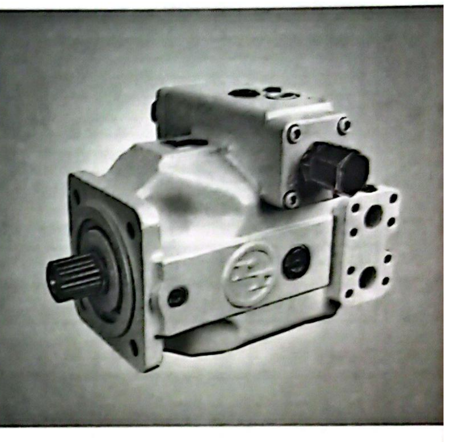
Rexroth
Bosch Group

Variable displacement pump A4VSG

RE 92 100/11.95 1/36
Replaces: 01.95

closed circuit

Sizes 40...1000
Series 1 and 2
Nominal pressure 350 bar
Peak pressure 400 bar



Contents

Features

The axial piston swashplate design variable displacement pump A4VSG is designed for hydrostatic transmission in closed circuit.

Flow is proportional to input speed and displacement and is infinitely variable by adjustment of the swashplate.

- slot-controlled swashplate design
- infinitely variable adjustment of displacement
- reversible flow
- permissible nominal pressure 350 bar
- low noise level
- long service life
- drive shaft capable of absorbing axial and radial loads
- high power/weight ratio
- modular design
- short control times
- through drive and tandem pumps possible
- pump swivel angle indicator
- installation position optional
- operation on HF fluids possible with reduced operating parameters

For description of control and regulating devices see separate RE sheets

RE 92055, RE 92060, RE 92064
RE 92072, RE 92076, RE 92080

Ordering code

Fluid

Mineral oils (no short code)	
HF fluids (except Skydrol)	E-

Axial piston unit

Variable pump, swashplate design, for industrial drives	A4VS

Operating mode

Pump, closed circuit	G

Size

	40	71	125	180	250	355	500	750	1000
≙ Displacement $V_{g\,max}$ (cm³)	40	71	125	180	250	355	500	750	1000

Control device

		40	71	125	180	250	355	500	750	1000			
Manual control	MA	●	●	●	●	●	●	●	–	–	MA	see	RE 92072
Electric motor control	EM	●	●	●	●	●	●	●	–	–	EM..		
Hydraulic control, flow dependent	HM	●	●	●	●	●	●	●	❍	❍	HM..		
Hydr. control with servo/ prop. valve	HS	●	●	●	●	●	●	●	●	●	HS..	see	RE 92076
Electronic control	EO	●	●	●	●	●	●	●	❍	❍	EO..		
Hydr. control, pressure dependent	HD¹)	●	●	●	●	●	●	●	●	❍	HD..	see	RE 92080
Press. control, single sided operation	DR¹)	●	●	●	●	●	●	●	●	❍	DR..	see	RE 92060
Power control with hyperbolic curve	LR¹)	●	●	●	●	●	●	●	●	❍	LR..N	see	RE 92064
Hydr. control, distance dependent	HW	●	●	●	●	●	●	●	●	❍	HW	see	RE 92068 in prep.
Speed control, secondary control	DS	●	●	●	●	●	●	●	●	❍	DS..	see	RE 92055

Series

	40	71	125	180	250	355	500	750	1000	
	●	●	–	–	–	–	–	–	–	10
	–	–	●	●	●	●	●	●	●	22

Direction of rotation

Viewed on shaft end	right	R
	left	L
	bi-directional	W¹)

Seals

NBR (Nitrile rubber to DIN ISO 1629) with shaft seal FPM	P
FPM (Fluoride rubber to DIN ISO 1629)	V

Shaft end

Parallel with key to DIN 6885	P
Splined to DIN 5480	Z

Mounting flange

	40	71	125	180	250	355	500	750	1000	
ISO 4-hole	●	●	●	●	●	●	–	–	–	B
ISO 8-hole	–	–	–	–	–	–	●	●	●	H

