RE 10 515/07.02

Replaces: 05.00

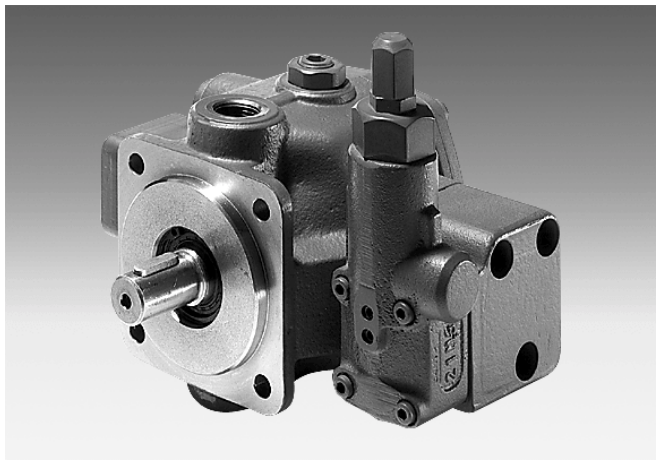
Variable vane pumps, pilot operated, type PV7

Nominal sizes 14 to 150

Series 1X

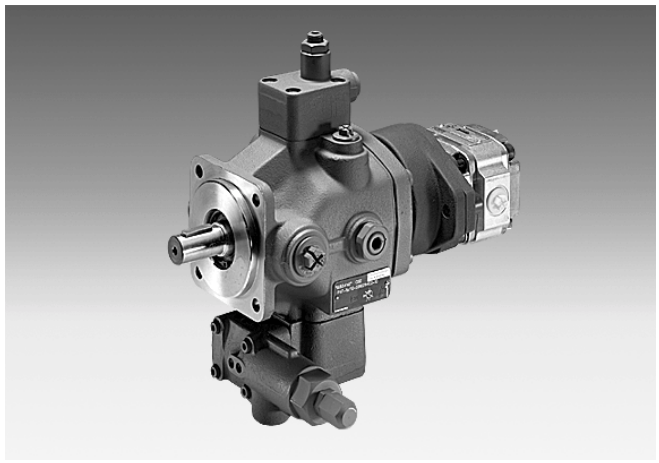
Maximum operating pressure 160 bar

Maximum flow 270 L/min



H/A 1790

Type PV7/16…C…



H/A/D 5641/97

Type P2V7/…+GF1/…

Overview of contents

Features

PV7

- Variable displacement
- Low operating noise
- Long bearing life due to hydro-dynamically lubricated plain bearings
- Control facility for pressure and flow
- Low hysteresis
- Very short control times for an and off stroke
- Installation and connection dimensions to
  - VDMA 24 560 part 1
  - ISO 3019/2
- Suitable for use with HETG and HEES fluids
- The standard PV7 pumps can be combined into numerous variations of combination pumps
- The PV7 pumps can also be combined with internal and external gear pumps, axial piston and radial piston pumps

MPU

- Is supplied as a completely assembled unit
- Drive coupling and pump mounting bracket are not required
- Low operating noise due to the compact design

Ordering details

Build and nominal sizes		Pipe connection	Zero stroke pressure range	
BS 10-NS 14 cm³	= **10-14**	= **01**	**16 =**	up to 160 bar
BS 10-NS 20 cm³	= **10-20**	= **01**	**10 =**	up to 100 bar
BS 16-NS 20 cm³	= **16-20**	= **01**	**16 =**	up to 160 bar
BS 16-NS 30 cm³	= **16-30**	= **01**	**08 =**	up to 80 bar
BS 25-NS 30 cm³	= **25-30**	= **01**	**16 =**	up to 160 bar
BS 25-NS 45 cm³	= **25-45**	= **01**	**08 =**	up to 80 bar
BS 40-NS 45 cm³	= **40-45**	= **37**	**16 =**	up to 160 bar
BS 40-NS 71 cm³	= **40-71**	= **37**	**08 =**	up to 80 bar
BS 63-NS 71 cm³	= **63-71**	= **07**	**16 =**	up to 160 bar
BS 63-NS 94 cm³	= **63-94**	= **07**	**08 =**	up to 80 bar
BS 100-NS 118 cm³	= **100-118**	= **07**	**16 =**	up to 160 bar
BS 100-NS 150 cm³	= **100-150**	= **07**	**08 =**	up to 80 bar

PV7–1X /	R	E				–	

Series
Series 10 to 19 = **1X**
(10 to 19: unchanged installation and connection dimensions)

Direction of rotation
Clockwise = **R**

Shaft end
Cylindrical drive shaft with through drive = **E**

Pipe connections
Standard version
BS 10, 16, 25:
Suction, pressure connection: pipe thread = **01**
BS 40:
Suction connection: SAE flange connection,
Pressure connection: pipe thread = **37**
BS 63, 100:
Suction, pressure connection: SAE flange connection = **07**

Ordering examples: PV7-1X/16 20RE01MC5-16
PV7-1X/40-45RE37KD0-16

For pumps with settings to the customer's requirements:
On the order please state the required setting data in clear text (e.g. q_{Vmax} = 20 L/min; $p_{zero\ stroke}$ = 70 bar). The pump will be set to the required values and the operating noise optimised respectively.

Directional valve [1]
WG = Normally closed
WH = Normally open

Controller option
0 = Standard
3 = Lockable
5 = With K-plate
6 = With Q-plate
7 = Lockable with K-plate
8 = Lockable with Q-plate

Controller type
C = Pressure controller
D = Pressure controller for hydraulic remote pressure control
E = Pressure controller with electrical remote pressure control (on request)
N = Flow controller
W = Pressure controller with electrical 2-stage pressure adjustment

Seals
M = NBR seals
K = FKM shaft seal ring (other seals NBR)

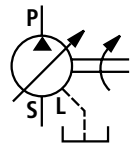
Without any clear text information the flow and the zero stroke pressure will be set to the relevant maximum values and the operating noise will be adjusted accordingly.

[1] Only for C5, D5 and W controllers (optional)

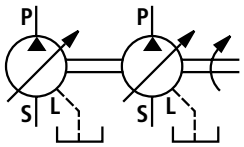
Preferred types (readily available)

Type	Material No.	Type	Material No.
PV7–1X/10-14RE01MC0-16	00580381	PV7–1X/10-14RE01MD0-16	00504653
PV7–1X/10-20RE01MC0-10	00534143	PV7–1X/10-20RE01MD0-16	00906584
PV7–1X/16-20RE01MC0-16	00580382	PV7–1X/16-20RE01MD0-16	00509274
PV7–1X/16-30RE01MC0-08	00533582	PV7–1X/16-30RE01MD0-08	00560658
PV7–1X/25-30RE01MC0-16	00580383	PV7–1X/25-30RE01MD0-16	00509506
PV7–1X/25-45RE01MC0-08	00534508	PV7–1X/25-45RE01MD0-08	00568833
PV7–1X/40-45RE37MC0-16	00580384	PV7–1X/40-45RE37MD0-16	00593330
PV7–1X/40-71RE37MC0-08	00535588	PV7–1X/40-71RE37MD0-08	00539886
PV7–1X/63-71RE07MC0-16	00506808	PV7–1X/63-71RE07MD0-16	00519094
PV7–1X/63-94RE07MC0-08	00560659	PV7–1X/63-94RE07MD0-08	00574560
PV7–1X/100-118RE07MC0-16	00506809	PV7–1X/100-118RE07MD0-16	00532770
PV7–1X/100-150RE07MC0-08	00561846	PV7–1X/100-150RE07MD0-08	00915470

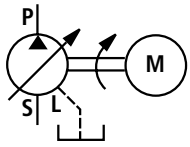
Symbol



Single pump



Double pump



Motor-pump-drive unit

Function, section

Design

The PV7 hydraulic pumps are variable displacement vane pumps.

They mainly consist of the housing (1), rotor (2), vanes (3), stator ring (4), pressure controller (5) and adjustment screw (6).

The circular stator ring (4) is retained between the small control piston (10) and the large control piston (11). The third contact point of the ring is the height adjustment screw (7).

The driven rotor (2) rotates inside the stator ring (4). The vanes contained within the rotor are pressed against the stator ring (4) by centrifugal force.

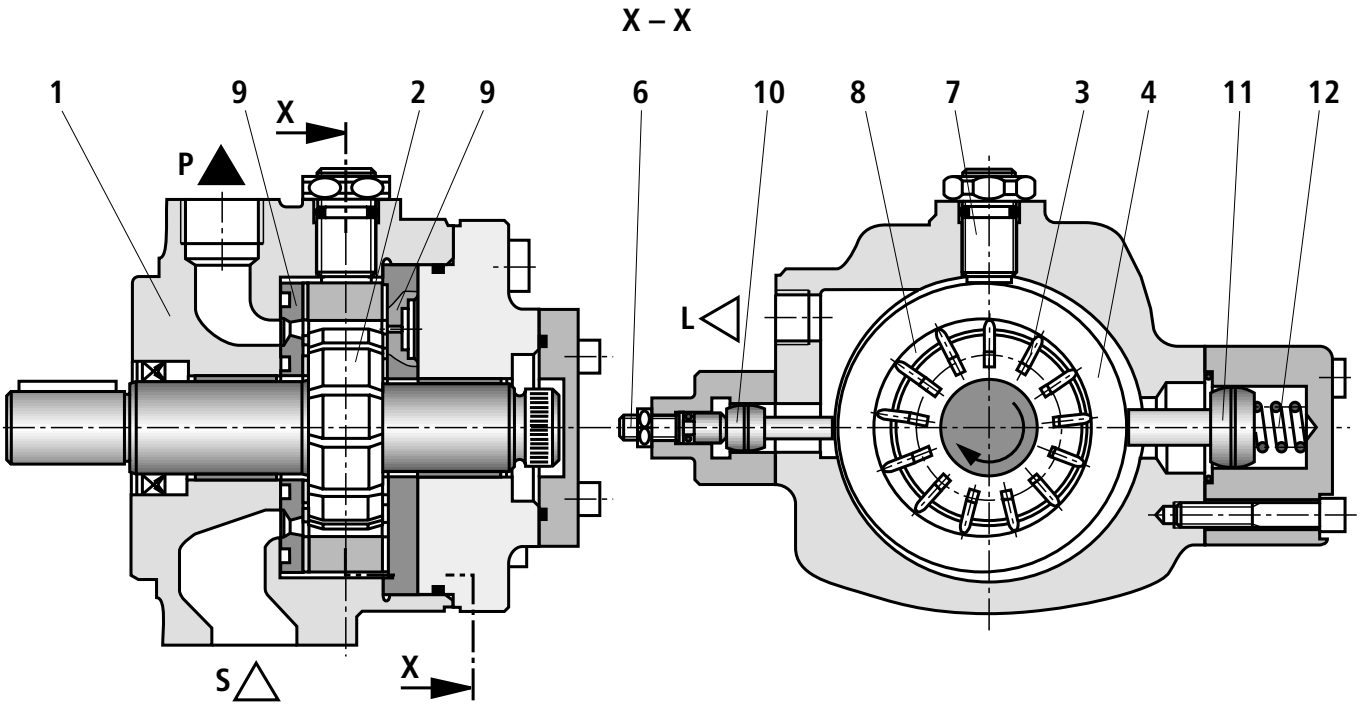
Adjustment

At the same time as the system pressure builds up, the rear surface of the small control piston (10) is connected to the system via a channel and is, therefore always subjected to the system pressure.

When the pump is in its displacement position, the rear surface of the large control piston (11) is also subjected to the system pressure via a drilling in the control piston (14). The control piston (11) with the larger surface area holds the stator ring (4) in its eccentric position.

The pumps displaces fluid at a pressure that is lower than the zero stroke pressure set on the pressure controller (5).

The control piston (14) is held in a certain position by a spring (13).



Suction and displacement process

The chambers (8) which are required for the transport of the fluid are formed by the vanes (3), the rotor (2), the stator ring (4) and the control plates (9).

In order to ensure the pump function during commissioning, the stator ring (4) is held in the eccentric position (displacement position) by the spring (12) which is behind the large control piston (11).

Due to the rotation of the rotor (2), the chambers (8) increase in size and at the same time, fill with fluid via the suction channel (S). When the maximum chamber volume is reached, the chambers (8) are disconnected from the suction side. As the rotor (2) continues to rotate, they are connected to the pressure side and become smaller and press the pressure fluid into the system via the pressure channel (P).

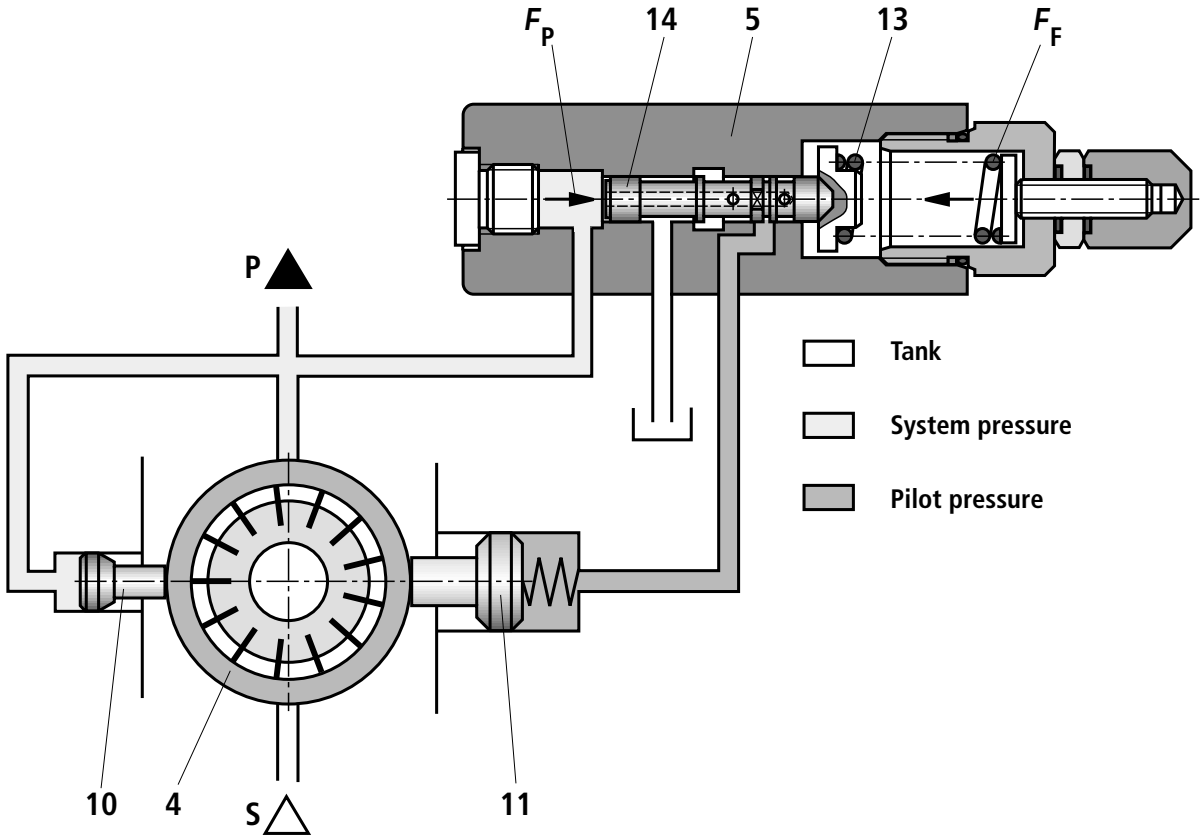
Off-stroke

If force F_P, resulting from the product of pressure x area, exceeds the counter force F_F of the spring, the controller piston (14) is moved against the spring (13). In this way, the chamber behind the large control spool (11) is connected to tank and is thus unloaded.

The small control piston (10), which is constantly under system pressure, moves the stator ring (4) towards the centre position, virtually the zero position. The pump maintains the pressure, the flow decreases to zero, leakages are compensated for.

Power loss and heating of the fluid are kept at a low level.

