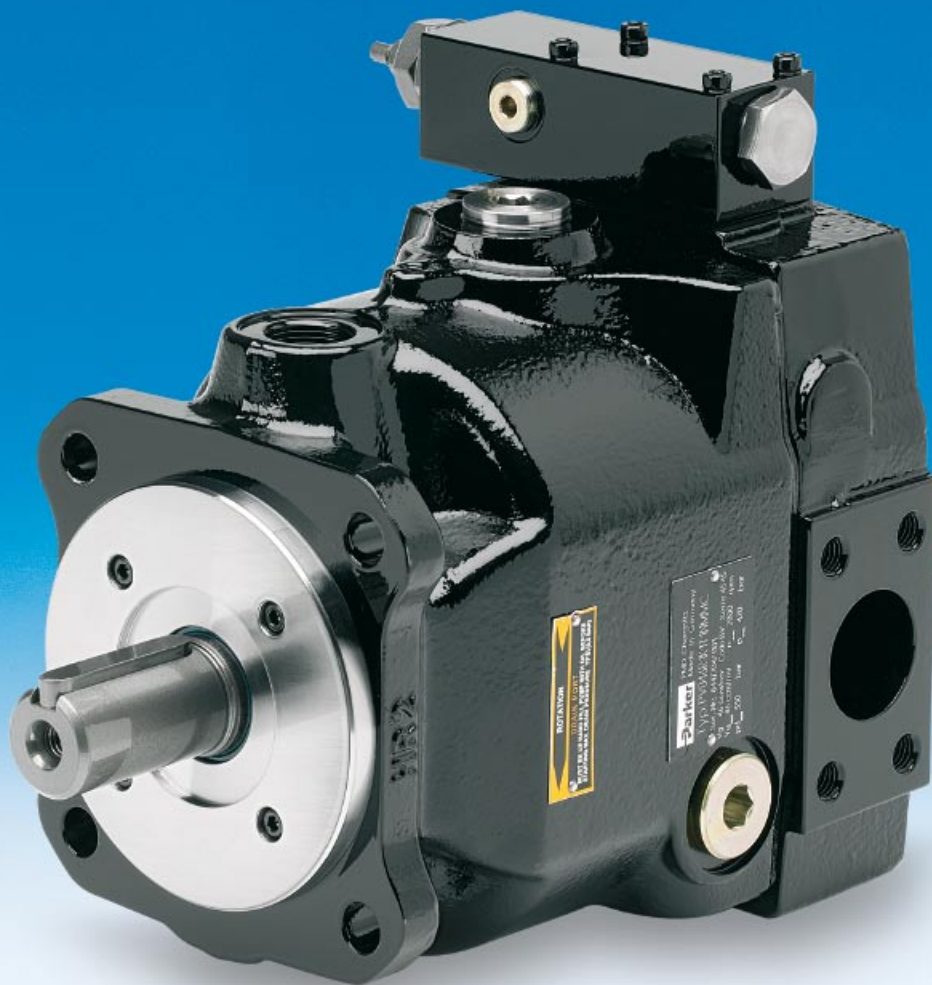




Axial Piston Pump Series PV

Variable Displacement

*Catalogue HY30-3245/UK
April 2006*

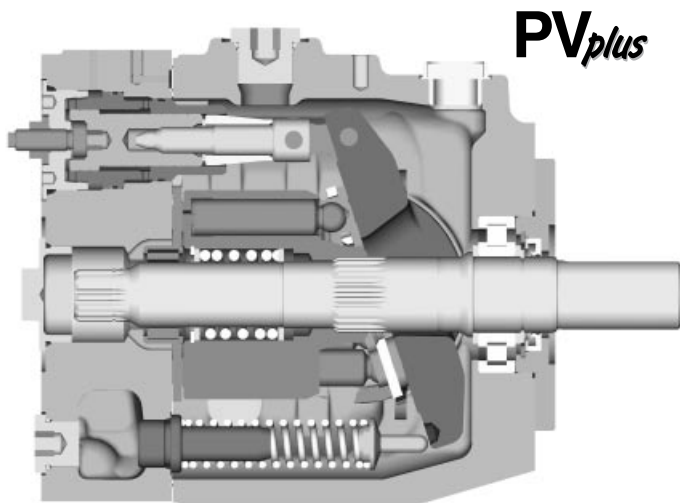


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Introduction

With thru drive for single and multiple pumps

Swash plate type for open circuit



Technical Features

- Low noise level
- Fast response (eg. PV046: upstroke <70ms, downstroke <40ms)
- Service-friendly
- High self-priming speed
- Compact design
- Thru drive for 100% nominal torque

Technical Data

Size	PV032	PV040	PV046
Max. Displacement [cm ³ /rev.]	32	40	46
Output flow at 1500 min ⁻¹ [l/min]	48	60	69
Nominal pressure pN [bar]	350	350	350
Max. pressure pmax [bar]	420	420	420
Max. Case drain pressure [bar]	2	2	2
Min. Inlet pressure [bar]	0,8	0,8	0,8
Max. Inlet pressure [bar]	16	16	16
Input power at 1500 min ⁻¹ and 350 bar [kW]	31	39	45
Max speed ¹⁾ [min ⁻¹]	2800	2800	2800
Moment of inertia [kgm ²]	0,0043	0,0043	0,0043
Weight [kg]	30	30	30

1) The maximum speed ratings are shown for an inlet pressure of 1 bar (absolute) and for a fluid viscosity of $\nu = 30 \text{ mm}^2/\text{s}$

General Information

Fluid recommendations

Premium quality hydraulic mineral fluid are recommended, like HLP oils to DIN 51522, part 2.

Viscosity

The normal operating viscosity should range between 12 and 150 mm²/s (cSt). Max. start-up viscosity is 800 mm²/s (cSt).

Seals

NBR (nitrile) seals are used for operation with hydraulic fluids based on mineral oil. For synthetic fluids, such as phosphoric acid esters, Fluorocarbon seal are required.

Filtration

For maximum pump and system component functionality and life, the system should be protected from contamination by effective filtration.

Fluid cleanliness should be in accordance with ISO classification ISO 4406:1999. The quality of filter elements should be in accordance with ISO standards.

