MANNESMANN REXROTH

Direct controlled vane pump , with variable stroke volume Type V3 - Series 3X and 4X

Size 12 to 63 | **up to 100 bar** | **from 8.5 cm³ to 47 cm³**

RE 10 436/08.94

Replaces: 07.86

- Very short control times
- Low operating noise level
- Good degree of effectiveness
- Long life
- May be used as combination pump

K 3460/7

Type 1 PV2 V3-3X/40 RA01 MC100 A1

Ordering Code

1 PV 2	V3 –	/		R		01				A	1	*

Series
Sizes 40 and 63 **= 3X**
Series 30 to 39

Sizes 12 and 25 **= 4X**
Series 40 to 49
(30 to 39 ≙ installation and connection dim. unchanged)
(40 to 49 ≙ installation and connection dim. unchanged)

Size (size)
8,5 cm³ = size 12 **= 12**
19 cm³ = size 25 **= 25**
32 cm³ = size 40 **= 40**
47 cm³ = size 63 **= 63**

Rotation direction
clockwise (view onto drive shaft) **= R**

Shaft end, cone-shaped
Single pump **= A**
Combination pump, front **= E**
Combination pump, back (gear-toothed) **= G**

Connection ports
Suction and pressure port **= 01**
Pipe thread to ISO 228/1

Ordering examples: 1PV2 V3-4X/12 RA01 MS 63 A1 or
1PV2 V3-3X/63 RA01 MC 100 A1

Further details in clear text

1 = Bleed valve

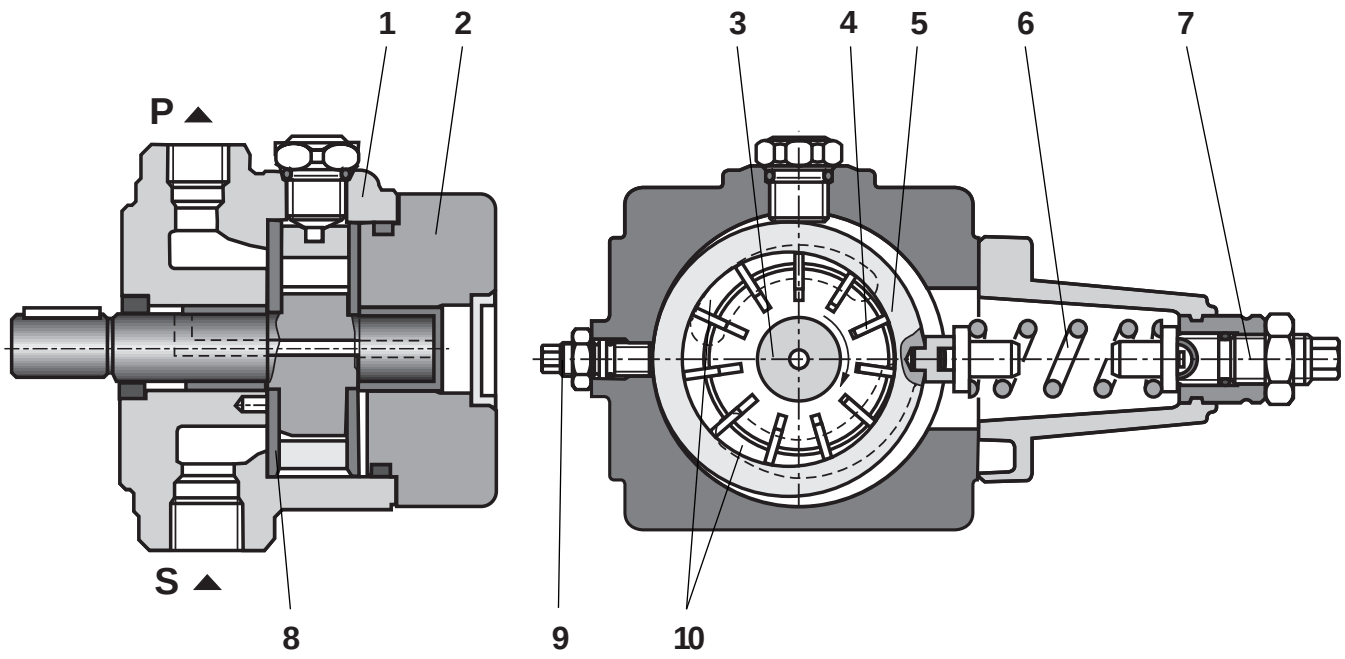
Volume flow adjustment
A = Setting screw

Zero stroke range
25 = 12 to 25 bar
40 = 20 to 40 bar
63 = 30 to 63 bar
100 = 50 to 100 bar

Pressure adjustment
C = Setting screw
S = Setting screw, lockable

Seals
M = NBR - seals, suitable for Mineral oil HLP to DIN 51 524 part 2
V = Viton seals, suitable for Phosphate ester (HFD-R)

Section, Function Description



Hydraulic pumps type V3 are direct operated variable displacement vane pumps

The main components are the housing (1), cover (2), rotor (3), vanes (4), stator ring (5), pressure spring (6), setting screw (7), control plate (8).