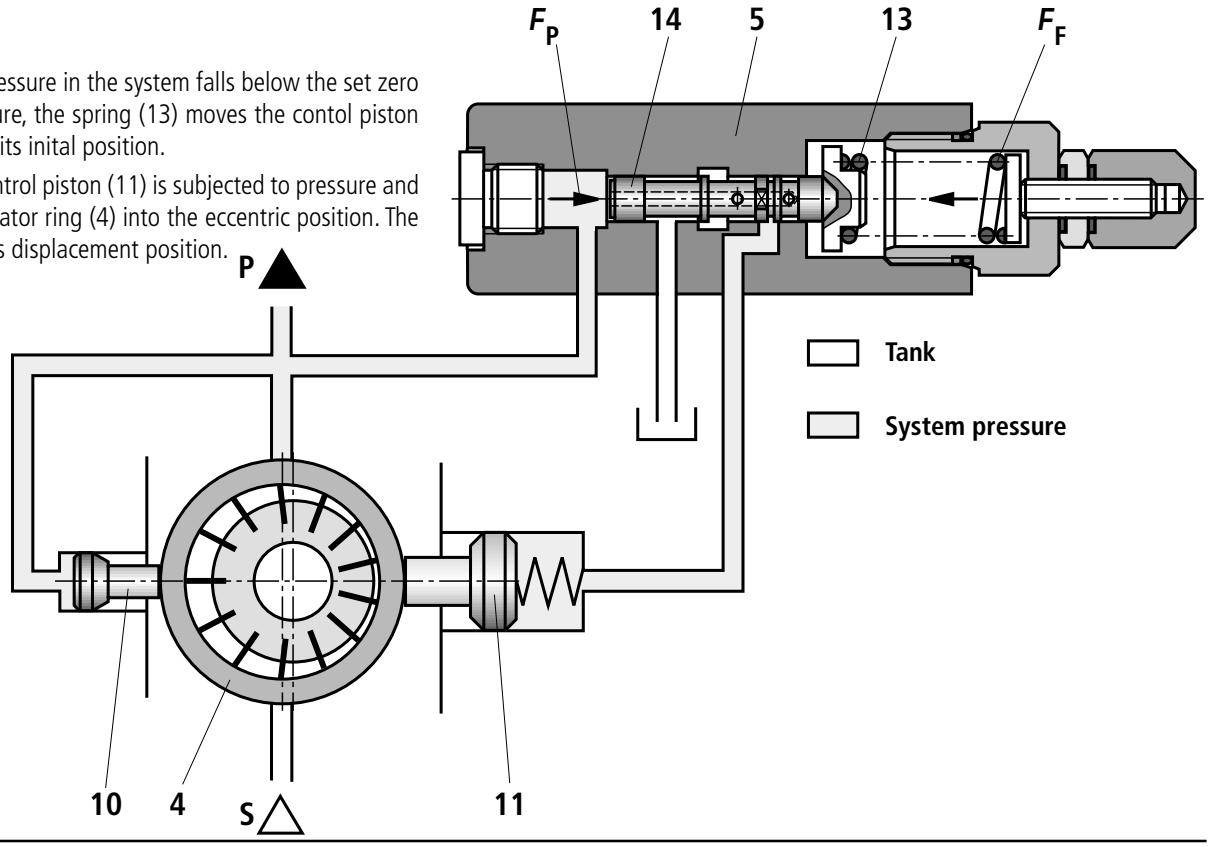
The q_V-p-characteristic curve runs vertically and shifts in parallel as higher pressures are set.



On-stroke

When the pressure in the system falls below the set zero stroke pressure, the spring (13) moves the contol piston (14) back to its inital position.

The large control piston (11) is subjected to pressure and moves the stator ring (4) into the eccentric position. The pump is in its displacement position.



Technical data (for applications outside these parameters, please consult us!)

Model			Pilot operated variable displacement vane pump. adjustable															
Type			PV7															
Mounting style			4-hole flange (to VDMA 24 560 part 1 and ISO 3019/2)															
Pipe connections			Threaded or SAE flange connection (dependent on build size)															
Installation			Optional, preferably horizontal (see page 21)															
Shaft loading			Radial and axial forces **cannot** be taken up															
Direction of rotation			Clockwise (viewed on the shaft end)															
Drive speed	n	min^{-1}	900 to 1800															
Build size		BS	10		16		25		40		63		100					
Nominal size	V_g	cm^3	14	20	20	30	30	45	45	71	71	94	118	150				
Drive power [1]	P_{max}	kW	6.3	5.8	8.5	6.8	13.7	10.2	20.5	16.5	33	20.9	51.5	33				
Permissible drive torque	T_{max}	Nm	90		140		180		280		440		680					
Max. flow [2]	q_V	L/min	21	29	29	43.5	43.5	66	66	104	108	136	171	218				
Leakage flow at zero stroke (with operating pressure at outlet = p_{max})	q_{VL}	L/min	2.7	1.9	4	2.5	5.3	3.2	6.5	4	8	5.3	11	7.3				
Operating pressure, absolute																		
– Inlet	$p_{min-max}$	bar	0.8 to 2.5															
– Outlet [3]	p_{max}	bar	160	100	160	80	160	80	160	80	160	80	160	80				
– Leakage outlet	p_{max}	bar	2															
Pressure fluid for use up to 160 bar (nominal pressure)			HLP mineral oil to DIN 51 524 part 2															
Special pressure fluids [4] (only with ordering detail **„…K…"**)																		
– Up to operating pressure p_{max} = 100 bar			HETG and HEES pressure fluids to VDMA 24 568															
– Up to operating pressure p_{max} = 80 bar			HLP mineral oil to DIN 51 524 part 2 (from 10 mm^2/s) HL mineral oil DIN 51 524 part 1															
Pressure fluid temperature range	ϑ	°C	– 10 to + 70, take the permitted viscosity range into account!															
Viscosity range	ν	mm^2/s	16 to 160 at operating temperature Max. 800 when starting under displacement conditions Max. 200 when starting under zero stroke conditions															
Degree of contamination			Max. permissible degree of contamination of the pressure fluid is to NAS 1638 class 9. We, therefore recommend a filter with a minimum retention rate of β_{10} = 100.															
Weight (with pressure controller)	m	kg	12.5		17		21		30		37		56					
Change of flow (with one turn of the adjustment screw and n = 1450 min^{-1})	q_V	L/min	10		14		18		25		34		46					

[1] Measured at n = 1450 min^{-1}; $p = p_{max}$; ν = 41 mm^2/s

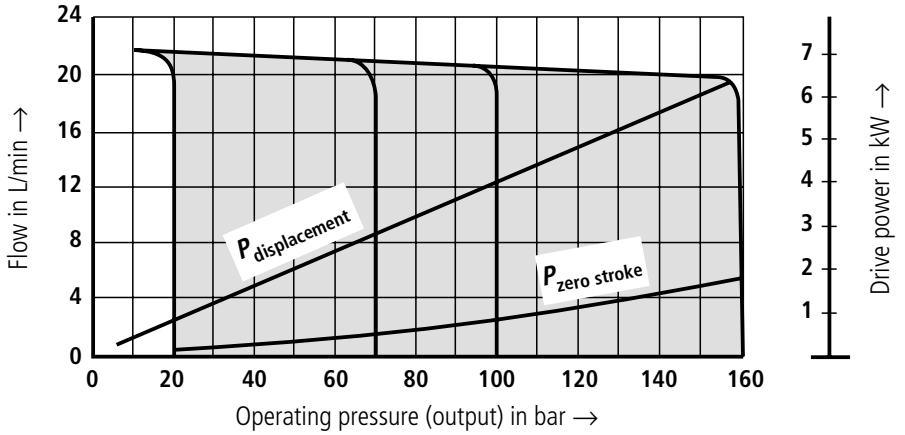
[2] The flow, due to manufacturing tolerances, can exceed the stated values by approx. 6 %
(measured at n = 1450 min^{-1}; p = 10 bar; ν = 41 mm^2/s).

[3] The minimum settable pressure is approx. 20 bar, as standard 30 bar is pre-set by the factory.

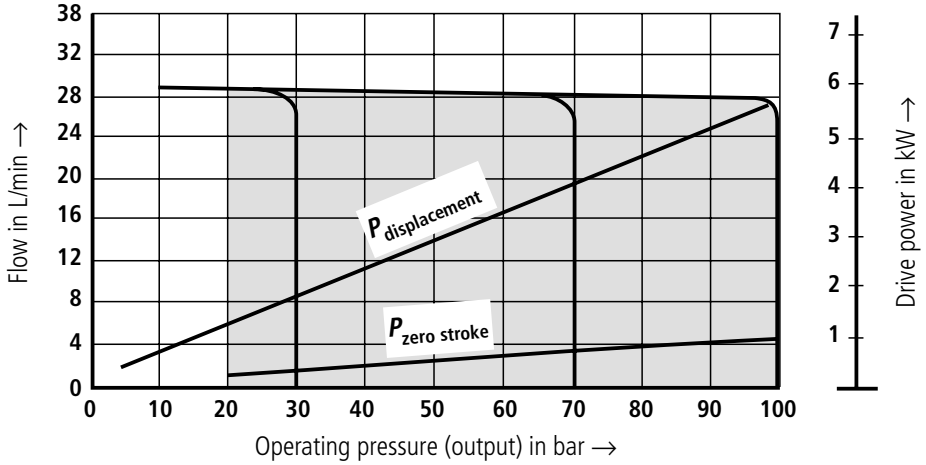
[4] Further special pressure fluids on request (e.g. for systems in the food processing industry or for fire resistant fluids)!

Characteristic curves (measured at n = 1450 min^{-1}, ν = 41 mm^2/s and ϑ = 50 °C)

PV7/10-14



PV7/10-20



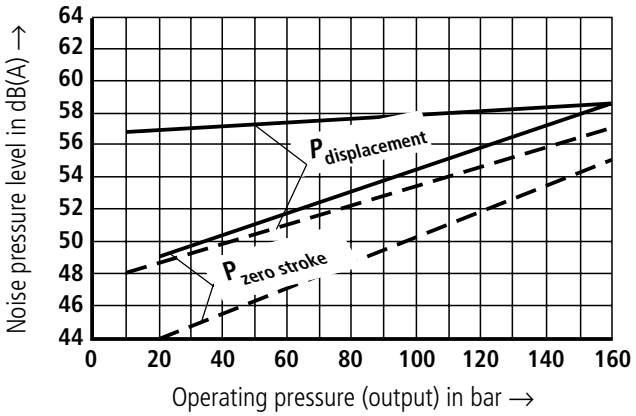
Noise pressure level measured in an anechoic chamber to DIN 45 635 part 26. Distance of microphone – pump = 1 m.

When ordering please take into account!

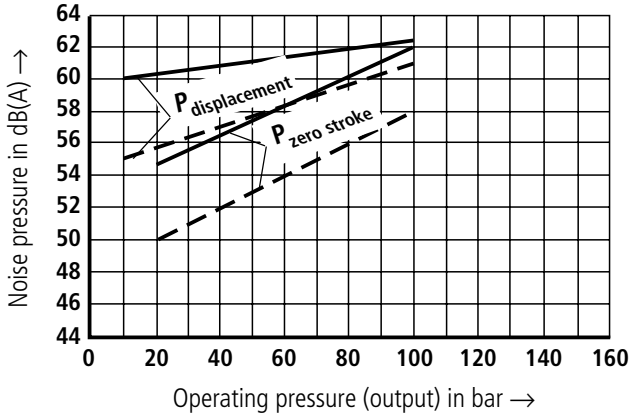
The pump adjustment is so carried out that the most favourable noise pressure level is relation to the largest zero stroke pressure is achieved. It is, therefore vital that the required zero stroke pressure is stated on an order when this differs from the nominal pressure.

Please take into account the engineering notes on page 30.

PV7/10-14



PV7/10-20

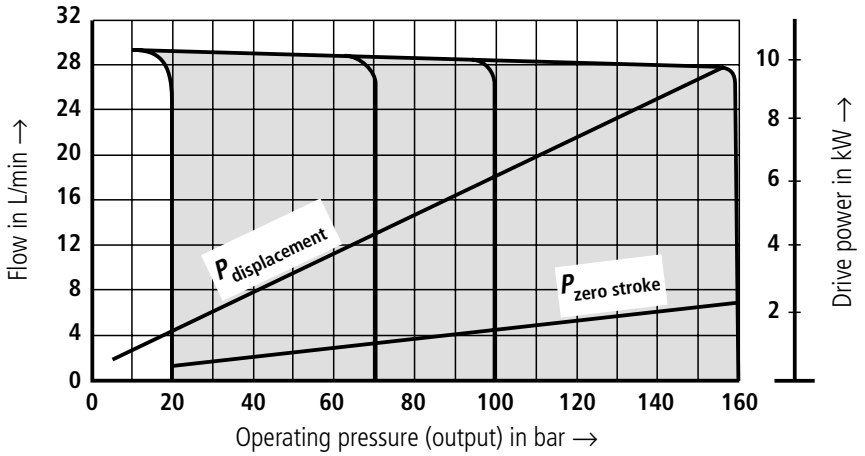


Drive RPM: ——— n = 1450 min^{-1}

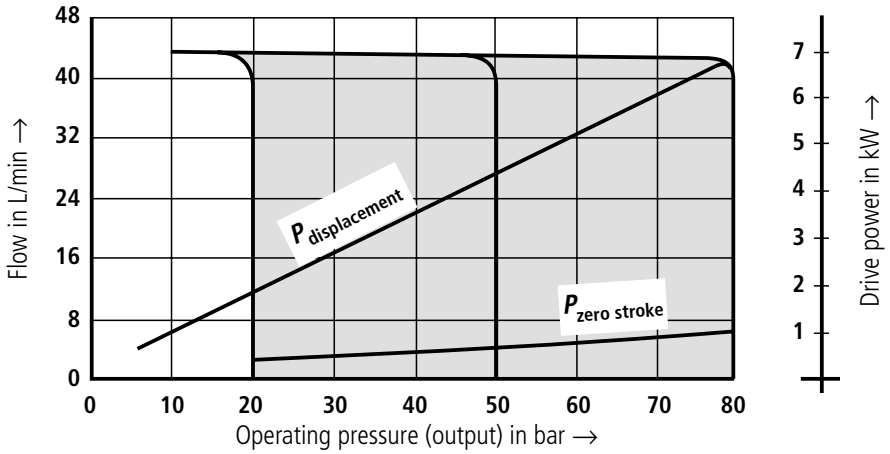
– – – n = 1000 min^{-1}

Characteristic curves (measured at $n = 1450\ min^{-1}$, $\nu = 41\ mm^2/s$ and $\vartheta = 50\ °C$)

PV7/16-20



PV7/16-30



Noise pressure level measured in an anechoic chamber to DIN 45 635 part 26. Distance of microphone – pump = 1 m.

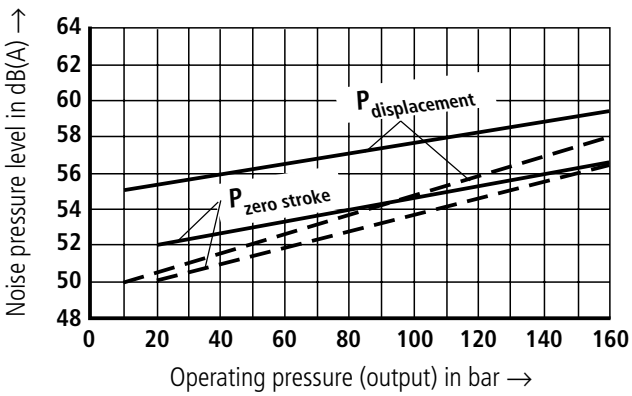
When ordering please take into account!

The pump adjustment is so carried out that the most favourable noise pressure level in relation to the largest zero stroke pressure is achieved.

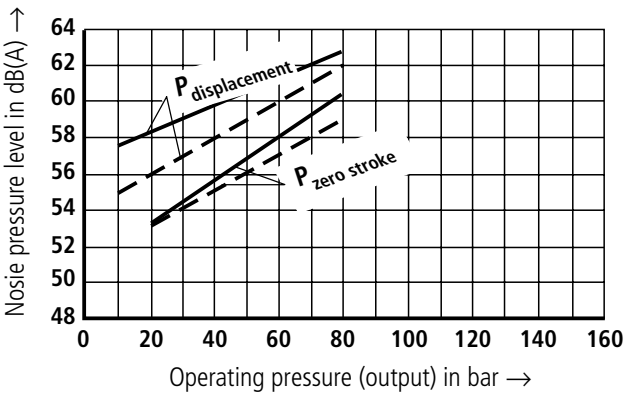
It is, therefore vital that the required zero stroke pressure is stated on an order when this differs from the nominal pressure.

Please take into account the engineering guidelines on page 30.

