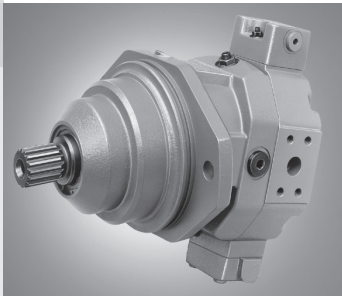
Rexroth
Bosch Group

Variable Displacement Plug-In Motor A6VE

RD 91 606/05.99
replaces: 03.97

for open and closed circuits



Sizes 28...250
Series 6
Nominal pressure up to 400 bar
Peak pressure up to 450 bar

Index

Features

- Variable displacement plug-in motor with a axial tapered piston rotary group of bent axis design for hydrostatic drives in open and closed circuits
- Easy assembly, simply «plugs-in» to mechanical gearboxes (no installation tolerances to consider)
- The design of the motor with the mounting flange in the centre of the housing allows it to be almost fully integrated into a mechanical gearbox to give an extremely compact unit.
- For use in mobile applications
- Complete unit, ready assembled and tested

- Further informations:
  Variable displacement motor A6VM RE 91 604

Ordering Code / Standard Program

Hydraulic Fluid

Mineral oil (no code)	

Axial piston unit

Bent axis design, variable displacement	**A6V**

Mode of operation

Plug-in motor	**E**

Size

≙ Displacement $V_{g\,max}$ in cm^3	**28**	**55**	**80**	**107**	**160**	**250**

sizes 28...160: production plant Elchingen; size 250: production plant Horb

Control device				**28**	**55**	**80**	**107**	**160**	**250**	
Hydraulic control, pilot pressure related	pilot pressure increase	10 bar	HD1	●	●	●	●	●	●	**HD1**
		25 bar	HD2	●	●	●	●	●	●	**HD2**
Hydraulic two-position control			HZ	–	–	–	–	–	●	**HZ**
			HZ1	●	–	–	–	●	–	**HZ1**
			HZ3	–	●	●	●	●[1]	–	**HZ3**
Electrical control, with proportional solenoid	control voltage	12 V	EP1	●	●	●	●	●	○	**EP1**
		24 V	EP2	●	●	●	●	●	○	**EP2**
Electrical control, with switching solenoid	control voltage	12 V	EZ1	●	–	–	–	●	●	**EZ1**
		24 V	EZ2	●	–	–	–	●	●	**EZ2**
		12 V	EZ3	–	●	●	●	–	–	**EZ3**
		24 V	EZ4	–	●	●	●	–	–	**EZ4**
Automatic control, high pressure related	without pressure increase		HA1	●	●	●	●	●	●	**HA1**
	pressure increase Δp=100bar		HA2	●	●	●	●	●	●	**HA2**
	without pressure increase		HA3	–	●	●	●	●	–	**HA3**[1]
Hydraulic control, speed related			DA	–	–	–	–	–	●	**DA**
el. valve for travel direction (24V) + el. $q_{V\,max}$-switch (24V), p_{St}/p_{HP}=5/100			DA3	●	●	●	●	●	–	**DA3**

Pressure control (only for HD)

without pressure control (no code)	
Pressure control	**D**

Override of HA-control (only for HA)

without override (no code)	
Hydraulic override	**T**

Series

	6

Index

	3

Direction of rotation

viewed on shaft end	alternating	**W**

Adjustment range for displacement [2]		**28**	**55**	**80**	**107**	**160**	**250**	
$V_{g\,min}$ = 0 to 0,8 $V_{g\,max}$ (no code)		●	●	●	●	●	—	
$V_{g\,min}$ = 0 to 0,4 $V_{g\,max}$	$V_{g\,max} = V_{g\,max}$ to 0,8 $V_{g\,max}$	—	—	—	—	—	●	**1**
$V_{g\,min} > 0,4\,V_{g\,max}$ to 0,8 $V_{g\,max}$	$V_{g\,max} = V_{g\,max}$ to 0,8 $V_{g\,max}$	—	—	—	—	—	●	**2**

■ = Preferred program (preferred types see page 10)