To limit the maximum volume flow the pump is equipped with a setting screw (9).

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

Suction and pumping process

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

The chamber volume (10) increases through the rotation of the rotor (3) and fill with oil when passing the suction side (S). On reaching maximum 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 oil into the system via the pressure port (P) .

Pressure control

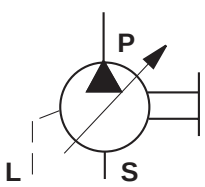
The stator ring (5) is held in the eccentric starting position by the spring (6). The maximum operating pressure required in the system is set at the setting screw (7) via the spring (6).

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

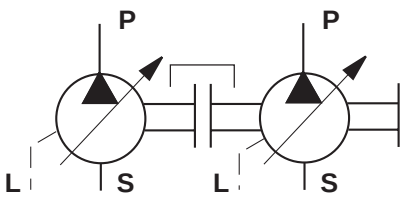
When the pressure corresponding to the set spring force has been reached the stator ring (5) is moved from its eccentricity towards the zero position. The volume flow sets itself to the value which is just been taken. If the maximum pressure set at the spring (6) has been reached the pump controls almost zero at the volume flow. The operating pressure is kept and only the leakage oil is replaced. Loss and the heating up of the oil is therefore kept to a minimum.

Symbol

Single pump



Double pump



Technical Data (For application outside these parameters please consult us!)

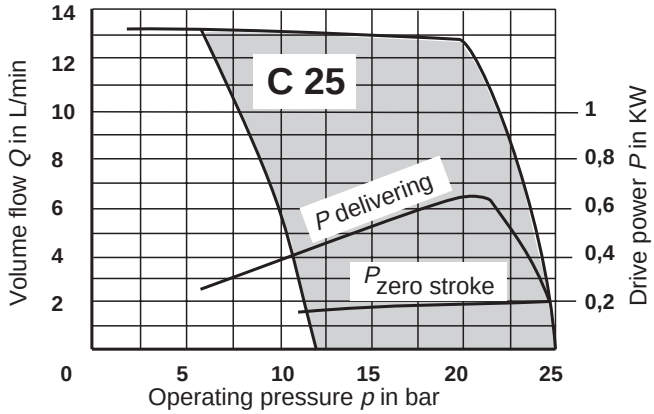
Model				Vane pump, variable			
Type				V3			
Mounting type				Flange mounting			
Connection type				Thread			
Installation position				optional (horizontal preferred)			
Shaft loading				Radial and axial forces **cannot** be transferred			
Rotation direction				clockwise (view on shaft end)			
Pressure fluid [1])				HLP - Mineral oil to DIN 51524, Phosphate ester (HFD-R)			
Temperature range pressure fluid		T	°C	–10 to 70			
Viscosity range		v	mm^2/s	16 to 160 at operating temperature and zero stroke pressure < 63 bar 25 to 160 at operating temperature and zero stroke pressure > 63 bar max. 800 when starting under flow condition max. 200 when starting at zero flow			
Fluid cleanliness				Maximum permissible degree of contamination of the fluid to NAS 1638 Class 9. Therefore we recommend a filter with a minimum retention rate of $ß_{20} \geq 100$. To secure long life we recommend Class 8 to NAS 1638. For this we recommend a filter with a minium retention rate of of $ß_{10} \geq 100$.			
Size		size		12	25	40	63
Weight		m	kg	6,25	11,1	26,5	29,5
Drive speed	min	n	min^{-1}	1000	1000	1000	1000
	max	n	min^{-1}	1800	1800	1800	1800
Max. perm. torque		T	Nm	54	61,8	235	353
Displacement volume	min	V	cm^3	5	8,5	19	32
	max	V	cm^3	8,5	19	32	47
Volume flow [2]) (at 1450 min^{-1}; 5 bar)		Q	l/min	13	27,5	47	67
Nominal pressure		p	bar	100			
Operating pressure, absolute							
Input		p	bar	0.8 to 2.5			
Leakage output		p	bar	2			
Output, zero pressure range		p	bar	to 100			
with spring type **C25**		p	bar	12 to 25			
with spring type **C40**		p	bar	20 to 40			
with spring type **C63**		p	bar	30 to 63			
with spring type **C100**		p	bar	50 to 100			

