

RE 10 520/10.97

Replaces: 12.95

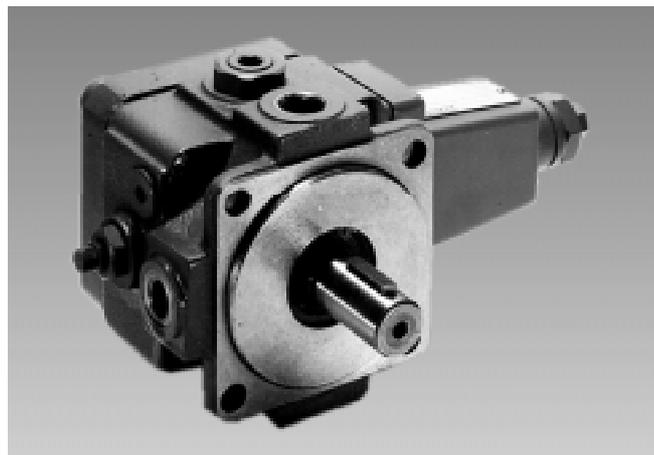


Vane pumps, direct controlled Type PV7...A

Nominal sizes 10 to 25

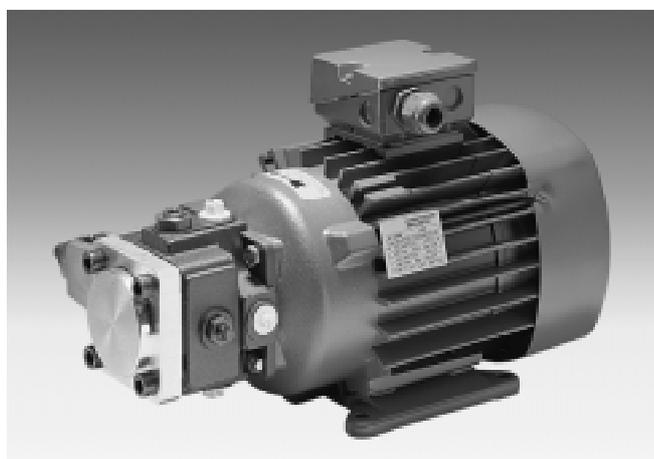
Series 1X

Maximum operating pressure 100 bar

Displacements from 10 to 25 cm³

H/A 4617/95

Type PV7-1X/..RA01MA0-...



H/A/D 5640/97

Typ MPU1-V710-90L/...

Contents

Description	Page
Features	1
Ordering details, preferred types	2
Symbols	2
Function, section	3
Technical data	4
Dynamic characteristics	4
Characteristic curves	5 to 7
Unit dimensions	8
Motor pump drive unit	9 to 11
Project and commissioning guidelines	12
Installation guidelines	13

Features

- Very short control times
- Low operating noise
- Mounting and connection dimensions to VDMA 24 560/1 and ISO 3019/2
- Good efficiency
- Long service life
- Variable displacement
- Also available as a completely assembled compact drive unit „MPU“ (pump + motor)

Ordering details

	PV7	-1X	/	R	A	01	A	-	*
--	------------	------------	----------	----------	----------	-----------	----------	----------	----------

Series
Series 10 to 19
(10 to 19: unchanged installation and connection dimensions)

Frame size	Nominal size	
BS	NS	
06	10 cm ³	= 06 - 10
06	14 cm ³	= 06 - 14
20	25 cm ³	= 20 - 25

Direction of rotation
Clockwise (viewed on the drive shaft) = R

Shaft end
Cylindrical drive shaft = A

Line connections
Suction and pressure connection = 01
Pipe thread to ISO 228/1

Further details in clear text

Zero stroke pressure range
V7/06-10 and V7/20-25

05 = up to 50 bar
10 = up to 100 bar

V7/06-14

04 = up to 40 bar
07 = up to 70 bar

Adjuster

0 = adjustment screw (standard)
¹⁾ **3** = lockable rotary knob and scale

A = Direct controlled

Seals

M = NBR seals, suitable for mineral oil HLP to DIN 51 524

K = FPM shaft seal (other seals made from NBR) suitable for HETG and HEES pressure fluids to VDMA 24 SW

Ordering examples: PV7-1X/06-10RA01MA0-10
PV7-1X/20-25RA01MA0-05

Pumps with customer-specific setting:

PV7-1X/20-25RA01MA0-10

Details in clear text: $q_{V \max} = 20 \text{ L/min}$; $p_{\text{zero stroke}} = 70 \text{ bar}$;

The pump is set to the required values. The optimum operating noise is set at the required zero stroke pressure. Without any details in clear text the flow and zero stroke pressure will be set to their maximum values.

¹⁾ H-key with material no. 00008158 is included within the scope of supply.

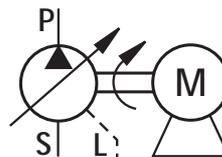
Preferred versions (readily available)

Type	Material no.
PV7-1X/06-10RA01MA0-05	00561857
PV7-1X/06-10RA01MA0-10	00563233
PV7-1X/06-14RA01MA0-04	00919235
PV7-1X/06-14RA01MA0-07	00919237
PV7-1X/20-25RA01MA0-05	00569700
PV7-1X/20-25RA01MA0-10	00569668