Minimum requirement for filtration rate x (mm); General hydraulic systems for satisfactory operation: Class 20/18/15, according to ISO 4406:1999

Hydraulic systems with maximised component life and functionality:

Class 18/16/13, according to ISO 4406:1999

Ordering Code



axial piston pump variable displacement high pressure version

size and displacement

code	displacement
032	32 cm ³ /rev
040	40 cm ³ /rev
046	46 cm ³ /rev

rotation

code	rotation
R	clockwise

variation

code	variation
1	standard

mounting interface

code	mounting interface	shaft
K	metr. ISO 4-hole flange	cylindric, key
L	3019/2 4-hole flange	splined, DIN 5480

thru drive code

code	ports ¹⁾	threads ²⁾
1	BSPP	metrisch

¹⁾ refers to drain, gage and flushing port,
²⁾ refers to all mounting threads

coupling code

code	thru drive coupling option
1	single pump, no coupling
H	with coupling 25 x 1,5 x 15, DIN 5480
J	with coupling 32 x 1,5 x 20, DIN 5480
Y	with SAE coupling 9T-16/32 DP
A	with SAE coupling 11T-16/32 DP
B	with SAE coupling 13T-16/32 DP
C	with SAE coupling 15T-16/32 DP

seals

code	material
N	NBR (nitrile)

compensator

design series:
pump compensator
not required on order

see next page →

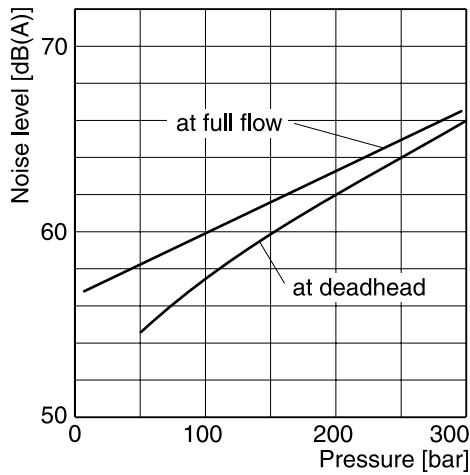
code	thru drive option
no thru drive adapter	
T	single pump, prepared for thru drive
with thru drive adapter	
A	SAE A, Ø 82,55mm
B	SAE B, Ø 101,6mm
J	metric, Ø 100mm
K	metric, Ø 125mm

See dimensional drawing for details

bold letters = preferred program

Noise Levels

PV032 - PV046

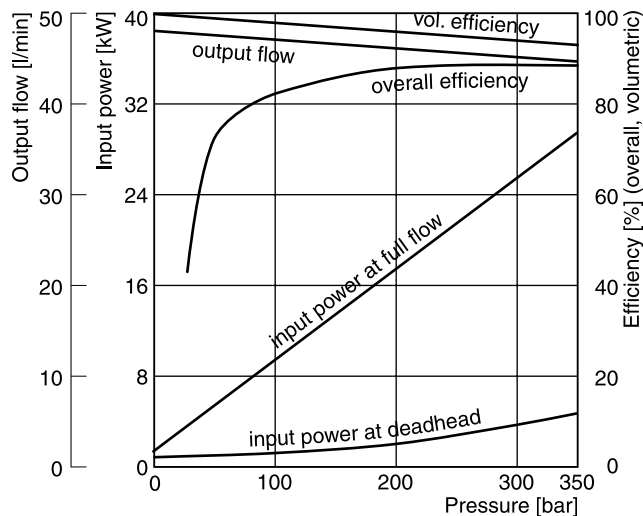


Typical sound level for single pumps, measured in anechoic chamber according to DIN 45 635, part 1 and 26. Microphone distance 1m; speed: $n = 1500 \text{ min}^{-1}$.

All data measured with mineral oil viscosity $30 \text{ mm}^2/\text{s}$ (cSt) at 50°C .

Efficiency and Case Drain Flows

**Efficiency, power consumption
PV032**



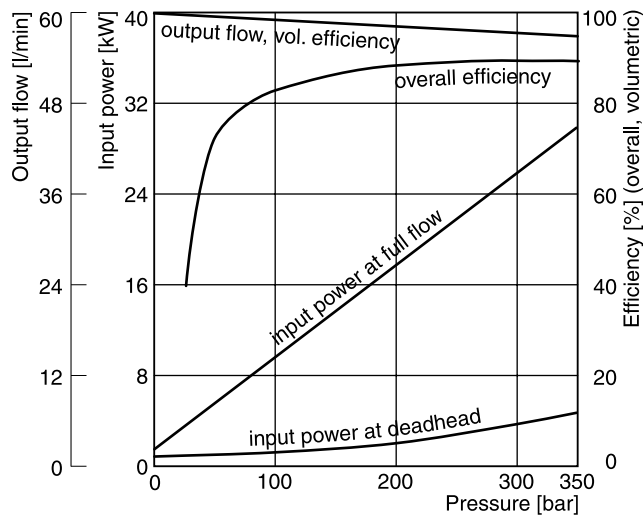
Efficiency and case drain flows PV032 to PV046

The efficiency and power graphs are measured at an input speed of $n = 1500 \text{ min}^{-1}$, a temperature of 50°C and a fluid viscosity of $30 \text{ mm}^2/\text{s}$.

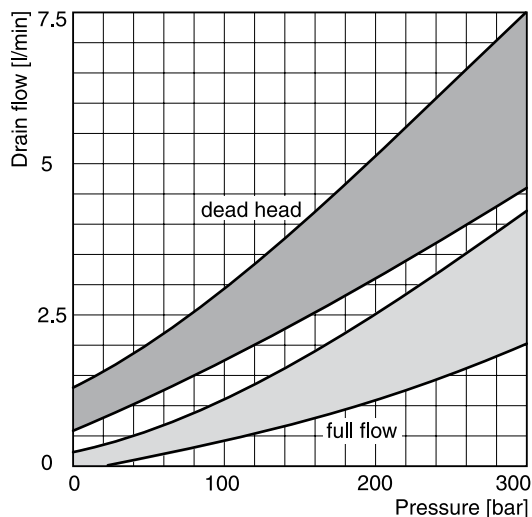
Case drain flow and compensator control flow leave via the drain port of the pump. To the values shown are to be added 1 to 1.2 l/min, if at pilot operated compensators (codes FR*, FF*, UT*, power compensator and p/Q control) the control flow of the pressure pilot valve also goes through the pump.

Please note: The values shown below are only valid for static operation. Under dynamic conditions and at rapid compensation of the pump the volume displaced by the servo piston also leaves the case drain port. This dynamic control flow can reach up to 60 l/min! Therefore the case drain line is to lead to the reservoir at full size and without restrictions as short and direct as possible.

