

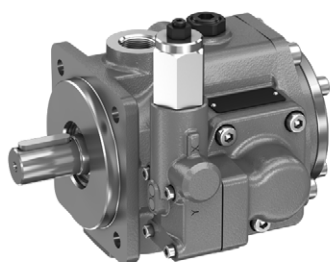
Adjustable vane pump, pilot-operated

Type PV7

RE 10515

Edition: 2018-11

Replaces: 10.2005



- ▶ Size 14 to 150
- ▶ Component series 1X
- ▶ Maximum operating pressure 160 bar
- ▶ Maximum flow 270 l/min

Features

- ▶ Variable displacement
- ▶ Low operating noise
- ▶ Extended bearing life cycle thanks to hydrodynamically lubricated plain bearings
- ▶ Pressure and flow can be controlled
- ▶ Low hysteresis
- ▶ Very low control up times and down control times
- ▶ Mounting dimensions according to ISO 3019-2.
- ▶ Connection dimensions according to ISO 6162-1 and ISO 228-1
- ▶ Suitable for HLP, HETG, HEES and HFD-U hydraulic fluids
- ▶ Standard Series PV7 single pumps can be combined with multiple pumps as well as internal gear, external gear, axial piston and radial piston pumps.
- ▶ Used for drives in continuous operation with variable flow requirement and a high share in the pressure holding function, e.g.:
 - machine tools
 - hydrostatic bearings
 - constant pressure systems

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Ordering code

01	02	03	04	05	06	07	08	09	10	11	12
PV7	-	1X	/		R	E				-	

Type

01	Vane pump, variable, pilot-operated	PV7
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Series

02	Series 1A to 1Z (1A to 1Z have unchanged installation and connection dimensions)	1X
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Frame size (BG) and size (NG)

03	BG 10 – NG 14 cm ³	10-14
	BG 10 – NG 20 cm ³	10-20
	BG 16 – NG 20 cm ³	16-20
	BG 16 – NG 30 cm ³	16-30
	BG 25 – NG 30 cm ³	25-30
	BG 25 – NG 45 cm ³	25-45
	BG 40 – NG 45 cm ³	40-45
	BG 40 – NG 71 cm ³	40-71
	BG 63 – NG 71 cm ³	63-71
	BG 63 – NG 94 cm ³	63-94
	BG 100 – NG 118 cm ³	100-118
	BG 100 – NG 150 cm ³	100-150

Direction of rotation

04	Viewed on drive shaft	clockwise	R
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Drive shaft

05	Cylindrical drive shaft according to ISO 3019-2 with output	E
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Line connections

06	Frame sizes 10, 16, 25	Suction and pressure port: Pipe thread according to ISO 228-1	01
	Frame size 40	Suction port: SAE flange connection according to ISO 6162-1 Pressure port: Pipe thread according to ISO 228-1	37
	Frame sizes 63, 100	Suction and pressure port: SAE flange connection according to ISO 6162-1	07

Seal material

07	NBR seals, suitable for HLP mineral oil according to DIN 51524	M
	FKM shaft seal ring, suitable for HETG, HEES and HFD-U hydraulic fluid	K

Controller type

08	Pressure controller	C
	Pressure controller for hydraulic remote pressure adjustment	D
	Flow controller	N
	Pressure controller with 2-step electric pressure adjustment	W

Controller option

09	Standard	0
	Lockable	3
	With K plate	5
	With Q plate	6
	Lockable with K plate	7
	Lockable with Q plate	8

01	02	03	04	05	06	07	08	09	10	11	12	
PV7	-	1X	/		R	E				-		

Zero stroke pressure range

10		10 -14	10 -20	16 -20	16 -30	25 -30	25 -45	40 -45	40 -71	63 -71	63 -94	100 -118	100 -150	
	20 - 80 bar	-	-	-	●	-	●	-	●	-	●	-	●	08
	20 - 100 bar	-	●	-	-	-	-	-	-	-	-	-	-	10
	20 - 160 bar	●	-	●	-	●	-	●	-	●	-	●	-	16

Option

11	Directional valve, normally closed, only available for C5-, D5 and W controllers	WG
	Directional valve, normally open, only available for C5, D5 and W controllers	WH

Setting in plain text

12	Pressure adjustment [bar]	-P***
	Flow setting [l/min] at $n = 1450$ rpm	-Q***

Preferred types (available for immediate delivery)

Controller type C	Material number
PV7-1X/10-14RE01MC0-16	R900580381
PV7-1X/10-20RE01MC0-10	R900534143
PV7-1X/16-20RE01MC0-16	R900580382
PV7-1X/16-30RE01MC0-08	R900533582
PV7-1X/25-30RE01MC0-16	R900580383
PV7-1X/25-45RE01MC0-08	R900534508
PV7-1X/40-45RE37MC0-16	R900580384
PV7-1X/40-71RE37MC0-08	R900535588
PV7-1X/63-71RE07MC0-16	R900506808
PV7-1X/63-94RE07MC0-08	R900560659
PV7-1X/100-118RE07MC0-16	R900506809
PV7-1X/100-150RE07MC0-08	R900561846
Controller type D	
PV7-1X/10-14RE01MD0-16	R900504653
PV7-1X/10-20RE01MD0-10	R900906584
PV7-1X/16-20RE01MD0-16	R900509274
PV7-1X/16-30RE01MD0-08	R900560658
PV7-1X/25-30RE01MD0-16	R900509506
PV7-1X/25-45RE01MD0-08	R900568833
PV7-1X/40-45RE37MD0-16	R900593330
PV7-1X/40-71RE37MD0-08	R900539886
PV7-1X/63-71RE07MD0-16	R900519094
PV7-1X/63-94RE07MD0-08	R900574560
PV7-1X/100-118RE07MD0-16	R900532770
PV7-1X/100-150RE07MD0-08	R900915470

Sample pumps with customer-specific setting:

- ▶ PV7-1X/16-20RE01MC0-16-P50 $p_{\text{zero stroke}} = 50$ bar
- ▶ PV7-1X/16-20RE01MC0-16-Q25 $q_{V \text{ max}} = 25$ l/min
- ▶ PV7-1X/16-20RE01MC0-16-P70Q20 $p_{\text{zero stroke}} = 70$ bar
 $q_{V \text{ max}} = 20$ l/min

In customer-specific settings, the pump comes noise-optimized at the desired operating points ($p_{\text{zero stroke}}/q_{V \text{ max}}$).

In standard versions, the pump is noise-optimized at maximum operating pressure and the zero stroke pressure is reset to 30 bar for delivery.

Function, section

Type PV7 hydraulic pumps are vane pumps with variable displacement.

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

The annular stator ring (4) is fixed by the small floating stroking piston (10) and the large floating set piston (11). The ring is fixed at a third location by the height adjusting screw (7).

The driven rotor (2) rotates within the stator ring (4).

The vanes (3) are guided in the rotor (2) and are pressed against the inner running surface of the stator ring (4) by centrifugal force.

Suction and displacement procedure

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

To ensure pump function on commissioning, the stator ring (4) is held in its eccentric position (displacement position) by the spring (12) behind the large floating stroking piston (11).

The chamber volume (8) increases as the rotor (2) rotates and the chambers (8) are filled with hydraulic fluid through the suction channel (S). When the greatest chamber volume is reached, the chambers (8) are separated from the suction side.

As the rotor (2) continues to rotate, the connection to the pressure side is opened, and the chambers decrease in size and force the hydraulic fluid into the system through the pressure channel (P).

Adjustment

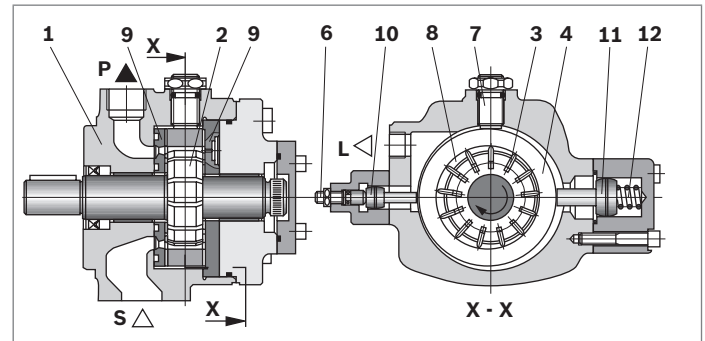
As pressure builds in the system, the back of the small floating stroking piston (10) is always pressurized through a channel.

In the flow position, the back of the large stroking piston (11) is also pressurized through a bore in the regulator spool (14). The large stroking piston (11), with the larger surface, holds the stator ring (4) in its eccentric position.

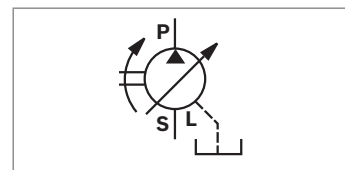
The pump displaces fluid at a pressure that is below the zero stroke pressure set on the pressure controller (5).

The regulator spool (14) is held in a certain position by the spring (13).

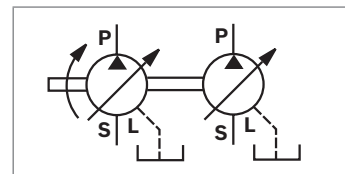
▼ PV7-1X



▼ Single pump symbol



▼ Double pump symbol



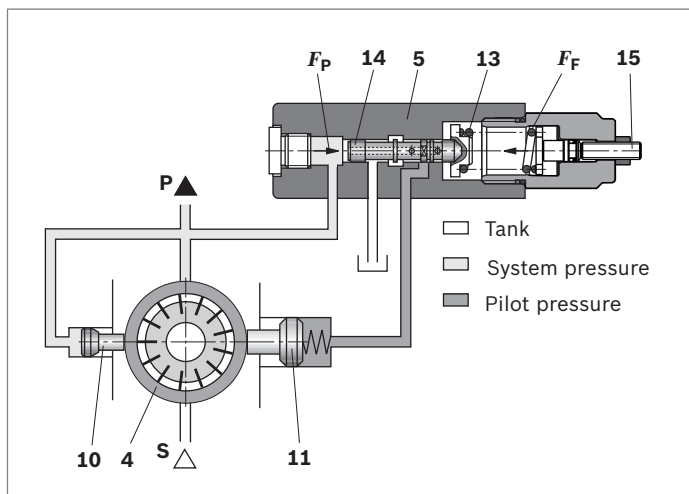
Pressure relief

If the force F_P produced by pressure $\times$ area exceeds the counterforce F_F of the spring, the regulator spool (14) is pushed against the spring (13). This connects the space behind the large floating stroking piston (11) to the tank, relieving pressure.

The small set piston (10), which is always under system pressure, moves the stator ring (4) to virtually the center position. The pump maintains pressure, flow returns to zero, leakages are replaced.

Power loss and fluid heating are minimal.

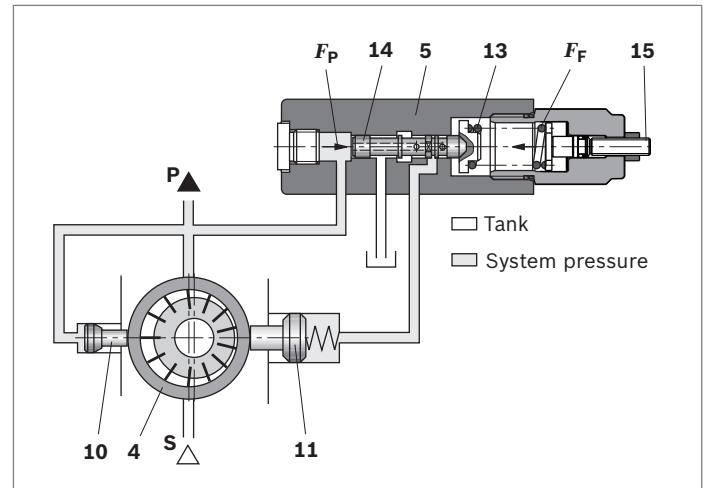
The characteristic curve q_V-p runs vertically and moves parallel to various high pressures that are set.



Pressure recovery

If the pressure in the system drops below the set zero stroke pressure, the spring (13) moves the regulator spool (14) back to its original position.

The large stroking piston (11) is pressurized and moves the stator ring (4) to its eccentric position. The pump continues to displace fluid.