Symbols

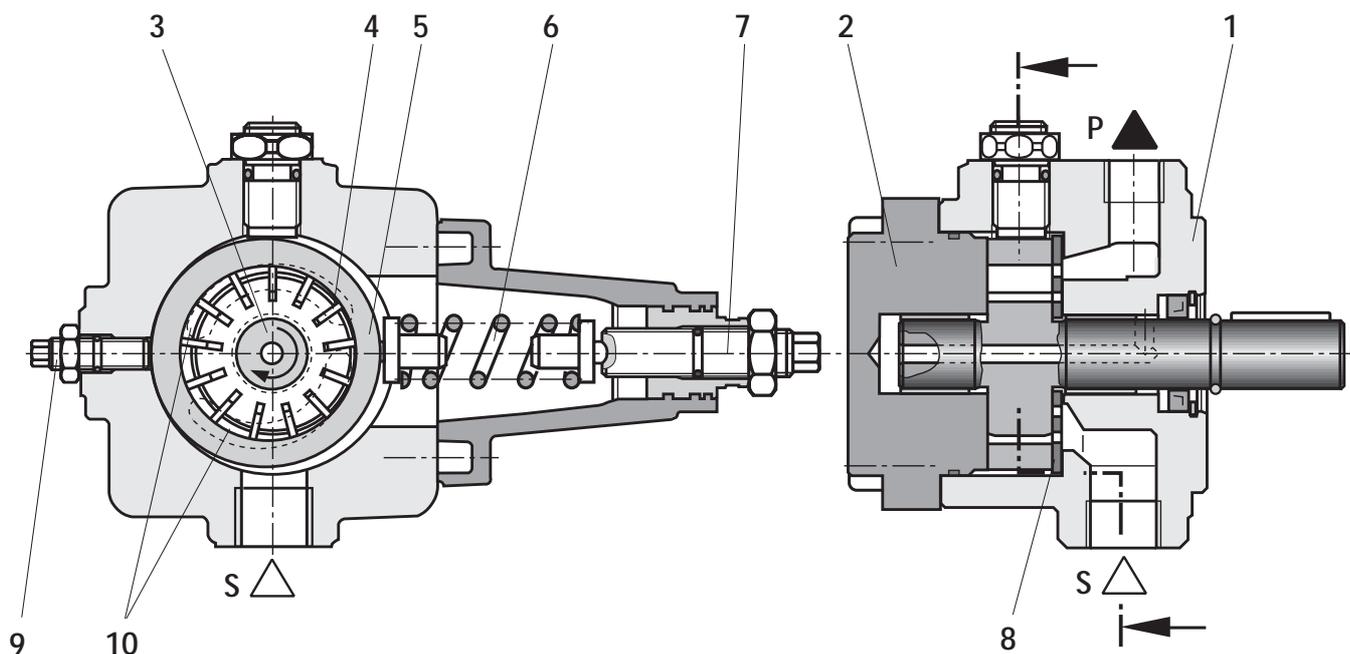


Single pump



Motor-pump drive unit

Functional description



Hydraulic pumps of the type PV7...A are direct operated variable displacement vane pumps.

They mainly consist of housing (1), cover (2), rotor (3), vanes (4), stator ring (5), compression spring (6), adjustment screw (7) and control plate (8).

To limit the maximum flow the pump is equipped with an adjustment screw (9).

The driven rotor (3) rotates within the stator ring (5). The vanes (4) inside the rotor are pressed against the inside of the stator ring (5) by the centrifugal force.

Suction and pumping process

The chambers (10) necessary for the transport of the fluid are formed by the vanes (4), rotor (3), stator ring (5), the control plate (8) and the cover (2).

The chambers increase in size due to the rotation of the rotor (3) and fill up with fluid via the suction port (S). On reaching the maximum chamber volume the chambers (10) are separated from the suction side. As the rotor (3) continues to rotate they connect to the pressure side become smaller and pump the fluid into the system via the pressure port (P).

Pressure control

The stator ring (5) is held in the eccentric start-up position by the spring (6). The maximum operating pressure required in the system is set at the adjustment screw (7) via the spring (6).

The pressure produced by the operating resistance pushes onto the inside of the stator (5) at the pressure side against the force of the spring (6).

When the pressure corresponding to the set spring force has been reached the stator ring (5) is moved from its eccentric position towards the zero position. The flow adjusts itself to the value which is being demanded. If the maximum pressure set at the spring (6) has been reached the pump regulates and the flow is virtually reduced to zero. The operating pressure is maintained and only the leakage fluid is replaced. Losses and heating of the fluid is, therefore, kept to a minimum.

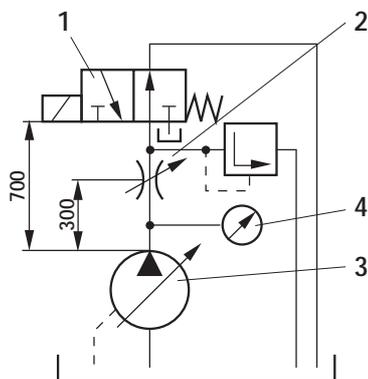
Technical data (for applications outside these parameters, please consult us!)

Version	vane pump, adjustable displacement volume		
Type	PV7...A		
Mounting style	flange connection		
Line connection	pipe thread "G..." to ISO 228/1		
Installation position	optional		
Shaft loading	radial and axial forces cannot be transferred		
Direction of rotation	clockwise (viewed on the drive shaft)		
Drive speed	n	min^{-1}	1000 to 1800
Build size	$size$		06 20
Nominal size/displacement volume	V	cm^3	10 14 25
Max. permissible drive torque	T	Nm	50 90
Max. flow ¹⁾ (at $n = 1450 \text{ min}^{-1}$; $p = 10 \text{ bar}$; $v = 41 \text{ mm}^2/\text{s}$)	q_V	L/min	14.5 20 36
Operating pressure, absolute			
– Inlet	p	bar	0.8 to 2.5
– Outlet	p	bar	100 70 100
– Leakage outlet	p	bar	2
– Leakage flow at zero stroke (with operating pressure outlet = $p_{\text{zero stroke max.}}$)	q_V	L/min	1.7 2.4
Pressure fluid	HLP – mineral oil to DIN 51 524 part 2 The specifications stated in catalogue sheet RE 07 075 have to be taken into account!		
Temperature range pressure fluid	ϑ	$^{\circ}\text{C}$	– 10 to +70, permissible viscosity range has to be taken into account!
Viscosity range	ν	mm^2/s	16 to 160 at operating temperature max. 800 when starting in pumping operation max. 200 when starting in zero stroke operation
Degree of contamination	maximum permissible degree of contamination of the pressure fluid is to NAS 1638 class 10. We, therefore, recommend a filter with a minimum retention rate of $\beta_{20} \geq 100$. To ensure a long service life we recommend class 9 to NAS 1638. This is achievable with a filter with a minimum retention rate of $\beta_{10} \geq 100$.		
Weight	m	kg	6.3 11.3

¹⁾ Flow of + 6% possible because of manufacturing tolerances

Dynamic response, test set-up (measured at $n = 1450 \text{ min}^{-1}$, $v = 41 \text{ mm}^2/\text{s}$ and $\vartheta = 50 \text{ }^{\circ}\text{C}$)

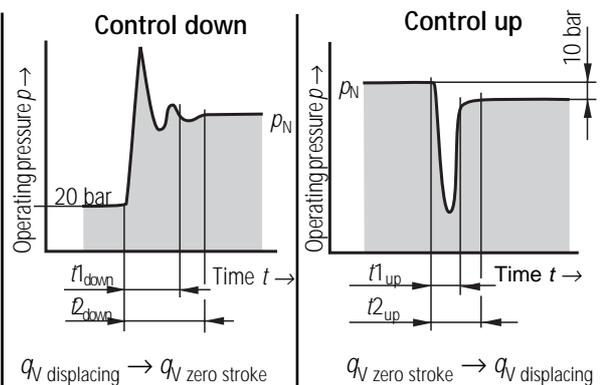
The control times are valid for the shown test set-up. With different set-ups and other line lengths the control times change.



