RE 10522
Edition: 2022-11
Replaces: 2013-01

rexroth
A Bosch Company

Adjustable vane pump, direct operated

Type PV7...A

- Component series 1X; 2X
- Variable displacement
- Frame size 06 and 20
- Sizes 10 ... 25
- Maximum operating pressure 100 bar
- Displacement 10 ... 25 cm³

Features

- Very short control times
- Low operating noise
- Fastening and connection dimensions according to ISO 3019-2
- High efficiency
- Long life cycle

Contents

Ordering code

01		02		03	04	05	06	07	08	09		10	11
PV7	**–**		**/**		**R**	**A**	**01**	**M**	**A**		**–**		*****

01	Vane pump, pressure-controlled, direct operated	**PV7**
02	Component series 10 ... 19 (10 ... 19: unchanged installation and mounting dimensions) (Frame size 06)	**1X**
	Component series 20 ... 29 (20 ... 29: unchanged installation and mounting dimensions) (Frame size 20)	**2X**
03	**Frame size 06**	
	Size 10 (displacement 10 cm^3)	**06-10**
	Size 14 (displacement 14 cm^3)	**06-14**
	Frame size 20	
	Size 20 (displacement 20 cm^3)	**20-20**
	Size 25 (displacement 25 cm^3)	**20-25**
Direction of rotation		
04	When looking at the drive shaft, right	**R**
Drive shaft		
05	Cylindrical shaft with fitting key according to ISO 3019-2	**A**
Line connections		
06	Suction and pressure port with pipe thread according to DIN EN ISO 228-1	**01**
Seal material		
07	NBR seals	**M**
08	Direct operated	**A**
Pressure adjustment (controller option)		
09	Standard	**0**
	Lockable	**3**
Zero stroke pressure range [1]		
10	**Size 10**	
	25 ... 50 bar	**05**
	50 ... 100 bar	**10**
	Size 14	
	15 ... 40 bar	**04**
	40 ... 70 bar	**07**
	Size 20 and 25	
	25 ... 50 bar	**05**
	50 ... 100 bar	**10**
11	Further details in the plain text	

[1] In the condition as supplied, the zero stroke pressure is set to the smallest value.

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Ordering code

Preferred types (available for immediate delivery)

Type	Material number
PV7-1X/06-10RA01MA0-05	R900561857
PV7-1X/06-10RA01MA0-10	R900563233
PV7-1X/06-14RA01MA0-04	R900919235
PV7-1X/06-14RA01MA0-07	R900919237
PV7-2X/20-20RA01MA0-05	R900950952
PV7-2X/20-20RA01MA0-10	R900950953
PV7-2X/20-25RA01MA0-05	R900950954
PV7-2X/20-25RA01MA0-10	R900950955

☞ **Notice:**
Setting up the pump in the condition as supplied
- If settings are not specified → The flow rate is set to the maximum value and the operating noise is optimized at maximum zero stroke pressure.
- If settings are specified → The pump is set to the desired values and the operating noise is optimized at the desired zero stroke pressure.

Example: Pump with customer-specific setting
- PV7-1X/06-14RA01MA0-07-P50, $p_{zero\ stroke}$ = 50 bar
- PV7-1X/06-14RA01MA0-07-Q20, q_{Vmax} = 20 l/min

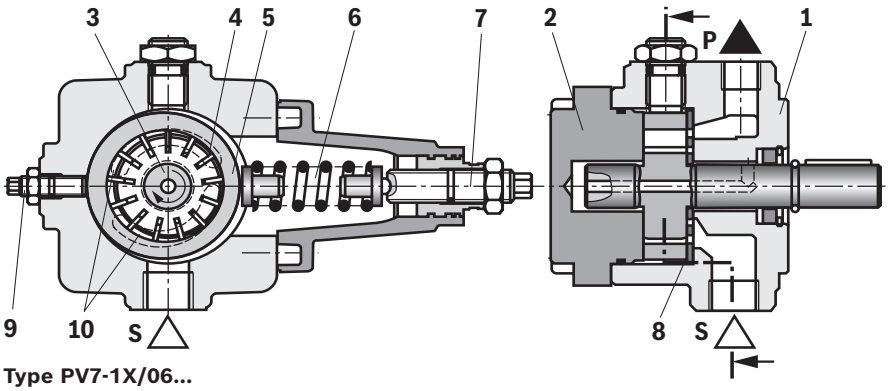
Function, section, symbol

Hydraulic pumps of type PV7...A are direct operated vane pumps with adjustable displacement.
They basically comprise of housing (1), cover (2), rotor (3), vanes (4), stator ring (5), compression spring (6), set screw (7) and control plate (8).
For limitation of the maximum flow, the pump is equipped with a set screw (9).
The driven rotor (3) rotates within the stator ring (5).
The centrifugal force presses the vanes (4) guided in the rotor (3) against the internal sliding surfaces of the stator ring (5).

