

Bosch Rexroth A6VE107DA1/63W-VZL02000B axial piston variable plug-in motor

Manufacturer: Bosch Rexroth

Manufacturer part number / published order designation: R902150254

Published model: A6VE107DA1/63W-VZL02000B

About this compilation

Prepared by Hydmaster from selected manufacturer documentation. Original technical pages follow without cropped drawings, rewritten data or altered units. This cover and index are Hydmaster editorial material, not a manufacturer-issued exact-execution datasheet.

Coverage: applicable family/component reference. Exact execution documentation remains incomplete. Do not treat standard component or stage drawings as approval of the complete custom assembly.

Execution notes and conditions

Binding installation drawing for exact execution, stop settings and unlisted options.

Not published; zero is a design capability, not a verified supplied mechanical-stop setting.

Manufacturer reference, June 2012 edition: applicable to the base size 107 series. The current size 250 sheet does not establish this execution.

A6VM pages supplement the shared controller only; their motor-body geometry does not apply to A6VE.

Source-page index

Source page numbers below are physical pages of each complete original PDF. The original printed page labels and technical content remain unchanged. Compiled page numbers count this cover/index.

Source A: Bosch Rexroth A6Ve Series 63 Re91606 2012 Archive

Original pages	Compiled pages	Relevant content
1-8	2-9	Applicable dated A6VE107 series overview; Applicable dated A6VE107 type key and setting limits; Applicable dated A6VE107 shaft, flange, port and valve key; Applicable dated A6VE107 fluid and viscosity conditions; Applicable dated A6VE107 case-pressure and shaft-seal conditions; Applicable dated A6VE107 working-pressure duty and inlet conditions; Applicable dated A6VE107 geometric displacement and qualified speed limits; Applicable dated A6VE107 radial and axial load limits
21	10	Applicable dated A6VE107 DA family function only; DA1 module defined by the supplement
24-25	11-12	Applicable dated A6VE107 020 base-body reference; exact control envelopes refer to RE91604; Applicable dated A6VE107 size 107 flange and shaft drawing table
39-40	13-14	Applicable dated A6VE107 installation and case-drain requirements; Applicable dated A6VE107 planning and tightening requirements

Source B: Bosch Rexroth A6Vm Series 63 Re91604 2012 Archive

Supplemental stage/component reference; not a complete assembly drawing.

Original pages	Compiled pages	Relevant content
2	15	Existing DA1 hydraulic controller key, ratio 5/100; no electric solenoid
27	16	Shared DA1 controller function and schematic, not the A6VM body
45	17	Size 107 DA1 controller-module dimensions only; other motor panels do not show A6VE geometry

Variable Plug-in Motor A6VE

RE 91606/06.12

1/40

Replaces: 10.07

Data sheet

Series 63
Size Nominal pressure/Maximum pressure
28 to 160 400 bar/450 bar
250 350 bar/400 bar
Open and closed circuits



Contents

Ordering code for standard program	2
Technical data	4
HD – Proportional control hydraulic	9
EP – Proportional control electric	12
HZ – Two-point control hydraulic	15
EZ – Two-point control electric	16
HA – Automatic control high-pressure related	17
DA – Automatic control speed-related	21
Electric travel direction valve (for DA)	23
Dimensions 28 to 250	24
Connector for solenoids	28
Flushing and boost pressure valve	29
Counterbalance valve BVD and BVE	31
Counterbalance valve integrated BVI	35
Speed sensor	38
Installation instructions	39
General instructions	40

Features

- Variable plug-in motor with axial tapered piston rotary group of bent-axis design, for hydrostatic drives in open and closed circuits
- Far-reaching integration in mechanical gearbox due to a recessed mounting flange located on the center of the case (extremely space-saving construction)
- Easy to install, simply plug into the mechanical gearbox (no configuration specifications to be observed)
- Tested unit ready to install
- For use especially in mobile applications
- The displacement can be infinitely changed from $V_{g \max}$ to $V_{g \min} = 0$.
- The wide control range enables the variable motor to satisfy the requirement for high speed and high torque.
- The output speed is dependent on the flow of the pump and the displacement of the motor.
- The output torque increases with the pressure differential between the high-pressure and low-pressure side and with increasing displacement.

Ordering code for standard program

A6V	E					/	63	W		-	V								
01	02	03	04	05	06		07	08	09		10	11	12	13	14	15	16	17	18

Axial piston unit

01	Bent-axis design, variable	A6V
----	----------------------------	-----

Operating mode

02	Motor, plug-in version	E
----	------------------------	---

Sizes (NG)

03	Geometric displacement, see table of values on page 7	28	55	80	107	160	250
----	---	----	----	----	-----	-----	-----

Control devices

			28	55	80	107	160	250	
04	Proportional control hydraulic	$\Delta p = 10$ bar	●	●	●	●	●	●	HD1
		$\Delta p = 25$ bar	●	●	●	●	●	●	HD2
	Two-point control hydraulic		-	-	-	-	-	●	HZ
			●	-	-	-	●	-	HZ1
			-	●	●	●	● ¹⁾	-	HZ3
	Proportional control electric	12 V	●	●	●	●	●	●	EP1
		24 V	●	●	●	●	●	●	EP2
	Two-point control electric	12 V	●	-	-	-	●	●	EZ1
		24 V	●	-	-	-	●	●	EZ2
		12 V	-	●	●	●	-	-	EZ3
		24 V	-	●	●	●	-	-	EZ4
	Automatic control high-pressure related	with minimum pressure increase $\Delta p \leq 10$ bar	●	●	●	●	●	●	HA1
		with pressure increase $\Delta p = 100$ bar	●	●	●	●	●	●	HA2
		with minimum pressure increase $\Delta p \leq 10$ bar	-	●	●	●	●	-	HA3 ¹⁾
	Automatic control speed related		-	-	-	-	-	●	DA
		$p_{Si}/p_{HD} = 3/100$, hydraulic travel direction valve							
		$p_{Si}/p_{HD} = 5/100$, electric travel direction valve + electric $V_{g \max}$ -circuit	24 V	●	●	●	●	●	DA3

Pressure control (only for HD, EP)

05	Without pressure control (without code)	
	Pressure control, fixed setting	D

Override of controls HA

06	Without override (without code)	
	Hydraulic override, remote control, proportional	T

Series

07	Series 6, index 3	63
----	-------------------	----

Direction of rotation

08	Viewed on drive shaft, bidirectional	W
----	--------------------------------------	---

Setting ranges for displacement²⁾

		28	55	80	107	160	250
09	$V_{g \min} = 0$ to $0.7 V_{g \max}$ (without 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

Seals

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

● = Available ○ = On request - = Not available

■ = Preferred program

1) Only possible in combination with port plate 22 (integrated counterbalance valve).

