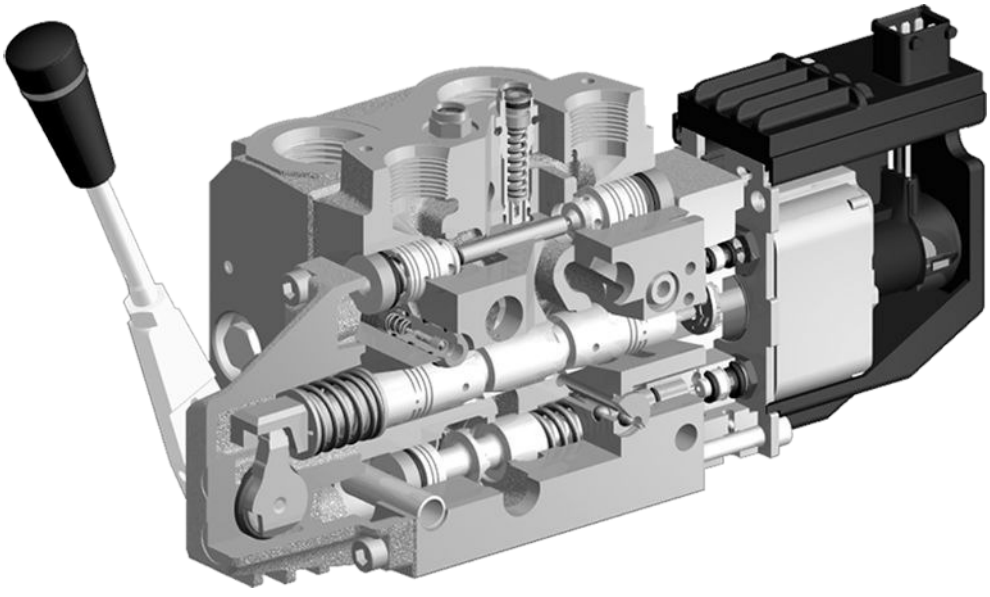
ENGINEERING
TOMORROW

Technical Information

PVBZ, Basic Module
PVP with Integrated HPCO



Revision history

Table of revisions

Date	Changed	Rev
October 2017	add notes for PVST fittings	0402
Jun 2017	Technical data (table) corrected	0401
August 2014	HPCO diagram corrected	CC
May 2014	Converted to Danfoss layout – DITA CMS	CB
January 2010	Drawings change page 4, 13	CA
September 2009	First edition	AA

Contents

Introduction

PVBZ

With the introduction of basic module PVBZ, Danfoss can now supply basic modules with integrated pilot operated check valves.

The PVBZ load compensated module is developed for applications, where integrated pilot operated check valves in the work ports are required to limit the work port leakage down to a minimum (below 1 cm^3 [0.06 in^3] per minute).

The new PVBZ basic module can only be mixed with basic modules PVB and PVP pumpside modules mentioned in this Tech Note and offers the following features:

- Integrated pilot operated check valves for low internal leakage
- Integrated thermal relief valve
- Standard 4/3 spools
- 4/4 float spools
- Interchangeable spools

PVP with integrated HPCO

Together with the introduction of PVBZ (and PVB with separate tank line T0). Danfoss can now also supply PVG 32 valves with integrated HPCO functionality (High Pressure Carry Over).

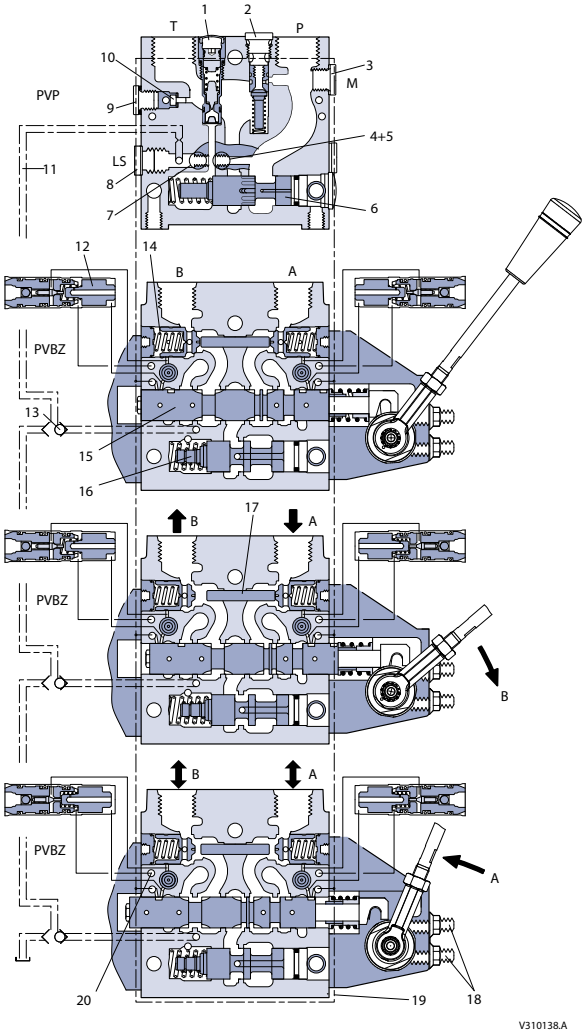
The HPCO function will guide the pump flow not used in the PVG 32 valve group via the HPCO port to for example a directional valve. The PVP pump side module with integrated HPCO function can only be mixed with PVB, PVBZ and PVST.