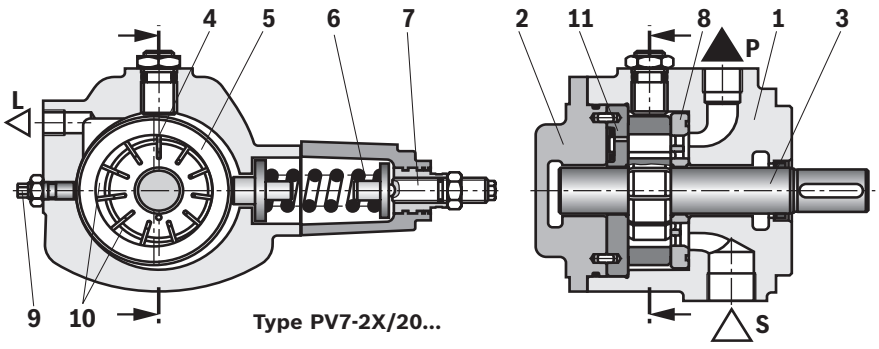
Suction and displacement procedure
The cells (10) necessary to transport the hydraulic fluid are formed by the vanes (4), the rotor (3), the stator ring (5), the control plate (8) and the cover (2). The cell volume increases as the rotor (3) rotates and the cells (10) are filled with hydraulic fluid through the suction channel (S).
When reaching the biggest cell volume, the cells (10) are separated from the suction side.
If the rotor (3) is rotated further, connection to the pressure side is established, the cells narrow and displace the hydraulic fluid via the pressure channel (P) into the system.

Pressure control
The stator ring (5) is held in the eccentric initial position by the spring (6). The maximum operating pressure required in the system is set at the set screw (7) using the spring (6).
The pressure building up by the load resistance acts at the pressure side on the inner sliding surface of the stator ring (5), against the force of the spring (6).
If the pressure corresponding to the set spring force has been reached, the stator ring (5) is pushed out of its eccentricity in zero position direction. The flow settles at the set value which is just removed. If the peak pressure set at the spring (6) is reached, the pump controls the flow to almost zero. The operating pressure is maintained and only the leakage is replaced.
In this way, the power loss and heating of the hydraulic fluid are kept to a minimum.

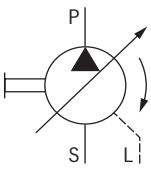
Materials used
- Frame size 06:
  - Housing (1): Cast iron
  - Cover (2): Aluminum
  - Displacer elements (3 ... 7), (9): Steel
  - Control plate (8): Tin bronze
- Frame size 20:
  - Housing (1) and cover (2): Cast iron
  - Displacer elements (3 ... 7), (9): Steel
  - Control plate (8), (11): Aluminum



Type PV7-1X/06...



Type PV7-2X/20...



Technical data

(For applications outside these values, please consult us!)

General					
Frame size		06	06	20	20
Size	NG	10	14	20	25
Pump design		Vane pump			
Type of mounting		Flange mounting			
Type of connection		Pipe thread			
Weight	kg	6.3	6.3	11.4	11.4
Installation position		Horizontal, suction port at the bottom or vertically			
Shaft load		Radial and axial forces cannot be transmitted			
Direction of rotation		Clockwise rotation			
Minimum speed	rpm	900			
Maximum speed	rpm	1800			
Maximum torque	Nm	50	50	110	110
Drive shaft		Cylindrical shaft with fitting key according to ISO 3019-2			
Flange		4-hole mounting flange according to ISO 3019-2			
Surface protection		Preserved			

Hydraulic					
Minimum suction pressure	bar	0.8			
Maximum suction pressure	bar	2.5			
Maximum operating pressure	bar	100	70	100	100
Maximum pressure in the drain port	bar	2			
Hydraulic fluid		Mineral oil HLP according to DIN 51524 (other hydraulic fluid on request)			
Hydraulic fluid temperature range	°C	–10 ... +70			
Viscosity range	mm^2/s	16 ... 160			
Maximum admissible degree of contamination of the hydraulic fluid; cleanliness class according to ISO 4406 (c)		Class 19/16/13 [1]			
Displacement (geometrical)	cm^3	10	14	20	25
Maximum flow [2]	l/min	18.0	25.2	36.0	45.0
Maximum leakage [3]	l/min	2.0	1.4	2.5	2.5
Change in flow [4]	l/min	7.5	7.5	14	14

[1] The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and at the same time increases the life cycle of the components.