2) Specify exact settings for $V_{g \min}$ and $V_{g \max}$ in plain text when ordering: $V_{g \min} = \dots \text{ cm}^3$, $V_{g \max} = \dots \text{ cm}^3$

Ordering code for standard program

A6V	E					/	63	W		-	V								
01	02	03	04	05	06		07	08	09		10	11	12	13	14	15	16	17	18

Drive shafts											28	55	80	107	160	250		
11	Splined shaft DIN 5480										●	-	●	-	●	-	A	
											-	●	-	●	-	●	Z	

Mounting flanges											28	55	80	107	160	250		
12	Similar to ISO 3019-2										●	●	●	●	●	-	L	
											-	-	-	-	-	●	M	
	Modified adapter flange										-	-	-	●	-	-	U	

Port plates for service lines ³⁾											28	55	80	107	160	250		
13	SAE flange ports A and B at side, opposite										0	●	●	●	●	●	020	
											7	●	●	●	●	●	027	
	SAE flange ports A and B at bottom only with integrated counterbalance valve BVI ⁴⁾										1	-	●	●	●	-	221	
											2	-	●	●	●	-	222	
	Port plate with 1-level pressure-relief valves for mounting a counterbalance valve ⁵⁾⁷⁾										0	-	-	-	●	-	370	
											8	-	●	●	●	●	378	
											8	-	●	●	●	●	380	
											-	-	-	●	●	- ⁹⁾	388	

Valves (see pages 29 to 37)												
14	Without valve										0	
	Brake release valve integrated (pilot pressure for brake release)										1	
											2	
	Flushing and boost pressure valve mounted										7	
	Counterbalance valve mounted ⁶⁾⁷⁾										8	

Speed sensor (see page 38)											28	55	80	107	160	250		
15	Without speed sensor										●	●	●	●	●	●	0	
	Prepared for DSA speed sensor										○	○	○	○	○	○	U	
	DSA speed sensor mounted ⁸⁾										○	○	○	○	○	○	V	

Connector for solenoids (see page 28)											28 to 160		250		
16	Without connector (without solenoid, only with hydraulic controls) (size 250 without code)										●		-	0	
											-		●		
	DEUTSCH – molded connector, 2-pin – without suppressor diode										●		-	P	
	HIRSCHMANN connector – without suppressor diode (without code)										-		●		

Beginning of control											28	55	80	107	160	250		
17	Port plate 02, 37, 38										●	●	●	●	●	●	A	
											●	●	●	●	●	●	B	
	Port plate 22										-	●	●	●	●	-	B	
											-	●	●	●	●	-	B	

Standard / special version												
18	Standard version (without code)											
	Standard version with installation variants (e. g. T ports against standard open or closed)										-Y	
	Special version										-S	

● = Available ○ = On request - = Not available

■ = Preferred program

3) Metric fastening thread

4) Only for HZ3 and HA3. Add specification of integrated counterbalance valve BVI, see separate ordering code on page 35. Note the restrictions on page 36.

5) Only possible in conjunction with HD, EP and HA1 and HA2 control

6) Specify ordering code of counterbalance valve according to

data sheet (BVD – RE 95522, BVE - RE 95525) separately.

7) Note the restrictions on page 32.

8) Specify ordering code of sensor according to data sheet (DSA – RE 95133) separately and observe the requirements on the electronics.

9) Counterbalance valve MHB32, please contact us.

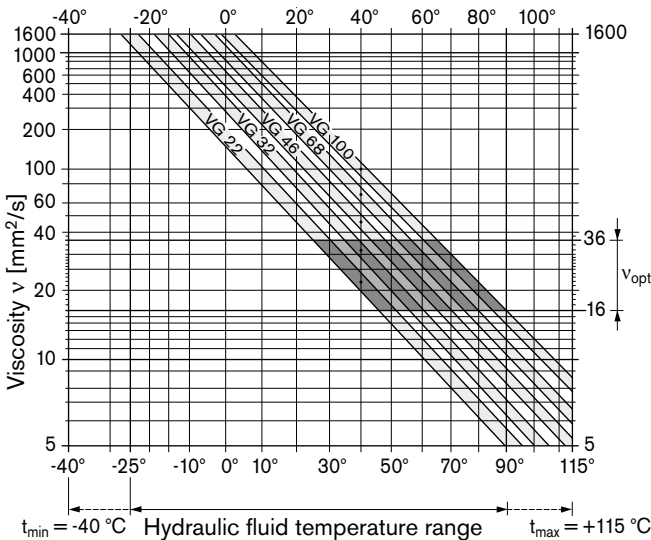
Technical data

Hydraulic fluid

Before starting project planning, please refer to our data sheets RE 90220 (mineral oil), RE 90221 (environmentally acceptable hydraulic fluids), RE 90222 (HFD hydraulic fluids) and RE 90223 (HFA, HFB, HFC hydraulic fluids) for detailed information regarding the choice of hydraulic fluid and application conditions.

The variable motor A6VE is not suitable for operation with HFA hydraulic fluid. If HFB, HFC, or HFD or environmentally acceptable hydraulic fluids are used, the limitations regarding technical data or other seals must be observed.

Selection diagram



Details regarding the choice of hydraulic fluid

The correct choice of hydraulic fluid requires knowledge of the operating temperature in relation to the ambient temperature: in a closed circuit, the circuit temperature, in an open circuit, the reservoir temperature.

The hydraulic fluid should be chosen so that the operating viscosity in the operating temperature range is within the optimum range (v_{opt} see shaded area of the selection diagram). We recommended that the higher viscosity class be selected in each case.

Example: At an ambient temperature of X °C, an operating temperature of 60 °C is set in the circuit. In the optimum viscosity range (v_{opt} , shaded area) this corresponds to the viscosity classes VG 46 or VG 68; to be selected: VG 68.

Note

The case drain temperature, which is affected by pressure and speed, can be higher than the circuit temperature or reservoir temperature. At no point of the component may the temperature be higher than 115 °C. The temperature difference specified below is to be taken into account when determining the viscosity in the bearing.

If the above conditions cannot be maintained due to extreme operating parameters, we recommend flushing the case with a flushing and boost pressure valve (see page 29).

Viscosity and temperature of hydraulic fluid

	Viscosity [mm²/s]	Temperature	Comment
Transport and storage at ambient temperature		$T_{min} \geq -50 \text{ °C}$ $T_{opt} = +5 \text{ °C to } +20 \text{ °C}$	factory preservation: up to 12 months with standard, up to 24 months with long-term
(Cold) start-up ¹⁾	$v_{max} = 1600$	$T_{St} \geq -40 \text{ °C}$	$t \leq 3 \text{ min}$, without load ($p \leq 50 \text{ bar}$), $n \leq 1000 \text{ rpm}$ (sizes 28 to 160), $n \leq 0.25 \cdot n_{nom}$ (size 250)
Permissible temperature difference		$\Delta T \leq 25 \text{ K}$	between axial piston unit and hydraulic fluid
Warm-up phase	$v < 1600 \text{ to } 400$	$T = -40 \text{ °C to } -25 \text{ °C}$	At $p \leq 0.7 \cdot p_{nom}$, $n \leq 0.5 \cdot n_{nom}$ and $t \leq 15 \text{ min}$
Operating phase			
Temperature difference		$\Delta T = \text{approx. } 12 \text{ K}$	between hydraulic fluid in the bearing and at port T.
Maximum temperature		115 °C 103 °C	in the bearing measured at port T
Continuous operation	$v = 400 \text{ to } 10$ $v_{opt} = 36 \text{ to } 16$	$T = -25 \text{ °C to } +90 \text{ °C}$	measured at port T, no restriction within the permissible data
Short-term operation ²⁾	$v_{min} \geq 7$	$T_{max} = +103 \text{ °C}$	measured at port T, $t < 3 \text{ min}$, $p < 0.3 \cdot p_{nom}$
FKM shaft seal ¹⁾		$T \leq +115 \text{ °C}$	see page 5

¹⁾ At temperatures below -25 °C, an NBR shaft seal is required (permissible temperature range: -40 °C to +90 °C).

