Tech Note

Proportional Valve Group PVG 83

Valve system
PVG 83 is a hydraulic load sensing valve designed to give the customer just the valve he needs. From a simple load sensing directional valve, to an advanced electrically controlled load independent proportional valve.

The PVG 83 stackable mono block system makes it possible to build up a valve group to meet requirements precisely.
The compact external dimensions of the valve remain unchanged whatever combination is specified.

Features

General features PVG 83
- Load-independent flow control:
  - Oil flow to an individual function is independent of the load pressure of this function.
  - Oil flow to one function is independent of the load pressure of other functions.
- Good regulation characteristics
- Energy-saving
- Up to 8 spools per valve group

Pump side module – PVP
- Built in full flow pressure relief valve
- Built in P-controlled back-pressure valve
- Full flow dump valve, electrical actuated
- System pressure up to 250 bar continious and 260 bar intermittent
- Versions:
  - Open centre version for systems with fixed displacement pumps
  - Central pilot oil supply for electrical actuator built into the pump side module
  - For closed centre versions, without PVP-modul

Mono block
- Port-pressure up to 350 bar A/B
- Depending on requirements the mono block can be supplied with:
  - Check valve in P-channel
  - Integrated compensator in P-channel
  - Shock/suction valves
  - Different spool variants
- 2,3,4 function blocks available

Actuation
- Mono block for mechanical actuation, with free spool ends
- Mono block for electrical actuation, with the following versions:

1. PVEO - ON/OFF
2. PVEM - prop., medium performance (12 V or 24 V)
3. PVEM - float position
4. PVEH - prop., high performance (12 V og 24 V
5. PVEH - float position
6. PVES, prop, super performance

Technical data

The technical data for PVG 83 are typical measured results. For the hydraulic system a mineral based hydraulic oil with a viscosity of 21 mm2/s and a temperature of 50°C was used.

Valve group PVG 83

Max.pressure	Port P	continuous	250 bar
		intermittent[1)]	260 bar
	Port A/B		350 bar
	Port T1, static/dynamic		25 bar/40 bar
	Port T2, static/dynamic		85 bar/100 bar
Oil flow	Port P, rated max.		200 l/min
	Port A/B with press. comp		150 l/min
	Port A/B without press. comp		170 l/min
Spool travel			± 7 mm
Spool travel, float pos.	Proportional range		± 4.8 mm
	Float position		± 8 mm
Dead band, flow spools			± 1.5 mm
Max. internal leakage at 70 bar, 21 mm ^{2}/s	A/B →T, with shock valve		8 cm ^{3}/min
Oil temperature (inlet temperature)	Recommended temperature		30 to 60°C
	Min. temperature		-30°C
	Max. temperature		+90°C
Ambient temperature			-30 to +60°C
Oil viscosity	Operating range		12 to 75 mm ^{2}/s
	Min. viscosity		4 mm ^{2}/s
	Max. viscosity		460 mm ^{2}/s
Filtration	Max.contamination (ISO 4406)		19/16
Oil consumption in:	pilot oil reduction valve		1 l/min

1) Max.10% operation every minute

Mechanical actuation

Operating force	Neutral position	150 N
	Max. spool travel	170 N
	Float position	420 N