Service ports

Ports A,B: SAE at the side (same side), with metric fixing screws	10

Through drive / tandem pump

1. If a **second Brueninghaus pump is factory mounted**, both ordering codes must be combined with "+".
   Ordering code 1st pump + ordering code 2nd pump
   Ordering example: A4VSG 125 EO1/22R – PPB10K339F + A4VSG 71 HM1/10R – PZB10N000N
2. If a **gear pump or radial piston pump is factory mounted**, please consult us.

¹) Bi-directional rotation not always possible, please note separate RE sheets.
²) Size 500 only available for DS control, for HS/HS1 see RE 92076

● = available ❍ = in preparation – = not available

	A4VS	G			/		–			10			

Fluid – Axial piston unit – Operating mode – Size – Control device – Model – Direction of rotation – Seals – Shaft end – Mounting flange – Service ports

Through drive

Flange	Hub/Shaft	to accept	40	71	125	180	250	355	500	750	1000	
Without through drive			●	●	●	●	●	●	●	●	●	N00
With through drive¹) for mounting of axial piston unit, gear pump or radial piston pump												
ISO 125, 4-hole	Splined shaft 32x2x30x14x9g	A4VSO/H/G 40	●	●	●	●	●	❍	●	❍	❍	K31
ISO 140, 4-hole	Splined shaft 40x2x30x18x9g	A4VSO/H/G 71	–	●	●	●	●	●	●	❍	❍	K33
ISO 160, 4-hole	Splined shaft 50x2x30x24x9g	A4VSO/H/G 125	–	–	●	●	●	❍	●	❍	❍	K34
ISO 160, 4-hole	Splined shaft 50x2x30x24x9g	A4VSO/G 180	–	–	–	●	●	❍	●	❍	❍	K34
ISO 224, 4-hole	Splined shaft 60x2x30x28x9g	A4VSO/H/G 250	–	–	–	–	●	❍	●	❍	❍	K35
ISO 224, 4-hole	Splined shaft 70x3x30x22x9g	A4VSO/G 355	–	–	–	–	–	●	❍	❍	❍	K77
ISO 315, 8-hole	Splined shaft 80x3x30x25x9g	A4VSO/G 500	–	–	–	–	–	–	●	●	❍	K43
ISO 400, 8-hole	Splined shaft 90x3x30x28x9g	A4VSO/G 750	–	–	–	–	–	–	–	❍	❍	K76
ISO 80, 2-hole	Keyed shaft 18 mm dia.	A10VSO 18	●	●	●	●	●	●	●	❍	❍	K51
ISO 100, 2-hole	Keyed shaft 22 mm dia.	A10VSO 28	●	●	●	●	●	❍	❍	❍	❍	K25
ISO 100, 2-hole	Keyed shaft 25 mm dia.	A10VSO 45	●	●	●	●	●	❍	●	❍	❍	K26
ISO 125, 2-hole	Keyed shaft 32 mm dia.	A10VSO 71	–	●	●	●	●	●	●	❍	❍	K27
ISO 125, 2-hole	Keyed shaft 40 mm dia.	A10VSO 100	–	–	●	●	●	❍	●	❍	❍	K37
ISO 180, 4-hole	Keyed shaft 45 mm dia.	A10VSO 140	–	–	–	❍	●	●	●	❍	❍	K59
82-2 (SAE A, 2-hole)	Splined shaft 5/8" 16-4 (SAE A)	G2 / GC2/GC3-1X	●	●	●	●	●	●	●	❍	❍	K01
82-2 (SAE A, 2-hole)	Splined shaft 3/4" 19-4 (SAE A-B)	A10VSO 18	●	●	●	●	●	●	●	❍	❍	K52
101-2 (SAE B, 2-hole)	Splined shaft 7/8"	G3, A10VO 28	●	●	●	●	●	●	●	●	❍	K02
101-2 (SAE B)	Splined shaft 25-4 (SAE B-B)	GC4-1X, A10VO 45	❍	❍	●	❍	❍	●	❍	❍	❍	K04
101-2 (SAE B)	Splined shaft 32-4 (SAE C)	GC5-1X	❍	●	●	❍	●	❍	❍	❍	❍	K06
127-2 (SAE C)	Splined shaft 32-4 (SAE C)	A10VO 71	–	❍	❍	❍	❍	❍	❍	❍	❍	K07
127-2 (SAE C)	Splined shaft 38-4 (SAE C-C)	GC6-1X, A10VO 100	–	–	●	●	●	❍	❍	❍	❍	K24
152-4 (SAE D)	Splined shaft 44-4 (SAE D)	A10VO 140	–	–	–	❍	❍	❍	❍	❍	❍	K17
63 mm dia. metric, 4-hole	Keyed shaft 25 mm dia.	R4	●	●	●	❍	●	❍	❍	❍	❍	K57
101-2 (SAE B)	22-4 (SAE B)	G4	●	●	●	●	●	●	●	●	❍	K68
With through drive, without hub or intermediate flange, with cover closed			●	●	●	●	●	●	●	●	●	K99