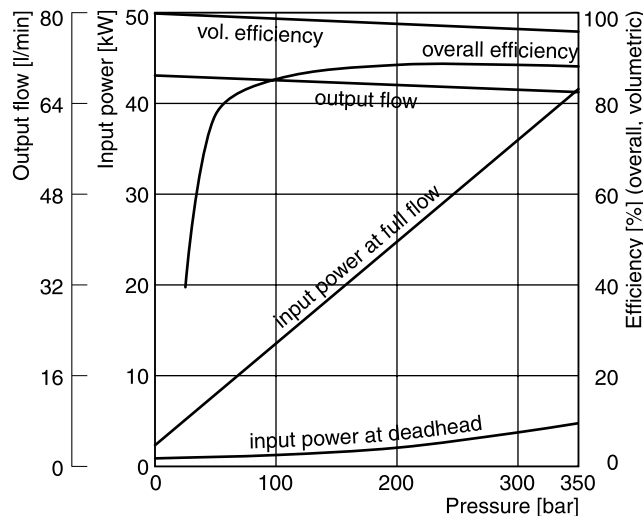
PV040



Case drain flows PV032-046

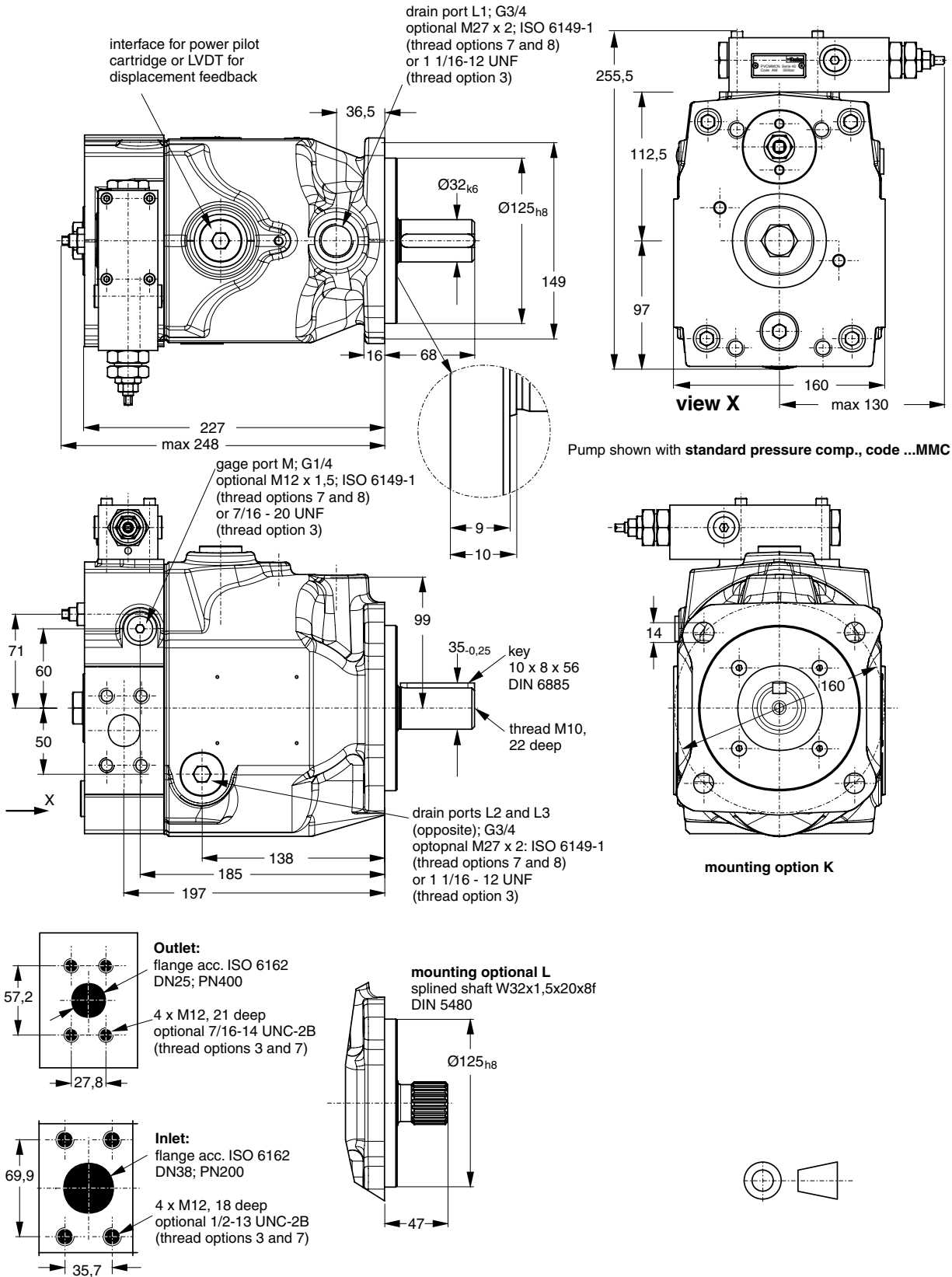


PV046



Dimensions

PV032 - 046, metric version

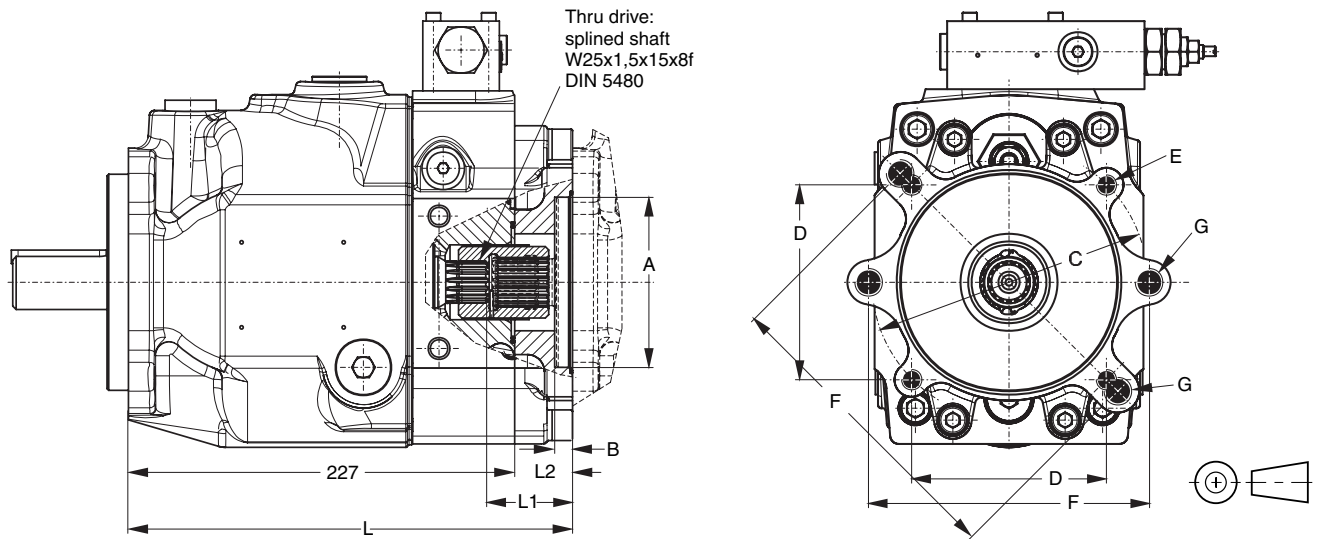


The pump shown above is rotation R (clockwise), for rotation L (ccw) inlet and outlet port are on the opposite side

For further information about flanges see catalogue No. 4039/UK "Pressure Hydraulic Flanges" (on request).
Shown is a clockwise rotating pump. Counter clockwise rotating pumps have inlet, outlet and gauge ports reversed.

Dimensions

Variation with thru drive



Dimension H and available couplings see page 12.
At threads options 3 and 7 the dimensions E and G are UNC - 2B threads.