Hydraulic actuation

Regulation range	5 to 15 bar
Max. pilot pressure	30 bar

Electrical actuation PVE

Voltage	Function		PVEO ON/OFF	PVEM Prop. medium	PVEH Prop. high	PVES Prop. high
Neutral switch	Reaction time from neutral position to max. spool travel	Max.	0.235 s	0.700 s	0.230 s	0.230 s
		Rated	0.180 s	0.450 s	0.150 s	0.150 s
		Min.	0.120 s	0.230 s	0.120 s	0.120 s
Neutral switch	Reaction time from max. spool travel to neutral position	Max.	0.175 s	0.175 s	0.175 s	0.175 s
		Rated	0.090 s	0.090 s	0.090 s	0.090 s
		Min.	0065 s	0065 s	0065 s	0065 s
Constant voltage	Reaction time from neutral position to max. spool travel	Max.	-	0.700 s	0.200 s	0.200 s
		Rated-	-	0.450 s	0.120 s	0.120 s
		Min.	-	0.230 s	0.050 s	0.050 s
Constant voltage	Reaction time from max. spool travel to neutral position	Max.	-	0.700 s	0.100 s	0.100 s
		Rated	-	0.450 s	0.090 s	0.090 s
		Min.	-	0.230 s	0.065 s	0.065 s
Without voltage	Pilot oil flow per PVE	Neutral	0.1 l/min	0.1 l/min	0.1 l/min	0.4 l/min
With voltage	Pilot oil flow per PVE	Locked	0.1 l min	0.1 l min	0.1 l min	0.2 l min
		1 actuation	0.002 l	0.002 l	0.002 l	0.002 l
		Actuations	0.7 l/min	0.5 l/min	1.1 l/min	1.1 l/min
	Hysteresis	Rated		<20%	<4%	<1%
	Grade of enclosure IEC 529		IP65			

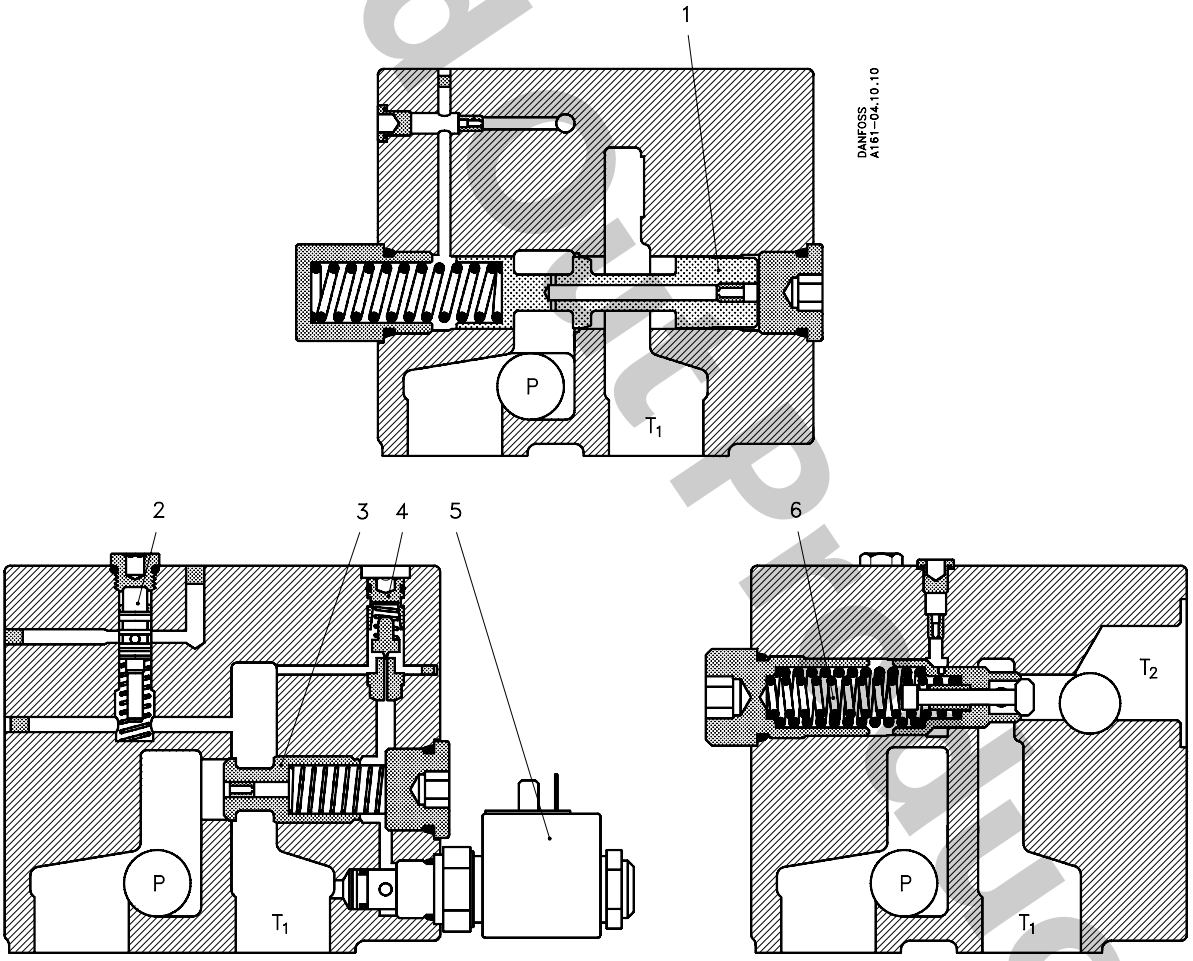
1) Hysteresis is indicated at rated voltage and f = 0.02 Hz for one cycle. A cycle incl. neutral > full A > N > full B > N.