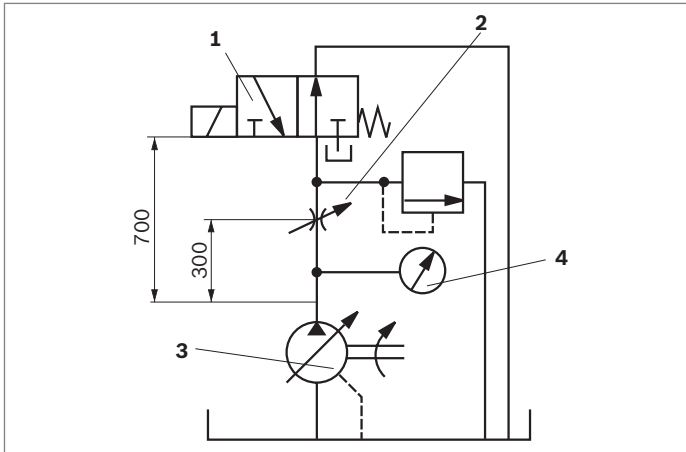
Technical data

Frame size		BG	10	10	16	16	25	25	40	40	63	63	100	100
Displacement	V_g	cm ³	14	20	20	30	30	45	45	71	71	94	118	150
Speed	n	rpm	900 ... 1800											
Drive power (at $n = 1450$ rpm; $p = p_{\max}$; $v = 41$ mm ² /s)	$P_{\max}$	kW	6.3	5.8	8.5	6.8	13.7	10.2	20.5	16.5	33	20.9	51.5	33
Maximum torque	$T_{\max}$	Nm	90	90	140	140	180	180	280	280	440	440	680	680
Operating pressure, absolute														
Input	$p_{\min-\max}$	bar	0.8 ... 2.5											
Output	$p_{\min}$	bar	20											
	$p_{\max}$	bar	160	100	160	80	160	80	160	80	160	80	160	80
Leakage oil	$p_{\max}$	bar	2											
Leakage flow at zero stroke (at $p_{\max}$)	q_{VL}	l/min	2.7	1.9	4	2.5	5.3	3.2	6.5	4	8	5.3	11	7.3
Maximum flow (at $n = 1450$ rpm; $p = 10$ bar; $v = 41$ mm ² /s)	q_v	l/min	21	29	29	43.5	43.5	66	66	104	108	136	171	218
Change in flow (from one turn of flow adjusting screw $n = 1450$ rpm)	q_v	l/min	10	10	14	14	18	18	25	25	34	34	46	46
Change in pressure			From one turn of pressure adjusting screw (see page 5 pos. 15) approx. 19 bar											
Shaft load			Radial and axial forces cannot be absorbed.											
Weight (with pressure controller)	m	kg	12.5	12.5	17	17	21	21	30	30	37	37	56	56
Hydraulic fluid														
Hydraulic fluid for use at up to 160 bar (nominal pressure)			Mineral oil HLP according to DIN 51524, part 2 Please observe our regulations according to data sheet 90220.											
Special hydraulic fluids														
up to operating pressure	$p_{\max} = 100$ bar	HETG and HEES hydraulic fluids according to VDMA 24 568 HFD-U according to ISO 12922 Other hydraulic fluids available on request!												
Hydraulic fluid temperature range	θ	°C	-10 to +70, observe permissible viscosity range.											
Viscosity range	v	mm ² /s	16 to 160 at operating temperature Maximum 800 on start with pump mode Maximum 200 on start in zero stroke mode											
Maximum admissible degree of contamination of the hydraulic fluid cleanliness class according to ISO 4406 (c)			Class 20/18/15											
Type of mounting			4-hole mounting flange (according to VMDA 24560 Part 1 and DIN ISO 3019-2)											

Dynamic pressure control characteristics, measurement set-up

The control times apply to the measurement set-up shown.
For other set-ups and line lengths, the control times will change.

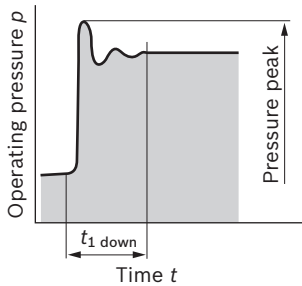
▼ Circuit diagram



- 1 Directional valve (switching time 30 ms)
- 2 Throttle for setting pressure during displacement
- 3 Hydraulic pump
- 4 Pressure tapping point

Pressure relief

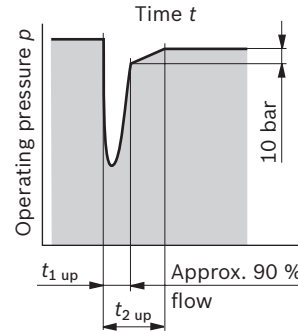
q_v displacement → q_v zero stroke



Pump type	Down control times [ms] (average)					
	20 ... 160 bar		20 ... 80 bar		20 ... 40 bar	
	t_{down}	$p_{\text{max}}^{1)}$	t_{down}	$p_{\text{max}}^{1)}$	t_{down}	$p_{\text{max}}^{1)}$
10-14	100	180	–	–	150	80
10-20	–	–	100	130	150	100
16-20	100	200	–	–	120	100
16-30	–	–	100	140	150	110
25-30	100	220	–	–	120	120
25-45	–	–	100	150	120	120
40-45	100	240	–	–	120	140
40-71	–	–	100	180	120	150
63-71	150	220 ²⁾	–	–	150	180
63-94	–	–	200	150 ²⁾	220	150
100-118	200	220 ²⁾	–	–	250	200
100-150	–	–	250	150 ²⁾	280	150

Pressure recovery

q_v zero stroke → q_v displacement



Pump type	Control up times [ms] (average)					
	160 ... 130 bar		80 ... 60 bar		40 ... 30 bar	
	$t_{1 \text{ up}}$	$t_{2 \text{ up}}$	$t_{1 \text{ up}}$	$t_{2 \text{ up}}$	$t_{1 \text{ up}}$	$t_{2 \text{ up}}$
10-14	60	80	–	–	60	80
10-20	–	–	60	80	50	100
16-20	50	80	–	–	50	90
16-30	–	–	50	80	50	100
25-30	80	100	–	–	70	100
25-45	–	–	80	100	80	130
40-45	70	100	–	–	60	100
40-71	–	–	80	100	80	140
63-71	80	120	–	–	100	140
63-94	–	–	120	150	130	210
100-118	100	150	–	–	150	250
100-150	–	–	150	200	180	280

1) Permissible pressure peaks

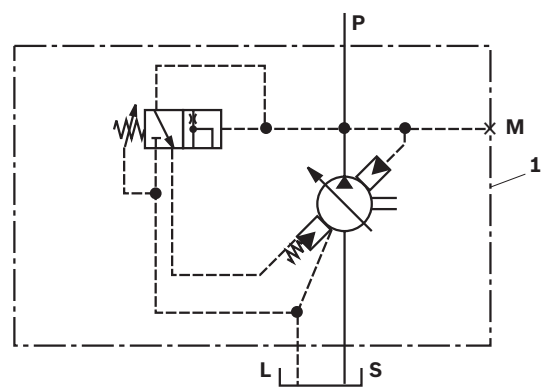
2) Pressure relief valve required to limit pressure peaks.

Controller

Type C pressure controller

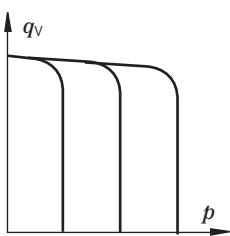
- ▶ Mechanical pressure adjustment, ordering code ...C0...
- ▶ Lockable version, ordering code ...C3...

▼ Circuit diagram



Connections	
P	Pressure port
S	Suction port
L	Drain port
S	Measuring port (plugged)

▼ Characteristic curve



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

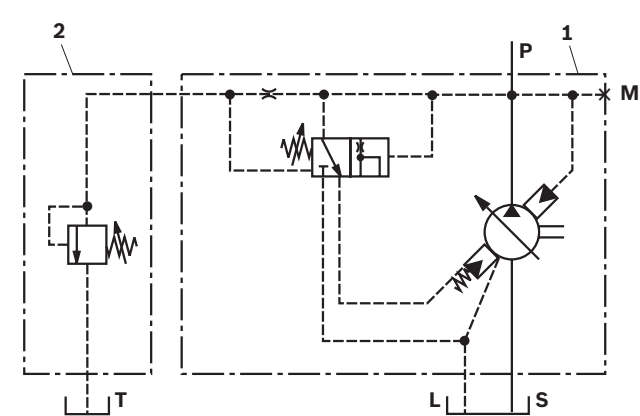
Spare part controller V7-1A/...C0-10 BG (100 bar)
Material no.: R901182736

Spare part controller V7-1A/...C0-16 BG (160 bar)
Material no.: R901169899

Type D pressure controller

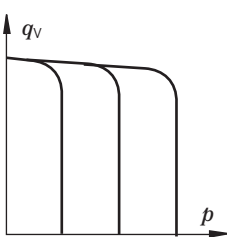
- ▶ Remote pressure setting, ordering code ...D0...
- ▶ Lockable version, ordering code ...D3...

▼ Circuit diagram



Connections	
P	Pressure port
S	Suction port
T	Tank port
L	Drain port
S	Measuring port (plugged)

▼ Characteristic curve



Order example	
1	Pump: PV7-1X/25-45RE01MD0-08
2	Pressure relief valve must be ordered separately.

The remote control line between the controller (1) and the pressure relief valve (2) should not exceed 2 m.

Notice

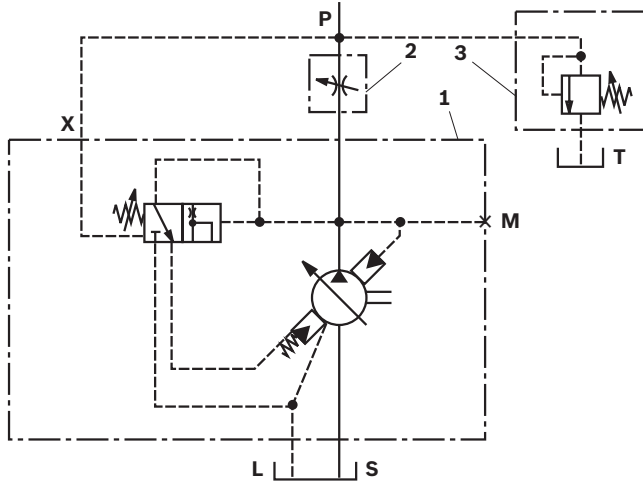
The zero stroke pressure is the aggregate of the pressures set on the pump and pressure relief valve. Do not plug the remote control port, otherwise the pump cannot relieve pressure.

Spare part controller V7-1A/...D0-16 BG (160 bar)
Material no.: R901169902

Type N flow controller

- Remote flow control, ordering code ...**N0**...
- Lockable version, ordering code ...**N3**...

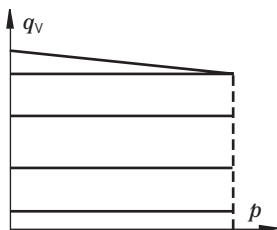
▼ Circuit diagram



Connections

P	Pressure port
S	Suction port
X	Control port
T	Tank port
L	Drain port
S	Measuring port (plugged)

▼ Characteristic curve



Order example

1	Pump: PV7-1X/16-20RE01MN0-16 or PV7-1X/63-94RE07MN3-08
2	Any metering orifice (e.g., throttle according to RE 27219)
3	Any pressure relief valve (this valve is required, since there is no control to zero stroke)

Pos. (2) and (3) must be ordered separately.

The control line between the controller "X" and the metering orifice should not exceed 1.5 m.

Differential pressure approx. 13 bar

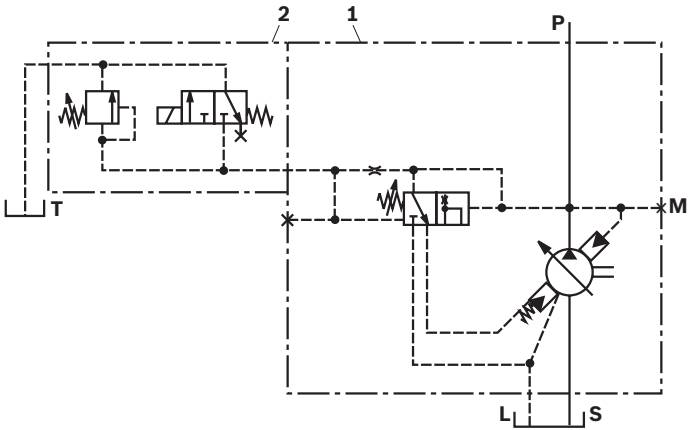
Spare part controller V7-1A/...N0-16 BG (160 bar)

Material no.: R901169904

Type W pressure controller

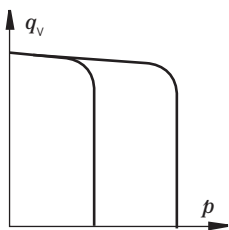
- ▶ 2-step electrically switchable pressure adjustment, ordering code ...**W0**...

▼ Circuit diagram



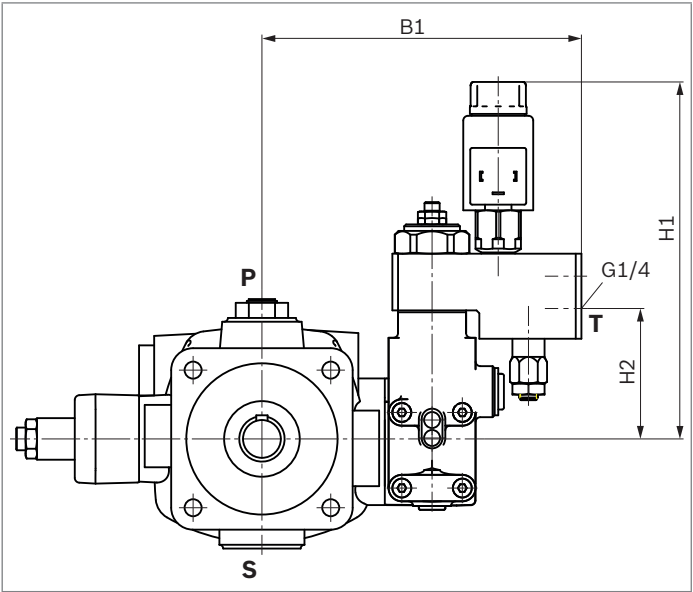
Connections	
P	Pressure port
S	Suction port
T	Tank port
L	Drain port
S	Measuring port (plugged)

▼ Characteristic curve



Order example	
1	Pump: PV7-1X/16-20RE01MW0-16
2.1	3/2-way cartridge valve optional: – Normally closed, ordering code: ...WG Comes with valve KKDER8NA/HN9V Material no. R901069975 – Normally open, ordering code: ...WH Comes with valve KKDER8PA/HN9V Material no. R901069978
2.2	Pressure relief valve according to Data Sheet 25710 included

▼ Unit dimensions



Frame size	B1	H1	H2
10	169	189	69
16	172	190.5	70.5
25	178	190.5	70.5
40	204	190	70
63	209	190	70
100	228.5	190	70

For additional unit dimensions, see page 20.