Features:

- HPCO functionality
- Prioritized flow for PVG 32
- Reduced plumbing

Function

Sectional view



Legend:

1. Pressure relief valve
2. Pressure reduction valve for pilot oil supply
3. Pressure gauge connection
4. Plug, open centre
5. Orifice, closed centre
6. Pressure adjustment spool
7. Plug, closed centre
8. LS connection
9. T0 connection
10. Plug to be removed for internal T0 (157B: 5130, 5131, 5330 and 5331 only)
11. LS signal
12. Pilot valve for POC
13. Shuttle valve
14. Pilot operated check valve, POC
15. Main spool
16. Compensator
17. Shuttle pin
18. Max. oil adjustment screws for ports A and B
19. Pilot supply for PVE
20. Separate tank line, (T0)

PVBZ function

When main spools (15) are in neutral position, the pilot operated check valves (hereafter POC) are kept closed by a spring plus the work port load, which is directed to the spring side of the POC (14) via a small orifice.

If a main spool is actuated to have flow out of the B port, the meter out flow forces the respective POC valve to open. At the same time, pilot pressure is guided via the main spool to the back side of a small pilot valve (12) on the A port side. This will ensures, that the load pressure behind the POC is released to a

Function

separate tank T0 (20) via a seat valve and allow the POC to open and let return flow pass across the main spool back to tank.

For float function, both POC are released to tank at the same time like described above.

In some applications with 3/3 spools and low load pressure (eg. Hitch applications), it is necessary to force open the POC by a pin (17). This pin is actuated by means of pump pressure on the A portside.

PVBZ modules cannot be option mounted (PVM on B - Port side).

The separate tank connection T0 is needed to ensure proper performance of the POC' s regardless of the pressure in main tank line T. It is therefore nessessary to connect the T0 port (9) in the Inlet PVP directly to the oil reservoir with a separate hose.

Thermal relief valves (157B6261, 157B6262, 157B6266 157B6661, 157B6662 and 157B6666) can be integrated to ensure that unintended high pressure between POC and cylinder/motor is not built up by means of external heat source. The setting of the therminal relief is fixed to 276 bar [4003 psi], max. capacity 1 l/min [0.264 US gal/min].

If tank connection T0 is not used, plug (10) must be removed. Pos 10 is not part of 157B5132, 157B5133, 157B5332 and 157B5333 and therefore T0-port (9) in 157B5132, 157B5133, 157B5332 and 157B5333 must always be connected to tank. PVBZ can only be used in combination with PVB and PVP mentioned in this Tech Note.

When using PVB, PVBZ and PVP (157B5140, 157B5142, 157B5340 and 157B5342 only) with separate tank line T0 it is possible to pressurize the tank port in PVP having HPCO function.

Return flow from A and B ports of PVG 32 must be guided to tank via separate tank port in the end plate PVST* (157B2500 and 157B2520).

*When using a PVST (157B2500 or 157B2520) it is not possible to use the LS A/B fitting in the bottom of the PVG-section next to the PVST.

T0 tank port in PVP 157B5140, 157B5142, 157B5340 and 157B5342 must always be connected to tank, see *hydraulic diagram* and *PVG 32 Specification Example for Valve Group with HPCO* on page 18 for according specification.

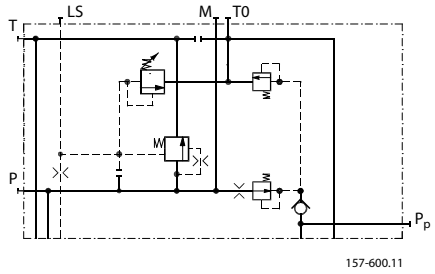
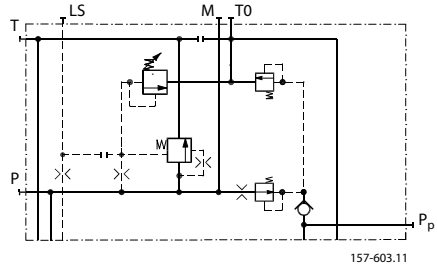
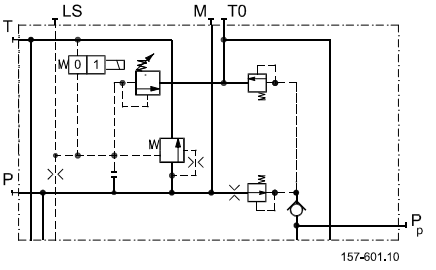
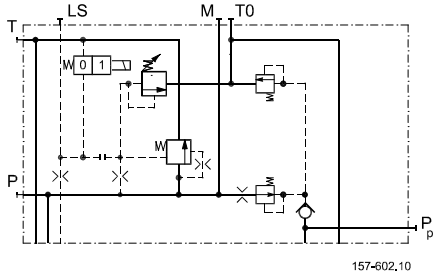
Technical data