Control times (average values)

$$t_{\text{down}} / t_{\text{up}}$$

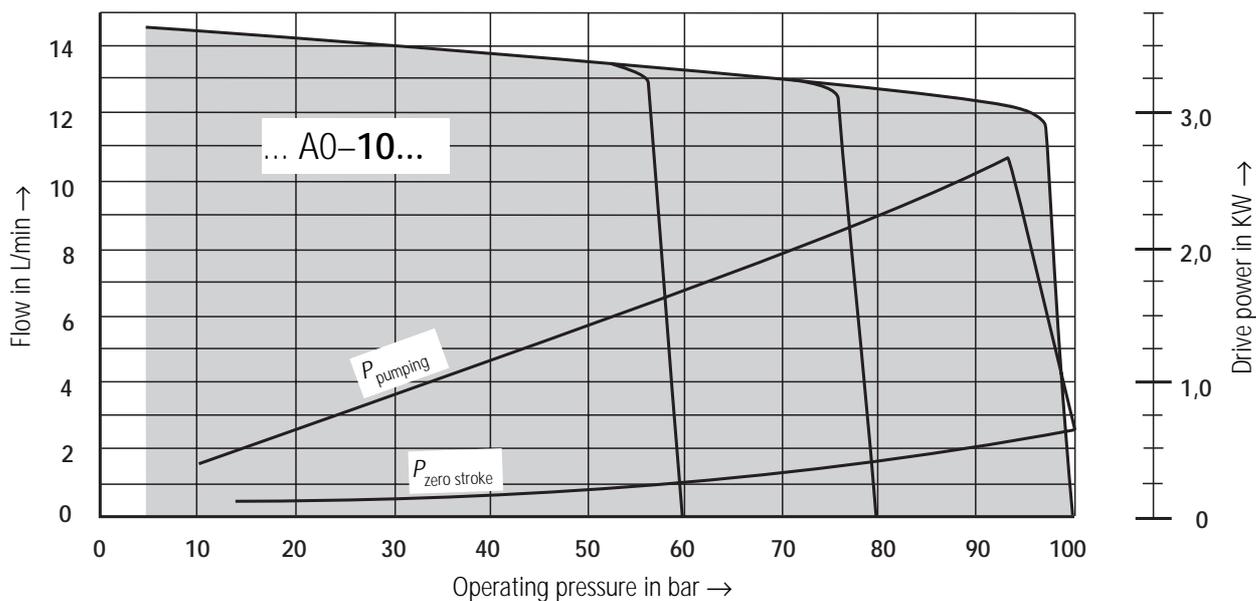
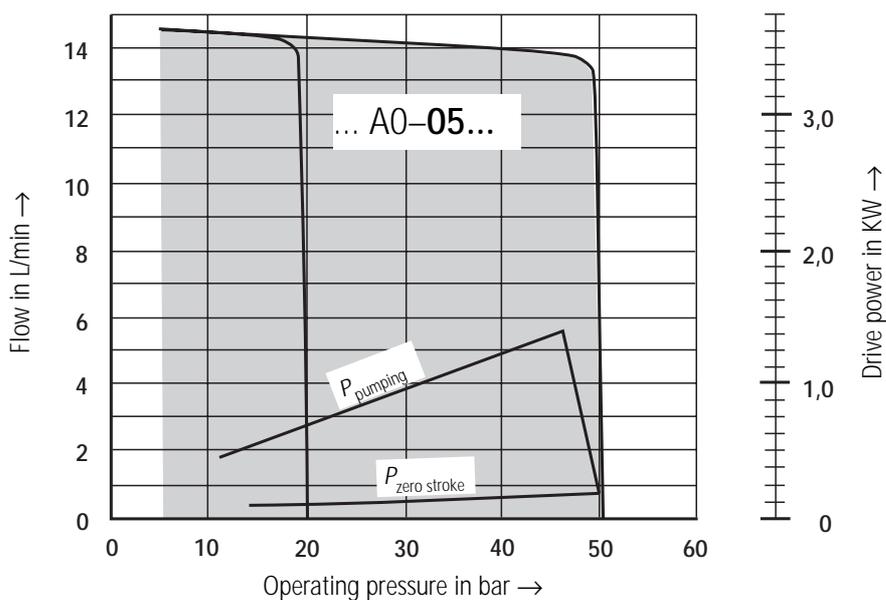
- 1 Directional valve (switching time 30 ms)
- 2 Throttle for setting the pressure
- 3 Hydraulic pump
- 4 Pressure test point



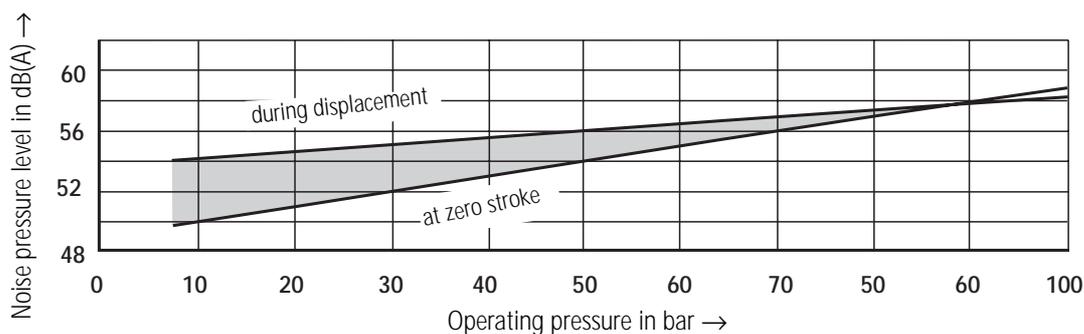
Pump type	Pressure p_N bar	$t1_{\text{down}}$	$t2_{\text{down}}$	$p_{\text{max}}^{2)}$	$t1_{\text{up}}$	$t2_{\text{up}}$
...06-10...10...	100	85	90	150	35	60
...05...	50	70	110	130	20	30
...06-14...07...	70	80	100	130	30	50
...04...	40	65	90	100	20	35
...20-25...10...	100	80	125	100	25	45
...05...	50	60	85	150	20	40