²⁾ Size 250, please contact us.

Technical data

Filtration of the hydraulic fluid

Finer filtration improves the cleanliness level of the hydraulic fluid, which increases the service life of the axial piston unit.

To ensure the functional reliability of the axial piston unit, a gravimetric analysis of the hydraulic fluid is necessary to determine the amount of solid contaminant and to determine the cleanliness level according to ISO 4406. A cleanliness level of at least 20/18/15 is to be maintained.

At very high hydraulic fluid temperatures (90 °C to maximum 115 °C), a cleanliness level of at least 19/17/14 according to ISO 4406 is necessary.

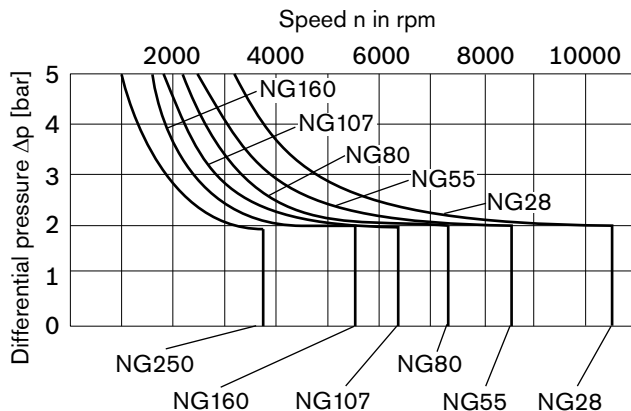
If the above classes cannot be achieved, please contact us.

Shaft seal

Permissible pressure loading

The service life of the shaft seal is influenced by the speed of the axial piston unit and the case drain pressure (case pressure). The mean differential pressure of 2 bar between the case and the ambient pressure may not be enduringly exceeded at normal operating temperature. For a higher differential pressure at reduced speed, see diagram. Momentary pressure spikes ($t < 0.1$ s) of up to 10 bar are permitted. The service life of the shaft seal decreases with an increase in the frequency of pressure spikes.

The case pressure must be equal to or higher than the ambient pressure.



The values are valid for an ambient pressure $p_{abs} = 1$ bar.

Temperature range

The FKM shaft seal may be used for case drain temperatures from -25 °C to +115 °C.

Note

For application cases below -25 °C, an NBR shaft seal is required (permissible temperature range: -40 °C to +90 °C). State NBR shaft seal in plain text when ordering. Please contact us.

Influence of case pressure on beginning of control

An increase in case pressure affects the beginning of control of the variable motor when using the following control options:

HD, HA.T (sizes 28 to 160) _____ increase
 HD, EP, HA, HA.T (size 250) _____ increase
 DA _____ decrease

With the following controls, an increase in the case pressure has no influence on the beginning of control:
 EP, HA (sizes 28 to 160)

The factory settings for the beginning of control are made at $p_{abs} = 2$ bar (sizes 28 to 160) or $p_{abs} = 1$ bar (size 250) case pressure.

Direction of flow

Direction of rotation, viewed on drive shaft

cw	ccw
A to B	B to A

Technical data

Operating pressure range

(operating with mineral oil)

Pressure at service line port A or B

Sizes 28 to 160

Nominal pressure p_{nom} _____ 400 bar absolute

Maximum pressure p_{max} _____ 450 bar absolute

Single operating period _____ 10 s

Total operating period _____ 300 h

Size 250

Nominal pressure p_{nom} _____ 350 bar absolute

Maximum pressure p_{max} _____ 400 bar absolute

Single operating period _____ 10 s

Total operating period _____ 300 h

Minimum pressure (high-pressure side) _____ 25 bar absolute

Summation pressure (pressure A + pressure B) p_{su} _____ 700 bar

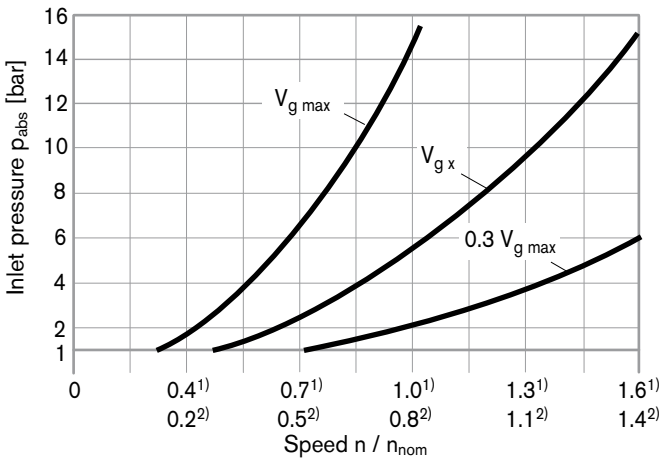
Rate of pressure change $R_{A \max}$

with integrated pressure-relief valve _____ 9000 bar/s

without pressure-relief valve _____ 16000 bar/s

Minimum pressure – pump mode (inlet)

To prevent damage to the axial piston motor in pump operation mode (change of high-pressure side with unchanged direction of rotation, e. g. when braking), a minimum pressure must be guaranteed at the service line port (inlet). This minimum pressure is dependent on the speed and displacement of the axial piston unit (see characteristic curve below).



¹⁾ For sizes 28 to 160

²⁾ For size 250

This diagram is valid only for the optimum viscosity range from $v_{opt} = 36$ to $16 \text{ mm}^2/\text{s}$.

Please contact us if the above conditions cannot be satisfied.

Note

Values for other hydraulic fluids, please contact us.

Definition

Nominal pressure p_{nom}

The nominal pressure corresponds to the maximum design pressure.

Maximum pressure p_{max}

The maximum pressure corresponds to the maximum operating pressure within the single operating period. The sum of the single operating periods must not exceed the total operating period.

Minimum pressure (high-pressure side)

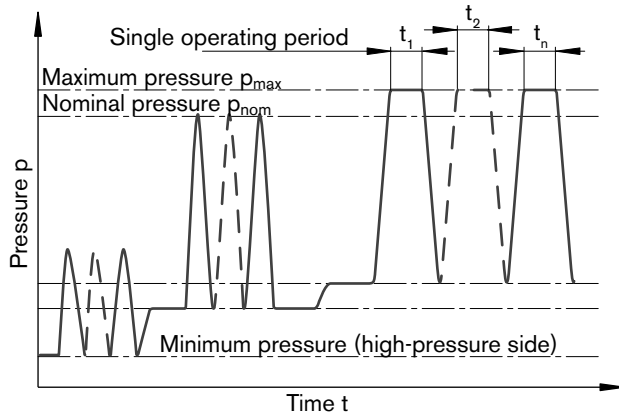
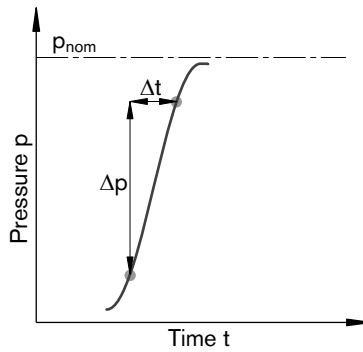
Minimum pressure at the high-pressure side (A or B) which is required in order to prevent damage to the axial piston unit.

Summation pressure p_{su}

The summation pressure is the sum of the pressures at both service line ports (A and B).