Ordering Code / Standard Program

A6V	E			/	6	3	W		–	V						

Axial piston unit
Mode of operation
Size
Control device
Series
Index
Direction of rotation
Adjustment range for displacement

Seals

	28	55	80	107	160	250	
FKM (fluor-caoutchouc)	●	●	●	●	●	●	V

Shaft end

Splined shaft	●	–	●	–	●	–	A
DIN 5480	–	●	–	●	–	●	Z

Mounting flange

	28	55	80	107	160	250	
Special 2-hole (standard flange)	●	●	●	●	●	–	L
Special 4-hole (standard flange)	–	–	–	–	–	●	M
Modified 2-hole flange (adaption flange)	–	–	–	●	–	–	U

Service line connections

Ports A, B: SAE at side (on opposite sides) (metric threads)	02	0	●	●	●	●	●	●	020
		7	●	●	●	●	●	●	027
Port plate with integral motion control valve (with brake release valve), and secondary valves (ports A, B: SAE at side (same side))	22	1	–	●	●	●	●	–	221[3]
		2	–	●	●	●	●	–	222[3]
port plate for mounting a motion control valve	08	0	–	–	–	–	–	●	080
		8	–	–	–	–	–	●	088

Valves

Flushing and boost pressure valve	without	0
	with	7
pressure release valve (control pressure for brake release)	internal boring	1
	external piping	2
with mounted motion control valve		8

Speed sensor

	28	55	80	107	160	250	
without speed sensor (no code)	●	●	●	●	●	●	
suitable for fitting speed sensor	●	●	●	●	●	●	D

Start of control

Port plate 02, 08	at $V_{g\,min}$ (standard for HA)	●	●	●	●	●	●	A
	at $V_{g\,max}$ (standard for HD, HZ, EP, EZ, DA)	●	●	●	●	●	●	B
Port plate 22	at $V_{g\,min}$ (standard for HA3)	–	●	●	●	●	–	B
	at $V_{g\,max}$ (standard for HZ3)	–	●	●	●	●	–	B

Motion control valve code (only for port plate 22)

9 digits code (is issued from BHY at projection of the integral motion control valve)	

[1]) only possible in connection with port plate 22 (integral motion control valve)
[2]) Note: $V_{g\,min}$ and $V_{g\,max}$ are infinitely adjustable in the adjustment ranges.
Indicate in the order the exact adjustment value in clear text: $V_{g\,min}$ = ... cm³, $V_{g\,max}$ = ... cm³.
[3]) only possible in connection with controls HZ3 or HA3

● = available
○ = in preparation
– = not available

Technical Data

Fluid

We request that before starting a project detailed information about the choice of pressure fluids and application conditions are taken from our catalogue sheets RE 90220 (mineral oil), RE 90221 (environmentally acceptable hydraulic fluids) and RE 90223 (fire resistance fluids, HF).

When using HF- or environmentally acceptable hydraulic fluids possible limitations for the technical data have to be taken into consideration. If necessary please consult our technical department (please indicate type of the hydraulic fluid used for your application on the order sheet). The operation with HFA-, HFB- and HFC- hydraulic fluids requires additional special measures.

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 loop temperature (closed circuit) or tank temperature (open circuit).

Viscosity limits

The limiting values for viscosity are as follows:

ν_{min} = 5 mm²/s, short term at a max. permissible temperature t_{max} = 115°C
ν_{max} = 1600 mm²/s, short term on cold start (t_{min} = -40°C)

Please note that the max. fluid temperature is also not exceeded in certain areas (for instance bearing area).

At temperatures of -25°C up to -40°C special measures may be required for certain installation positions. Please contact us for further information.