²⁾ Permissible pressure peaks

Characteristic curves: type PV7/06-10, (measured at $n = 1450 \text{ min}^{-1}$, $v = 41 \text{ mm}^2/\text{s}$ and $\vartheta = 50 \text{ }^\circ\text{C}$)



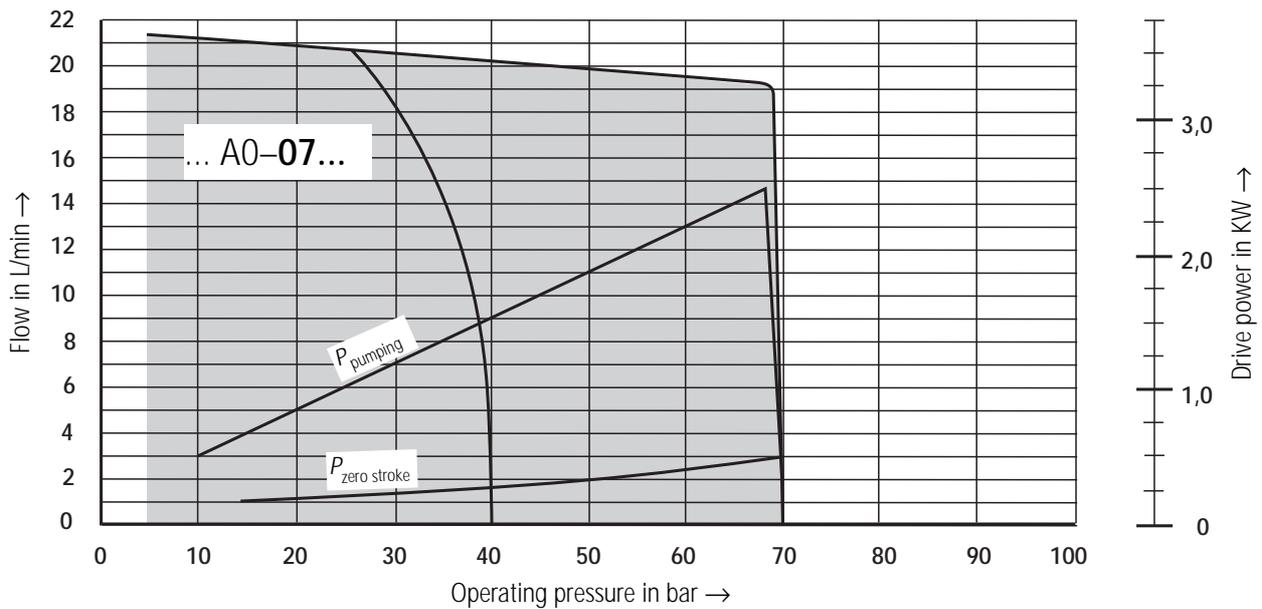
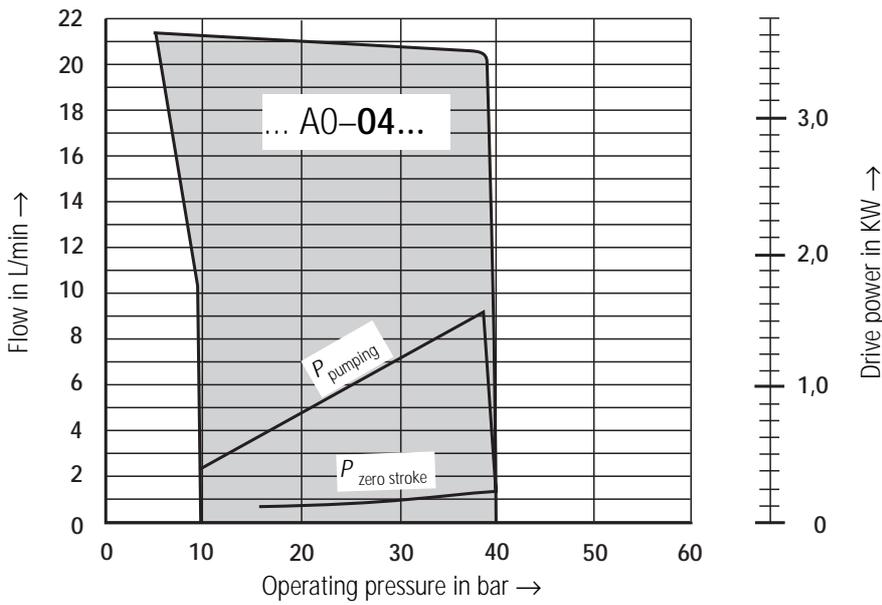
Noise pressure level



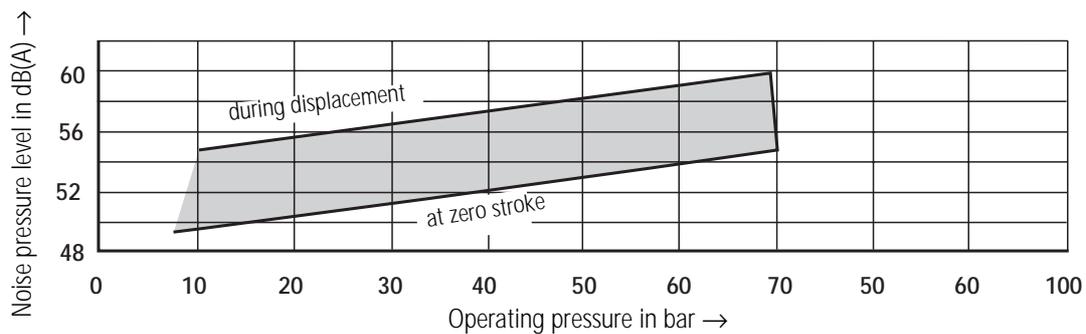
Measured in an anechoic chamber to DIN 45 635, sheet 26

Distance: microphone – pump = 1m

Characteristic curves: type PV7/06-14, (measured at $n = 1450 \text{ min}^{-1}$, $v = 41 \text{ mm}^2/\text{s}$ and $\vartheta = 50 \text{ }^\circ\text{C}$)