Rate of pressure change R_A

Maximum permissible rate of pressure rise and reduction during a pressure change over the entire pressure range.



Total operating period = $t_1 + t_2 + \dots + t_n$

Technical data

Table of values (theoretical values, without efficiency and tolerances; values rounded)

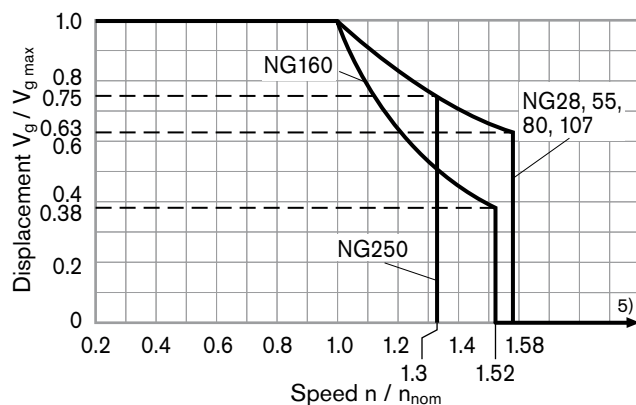
Size	NG	28	55	80	107	160	250
Displacement geometric ¹⁾ , per revolution	$V_{g \max}$ cm ³	28.1	54.8	80	107	160	250
	$V_{g \min}$ cm ³	0	0	0	0	0	0
	$V_{g x}$ cm ³	18	35	51	68	61	188
Speed maximum ²⁾ (while adhering to the maximum permissible input flow)							
at $V_{g \max}$	n_{nom} rpm	5550	4450	3900	3550	3100	2700
At $V_g < V_{g x}$ (see diagram below)	n_{max} rpm	8750	7000	6150	5600	4900	3600
at $V_{g 0}$	n_{max} rpm	10450	8350	7350	6300	5500	3600
Input flow ³⁾							
at n_{nom} and $V_{g \max}$	$q_{V \max}$ L/min	156	244	312	380	496	675
Torque ⁴⁾							
At $V_{g \max}$ and $\Delta p = 400$ bar	T Nm	179	349	509	681	1019	–
At $V_{g \max}$ and $\Delta p = 350$ bar	T Nm	157	305	446	596	891	1391
Rotary stiffness							
$V_{g \max}$ to $V_{g/2}$	$C_{\min}$ KNm/rad	6	10	16	21	35	60
$V_{g/2}$ to 0 (interpolated)	$C_{\max}$ KNm/rad	18	32	48	65	105	181
Moment of inertia for rotary group	J_{GR} kgm ²	0.0014	0.0042	0.008	0.0127	0.0253	0.061
Maximum angular acceleration	α rad/s ²	47000	31500	24000	19000	11000	10000
Case volume	V L	0.5	0.75	1.2	1.5	2.4	3.0
Mass (approx.)							
Port plate 02, 37, 38	m kg	16	26	34	47	64	90
Port plate 22	m kg	–	35	43	53	72	–

- 1) The minimum and maximum displacement are infinitely adjustable, see ordering code, page 2.
(standard setting for size 250 if not specified in the order: $V_{g \min} = 0.2 \cdot V_{g \max}$, $V_{g \max} = V_{g \max}$).
- 2) The values are valid:
 - for the optimum viscosity range from $\nu_{\text{opt}} = 36$ to $16 \text{ mm}^2/\text{s}$
 - with hydraulic fluid based on mineral oils
- 3) Restriction of input flow with counterbalance valve, see page 32
- 4) Torque without radial force, with radial force see page 8

Note

Operation above the maximum values or below the minimum values may result in a loss of function, a reduced service life or in the destruction of the axial piston unit. Other permissible limit values, with respect to speed variation, reduced angular acceleration as a function of the frequency and the permissible startup angular acceleration (lower than the maximum angular acceleration) can be found in data sheet RE 90261.

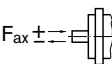
Permissible displacement in relation to speed



- 5) Values in this range on request

Technical data

Permissible radial and axial forces of the drive shafts

Size	NG		28	55	80	107	160	250	
Drive shaft	ø	mm	30	30	40	40	50	50	
Maximum radial force ¹⁾ at distance a (from shaft collar)		$F_{q \max}$	N	4838	7581	10283	13758	16435	1200 ³⁾
	a	mm	17.5	17.5	22.5	22.5	27.5	41	
with permissible torque	$T_{\max}$	Nm	179	281	509	681	1019	4)	
△ Permissible pressure Δp at $V_{g \max}$	$p_{\text{nom perm.}}$	bar	400	322	400	400	400	4)	
Maximum axial force ²⁾		$+F_{ax \max}$	N	315	500	710	900	1120	1200
		$-F_{ax \max}$	N	0	0	0	0	0	0
Permissible axial force per bar operating pressure	$F_{ax \text{ perm./bar}}$	N/bar	4.6	7.5	9.6	11.3	15.1	4)	

1) With intermittent operation.

2) Maximum permissible axial force during standstill or when the axial piston unit is operating in non-pressurized condition.

3) When at a standstill or when axial piston unit operating in non-pressurized conditions. Higher forces are permissible when under pressure, please contact us.

4) Please contact us.

Note

Influence of the direction of the permissible axial force:

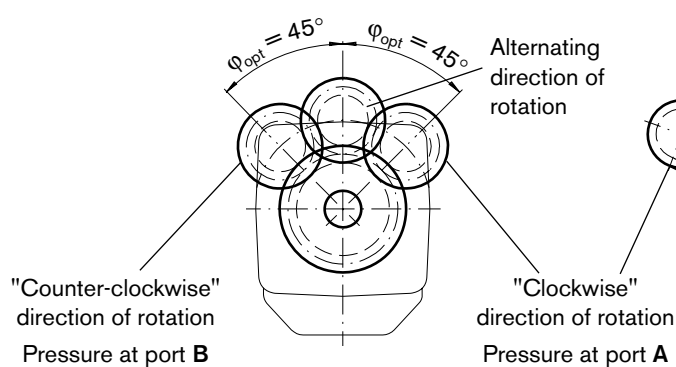
$+F_{ax \max}$ = Increase in service life of bearings

$-F_{ax \max}$ = Reduction in service life of bearings (avoid)

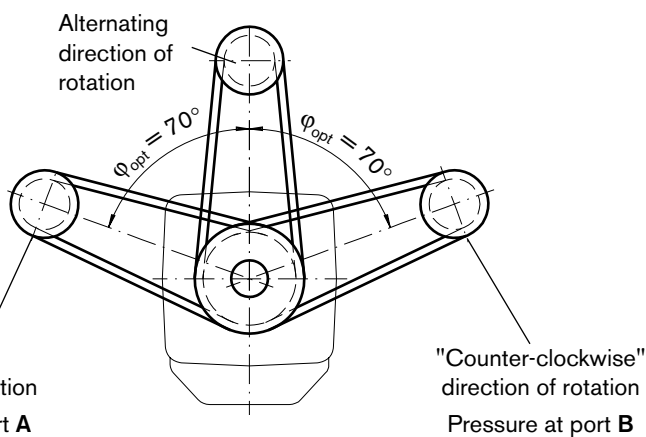
Effect of radial force F_q on the service life of bearings

By selecting a suitable direction of radial force F_q , the load on the bearings, caused by the internal rotary group forces can be reduced, thus optimizing the service life of the bearings. Recommended position of mating gear is dependent on direction of rotation. Examples:

Toothed gear drive



V-belt drive



Determining the operating characteristics

Input flow	$q_v = \frac{V_g \cdot n}{1000 \cdot \eta_v}$	[L/min]	V_g = Displacement per revolution in cm ³
			Δp = Differential pressure in bar
Speed	$n = \frac{q_v \cdot 1000 \cdot \eta_v}{V_g}$	[min ⁻¹]	n = Speed in rpm
			η_v = Volumetric efficiency
Torque	$T = \frac{V_g \cdot \Delta p \cdot \eta_{mh}}{20 \cdot \pi}$	[Nm]	η_{mh} = Mechanical-hydraulic efficiency
			η_t = Total efficiency ($\eta_t = \eta_v \cdot \eta_{mh}$)
Power	$P = \frac{2 \pi \cdot T \cdot n}{60000} = \frac{q_v \cdot \Delta p \cdot \eta_t}{600}$	[kW]	

DA – Automatic control speed-related

The variable motor A6VE with automatic speed-related control, is intended for use in hydrostatic travel drives in combination with the variable pump A4VG with DA control.