Thru drive adaptors are available with the following dimensions

Thru drive option	A	B	C	D	E	F	G	L1	L	Remark
A	82,55	8	-	-	-	106	M10	49	261	2-Bolt
B	101,6	11	-	89,8	M12	146	M12	49	261	2/4-Bolt
J	100	10,5	125	-	M10	140	M12	49	261	
K	125	10,5	160	-	M12	-	-	49	261	

Kits

Mounting kits for multiple pumps, for second pump option

MK - **PV**

Mounting kit Axial piston pump series PV

BG

Size Second pump Thread Seals Design series (see name plate)

Code	Pump size	Code	Second pump, SAE	Code	Seals																													
1	Pump size 1: PV016 - PV028	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>Second pump, SAE</th> </tr> </thead> <tbody> <tr> <td>T</td> <td>Prepared for thru drive option (plugged)</td> </tr> <tr> <td>Y</td> <td>SAE AA, diameter 50.8 mm</td> </tr> <tr> <td>A</td> <td>SAE A, diameter 82.55 mm</td> </tr> <tr> <td>B</td> <td>SAE B, diameter 101.6 mm</td> </tr> <tr> <td>C</td> <td>SAE C, diameter 127 mm</td> </tr> <tr> <td>D</td> <td>SAE D, diameter 152.4 mm</td> </tr> <tr> <td>E</td> <td>SAE E, diameter 165.1 mm</td> </tr> <tr> <td colspan="2" style="text-align: center;">Second pump, metric</td> </tr> <tr> <td>G</td> <td>Diameter 63 mm</td> </tr> <tr> <td>H</td> <td>Diameter 80 mm</td> </tr> <tr> <td>J</td> <td>Diameter 100 mm</td> </tr> <tr> <td>K</td> <td>Diameter 125 mm</td> </tr> <tr> <td>L</td> <td>Diameter 160 mm</td> </tr> <tr> <td>M</td> <td>Diameter 200 mm</td> </tr> </tbody> </table>	Code	Second pump, SAE	T	Prepared for thru drive option (plugged)	Y	SAE AA, diameter 50.8 mm	A	SAE A, diameter 82.55 mm	B	SAE B, diameter 101.6 mm	C	SAE C, diameter 127 mm	D	SAE D, diameter 152.4 mm	E	SAE E, diameter 165.1 mm	Second pump, metric		G	Diameter 63 mm	H	Diameter 80 mm	J	Diameter 100 mm	K	Diameter 125 mm	L	Diameter 160 mm	M	Diameter 200 mm	N	NBR
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M	Diameter 200 mm																																	
2	Pump size 2: PV032 - PV046, PV076	V	FPM																															
3	Pump size 3: PV063, PV080 - PV100	E	EPR																															
4	Pump size 4: PV140 - PV180	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>Thread</th> </tr> </thead> <tbody> <tr> <td>M</td> <td>Metric</td> </tr> <tr> <td>S</td> <td>SAE</td> </tr> </tbody> </table>		Code	Thread	M	Metric	S	SAE																									
Code	Thread																																	
M	Metric																																	
S	SAE																																	
5	Pump size 5: PV270																																	

Kit contains positions 30, 69, 84, 85 and 87, see drawing below.

Mounting kits for multiple pumps, couplings

MK - **PV**

Mounting kit Axial piston pump series PV

BG **K**

Size Coupling Design series (see name plate)

Code	Pump size	Code	Coupling for metric, splined shaft DIN 5480
1	Pump size 1: PV016 - PV028	01	N25 x 1.5 x 15
2	Pump size 2: PV032 - PV046, PV076	02	N32 x 1.5 x 20
3	Pump size 3: PV063, PV080 - PV100	03	N40 x 1.5 x 25
4	Pump size 4: PV140 - PV180	04	N50 x 2 x 24
5	Pump size 5: PV270	05	N60 x 2 x 28
		Coupling for SAE splined shaft flat root, side fit	
		11	9T 16/32
		12	11T 16/32
		13	13T 16/32
		14	15T 16/32
		15	14T 12/24
		16	17T 12/24
		17	13T 8/16
		18	15T 8/16
		Coupling + adaptor for keyed shaft	
		20	Diameter 12 mm
		21	Diameter 16 mm
		22	Diameter 18 mm

front pump

SAE, splined

keyed shaft, (only up to Ø 18, metric)

metric, splined

second pump

Kit contains positions 91 (and 92 for keyed shaft).

Thru Drive, Shaft Load Limitations

Max. transferable torque in [Nm] for different shafts options

Shaft code	PV016-028	PV032-046, PV076
D	300	550
E	300	610
K	300	570
L	405	675
Max. torque transmission cap. for rear mounted pump	140	275

Important notice

The max. allowable torque of the individual shaft must not be exceeded. For 2-pump combinations there is no problem because PV series offers 100% thru torque. For 3-pump combinations (and more) the limit torque could be reached or exceeded.

Therefore it is necessary to calculate the torque factor and compare it with the allowed torque limit factor in the table.

Required: calculated torque factor
 < torque limit factor

To make the necessary calculations easier and more user friendly it is not required to calculate actual torque requirements in Nm and compare them with the shaft limitations. The table on the right shows limit factors that include material specification, safety factors and conversion factors.

Pump	Shaft	Torque limit factor
PV016-028	D	17700
	E	17700
	K	17700
	L	20130
PV032-046	D	32680
	E	36380
	K	33810
	L	40250

The **total torque factor** is represented by the sum of the individual torque factors of all pumps in the complete pump combination.

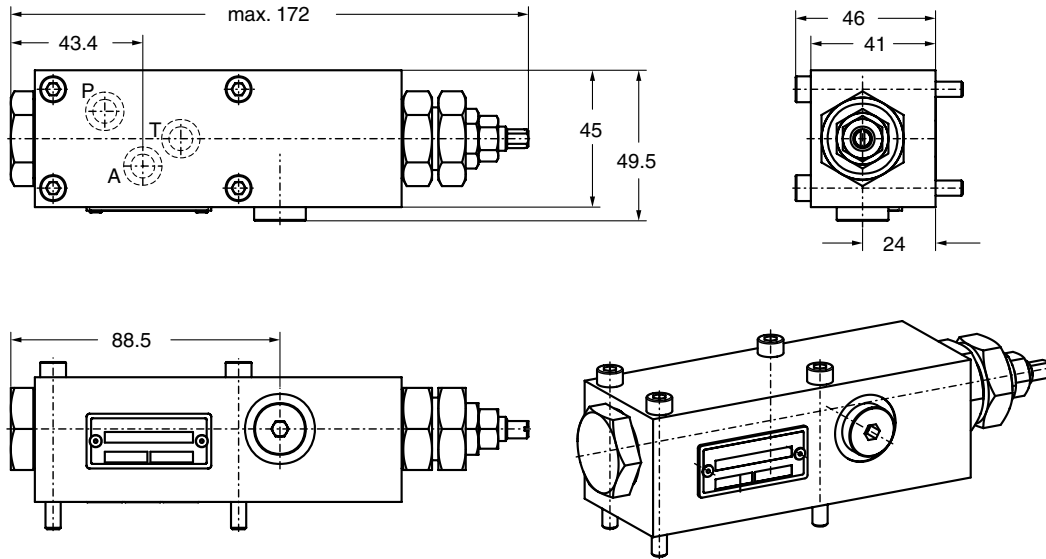
Total torque factor of the combination
= sum of individual torque factors of all pumps

The **torque factor of each individual pump** is calculated by multiplying the max. operating pressure p of the pump (in bar) with the max. displacement Vg of the pump (in cm³/rev).