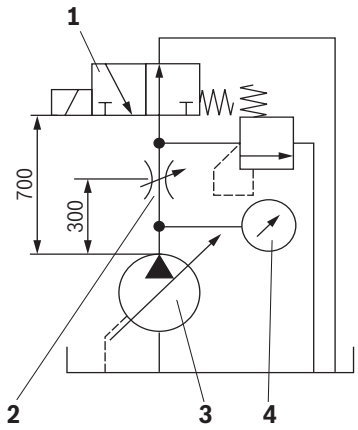
[2] Measured at maximum speed

[3] Measured with maximum operating pressure and viscosity $\boldsymbol{v}$ = 30 mm^2/s

[4] For a rotation of the flow adjusting screw

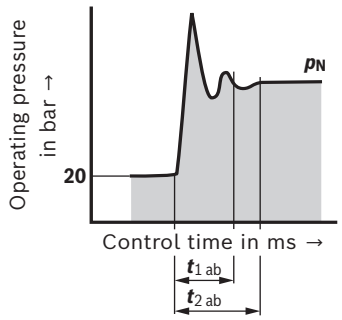
Dynamic behavior, measurement set-up

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

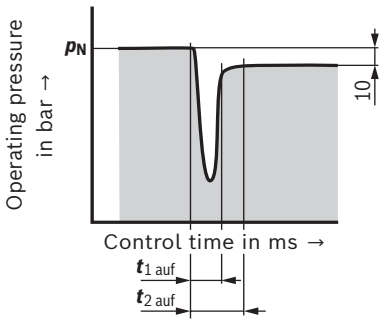


1 Directional valve (switching time 30 ms)
2 Throttle for setting pressure during displacement
3 Hydraulic pump
4 Pressure tapping point

Pressure relief ($q_{V\ displacement} \rightarrow q_{V\ zero\ stroke}$)



Pressure recovery ($q_{V\ zero\ stroke} \rightarrow q_{V\ displacement}$)



Version	Pressure in bar		Control times (average values) in ms	
	p_N	p_{max} [1]	$t_{1\ down}$	$t_{2\ down}$
"06-10...10"	100	150	85	90
"06-10...05"	50	130	70	110
"06-14...07"	70	130	80	100
"06-14...04"	40	100	65	90
"20-20...10"	100	170	80	125
"20-25...10"	100	170	80	125
"20-25...05"	50	120	60	85

[1] Admissible pressure peaks

Version	Pressure in bar	Control times (average values) in ms	
	p_N	$t_{1\ up}$	$t_{2\ up}$
"06-10...10"	100	35	60
"06-10...05"	50	20	30
"06-14...07"	70	30	50
"06-14...04"	40	20	35
"20-20...10"	100	25	45
"20-25...10"	100	25	45
"20-25...05"	50	20	40

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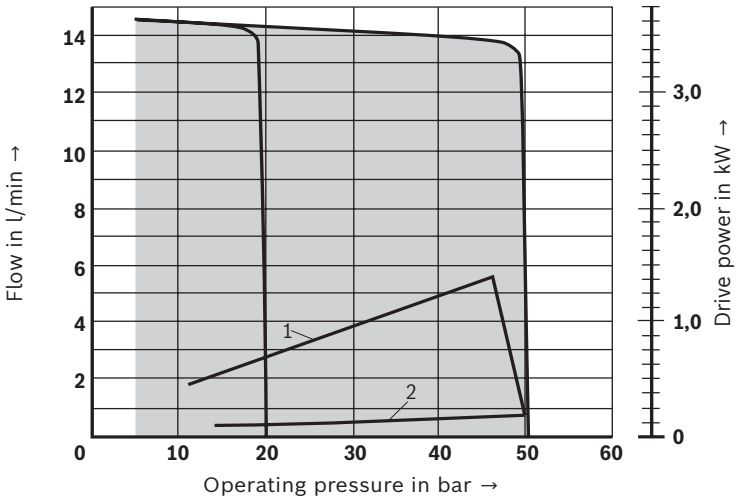
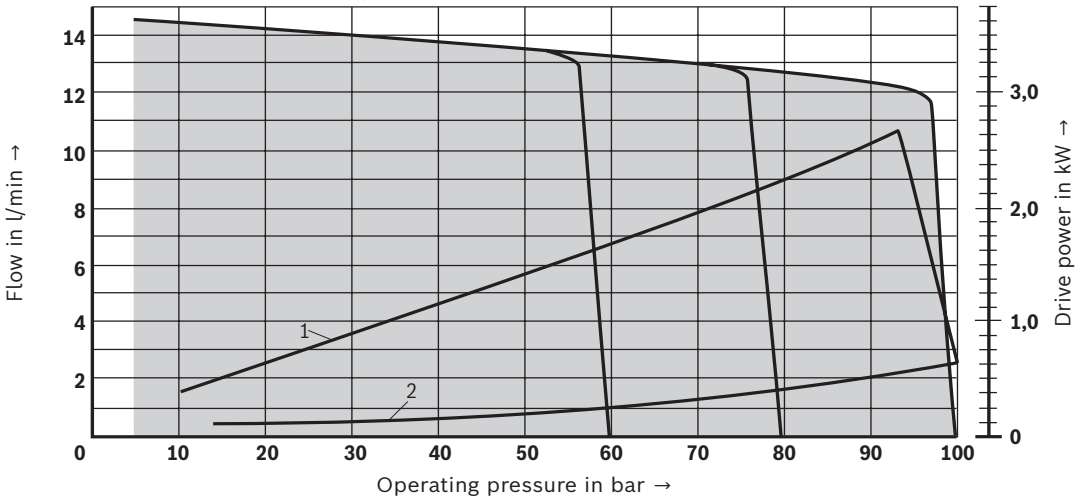
Characteristic curves: "06-10"
(measured with n = 1450 rpm, v = 41 mm²/s, ϑ_{oil} = 50°C)