Electrical actuation PVE

Actuation		PVEO, PVEM and PVEH	
Rated voltage		12 V ⎓	24 V ⎓
Supply voltage (U_{DC})	Range	11 to 15 V	22 to 30 V
	Max. ripple (PVEH)	5%	
Current consumption [2)]		0,65 A	0,33 A
Signal voltage (PVEM/PVEH)	Neutral	0,5 × U_{DC}	
	Control range	0,25 × U_{DC} to 0,75 × U_{DC}	
Signal current [2)] (PVEM/PVEH)		0,25 mA	0,5 mA
Input impedance at 0,5 × U_{DC} (PVEH)		12 kΩ	
Power consumption		8 W	
Fault monitoring (PVEH aktiv)	Max. load	- 100 mA	- 60 mA
	Reaction time at fault	500 ms	
Fault monitoring (PVEH passive)	Reaction time at fault	250 ms	

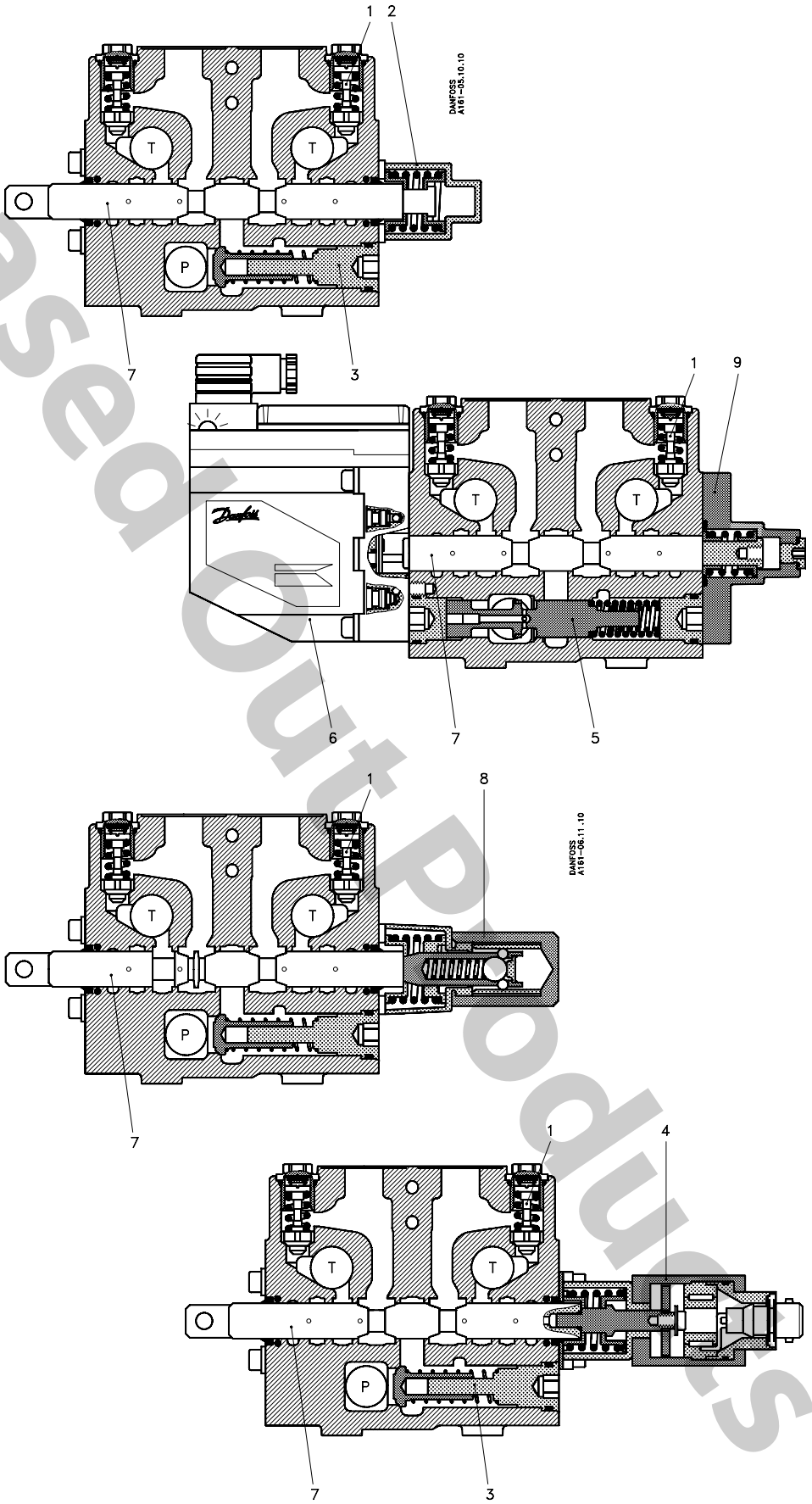
[2)] at rated voltage

Sectional drawing PVP 83



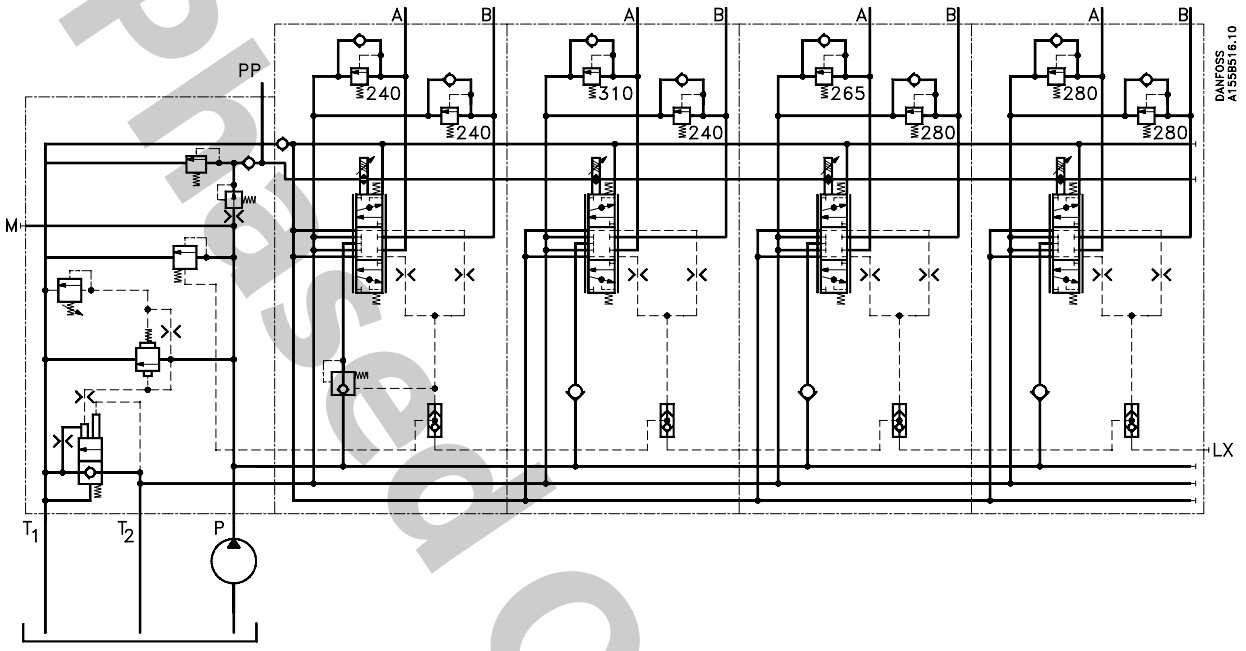
1. Pressure matching spool
2. Pilot oil supply
3. Main relief valve
4. Pilot main relief valve
5. Electr. relief valve for full flow dump
6. Back pressure valve, PVSR