Torque factor of any pump
= p x Vg

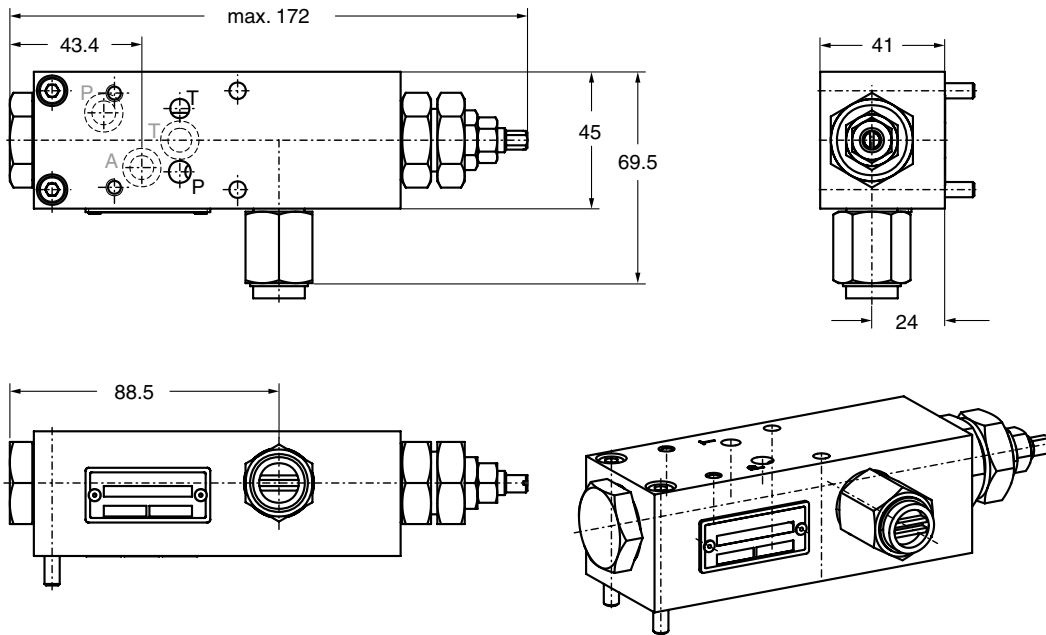
Compensator Dimensions

Dimensions standard pressure compensator, code MMC



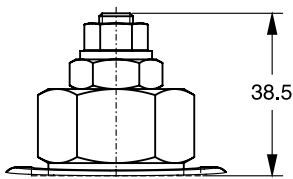
Code "MM1" has NG06/CETOP 3 interface topside as shown below.

Dimensions remote pressure and load sensing compensator, code MR1 and MF1



Codes "MRC" and "MFC" have same dimensions, but no valve interface on top.

Dimensions power pilot cartridge

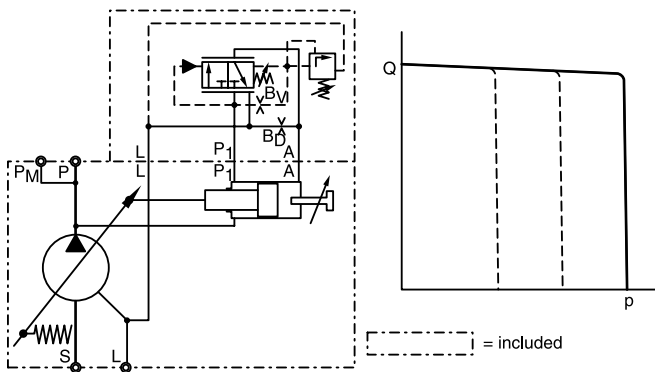


Standard pressure compensator, code MMC

The standard pressure compensator adjusts the pump displacement according to the actual need of the system in order to keep the pressure constant.

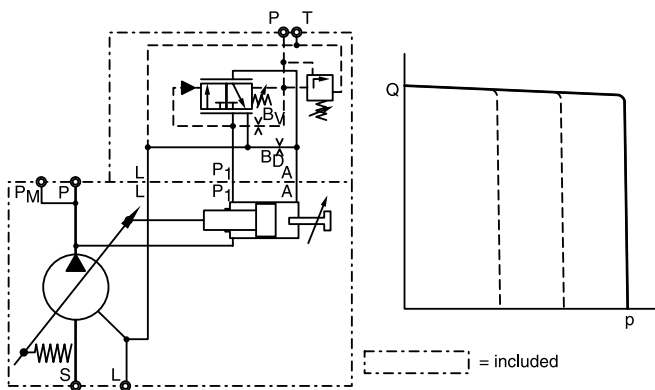
As long as the system pressure at outlet port P is lower than the set pressure (set as spring preload of the integrated pilot valve) the working port A of the compensator valve is connected to the case drain and the piston area is unloaded. Bias spring and system pressure on the annulus area keep the pump at full displacement.

When the system pressure reaches the set pressure of the pilot valve, pilot flow is built up and a differential pressure will occur at pilot orifice B_v. When this differential pressure reaches the factory setting of the compensator, the control spool connects port P₁ to A and builds up a pressure at the servo piston resulting in a down stroking of the pump. The displacement of the pump is controlled in order to match the flow requirement of the system.



Standard pressure compensator with NG6 interface, code MM1

With code ...MM1 the standard pressure compensator has on its top side a valve interface size NG 6 DIN 24 340 (CETOP 03 acc. RP35H, NFPA D03). This interface allows the mounting of accessories like multiple pressure selectors without the need of external piping and valve mounting.

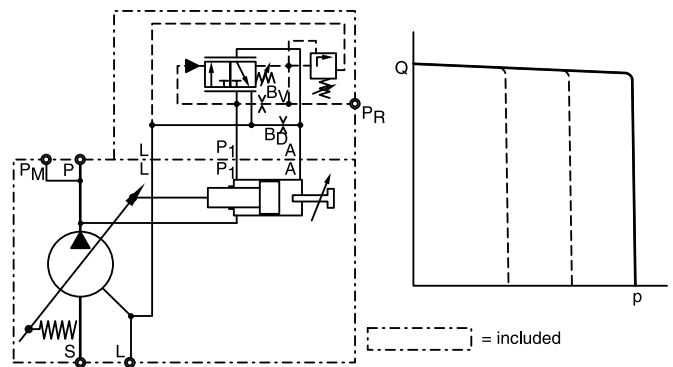


Remote pressure compensator, code MRC

The basic function of the remote pressure compensator code ...MRC is equal to the function of the standard pressure compensator. The remote compensator offers an additional remote control port on the side of the compensator body. With a remote installed pilot valve, the setting of the pump compensating pressure can be adjusted from a location up to 15 meter apart from the pump.

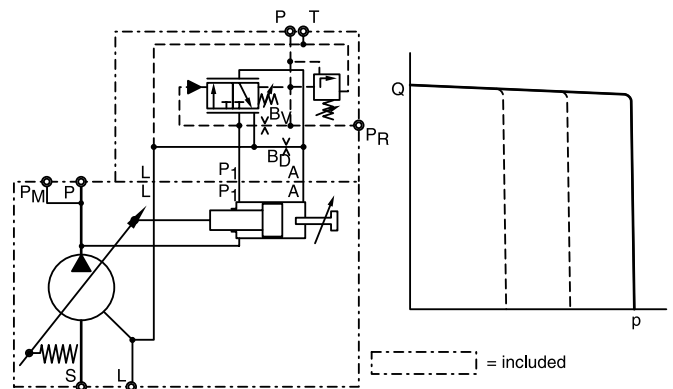
The thread of this remote port is defined in the thread option of the PV pump ordering code.