Notes on the selection of the hydraulic fluid

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

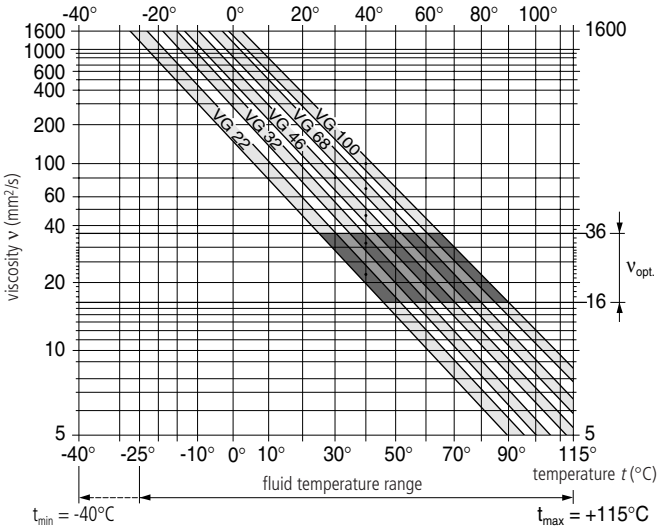
The hydraulic fluid should be selected so that within the operating temperature range, the operating viscosity lies within the optimum range (ν_{opt}) (see shaded section of the selection diagram). We recommend that the highest possible viscosity range should be chosen in each case.

Example: At an ambient temperature of X°C the operating temperature is 60°C. Within the operating viscosity range (ν_{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 pump speed and is always higher than the circuit temperature. However, at no point in the circuit may the temperature exceed 115°C

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

Selection diagram



Technical Data

Filtration

The finer the filtration the better the achieved purity grade of the pressure fluid and the longer the life of the axial piston unit.

To ensure the functioning of the axial piston unit a minimum purity grade of:

9 to NAS 1638

18/15 to ISO/DIS 4406 is necessary.

At very high temperatures of the hydraulic fluid (90°C to max. 115°C) at least cleanless class

8 to NAS 1638

17/14 to ISO/DIS 4406 is necessary.

If above mentioned grades cannot be maintained please consult supplier.

Installation position

Optional. The motor housing must be filled with fluid prior the commissioning, and must remain full whenever it is operating.

For extensive information on installation postition, please consult our data sheet RE 90270 before completing your design work.

Operating pressure range

Maximum pressure at port A or B

Size		28...160	250
Nominal pressure p_N	*bar*	400	350
Peak pressure p_{max}	*bar*	450	400

(pressure data to DIN 24312)

The summ of the pressures at ports A and B may not exceed 700 bar.

Direction of flow

clockwise rotation	anti-clockwise rotation
A to **B**	**B** to **A**

Further informations see RE 91604 (variable motor A6VM)

- Description and dimensions of control devices
- Description and dimensions of flushing and boost pressure valve
- Speed sensor
- Perm. case drain pressure, perm. displacement and inlet pressure depending on speed
- Perm. radial load for drive shaft

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

Size			28	55	80	107	160	250
Displacement [1]	$V_{g\,max}$	cm³	28,1	54,8	80	107	160	250
	$V_{g\,0}$	cm³	0	0	0	0	0	0
Max. speed (at max. permitted flow)	n_{max} at $V_{g\,max}$	rpm	5550	4450	3900	3550	3100	2500
	n_{max} at $V_g < V_{g,1}$	rpm	8750	7000	6150	5600	4900	3300
	$V_{g,1}$	cm³	18	35	51	68	101	190
	n_{max} at $V_{g\,0}$	rpm	10450	8350	7350	6300	5500	3300
Max. perm. flow	$q_{V\,max}$	L/min	156	244	312	380	469	625
Torque constants	T_k at $V_{g\,max}$	Nm/bar	0,446	0,87	1,27	1,70	2,54	3,98
Max. torque	T_{max} at $V_{g\,max}$ [2]	Nm	179	349	509	681	1019	1391
Case volume		L	0,5	0,75	1,2	1,5	2,4	3,0
Moment of inertia about drive axis	J	kgm²	0,0014	0,0042	0,0080	0,0127	0,0253	0,061
Weight (approx.)	port plate 02	kg	16	26	34	45	64	90
	port plate 22	kg	—	35	43	53	72	—