Sectional drawing PVB 83

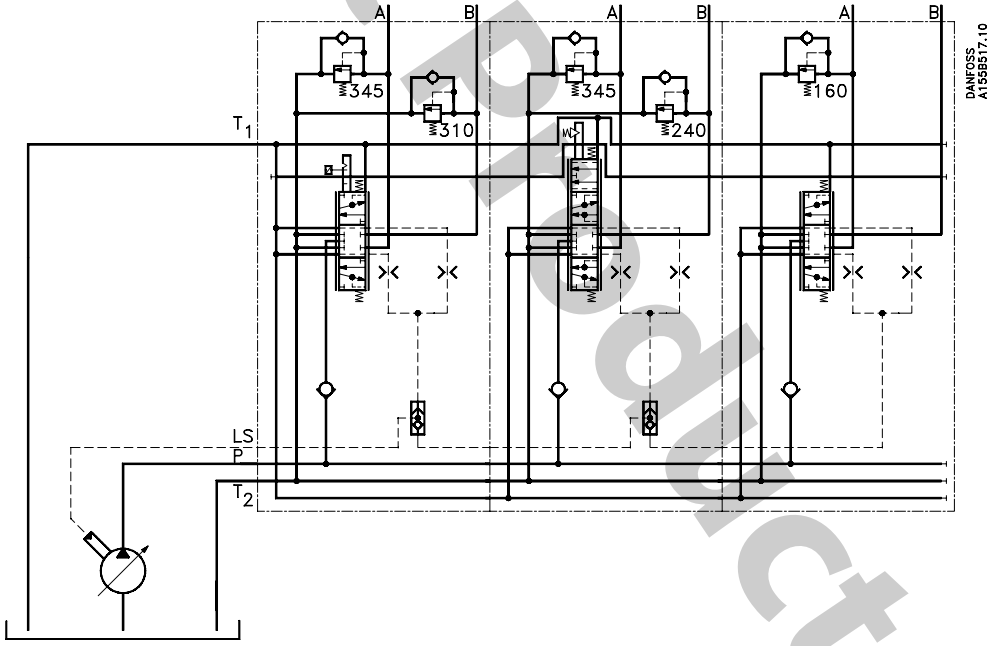


1. Shock and suction valve, PVLP
2. Spring package for neutral positioning
3. Load hold check valve
4. Electric detent for mech. valve
5. Pressure compensator
6. Electrical activation
7. Main spool
8. Mech. float/detent
9. Housing for spring package

Example electrically actuated PVG 83 - fixed displacement pump



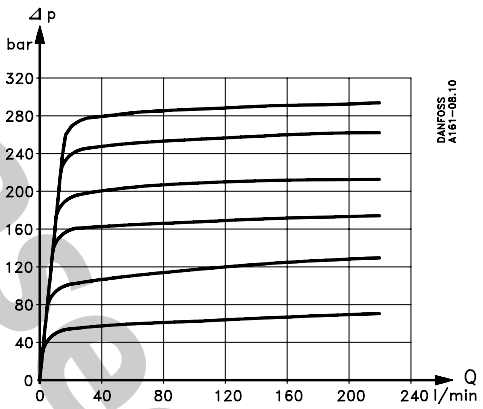
Example manually actuated PVG 83 - variable displacement