A drive-speed-related pilot pressure signal is generated by the A4VG variable pump, and that signal, together with the operating pressure, regulates the swivel angle of the hydraulic motor.

Increasing pump speed, i.e. increasing pilot pressure, causes the motor to swivel to a smaller displacement (lower torque, higher speed), depending on the operating pressure.

If the operating pressure exceeds the pressure setpoint set on the controller, the variable motor swivels to a larger displacement (higher torque, lower speed).

Pressure ratio p_{St}/p_{HD} : 3/100, 5/100

DA closed loop control is only suitable for certain types of drive systems and requires review of the engine and vehicle parameters to ensure that the motor is used correctly and that machine operation is safe and efficient. We recommend that all DA applications be reviewed by a Bosch Rexroth application engineer.

Detailed information is available from our sales department and on the Internet at www.boschrexroth.com/da-control.

Note

The beginning of control and the DA characteristic are influenced by case pressure. An increase in case pressure causes a decrease in the beginning of control (see page 5) and thus a parallel shift of the characteristic.

DA

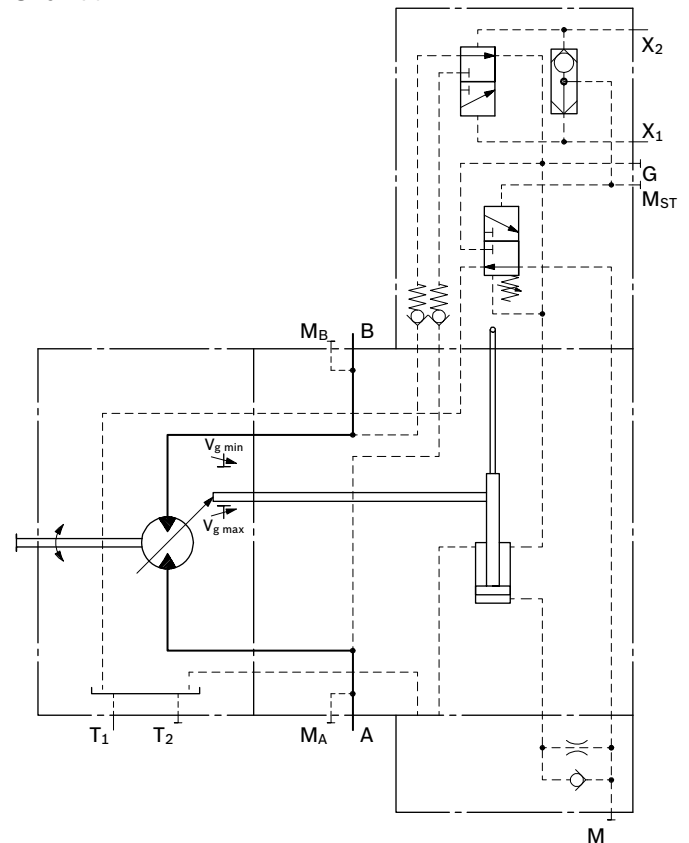
Hydraulic travel direction valve

Dependent on the direction of rotation (travel direction), the travel direction valve is switched by using pilot pressures connections X_1 or X_2 .

Direction of rotation	Operating pressure in	Pilot pressure in
cw	A	X_1
ccw	B	X_2

Schematic DA

Size 250

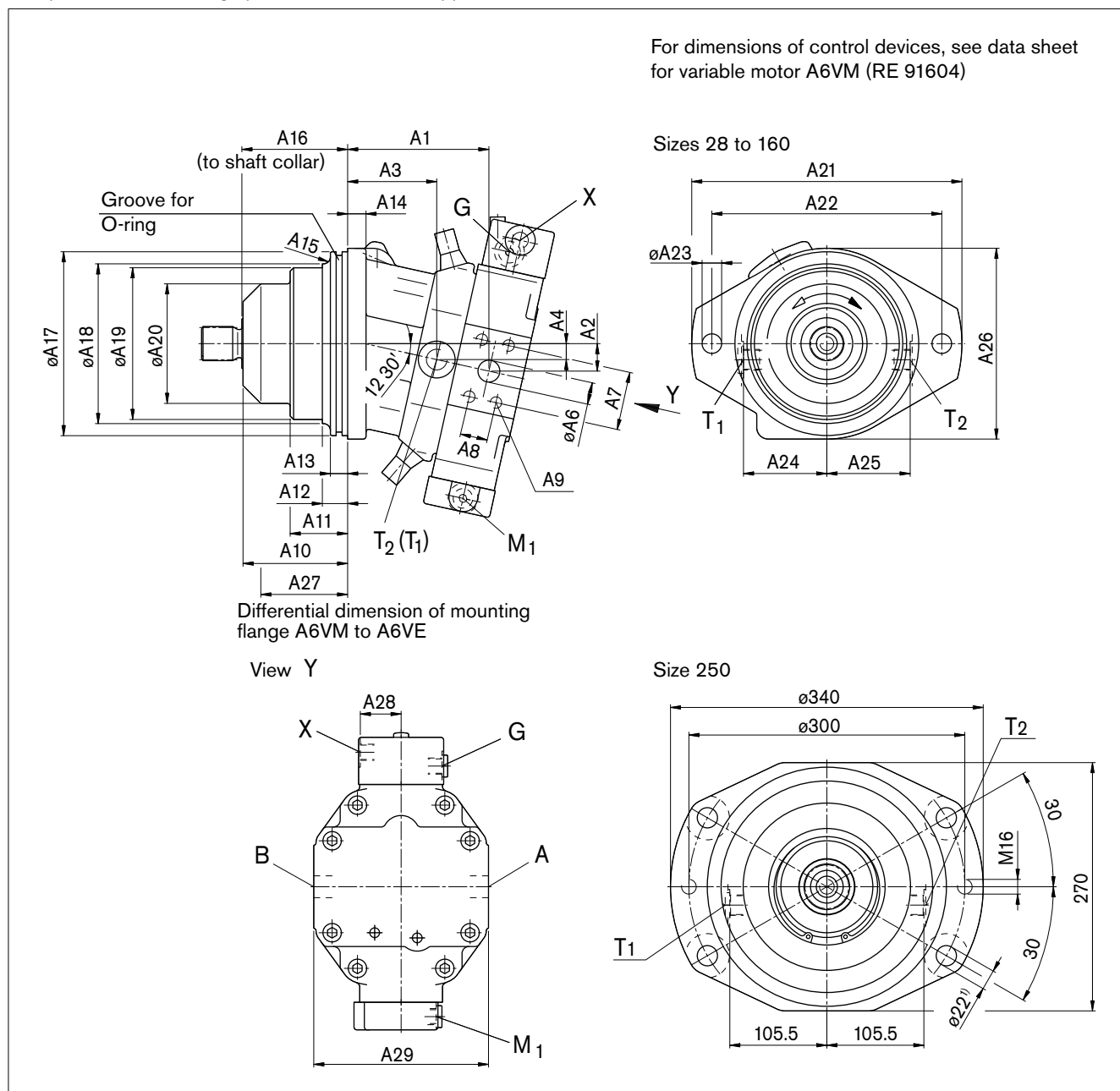


Dimensions

Before finalizing your design, request a binding installation drawing. Dimensions in mm.