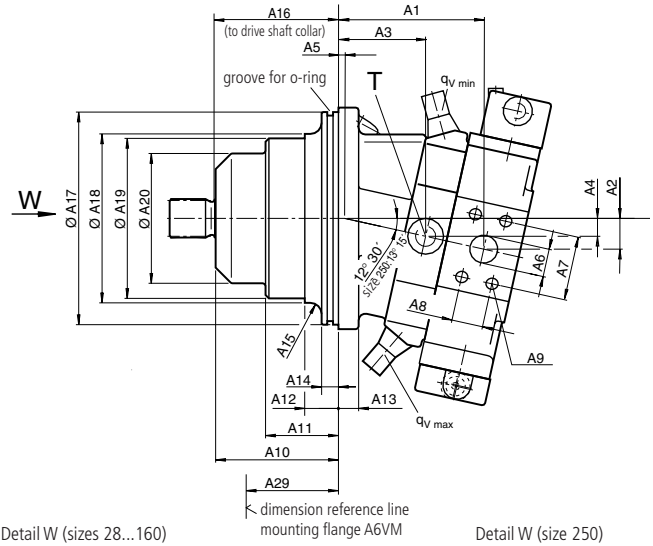
[1]) The minimum and maximum displacement are infinitely adjustable, see ordering code page 3

[2]) sizes 28...160: Δp = 400 bar; size 250: Δp = 350 bar

Unit Dimensions

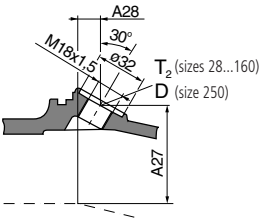
Before finalising your design, please request a certified drawing.

Port plate 02 (service ports A, B at side)



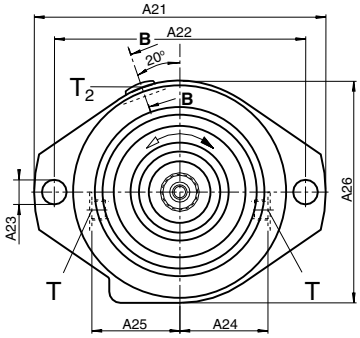
For dimensions of control devices, see variable displacement motor A6VM (RE 91604)

Detail B-B
only for design **D** (suitable for fitting speed sensor), otherwise no threads

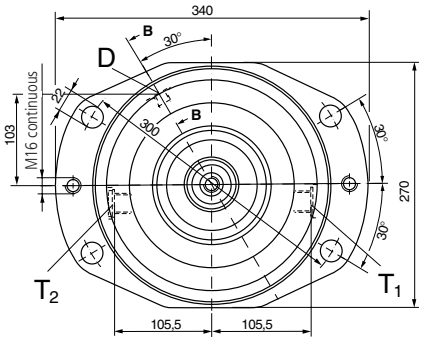


Note at A6VE 250...D:
- Number of teeth: 86 teeth!
- Use only HD-sensor with variable length of thread engagement (RE 95134)

Detail W (sizes 28...160)



Detail W (size 250)



Connections

Sizes 28...160
- A, B Service line ports 420 bar (6000 psi) high pressure series
- T Case drain ports (1port plugged)
- T_2 Port for speed sensor (only for design **D**)

Size	Service line ports A, B	Case drain ports T	Speed sensing T_2
28	SAE 3/4"	M18x1,5	M18x1,5
55	SAE 3/4"	M18x1,5	M18x1,5
80	SAE 1"	M18x1,5	M18x1,5
107	SAE 1"	M18x1,5	M18x1,5
160	SAE 1 1/4"	M26x1,5	M18x1,5

Size 250
- A, B Service line ports 420 bar (6000 psi) high pressure series
- T_1, T_2 Case drain ports (1port plugged)
- D Port for speed sensor (only for design **D**)

Size	Service line ports A, B	Case drain ports T_1, T_2	Speed sensing D
250	SAE 1 1/4"	M22x1,5	M18x1,5

Unit Dimensions

Before finalising your design, please request a certified drawing.