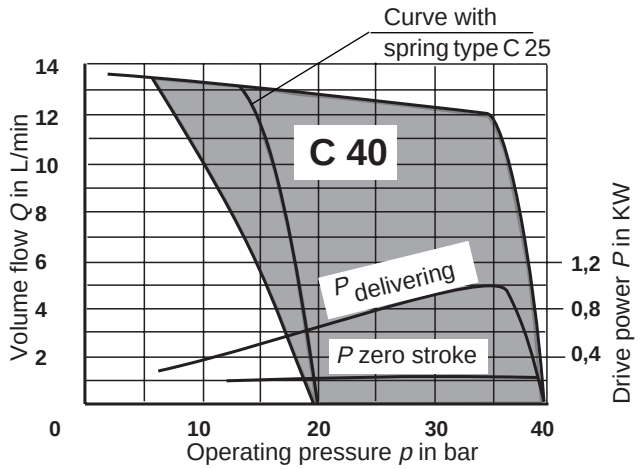
[1]) Please consult data sheet RE 07 075, other fluids on request

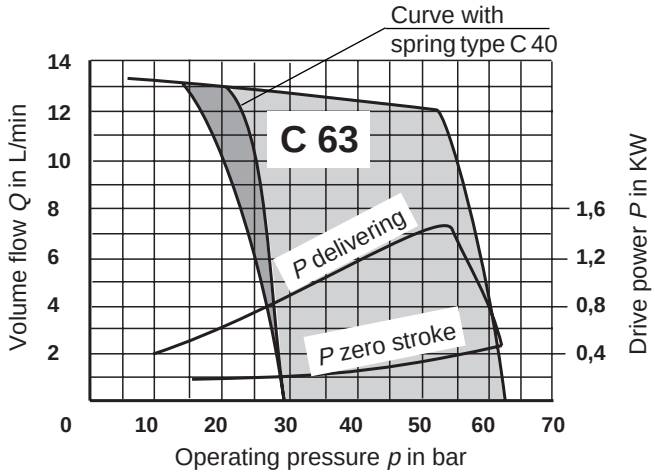
[2]) The volume flow can increase by up to +9% because of manufacturing tolerances

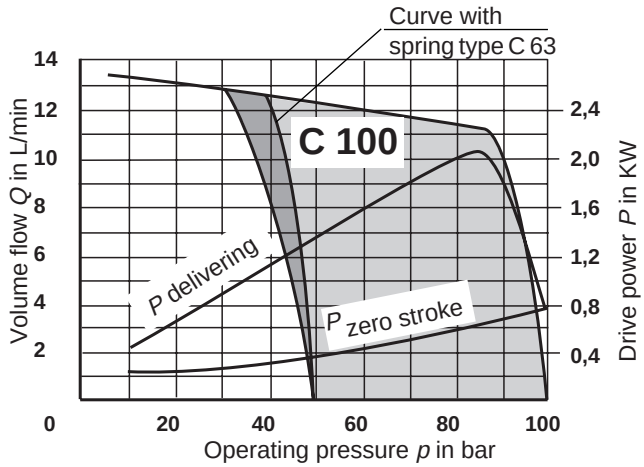
Performance Curves (medium values) measured at n = 1450 min^{-1}, v = 41mm^2/s and t = 50°C