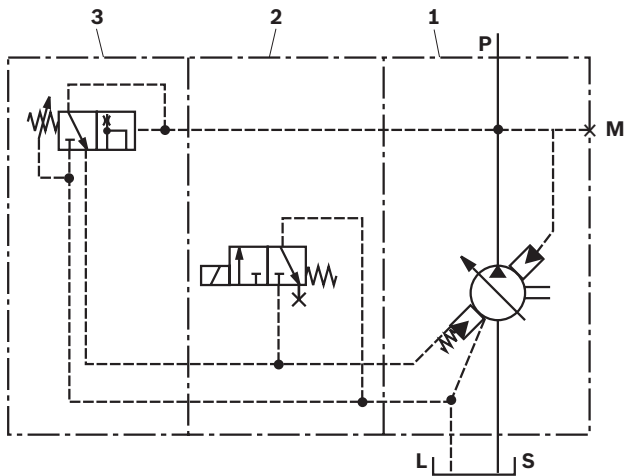
Hydraulic start assist (K plate)

Sandwich plate with relief valve for starting at minimum zero stroke pressure.

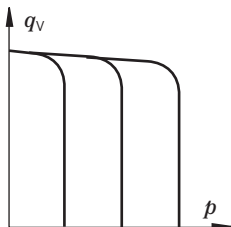
- ▶ Zero stroke pressure approx. 20 bar (based on application), ordering code **...5-...**
- ▶ Lockable version, ordering code **...7-...**

Notice

Not suitable for 2-step control.

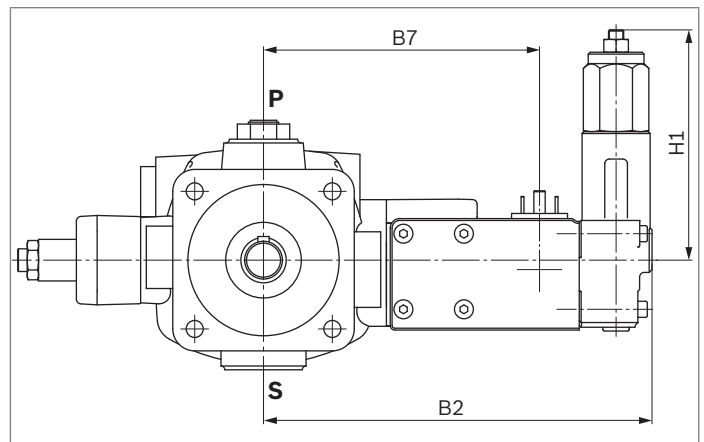
▼ Circuit diagram**Connections**

P	Pressure port
S	Suction port
L	Drain port
S	Measuring port (plugged)

▼ Characteristic curve**Order example**

- 1** Pump: PV7-1X/40-71RE37MC5-08
- 2** 3/2-way cartridge valve optional:
 - ▶ Normally closed, ordering code: **...WG**
Comes with valve KKDER8NA/HN9V
Material no. R901069975
 - ▶ Normally open, ordering code: **...WH**
Comes with valve KKDER8PA/HN9V
Material no. R901069978
- 3** Type C, D or N controller optional

Accessories for converting controller variant **...0-...** to **...5-...**:
Plate V7-1X/.K, material no. R901110638

Unit dimensions

Frame size	B2	B7	H1
10	205.5	146	121.8
16	208.5	149	123.3
25	214.5	155	123.3
40	240.5	181	122.8
63	244.5	186	122.8
100	265	205.5	122.8

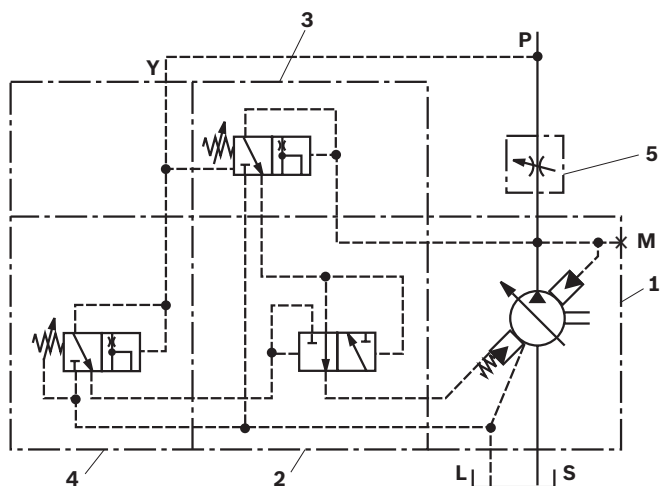
For additional unit dimensions, see page 20.

Flow pressure controller (Q plate)

Sandwich plate for linking a flow controller to a pressure-controlled pump.

- ▶ Standard flow controller installed ordering code ...**6**...
- ▶ Lockable version, ordering code ...**8**...

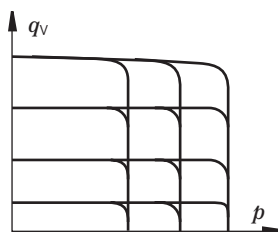
▼ **Circuit diagram**



Connections

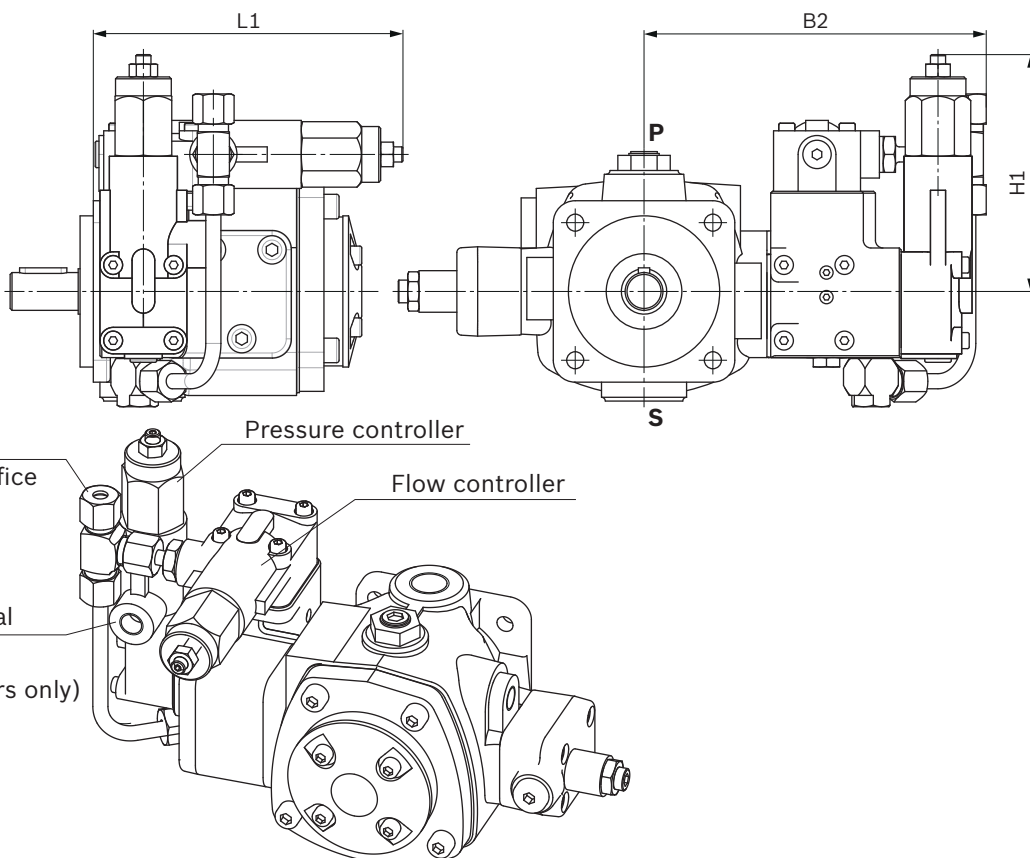
P	Pressure port
S	Suction port
Y	Control port
L	Drain port
S	Measuring port (plugged)

▼ Characteristic curve



Frame size	B2	H1	L1
10	173.5	117	142
16	176.5	118.5	161
25	182.5	118.5	173
40	208.5	118	182.6
63	213.5	118	205.3
100	233	118	237.3

▼ Unit dimensions



Order example	
1	Pump: PV7-1X/63-71RE07MC6-16
2	Sandwich plate for linking pressure controller and flow controller functions
3	Flow controller as described on page 9
4	Type C, D, E or W pressure controller optional as described on page 8 to 10
5	Any metering orifice (e.g., throttle), must be ordered separately

The control line between the controller port "Y" and the metering orifice should not exceed 1.5 m.

Accessories for converting controller variant **...0-...** to **...6-...**, includes no. **2** and **3**:

Plate V7-1X/...Q, material no. R900860093

For additional unit dimensions, see page 20

Lock

Material no.: R901183126

This lock comes in pumps with controller options in the versions **...3...**, **...7...** or **...8...**

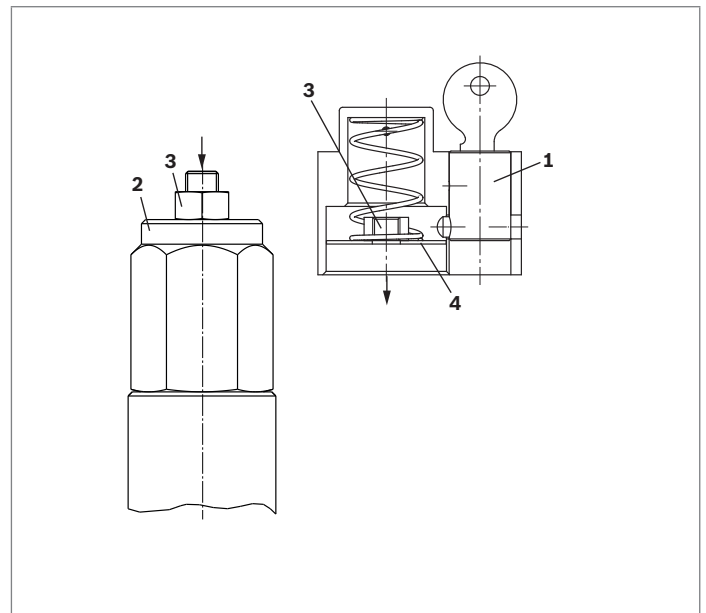
Functional description

Once unlocked (by turning the key to the right), the lock (1) can be removed from the controller (2), making the adjuster accessible.

To lock, the cover is placed over the adjuster and pressed down as far as it will go, then the key is turned to the left.

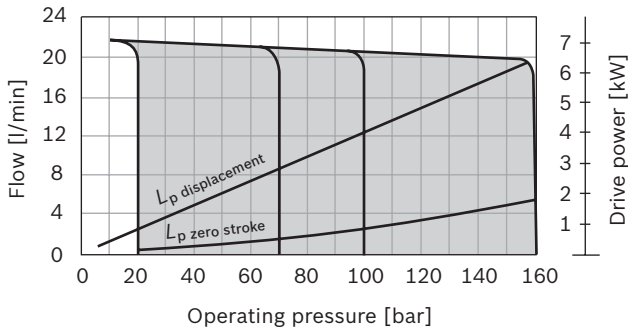
The lock can be retrofitted on a standard pump as follows:

- ▶ Unscrew the nut (3).
- ▶ Insert the washer (4) and screw on the nut (3).
- ▶ Install the lock (1) as described in the functional description.