Standard flange L (sizes 28-160), **M** (size 250)

Size	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14
28	91	20	47	10	3	19	50,8	23,8	M10; 17 deep	88	54	—	14	15
55	123	24	77	14	15	19	50,8	23,8	M10; 17 deep	91	50	22	16	15
80	130	28	78	16	5,5	25	57,2	27,8	M12; 17 deep	109,5	65	30	18	15
107	137	30	84	18	3,2	25	57,2	27,8	M12; 17 deep	121,8	72	35	18	15
160	171	34	109	20	17,5	32	66,7	31,8	M14; 19 deep	122	67	29	20	15
250	204	44	103	20	18,5	32	66,7	31,8	M14; 19 deep		–		25	14

Size	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29	O-ring[1])
28	R10	89	$135_{-0,025}$	110	–	86	188	160	13,5	62,5	62,5	142	63,4	14,6	64	126x4
55	R6	92	$160_{-0,025}$	139	132	104	235	200	17	72,5	72,5	166	79,5	8,5	59	150x4
80	R10	110,5	$190_{-0,029}$	151	143	116	260	224	21	78,5	78,5	198	88,4	12	79	180x4
107	R12	122,8	$200_{-0,029}$	168	160	132	286	250	21	86,5	86,5	210	97,2	12,3	82	192x4
160	R5	123	$200_{-0,029}$	188	180	146	286	250	21	98,5	98,5	208	104	10,5	83	192x4
250		133,5	260_{h8}	230	–		–	–	–	–	–	–	119	21,5	83,5	250x5

Adaption flange U (size 107)

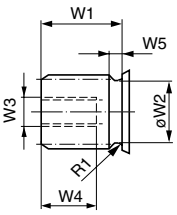
Size	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14
107	150	30	96	18	15,5	25	57,2	27,8	M12; 17 deep	109,5	59,7	22,7	18	15

Size	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29	O-ring[1])
107	R8	110,5	$190_{-0,025}$	168	160	132	260	22,4	22	86,5	86,5	198	91,5	13,8	70	180x4

[1]) the O-ring is not comprised in the delivery volume

Shaft ends

Splined shaft DIN 5480



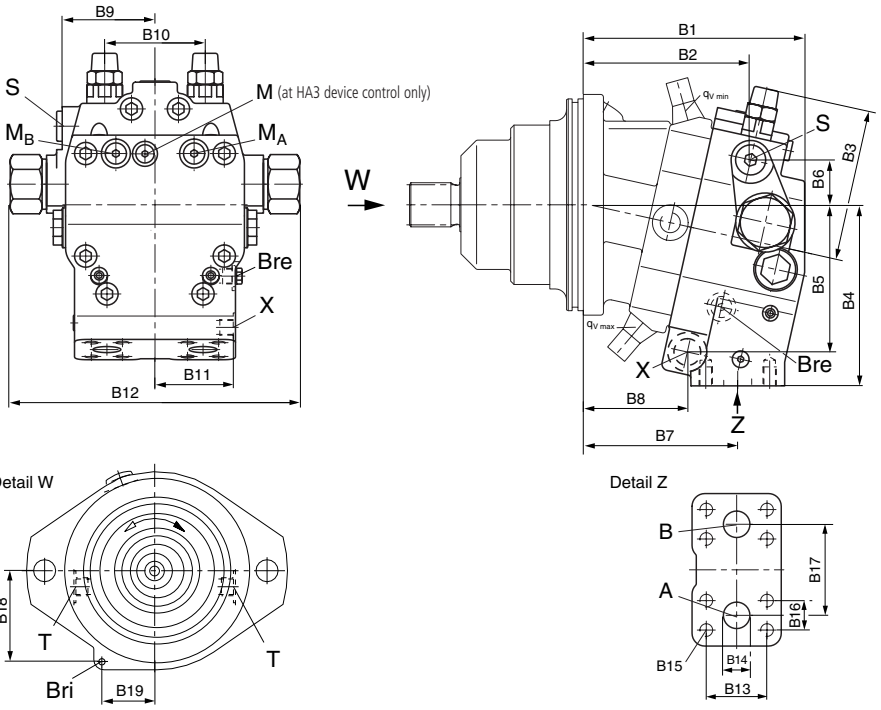
Size	Shaft end	W1	øW2	W3	W4	W5	R1
28	**A** (W30x2x30x14x9g)	35	24,6	M10	22	8	1,6
55	**Z** (W30x2x30x14x9g)	35	24,6	M12	28	8	1,6
80	**A** (W40x2x30x18x9g)	45	34,6	M16	36	8	2,5
107	**Z** (W40x2x30x18x9g)	45	34,6	M12	28	8	2,5
160	**A** (W50x2x30x24x9g)	55	44,6	M16	36	11	4
250	**Z** (W50x2x30x24x9g)	58	45	M16	36	9	2,5

Integral Motion Control Valve - Unit Dimensions

Before finalising your design, please request a certified drawing.