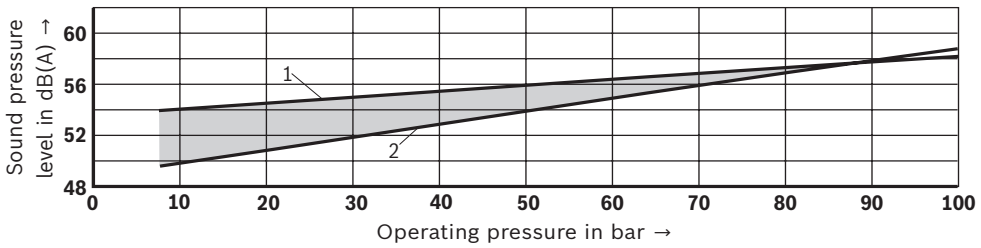
Zero stroke pressure range "05"



Zero stroke pressure range "10"



Sound pressure level

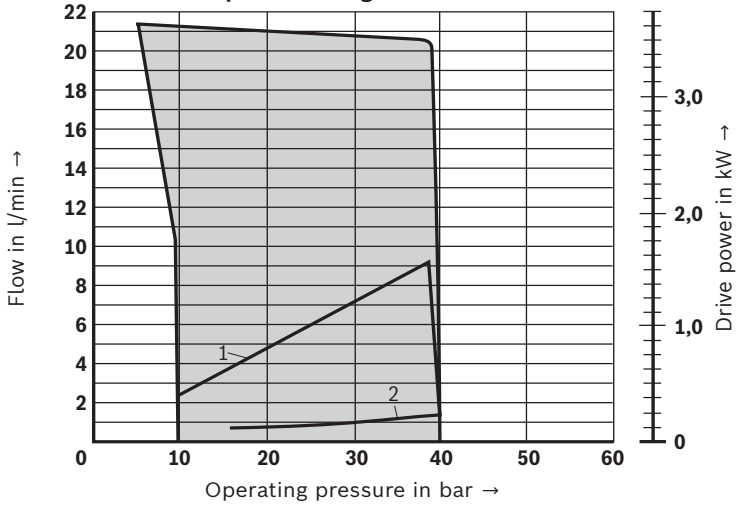


1 Displacement
2 Zero stroke

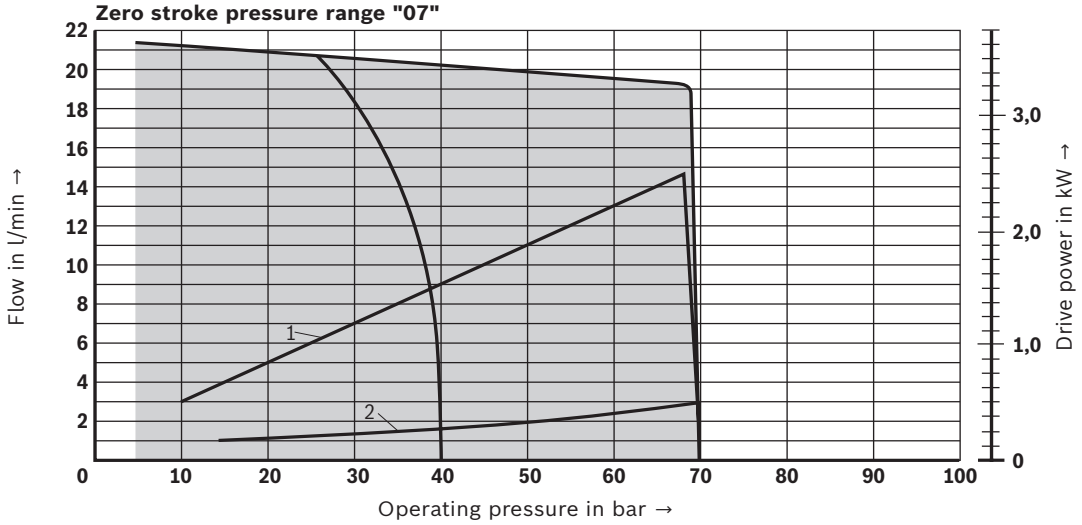
☞ **Notice:**
Sound pressure level measured in the sound measuring chamber according to DIN 45635, sheet 26; distance microphone/pump = 1 m

Characteristic curves: "06-14"
(measured with n = 1450 rpm, ν = 41 mm²/s, ϑ_{oil} = 50°C)