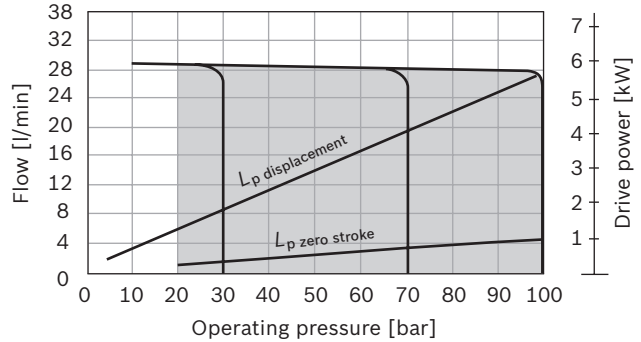


Characteristic curves for frame size 10

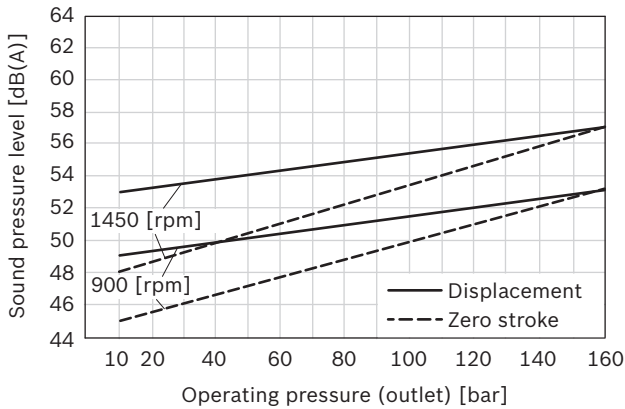
▼ PV7/10-14



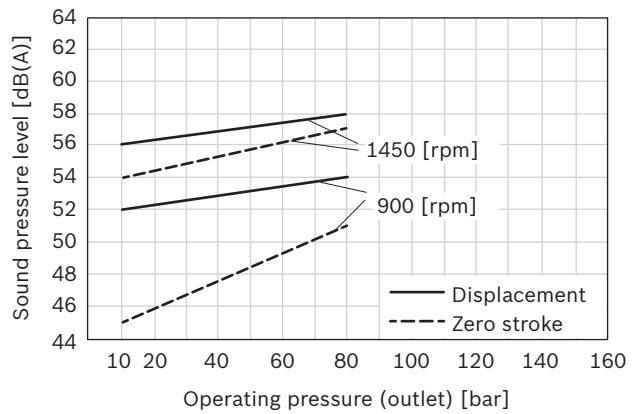
▼ PV7/10-20



▼ PV7/10-14 sound pressure levels



▼ PV7/10-20 sound pressure levels

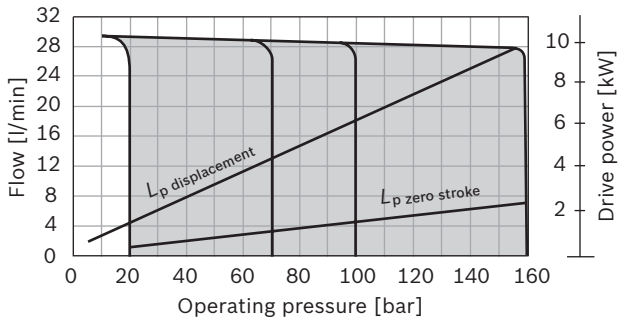


Notice

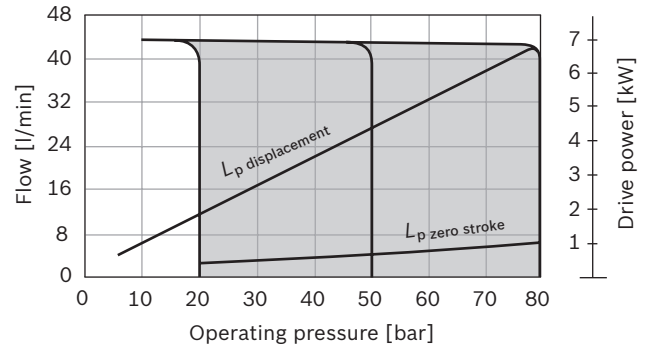
- Characteristic curves measured at $n = 1450$ rpm; $v = 41$ mm²/s; $\theta = 50$ °C
- Sound pressure levels measured in acoustic room according to DIN 45635 Part 26;
Distance: Microphone – pump = 1 m
- The pump comes calibrated for optimal operating noise at the desired zero stroke pressure. If not specified, the pump comes optimized for the maximum achievable zero stroke pressure.

Characteristic curves for frame size 16

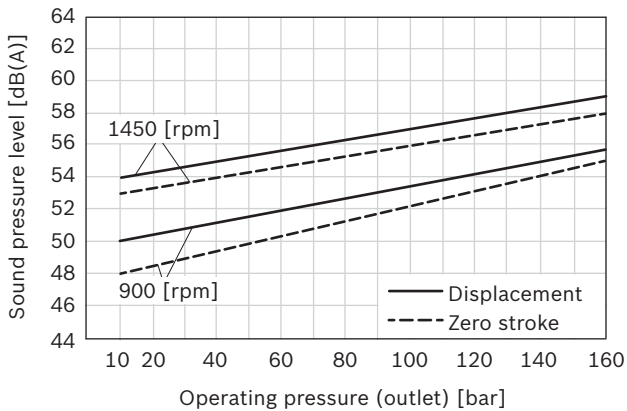
▼ PV7/16-20



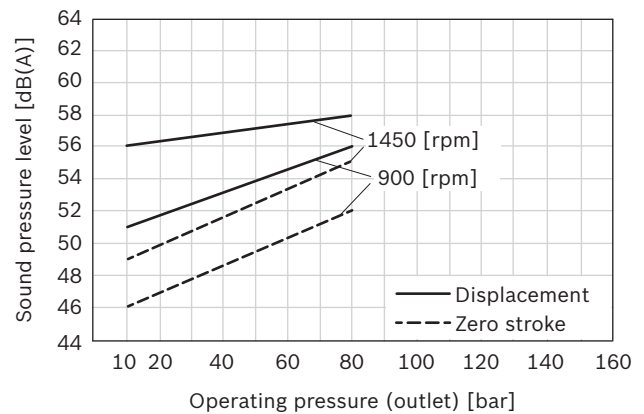
▼ PV7/16-30



▼ PV7/16-20 sound pressure levels



▼ PV7/16-30 sound pressure levels

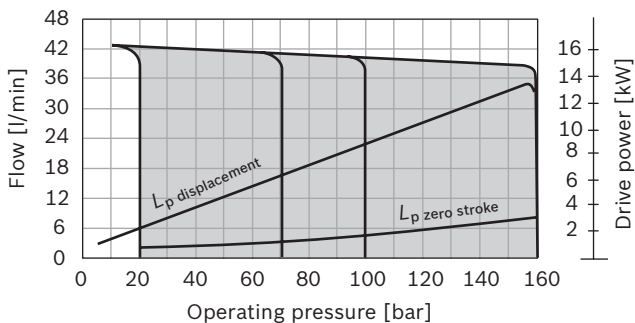


Notice

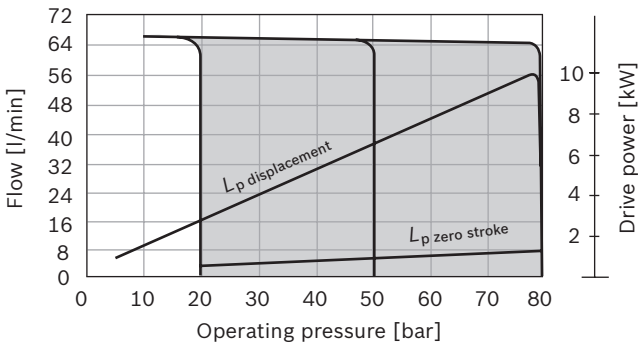
- Characteristic curves measured at $n = 1450$ rpm; $v = 41$ mm²/s; $\theta = 50$ °C
- Sound pressure levels measured in acoustic room according to DIN 45635 Part 26; Distance: Microphone – pump = 1 m
- The pump comes calibrated for optimal operating noise at the desired zero stroke pressure. If not specified, the pump comes optimized for the maximum achievable zero stroke pressure.

Characteristic curves for frame size 25

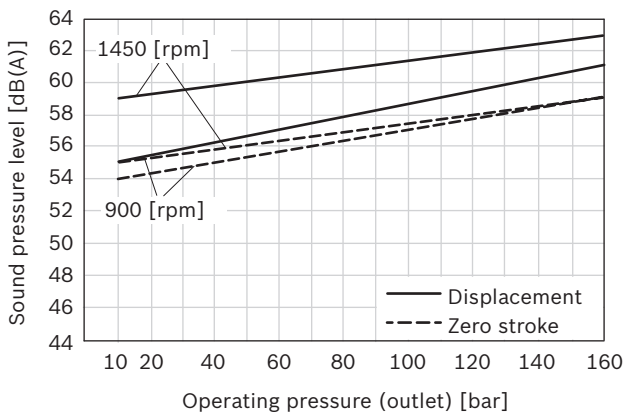
▼ PV7/25-30



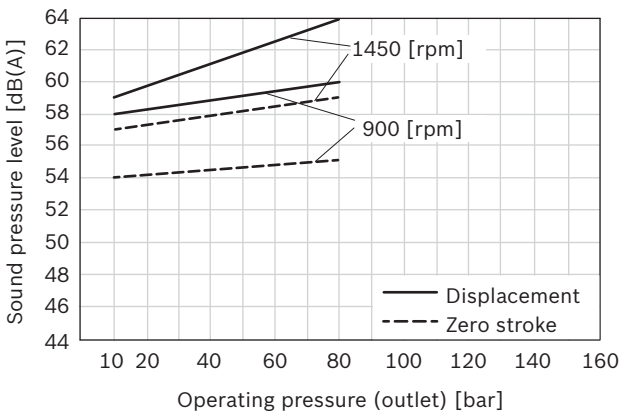
▼ PV7/25-45



▼ PV7/25-30 sound pressure levels



▼ PV7/25-45 sound pressure levels

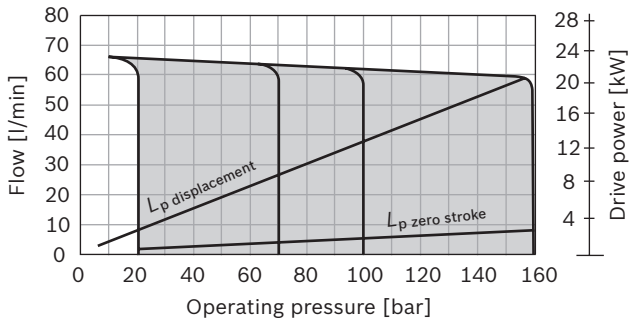


Notice

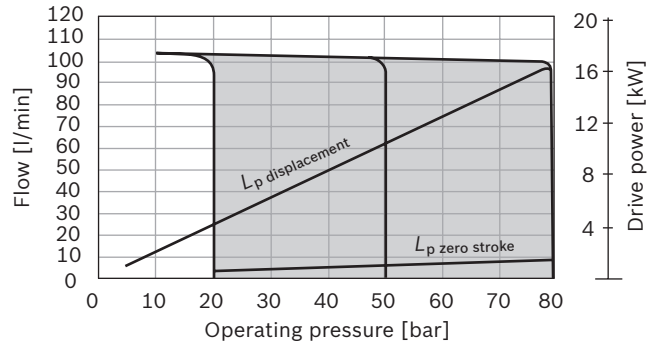
- Characteristic curves measured at $n = 1450 \text{ rpm}$; $v = 41 \text{ mm}^2/\text{s}$; $\theta = 50^\circ \text{C}$
- Sound pressure levels measured in acoustic room according to DIN 45635 Part 26;
Distance: Microphone – pump = 1 m
- The pump comes calibrated for optimal operating noise at the desired zero stroke pressure. If not specified, the pump comes optimized for the maximum achievable zero stroke pressure.

Characteristic curves for frame size 40

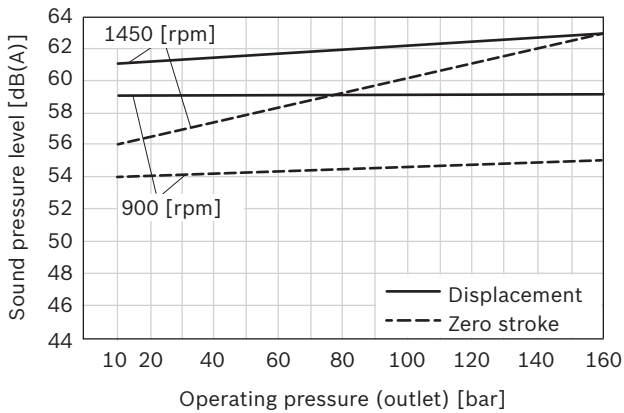
▼ PV7/40-45



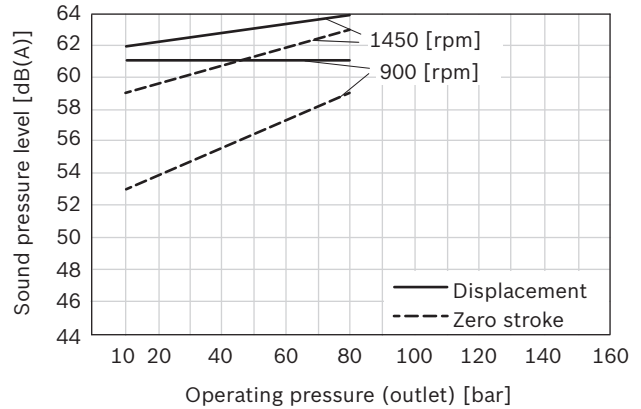
▼ PV7/40-71



▼ PV7/40-45 sound pressure levels



▼ PV7/40-71 sound pressure levels

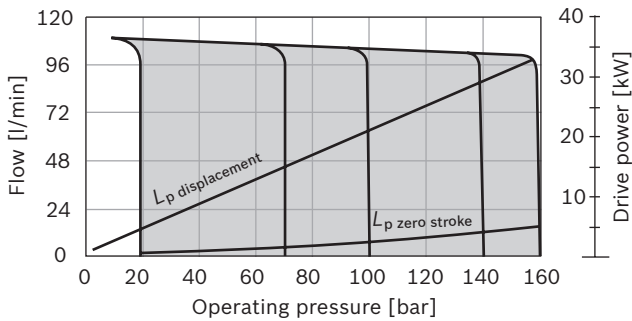


Notice

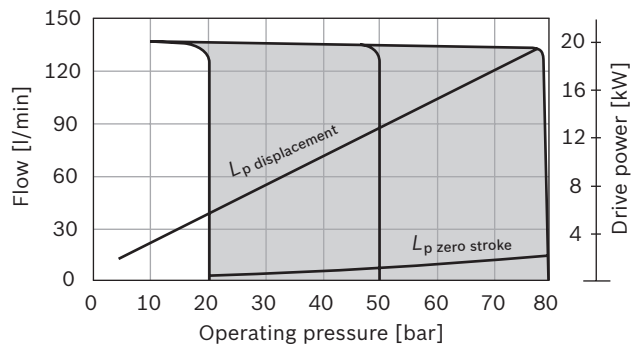
- Characteristic curves measured at $n = 1450$ rpm; $v = 41$ mm²/s; $\theta = 50$ °C
- Sound pressure levels measured in acoustic room according to DIN 45635 Part 26; Distance: Microphone – pump = 1 m
- The pump comes calibrated for optimal operating noise at the desired zero stroke pressure. If not specified, the pump comes optimized for the maximum achievable zero stroke pressure.