PV7/16-20



PV7/16-30

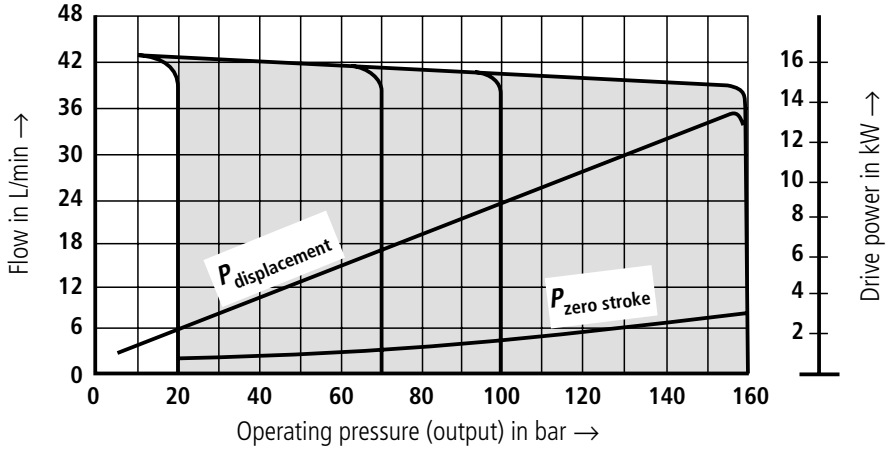


Drive RPM: —— $n = 1450\ min^{-1}$

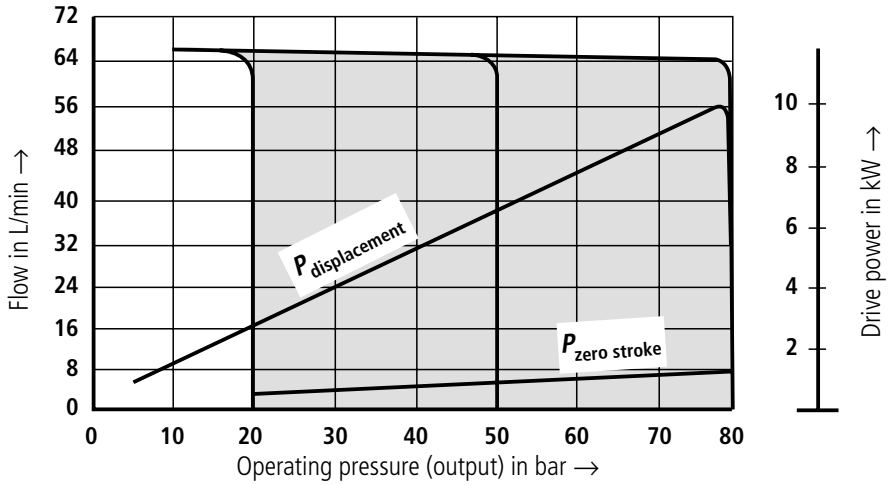
– – – $n = 1000\ min^{-1}$

Characteristic curves (measured at n = 1450 min^{-1}, ν = 41 mm^2/s and ϑ = 50 °C)

PV7/25-30



PV7/25-45



Noise pressure level measured in an anechoic chamber to DIN 45 635 part 26. Distance of microphone – pump = 1 m.

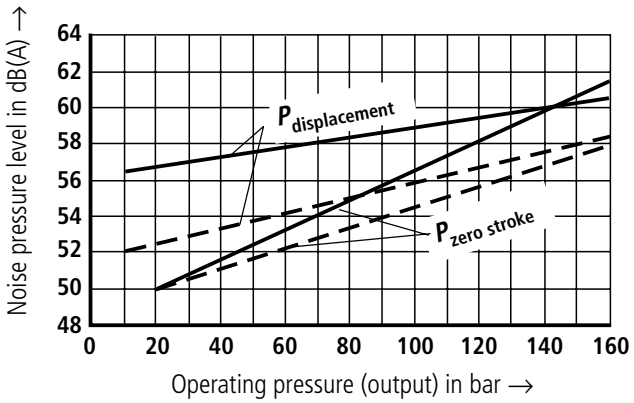
When order please take into account!

The pump adjustment is so carried out that the most favourable noise pressure level in relation to the largest zero stroke pressure is achieved.

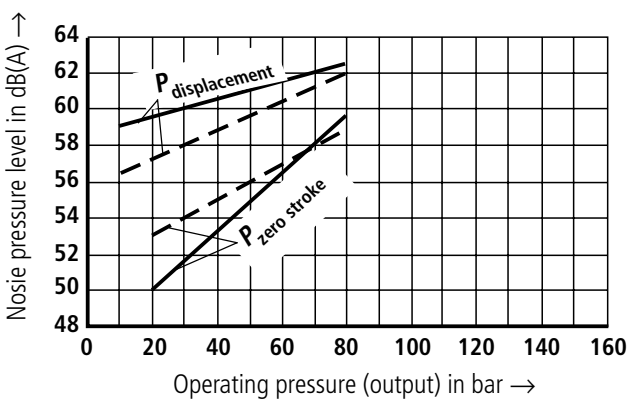
It is, therefore vital that the required zero stroke pressure is stated on an order when this differs from the nominal pressure.

Please take into account the engineering guidelines on page 30.

PV7/25-30



PV7/25-45

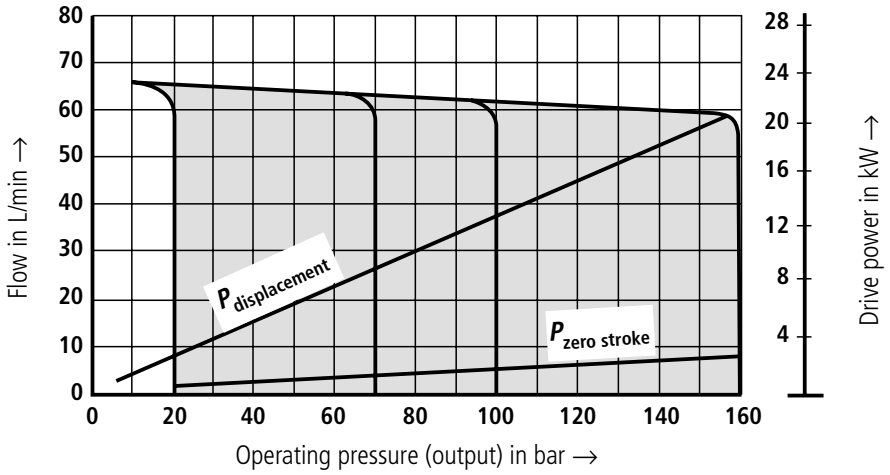


Drive RPM: —— n = 1450 min^{-1}

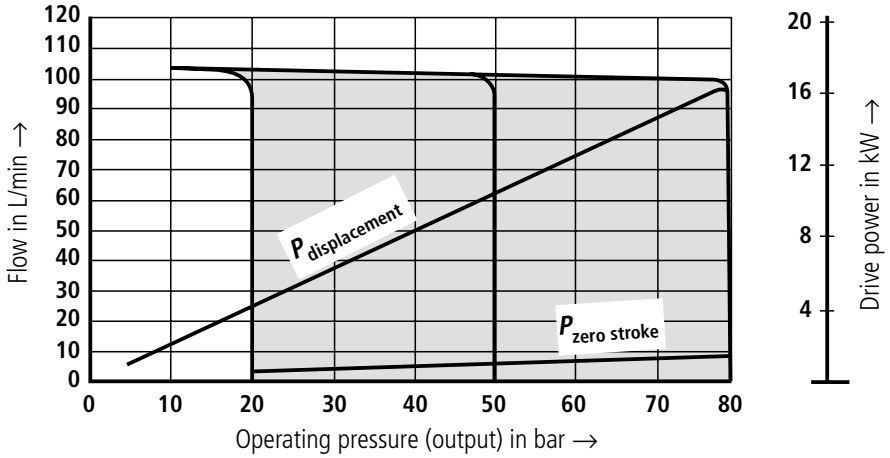
– – – n = 1000 min^{-1}

Characteristic curves (measured at $n = 1450\ min^{-1}$, $\nu = 41\ mm^2/s$ and $\vartheta = 50\ °C$)

PV7/40-45



PV7/40-71



Noise pressure level measured in an anechoic chamber to DIN 45 635 part 26. Distance of microphone – pump = 1 m.

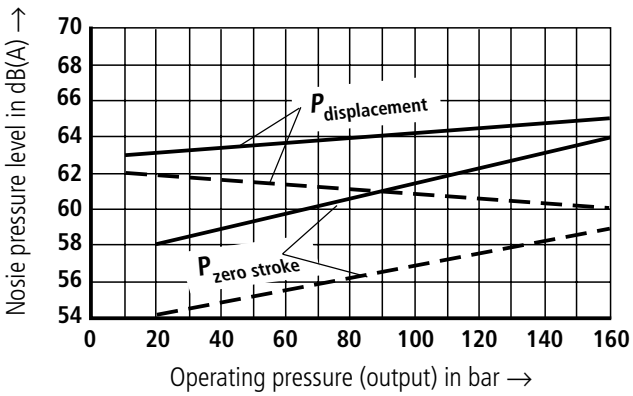
When ordering please take into account!

The pump adjustment is so carried out that the most favourable noise pressure level in relation to the largest zero stroke pressure is achieved.

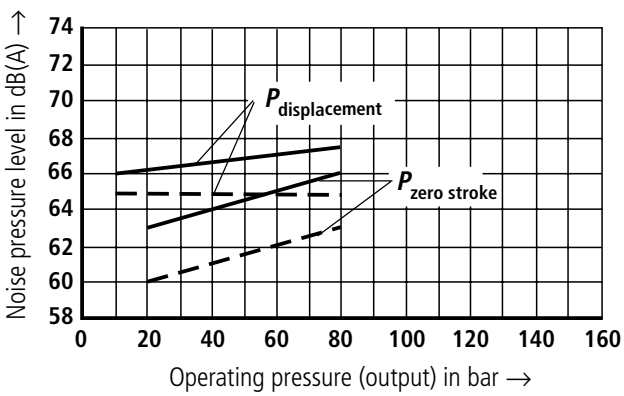
It is, therefore vital that the required zero stroke pressure is stated on an order when this differs from the nominal pressure.

Please take into account the engineering guidelines on page 30.

PV7/40-45



PV7/40-71

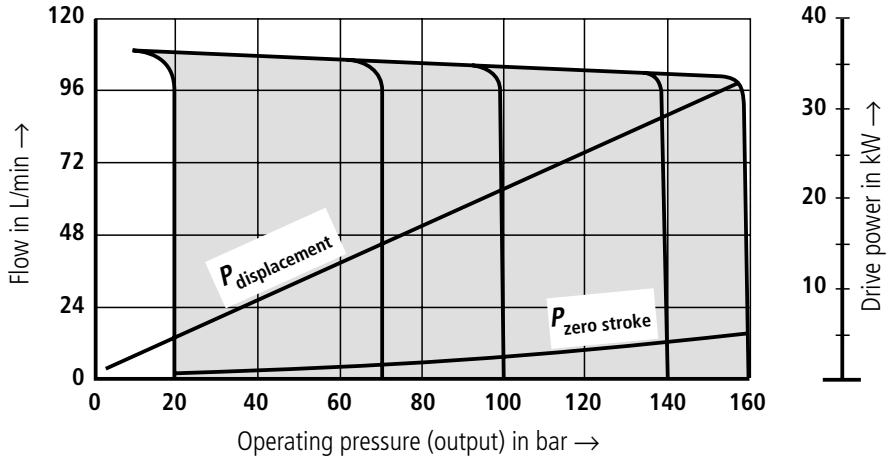


Drive RPM: —— $n = 1450\ min^{-1}$

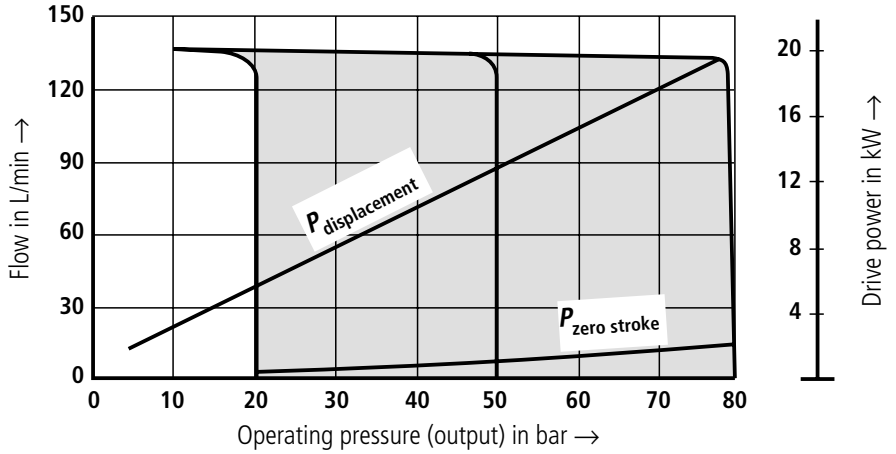
– – – $n = 1000\ min^{-1}$

Characteristic curves (measured at n = 1450 min^{-1}, ν = 41 mm^2/s and ϑ = 50 °C)

PV7/63-71



PV7/63-94



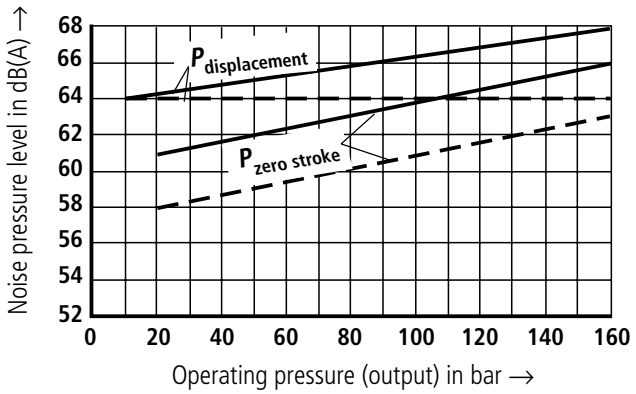
Noise pressure level measured in an anechoic chamber to DIN 45 635 part 26. Distance of microphone – pump = 1 m.

When ordering please take into account!

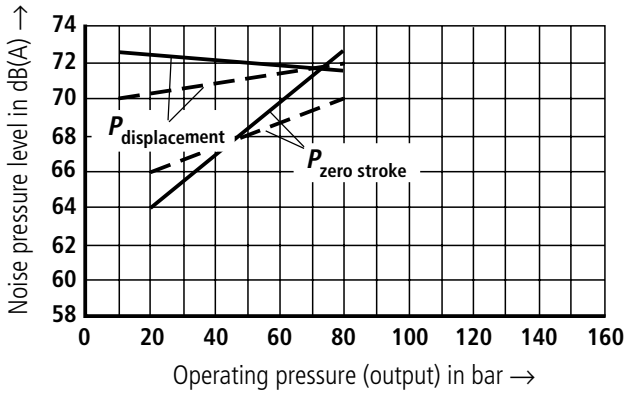
The pump adjustment is so carried out that the most favourable noise pressure level in relation to the largest zero stroke pressure is achieved. It is, therefore vital that the required zero stroke pressure is stated on an order when this differs from the nominal pressure.

Please take into account the engineering guidelines on page 30.

PV7/63-71



PV7/63-94

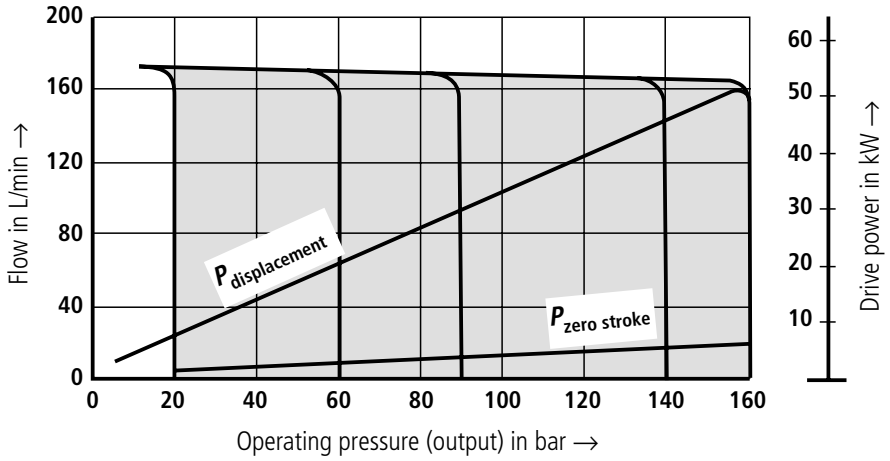


Drive RPM: —— n = 1450 min^{-1}

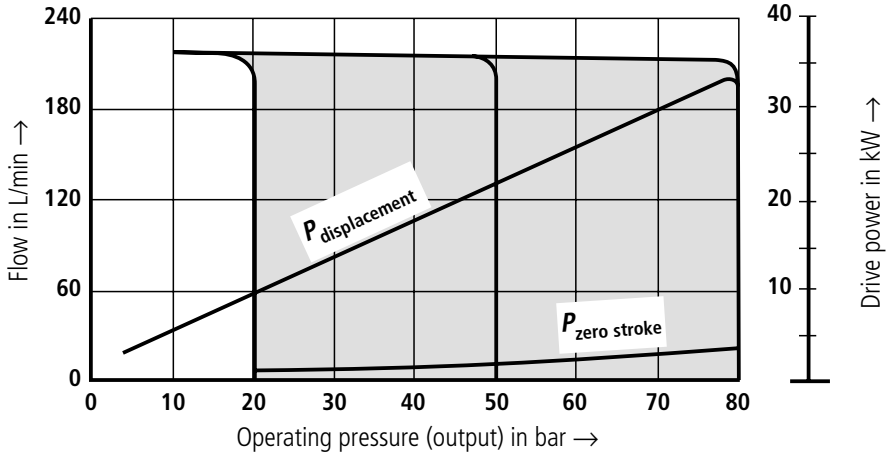
– – – n = 1000 min^{-1}

Characteristic curves (measured at n = 1450 min^{-1}, ν = 41 mm^2/s and ϑ = 50 °C)

PV7/100-118



PV7/100-150



Noise pressure level measured in an anechoic chamber to DIN 45 635 part 26. Distance of microphone – pump = 1 m.