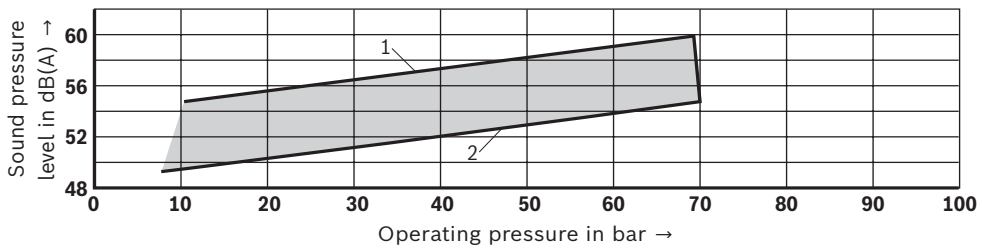
Zero stroke pressure range "04"



Zero stroke pressure range "07"



Sound pressure level

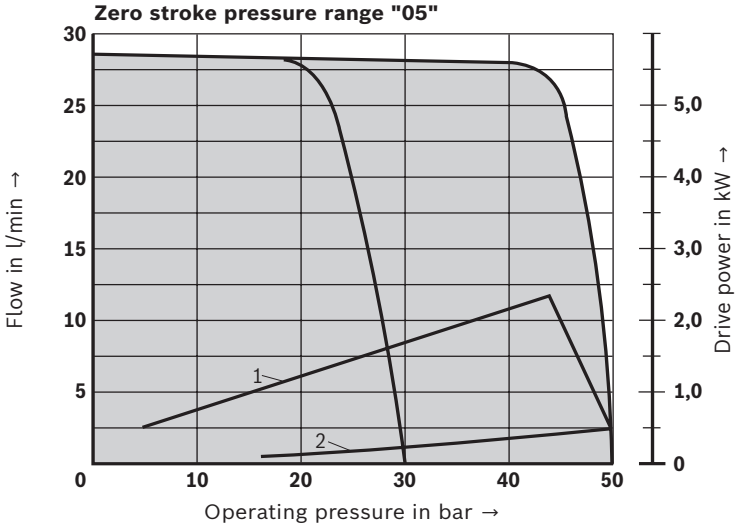


1 Displacement
2 Zero stroke

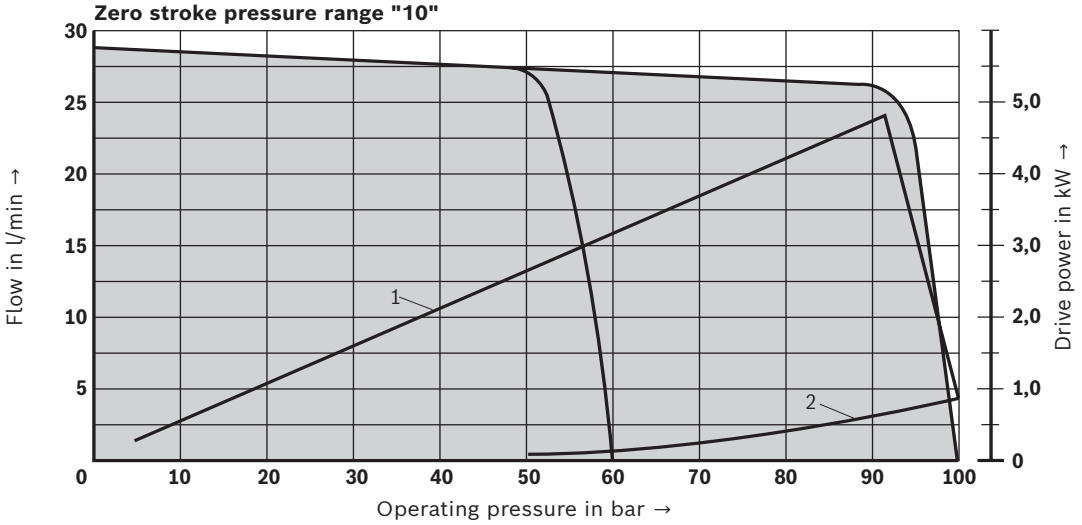
☞ **Notice:**
Sound pressure level measured in the sound measuring chamber according to DIN 45635, sheet 26; distance microphone/pump = 1 m

Characteristic curves: "20-20"
(measured with n = 1450 rpm, ν = 41 mm²/s, ϑ_{oil} = 50°C)

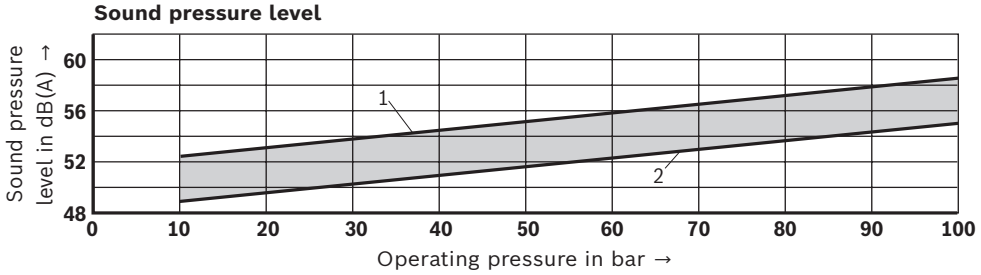
Zero stroke pressure range "05"