Characteristic curves for frame size 63

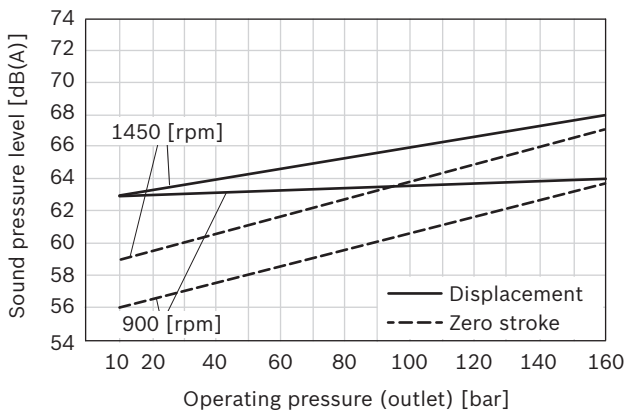
▼ PV7/63-71



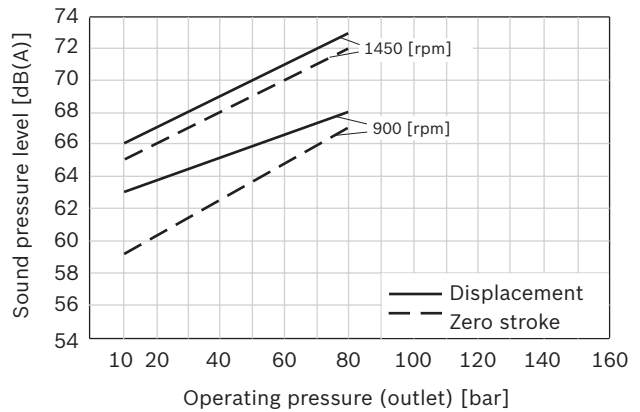
▼ PV7/63-94



▼ PV7/63-71 sound pressure levels



▼ PV7/63-94 sound pressure levels

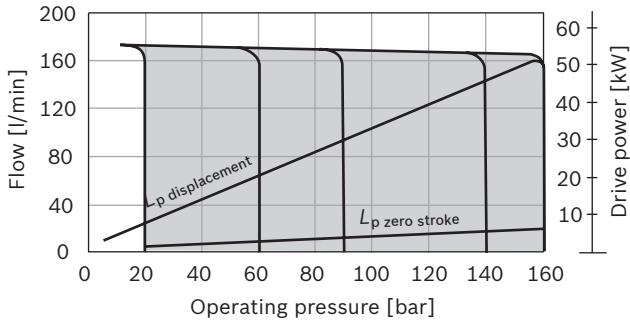


Notice

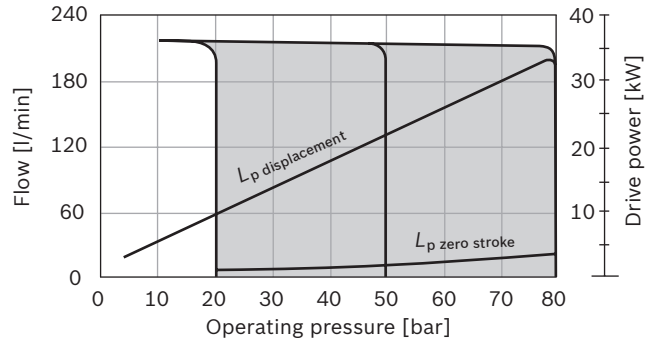
- ▶ Characteristic curves measured at $n = 1450$ rpm; $v = 41$ mm²/s; $\theta = 50$ °C
- ▶ Sound pressure levels measured in acoustic room according to DIN 45635 Part 26;
Distance: Microphone – pump = 1 m
- ▶ The pump comes calibrated for optimal operating noise at the desired zero stroke pressure. If not specified, the pump comes optimized for the maximum achievable zero stroke pressure.

Characteristic curves for frame size 100

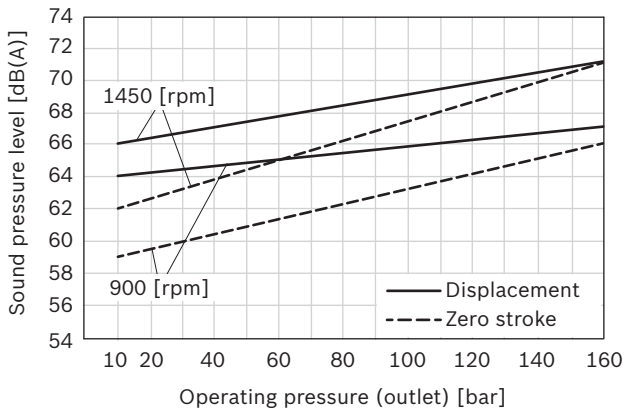
▼ PV7/100-118



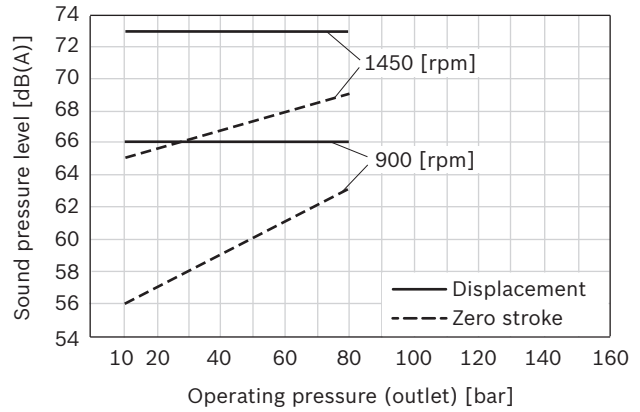
▼ PV7/100-150



▼ PV7/100-118 sound pressure levels



▼ PV7/100-150 sound pressure levels

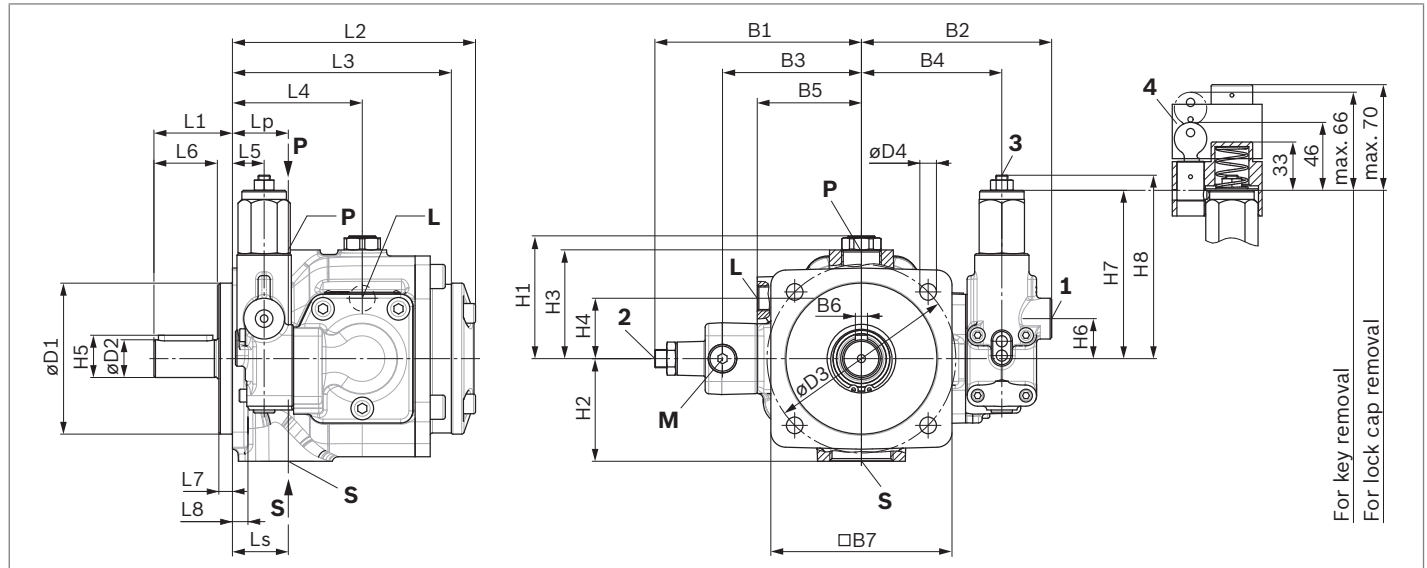


Notice

- Characteristic curves measured at $n = 1450$ rpm; $v = 41$ mm²/s; $\theta = 50$ °C
- Sound pressure levels measured in acoustic room according to DIN 45635 Part 26;
Distance: Microphone – pump = 1 m
- The pump comes calibrated for optimal operating noise at the desired zero stroke pressure. If not specified, the pump comes optimized for the maximum achievable zero stroke pressure.

Dimensions (dimensions in mm)

Single pump with type C, D or N controller



P	Pressure port ¹⁾
S	Suction port
L	Drain port
S	Measuring port
1	Control port G1/4×12 only for ordering code: ... D ... (Pressure controller with remote pressure setting), or ... N ... (Flow controller with remote flow control)
2	Flow control
3	Pressure adjuster
4	Space required to remove the lock cap (pressure can only be adjusted with lock cap removed)

Notes on adjustments

► Flow control (2)

- Turning clockwise reduces flow.
- Turning counterclockwise increases flow.
- The set flow should not be less than 50% of the maximum value.

► Pressure adjuster (3)

- Turning clockwise increases operating pressure.
- Turning counterclockwise decreases operating pressure.

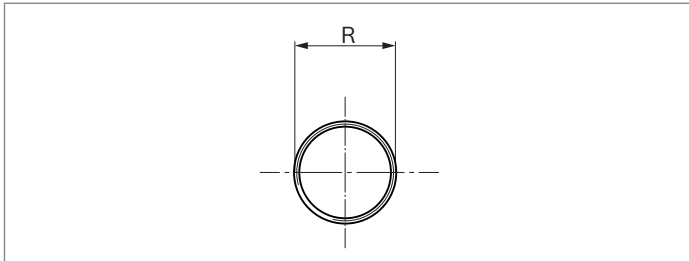
BG	L1	L2	L3	L4	L5	L6	L7	L8	Lp	Ls	L	S	ØD1	ØD2	ØD3	ØD4
10	44	142	132	78.5	22	36	7	9.3	26	26	G1/4×12	G1/4×12	80h8	20j6	103	9H13
16	52	161	145	86	21	42	9	10.3	37	37	G3/8×12	G1/4×12	100h8	25j6	125	11H13
25	52	173	157	86	21	42	9	10.3	34	38	G3/8×12	G1/4×12	100h8	25j6	125	11H13
40	68	182.6	166.6	86	21.5	58	9	12.3	26.5	43	G1/2×14	G1/4×12	125h8	32k6	160	14H13
63	68	205.3	189.3	98.7	34.2	58	9	12	38.7	50.7	G1/2×14	G1/4×12	125h8	32k6	160	14H13
100	92	237.3	221.3	110.8	28.3	82	9	17	45.3	59.3	G3/4×16	G1/4×12	160h8	40k6	200	18H13

BG	B1	B2 ¹⁾	B3	B4	B5	B6	□B7	H1	H2	H3	H4	H5	H6	H7	H8
10	max. 134	123	88	90	65	6h9	96	max. 76.1	58	64	37	22.5	25	110	max. 130
16	max. 138	126	92	93	69	8h9	120	max. 83.6	68	72	40	28	26.5	111.5	max. 131.5
25	max. 144	132	98	99	75	8h9	120	max. 93.8	92	80	40	28	26.5	111.5	max. 131.5
40	max. 161	158	115	125	94	10h9	141.2	max. 108.3	89	94	45	35	26	111	max. 131
63	max. 167	163	121	130	100	10h9	141.2	max. 114.7	105	100	47	35	26	111	max. 131
100	max. 195	182.5	150	149.5	121	12h9	200	max. 127.2	126	111	52	43	26	111	max. 131

¹⁾ For controller with ordering code ...**C**... B2 + 2 mm

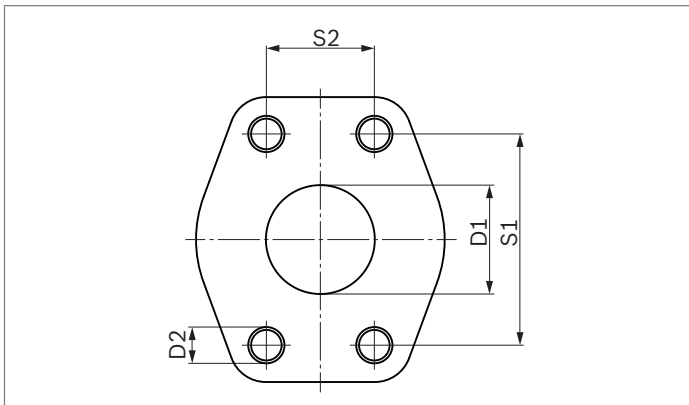
Connections

▼ Suction port S and pressure port P Pipe thread according to ISO 228-1



BG	Suction port S R	Pressure connection P R
10	G1 × 18	G1/2×14
16	G1 1/4×20	G3/4×16
25	G1 1/2×22	G1 × 18
40	See SAE flange connection	G1 × 18

▼ Suction port S and pressure port P SAE flange connection according to ISO 6162-1



Suction port S						Pressure connection P				
BG	Port size	D1	D2	S1	S2	Port size	D1	D2	S1	S2
40	DN38 (SAE 1 1/2")	Ø36	M12 × 20	69.9±0.2	35.7±0.2	See pipe thread				
63	DN51 (SAE 2")	Ø51	M12 × 27	77.8±0.6	42.9±0.6	DN32 (SAE 1 1/4")	Ø32	M10 × 29	58.7±0.6	30.2±0.6
100	DN64 (SAE 2 1/2")	Ø63	M12 × 30	88.9±0.2	50.8±0.2	DN38 (SAE 1 1/2")	Ø38	M12 × 27	69.9±0.2	35.7±0.2

Multiple pumps

All type PV7 pumps are combinable. All pumps with shaft "E" have output drive gearing.