PVBZ technical data

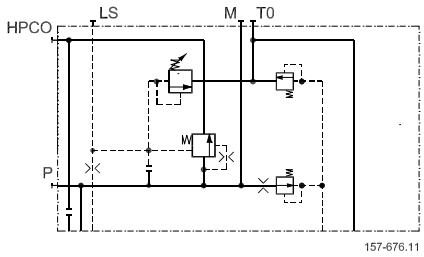
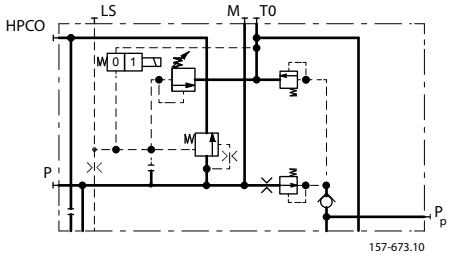
Max. pressure	**Port P, continuous**	350 bar	[5076 psi]
	Port A/B	350 bar	[5076 psi]
	Port T, static/dynamic	25 bar/40 bar	[365/580 psi]
Oil flow, rated	**Port P**	140 l/min	[37 US gal/min]
	Port A/B, with press. comp.	100 l/min	[26.4 US gal/min]
	Port A/B , without press. comp.	125 l/min	[33 US gal/min]
Spool travel, standard		± 7 mm	[±0.28 in]
Spool travel, float position spool	**Proportional range**	± 5.5 mm	[±0.22 in]
	Float position	7.5 mm	[±0.30 in]
Dead band, flow control spool standard		± 0.8 mm	[±0.03 in]
Max. internal leakage at 200 bar [2900 psi] and 21 mm^2/s [102 SUS]; A/B → T		1 cm^3/min	[0.06 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]
Ambient temperature		-30 → 60°C	[–22 → 140°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]
Filtration / Max. contamination (ISO 4406)		18/16/13	

PVP pump side module with T0

PVP, pump side modules with T0 code numbers

Symbol	PVP description	Code number	
		BSP version	SAE version
	Open centre pump side module for pumps with fixed displacement External T0; possible to connect T0 to internal tank With pilot supply for electrical actuation	157B5130	157B5330
	Closed centre pump side module for pumps with variable displacement External T0; possible to connect T0 to internal tank With pilot supply for electrical actuation	157B5131	157B5331
	Open centre pump side module for pumps with fixed displacement External T0 With pilot supply for electrical actuation and connection for pilot oil pressure. Facility for LS unloading valve, PVPX	157B5132	157B5332
	Closed centre pump side module for pumps with variable displacement External T0 With pilot supply for electrical actuation and connection for pilot oil pressure. Facility for LS unloading valve, PVPX	157B5133	157B5333

PVP pump side module with T0

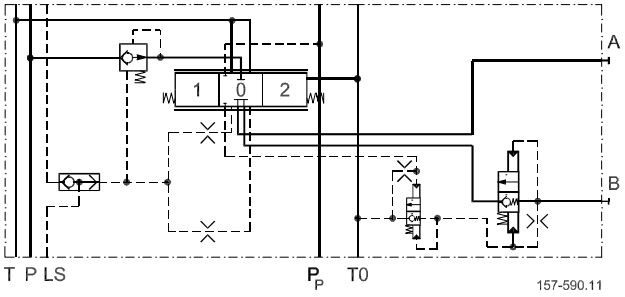
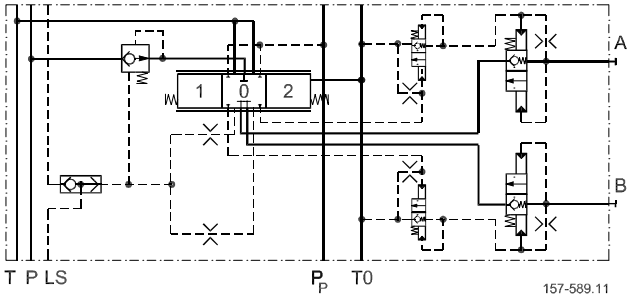
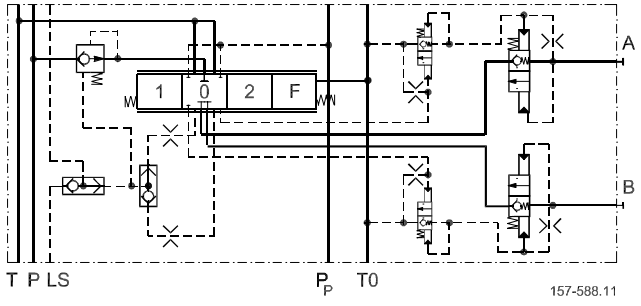
Symbol	PVP description	Code number	
		BSP version	SAE version
	Open centre pump side module for pumps with fixed displacement External T0 With pilot supply for electrical actuation Blocked T line for HPCO	157B5140	157B5340
	Open centre pump side module for pumps with fixed displacement External T0 With pilot supply for electrical actuation and connection for pilot oil pressure. Facility for LS unloading valve, PVPX Blocked T line for HPCO	157B5142	157B5342

P and T-port connection: G ¾ [1 $^{1}/_{16}$ in–12]