Auxiliary pump mounted and piped to boost circuit filter

		40	71	125	180	250	355	500	750	1000	
1 auxiliary pump for boost oil circuit	n < 2800 rpm	–	●	●	●	●	●	●	❍	❍	H02
	n > 2800 rpm	●	●	–	–	–	–	–	–	–	H03
1 auxiliary pump for boost and pilot oil circuits combined (only for EO1)	n < 2800 rpm	–	●	●	–	●	–	–	–	–	H04
	n > 2800 rpm	●	●	–	–	–	–	–	–	–	H05

For mounted auxiliary pumps see RE 90139 (in preparation)

Valves

Without valve block	0
Valve block SDVB mounted	9

Filtration

	40	71	125	180	250	355	500	750	1000	
Without filter	●	●	●	●	●	●	●	●	●	N
Filter in boost circuit, mounted	●	●	●	●	●	●	●	❍	❍	F
Sandwich plate filter for HS and DS control (see RE 92076 and RE 92055)	●	●	●	●	●	●	●²)	–	–	Z
Filter in boost circuit mounted and sandwich plate filter for HS and DS controls	●	●	●	●	●	●	●²)	–	–	U

Fluid

For extensive information on the selection of fluids and for application conditions, please consult our data sheets RE 90220 (mineral oils), RE 90221 (environmentally acceptable fluids) or RE 90223 (HF fluids) before proceeding with the design stage. When operating with environmentally acceptable or HF fluids reduced operating conditions may apply.

Operating viscosity range

In order to obtain optimum efficiency and service life, we recommend that the operating viscosity (at operating temperature) be selected from within the range:

ν_{opt} = operating viscosity 16...36 mm²/s

referred to the closed loop temperature.

Viscosity limits

The limiting values for viscosity are as follows:

ν_{min} = 10 mm²/s
short term at a maximum permissible drain temperature of 90° C.

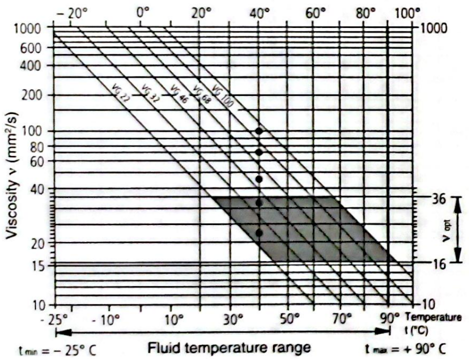
ν_{max} = 1000 mm²/s
short term on cold start.

Notes on the selection of hydraulic fluid

In order to select the correct fluid, it is necessary to know the operating temperature in the circuit (closed loop), in relation to the ambient temperature.