Size 12

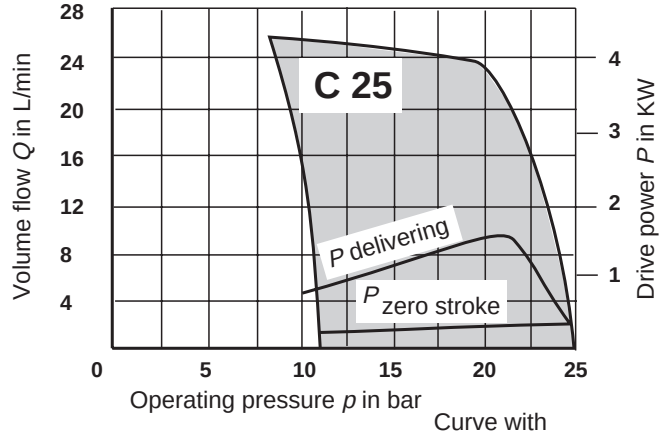


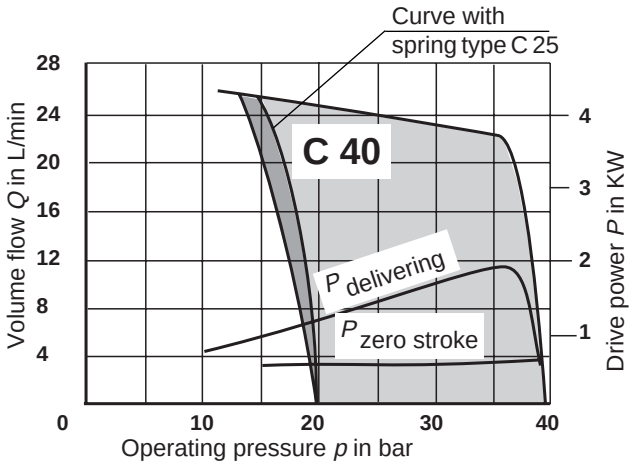


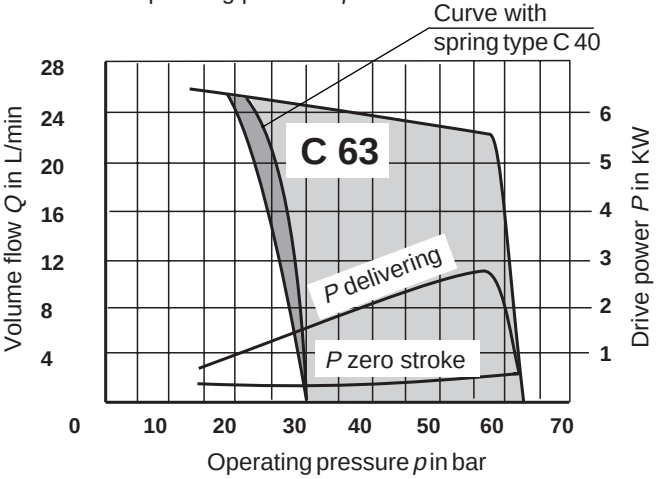


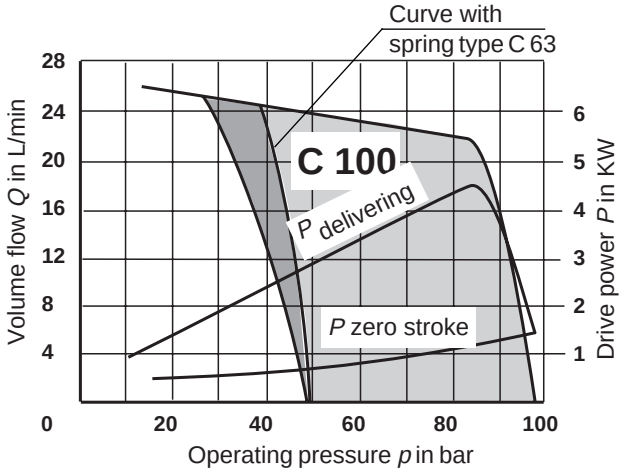


Size 25



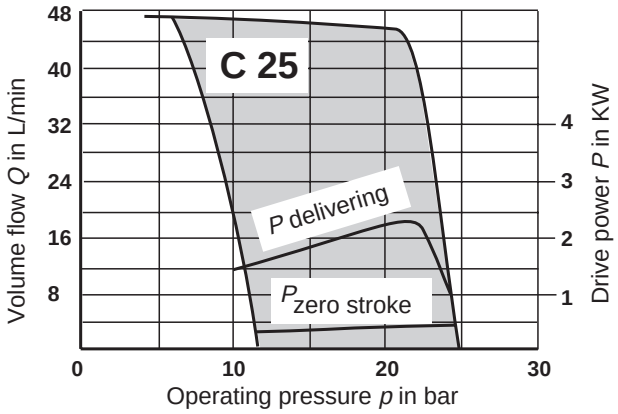