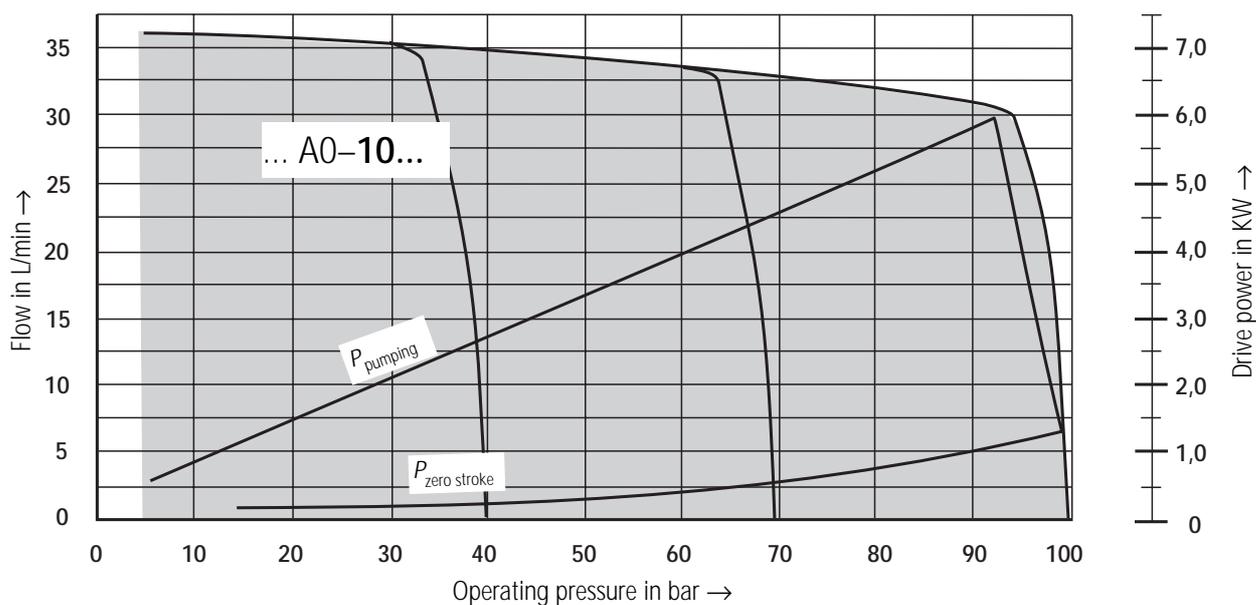
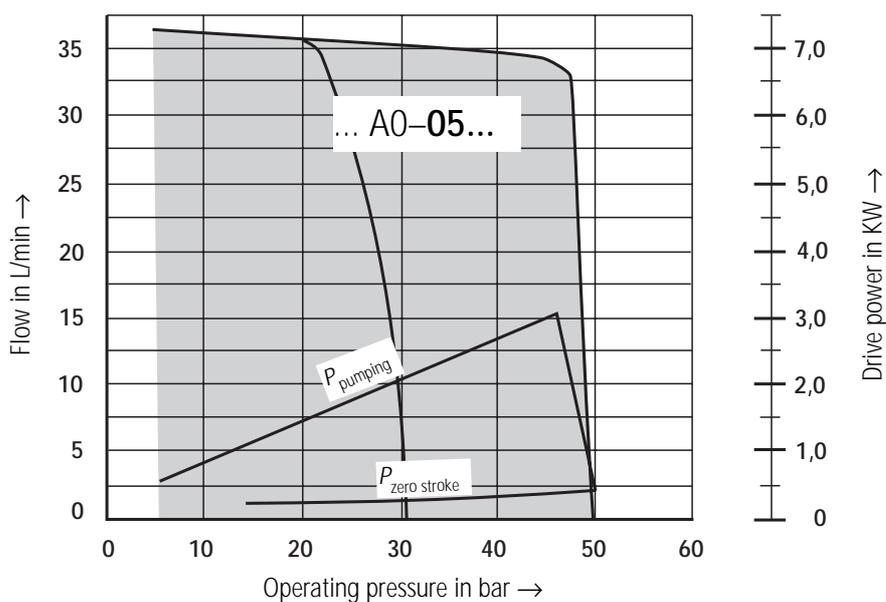
Noise pressure level



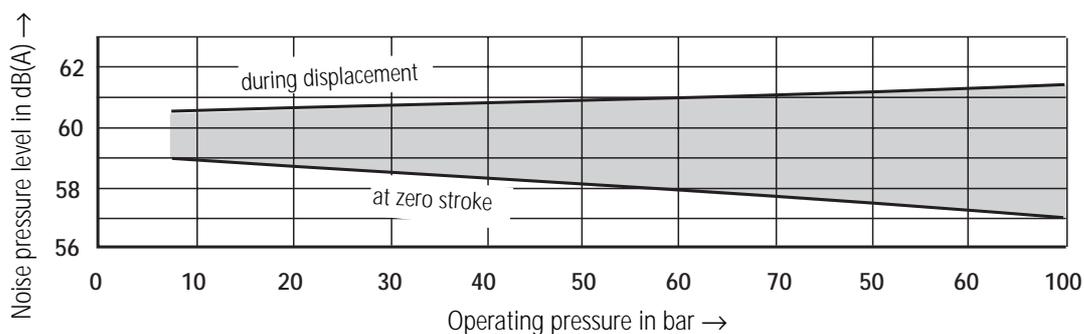
Measured in an anechoic chamber to DIN 45 635, sheet 26

Distance: microphone – pump = 1m

Characteristic curves: type PV7/20–25, (measured at $n = 1450 \text{ min}^{-1}$, $v = 41 \text{ mm}^2/\text{s}$ and $\vartheta = 50 \text{ }^\circ\text{C}$)