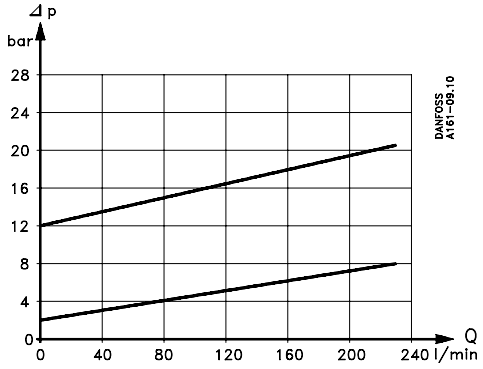
Technical characteristics Pumpside modul, PVP

General

Pressure relief valve characteristic

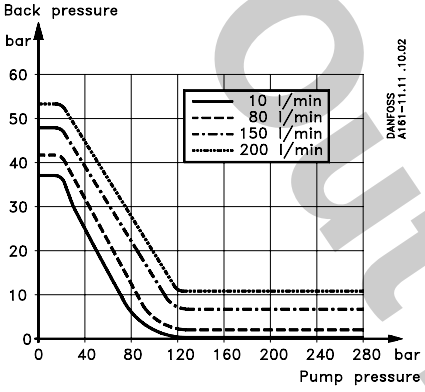


Neutral flow pressure

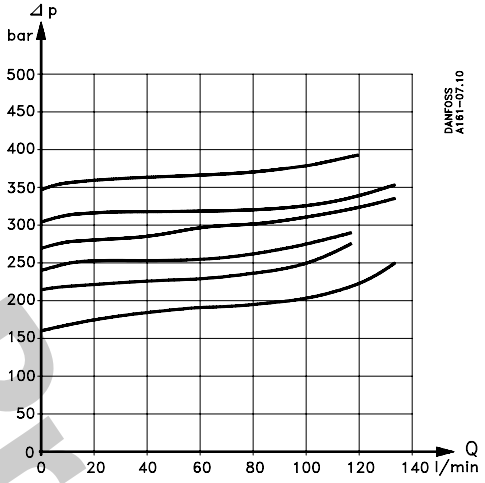


