MANNESMANN REXROTH

Variable Vane Pump
Type V4 / Series 2X, 3X and 4X
with controls

Sizes 20 to 125 | **up to 160 bar** | **from 20 to125 cm³**

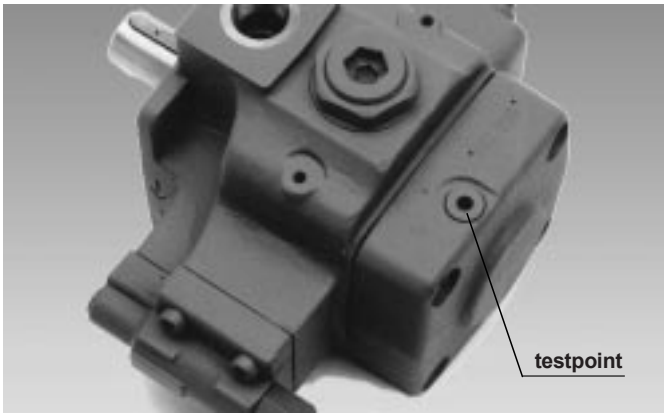
RE 10 460/08.90

Replaces RE 10 459

- variable displacement
- low noise level
- good bearing life by virtue of hydrodynamically lubricated plain bearings
- bronze-coated start and control plates giving good frictional characteristics
- single control device for all sizes (C, D W and E)
- optional control of pressure and flow
- low hysteresis
- very short control times
- high reliability by virtue of automatic bleeding
- test point
- can also be supplied as combination pump

K4752-7
Type V4/20

F90003
Type V4 with lock



F90005
Type V4/Testpoint

K4751-7
Type V4 + V4-Combination

Table of Contents

Functional description, Section, Symbols

Hydraulic pumps type V4 are variable displacement vane pumps.

Construction

They basically consist of the housing (1), the rotor (2), vanes (3), stator ring (4) , pressure regulator (5), setting screw (6), automatic bleed valve (7) and cover (17).

The circular stator ring is held between the small positioning piston (10) and the large positioning piston (11). The third contact point for the ring is the height adjustment screw (13).

The rotor (2) rotates inside the stator ring (4). The vanes within the rotor (3) are pressed against the stator ring (4) by centrifugal force.