PVBZ basic module with T0

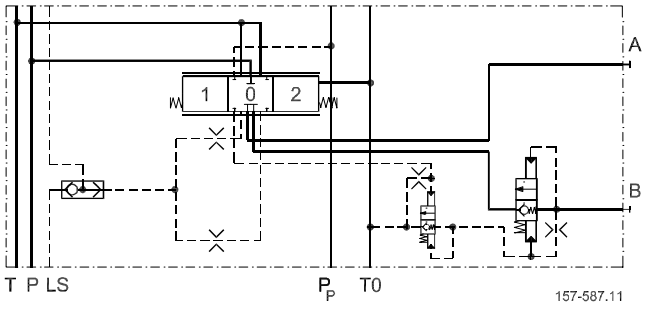
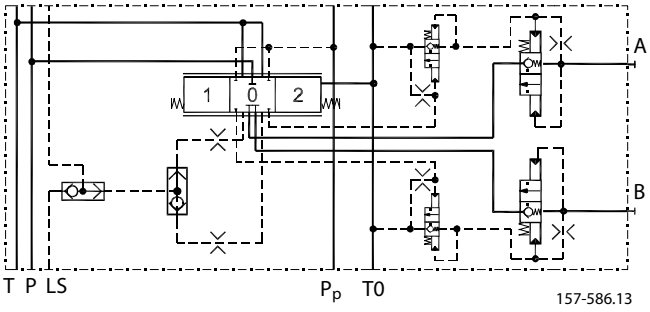
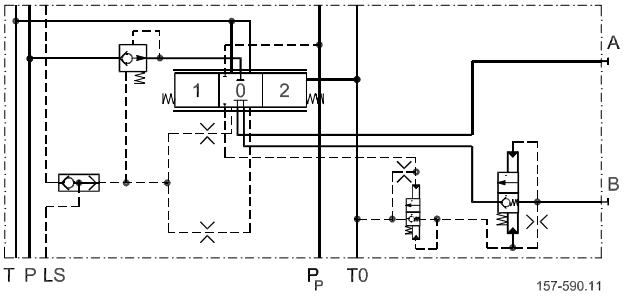
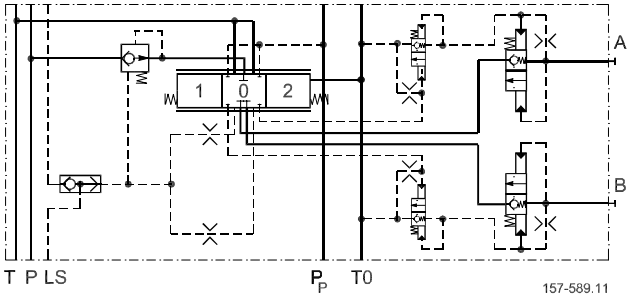
PVBZ basic modules with T0 code numbers

PVBZ basic modules with T0, with thermal relief valve

Symbol	PVBZ description Max. work port pressure 210 bar [3045 psi]	Code No. 157B....	
		BSP	SAE
	**With** compensator and thermal relief valve **With** pilot operated check valves on work port B Compensated work port flow A/B = 100 l/min [26.4 US gal/min]	6261	6661
	**With** compensator and thermal relief valve **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]	6262	6662
	**With** compensator and thermal relief valve **With** pilot operated check valves on work port A and B $LS_{A/B}$ shuttle valve for float and shuttle pin Compensated work port flow A/B = 100 l/min [26.4 US gal/min]	6266	6666

PVBZ basic module with T0

PVBZ basic module with T0, without thermal relief valve

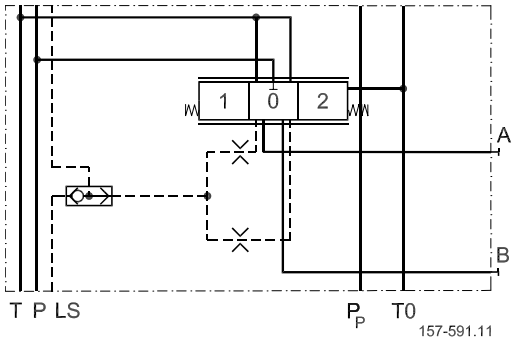
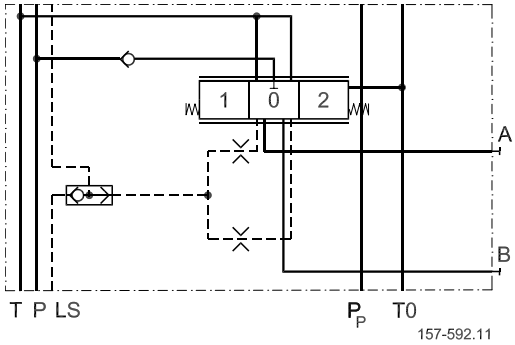
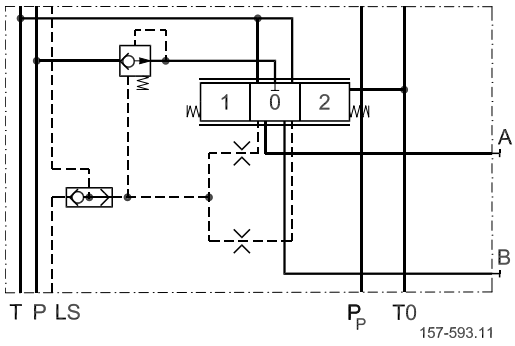
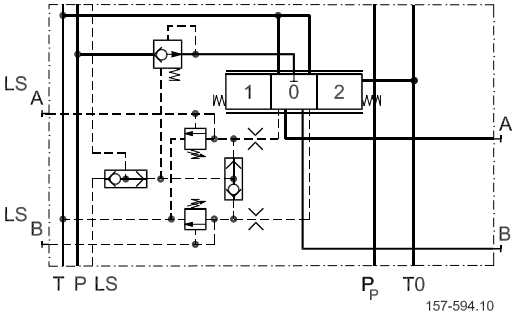
Symbol	PVBZ description Max. work port pressure 210 bar [3045 psi]	Code No. 157B....	
		BSP	SAE
	**Without** thermal relief valve **Without** compensator and load drop check valve **With** pilot operated check valves on work port B	6051	6451
	**Without** thermal relief valve **Without** compensator and load drop check valve **With** pilot operated check valves on work port A and B	6052	6452
	**Without** thermal relief valve **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]	6251	6651
	**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]	6252	6652