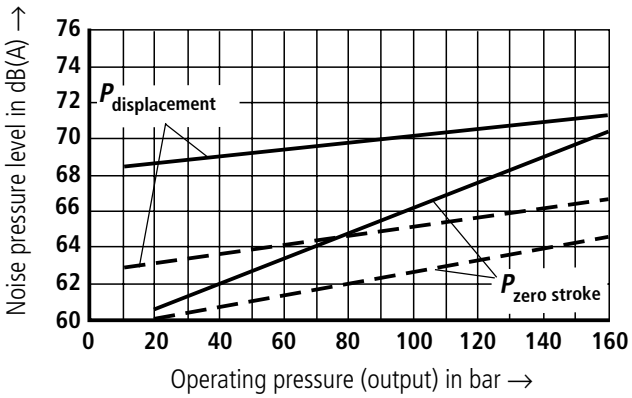
When ordering please take into account!

The pump adjustment is so carried out that the most favourable noise pressure level in relation to the largest zero stroke pressure is achieved.

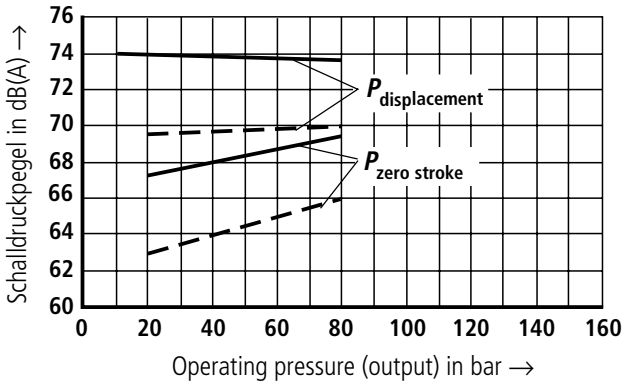
It is, therefore vital that the required zero stroke pressure is stated on an order when this differs from the nominal pressure.

Please take into account the engineering guidelines on page 30.

PV7/100-118



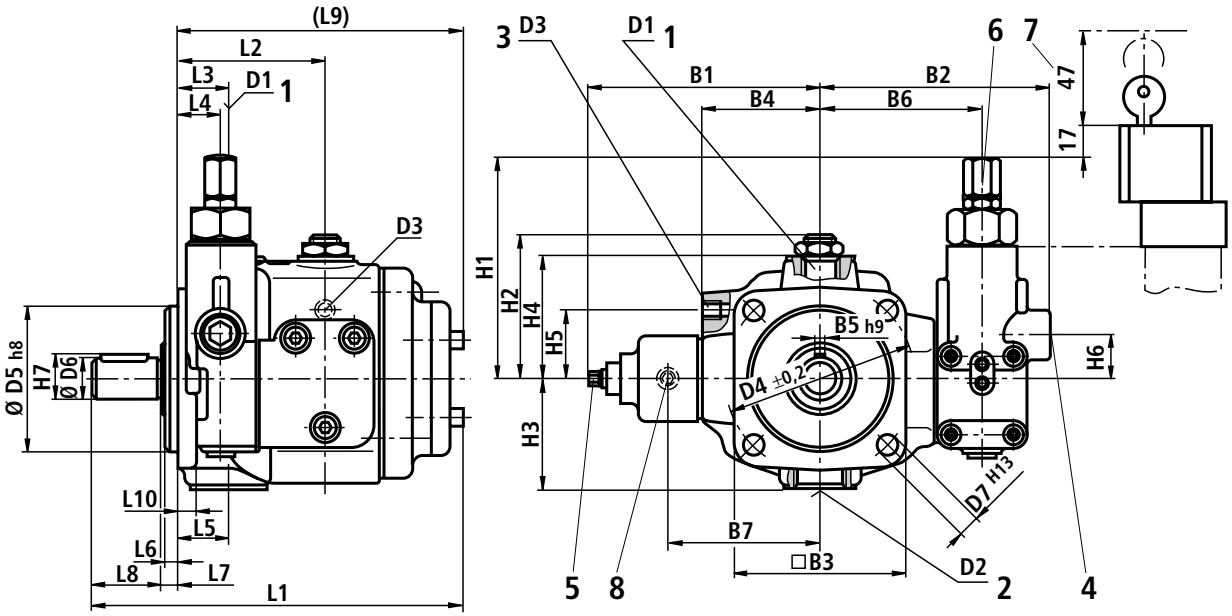
PV7/100-150



Drive RPM: —— n = 1450 min^{-1}

– – – n = 1000 min^{-1}

Single pump with C-, D- and N-controller



1 Pressure port [1)]

2 Suction port [2)]

3 Leak-oil port

4 For controller with hydraulic remote control
Ordering detail **…D…** and flow controller
Ordering detail **…N…**, plug G 1/4, 12 deep

5 Flow adjustment
Adjustment guidelines:
– Flow decreases when turned in a clockwise direction
– and increases when turned in an anti-clockwise direction
(see page 5)
– The set flow should not be less than 50 % of the maximum value

6 Pressure controller
Adjustment guidelines:
– The operating pressure increases when turned in a clockwise direction
– and decreases when turned in an anti-clockwise direction

☞ **Note:** The zero stroke pressure changes by approx. 19 bar for 1 turn of the adjustment screw.

7 The space required to remove the lock cover (the pressure can only be adjusted when the lock cover is removed)

8 Test point G 1/4, 12 deep

BS	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	B1	B2	□B3	B4	B5 $_{h9}$	B6	B7
10	193	78.5	26	22	26	7	8	36	149	9	130	125	96	65	6	90	88
16	217	86	37	20	37	9	10	42	165	10	134.5	131	120	69	8	93	92
25	229	86	34	20	38	9	10	42	177	10	140.7	137	120	75	8	99	98
40	254,6	86	26.5	21.5	43	9	10	58	186.6	12	157.8	161	141.2	94	10	125	115.5
63	279	99	39	34.5	51	9	10	58	211	13	163.7	165	141.2	100	10	130	121
100	334	111	45.5	28.5	60.5	9	10	82	242	16	191.7	184.5	200	121	12	149.5	150

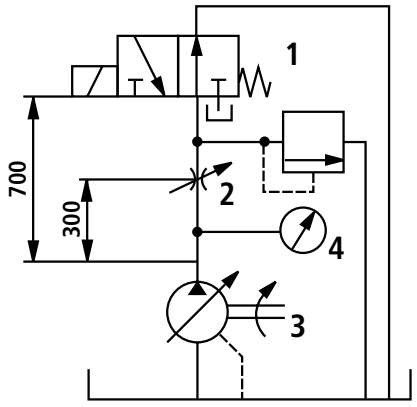
BS	H1	H2	H3	H4	H5	H6	H7	D1 [1)]	D2 [2)]	D3	D4 $_{\pm 0,2}$	Ø D5 $_{h8}$	Ø D6	D7 ^{H13}
10	117	74	58	64	37	25	22.5	G 1/2	G 1	G 1/4	103	80	20 $_{j6}$	9
16	118.5	81.5	68	72	40	26.5	28	G 3/4	G 1 1/4	G 3/8	125	100	25 $_{j6}$	11
25	118.5	91.5	92	80	40	26.5	28	G 1	G 1 1/2	G 3/8	125	100	25 $_{j6}$	11
40	118	105.5	89	94	45	26	35	G 1	SAE 1 1/2"	G 1/2	160	125	32 $_{k6}$	14
63	118	111.5	105	100	47	26	35	SAE 1 1/4"	SAE 2"	G 1/2	160	125	32 $_{k6}$	14
100	118	123.5	126	111	52	26	43	SAE 1 1/2"	SAE 2 1/2"	G 3/4	200	160	40 $_{k6}$	18

1) Build sizes 10, 16, 25 and 40
Pipe thread „G…" to ISO 228/1
Build sizes 63 and 100 flange connection to SAE

2) Build sizes 10, 16 and 25
Pipe thread „G…" to ISO 228/1
Build sizes 40, 63 and 100 flange connection to SAE

Dynamic charateristics of the pressure control

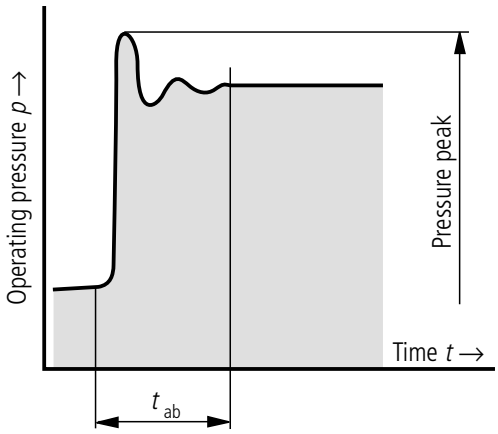
Test set-up



1 Directional valve (switching time 30 ms)
2 Throttle for adjusting the pressure when the pump is displacing
3 Hydraulic pump
4 Pressure measurement point

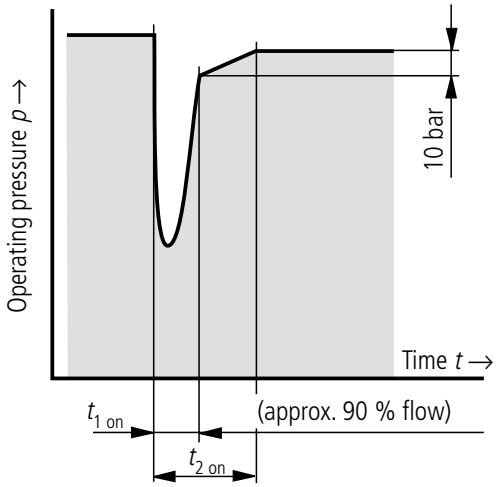
Off-stroke

$q_{V\ displacement} \rightarrow q_{V\ zero\ stroke}$



On-stroke

$q_{V\ zero\ stroke} \rightarrow q_{V\ displacement}$



	Control times	Off-stroke in ms (average values) $q_{V\ displacement} \rightarrow q_{V\ zero\ stroke}$						On-stroke in ms (average values) $q_{V\ zero\ stroke} \rightarrow q_{V\ displacement}$					
		20 → 160 bar		20 → 80 bar		20 → 40 bar		160 → 130 bar		80 → 60 bar		40 → 30 bar	
		t_{off}	p_{max} [1]	t_{off}	p_{max}	t_{off}	p_{max}	$t_{1\ on}$	$t_{2\ on}$	$t_{1\ on}$	$t_{2\ on}$	$t_{1\ on}$	$t_{2\ on}$
Build and nominal sizes	10-14	100	180	–	–	150	80	60	80	–	–	60	80
	10-20	–	–	100	130	150	100	–	–	60	80	50	100
	16-20	100	200	–	–	120	100	50	80	–	–	50	90
	16-30	–	–	100	140	150	110	–	–	50	80	50	100
	25-30	100	220	–	–	120	120	80	100	–	–	70	100
	25-45	–	–	100	150	120	120	–	–	80	100	80	130
	40-45	100	240	–	–	120	140	70	100	–	–	60	100
	40-71	–	–	100	180	120	150	–	–	80	100	80	140
	63-71	150	220 [2]	–	–	150	180	80	120	–	–	100	140
	63-94	–	–	200	150 [2]	220	150	–	–	120	150	130	210
	100-118	200	220 [2]	–	–	250	200	100	150	–	–	150	250
	100-150	–	–	250	150 [2]	280	150	–	–	150	200	180	280

[1] Permissible pressure peaks

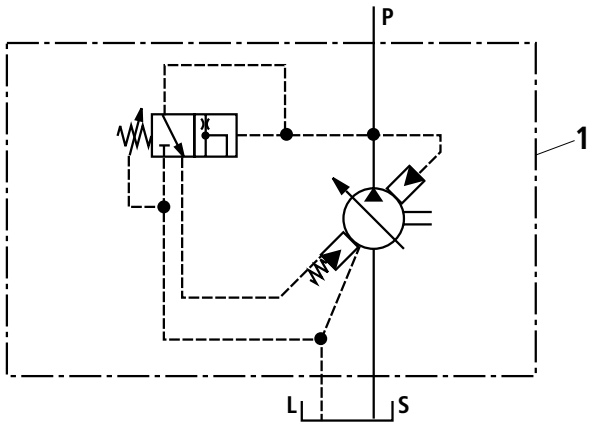
[2] Pressure relief valve is required to limit pressure peaks

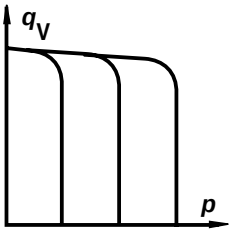
C-controller

Pressure controller

With mechanical pressure adjustment, ordering detail **…C0-…**
(for the lockable version the ordering detail is **…C3-…**)

Symbol





Ordering example:

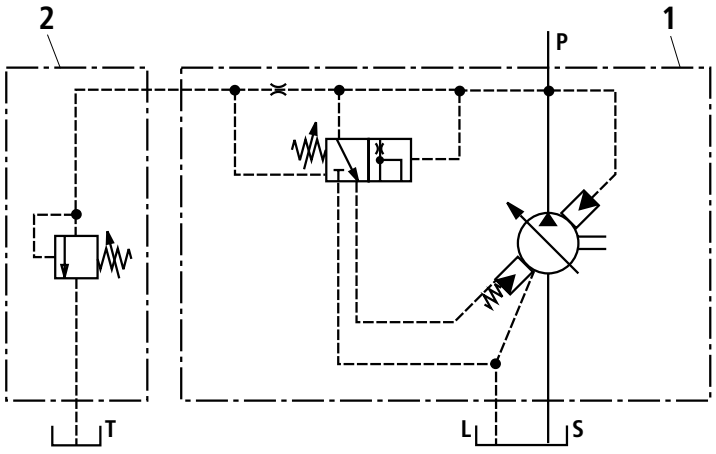
1 Pump: PV7-1X/16-20RE01MC0-16
or PV7-1X/63-94RE07MC0-08

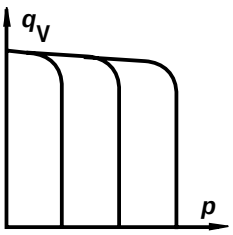
D-controller

Pressure controller

With hydraulic remote pressure adjustment, ordering detail **…D0-…**
(for the lockable version the ordering detail is **…D3-…**)

Symbol





Ordering example:

1 Pump: PV7-1X/25-45RE01MD0-08

2 Optional pressure relief valve; must be ordered separately

The remote control line between the controller and pressure relief valve (2) should not be longer than 2 m.

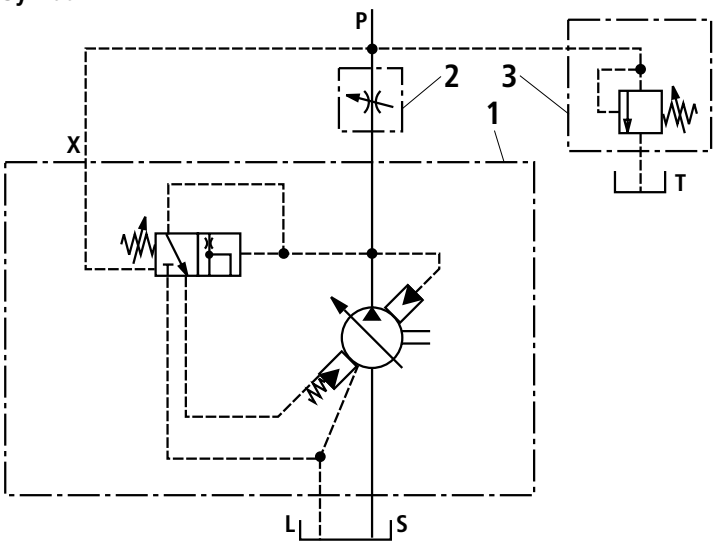
Note: The zero stroke pressure results from the pressure set at the pump and pressure relief valve. The remote control port must not be plugged as the pump will not de-stroke!

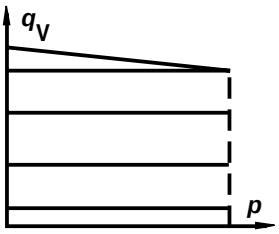
N-controller

Flow controller

With mechanical flow adjustment, ordering detail **…N0-…**
(for the lockable version the ordering code is **…N3-…**)

Symbol





Ordering example:

1 Pump: PV7-1X/16-20RE01MN0-16
or PV7-1X/63-94RE07MN3-08

2 Optional orifice (e.g. throttle to RE 27 219)

3 Optional pressure relief valve
(this valve is necessary as, in this case, there is no control to zero stroke)

Items 2 and 3 must be ordered separately.