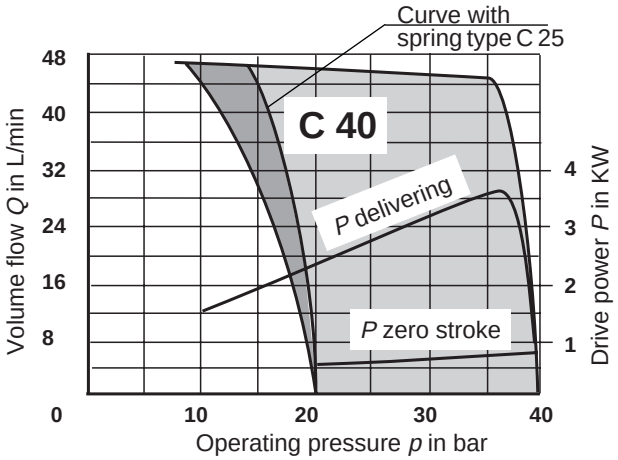


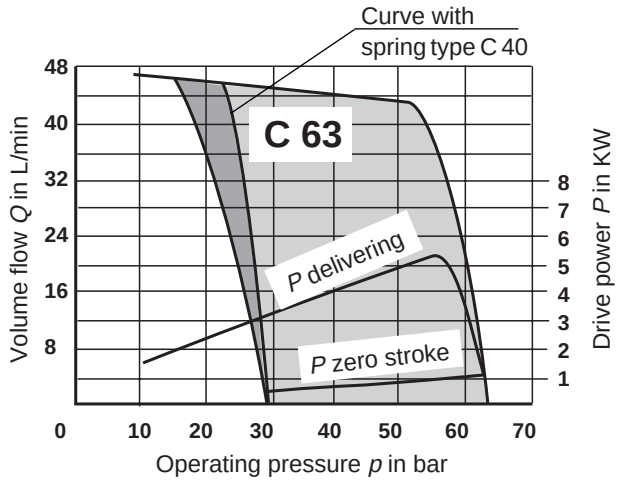


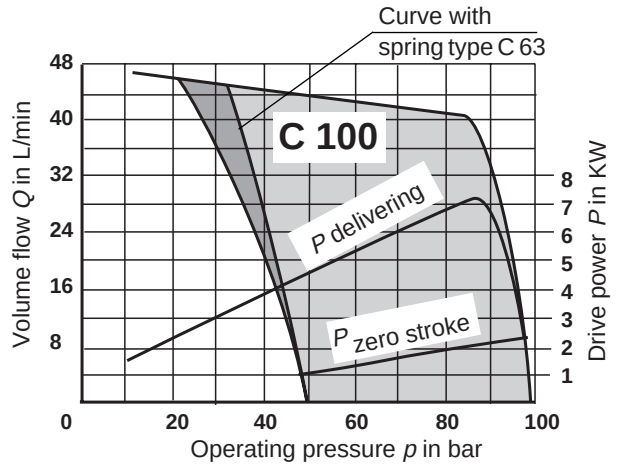
Performance Curves (medium values) measured at n = 1450 min^{-1}, v = 41mm^2/s and t = 50°C