All combinations of PV7 and any downstream pump are sealed off from one another by the shaft seal ring of the downstream pump. The seal depends on direction. For stricter requirements on secure media separation, please consult Technical Sales.

The possible combinations and material numbers for the required combination parts can be taken from the following table.

Downstream pump	Data sheet	Upstream pump			
		PV7-1X/10	PV7-1X/16/25	PV7-1X/40/63	PV7-1X/100
PV7-1X/06-...RA01M...	10522	R900540811	R900540812	–	–
PV7-1X/10-...RE01M...	10515	R900540811	R900540812	–	–
PV7-1X/16-...RE01M...	10515	–	R900540813	R900540815	R900543035
PV7-2X/20-...RA01M...	10522	–	R900540813	R900540815	R900543035
PV7-1X/25-...RE01M...	10515	–	R900540813	R900540815	R900543035
PV7-1X/40-...RE37M...	10515	–	–	R900540816	R900543036
PV7-1X/63-...RE07M...	10515	–	–	R900540816	R900543036
PV7-1X/100-...RE07M...	10515	–	–	–	R900543037
PGF1-2X/...RE01VU2	10213	R900857584	R900857585	–	–
PGF2-2X/...RJ...VU2	10213	R900541209	R900541210	R900541203	R900544959
PGP2-2X/...RJ20VU2	10231	R900541209	R900541210	R900541203	–
PGH2-2X/...RR...VU2	10223	R900541209	R900541210	R900541203	R900544959
PGH3-2X/...RR...VU2	10223	R900541209	R900541210	R900541203	R900544959
PGZ4/5-1X/...RT...VU2	10545	–	R901240641	R901240642	R901240643
AZPF...RR...MB	10089	R900541209	R900541210	R900541203	R900544959
PR4-1X/0.40...2.00-...WG...	11263	–	R900541205	–	–
PR4-3X/1.60...20.00-...RA...	11263	–	R900541207	R900541208	–
A10VSO10...U	92709	R900541209	R900541210	R900541203	R900544959
A10VSO18...U	92709	R900541209	R900541210	R900541203	R900544959

Ordering code**Type**

01	2-fold	P2
02	Vane pump, variable, pilot-operated	V7

Frame size (BG) and unit (NG) of the first pump

03	BG 10 – NG 14 cm ³	10-14
	BG 10 – NG 20 cm ³	10-20
	BG 16 – NG 20 cm ³	16-20
	BG 16 – NG 30 cm ³	16-30
	BG 25 – NG 30 cm ³	25-30
	BG 25 – NG 45 cm ³	25-45
	BG 40 – NG 45 cm ³	40-45
	BG 40 – NG 71 cm ³	40-71
	BG 63 – NG 71 cm ³	63-71
	BG 63 – NG 94 cm ³	63-94
	BG 100 – NG 118 cm ³	100-118
	BG 100 – NG 150 cm ³	100-150

Controller of the first pump¹⁾

04	Pressure controller	C
	Pressure controller for hydraulic remote pressure adjustment	D
	Flow controller	N
	Pressure controller with 2-step electric pressure adjustment	W

Controller option

05	Standard	0
	Lockable	3
	With K plate	5
	With Q plate	6
	Lockable with K plate	7
	Lockable with Q plate	8

06	Series of the second pump ¹⁾	
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07	Size of the second pump ¹⁾	
----	---------------------------------------	--

08	Controller of the second pump ¹⁾ (if required)	
----	---	--

Direction of rotation

09	Viewed on drive shaft	clockwise	R
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Drive shaft of the first pump

10	Cylindrical drive shaft according to ISO 3019-2 with output	E
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¹⁾ For detailed information, see type keys on pages 2 and 3.

Line connection of the first pump

11	Frame sizes 10, 16, 25	Suction and pressure port: Pipe thread according to ISO 228-1	01
	Frame size 40	Suction port: SAE flange connection according to ISO 6162-1 Pressure port: Pipe thread according to ISO 228-1	37
	Frame sizes 63, 100	Suction and pressure port: SAE flange connection according to ISO 6162-1	07

Drive shaft of the second pump

12	(If required)	
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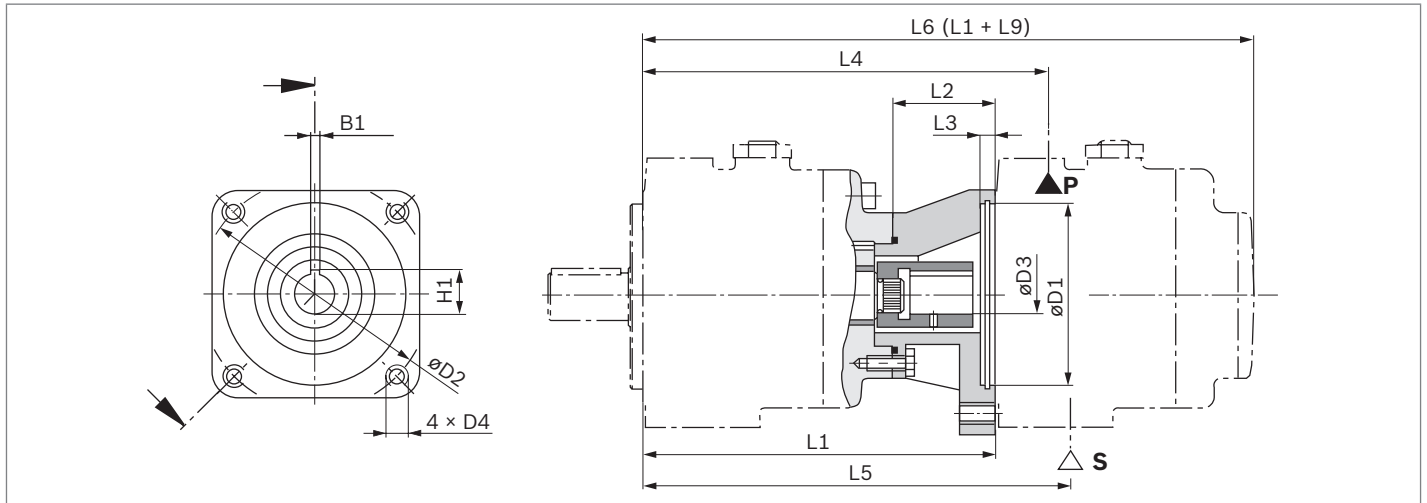
Line connection of the second pump

13	(If required)	
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Mounting flange of the first pump

14	4-hole flange according to ISO 3019-2	E4
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15	Further details in the plain text	*
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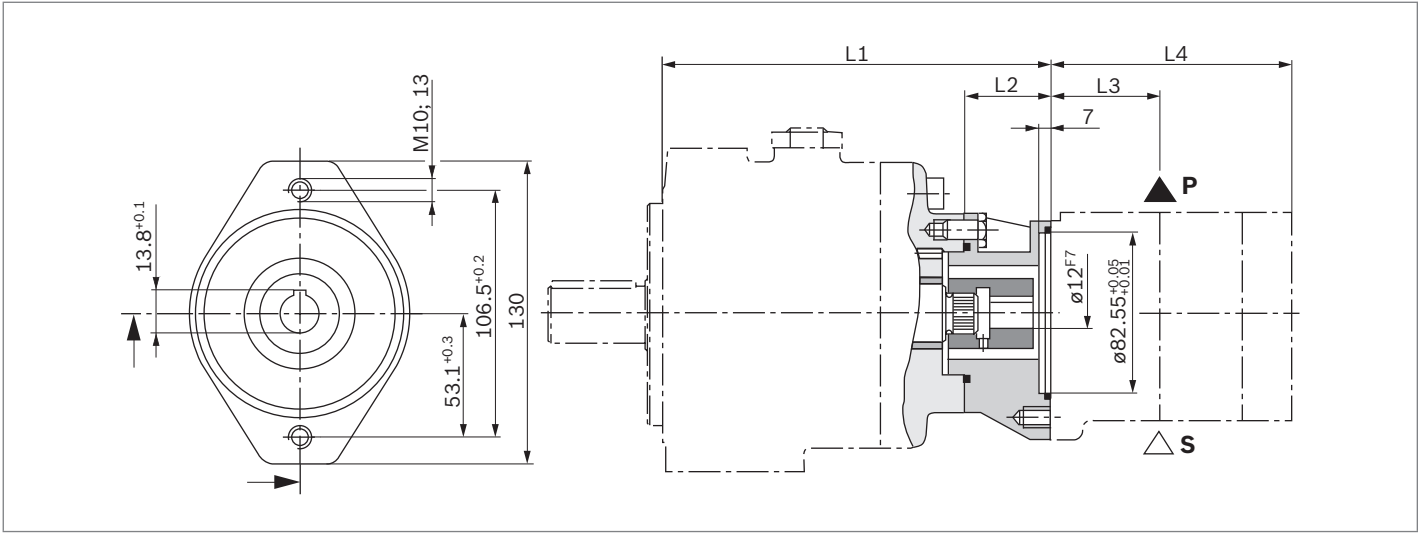
Pump combination dimensions (dimensions in mm)▼ **P2V7...+ V7/...**

BG 1st pump	BG 2nd pump	L1	L2	L3	øD1	øD2	øD3	D4	H1	B1 ^{JS9}	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	324
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	342
	16	208	63	10	100	125	25	M10	28.3	8	245	245	369
	20	208	63	10	100	125	25	M10	28.3	8	238	233	343
	25	208	63	10	100	125	25	M10	28.3	8	242	246	381
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	354
	16	220	63	10	100	125	25	M10	28.3	8	257	257	362
	20	220	63	10	100	125	25	M10	28.3	8	250	245	355
	25	220	63	10	100	125	25	M10	28.3	8	254	258	397
40	16	229.6	63	10	100	125	25	M10	28.3	8	266.6	266.6	374.6
	20	229.6	63	10	100	125	25	M10	28.3	8	260	254.6	364.6
	25	229.6	63	10	100	125	25	M10	28.3	8	263.6	267.6	402.6
	40	246.6	80	10	125	160	32	M12	35.3	10	273.1	289.6	429.2
	63	246.6	80	10	125	160	32	M12	35.3	10	285.3	297.3	451.9
63	16	252	63	10	100	125	25	M10	28.3	8	289	289	413
	20	252	63	10	100	125	25	M10	28.3	8	282	277	387
	25	252	63	10	100	125	25	M10	28.3	8	286	290	425
	40	269	80	10	125	160	32	M12	35.3	10	296	312	452
	63	269	80	10	125	160	32	M12	35.3	10	308	320	475
100	16	284	63	10	100	125	25	M10	28.3	8	321	321	445
	20	284	63	10	100	125	25	M10	28.3	8	314	309	419
	25	284	63	10	100	125	25	M10	28.3	8	318	322	457
	40	301	80	10	125	160	32	M12	35.3	10	328	344	484
	63	301	80	10	125	160	32	M12	35.3	10	340	352	507
	100	321	100	10	160	200	40	M16	43	12	367	381	559

Order example

- ▶ P2V7/10-14C0+V7/10-14C0RE01+01E4
- ▶ P2V7/16-20C0+V7/16-20C0RE01+01E4
- ▶ P2V7/25-30C0+V7/25-30C0RE01+01E4
- ▶ P2V7/40-45C0+V7/40-45C0RE37+37E4
- ▶ P2V7/63-71C0+V7/63-71C0RE07+07E4
- ▶ P2V7/100-118C0+V7/100-118C0RE07+07E4

▼ P2V7....+ GF1...