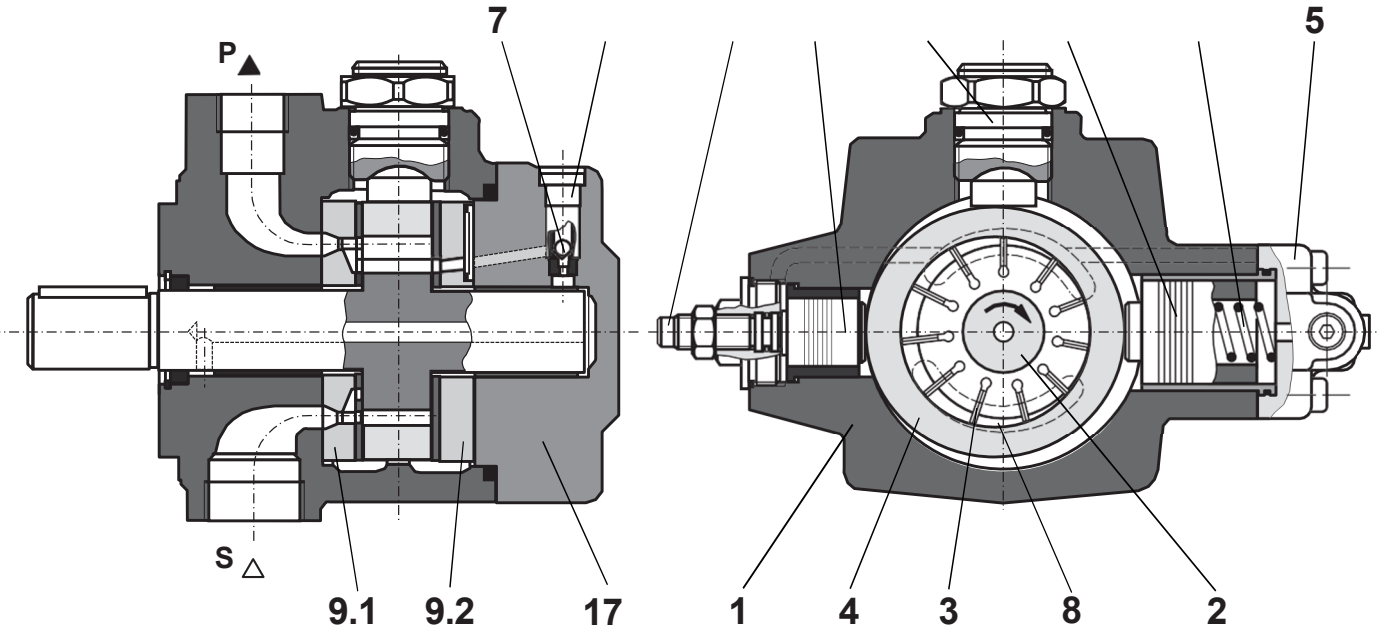
Pressure control

System pressure is fed continuously to the back of the small positioning piston (10) via an internal a channel.

As pressure builds up in the system, oil flows via the drilling in the pressure control spool (14) into the chamber behind piston (11). Pressure behind the large piston (11) then holds the stator ring (4) in the offset position.

At all pressures below the stall pressure set on the pressure controller (5). Control spool (14) is is held down by the spring (15). This causes system pressure to pass to the rear of the large positioning piston (11) holding the the stator ring (4) in the pumping position.

Removal of the plug (16) allows the automatic bleed valve point to be used as a test point.



Suction and pumping process

Chambers (8) required for transportation of the fluid are formed by the vanes (3), the rotor (2), the stator ring (4), the control plate (9.1) and the cover plate (9.2).

To ensure the operation of the pump on start-up the stator ring (4) is held in the eccentric position (maximum displacement position) by spring (12) behind the large positioning piston (11).

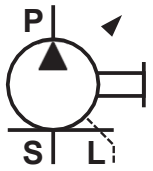
As the rotor rotates, chambers (8) increase in size due to the rotation of the rotor (2) and at the same time fill with fluid via the suction channel (S).

When maximum chamber volume is reached chambers (8) are disconnected from the suction port. As the rotor (2) continues to rotate they are connected to the pressure port, become smaller and pump oil into the system via the pressure channel (P).

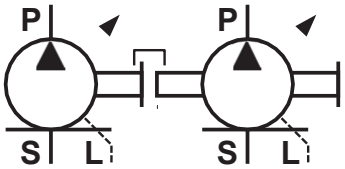
Principal Parts

1	Housing	**5**	Pressure controller
2	Rotor	**10**	Small positioning piston
3	Vane	**11**	Large positioning piston
4	Stator ring	**13**	Height adjustment screw
		17	Cover