A and B-port connection: G ½ [$^{7}/_{8}$ in – 14].

Seal kit for PVBZ: 157B6989

PVB basic module with T0

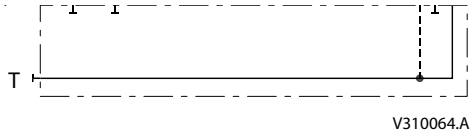
PVB basic modules with T0 code numbers

Symbol	PVB description	Code number 157B.....			
		W/O 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

A and B-port connection: G ½ [$^{7}/_{8}$ in – 14].

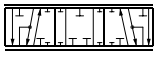
Standard spools for PVBZ

End Plate PVST

Code number 157B		BSP G 1/2	SAE 7/8 in - 14
 V310064.A	PVST without active elements Tank port connection	2500*	2520*

*When using a PVST (157B2500 or 157B2520) it is not possible to use the LS A/B fitting in the bottom of the PVG-section next to the PVST.

Standard FC-spools for PVBZ (Electrical and Mechanical Actuation)

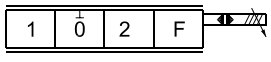
Code number 157B....	Pressure compensated flow l/min [US gal/min]					
Symbol	**5 [1.3]**	**10 [2.6]**	**25 [6.6]**	**40 [10.6]**	**65 [17.2]**	**100 [26.4]**
 157-636.11 4-way, 3-position	9405	9400	9401	9402	9403	9404

Standard Float Spools for PVBZ (Electrical Actuation)

Code number 157B....	Pressure compensated flow l/min [US gal/min]					
Symbol	**5 [1.3]**	**10 [2.6]**	**25 [6.6]**	**40 [10.6]**	**65 [17.2]**	**100 [26.4]**
 157-635.11 4-way, 3-position Float P > A > F	9415	9410	9411	9412	9413	9414

Float spools to be used in combination with PVBZ modules, 157B6266 and 157B6666 only.