The control lines between the controller connection „X" and the measurement orifice should not be longer than 1.5 m.

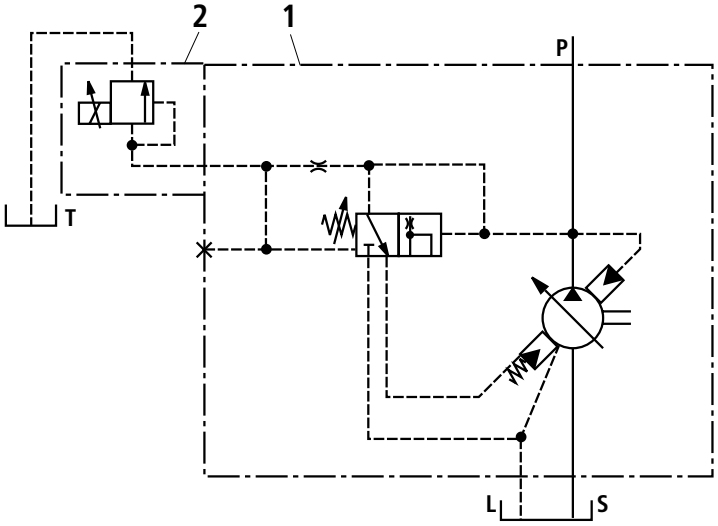
Pressure differential: approx. 13 bar

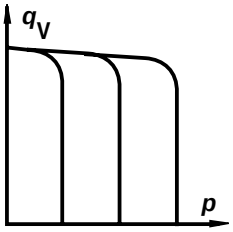
E-controller (on request)

Pressure controller

With electrical remote pressure adjustment, ordering detail **…E0-…**

Symbol





Ordering example:

1 Pump: PV7-1X/16-20RE01ME0-16

2 Pressure relief valve

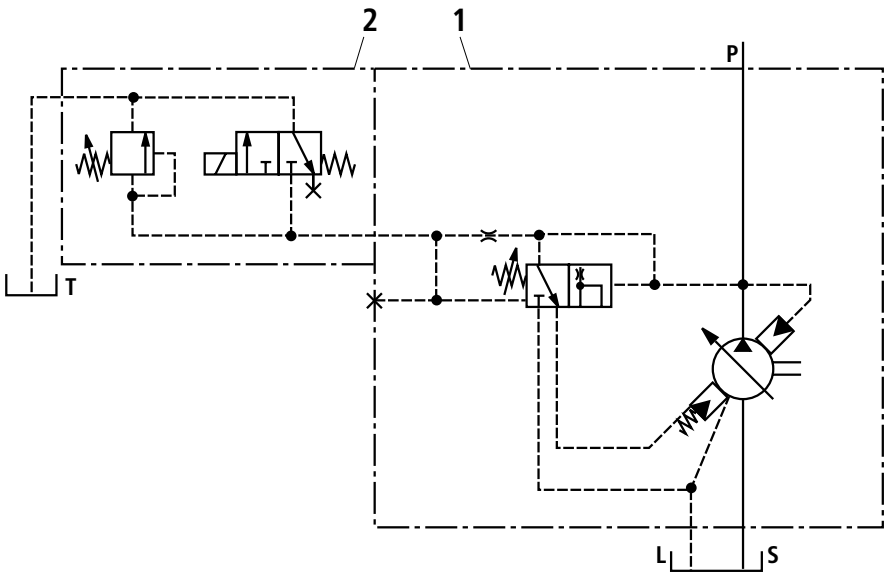
Controller programme

W-controller

Pressure controller

With an electrically switchable 2-stage pressure control
Ordering detail **…W0-…**

Symbol

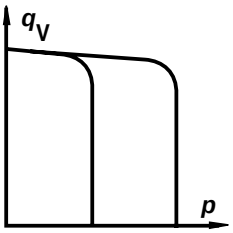


Ordering example:

1 Pump: PV7-1X/16-20RE01MW0-16

2.1 3/2-way cartridge valve to RE 23 140, optionally normally open or normally closed

2.2 Pressure relief valve to RE 25 710



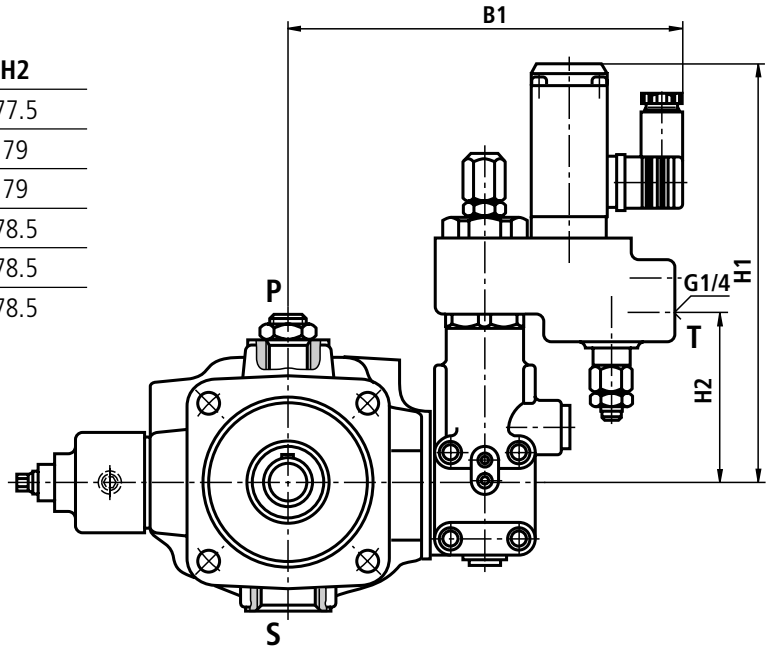
Unit dimensions

(Dimensions in mm)

W-controller

For further unit dimensions see page 12.

Build size	B1	H1	H2
10	189	187.5	77.5
16	192	189	79
25	198	189	79
40	224	188.5	78.5
63	229	188.5	78.5
100	248.5	188.5	78.5

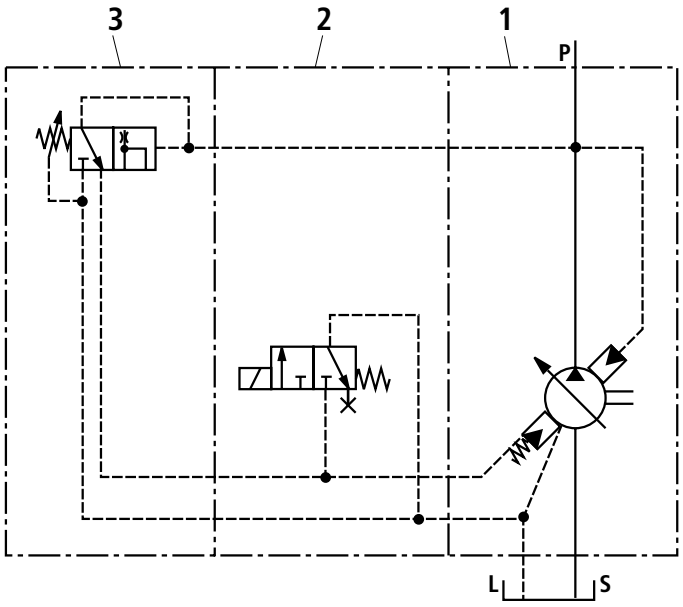


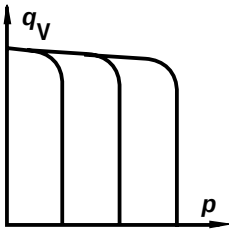
Controller programme

Hydraulic start-up assistance (K-plate)
Sandwich plate
With an unloading valve for start-up at the lowest zero stroke pressure.
Zero stroke pressure is approx. 20 bar (application dependent)
Ordering detail **…5-…**
(for the lockable version the ordering detail is **…7-…**)

☞ **Note:** Not suitable for a 2-stage control!

Symbol





Ordering example:

1 Pump: PV7-1X/40-71RE37MC5-08

2 3/2-cartridge valve to RE 23 140
optionally
Normally closed:
Ordering detail: …WG or
Normally open:
Ordering detail: …WH or separate
Shown is type …WG

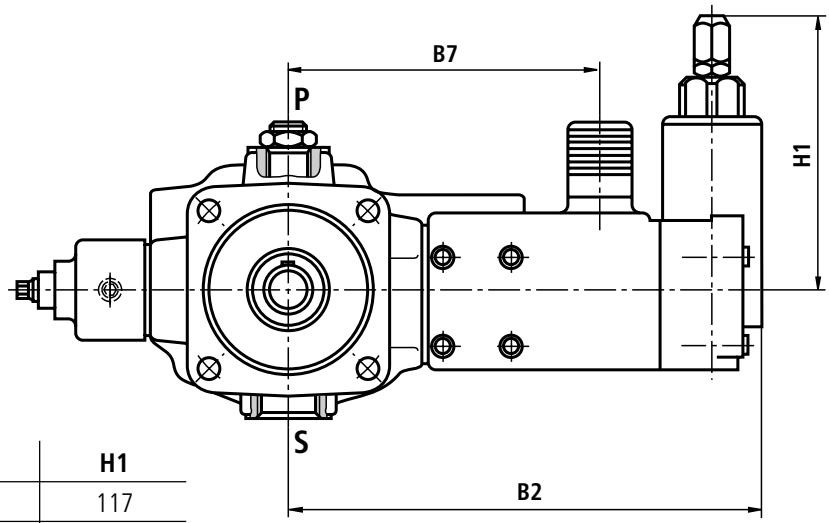
3 Optionally C-, D- or N-controller

Unit dimensions

(Dimensions in mm)

K-plate

For further unit dimensions see page 12.

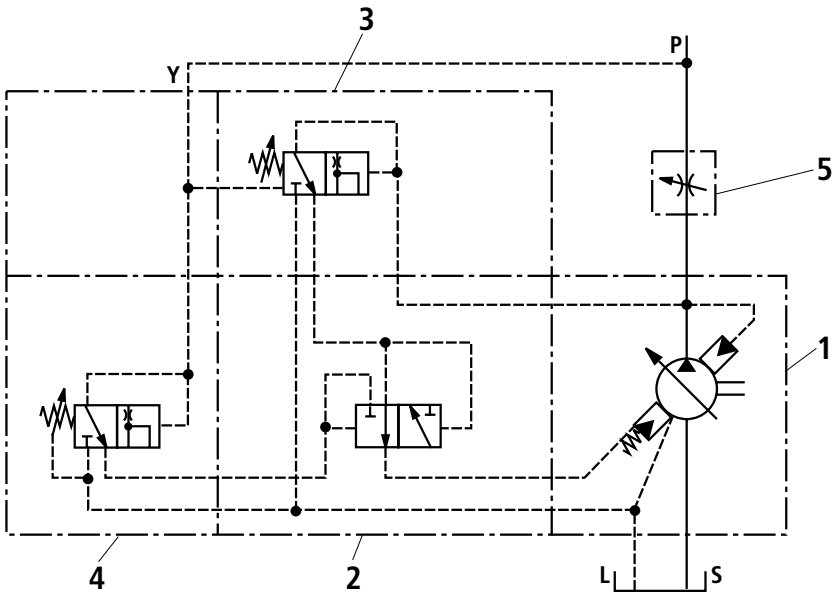


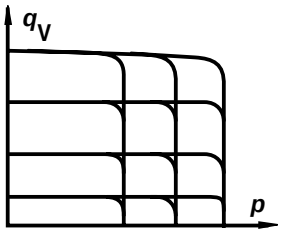
Build size	B2	B7	H1
10	204.5	143.5	117
16	207.5	146.5	118
25	214	153	118
40	240	179	118
63	244.5	183.5	118
100	264	203	118

Controller programme

Flow-pressure controller (Q-plate)
Sandwich plate
For connecting a flow controller to a pressure compensated pump.
Fitted with a standard flow controller
Ordering detail **…6-…**
(for the lockable version the ordering detail is **…8-…**)

Symbol





Ordering example:

1 Pump: PV7-1X/63-712RE07MC6-16

2 Sandwich plate for connecting the pressure controller and flow controller functions

3 Flow controller as described on page 14

4 Pressure controller optionally types C, D, E or W as described on pages 14 and 15

5 Optional measurement orifice (e.g. throttle to RE 27 219), must be ordered separately

The control line between the controller connection „Y" and the measurement orifice should not be longer than 1.5 m.

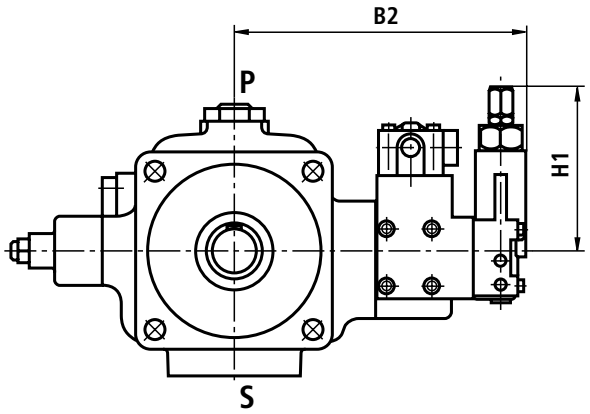
Unit dimensions

(Dimensions in mm)

Q-plate

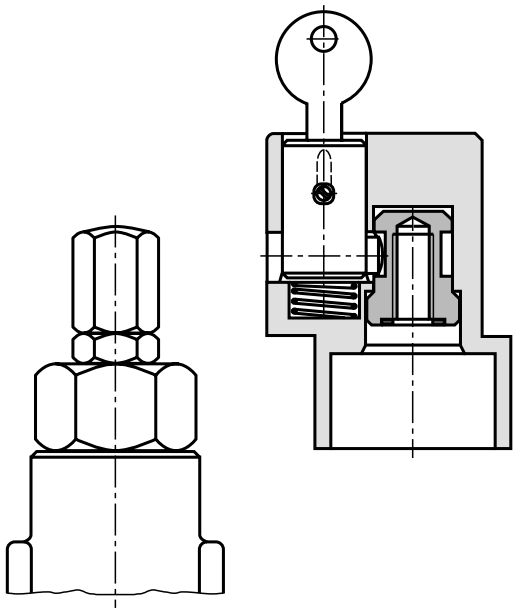
For further unit dimensions see page 12.

Build size	B2	H1
10	173.5	117
16	176.5	118.5
25	182.5	118.5
40	208.5	118
63	213.5	118
100	233	118



Lock

Material No.: 00844598
This lock is fitted to all pumps which have the controller option **…3…, …7…** or **…8….**



Functional description
After unlocking (by turning the key clockwise) the enire lock cover can be removed from the control. The control adjuster is then accessible.

To lock, the lock cover is placed over the control adjuster and then pressed home, the lock cylinder is pressed down and the key turned in an anti-clockwise direction.

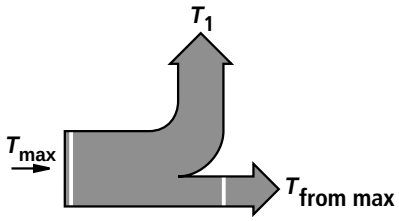
A lock can be fitted to a standard pump by,

- Unscrewing the domed nut from the control adjuster.
- Fitting the nut which contains the lock.
- Fitting the lock cover as described in the functional description.

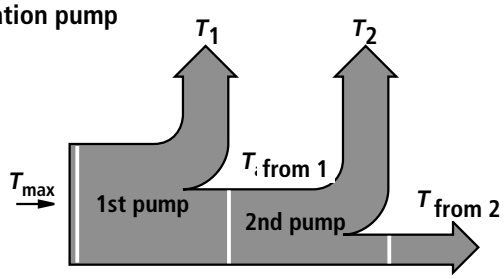
Engineering guidelines for combination pumps

- The PV7 pumps are, as standard, capable of being combined. Each pump is fitted with a splined second shaft end.
- When operating the PV7 pump, as a fixed displacement unit, the fixed displacement unit must be the rear pump.
- The general technical data is the same as with the single pumps (see page 5).
- The pump with the higher load (pressure x flow) should be the first pump stage.
- When combining several pumps, the torques produced can reach excessively high values.
  The sum of the torques must not exceed the permissible values (see table)
- Combination parts have to be a separate item on an order.
- The necessary seals and screws are included in the combination kit.