Size 40

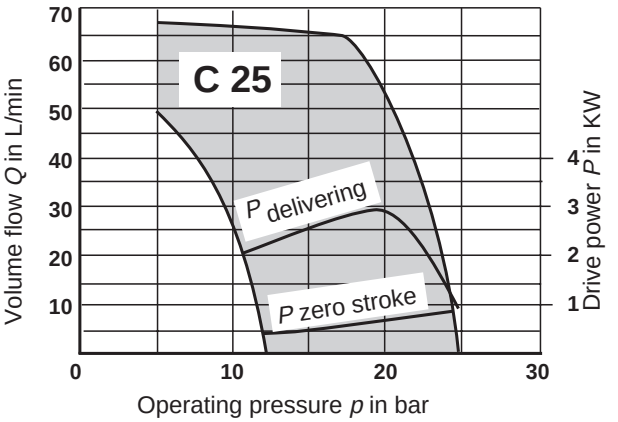


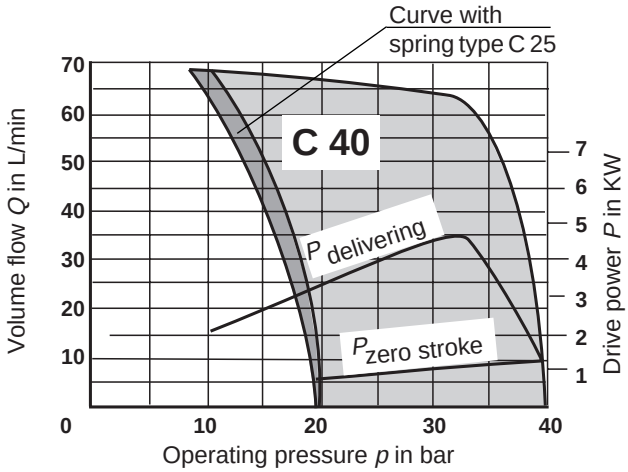


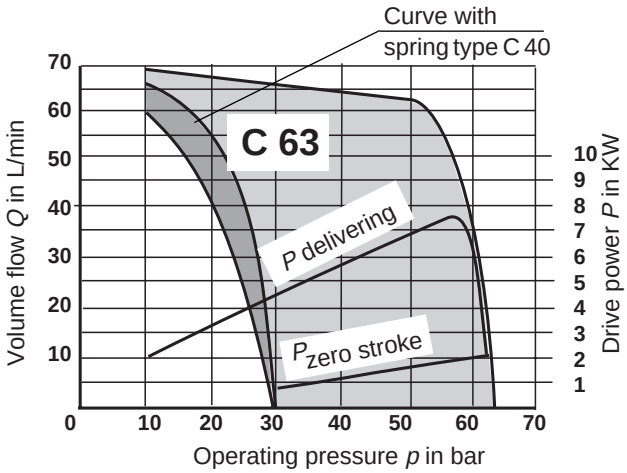


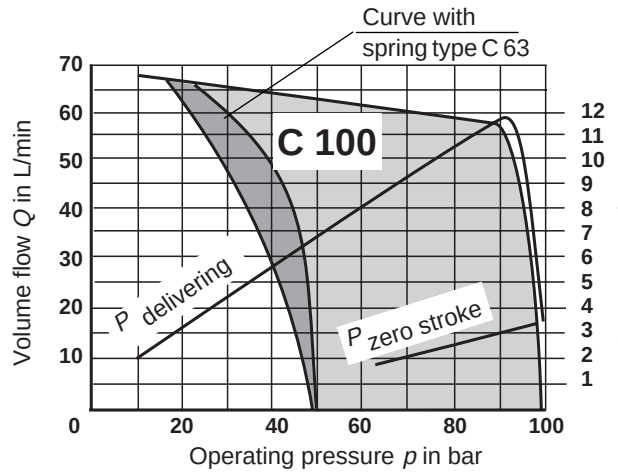


Size 63







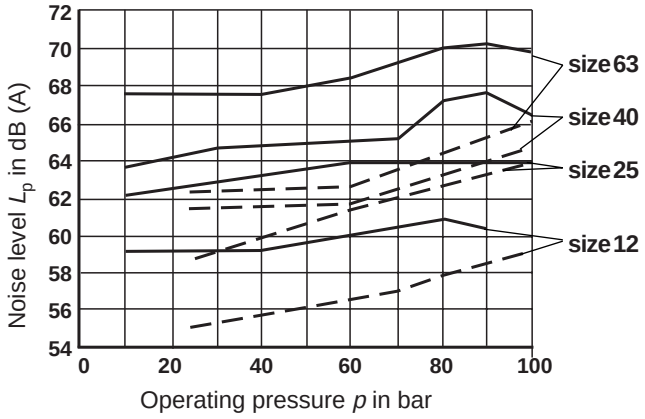


Performance Curves (medium values) measured at n = 1450min^{-1}, v = 41mm^2/s and t = 50°C

Noise level L_p

Noise level when pump is delivering

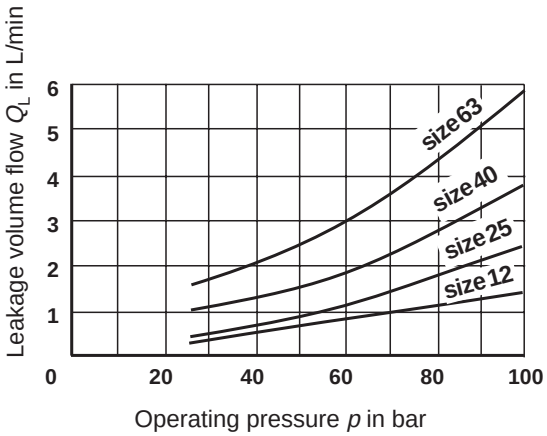
Noise level with zero stroke



Measured in a noise measuring chamber to DIN 45 635, Part 28

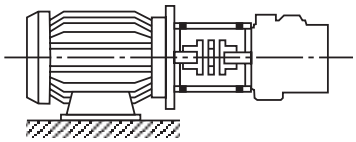
Distance microphone - pumps =1m

Leakage volume flow Q_L



Installation Instructions

E–Motor + pump carrier + coupling + pump



Warning!

- No radial and axial forces on the pump shaft are permitted!
  –> Motor and pump must be exactly aligned!
  –> Use flexible coupling

Oil tank:

– The usable volume of the tank must meet requirements

Warning! The permissible fluid temperature must not be exceeded

–> If required install cooler!

Lines and connections

– Cut at an angle of 45°

– Min. distance of 50 mm to bottom of tank

–> Dirt is not sucked up or otherwise disturbed

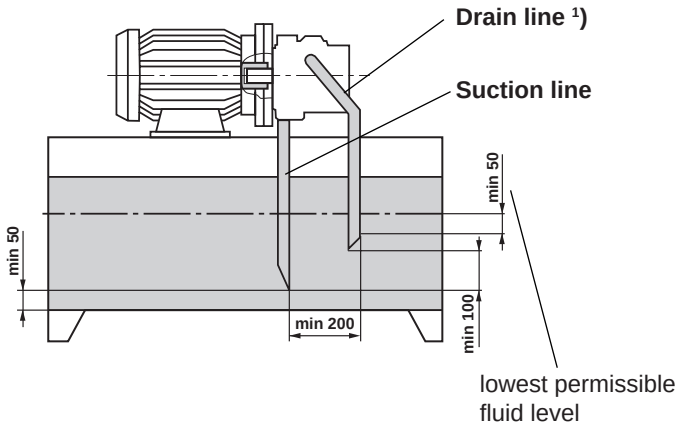
– Min. 50 mm immersion depth, even at lowest permissible fluid level

–> Foaming is avoided

– case drain and return fluids must not be sucked up again immediately!