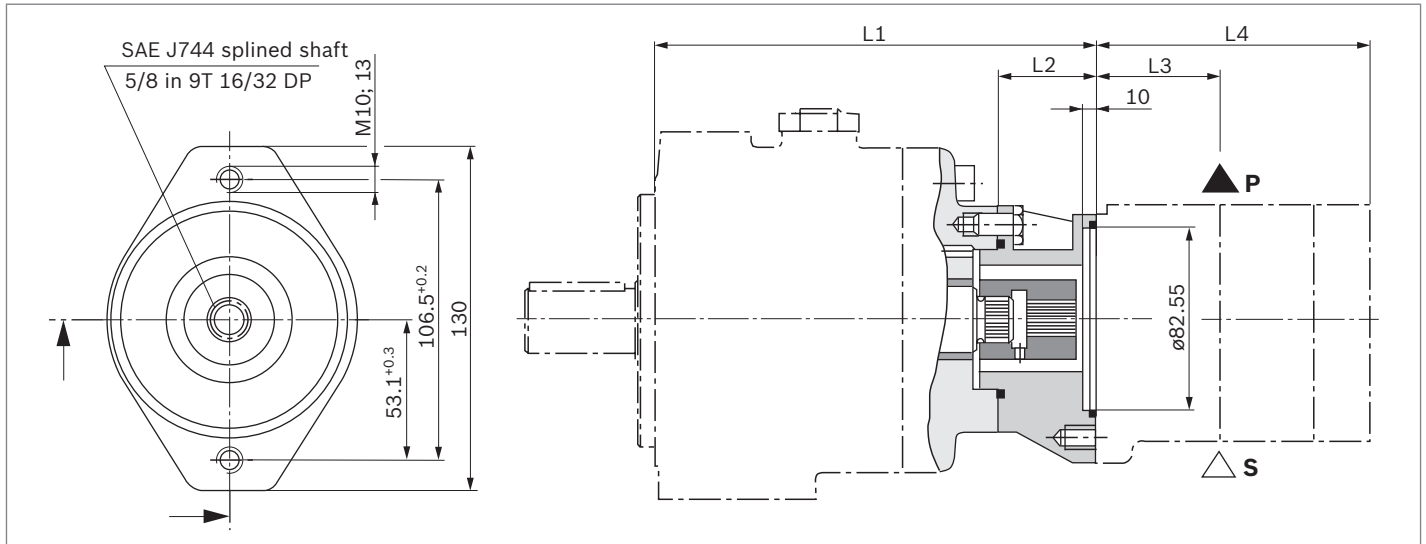
Type	BG	L1	L2
PV7	10	168	36
	16	192	47
	25	204	47

Type	NG	L2	L3
GF1	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

Order example

- P2V7/10-14C0+GF1/4,1RE01+E01E4
- P2V7/25-45C0+GF1/4,1RE01+E01E4

▼ P2V7...+ GF2 / GP2 / GH2 / GH3 / AZPF / A10VSO



Type	BG	L1	L2
PV7	10	168	36
	16	192	47
	25	204	47
	40	213.6	47
	63	236.4	47
	100	268.4	47

Type	NG	L3	L4
PGF2/PGP2	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

Type	NG	L3	L4
PGH2	003	51	102.5
	005	54	110
	006	55.5	112.5
	008	57	116

Type	NG	L3	L4
PGH3	011	60	121.5
	013	62.5	126.5
	016	65	131.5

Type	NG	L3	L4
AZPF	004	40	85
	005	41	87.5
	008	43	91.5
	011	47	96.5
	014	47.5	101.5
	016	47.5	105
	019	47.5	110
	022	55	115.5

Type	NG	L3	L4
A10VSO	010	148 ¹⁾	164; 179 ²⁾
	018	145	195

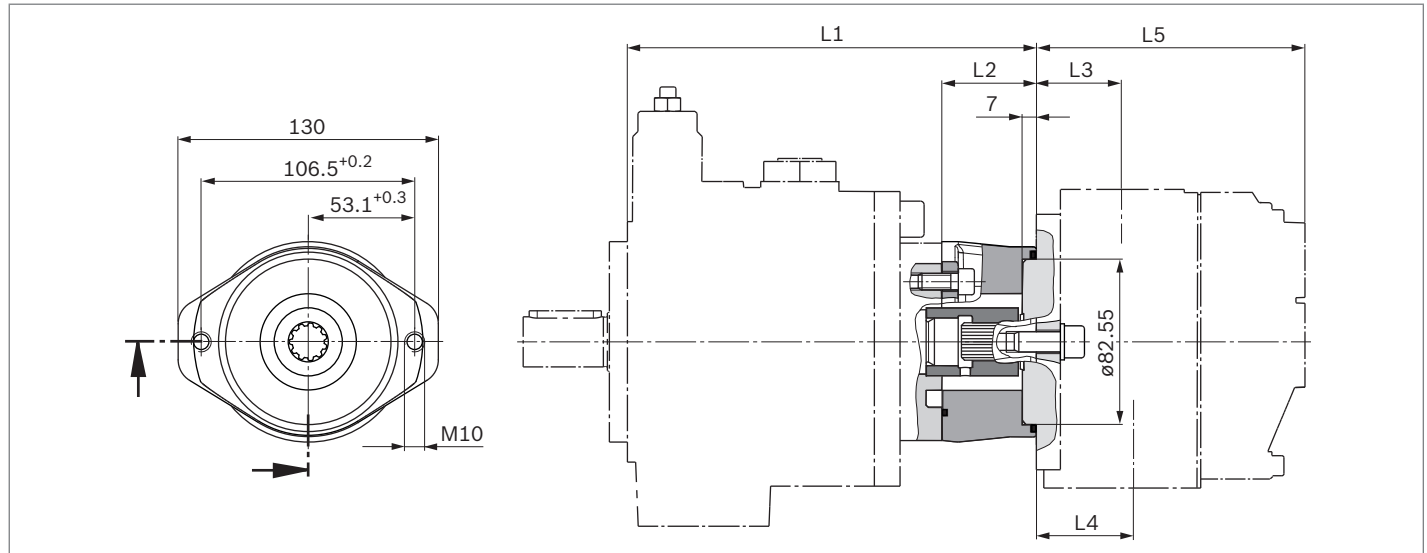
Order example

- P2V7/10-14C0+GF2/016RE01+J20E4
- P2V7/10-14C0+GP2/011RE01+E20E4
- P2V7/10-14C0+GH2/005RE01+R07E4
- P2V7/10-14C0+GH3/013RE01+07E4
- P2V7/10-14C0+AZPF/016RE01+R20E4
- P2V7/25-45C0+A10VSO10DFR-RE07+64E4

1) Axial line connections

2) Controller-based (see Data Sheet 92713)

▼ **P2V7...+ GZ4/5-1X**



Type	BG	L1	L2
PV7	16	192	47
	25	204	47
	40	213.6	47
	63	236.4	47
	100	268.4	47

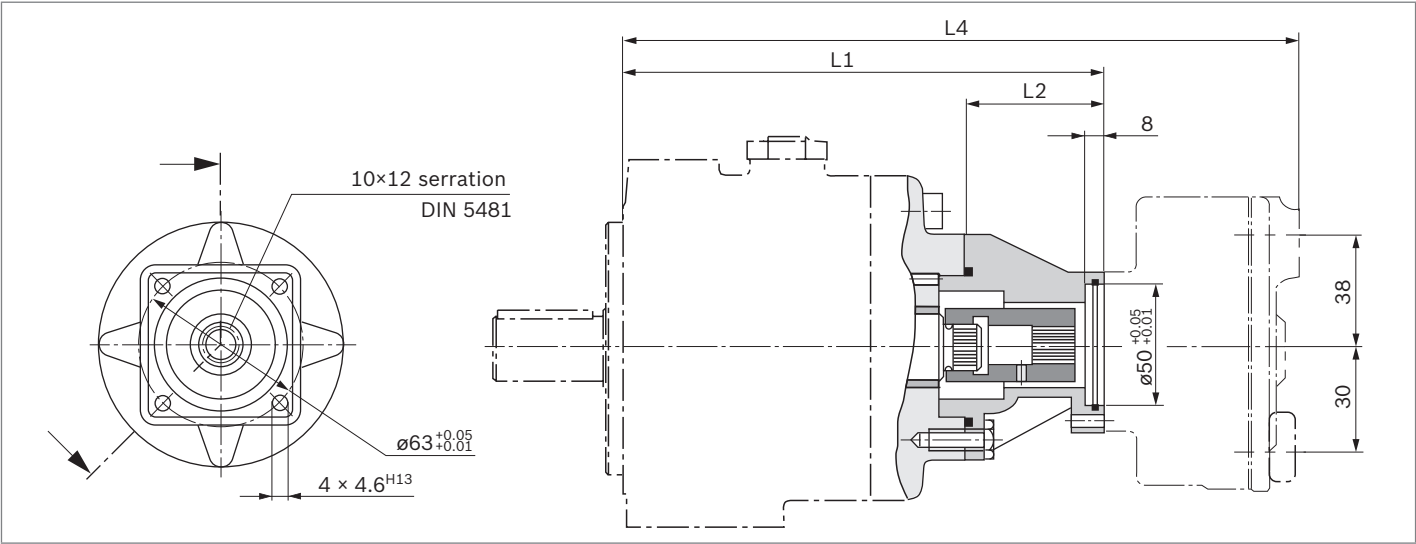
Type	NG	L3	L4	L5
PGZ4-1X	020	42.5±0.2	42.5±0.2	116.5±1.2
	032	42.5±0.2	42.5±0.2	121.5±1.2
	040	42.5±0.2	42.5±0.2	125±1.2
	050	42.5±0.2	42.5±0.2	129±1.2
	063	42.5±0.2	42.5±0.2	134±1.2
	080	42.5±0.2	42.5±0.2	142±1.2

Type	NG	L3	L4	L5
PGZ5-1X	063	42.5±0.2	48.5±0.2	134±1.2
	080	42.5±0.2	48.5±0.2	142±1.2
	100	42.5±0.2	48.5±0.2	150.5±1.2
	140	42.5±0.2	48.5±0.2	163±1.2

Order example

- ▶ P2V7/16-20C0+GZ4/032RE01+07E4
- ▶ P2V7/40-45C0+GZ5/080RE37+07E4

▼ P2V7/...+ PR4 mini



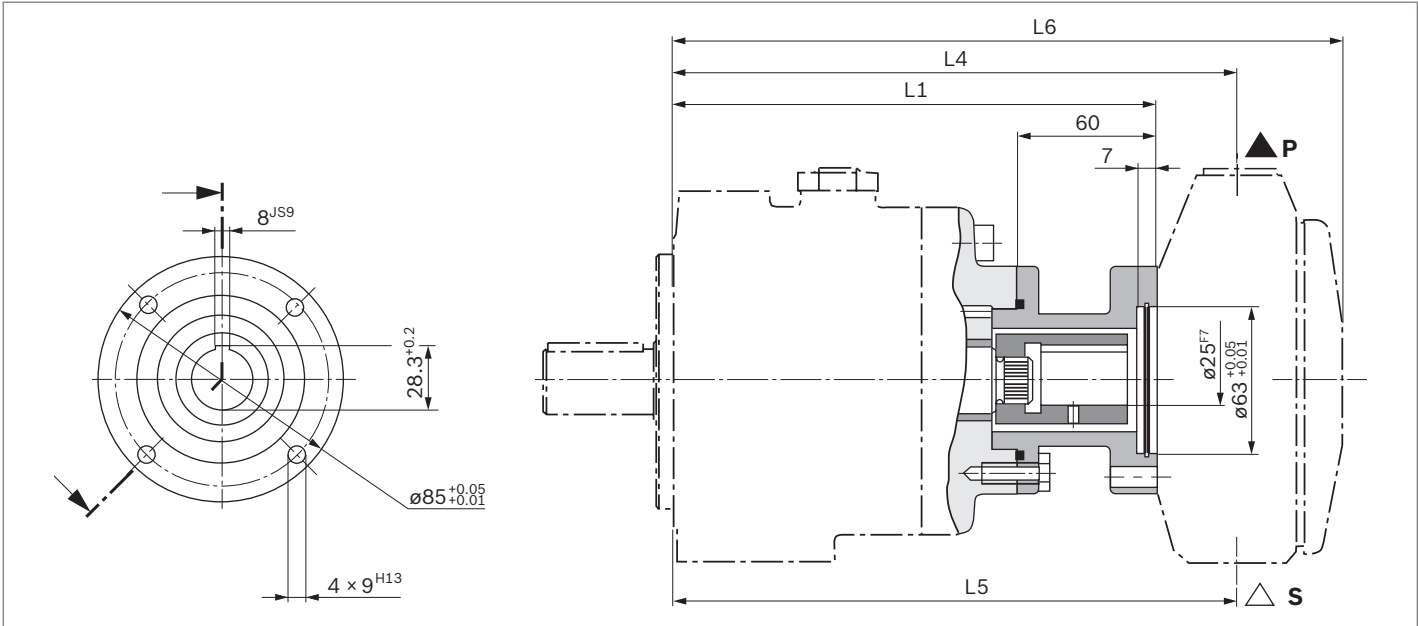
Type	BG	L1	L2	L4
PV7	16	208	63	277
	25	220	63	289

Notice
Suction port **S** on PR4 should be above the pressure port.