Single pump



Combination pump



PV7 Build size	Max. permissible Drive torque T_{max}	Output torque $T_{from\ max}$
10	90	45
16	140	70
25	180	90
40	280	140
63	440	220
100	680	340

Calculation exaple:

V	=	Displacement in in cm³
$\eta_{hydr.\text{-}mech.}$	=	Hydraulic-mechanical efficiency
T	=	Torque in Nm
Δp	=	Pressure in bar

Combination pump: P2V7/25-30… + V7/25-30…
Required max. pressure: p_n = 160 bar

$$T = \frac{\Delta p \bullet V \bullet 0.0159}{\eta_{hydr.\text{-}mech.}} \text{ (Nm)}$$

$$T_{1.2} = \frac{160 \bullet 30 \bullet 0.0159}{0.85} \text{ (Nm)}$$

$T_{1.2} = 90\ \text{Nm} \leq T_{from\ max}$

$T = T_1 + T_2 = 180\ \text{Nm} \leq T_{max}$

The combination pump can be operated on the basis of the calculated data.

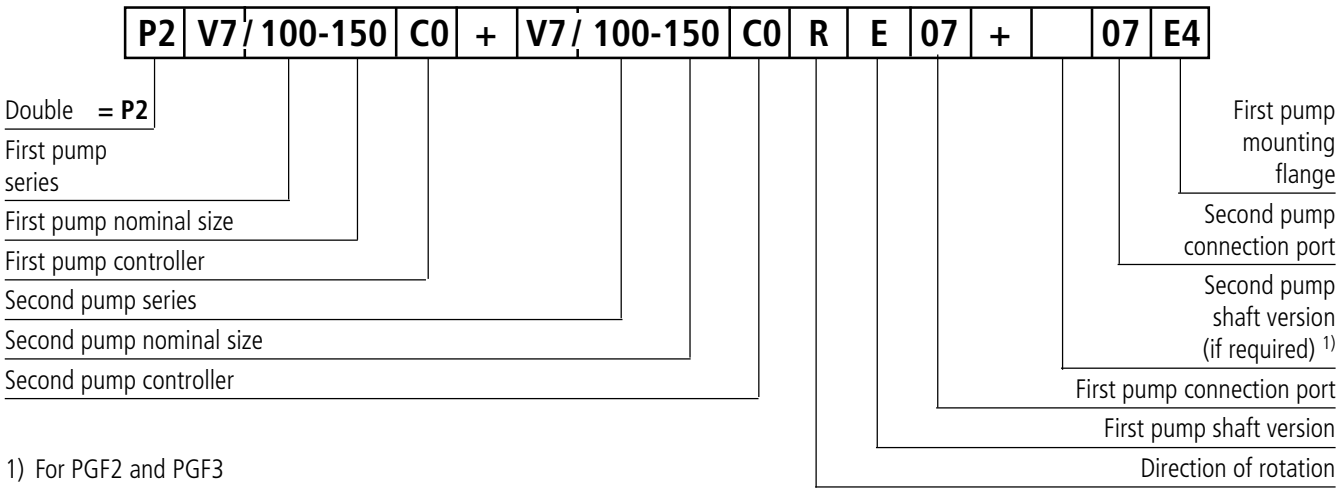
Combination pump possiblities

All of the type PV7 pumps are capable of being combined. Pumps with an E-shaft have a through drive.

The possible pump combinations, the Material Nos. and the required combination kits are contained within the following table.

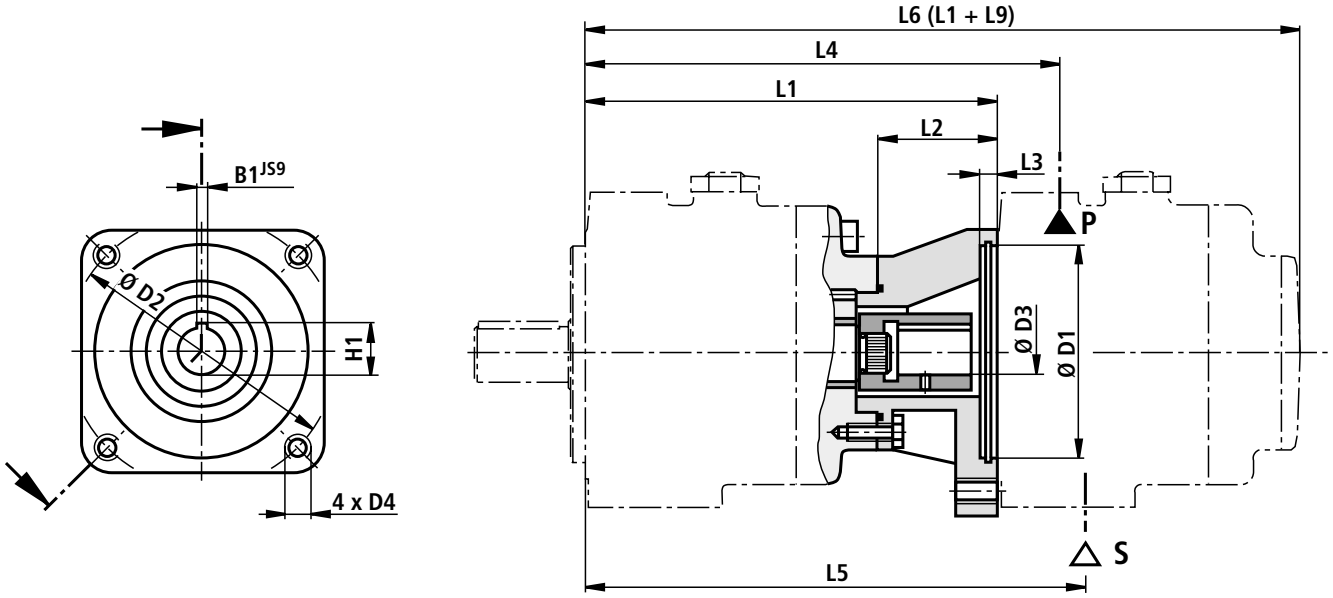
Rear pump	Front pump			
	PV7-1X/**10**	PV7-1X/**16/25**	PV7-1X/**40/63**	PV7-1X/**100**
PV7-1X/06-…RA01M…	00540811	00540812	00540814	00543034
PV7-1X/10-…RE01M…	00540811	00540812	00540814	00543034
PV7-1X/16-…RE01M…	–	00540813	00540815	00543035
PV7-2X/20-…RA01M…	–	00540813	00540815	00543035
PV7-1X/25-…RE01M…	–	00540813	00540815	00543035
PV7-1X/40-…RE37M…	–	–	00540816	00543036
PV7-1X/63-…RE07M…	–	–	00540816	00543036
PV7-1X/100-…RE07M…	–	–	–	00543037
PGF1-2X/…RH01VU2	00857584	00857585	–	–
PGF2-2X/…RJ…VU2	00541209	00541210	00541203	00544959
PGF3-3X/…RJ…VU2	–	00888267	00880623	00880624
PGP2-2X/…RJ20VU2	00541209	00541210	–	00544959
PGP3-3X/…RJ…VU2	–	00888267	00880623	00880624
PGH2-2X/…RR…VU2	00541209	00541210	00541203	00544959
PGH3-2X/…RR…VU2	00541209	00541210	00541203	00544959
PGH4-2X/…RR…VU2	–	–	00876578	00876576
PVV/Q1/2-1X/…RJ15…	–	00888267	00880623	00880624
PVV/Q4/5-1X/…RJ15…	–	–	00876023	00875983
1PF2G2-4X/…RR20MR	00541209	00541210	00541203	00544959
1PF1R4-1X/0,40…2,00-…WG…	00541204	00541205	–	–
1PF1R4-1X/1,60…20,00-…RG…	00541214	–	–	–
1PF1R4-1X/1,60…20,00-…RA…	–	00541207	00541208	00543767
A10VSO10…U	00541209	00541210	00541203	00544959
A10VSO18…U	00541209	00541210	00541203	00544959
A10VO28…S	–	00888267	00880623	00880624
A10VO45…S	–	–	–	00875983

Ordering details for combination pumps



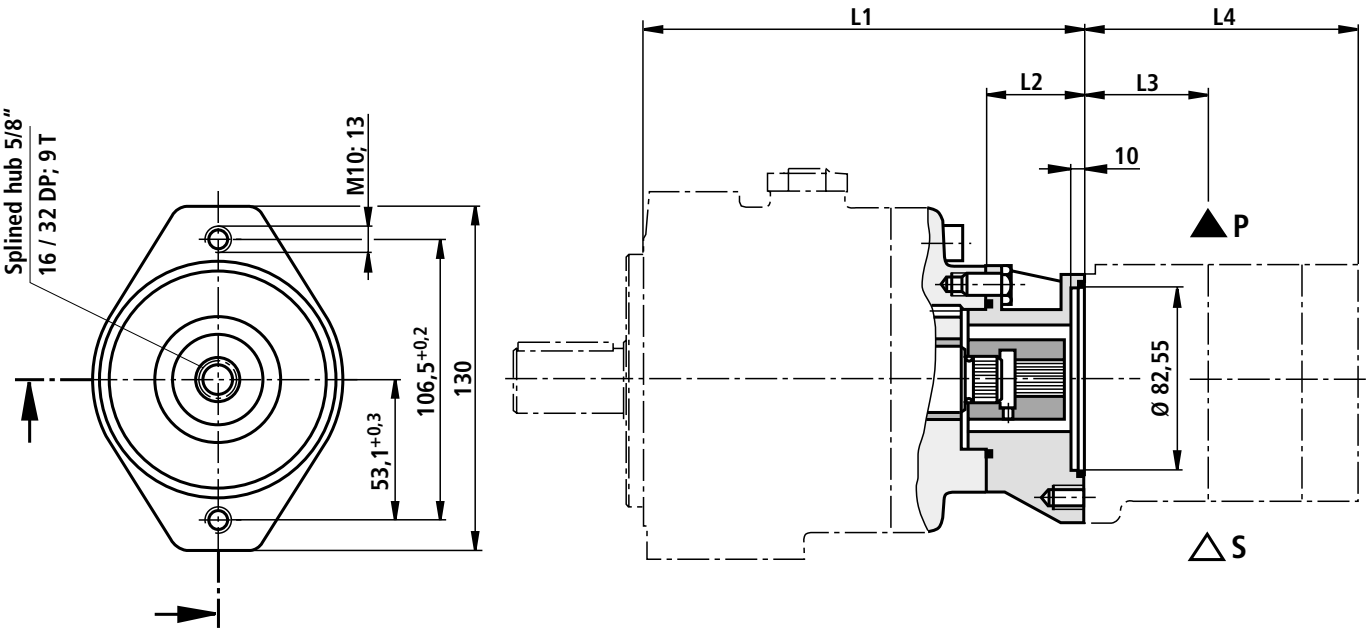
1) For PGF2 and PGF3

Triple and quadruple pumps are coded analogue!



1st pump BS	2nd pump BS	L1	L2	L3	ØD1	ØD2	ØD3	D4	H1	B1	L4	L5	L6
10	06	182	50	8	80	103	20	M8	22.8	6	199	202.5	283
	10	182	50	8	80	103	20	M8	22.8	6	208	208	331
16	06	200	55	8	80	103	20	M8	22.8	6	217	220.5	301
	10	200	55	8	80	103	20	M8	22.8	6	226	226	349
	16	208	63	10	100	125	25	M10	28.3	8	245	245	373
25	06	212	55	8	80	103	20	M8	22.8	6	229	232.5	313
	10	212	55	8	80	103	20	M8	22.8	6	238	238	361
	16	220	63	10	100	125	25	M10	28.3	8	257	257	385
	20	220	63	10	100	125	25	M10	28.3	8	245	245	354
	25	220	63	10	100	125	25	M10	28.3	8	254	258	397
40	06	221.6	55	8	80	103	20	M8	22.8	6	238.6	242.1	322.6
	10	221.6	55	8	80	103	20	M8	22,8	6	247.6	247.6	370.6
	16	229.6	63	10	100	125	25	M10	28.3	8	266.6	266.6	394.6
	20	229.6	63	10	100	125	25	M10	28.3	8	254.6	254.6	363.6
	25	229.6	63	10	100	125	25	M10	28.3	8	263.6	267.6	406.6
	40	246.6	80	10	125	160	32	M12	35.3	10	273.1	289.6	433.2
63	06	244.5	55	8	80	103	20	M8	22.8	6	261.5	265	345.5
	10	244.5	55	8	80	103	20	M8	22.8	6	270.5	270.5	393.5
	16	252.5	63	10	100	125	25	M10	28.3	8	289.5	289.5	417.5
	20	252.5	63	10	100	125	25	M10	28.3	8	277.5	277.5	386.5
	25	252.5	63	10	100	125	25	M10	28.3	8	286.5	290.5	429.5
	40	269.5	80	10	125	160	32	M12	35.3	10	296	312.5	456.1
	63	269.5	80	10	125	160	32	M12	35.3	10	308.5	320.5	480.5
100	06	276.5	55	8	80	103	20	M8	22.8	6	293.5	297	277.5
	10	276.5	55	8	80	103	20	M8	22.8	6	302.5	302.5	425.5
	16	284.5	63	10	100	125	25	M10	28.3	8	321.5	321.5	449.5
	20	284.5	63	10	100	125	25	M10	28.3	8	309.5	309.5	418.5
	25	284.5	63	10	100	125	25	M10	28.3	8	318.5	322.5	461.5
	40	301.5	80	10	125	160	32	M12	35.3	10	328	344.5	488.1
	63	301.5	80	10	125	160	32	M12	35.3	10	340.5	352.5	515.5
	100	321.5	100	10	160	200	40	M16	47.3	12	367	382	563.5

Pump combinations P2V7… + PGF2 / PGP2 / PGH2 / PGH3 / G2 / A10SVO10;18 (Dimensions in mm)



PV7 build size	L1	L2
10	168	36
16	192	47
25	204	47
40	213.6	47
63	236.5	47
100	268.5	47

PGF2 / PGP2 nom. size	L3	L4
006	65	116
008	67	119.5
011	69.5	125
013	72	130
016	74.5	135
019	77.5	141
022	80.5	147

PGH2 nom. size	L3	L4
003	51	102.5
005	54	110
006	55.5	112.5
008	57	116

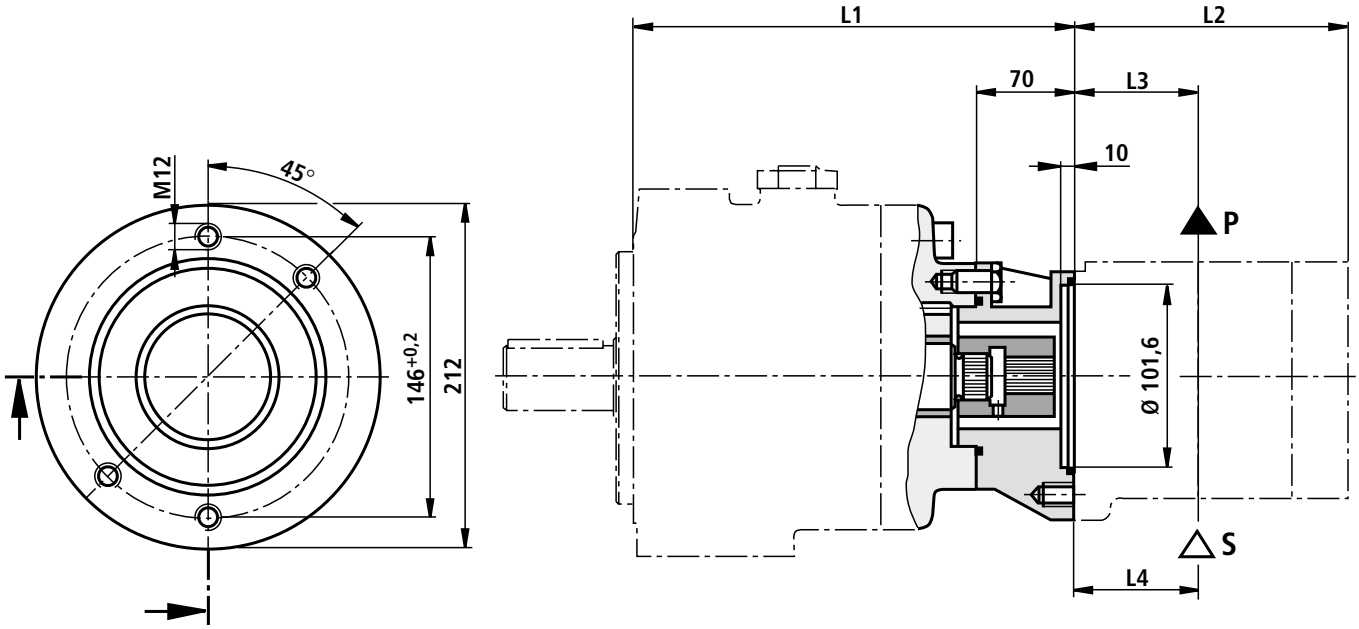
PGH3 nom. size	L3	L4
011	60	121.5
013	62.5	126.5
016	65	131.5