Symbols



Single pump



Pump combination

Control

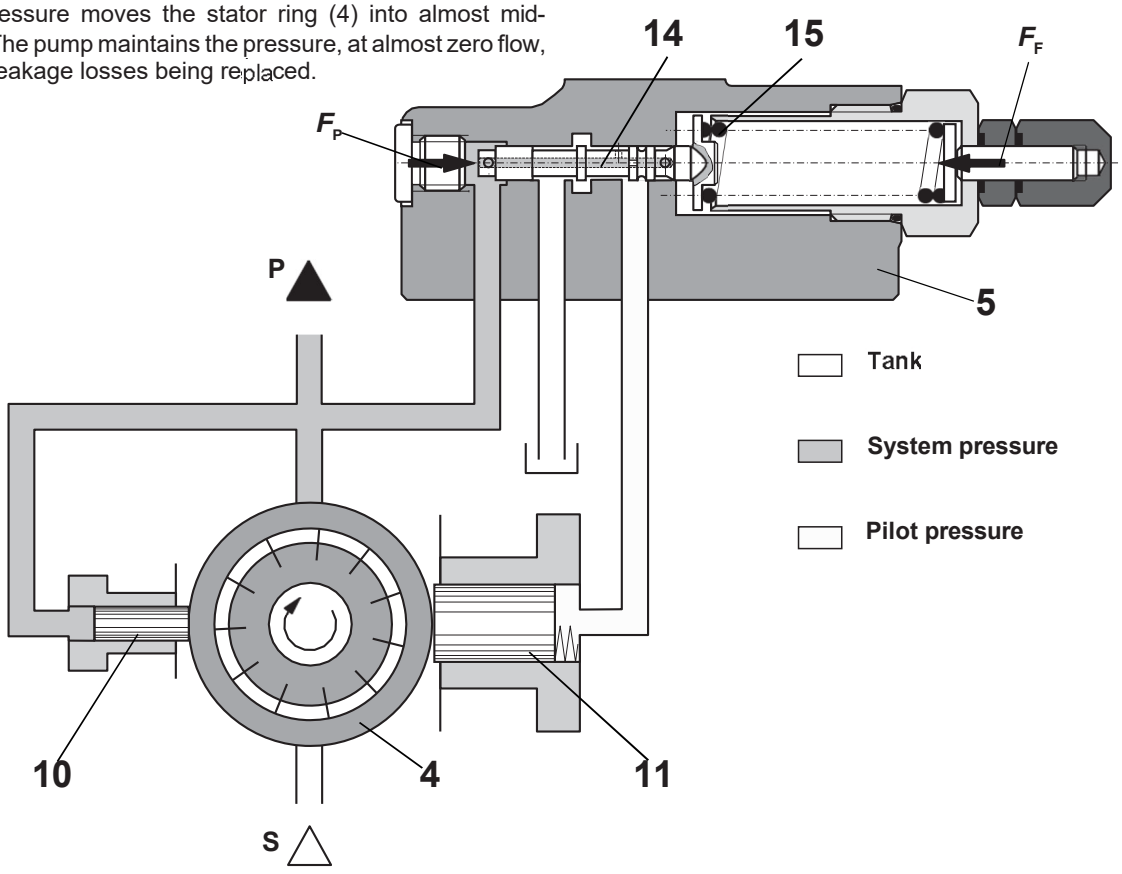
Control (decreasing flow)

If force F_P arising from the product of P(pressure) x A(area) exceeds counter force F_F of the spring, control piston (14) will be moved against the spring (15). In this way the area behind the large positioning piston (11) is connected to tank and is therefore at zero pressure.

The small positioning piston (10) which is constantly under system pressure moves the stator ring (4) into almost mid-position. The pump maintains the pressure, at almost zero flow, with only leakage losses being replaced.