The hydraulic fluid should be selected so that within the operating temperature range the operating viscosity lies within the optimum range (n_{opt}), (see shaded section of selection diagram). We recommend that the highest possible viscosity range be chosen in each case.

Selection diagram



Example: At an ambient temperature of X° C the operating temperature is 60° C. Within the optimum operating viscosity range (n_{opt}; shaded area) this corresponds to viscosity ranges VG 46 or VG 68. VG 68 should be selected.

Important: The leakage oil (case drain oil) temperature is influenced by pressure and speed and is always higher than the circuit temperature. However at no point in the circuit may the temperature exceed 90° C.

If it is not possible to comply with the above conditions because of extreme operating parameters or high ambient temperatures, please consult us.

Flushing of the bearings

With the following operating conditions the bearings should be flushed to ensure correct functioning over a long period:

- with special fluids (not mineral) due to limited lubricity and a narrow operating temperature range
- when operating with mineral oils in limited conditions of temperature and viscosity
- with vertical installation (drive shaft facing upwards) flushing of the bearings is recommended for lubrication of the front bearing and shaft sealing ring.

Flushing of the bearings is carried out via port "U" in the vicinity of the front flange of the variable pump. The flushing oil flows through the front bearing and out with the pump case drain oil at the drain port.

The following quantities are required for flushing the various sizes:

Size	40	71	125	180	250	355	500	750	1000
Q_{sp} L/min	3	4	5	7	10	15	20	30	40

For the given flushing quantities there will be a pressure difference of approx. 2 bar between port "U" (including fittings) and the case drain oil chamber.

Filtration of fluid (axial piston unit)

In order to ensure correct functioning of the unit, a minimum level of cleanliness to NAS 16389 class 9
SAE class 6
ISO/DIS 4406 class 18/15 is necessary.

This is achievable for example with a filter element Type...D 020...(see RE 31278).

This gives a filter quotient of

$\beta_{20} \geq 100$

If a filter for the boost circuit is factory mounted (Ordering code F), depending on the size of the axial piston unit the following filters are installed, fitted with opto-electrical clogging indicator as standard:

Sizes 40 and 71:	LFBN/HC60G20D1.0/24/V
Sizes 125, 180 and 250:	LFBN/HC110G20D1.0/24/V
Size 355:	LFBN/HC240G20D1.0/L24/V
Size 500:	LFBN/HC330G20D1.0/L24/V

For further details see RE 31278.

Temperature range (cf. selection diagram)

t_{min} = – 25° C
t_{max} = + 90° C

Installation instructions

Installation position:

Optional. The pump housing must be filled with hydraulic fluid when commissioning and during operation.

In order to minimise noise levels, all connecting piping (suction, pressure, case drain oil ports) must be disconnected from the tank by means of flexible elements.

The use of check valves in the case drain oil line is to be avoided. They, however, may be used in certain cases after consultation with us.

Technical data

(applicable for operation with mineral oils)

Operating pressure range - inlet side

Recommended boost pressure p_{Sp} ____ 16 bar

Recommended boost pressure with common auxiliary pump for boost and pilot oil circuits (EO1) p_{Sp} ____ 25 bar

Maximum boost pressure – auxiliary pump max. pressure $P_{H max}$
for MA-, EM-, HM-, HS-, EO-, DS-settings ____ 50 bar
for HD-, HW-settings and LR.N- and DR-control ____ 16 bar

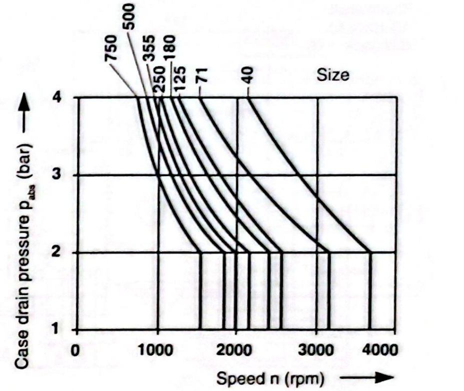
Auxiliary pumps - inlet pressure
Suction pressure $p_{s\,min}$(ν = 10...300 mm²/s) ≥ 0,7 bar absolute