For long distances between pump and remote control valve please consider temperature and response time influences.



Remote pressure compensator with NG6 interface, code MR1

With code ...MR1 the remote pressure compensator has on its top side a valve interface size NG 6 DIN 24 340 (CETOP 03 acc. RP35H, NFPA D03). This interface allows the mounting of accessories like multiple pressure selectors without the need of external piping and valve mounting.

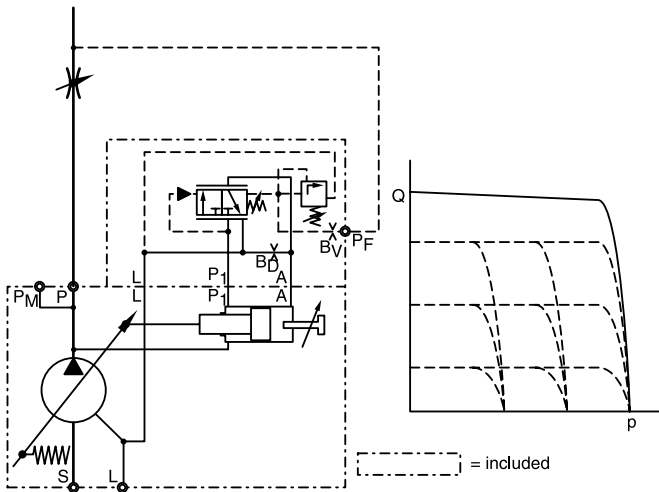


Load sensing compensator code MFC

The pilot pressure of the load sensing compensator is taken from a load sensing port in the hydraulic system. This port is located downstream of a throttle valve (manually or electronically operated). The pump compensator differential pressure is factory set to 10 bar.

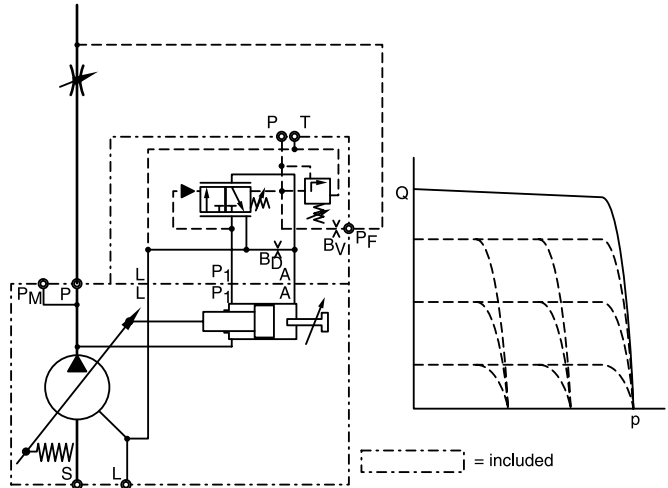
When the main stream throttle valve is set to a position, that creates the 10 bar pressure drop at a lower flow, than the pump nominal flow, the load sensing compensator will reduce the pump displacement accordingly to avoid power losses in the circuit. When the main stream throttle valve is closed, the pump will be compensated to stand-by operation at a pump outlet pressure of 10 bar.

If the system pressure exceeds the setting of the integrated pilot valve, the pilot valve will create an additional pressure drop at the pilot orifice BV. This will lead to a pressure compensation of the pump in order not to exceed the set pressure.



Load sensing compensator NG6 interface, code MF1

With code ...MF1 the load sensing compensator has on its top side a valve interface size NG 6 DIN 24 340 (CETOP 03 acc. RP35H, NFPA D03). This interface allows the mounting of accessories like multiple pressure selectors without the need of external piping and valve mounting.



Power Compensators

Hydraulic-mechanical power compensator

The hydraulic-mechanical power compensator consists of a modified remote pressure compensator (Code *L*) or of a modified load-sensing compensator (Code *C*) and a pilot valve. This pilot valve is integrated into the pump and is adjusted by a cam sleeve. The cam sleeve has a contour that is designed and machined for the individual displacement and the nominal power setting.

At a large displacement the opening pressure (given by the cam sleeve diameter) is lower than at small displacements. This makes the pump compensate along a constant power (torque) curve (see diagrams on opposite page).

For all nominal powers of standard electrical motors Parker offers a dedicated cam sleeve. The exchange of this cam sleeve (e.g.: to change power setting) can easily be done without disassembly of the pump.

On top of that an adjustment of the power setting can be done within certain limits by adjusting the preload of the pilot control cartridge spring. That allows an adjustment of a constant power setting for other than the nominal speeds (1500 min⁻¹) or for other powers.

Ordering code for the power option

The first digit designates the power setting:

Code B = 3.0 kW etc. up to

Code 3 = 132.0 kW

The second digit designates the pilot flow source:

Code L internal pilot pressure, remote pressure function.

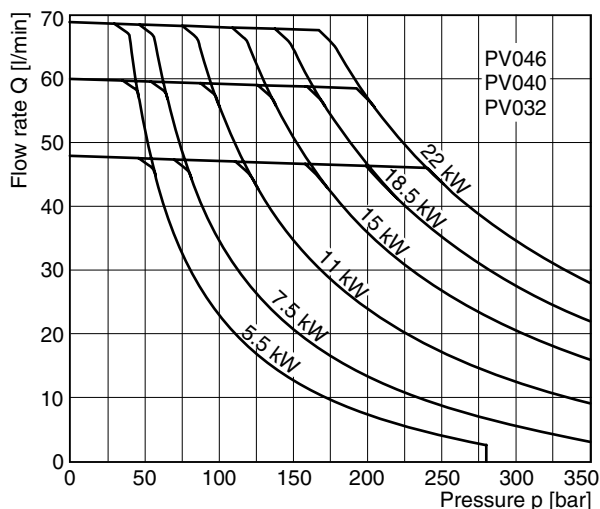
Code C external pilot pressure, combines power compensation with load-sensing compensation.

The third digit designates the possibility to adjust the overriding pressure compensation:

Code 1 comes with a top side NG6/D03 interface on the control valve to mount any suitable pilot valve or Parker pump accessories.

Code C includes a pilot valve for manual pressure adjustment. Max. setting: 350 bar.

Characteristic curves, power compensators



The diagrams shown are only valid for the following working conditions:

- Speed : n = 1500 rev/min
- Temperature : t = 50 °C
- Fluid : HLP, ISO VG46
- Viscosity : v = 46 mm²/s at 40 °C

Power compensator code *LC

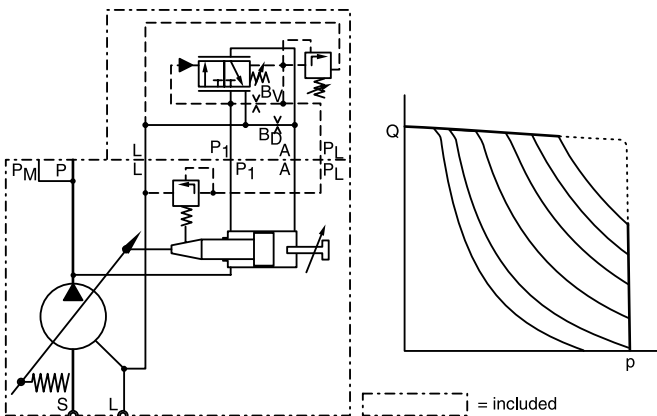
The control function of the power compensator is as described in the standard compensator section.