Zero stroke pressure range "10"



Sound pressure level

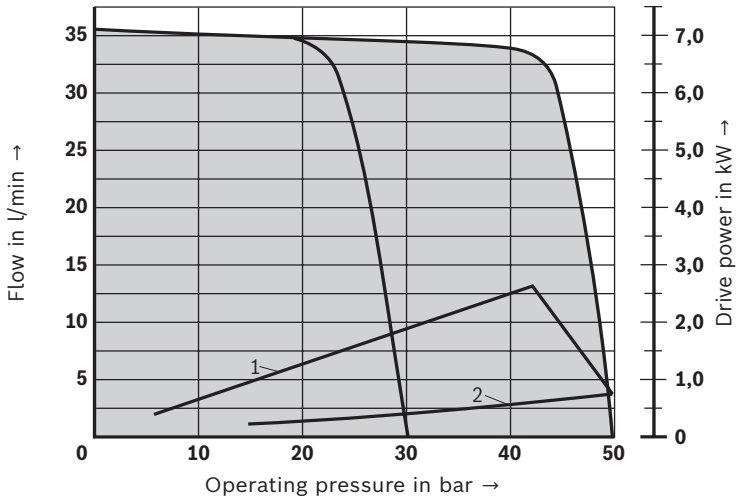


1 Displacement
2 Zero stroke

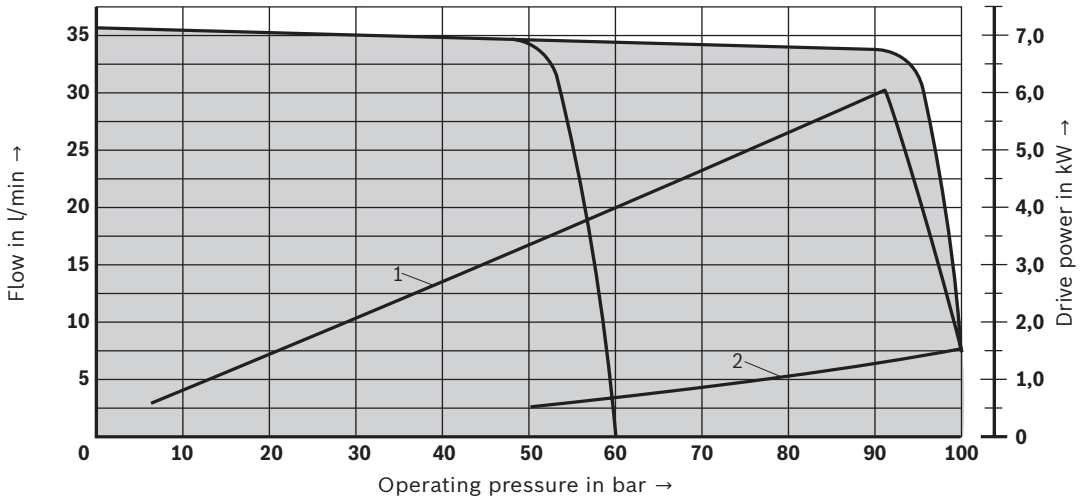
Notice:
Sound pressure level measured in the sound measuring chamber according to DIN 45635, sheet 26; distance microphone/pump = 1 m

Characteristic curves: "20-25"
(measured with n = 1450 rpm, ν = 41 mm²/s, ϑ_{oil} = 50°C)

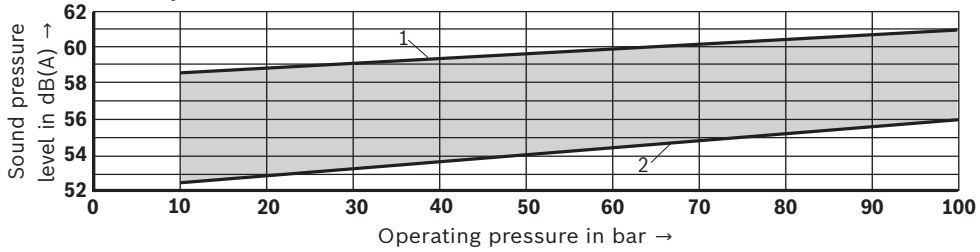
Zero stroke pressure range "05"



Zero stroke pressure range "10"



Sound pressure level



1 Displacement
2 Zero stroke

☞ **Notice:**
Sound pressure level measured in the sound measuring chamber according to DIN 45635, sheet 26; distance microphone/pump = 1 m