Operating pressure range - outlet side

(pressures to DIN 24312)
Pressure at port A or B
Nominal pressure p_N ____ 350 bar
Peak pressure p_{max} ____ 400 bar

Case drain pressure

The maximum permissible case drain pressure (housing pressure) is dependent on speed (see diagram).



Max. case drain pressure (housing pressure)
$p_{L\,max}$ ____ 4 bar
These are approximate values. Under certain operating conditions a reduction in these values may be necessary.

Table of values (theoretical values, without considering η_{mh} and η_v; values rounded)

Size				40	71	125	180	250	355	500	750	1000
Displacement		$V_{g\,max}$	cm³	40	71	125	180	250	355	500	750	1000
Max. speed		n_{max}	rpm	3700	3200	2600	2400	2200	2000	1800	1600	1600
Max. flow	at n_{max}	Q_{max}	L/min	148	227	325	432	550	710	900	1200	1600
	at n_E = 1500 rpm		L/min	60	107	186	270	375	533	750	1125	1500
Max. power	at $n_{o\,max}$	$P_{o\,max}$	kW	86	132	190	252	321	414	525	700	933
(Δp = 350 bar)	at n_E = 1500 rpm		kW	35	62	109	158	219	311	438	656	875
Max. torque (Δp = 350 bar)	at $V_{g\,max}$	T_{max}	Nm	223	395	696	1002	1391	1976	2783	4174	5565
Torque (Δp = 100 bar)	at $V_{g\,max}$	T	Nm	64	113	199	286	398	564	795	1193	1590
Moment of inertia about drive axis		J	kgm²	0,0049	0,0121	0,03	0,055	0,0959	0,19	0,3325	0,66	1,20
Filling volume			L	2	2,5	5	4	10	8	14	19	27
Approx. weight (pump with EO1 control and valve block)		m	kg	47	60	100	114	214	237	350	500	630
Max. axial force		$\pm F_{ax\,max}$	N	600	800	1000	1400	1800	2000	2000	2200	2200
Max. radial force		$F_{q\,max}$	N	1000	1200	1600	2000	2000	2200	2500	3000	3500

Determination of size

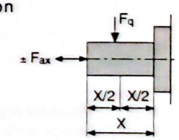
Output flow $$Q = \frac{V_g \cdot n \cdot \eta_v}{1000} \quad \text{[L/min]}$$

Torque $$T = \frac{1{,}59 \cdot V_g \cdot \Delta p}{100 \cdot \eta_{mh}} \quad \text{[Nm]}$$

Power $$P = \frac{2\pi \cdot T \cdot n}{60000} = \frac{T \cdot n}{9549} = \frac{Q \cdot \Delta p}{600 \cdot \eta_t} \quad \text{[kW]}$$