The pump will start to compensate, when the pilot valve(s), integrated into compensator and pump, create a differential pressure of 15 bar at the pilot orifice BV.

In addition to the standard pressure compensator the power option has an additional pilot valve in the pump housing. The pressure setting of this valve is controlled by a power feedback sleeve connected to the servo piston. At full displacement, the pressure setting is low and the pump will start to compensate at a lower pressure. The more the pump compensates, the more the feedback sleeve is moved by the down stroking servo piston. According to the contour of this sleeve, the pressure setting of the power pilot valve is raised.

That gives a constant power requirement for the pump drive. At low pressures the pump can provide a high flow output, at high pressures the flow output has to be lowered, to avoid overloading of the drive motor.

The contour of the power feedback sleeve is designed, to match the desired constant power curve (see following page). For each nominal setting a different contour sleeve is available. The last ordering code digit (*) defines the required setting (see ordering code pages).



Power compensator code *CC

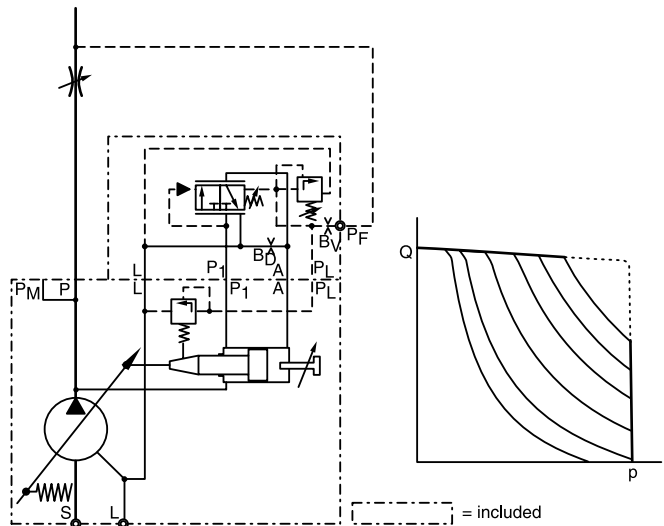
In code ...CC. the power compensator has an additional load sensing port.

As for the load sensing compensator, code ...FC the pilot pressure is not supplied internally, but from a load sensing port in the hydraulic system.

Please note: in this case the load sensing pressure differential is set to 15 bar in order to meet the constant power curve, which is laid out for a 15 bar pilot pressure differential.

With this feature the pump can be flow controlled by the main stream throttle valve, pressure controlled by the integrated pilot valve in the compensator and power controlled by the integrated pilot valve and contour sleeve in the pump housing.

Both power compensator versions: code ...LC* and code ...CC* can be ordered also with the top side interface for accessories (codes ...L1* resp. ...C1*), with a built on directional control valve for electrical unloading (codes ...LW* resp. ...CW*) and with a built on proportional pilot valve for electronic setting of the max. compensating pressure (codes ...LD* resp. ...CD*).



Electrohydraulic p/Q control

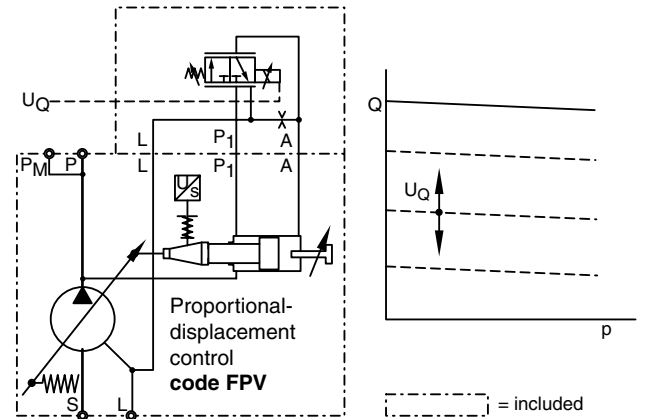
Proportional displacement control, code FPV

The proportional displacement control allows the adjustment of the pumps output flow with an electrical input signal.

The actual displacement of the pump is monitored by an LVDT and compared with the commanded displacement in an electronic control module PQDXXA. The command is given as an electrical input signal (0 - 10 V or 0 resp. 4 - 20 mA) from the supervising machine control. The command can also be provided by a potentiometer. The electronic control module offers a stabilized 10 V source to supply the potentiometer.

The electronic module compares permanently the input command and the actual displacement by powering the proportional solenoid of the control valve. A deviation from the commanded displacement leads to a modulation of the input current to the solenoid. The control valve then changes the control pressure (port A) until the correct displacement is adjusted.

Version FPV of the proportional control does not provide a pressure compensation. The hydraulic circuit must be protected by a pressure relief valve.

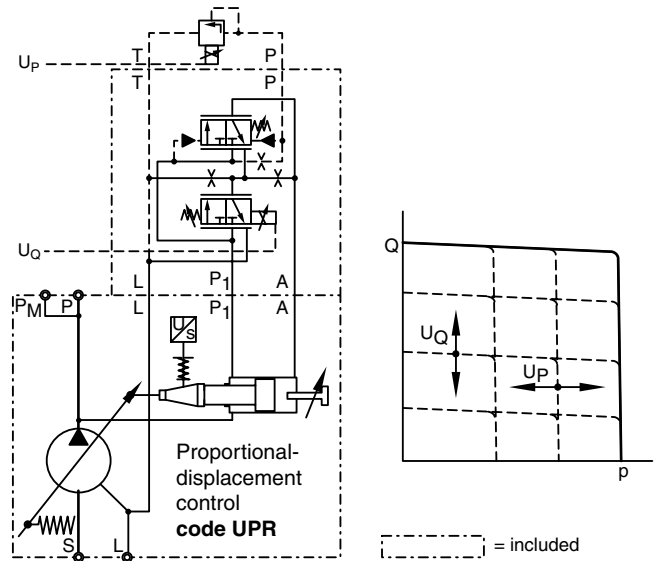


Proportional displacement control with overriding pressure control, codes UPR and UPG

In **version UPR** an additional pressure compensator valve can override the electrohydraulic displacement control. That adds pressure compensation to this control.