Noise pressure level

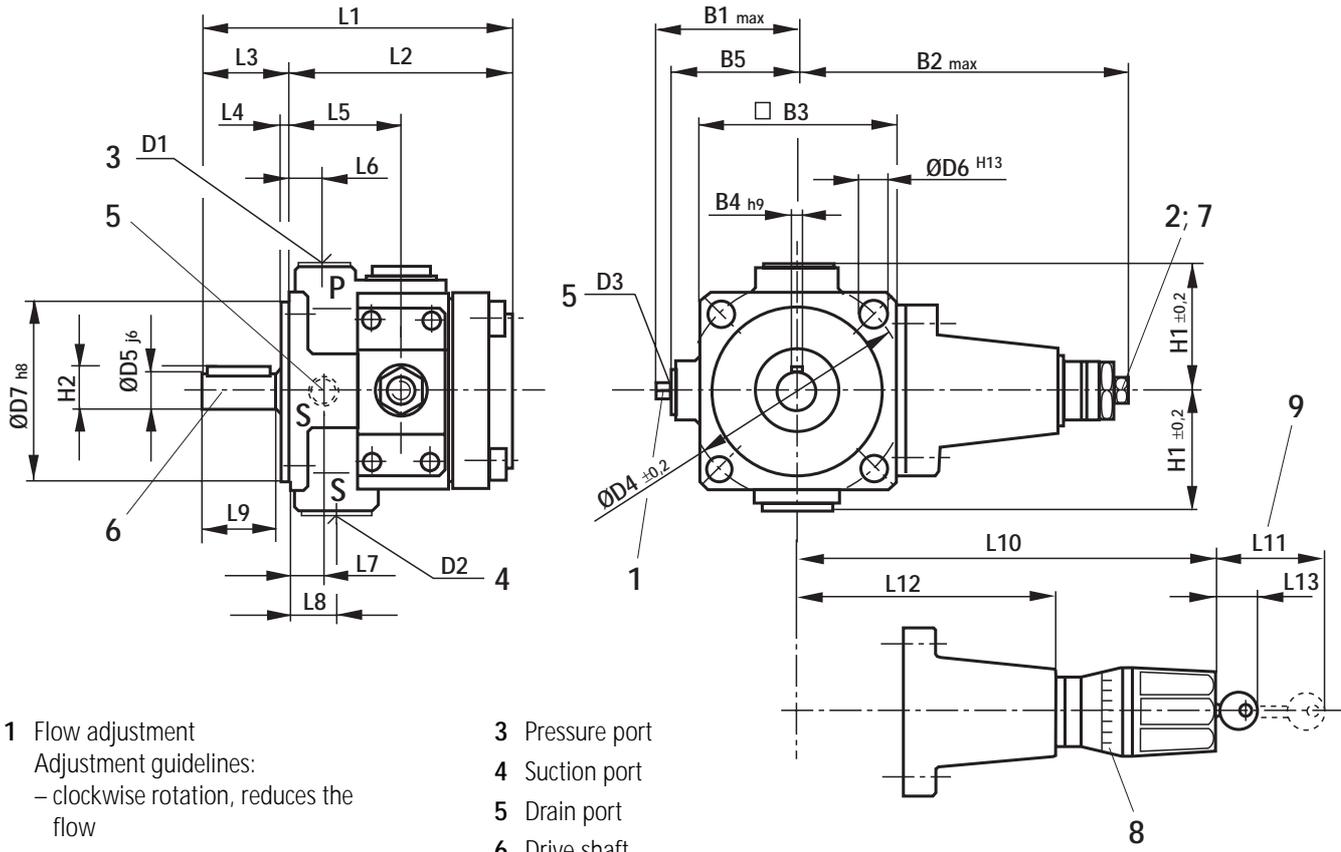


Measured in an anechoic chamber to DIN 45 635, sheet 26

Distance: microphone – pump = 1m

Unit dimensions: types PV7/06; PV7/20

(Dimensions in mm)



- 1 Flow adjustment
Adjustment guidelines:
– clockwise rotation, reduces the flow
– anti-clockwise rotation, increases the flow
Note: The change in flow for **one** turn of the adjustment screw is for:
PV7/06-10 approx. 7.5 L/min
PV7/06-14 approx. 7.5 L/min
PV7/20-25 approx. 12.3 L/min
each at $n = 1450\text{min}^{-1}$
- 2 Pressure adjustment
Adjustment guidelines:
– clockwise rotation increases the operating pressure
– anti-clockwise rotation decreases the operating pressure

- 3 Pressure port
- 4 Suction port
- 5 Drain port
- 6 Drive shaft
- 7 Pressure adjustment via adjustment screw (standard), ordering detail ...0...
- 8 Pressure adjustment with lockable rotary knob with scale, ordering detail ...3...
- 9 Space required to remove key

Size	B1 _{max}	B2 _{max}	□B3	B4 _{h9}	B5	D1	D2	D3	ØD4 _{±0.2}	ØD5 _{j6}	ØD6 ^{H13}	ØD7 _{h8}	H1 _{±0.2}	H2
06	68.5	166	93	6	56.5	G 3/8	G 1/2	G 1/4	103	20	9	80	56.6	22.5
20	78	164	115	8	56.5	G 1/2	G 3/4	G 1/4	125	25	11	100	65	28

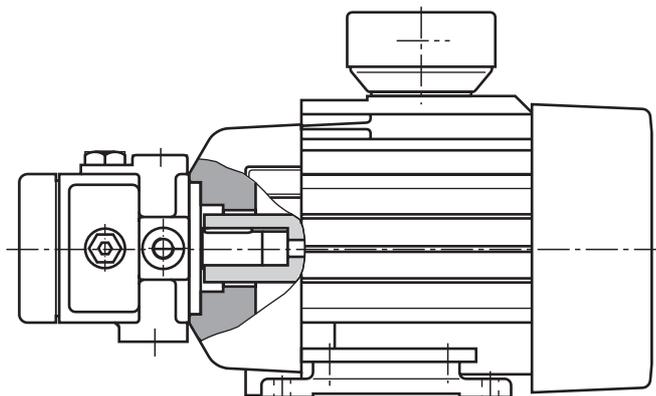
Size	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13
06	145	101	44	4	50.5	17	15.5	20.5	36	197.7	46	127.7	27
20	186	134	52	4	65	25	20	25	42	205.7	46	135.7	27

Motor-pump drive unit: design, section

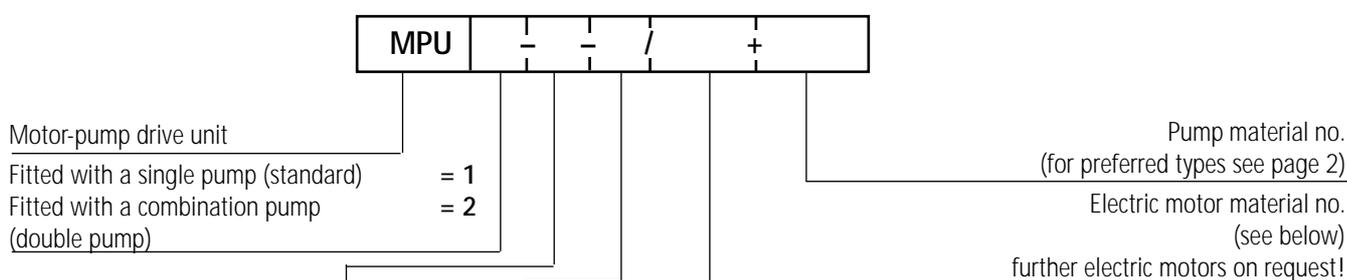
The electric motor and vane pump are connected **without** a coupling and pump mounting bracket. This results in the unit being very compact and cost effective.