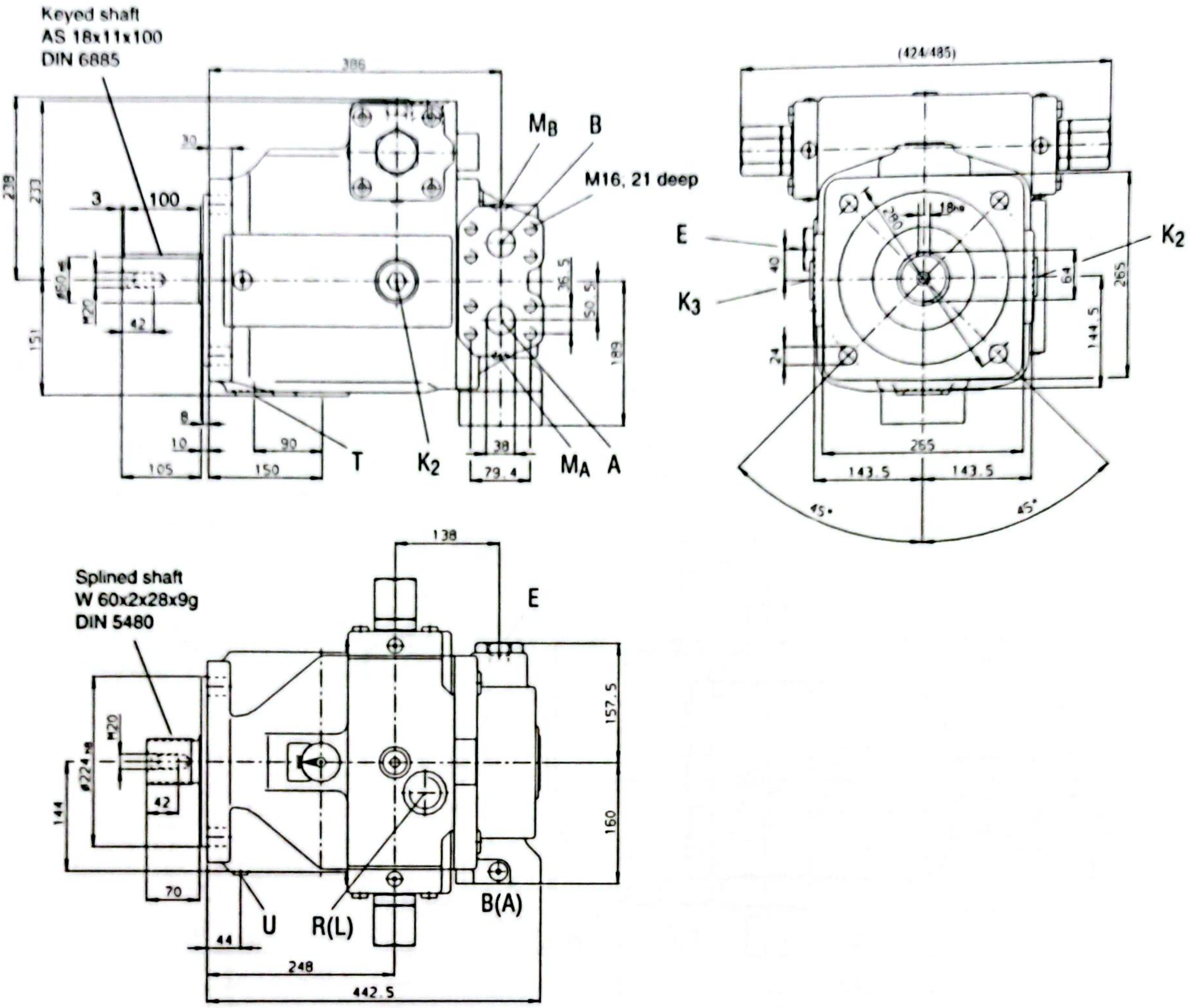
V_g = geometr. displacement [cm³] per revolution
Δp = Differential pressure [bar]
n = Speed [rpm]
η_v = Volumetric efficiency
η_{mh} = Mechanical-hydraulic efficiency
η_t = Total efficiency [$\eta_t = \eta_v \cdot \eta_{mh}$]

Application of forces



Unit dimensions Size 250

(not including control)



Connections

A, B	Pressure ports	SAE 1 1/2" (high pressure range)
M_A,M_B	Gauge ports	M14x1,5 (plugged)
T	Oil drain	M42x2 (plugged)
E	Boost port	M27x2
K_2, K_3	Housing flushing ports	M42x2 (plugged)
R(L)	Oil filling + bleeding ports For exact position see spec. for relevant control device	M42x2;
U	Flushing port	M14x1,5;12 deep (plugged)