G2-4X nom. size	L3	L4
004	42.75	88.5
005	42	93.5
008	45.75	93.5
011	48	98.5
014	50	103.5
016	49	108.5
019	51	113.5
022	56	118.5

A10VSO nom. size	L3	L4
010	148 [1]	164; 179 [2]
018	145	195

[1] Axial connection port

[2] Controller dependent (see RE 92 713)



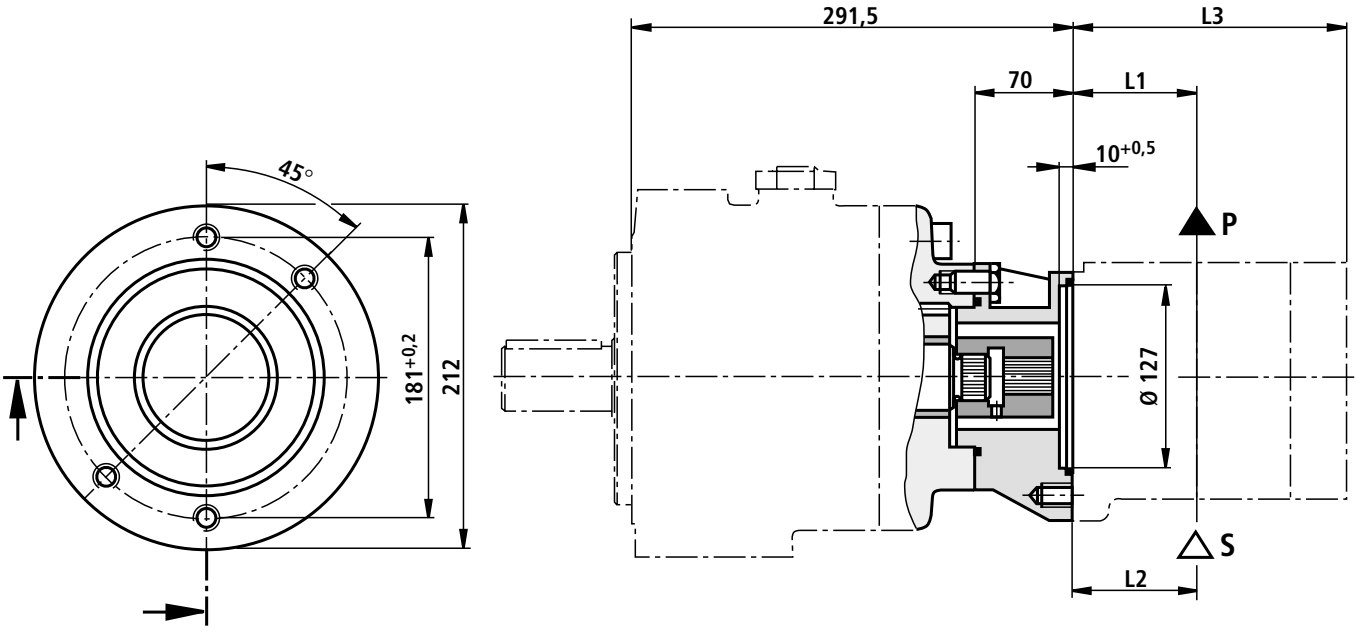
PV7 build size	L1
16	215
25	227
40	237
63	259.5
100	291.5

PGF3 / PGP3 nom. size	L2	L3; L4
020	144.5	79.5
022	146.5	80.5
025	150.5	82.5
032	159.5	87
040	169.5	92
050	182.5	98.5

PVV.UMB	L2	L3 (P)	L4 (S)
PVV1	156	133	63,5
PVV2	163	38.1	120.6

PGH4 nom. size	L2	L3; L4
020	147	70.5
025	152	73
032	159	76.5
040	166	80
050	176	85
063	190	92
080	204	99
100	224	109

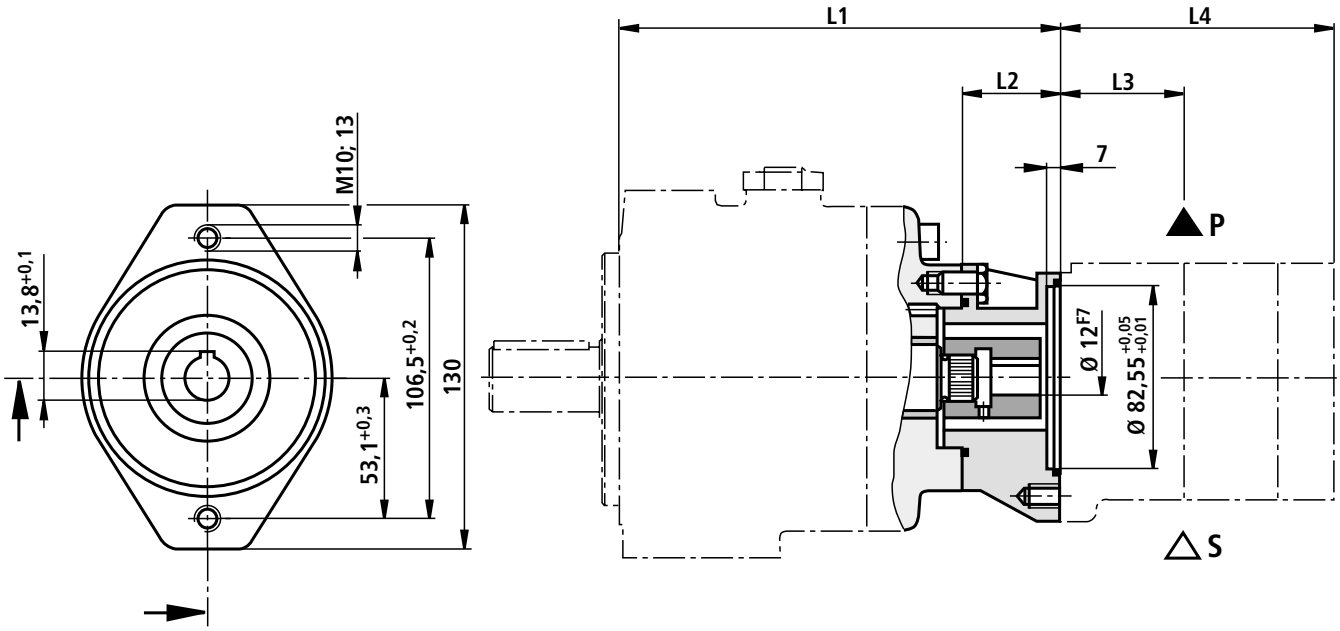
A10VO nom. size	L2	L3	L4
028	194	164.5	164.5



	L1	L2	L3
PVV4…UMC	38.1	125.5	186
PVV5…UMC	42.9	153	216
A10VO45	184	184	219

Pump combinations P2V7… + GF1…

(Dimensions in mm)

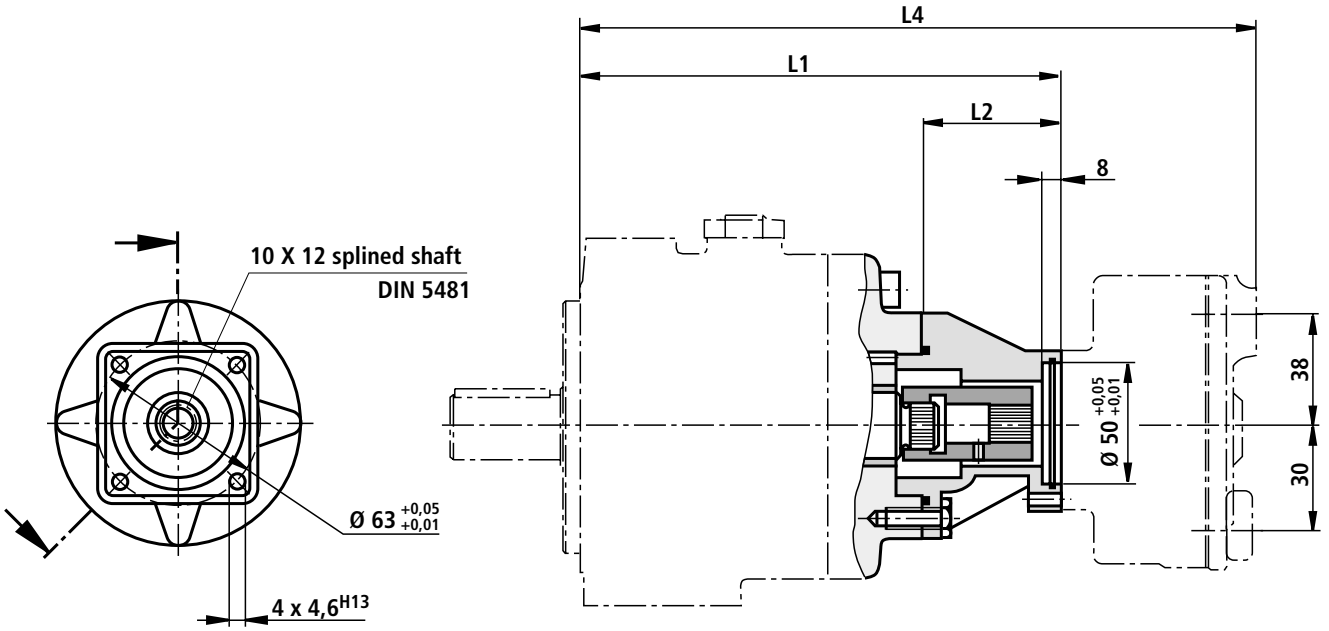


PV7 build size	L1	L2
10	168	36
16	192	47
25	204	47

GF1 nom. size	L3	L4
1.7	48.6	86
2.2	48.6	86
2.8	49.7	88.6
3.2	50.5	89.9
4.1	52.4	93.6
5.0	54.2	97.3

Pump combinations P2V7… + R4-Mini

(Dimensions in mm)

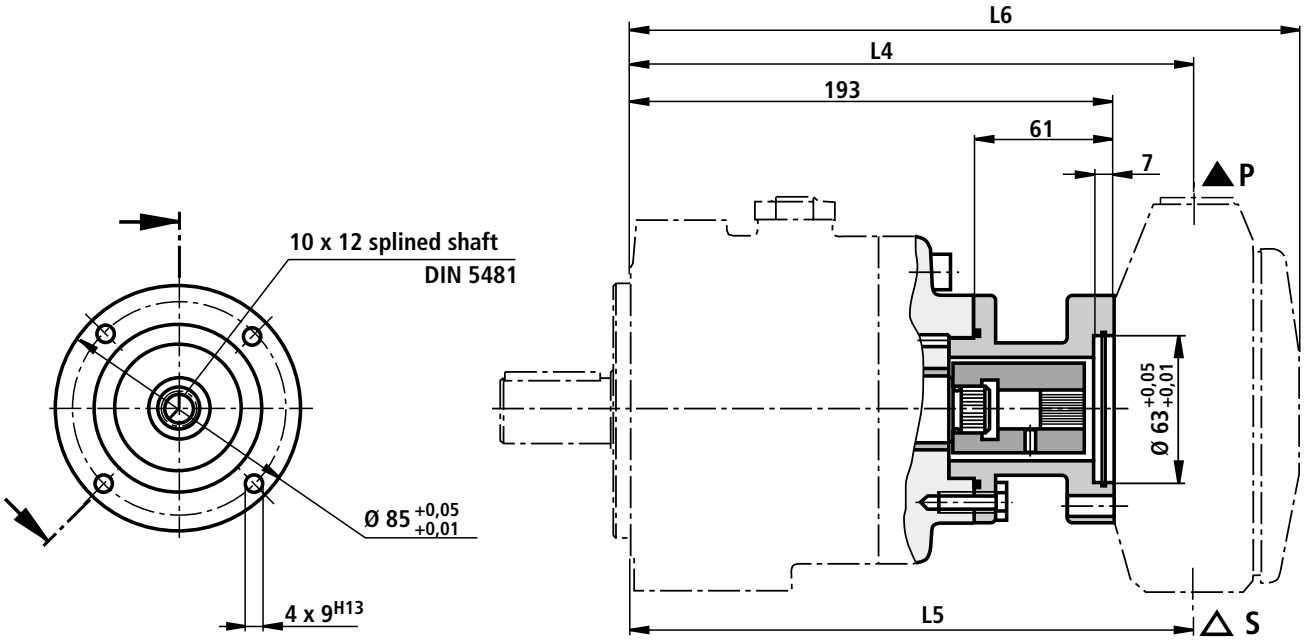


PV7 build size	L1	L2	L4
10	178	46	247
16	208	63	277
25	220	63	289

PV7 build size	L1	L2	L4
40	229.6	63	298.6
63	252.5	63	321.5
100	284.5	63	353.5

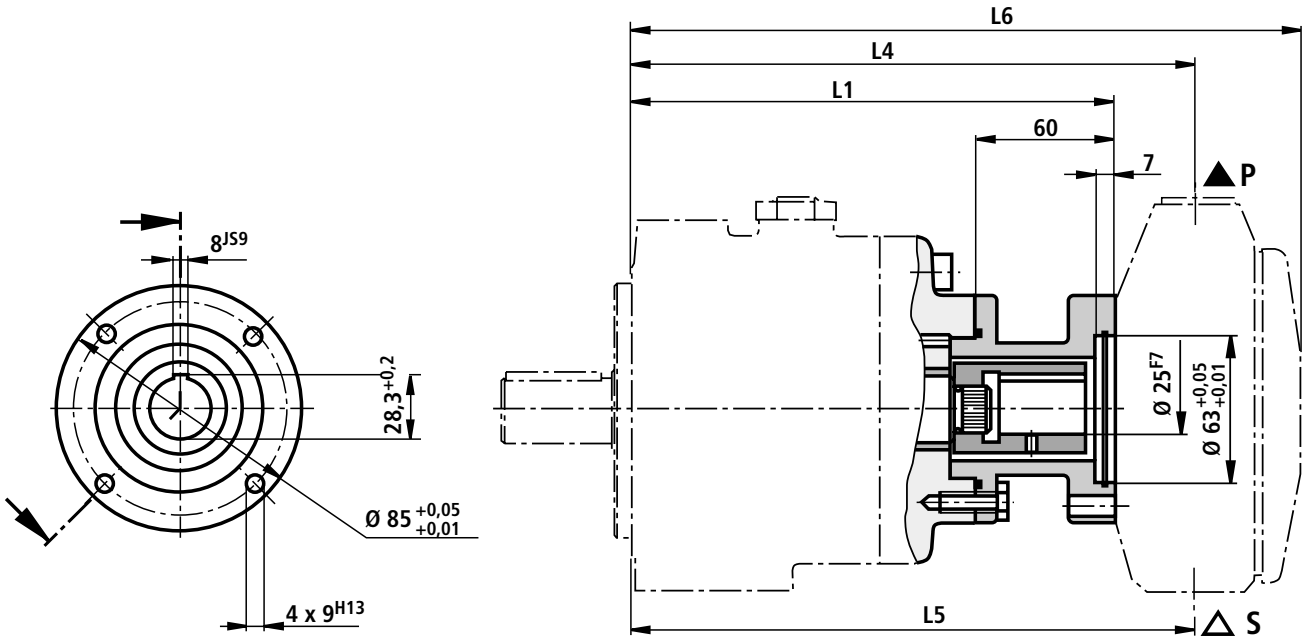
Note: The suction connection of the R4 pump should lie above the pressure port!

PV7/10… + R4-Standard



Piston	L4	L5	L6
3; 5	231.5	231.5	279
10	231.5	240.5	312.5

PV7/16… to PV7/100… + R4-standard



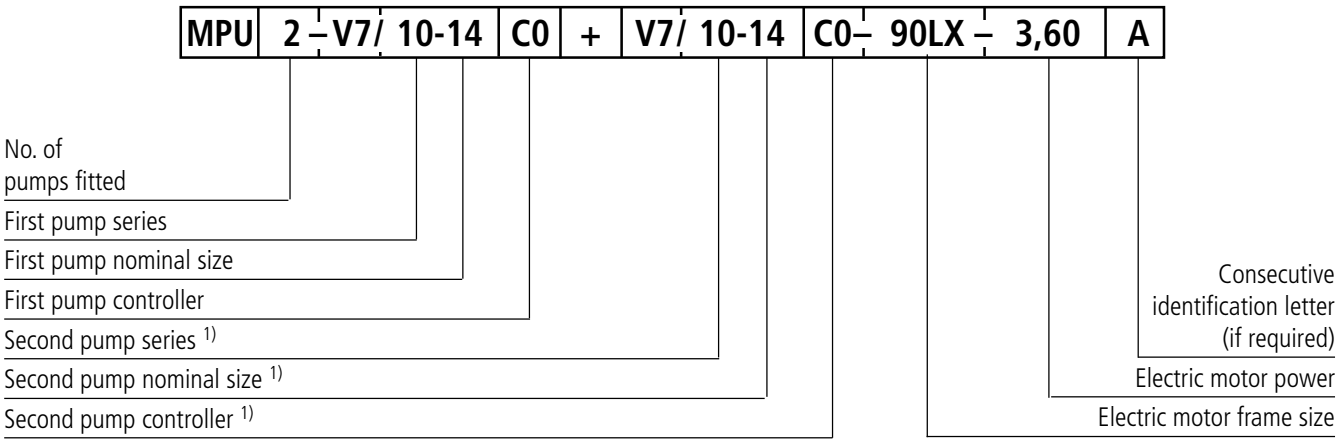
PV7 build size	L1	L4		L5		L6	
		3/5 pistons	10 pistons	3/5 pistons	10 pistons	3/5 pistons	10 pistons
16	205	243.5	243.5	243.5	252.5	291	324.5
25	217	255.5	255.5	255.5	264.5	303	336.5
40	226.6	265.1	265.1	265.1	274.1	312.6	346.1
63	249.5	288	288	288	297	335.5	369
100	281.5	320	320	320	329	367.5	401

Motor-pump drive unit

The electric motor and vane pump are connected **without** a coupling and pump mounting bracket. This results in a very cost effective and compact unit.