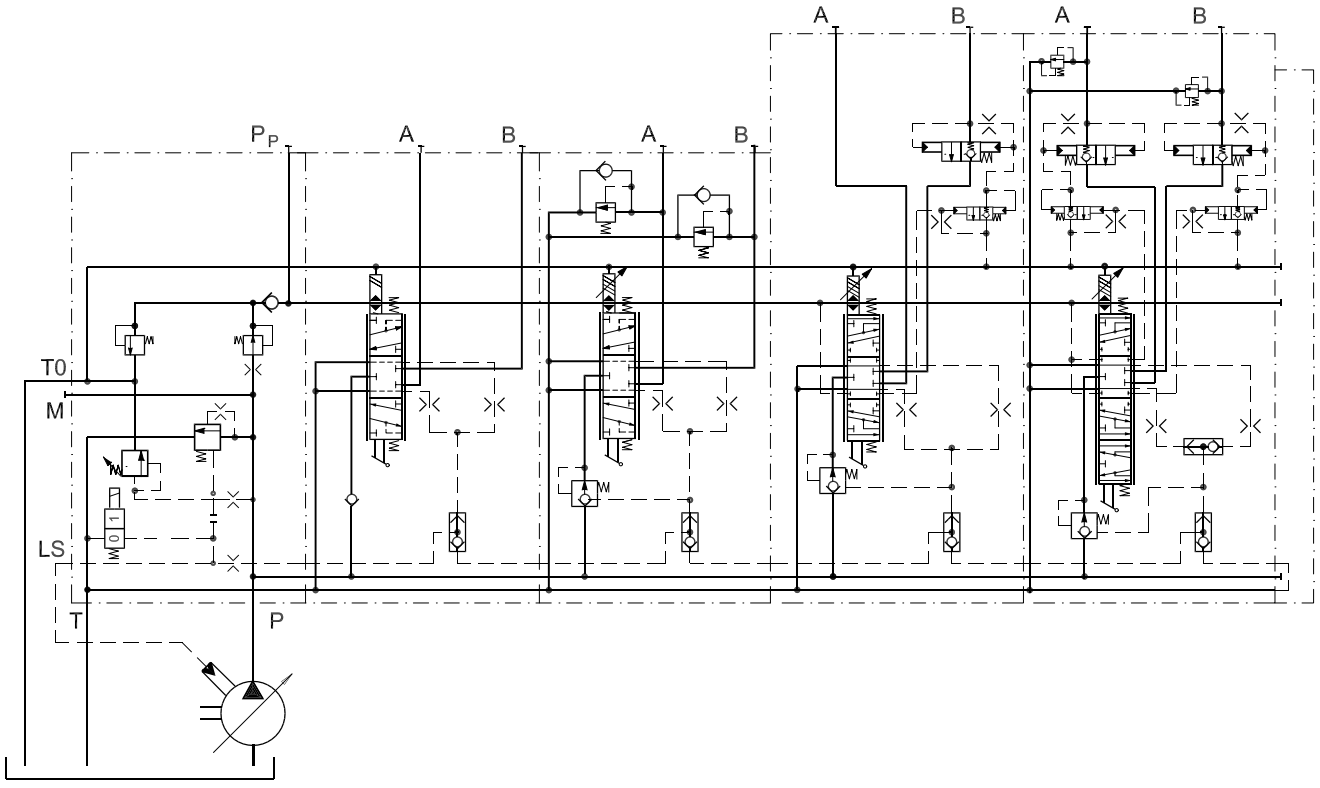
PVEH-F electrical actuation

Symbol	Description	Code number
 157-190.10	PVEH-F Proportional high, Active fault monitoring, Multivoltage 11 - 32 V Float P > A > F	157B4338*

* 6-pin AMP connector including 4 m [13 ft] cable can be ordered using code No. 157B4974.