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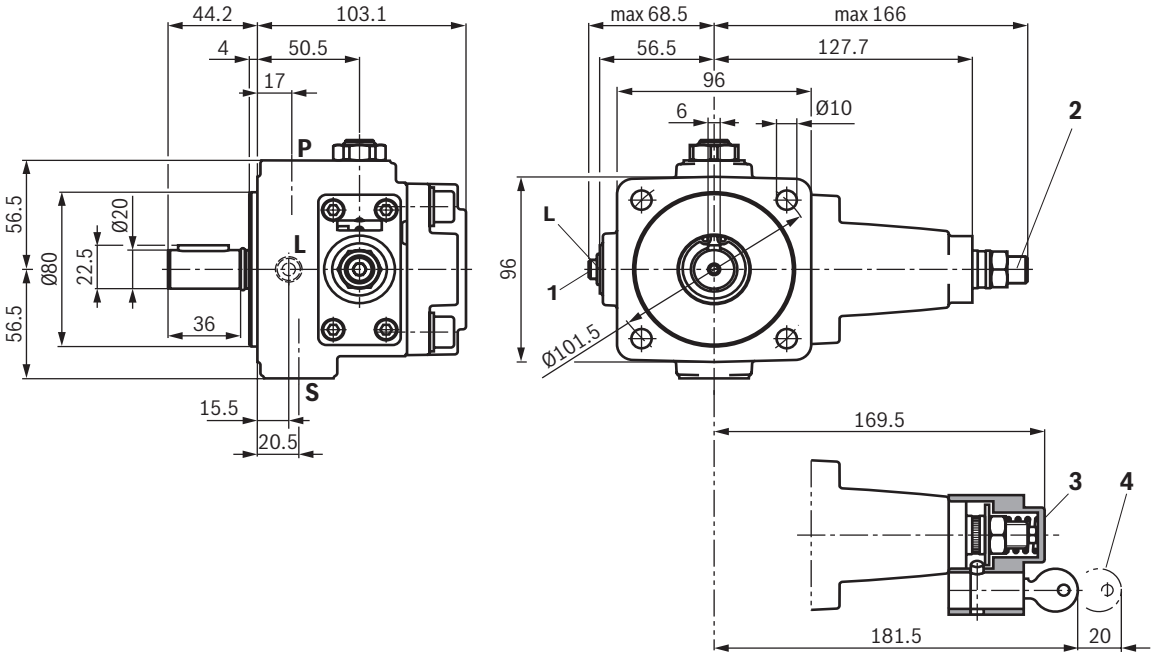
Dimensions: Version "06-10"; "06-14" (dimensions in mm)

Flange and shaft end according to ISO 3019-2 – 80B4HW – E20N



Connections

S	Suction port	G1/2
P	Pressure port	G3/8
L	Leakage connection	G1/4

1 Flow control
2 Pressure adjustment standard "0"
3 Pressure adjustment lockable "3"
4 Space required to remove the key

Notice:
- Flow control (1)
  - with clockwise rotation, reduction of the flow
  - with counterclockwise rotation, increase in flow
- Pressure adjustment (2)
  - with clockwise rotation, increase in the operating pressure
  - with counterclockwise rotation, reduction of the operating pressure
- The dimensions are nominal dimensions which are subject to tolerances.

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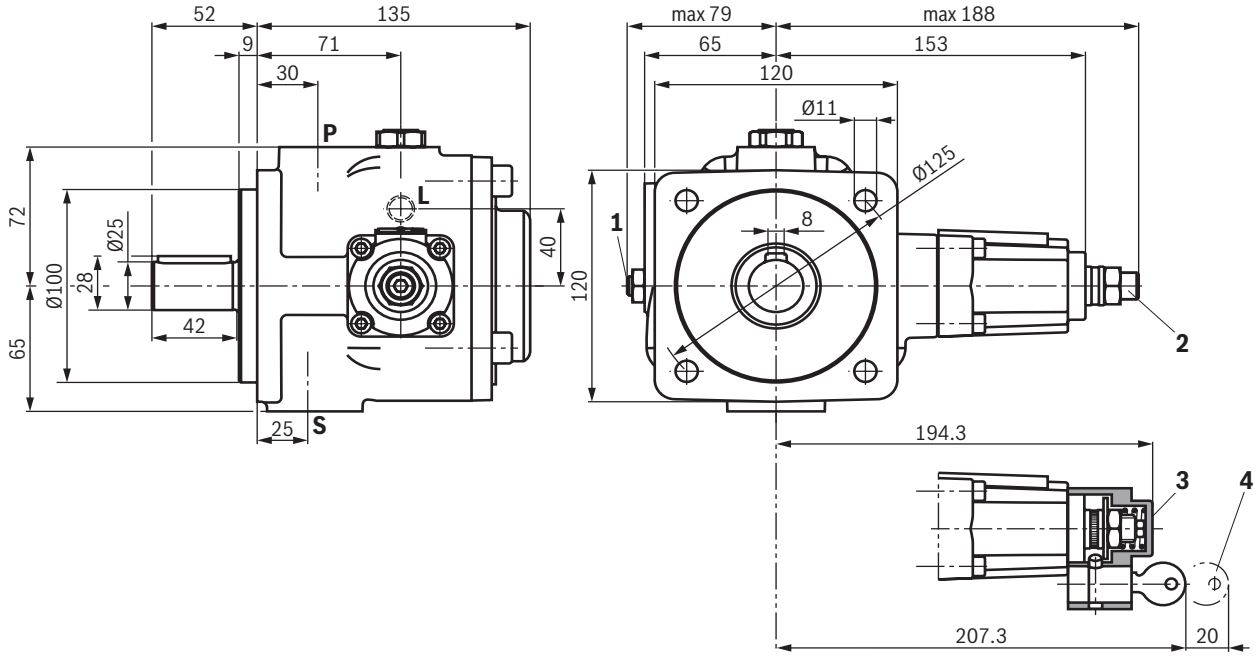
Dimensions: Version "20-20"; "20-25" (dimensions in mm)