Due to the omission of the electric motor bearing alignment stresses on the bearing points are avoided.

The motor design which has a hollow shaft and key-way permits standard pumps to be fitted.



Ordering details



For fitting pump type:	Motor	
	Design	Frame size
Type PV7/06	= V710	= 90L = 90LX = 112M
Types PV7/20 and PV7/25	= V716	= 90L = 112M = 132M

Ordering example:

MPU1-V710-90L/00025186+00563233

Reference to the EC machine guideline 89/392 EWG, annex II, section B:

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

Commissioning cannot be carried out until it has been ensured that the machine, into which the MPU drive is to be fitted, complies with the regulations stated in the EC guidelines.

Selection table/ordering details: electric motor (available variants)

El. motor frame size	Motor voltage 400/690 V			Motor voltage 230/400 V			
	90L	90LX	112M	132M			
Power in KW	1.8	2.2	3.0	4.0	5.5	7.5	9.2
Pump build size	Ordering details/material no. of the available motor variants						
PV7/06	00025186	00025086	00057712 00058668	00025291	00025088		
PV7/20	00025194			00026503 00070760	00025362	00025397	00026696

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

Technical data: electric motor

Design	surface cooled 3-phase AC caged motor		
Frame type	B3 with hollow shaft and mounting flange		
Motor type	B3/MPU		
Electrical connection	Pg fitting and earth connection in the terminal box		
Isolation	isolation class F		
Protection	IP54 to VDE 0530		
No. of pole pairs	4		
Voltage to IEC 38	V	230/400	
	V	400/690	
Frequency	Hz	50 or 60	
RPM	at 50 Hz	min ⁻¹	1500
	at 60 Hz	min ⁻¹	1800
Installation	horizontal		

Switching of the electric motor

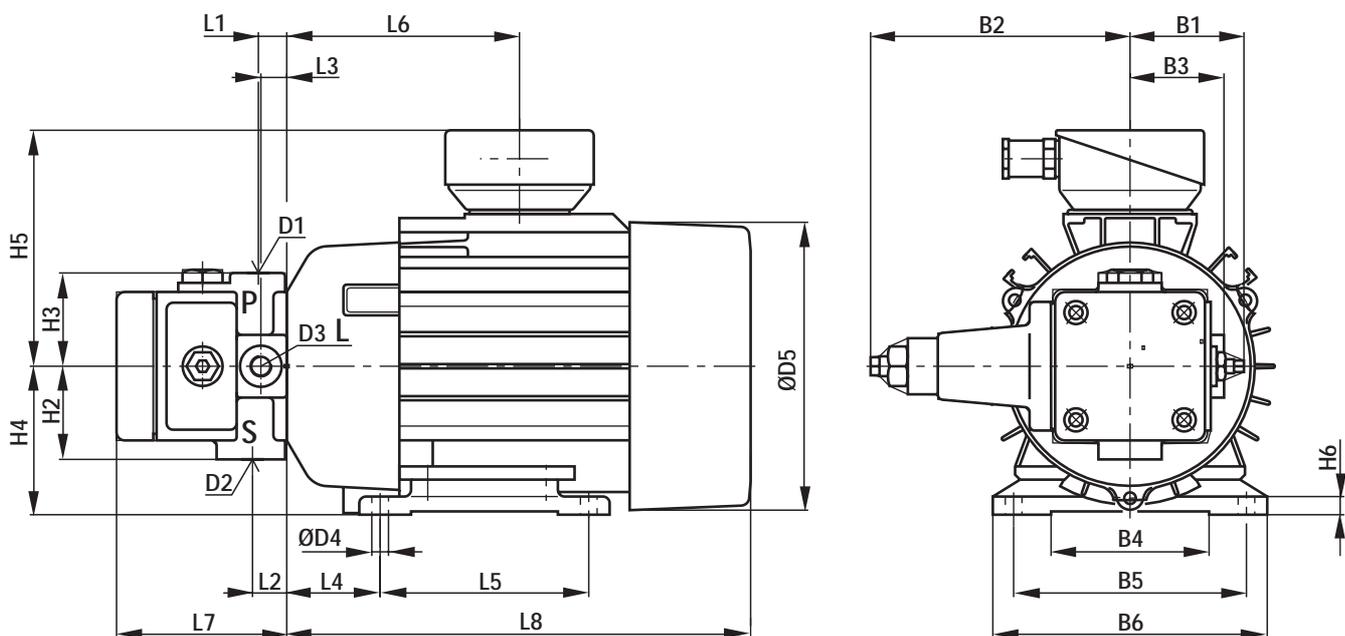
Winding version Volt	Operating voltage Volt	For direct starting Volt	For Y Δ starting Volt
230 Δ / 400 Y	220...240	220...240 Δ	220...240 Δ
	380...415	380...416 Y	
400 Δ / 690 Y	380...415	380...415 Δ	380...415 Δ
	660...725	660...726 Y	

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

El. motor wound for 50 Hz	Voltage V winding version		Conversion factor at 60 Hz	
	230/400	400/690	Nominal RPM $n_{nom.}$	Nom. power $P_{nom.}$
Connection to 60 Hz	230	400	1.2	1.0
	400	690	1.2	1.0
		440	1.2	1.15
		460	1.2	1.2

Unit dimensions

(Dimensions in mm)



Pump	Dimensions											
Build size	D1	D2	D3	L1	L2	L3	L7	H2	H3	B1	B2	B3
06	G 3/8	G 1/2	G 1/4	17	20.5	15.5	101	56.6	56.6	68.5	166	56.5
20	G 1/2	G 3/4	G 1/4	25	25	20	134	65	65	78	164	56.5

El. motor	Dimensions											
Build size	Ø D4	Ø D5	L4	L5	L6	L8	H4	H5	H6	B4	B5	B6
90L	10	174.5	56	125	140	278	90	143	11	95	140	165
90LX	10	174.5	56	125	140	308	90	143	11	95	140	165
112M	11	218	70	140	98	326	112	151	14	129	190	235
132M	11	258	89	178	114	407	132	195	16	160	216	260

Project guidelines

Comprehensive instructions and proposals can be found in the Hydraulic Trainer, Volume 3 RE 00 281, "Planning and design of hydraulic power systems".

When using vane pumps we recommend that the following guidelines are partially taken into account.

Technical data

All the technical data are dependent on manufacturing tolerances and are valid with certain operating conditions.