Port plate with integral motion control valve (22)
(additional dimensions see page 6)

Note appendix projection sheet RE 91606-P when using a variable displacement motor A6VE with integral motion control valve (see pages 11-12).



Connections

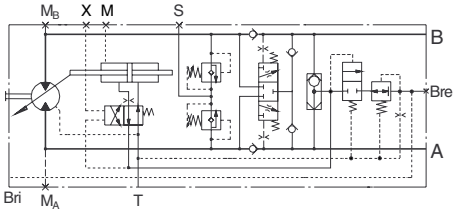
A, B	Service line ports 420 bar (6000 psi), high pressure series	
T	Case drain ports (1 port plugged)	
S	Boosting	
X	Pilot pressure port (open at HZ3 and HA3T, closed at HA3)	M14x1,5
M_A, M_B	Test port	M14x1,5
M	Test port for control pressure (at HA3 only)	M 10x1
Bre	Brake released port extern (open at design 22**2**)	M14x1,5
Bri	Brake released port intern (not at design with flange **U**)	ø4

Size	Ports A, B	Port T	Port S
55	SAE 3/4"	M18x1,5	M22x1,5
80	SAE 1"	M18x1,5	M22x1,5
107	SAE 1"	M18x1,5	M22x1,5
160	SAE 1 1/4"	M26x1,5	M27x2

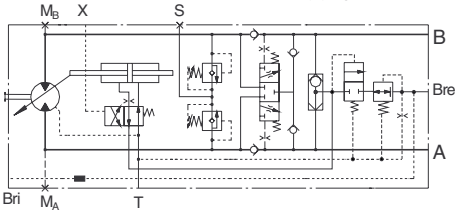
Size	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19
55	192	144	127	144	117	37	133	91	83	85	64	259	50,8	19	M10; 17 deep	23,8	80	74	51
80	198	150	136	162	132	40	138	93	83	90	69	259	57,2	25	M12; 17 deep	27,8	86	90	53
107	202	161	139	172	143	40	144	99	85	96	70	259	57,2	25	M12; 17 deep	27,8	86	96	58
160	240	195	152	197	162	47	177	128	102	108	78	259	66,7	32	M14; 19 deep	31,8	94	94	65

Integral Motion Control Valve - Circuit Diagrams

A6VE...HA3...**221** (brake release via internal boring)
(port X open at HA3T)



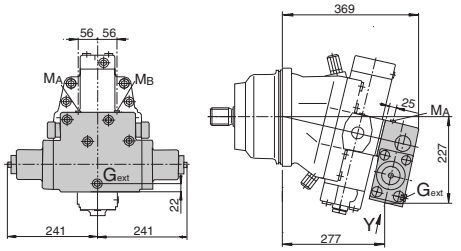
A6VE...HZ3...**222** (brake release via external piping)



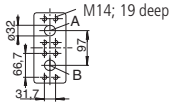
Mounted Motion Control Valve MHB

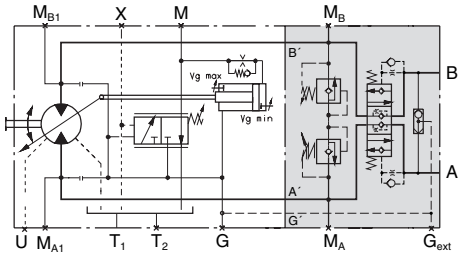
Before finalising your design, please request a certified drawing.