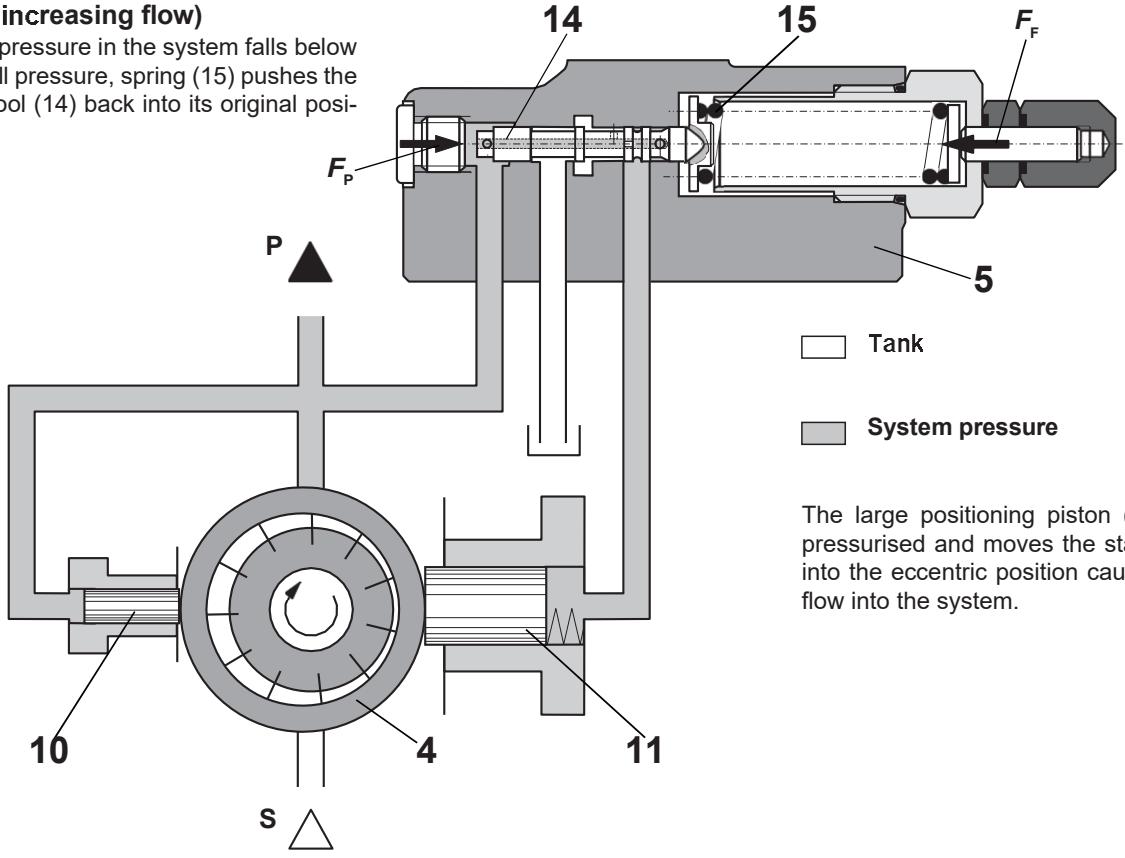
This reaction means that power losses and heating of the fluid are kept at a low level.

As adjustment of the stator ring (4) takes place hydraulically the flow/pressure curve is vertical and moves parallel to the axes of the performance curve as higher pressures are set.



Control (increasing flow)

When the pressure in the system falls below the set stall pressure, spring (15) pushes the control spool (14) back into its original position.



The large positioning piston (11) is now pressurised and moves the stator ring (4) into the eccentric position causing fluid to flow into the system.

Ordering Code, Preferred Types

1 PV 2 V4	–	/	R					–	16		1	*

Series
Series 20 to 29 = **2X**
Size 20 and Size 50 [1])
(20 to 29, externally interchangeable)
Series 30 to 39 = **3X**
Size 32 and Size 80 [1])
(30 to 39, externally interchangeable)
Series 40 to 49 = **4X**
Size 125
(40 to 49, externally interchangeable)

Size / Displacement

	V_{eff}	
Size 20	20,7 cm³	= **20**
Size 32	34,5 cm³	= **32**
Size 50	55,2 cm³	= **50**
Size 80	82,8 cm³	= **80**
Size 125	127,6 cm³	= **125**

Direction of rotation
Clockwise (viewed on shaft end) = **R**

Shaft end
Single pump
Metric, parallel with key = **A**
Combination pumps
Front pump = **E**
Middle pump = **F**
Rear pump = **G**

Connections
Standard model
Size 20, 32, 50: suction and pressure ports: BSP thread = **01**
Size 80: suction port: SAE flange = **37**
pressure port: BSP thread;
Size 125: suction and pressure ports: SAE flanges = **07**
Model with mounting for servo orifice on pressure port
Size 20, 32, 50: suction port: BSP thread = **27**
Size 80: suction port: SAE flange = **38**
Size 125: suction port: SAE flange = **07**

Displacement control
N = without setting screw for displacement control
A = with setting screw for displacement control

Stall pressure range
16 = up to 160 bar optimum range 40 to 160 bar
Other stall pressure settings
Details in clear text