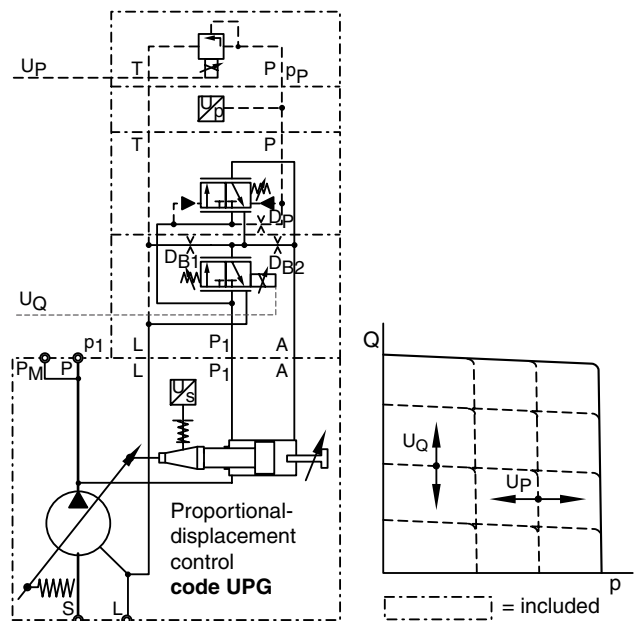
The compensator valve has an NG6/D03 interface on top to mount a pressure pilot valve. When using a proportional pressure pilot valve an electro-hydraulic p/Q control can be realized. The electronic driver modules are tuned for the valve type PVACPP* to get the best performance.

The electronic control module PQDXXA contains, beside the displacement control unit, also the driver electronics for the a. m. proportional pressure valves.



With **ordering code UPG** the proportional pressure pilot valve and a pressure transducer (Parker SCP 8181 CE) are included with the pump control. In combination with control module PQDXXA a closed loop pressure control of the pump outlet pressure is available.

Parker variable displacement pumps have a large servo piston. That leads to a extremely robust and stable pump control. On the other hand that requires high control flows (up to > 100 l/min). Parker has therefore chosen the 2-valve p/Q control concept, because in this case a hydraulic-mechanical compensator valve takes care of the pressure compensation of the pump. That allows a very fast pressure compensation and makes this the control insensitive to fluid contamination. We see the 2-valve concept as a contribution to system and pressure control safety.

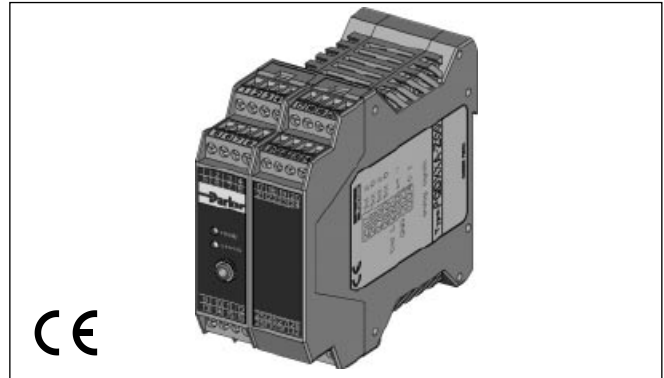


Electronic Module PQDXXA (digital)

The digital control module code PQDXXA-Z00 is designed for rail mounting.

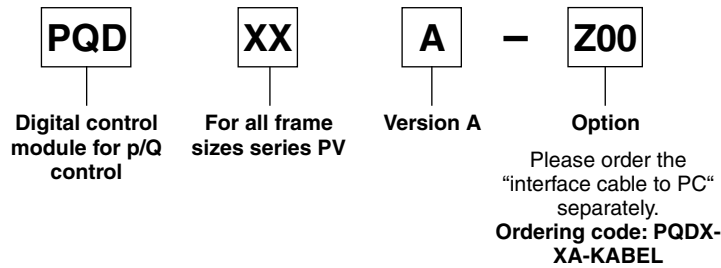
Features

- Digital control circuit
- Parameter setting via RS-232 interface
- All settings (ramps, MIN/MAX, control parameters) can be stored digitally and recalled from a PC to duplicate settings to other modules
- Ramp time up to 60 seconds
- Compatible to the relevant european EMC specifications
- Easy to use PC based setup software
- Covers all displacements from 16 to 270 cm³/rev



- Covers all functions: displacement control, displacement control with open loop pressure control, displacement control with closed loop pressure control and displacement control with closed loop pressure control and electronic power limitation.

Ordering code



Technical data

Mounting style	Snap-on mounting for EN50022 rail	
Body material	Polycarbonate	
Inflammation class	V2...V0 acc. UL 94	
Mounting position	any	
Env. temperature range	[°C]	-20...+55
Protection class	IP 20 acc. DIN 40 050	
Weight	[g]	160
Duty ratio	[%]	100
Supply voltage	[V]	18...30VDC, ripple <5% eff.
Rush in current	[A]	22 for 0.2 ms
Current consumption	[A]	< 4 for p/Q control ; < 2 for Q-control
Resolution	[%]	0.025 (power 0.1)
Interface	RS232C, 9600 baud, 3.5 mm cinch	
EMC	EN 50 081-2, EN 50 082-2	
Connectors	Screw terminals 0.2...2.5 mm², plug in style	
Cables	[mm²]	1.5 (AWG 16) overall braid shield, for supply and solenoid connection 0.5 mm² (AWG 20) overall braid shield, for sensor and command signal connections
Max. cable length	[m]	50

For programming the module via PC, an interface cable is needed, please order separately.

Programming software

The programming of the p/Q control module is done in an easy to learn mode. To select the pump model and size and to set the control parameters the program **ProPVplus** must be started. This program runs under WINDOWS® 95 and higher.

The latest version of this software can be downloaded at the following internet address:

http://www.parker.com/euro_hcd

The software offers the following features:

A **TERMINAL** window to set or read out the control parameters of the module. Settings as well as comments entered in the terminal window can be stored also in RTF format (opens e. g. under WORD or other text editors)

A **MONITOR** window allows to display process variables in numerical format.

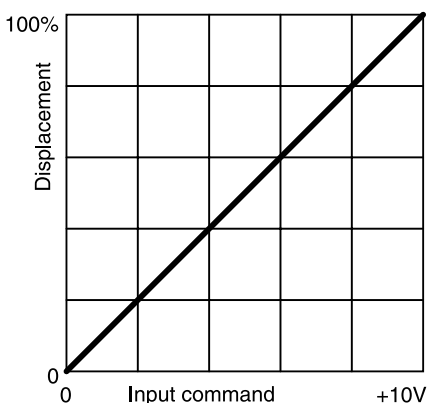
An **OSZILLOSKOP** window displays process variables as curves. The oscilloscope offers a start - stop function. The images can be saved and stored e. g. for import into other programs.

Features

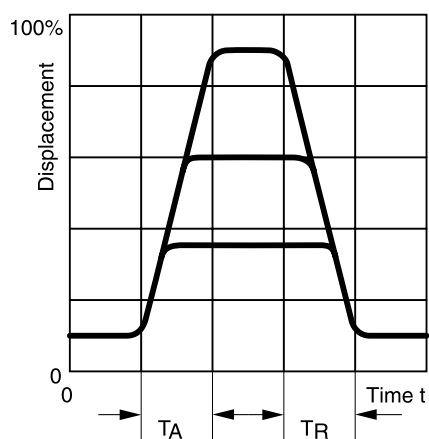
- Display and documentation of parameter sets
- Save and reload of optimized parameter sets
- Offers oscilloscope function for easy performance evaluation and optimization
- Pre-optimized parameter sets for all PVplus piston pump
- Sizes already in E²PROM memory

Diagrams

Typical static characteristic



Typical dynamic characteristic



Response times

Size	T_A [ms]	T_R [ms]
PV046	70	70



WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

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