HD1, HD2 – Proportional control hydraulic

Port plate 02 – SAE flange port A and B at side, opposite



Ports

Size	Service line port A, B SAE J518	Drain port T ₁ ; T ₂ ²⁾ DIN 3852 ³⁾
28	3/4 in	M18 x 1.5; 12 deep
55	3/4 in	M18 x 1.5; 12 deep
80	1 in	M18 x 1.5; 12 deep
107	1 in	M18 x 1.5; 12 deep
160	1 1/4 in	M26 x 1.5; 16 deep
250	1 1/4 in	M22 x 1.5; 14 deep

1) Hole $\varnothing 22$ with spot face $\varnothing 48$; 2 deep

2) 1x plugged

3) Observe the general instructions on page 40 for the maximum tightening torques.

For further ports, see variable motor A6VM (RE 91604)!

Dimensions

Before finalizing your design, request a binding installation drawing. Dimensions in mm.

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

NG	A1	A2	A3	A4	øA6	A7	A8	A9 (DIN 13) ²⁾	A10	A11	A12	A13	A14	A15
28	91	20	47	10	ø19	50.8	23.8	M10 x 1.5; 17 deep	88	54	–	15	14	R10
55	123	24	77	14	ø19	50.8	23.8	M10 x 1.5; 17 deep	91	50	22	15	16	R6
80	129	28	78	16	ø25	57.2	27.8	M12 x 1.75; 17 deep	109.5	65	30	15	18	R10
107	137	30	84	18	ø25	57.2	27.8	M12 x 1.75; 17 deep	121.8	72	35	15	18	R12
160	171	34	109	20	ø32	66.7	31.8	M14 x 2; 19 deep	122	67	29	15	20	R5
250	204	44	103	20	ø32	66.7	31.8	M14 x 2; 19 deep	131.5	–	–	14	25 ¹⁾	–

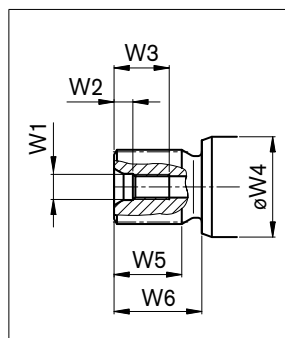
NG	A16 ³⁾	A17	A18	A19	A20	A21	A22	øA23	A24	A25	A26	A27	A28	A29	O-ring ⁴⁾
28	89	135 _{-0.025}	110	–	86	188	160	ø13.5	62.5	62.5	142	64	35.5	132	126x4
55	92	160 _{-0.025}	139	132	104	235	200	ø17	72.5	72.5	166	59	35.5	152	150x4
80	110.5	190 _{-0.029}	151	143	116	260	224	ø21	78.5	78.5	198	79	35.5	164	182x4
107	122.8	200 _{-0.029}	168	160	132	286	250	ø21	86.5	86.5	210	82	40.5	180	192x4
160	123	200 _{-0.029}	188	180	146	286	250	ø21	98.5	98.5	210	83	40.5	204	192x4
250	133.5	260 _{-0.081}	230	–	–	–	–	–	–	–	–	83.5	48.5	224	250x5

Adapter flange U (size 107)

NG	A1	A2	A3	A4	A5	A6	A7	A8	A9 (DIN 13) ²⁾	A10	A11	A12	A13	A14
107	150	30	96	18	15.5	25	57.2	27.8	M12 x 1.75; 17 deep	109.5	59.7	22.7	18	15

NG	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29	O-ring ⁴⁾
107	R8	110.5	190 _{-0.025}	168	160	132	260	224	22	86.5	86.5	198	91.5	13.8	70	182x4

Drive shafts



NG	Splined shaft DIN 5480	W1 ²⁾⁵⁾	W2	W3	øW4	W5	W6
28	A (W30x2x14x9g)	M10 x 1.5	7.5	22	ø35	27	35
55	Z (W30x2x14x9g)	M12 x 1.75	9.5	28	ø45	27	35
80	A (W40x2x18x9g)	M16 x 2	12	36	ø50	37	45
107	Z (W40x2x18x9g)	M12 x 1.75	9.5	28	ø60	37	45
160	A (W50x2x24x9g)	M16 x 2	12	36	ø70	44	55
250	Z (W50x2x24x9g)	M16 x 2	12	36	ø60	49	58

1) Hole ø22 with spot face ø48; 2 deep

2) Observe the general instructions on page 40 for the maximum tightening torques.

3) To shaft collar

4) The O-ring is not included in the delivery contents

5) Center bore according to DIN 332 (thread according to DIN 13)

Installation instructions

General

During commissioning and operation, the axial piston unit must be filled with hydraulic fluid and air bled. This must also be observed following a relatively long standstill as the axial piston unit may drain back to the reservoir via the hydraulic lines.

The case drain fluid in the motor housing must be directed to the reservoir via the highest available drain port (T_1 , T_2).

For combinations of multiple units, make sure that the respective case pressure in each unit is not exceeded. In the event of pressure differences at the drain ports of the units, the shared drain line must be changed so that the minimum permissible case pressure of all connected units is not exceeded in any situation. If this is not possible, separate drain lines must be laid if necessary.

To achieve favorable noise values, decouple all connecting lines using elastic elements and avoid above-reservoir installation.

In all operating conditions, the drain line must flow into the reservoir below the minimum fluid level.

Installation position

See the following examples 1 to 6.

Further installation positions are possible upon request.

Recommended installation positions: 1 and 2.

Note

In certain installation conditions, an influence on the control characteristics can be expected. Gravity, dead weight and case pressure can cause minor shifts in control characteristics and changes in response time.