Order example

► P2V7/16-20C0+R4/0.63-700RE01+G01E4

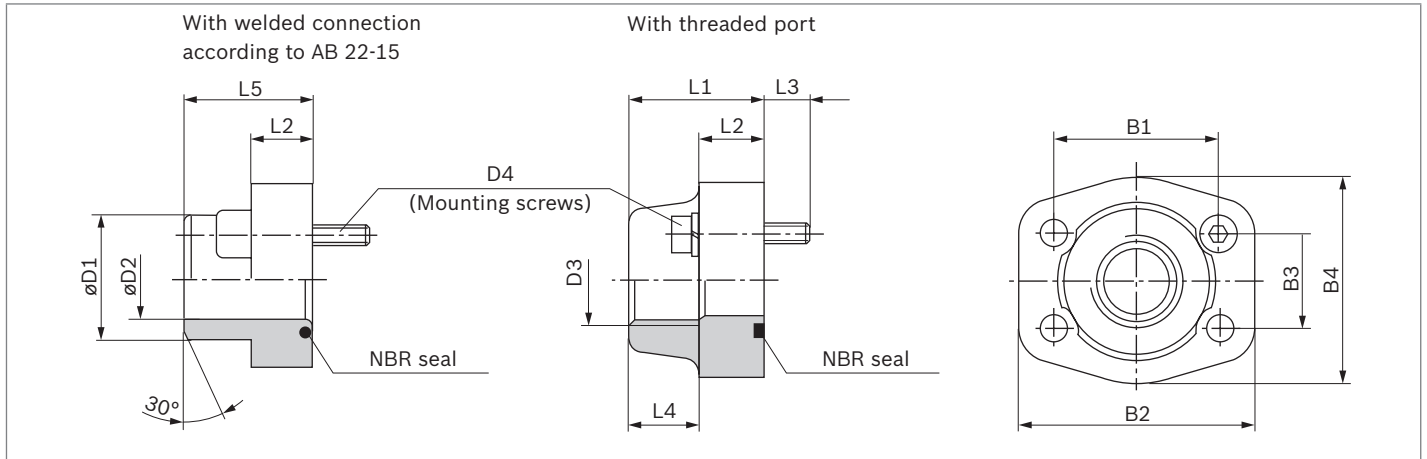
▼ P2V7/16... to PV7/63...+ PR4 standard



Type	BG	L1	L4		L5		L6	
			3/5 pistons	10 pistons	3/5 pistons	10 pistons	3/5 pistons	10 pistons
PV7	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	249.4	288.9	288.9	288.9	296.9	335.4	368.9

Order examples

- ▶ P2V7/16-20C0+R4/3.15-500RE01+A01E4
- ▶ P2V7/40-45C0+R4/4.00-700RE37+A01E4

SAE connection flange (dimensions in mm)**Maximum operating pressure 210bar [3000 psi]**

PV7		Flange NG	Material number¹⁾ for flange with	
suction flange	pressure flange		welded connection	threaded port²⁾
–	PV7/63-...	1 1/4"	R900012946	R900014153
PV7/40-...	PV7/100-...	1 1/2"	R900013501	R900014827
PV7/63-...	–	2"	R900013502	R900014829
PV7/100-...	–	2 1/2"	R900013503	R900024205

NG	B1	B2	B3	B4	D1	D2	D3	D4	L1	L2	L3	L4	L5
1 1/4"	58.7	79	30.2	68	38	30	G1 1/4	M10-8.8	41	21	18	22	42
1 1/2"	69.9	95	35.7	76	42	36	G1 1/2	M12-8.8	44	25	18	24	57
2"	77.8	102	42.9	90	61	49	G2	M12-8.8	45	25	18	26	46
2 1/2"	88.9	114	50.8	104	76	62	G2 1/2	M12-8.8	50	25	18	30	50

1) The material numbers include the flange, the O-ring (NBR) and the mounting screws.

2) Pipe thread "G" according to DIN EN ISO 228-1

Project planning information

When using vane pumps, we recommend carefully observing the notes below.

Project planning, installation and commissioning of the vane pumps require skilled persons with training.

Technical data

All characteristics are based on manufacturing tolerances and apply under specific boundary conditions.

Please note that this means certain deviations are possible and characteristics may vary when boundary conditions (e.g., viscosity) change.

Characteristic curves for flow and power input

When designing the drive motor, observe the maximum possible application parameters.

Sound pressure level

The sound pressure levels shown starting on page 14 were measured in the style of DIN 45635 Sheet 26.

This means that only the noise emitted by the pump is shown. Ambient influences (place of installation, piping, etc.) were not included.

These levels always refer to only one pump. Each additional comparable pump increases the initial level by 3 dB(A).

Notice

Due to the power unit design and influences at the final place of installation of the pump, the sound pressure level is usually 5 to 10 dB(A) higher than the level from the pump itself.

Leakage

Page 6 contains the average external leakage of the pumps. Note that these values are only intended to serve as project planning guidelines for determining cooler sizes and line cross-sections. The zero stroke power is the relevant factor for dimensioning the reservoir (see pages 14 to 19). Cross section narrowing and the use of a leakage cooler can cause unacceptably high pressure peaks in the leakage line.

Leakage cooler

The values for external leakage on page 6 are averages for continuous operation.

When the pump relieves pressure, the leakage flow is increased momentarily by the pilot fluid of the controller.

Cross section narrowing, long drain lines and leakage coolers can cause unacceptably high pressure peaks.

Appropriate steps, e.g., a check valve in the bypass, should be taken to prevent the leakage pressure ($p_{\max} = 2 \text{ bar}$) from exceeding permissible limits. Otherwise there is a risk the shaft seal will be damaged.

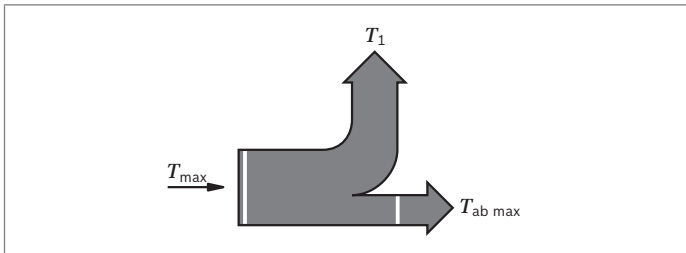
Pressure limitation

Depending on the controller version, the PV7 vane pump contains no internal mechanism for limiting potential peaks in operating pressure. Setting and limiting the admissible operating pressure has to be ensured on the system side. The pressure relief valves necessary for that purpose are to be designed considering the maximum flow and the existing pressure increase speed so that the admissible intermittent operating pressure is not exceeded.

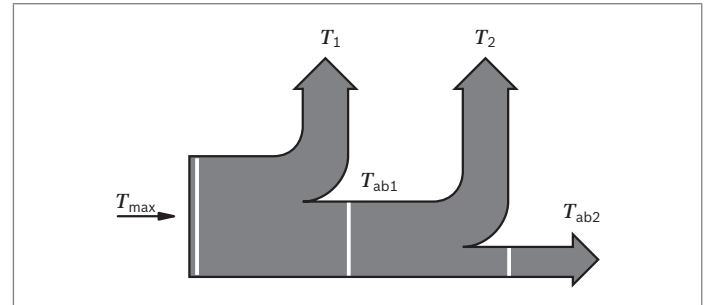
Multiple pumps

PV7 pumps are designed to be combinable. Every pump comes with a geared through-drive.

- ▶ When operating the PV7 as a displacement pump, it should be used as the downstream pump.
- ▶ The same general technical data for single pumps applies (see page 6).
- ▶ The pump under greater load (pressure × flow) should be the first pump stage.
- ▶ When combining multiple pumps, the torque generated may reach unacceptable levels.
The sum of the torque levels should not exceed the permissible values (see table).
- ▶ Combination parts must be listed as separate items when ordering.
- ▶ The combination parts come with the necessary seals and screws.

▼ Single pump

PV7 Frame size	Maximum permissible drive torque $T_{\max}$	Maximum permissible output torque $T_{\text{out max}}$
10	90	45
16	140	70
25	180	90
40	280	140
63	440	220
100	680	340

Combination pump

Pump combination: P2V7/25-30... + V7/25-30

Desired maximum pressure: $p_n = 160 \text{ bar}$

Calculation example

$$T = \frac{\Delta p \times V \times 0.0159}{\eta_{\text{hydr.-mech.}}} \quad [\text{Nm}]$$

$$T_{1,2} = \frac{160 \times 30 \times 0.0159}{0.85} = \quad [\text{kW}]$$

$$T_{1,2} = 90 \text{ Nm} \leq T_{\text{out max}}$$

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

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

Key

- T Torque [Nm]
 Δp Operating pressure [bar]
 V Displacement [cm^3]
 η Hydromechanical efficiency

Notice

The pump combination can be operated with the calculated parameters.

Installation information

Fluid tank

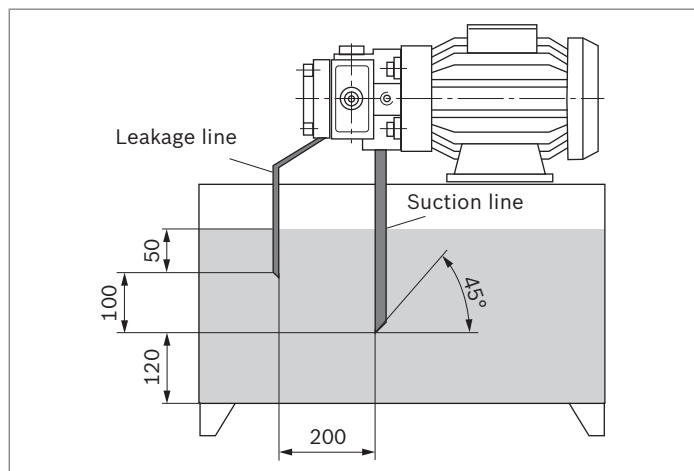
- ▶ Adjust useful volume of the tank to the operating conditions.
- ▶ The permissible fluid temperature may not be exceeded; include a cooler, if necessary.

Lines and connections

- ▶ Cut at a 45° angle.
- ▶ Remove protective plugs from the pump.
- ▶ We recommend the use of seamless precision steel pipes according to DIN EN 10305-1 and removable pipe connections.
- ▶ Select the inner width of the pipes according to the connections.
- ▶ Thoroughly clean pipelines and fittings prior to installing.

Suggested pipe routing

Minimum dimensions [mm]



- ▶ Minimum 120 mm from the tank bottom.
- ▶ Place the leakage line so the pump cannot run dry.
- ▶ Under no circumstances should the leakage and return fluid be directly suctioned back into the pump.

Filter

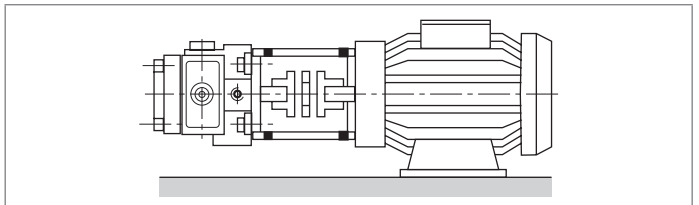
If possible, use return flow filters or pressure filters.
(Use suction filters only in combination with a ported vacuum switch/clogging indicator).

Hydraulic fluid

- ▶ Please observe our regulations according to data sheet 90220.
- ▶ We recommend brand name hydraulic fluids.
- ▶ Do not mix different types of hydraulic fluids, since this can result in decomposition and deterioration of lubricity.
- ▶ Hydraulic fluid should be replaced at regular intervals according to the operating conditions. Residue should also be cleaned from the hydraulic fluid reservoir at this time.

Drive

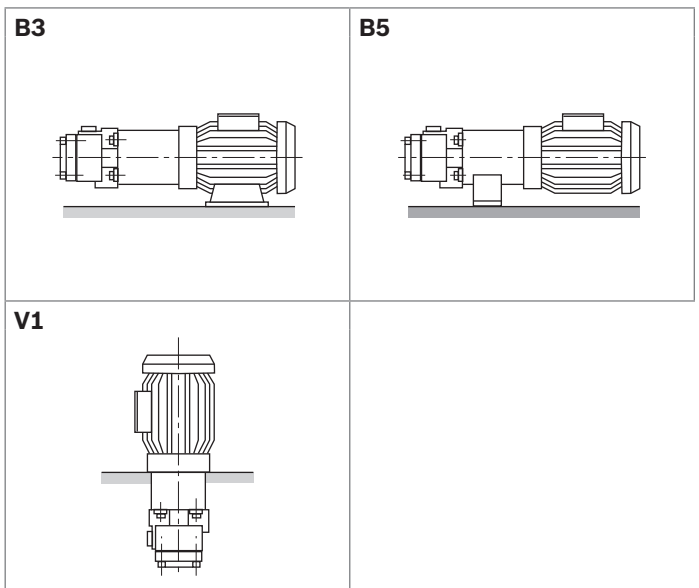
Electric motor + pump carrier + coupling + pump



- ▶ No radial or axial forces permissible on the pump drive shaft.
- ▶ Motor and pump must be exactly aligned.
- ▶ Use a torsionally flexible coupling.

Installation positions

Horizontal position preferred



Commissioning information

Bleeding

- ▶ All type PV7 vane pumps are self-priming.
- ▶ Before initial commissioning, the pump must be air bled to protect it against damage.
- ▶ During initial commissioning, we recommend filling the housing through the leakage line. Note the filter rating. This increases operating safety and prevents wear in case of unfavorable installation conditions.
- ▶ Should the pump not be outputting bubble-free oil after approx. 20 seconds, re-check the system. After the operating level has been reached, check the pipe connections for leakage. Check the operating temperature.

Commissioning

- ▶ Check whether the system is thoroughly and properly installed.
- ▶ Note the motor and pump direction of rotation arrows.
- ▶ Start the pump without load and let it pump at low pressure for a few seconds in order to ensure sufficient lubrication.
- ▶ Never operate the pump without hydraulic fluid.

Notice

The pump should only be adjusted, maintained and repaired by authorized, trained and instructed persons.
Use only original Rexroth spare parts.
Only operate the pump within the permissible tolerances.
Only operate the pump when in good working order.
Before working on the pump (e.g., installation/removal), de-energize and depressurize the system.
Do not make any unauthorized conversions or changes affecting the safety and functionality of the pump.
Install protective devices (e.g., coupling guard).
Do not remove any protective devices.
Always observe general safety and accident prevention regulations.