–> Fluid temperature is kept low

Suggestion for pipe layout



[1]) Lay drain line in such a way that pump cannot run empty

Commissioning - Instructions

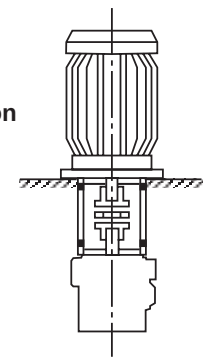
- Observe / check direction of rotation
- All V3 - pumps are self-aspirating

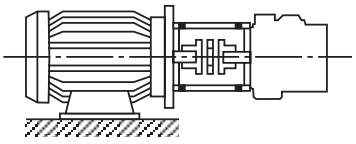
  When starting up for the first time we recommed filling the housing via the leakage port. Observe fineness of filter! This increases the operation safety and prevents wear and tear in unfavourable installation conditions.

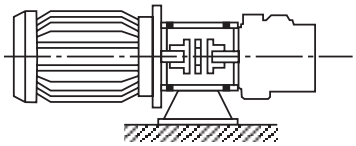
Installation positions

– horizontal preferred

Permissible installation position

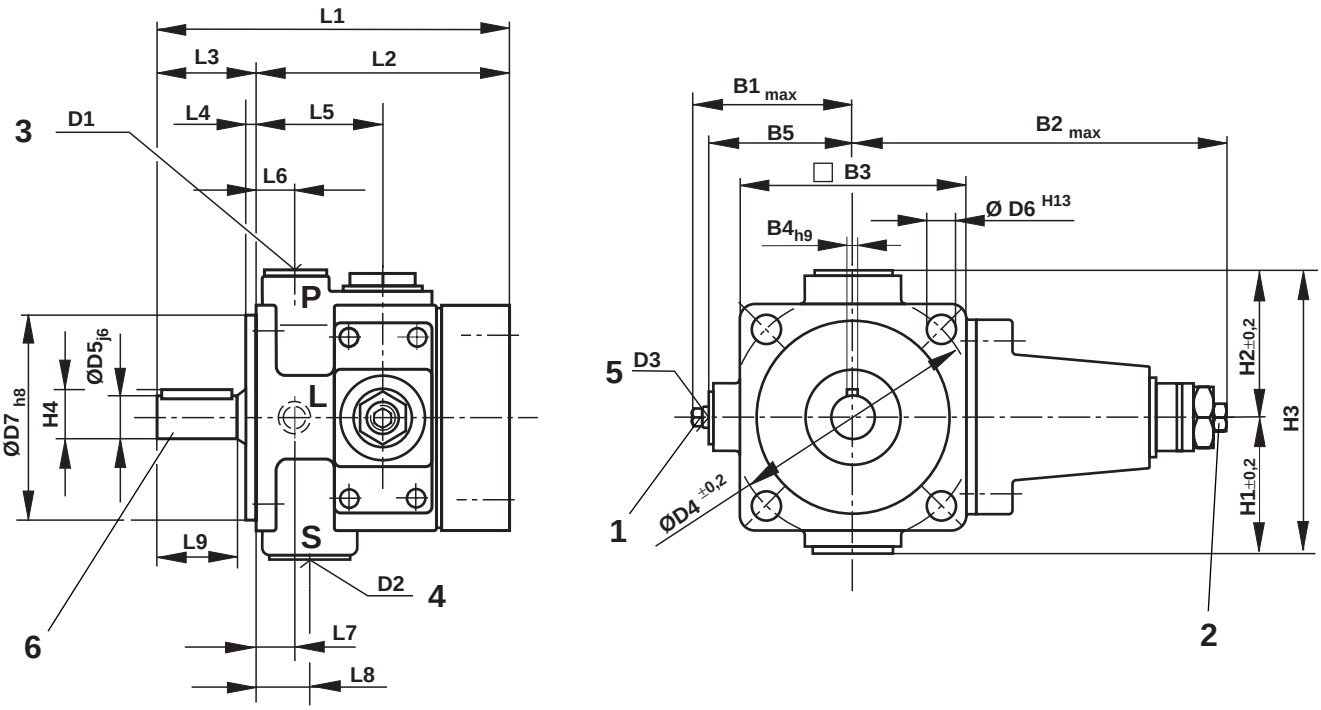






Unit Dimensions V3/12, V3/25, V3/40, V3/63

(Dimensions in mm)