1. Standard
2. PVPX full flow dump

Back pressure

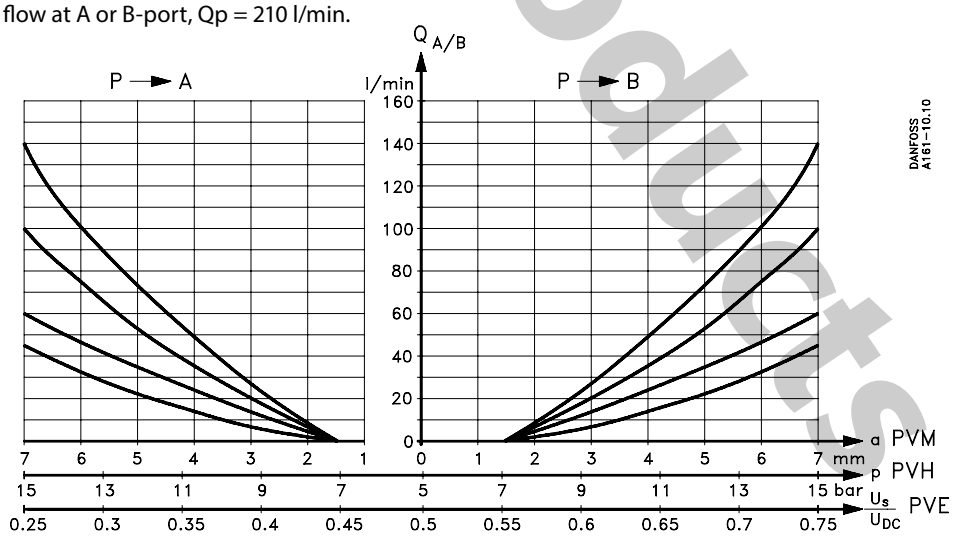


Chock valve PVLP



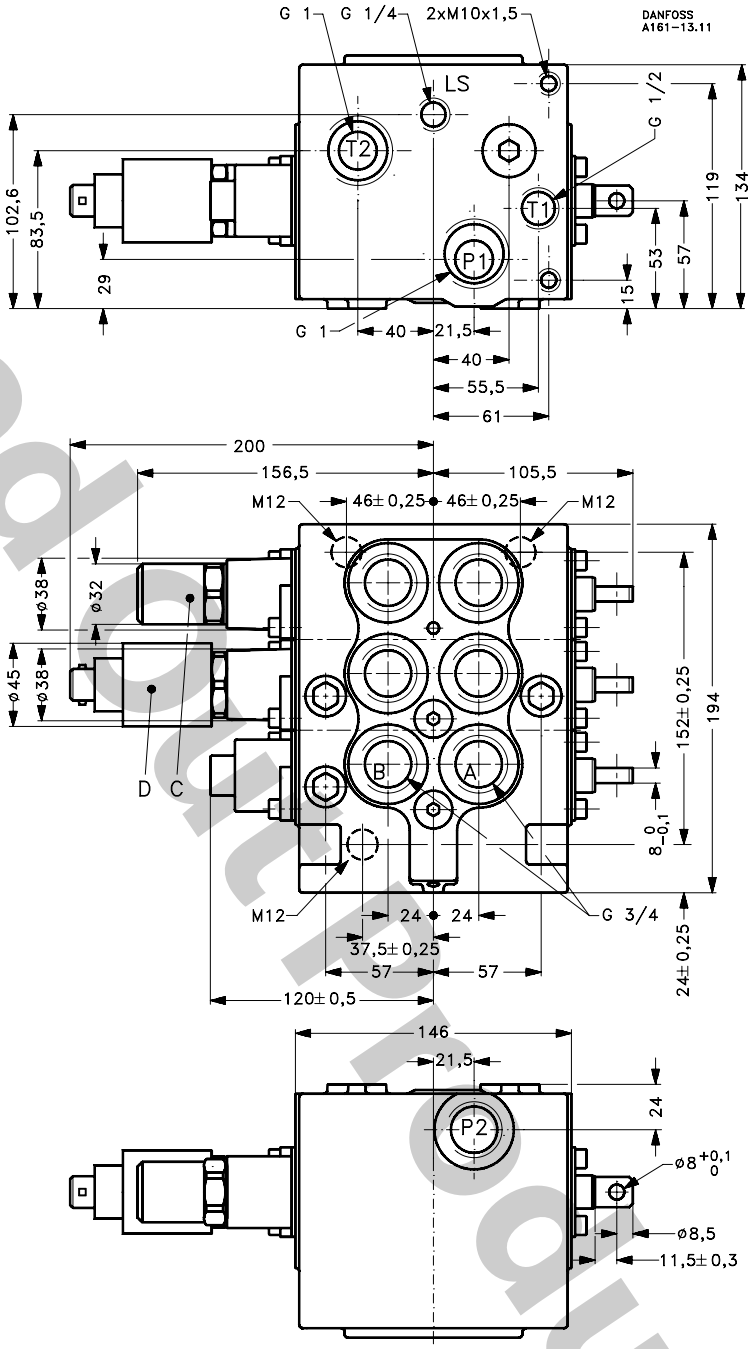
Pressure compensated monoblok

Oil flow at A or B-port, Qp = 210 l/min.