Installation position	Air bleed	Filling
1	–	T_2 , T_1
2	–	T_2 , T_1
3	–	T_2 , T_1
4	L_1	T_2 , T_1 (L_1)
5	L_1	T_2 , T_1 (L_1)
6	L_1	T_2 , T_1 (L_1)

L_1 Filling / air bleed

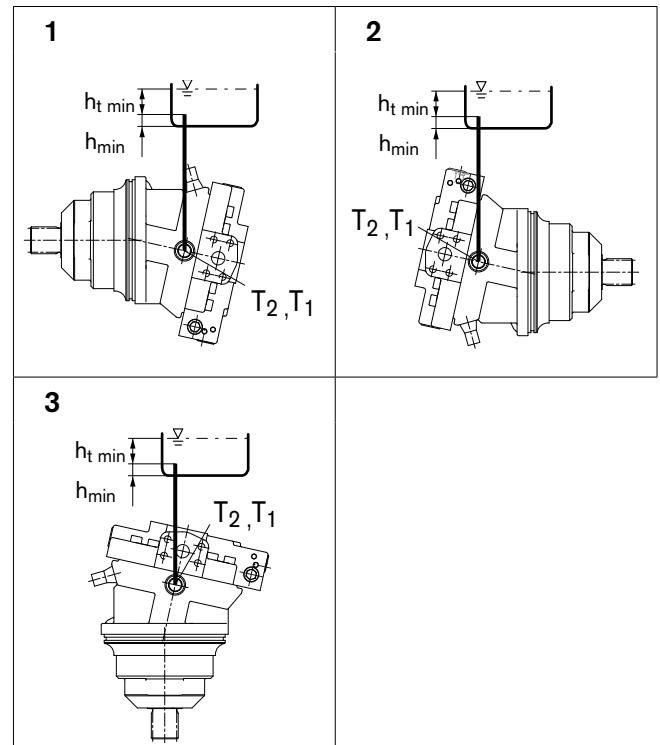
T_1 , T_2 Drain port

$h_{t\min}$ Minimum required immersion depth (200 mm)

$h_{\min}$ Minimum required spacing to reservoir bottom (100 mm)

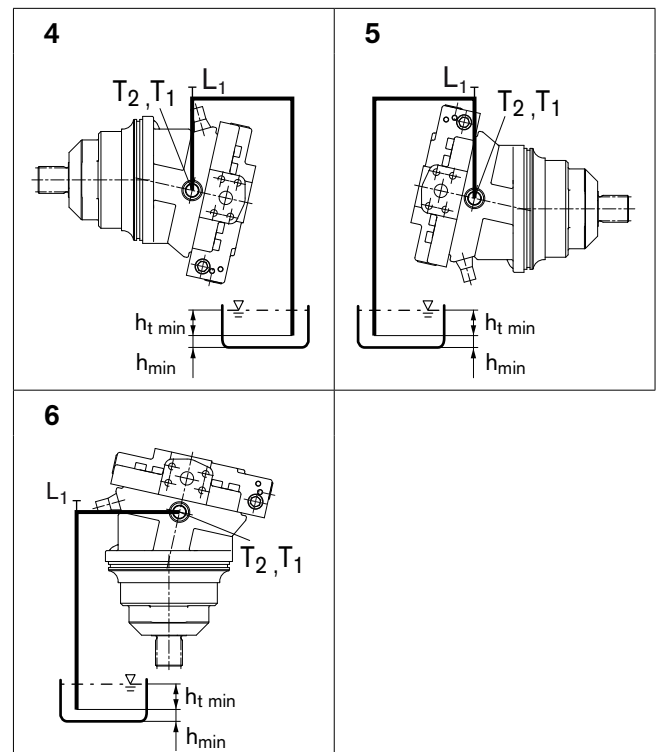
Below-reservoir installation (standard)

Below-reservoir installation means that the axial piston unit is installed outside the reservoir below the minimum fluid level.



Above-reservoir installation

Above-reservoir installation means that the axial piston unit is installed above the minimum fluid level of the reservoir.



General instructions

- The motor A6VE is designed to be used in open and closed circuits.
- The project planning, installation and commissioning of the axial piston unit requires the involvement of qualified personnel.
- Before using the axial piston unit, please read the corresponding instruction manual completely and thoroughly. If necessary, these can be requested from Bosch Rexroth.
- During and shortly after operation, there is a risk of burns on the axial piston unit and especially on the solenoids. Take appropriate safety measures (e. g. by wearing protective clothing).
- Depending on the operating conditions of the axial piston unit (operating pressure, fluid temperature), the characteristic may shift.
- Service line ports:
 - The ports and fastening threads are designed for the specified maximum pressure. The machine or system manufacturer must ensure that the connecting elements and lines correspond to the specified application conditions (pressure, flow, hydraulic fluid, temperature) with the necessary safety factors.
 - The service line ports and function ports can only be used to accommodate hydraulic lines.
- The data and notes contained herein must be adhered to.
- The product is not approved as a component for the safety concept of a general machine according to ISO 13849.
- The following tightening torques apply:
 - Fittings:
 - Observe the manufacturer's instruction regarding tightening torques for the fittings used.
 - Mounting bolts:
 - For mounting bolts with metric ISO threads according to DIN 13, we recommend checking the tightening torque in individual cases in accordance with VDI 2230.
 - Female threads in the axial piston unit:
 - The maximum permissible tightening torques $M_{G \max}$ are maximum values for the female threads and must not be exceeded. For values, see the following table.
 - Threaded plugs:
 - For the metallic threaded plugs supplied with the axial piston unit, the required tightening torques of threaded plugs M_V apply. For values, see the following table.

Ports		Maximum permissible tightening torque of the female threads $M_{G \max}$	Required tightening torque of the threaded plugs $M_V^{1)}$	WAF hexagon socket of the threaded plugs
Standard	Size of thread			
DIN 3852	M12 x 1.5	50 Nm	25 Nm ²⁾	6 mm
	M14 x 1.5	80 Nm	35 Nm	6 mm
	M16 x 1.5	100 Nm	50 Nm	8 mm
	M18 x 1.5	140 Nm	60 Nm	8 mm
	M22 x 1.5	210 Nm	80 Nm	10 mm
	M26 x 1.5	230 Nm	120 Nm	12 mm
	M27 x 2	330 Nm	135 Nm	12 mm
	M33 x 2	540 Nm	225 Nm	17 mm
	M42 x 2	720 Nm	360 Nm	22 mm

1) The tightening torques apply for screws in the "dry" state as received on delivery and in the "lightly oiled" state for installation.

2) In the "lightly oiled" state, the M_V is reduced to 17 Nm for M12 x 1.5.

Bosch Rexroth AG
 Mobile Applications
 Glockeraustrasse 4
 89275 Elchingen, Germany
 Tel.: +49-7308-82-0
 Fax: +49-7308-72-74
 info.brm@boschrexroth.de
 www.boschrexroth.com/axial-piston-motors

An den Kelterwiesen 14
 72160 Horb, Germany
 Tel.: +49-7451-92-0
 Fax: +49-7451-82-21

© This document, as well as the data, specifications and other information set forth in it, are the exclusive property of Bosch Rexroth AG. It may not be reproduced or given to third parties without its consent.

The data specified above only serve to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. It must be remembered that our products are subject to a natural process of wear and aging.

Subject to change.

DA – Automatic control speed-related

The variable motor A6VM with automatic speed-related control is intended for use in hydrostatic travel drives in combination with the variable pump A4VG with DA control.

A drive-speed-related pilot pressure signal is generated by the A4VG variable pump, and that signal, together with the operating pressure, regulates the swivel angle of the hydraulic motor.

Increasing pump speed, i.e. increasing pilot pressure, causes the motor to swivel to a smaller displacement (lower torque, higher speed), depending on the operating pressure.

If the operating pressure exceeds the pressure setpoint set on the controller, the variable motor swivels to a larger displacement (higher torque, lower speed).

Pressure ratio p_{SI}/p_{HD} : 3/100, 5/100, 8/100

DA closed loop control is only suitable for certain types of drive systems and requires review of the engine and vehicle parameters to ensure that the motor is used correctly and that machine operation is safe and efficient. We recommend that all DA applications be reviewed by a Bosch Rexroth application engineer.