Please take into account that minor variations are possible and technical data can be affected by differing conditions (e.g. viscosity).

Characteristic curves

Characteristic curves for flow and absorbed power.

Please take into account when dimensioning the drive motor the maximum possible application data.

Noise

The noise pressure level values given on pages 5 to 7 are measured according to DIN 45 635 part 26. This means that only the noise

emission of the pump is given. Ambient influences (such as place of installation, piping, etc.) are not taken into consideration. The values refer to only one pump.

Attention! The power unit design and the influences at the unit's final place of installation, in general, result in the fact that the noise pressure levels lie 5 to 10 dB(A) higher than that of the pump alone.

Leakage fluid

On page 4 the average external leakage of the pump is stated. Please note that these values are only intended for use as projecting guidelines when defining cooler sizes and pipe sizes. When determining the size of the oil reservoir the appropriate value to be used is the zero stroke power (see pages 5 to 7). Changes in cross-section and the use of a leakage oil cooler can result in there being unpermissibly high pressure peaks in the leak-oil line.

Commissioning guidelines

Bleeding

- All of the PV7...A vane pumps are self-priming.
- Before commissioning for the first time, the pump has to be bled so that it is protected against damage.
- During the first commissioning we recommend that the housing is filled via the leakage connection. Take into account the filter rating! This increases operating safety and prevents wear in the case of unfavourable installation conditions
- If the pump after approx. 20 seconds does not displace oil without any bubbles then the system has to be rechecked. After the operating values have been reached, check the pipe connections for leakage and check the operating temperature.

Commissioning

- Check to see if the system has been carefully, correctly and cleanly assembled.
- Take into account the motor and pump direction of rotation arrows.
- Start the pump without load and let it displace oil without pressure for a few seconds in order to provide sufficient lubrication.
- **Never run the pump without oil!**

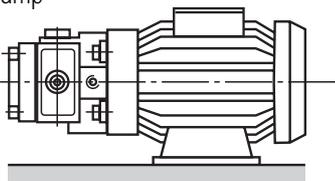
Important guidelines

- Adjustment, maintenance and servicing of the pump must only be carried out by authorised, trained and instructed personnel!
- Only use original Rexroth spare parts!
- The pump must only be operated within the permitted limits.
- The pump may only be operated in a sound condition!
- When carrying out any work on the pump (e.g. removing and refitting) switch the system to zero pressure and isolate from the mains supply!
- Unauthorised conversions and modifications which affect the safety and function of the pump are not permitted!
- Provide protective measures (e.g. coupling guard)!
- Do not remove any existing protective devices!
- The general valid safety and accident prevention regulations must be adhered to!

Installation guidelines

Drive: variant 1

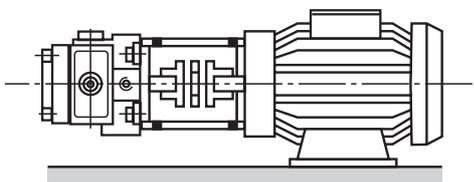
MPU drive unit (is supplied completely assembled)
E-motor and pump



- Very short design
- Cost-efficient solution (coupling and pump mounting bracket is not required)
- No assembly required
- For further information see RE 50 095-P

Drive: variant 2

E-motor + pump mounting bracket + coupling + pump

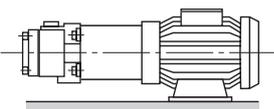


- Radial and axial forces on the pump drive shaft are not permitted!
- Motor and pump must be axactly aligned!
- Use flexible couplings

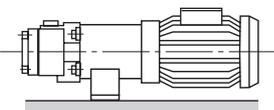
Installation positions

- Horizontal position preferred

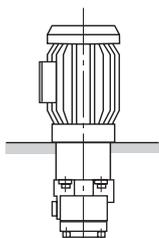
B3



B5



V1



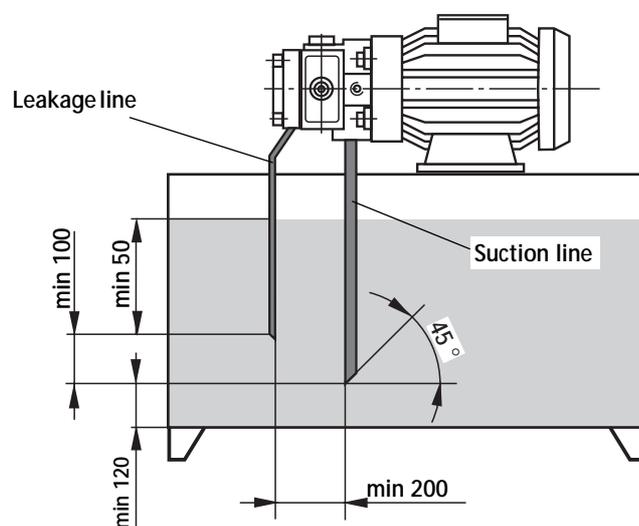
Fluid reservoir

- Match the service capacity of the reservoir to the operating conditions.
- The permissible fluid temperature must not be exceeded, if required provide a cooler!

Lines and connections

- Remove protective plugs from the pump.
- We recommend the use of seamless precision steel pipes to DIN 2391 and removable pipe connections.
- Select the inside diameter of the pipes according to the ports.
- Thoroughly clean pipes and fittings before assembly.

Piping recommendations (dimensions in mm)



- The leakage line is to be so fitted that the pump **cannot** drain!
- **Under no circumstances** must leakage and return fluid be directly taken up by the pump!

Filter

- Whenever possible, use return line or pressure filters.
(Suction filter only in conjunction with low pressure switch/clogging indicator)

Pressure fluid

- Please take into account the specifications stated in catalogue sheet RE 07 075.
- We recommend brand name fluids.
- Do not mix hydraulic fluids of different types since this can result in decomposition and deterioration of the lubricating quality.
- The fluid must be replaced at regular intervals according to the operating conditions. In connection with this, the tank must also be cleaned of residues.

Notes

Mannesmann Rexroth AG
Rexroth Hydraulics

D-97813 Lohr am Main
Jahnstraße 3-5 • D-97816 Lohr am Main
Telefon 0 93 52 / 18-0
Telefax 0 93 52 / 18-10 40 • Telex 6 89 418-0

Mannesmann Rexroth Limited

Cromwell Road, St. Neots,
Huntingdon, Cambs. PE19 2ES
Tel: (01480) 476041
Fax: (01480) 219052

The specified data is for product description purposes only and may not be deemed to be guaranteed unless expressly confirmed in the contract..