Dimensions

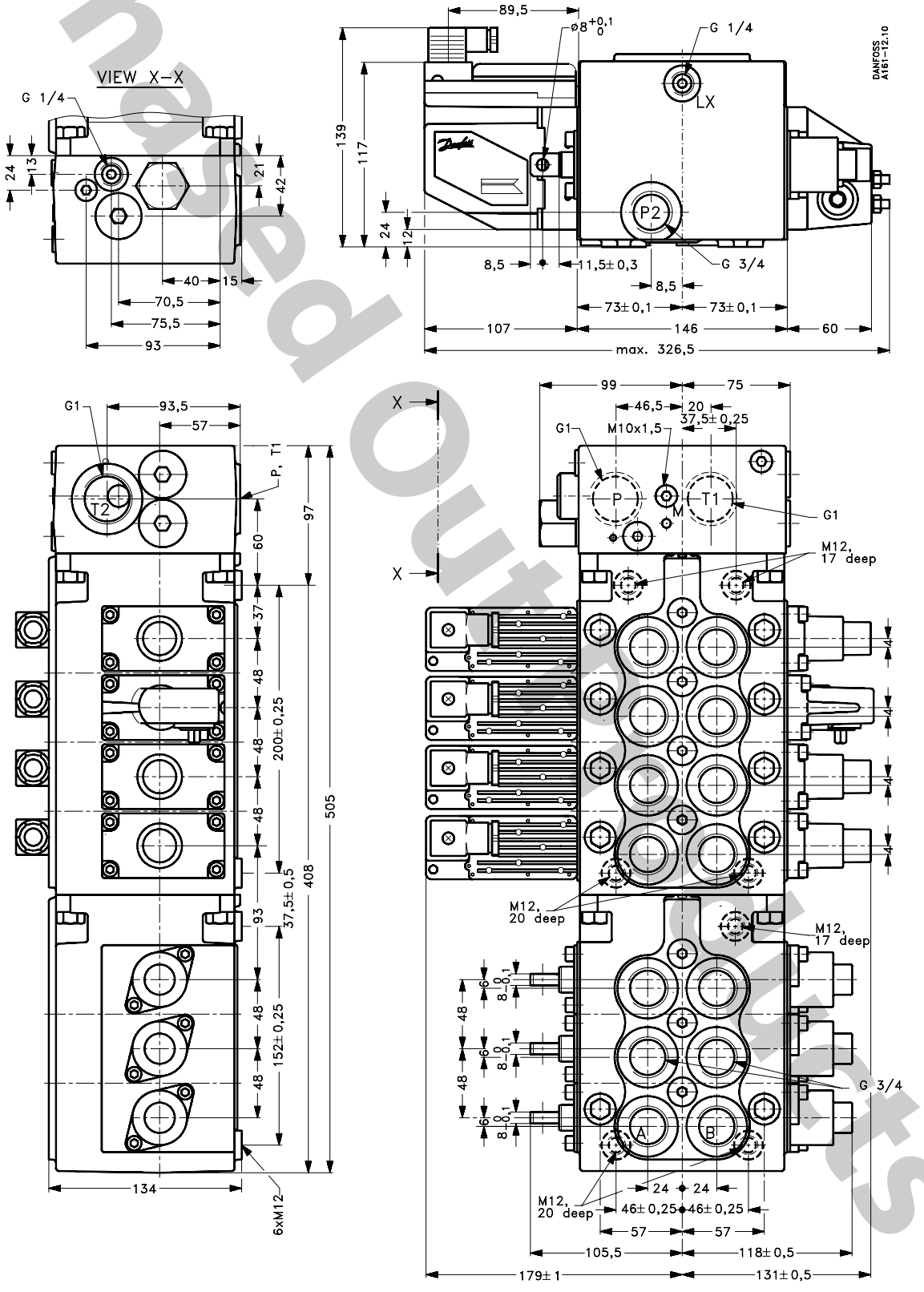
3 section monoblock in closed centre version (without PVP) mechanically actuated.



C : Electric detend
D : Mechanical detend/float

Dimensions

4 section and 3 section monoblock in open centre version. Electrically and mechanically actuated.



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 pro-blem-free operation and long working life.

Mineral oil
For systems with PVG 83 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. So please contact the sales organisation for Danfoss Hydraulics if the PVG 83 valve is to be used with phosphate-esters.

The following fluids should only be used by agreement with the sales organisation for

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

Before using other biodegradable fluids, please consult the Danfoss Sales Organisation for Hydraulics.

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 Danfoss PVG 83 is 19/16 (see ISO 4406.

Calibration in accordance with the ACFTD method).
In our experience a degree of contamination of 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 for 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.

The fineness of a pressure filter must be selected as described by the filter manufacturer so that a particle level of 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 83 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 protecting the essential PVE parts has a mesh of 150 µm.
Bursting pressure drop for internal filters is 25 bar.

Notes

Notes

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