Flange and shaft end according to ISO 3019-2 - 100B4HW - E25N



Connections

S	Suction port	G3/4
P	Pressure port	G1/2
L	Leakage connection	G1/4

1 Flow control
2 Pressure adjustment standard "0"
3 Pressure adjustment lockable "3"
4 Space required to remove the key

Notice:
- Flow control (1)
  - with clockwise rotation, reduction of the flow
  - with counterclockwise rotation, increase in flow
- Pressure adjustment (2)
  - with clockwise rotation, increase in the operating pressure
  - with counterclockwise rotation, reduction of the operating pressure
- The dimensions are nominal dimensions which are subject to tolerances.

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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.

Noise
The values for sound pressure level shown on the pages 7 ... 10 have been measured according to DIN 45635 part 26. That means only the noise emission of the pump is shown. Environmental influences (such as place of installation, piping, etc.) have been eliminated. The values are in each case only valid for one pump.

☞ **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 ... 10 dB(A) higher than the level from the pump itself.

Leakage
The "Technical Data" section states 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 7 ... 10).
Cross section narrowing and the use of a leakage cooler can cause unacceptably high pressure peaks in the leakage line.

Pressure limitation
Pressure controllers are no protection against excessive pressure. In the hydraulic system, a separate pressure relief valve is to be provided.

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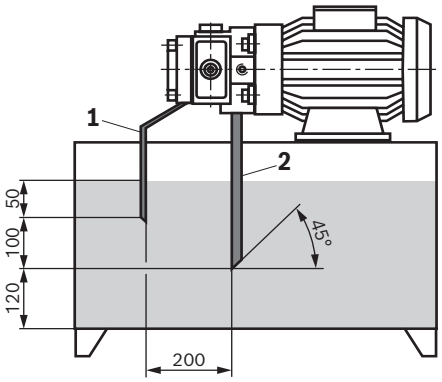
Installation information

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

Lines and connections
- Remove protective plugs from the pump.
- We recommend using seamless precision steel pipes according to DIN 2391 and releasable 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 in mm)



1 Leakage line
2 Suction line

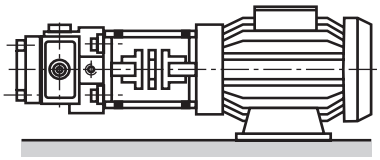
- Place the leakage line so the pump cannot run dry.
- Under no circumstances should the leakage and return fluid be directly suctioned back into the pump.

Filter
Use a return flow or pressure filter, if possible.
(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 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 position
- Horizontal, suction port facing downwards preferred
- Vertical, upwards shaft when installed in tank

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Commissioning information

Bleeding

- All vane pumps of type PV7...A are self-priming.
- Before initial commissioning, the pump must be air bled to protect it against damage.
- For the initial commissioning, we recommend filling the housing via the leakage line. Note the filter rating. This increases operating safety and prevents wear in case of unfavorable installation conditions.
- If the pump does not deliver medium without bubbles after approx. 20 seconds, the system must be checked once again. After the operating level has been reached, check the pipe connections for leak-tightness. Check the operating temperature.

Commissioning

- Check whether the system is thoroughly and properly installed.
- Observe the arrows indicating the direction of rotation of the motor and the pump.
- Start up the pump without load and allow to pump at zero pressure for some seconds in order to allow for sufficient lubrication.
- Never operate the pump without hydraulic fluid.

☞ **Notice:**

- The pump should only be adjusted, maintained and repaired by authorized, trained and instructed staff.
- Only use original Rexroth spare parts.
- Only operate the pump within the admissible 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.
- Unauthorized modifications or changes which impair the safety and function are inadmissible!
- Install protective devices (e.g. coupling guard).
- Existing protective devices must not be removed.
- Always observe General safety and accident prevention regulations.

Further information

- Hydraulic fluids based on mineral oils
- Information on available spares

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