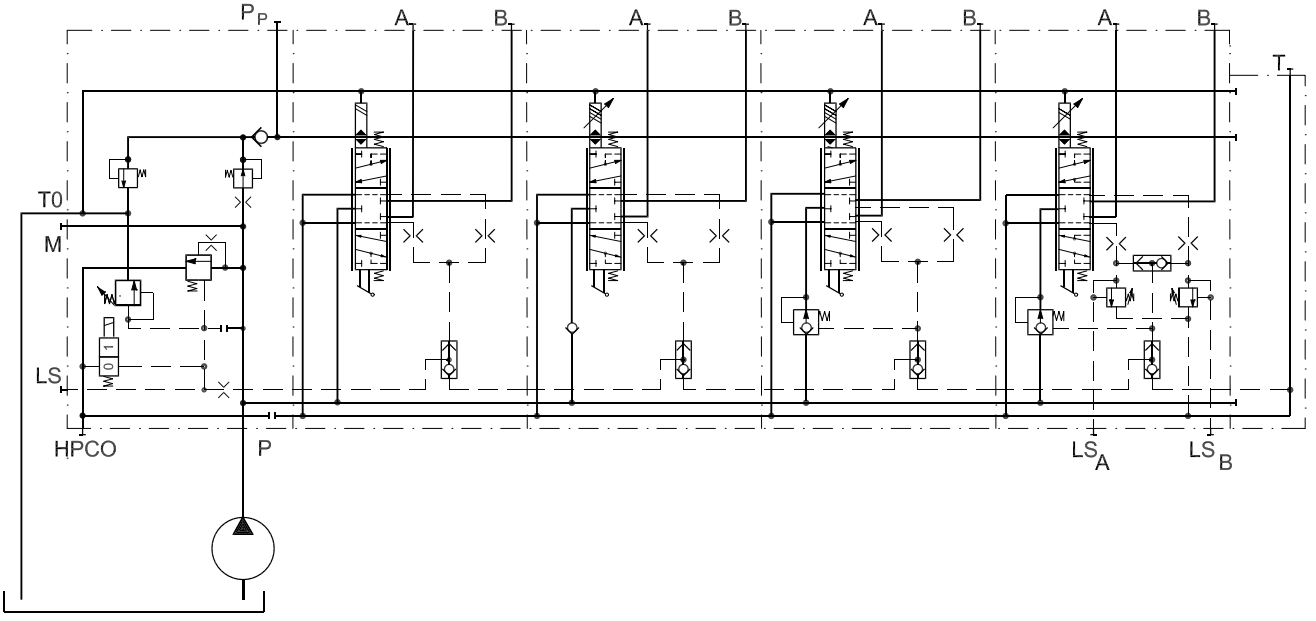
Hydraulic diagram

PVG 32 with basic modules PVBZ, including integrated pilot operated check valves



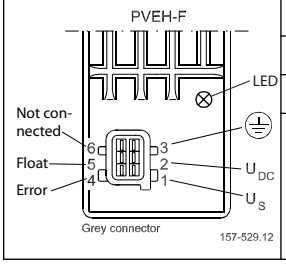
157-637.11

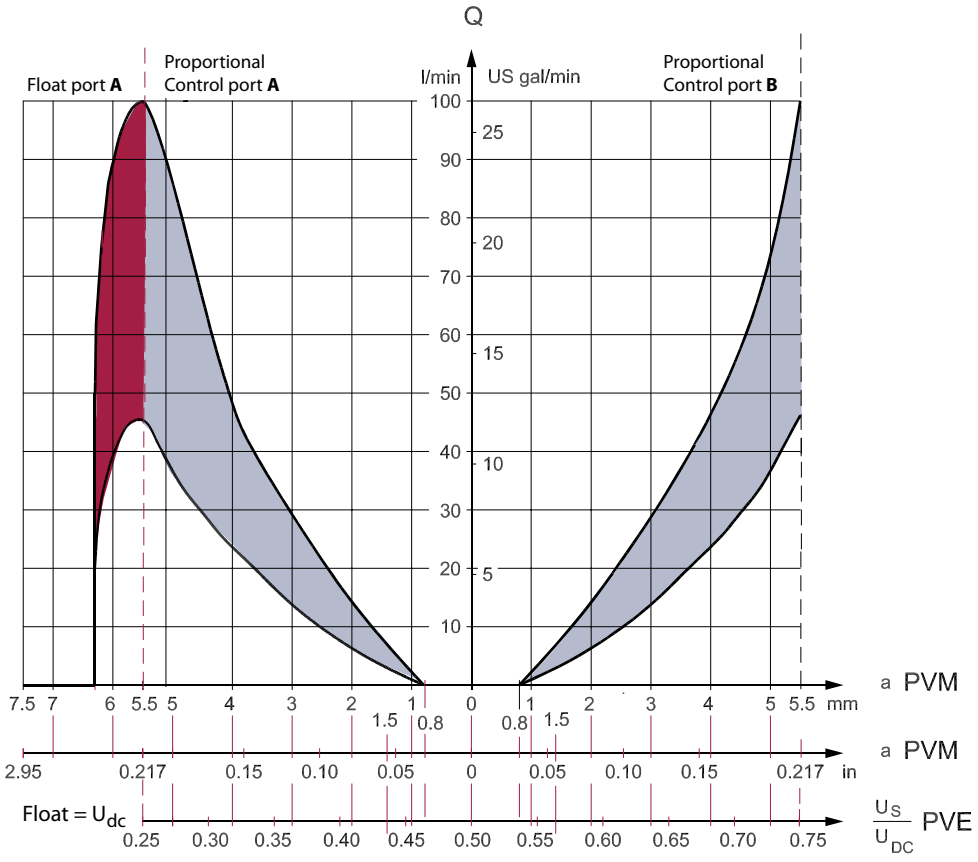
PVG 32 with integrated HPCO (High Pressure Carry Over)



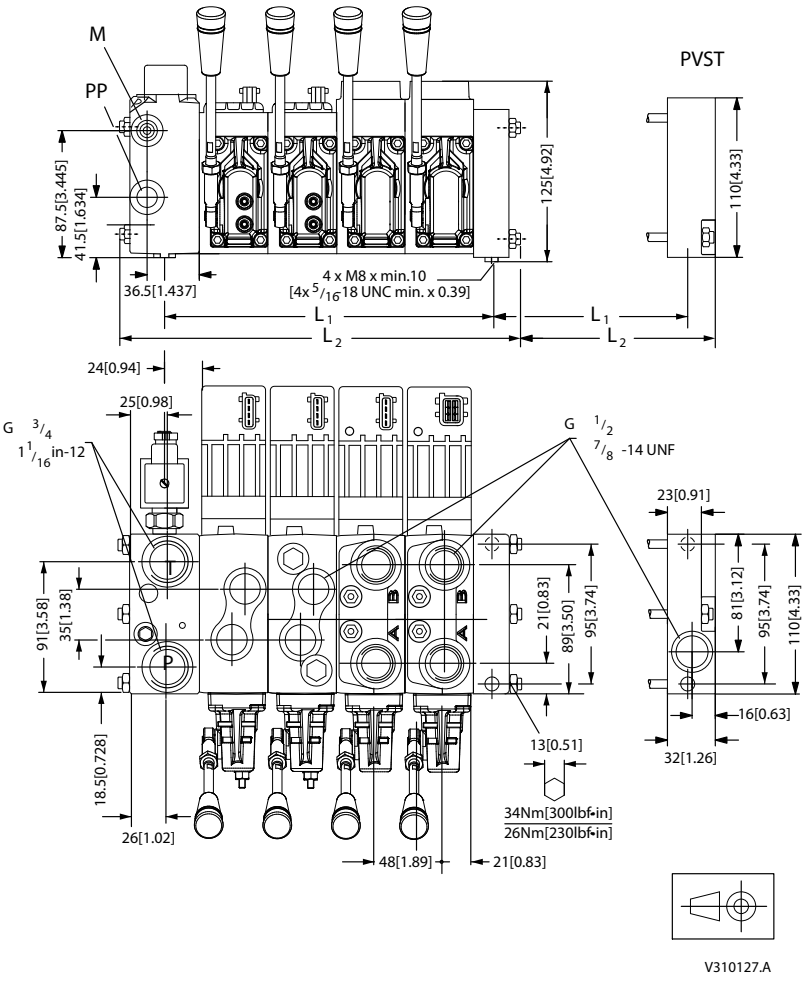
157-675.12

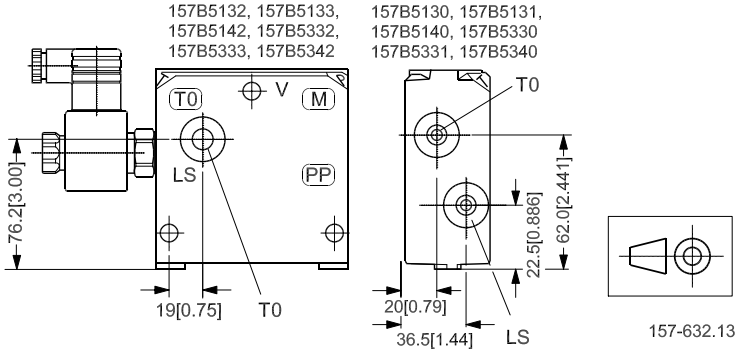
Actuation, PVEH-F

	Function	U_S (pin 1)	Float (pin 5)
	Neutral	0.5 x U_{DC}	0
	Q: → A	(0.5 → 0.25) x U_{DC}	0
	Q: → B	(0.5 → 0.75) x U_{DC}	0
	Float	None or any voltage U_{DC}	U_{DC}