Variable motor A6VE 250, with motion control valve MHB
Design with start of control at $V_{g\,min}$ (standard for HA)



Detail Y





Connections

A, B	Service line ports high pressure series	SAE $1^1/_4$"

Further Informations corresponding to the motion control valve (when ordering, please state in clear text the design of the motion control valve):

- MHB30 (for A6VE 250) RE 64316

Preference Types

Type	Ident-No.
A6VE28HD1/63W-VAL020B	9604197
A6VE28HZ1/63W-VAL020B	9604357
A6VE28EP1/63W-VAL020B	9604360
A6VE28HA2/63W-VAL020A	9604363
A6VE55HD1/63W-VZL020B	9605796
A6VE55HZ3/63W-VZL020B	9605817
A6VE55EP1/63W-VZL020B	9610606
A6VE55HA2/63W-VZL020A	9610607
A6VE80HD1/63W-VAL020B	9604199
A6VE80HZ3/63W-VAL020B	9610608
A6VE80EP1/63W-VAL020B	9604368
A6VE80HA2/63W-VAL020A	9604371
A6VE107HD1/63W-VZL020B	9610609
A6VE107HZ3/63W-VZL020B	9604870
A6VE107EP1/63W-VZL020B	9610611
A6VE107EP2/63W-VZL020B	9610612
A6VE107HA2/63W-VZL020A	9610613
A6VE160HD1/63W-VAL020B	9604201
A6VE160HZ1/63W-VAL020B	9604376
A6VE160EP2/63W-VAL020B	9604380
A6VE160HA1/63W-VAL020A	9604381

Sizes 28...160: production plant Elchingen
Size 250: production plant Horb

Please state type and ident-no. when ordering.

Project Sheet for Variable Motor A6VE with Integral Motion Control Valve (sizes 55...160)

Responsible: _____ Copy: _____

Company: _____

Place: _____

Name: _____

Department: _____

Telefax: _____

Phone: _____

Please send back the filled in project sheet, when ordering the motor

---

Customer: _____ Annual need: _____

Machine: _____

Total weight: _____ t

Track drive: ☐ Crawler excavator ☐ Crane ☐ Other

Engine speed: n_{min}= _____ rpm n_{max}= _____ rpm

Power: P = _____ kW

Hydraulic fluids: ☐ Mineral oil (HL, HLP) nach DIN 51 524 ☐ Phosphate-Esters (HFD-R)

Others: _____

Hydraulic Components

1. Drive pump(s)

Supplier: _____ Type(s): _____

Displacement/pump $q_{V\,min}$ (at $n_{min\ engine}$) = _____ l/min $q_{V\,max}$ (at $n_{max\ engine}$) = _____ l/min

2. Directional control valve

Supplier: _____ Type: _____

System: Open center system ☐

Flow on-demand control - negative control ☐

- positive control ☐ 2-step ☐ proportional ☐

- load sensing ☐ LUDV ☐

Symbol of drive spool (centerposition): _____

Spools from other suppliers: Opening section: A; B ➔ T _____ mm^2

Make up valves: no ☐ yes ☐

Pressurerised returnline: no ☐ yes ☐ _____ bar

Project Sheet for Variable Motor A6VE with Integral Motion Control Valve

3. Hydraulic motor

Type code as to RE 91606 _____

Control device: ☐ 2-step ☐ proportional

Input flow/motor $q_{V\,max}$= _____ l/min

Displacement/motor $V_{g\,min}$= _____ cm^3/rpm $V_{g\,max}$= _____ cm^3/rpm

Necessary min. boost pressure (self suction speed at n_{max}) p_{min}= _____ bar

Secondary relief valves: pressure setting p_{max} _____ bar

Parking brake: no ☐ yes ☐ release pressure range from _____ bar up to _____ bar

Brake lifting internal (Bri) ☐ external (Bre) ☐ seperate by pilot pressure ☐

4. Track drive gear box

Supplier/Type _____

Gear ratio i = _____ Sprocket diameter d = _____ m

Additional informations _____

Comissioned by: _____ _____
(Name) (Signature)

Modifications

at the prototype: _____

_____

at the hydraulic system: _____

_____

_____

Release

BHY-E:	_____ (Date)	_____ (Name)	_____ (Signature)
Customer:	_____ (Date)	_____ (Name)	_____ (Signature)

Type-code of the motor

to RE 91606 A6VE /63W-V 22

BHY-E-Ident-No. (fixing after receipt of order): _____

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