Control settings
1 = setting screw
3 = [3; 4]) lockable rotary hand knob with scale
5 = [3]) setting screw and K-plate for start at lowest stall pressure (refer page 16)
7 = [3; 4]) lockable rotary handknob with scale and K-plate for start at lowest stall pressure

[2]) **Controls**
C = Pressure control with mechanical pressure setting
D = Pressure control with remote hydraulic pressure setting
W = Pressure control with electrical 2 stage pressure setting
E = Pressure control with electrical remote pressure setting

Seals
M = NBR-seals, suitable for use with mineral oils (HLP) to DIN 51 524 part 2
V = Viton-seals, suitable for use with phosphate-ester (HFD-R)

Please note the data on fluids published in our data sheet RE 07 075

further details in clear text
1 = automatic bleed valve

[1]) Size 50 from Series 22; Size 80 from Series 32
[2]) for other controllers see page 14
[3]) only available with controls C,D,W or E
[4]) Key (ident. number 008158) included in supply

Sample order
1. Standard pump
1PV2V4-3X/32RA01MC1-16A1
(Flow Q_{max} bei 1450 min^{-1}/10 bar
46,4 L/min; p_{NH} = 160 bar)

1. Pump with settings specified by customers
1PV2V4-3X/80RA37MD1-16A1
Details in clear text:
Q_{max} = 6^ L/min p_{NH} = 100 bar

Pump set at required flow and stall pressure values. Optimum operating noise level set for required stall pressure.

Preferred types = available ex stock

Type	Ordering code
1PV2V4-2X/ 20RA01MC1-16A1	584 653
1PV2V4-3X/ 32RA01MC1-16A1	584 655
1PV2V4-2X/ 50RA01MC1-16A1	585 159
1PV2V4-3X/ 80RA37MC1-16A1	585 039
1PV2V4-4X/125RA07MC1-16A1	584 657

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

General

Construction			Variable vane pump				
Type			V4				
Mounting			Flange mounting				
Connections			Threaded or flanged, dependent on size of unit				
Installation position			Optional, preferrably horizontal (see page 8)				
Shaft loading			Radial and axial forces **cannot** be accepted				
Direction of rotation			Clockwise (viewed on shaft end)				
Speed range	n_{min} bis n_{max}	min^{-1}	900 to 1800				
Size			20	32	50	80	125
Drive power (n = 1450 min^{-1})	P_{eff}	kW	8,5	14,5	23	32	53
Torque	T_{max}	Nm	228	294	510	510	1330
Weight (with pressure control C1)	m	kg	23,5	31	42,8	56	98

Hydraulic

Size			20	32	50	80	125
Displacement	V_{eff}	cm^3	20,7	34,5	55,2	82,8	127,6
Max. flow (at n = 1450 min^{-1}; p = 10 bar)	Q	L/min	29	46,4	72,5	116	181
Nominal pressure	p_N	bar	160				
Operating pressure (absolute)							
Inlet	p	bar	0,8 to 2,5				
Outlet	p	bar	up to 160				
optimum adjustable stall pressure range	p_{NH}	bar	40 to 160 [1])				
Leakage outlet, max	p	bar	2				
Fluid			HLP-mineral oils to DIN 51 524 part 2 or HM and HV to ISO 6074; phosphate-ester (HFD-R) **Please observe the specifications in our data sheet RE 07 075!**				
Fluid temperature range		C	–10 to +70 (note permissible viscosity range)				
Viskosity range	n	mm^2/s	16 to 160 at operating temperature and stall pressure < 63 bar 25 to 160 at operating temperature and stall pressure > 63 bar max. 800 when starting under flow conditions max. 200 when starting at zero flow (stalled)				
Fluid cleanliness			Max. permissible degree of contamination of fluid to NAS 1638 Class 9. We therefore recommend a filter of a minimum retention rate of $b_{20} \geq 75$. In order to achieve a longer service life, we recommend fluid cleanliness to NAS 1638 Class 8. For this, we recommend a filter with a minimum retention rate of $b_{10} \geq 100$.				

[1]) for stall pressure < 40 bar rquired, please consult us