The motor design which has a hollow shaft with key-way makes it possible to utilise standard pumps.

Ordering details



1) If required

Ordering example: MPU1-V7/10-14CO-90L-2,20

Note with reference to the EC machinery guidelines 89/392 EWG, annex II, section B:

The UPP drive units are manufactured in accordance to the harmonised standards EN 982, EN 983, DIN EN 292 and DIN EN 60 204-1.

Commissioning is not permitted until it has bewen proven that the machine into which the UPP assembly is to be fitted complies with the requirements stated in the EC guidelines.

Selection table:

Electric motor

Electric motor build size	90SX	90L	90LX
Power in KW	0.75	2.20	3.60
Pump build size	Material No. of the available motor variants		
PV7/10	00892349	00892361	00892369

The nominal powers stated in the above table are valid for continuous operation to VDE 0530 at a frequency of 50 Hz, and a cooling medium temperature of 40 °C at a height up to 1000 m above sea level.

MPU-unit

Electric motor build size	90SX	90L	90LX
Power in KW	0.75	2.20	3.60
PV7/10-14C0	00979226	00979227	00979228
PV7/10-20C0	–	00979225	00977693

Technical data: Electric motor (for applications outside these parameters, please consult us!)

Motor type			Surface cooled, 3-phase with squirrel cage
Frame type			B3 with hollow shaft and mounting flange
Electrical power connection			Pg-fittings and earth in the terminal box
Insulation			Insulation class F
Protection			IP55 to VDE 0530
No. of poles			4
Voltage to DIN IEC 38		V	Δ230 / Y400 at 50 Hz; Δ266 / Y460 at 60 Hz
Frequency		Hz	50 or 60
RPM	At 50 Hz	min^{-1}	1500
	At 60 Hz	min^{-1}	1800
Installation			Only horizontal

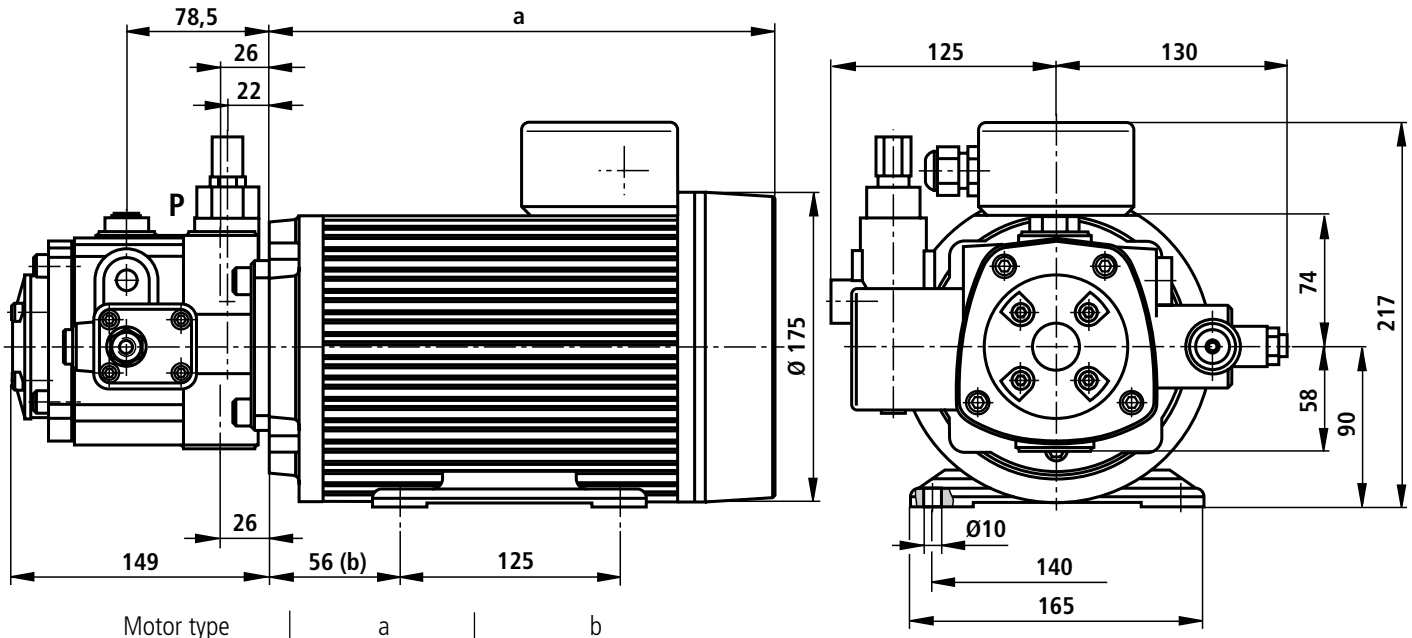
Operational switching of the AC motors

	Type of winding Volt	Operating voltage Volt	For direct starting Volt	For Y Δ starting Volt
50 Hz	230 Δ / 400 Y	220…240	220…240 Δ	220…240 Δ
		380…420	380…420 Y	

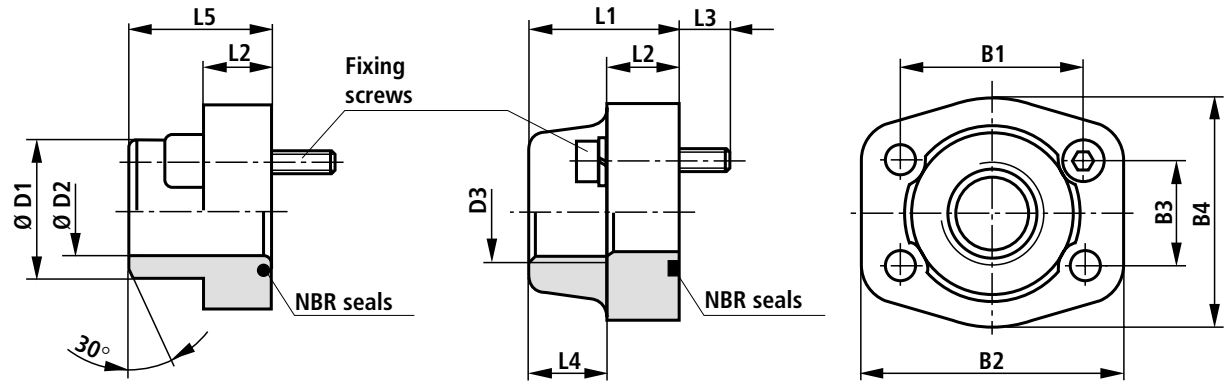
Motors with a winding for 50 Hz and connected to a 60 Hz supply

Conversion factor at 60 Hz	
Nom. RPM n_{nom}	Nom. power P_{nom}
1.2	1.0
1.2	1.0
1.2	1.15
1.2	1.2

Unit dimensions: MPU (Dimensions in mm)



Motor type	a	b	
90S	269	(16-106)	56
90L	283	(16-131)	
90X	315	(16-151)	



With welded connection to AB-E 22-15 **With threaded connection**

The Material No. includes the flange, O-ring and fixing screws.

Pipe threads „G" to ISO 228/1

NS	Sealing material	Material No.		For pump type	
		Welded connection	Threaded connection	Suction port	Pressure port
1 1/4"	NBR	00012946	0014153	–	PV7/63-…
1 1/2"	NBR	00013501	00014827	PV7/40-…	PV7/100-…
2"	NBR	00013502	00014829	PV7/63-…	–
2 1/2"	NBR	00013503	00024205	PV7/100-…	–

NS	B1	B2	B3	B4	ØD1	ØD2	D3	L1	L2	L3	L4	L5	Fixing screws
1 1/4"	58.7	79	30.2	68	38	30	G 1 1/4	41	21	18	22	42	M10-8.8
1 1/2"	69.9	95	35.7	76	42	36	G 1 1/2	44	25	18	24	57	M12-8.8
2"	77.8	102	42.9	90	61	49	G 2	45	25	18	26	46	M12-8.8
2 1/2"	88.9	114	50.8	104	76	62	G 2 1/2	50	25	18	30	50	M12-8.8

Engineering guidelines

Extensive guidelines and suggestions can be found in the Hydraulic Trainer, volume 3, RE 00 281, „Projecting and designing hydraulic systems".

When applying vane pumps, we recommnend that the following guidelines are particulary to be taken into account:

– **Technical data**
  All of the technical data stated are dependent on the manufacturing tolerances and are valid for certain conditions. Please take into account that due to this a small spread is possible and a change in the conditions (e.g. viscosity) can lead to the technical data being affected.

– **Characteristic curves**
  Characteristic curves for flow and absorbed power.
  Please take the maximum possible application data into account when selecting the electric motor.

– **Noise/noise pressure level**
  The values stated on pages 6 to 11 for the noise pressure level have been measured in accordance to DIN 45 635 part 26.

  This means that only the noise emission from the pump is shown. External influences (such as place of installation, pipework, etc.) are eliminated. The values stated always refer to one pump.

  If, for example, two pumps of the same size with the same loading are in use, then the noise level increases in accordance to the following formula

$$L_\Sigma = 10 \lg (10^{0,1 \bullet L1} + 10^{0,1 \bullet L2})$$

L_Σ = total level

$L_1 \ldots L_i$ = noise pressure level of a single pump

Example: PV7/16 + PV7/16

p = 120 bar

L_1 = 56 dB(A)

L_2 = 56 dB(A)

$L_\Sigma = 10 \log (10^{0,1 \bullet 56} + 10^{0,1 \bullet 56})$

= 59.01 dB(A)

⚠ **Attention:** The power unit design and the influences at the pumps final place of use result in the fact, in general, that the noise pressue level is 5 to 10 dB(A) higher than the value of the pump on its own.

Leakage fluid

Part of the frictional heat is dissipated via the leakage fluid from the pump. The leakage fluid should be returned directly to the oil reservoir with a low pipe back pressure. The distance between the leak line and the suction line must be large enough so that the returning leakage fluid cannot be directly taken up by the pump. The average leakage flow via the external port is shown on page 5. These values are **not** to be used for dimensioning the reservoir. For the selection of the reservoir size, the zero stroke power is the relevant value (see pages 6 to 11).

Leakage fluid cooler

The values stated on page 5 for the external leakage fluid are average values for continuous operation.

When the pump goes off-stroke the leakage fluid flow briefly increases by the control oil flow. Reductions in cross-section, long leak lines and also a leakage fluid cooler can lead to umpermissibly high pressure peaks. By means of suitable measures, e.g. a bypass check valve, it must be ensured that the leakage fluid pressure (p_{max} = 2 bar) does not exceed the permissible values. There is otherwise the danger of the shaft seal being damaged.

Commissioning

Air bleeding

– All PV7 vane pumps are self-priming.
– Before commissioning the pump must be bled to protect it from damage.
– When commissioning for the first time, we recommend that the housing is filled via the leakage connection. Take into account the filter rating! This increases the service life and prevents wear in the case of unfavourable installation conditions
– If the pump does not supply fluid free of bubbles after approx. 20 seconds then the system should be rechecked. After reaching the operating values check the pipe connection for leaks. Check the operating temperature.

Commissioning

– Check to see whether the system has been carefully and cleanly assembled.
– Take into account the direction of rotation arrows on the pump and motor.
– Start up the pump without load and permit it to supply fluid for a few seconds without pressure so that adequate lubrication in ensured.
– **Under no circumstances run the pump without fluid!**

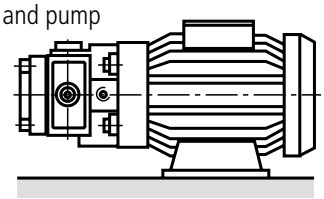
⚠ Important guidelines

– Adjustment, service and maintenance of the pump must only be carried out by authorised, trained and instructed personnel!
– Only use original Bosch Rexroth spare parts!
– The pump must only be operated with the permitted data.
– The pump must only be used when it is in a good condition!
– When carrying out any work on the pump (e.g. removing and refitting) the system must be depressurised and isolated from the mains supply!
– Conversion and modifications done by yourselves which affect the safety and function are not permitted!
– Protection features (e.g. coupling guard) are to be fitted!
– Protection features which are present must not be removed!
– The general safety and accident prevention regulations must be adhered too!

Installation guidelines

Drive: Variant 1

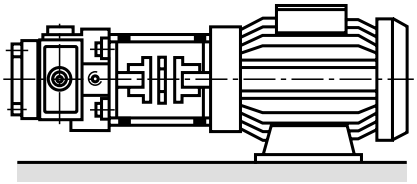
The UPP drive unit (is supplied complete by ourselves)
Electric motor and pump



- Very short design
- Cost effective (coupling and pump mounting bracket are not required)
- No assembly necessary

Drive: Variant 2

Electric motor + pump mounting bracket + coupling + pump

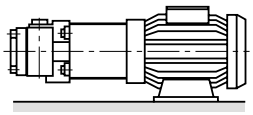


⚠ **Attention!** – Radial and axial forces which act on the pump drive shaft are not permitted!
→ Motor and pump must be exactly aligned!
→ Use a flexible drive coupling

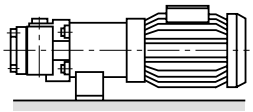
Installation

- Horizontal is preferred

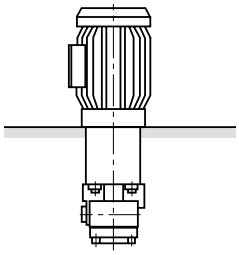
B3



B5



V1



Fluid reservoir

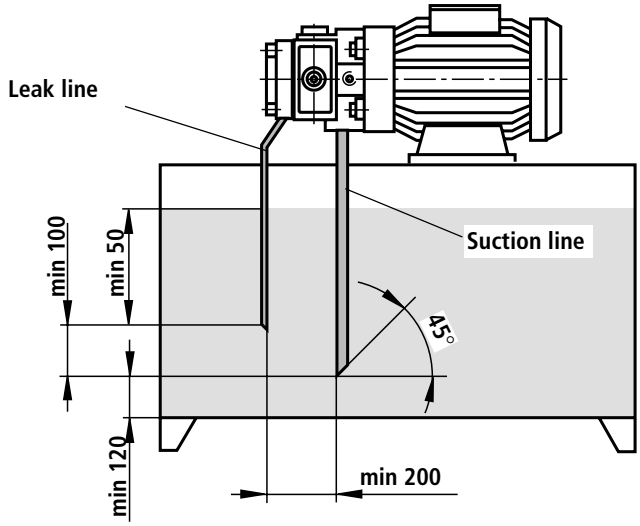
- Match the usable volume of the reservoir to suit the operating conditions.

⚠ **Attention!** – The permissible fluid temperature must not be exceeded
→ A cooler may have to be provided!

Pipes and connections

- Cut-off at an angle of 45°.
- Remove protective plugs from the pump.
- We recommend the use of seamless precision steel pipes to DIN 2391 and removable pipe couplings.
- Match the inside diameter of the pipe to the connections.
- Carefully clean pipe and fittings before assembly – **minimum distance to the bottom of the reservoir is 120 mm**.

Pipework suggestion (dimensions in mm)



- Lay the leakage line so that the pump **cannot** drain!
- Do **not** pipe with pump **without** a controller!
- Leak and return line fluid **must under no circumstances** be immediately taken up by the pump!

Filter

- Use return and pressure filters where possible.
(suction filter only in conjunction with an under pressure switch/ clogging indicator)

Pressure fluid

- Please take into account our specifications stated in catalogue sheet RE 07 075.
- We recommend brand name pressure fluids.
- Different types of pressure fluids must not be mixed as decomposition and a reduction in lubricity may result. Take the manufacterer's specifications into account!
- Depending on the operating conditions the pressue fluid must be changed at regular intervals. It is necessary to clean the fluid reservoir of any residues.

Notes

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