1 Volume flow adjustment
Adjustment instructions with clockwise rotation:
Decrease of volume flow
with anti-clockwise rotation:
Increase of volume flow

2 Pressure adjustment
Adjustment instructions for clockwise rotation:
Increase of operating pressure
with anti-clockwise rotation:
Decrease of operating pressure

3 Pressure port
4 Suction port
5 Leakage port
6 Drive shaft

Size	B1 max.	B2 max.	B3	$B4_{h9}$	B5	ØD1	ØD2	ØD3	$ØD4_{±0,2}$	$ØD5_{k6}$	ØD6	$ØD7_{h8}$	$H1_{±0,2}$	$H2_{±0,2}$	H3	H4
12	68,5	156	93	6	56,5	G3/8	G1/2	G1/4	100	18	9	80	56,5	56,5	113	20,5
25	78	164	115	6	56,5	G1/2	G3/4	G1/4	125	19	11	100	65	65	130	21,5
40	95	201	148	8	76	G3/4	G1 1/4	G3/8	160	28	14	125	94	94	188	31
63	95	201	148	10	76	G1	G1 1/2	G3/8	160	32	14	125	97	94	191	35,3

Size	L1 [1])	L1 [2])	L2 [1])	L2 [2])	L3	L4	L5	L6	L7	L8	L9
12	136,5	136,5	102	102	34,5	4	50,5	17	15,5	20,5	28
25	158,5	168,5	124	134	34,5	4	65	25	20	25	28
40	211	218	159	166	52	4	81	32	27	32	42
63	242	249	174	181	68	4	91	34	27	38	58

[1]) Up to 70 bar zero stroke pressure

[2]) Up to 100 bar zero stroke pressure

Project Instructions

Extensive instructions and ideas can be found in the Hydraulic Trainer, Volume 3, RE 00 281 " Planning and Design of Hydraulic Power Systems".

When using vane pumps we especially recommend the following instructions:

– **Specifications**

All values mentioned are dependent on manufacturing tolerances and are valid with certain conditions. Some variations in actual values must therefore be expected due to the manufacturing tolerances and changes in ambient and operating conditions (e.g. viscosity).

– **Performance curves**

Performance curves for volume flow and input power.

Please observe the maximum possible input data when designing the installation of the drive motor.

– **Noise level**

The values for the noise level shown on page 6 are measured to DIN 45 635 part 26. That means that only the noise emission of the pump is shown. Ambient conditions (as e.g. installation site, piping, etc.) are not taken into consideration. These values are only valid for one pump.

If, for example, two pumps of the same size are operated under the same load the noise level increases according to the formula

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

L_{Σ} = total level
$L_1 ... L_2$ = noise level of the single pumps

Example: V3/16 + V3/16, delivering
p = 80 bar
L_1 = 64 dB(A)
L_2 = 64 dB(A)
$L_{\Sigma} = 10\lg(10^{0,1 \cdot 64} + 10^{0,1 \cdot 64})$
= 67,01dB(A)

Warning: The construction of the unit and the influences of the site where the pump is eventually placed can cause the noise level to be, as a rule, 5 to 10 dB (A) higher than the value of the pump alone.

Leakage oil

The avaerage external leakage oil of the pumps is shown on page 6. Please note that these values are only to be used as a project aid for the design of the cooling sizes and the pipe cross sections. During the off stroke the quantity of the leakage oil is shortly increased due to the control oil of the controller. Caused by cross section narrowings but also through the leakage oil coolers it is possible that unduly high pressure peaks are produced in the leakage oil line. The relevant size for the dimensioning of the tanks is the zero stroke power (see pages 4 and 5).

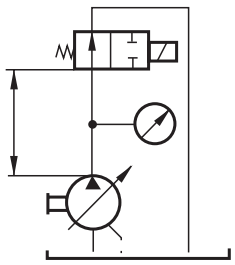
Zero stroke

During the stroke onto zero stroke variably high pressure peaks can occur according to design. For the illustrated measuring design the following values were measured:

	Pressure peak			
Zerostrokepressure	size 12	size 25	size 40	size 63
100 bar	175 bar	180 bar	190 bar	210 bar
63 bar	135 bar	140 bar	150 bar	170 bar
40 bar	115 bar	120 bar	130 bar	150 bar
25 bar	100 bar	105 bar	115 bar	135 bar

Please observe the possible effects on the units during projecting.

Measuring layout:



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