PVBZ Dimensions





Port connections T0, M, PP, LS: G ¼ [½ in - 20]

To have easier access to fittings when building valve groups with a mix of PVB and PVBZ, it is recommended to group PVB and PVBZ - see also *PVG 32 with basic modules PVBZ, including integrated pilot operated check valves* on page 14.

PVB	1	2	3	4	5	6	7	8	9	10
L1 mm [in]	82 [3.23]	130 [5.12]	178 [7.01]	226 [8.90]	274 [10.79]	322 [12.68]	370 [14.57]	418 [16.46]	466 [18.35]	514 [20.24]
L2 mm [in]	140 [5.51]	189 [7.44]	238 [9.37]	287 [11.30]	336 [13.23]	385 [15.16]	434 [17.09]	483 [19.02]	532 [20.95]	581 [22.87]

Specification sheet examples

PVG 32 Specification Example for Valve Group with PVBZ

PVG 32
Specification Sheet

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

Function	A-Port							B-Port	
		O	157B 5142		157B4236				
			p = 210	bar	157B				
	a 157B 3171	**1**	157B 6010		157B 7001	**13**		157B 4901	**c**
	b 157B		LS_A	bar	LS_B		bar	157B	**b**
	a 157B 3171	**2**	157B 6110		157B 7002	**13**		157B 4734	**c**
	b 157B		LS_A	bar	LS_B		bar	157B	**b**
	a 157B 3193	**3**	157B 6210		157B 7003	**13**		157B 4034	**c**
	b 157B		LS_A	bar	LS_B		bar	157B	**b**
	a 157B 3193	**4**	157B 6213		157B 7024	**13**		157B 4834	**c**
	b 157B		LS_A 50	bar	LS_B 150		bar	157B	**b**
	a 157B	**5**	157B		157B	**13**		157B	**c**
	b 157B		LS_A	bar	LS_B		bar	157B	**b**
	a 157B	**6**	157B		157B	**13**		157B	**c**
	b 157B		LS_A	bar	LS_B		bar	157B	**b**
	a 157B	**7**	157B		157B	**13**		157B	**c**
	b 157B		LS_A	bar	LS_B		bar	157B	**b**
	a 157B	**8**	157B		157B	**13**		157B	**c**
	b 157B		LS_A	bar	LS_B		bar	157B	**b**
	a 157B	**9**	157B		157B	**13**		157B	**c**
	b 157B		LS_A	bar	LS_B		bar	157B	**b**
	a 157B	**10**	157B		157B	**13**		157B	**c**
	b 157B		LS_A	bar	LS_B		bar	157B	**b**
Remarks		**11**	157B2500						
		12	157B8004						

Filled in by	Date

Specification sheet examples

PVG 32 Specification Example for Valve Group with HPCO

PVG 32
Specification Sheet

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

Function	A-Port			B-Port	
		O 157B 5142	157B4236		
		p = 210 bar	157B		
	a 157B 3171	**1** 157B 6010	157B 7001 **13**	157B 4901	**c**
	b 157B	LS_A bar	LS_B bar	157B	**b**
	a 157B 3171	**2** 157B 6110	157B 7002 **13**	157B 4734	**c**
	b 157B	LS_A bar	LS_B bar	157B	**b**
	a 157B 3193	**3** 157B 6210	157B 7003 **13**	157B 4034	**c**
	b 157B	LS_A bar	LS_B bar	157B	**b**
	a 157B 3193	**4** 157B 6213	157B 7024 **13**	157B 4834	**c**
	b 157B	LS_A 50 bar	LS_B 150 bar	157B	**b**
	a 157B	**5** 157B	157B **13**	157B	**c**
	b 157B	LS_A bar	LS_B bar	157B	**b**
	a 157B	**6** 157B	157B **13**	157B	**c**
	b 157B	LS_A bar	LS_B bar	157B	**b**
	a 157B	**7** 157B	157B **13**	157B	**c**
	b 157B	LS_A bar	LS_B bar	157B	**b**
	a 157B	**8** 157B	157B **13**	157B	**c**
	b 157B	LS_A bar	LS_B bar	157B	**b**
	a 157B	**9** 157B	157B **13**	157B	**c**
	b 157B	LS_A bar	LS_B bar	157B	**b**
	a 157B	**10** 157B	157B **13**	157B	**c**
	b 157B	LS_A bar	LS_B bar	157B	**b**
Remarks		**11** 157B2500			
		12 157B8004			

Filled in by	Date

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