Detailed information is available from our sales department and on the Internet at www.boschrexroth.com/da-control.

Note

The beginning of control and the DA characteristic are influenced by case pressure. An increase in case pressure causes a decrease in the beginning of control (see page 6) and thus a parallel shift of the characteristic.

DA, DA1, DA4

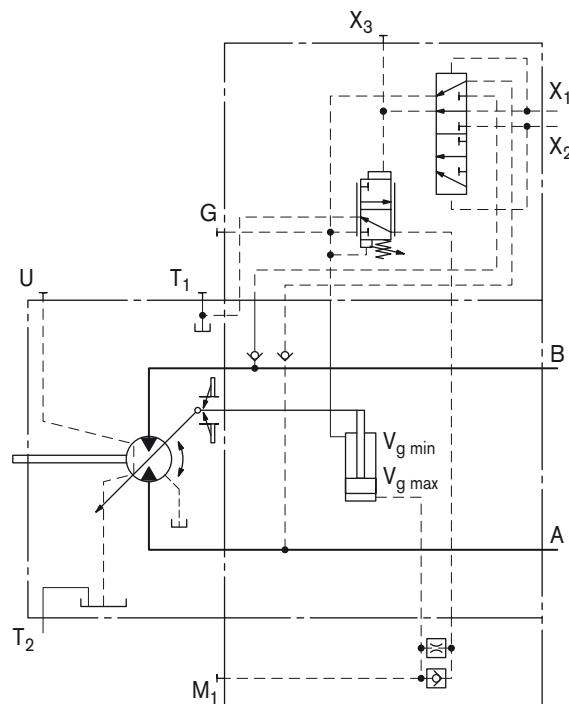
Hydraulic travel direction valve

Dependent on the direction of rotation (travel direction), the travel direction valve is switched by using pilot pressures connections X_1 or X_2 .

Direction of rotation	Operating pressure in	Pilot pressure in
CW	A	X_1
CCW	B	X_2

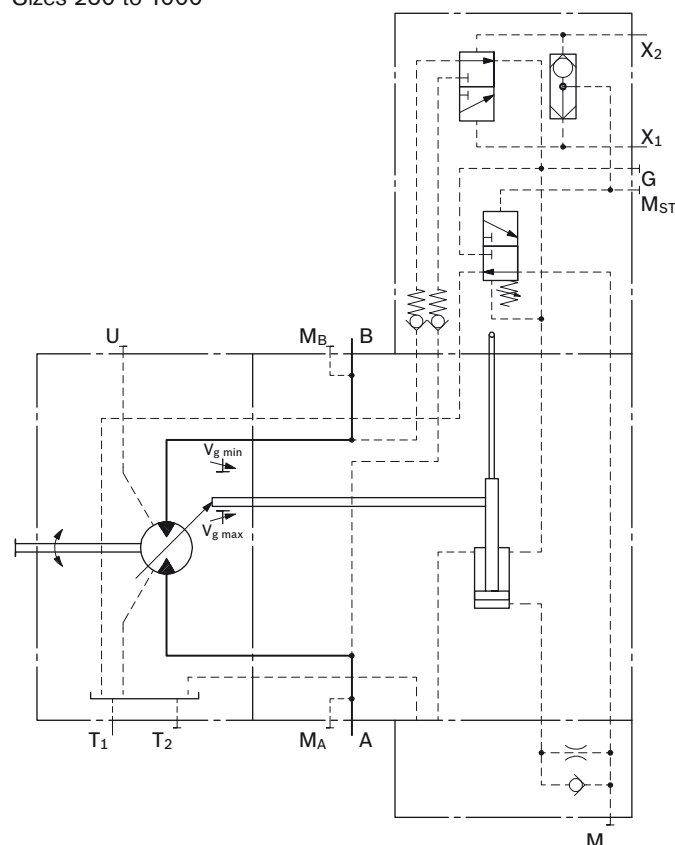
Schematic DA1, DA4

Sizes 28 to 200



Schematic DA

Sizes 250 to 1000

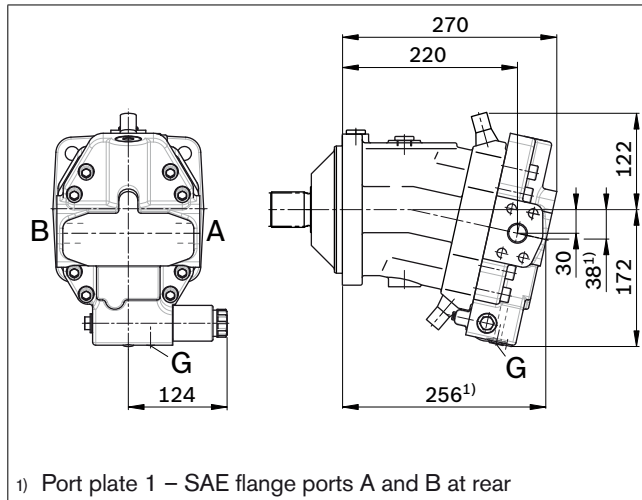


Dimensions size 107

Before finalizing your design, request a binding installation drawing. Dimensions in mm.

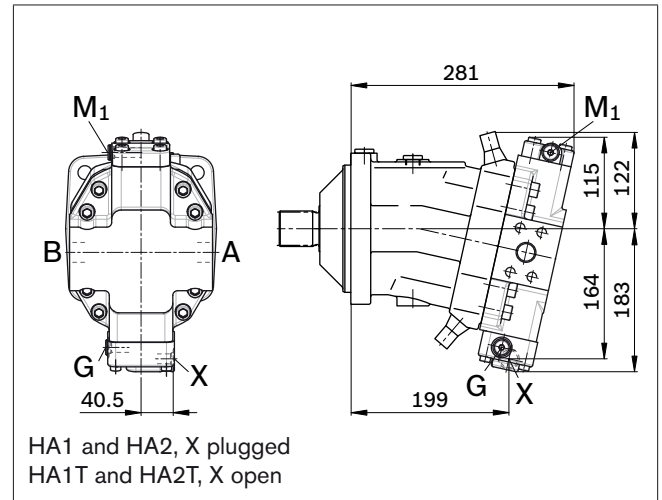
EZ3, EZ4

Two-point control electric



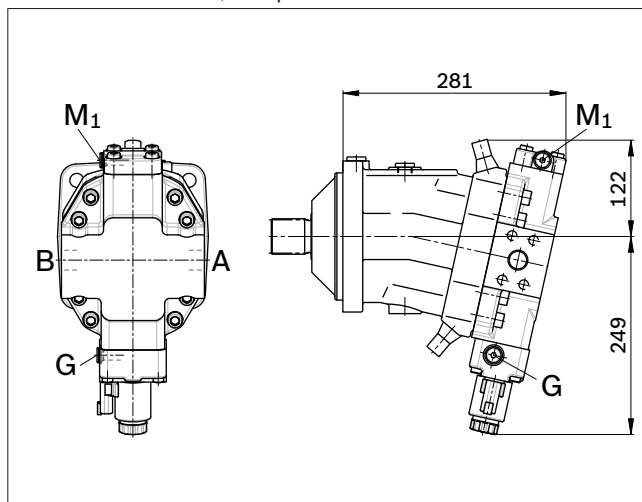
HA1, HA2 / HA1T, HA2T

Automatic control high-pressure related,
with override hydraulic remote control, proportional



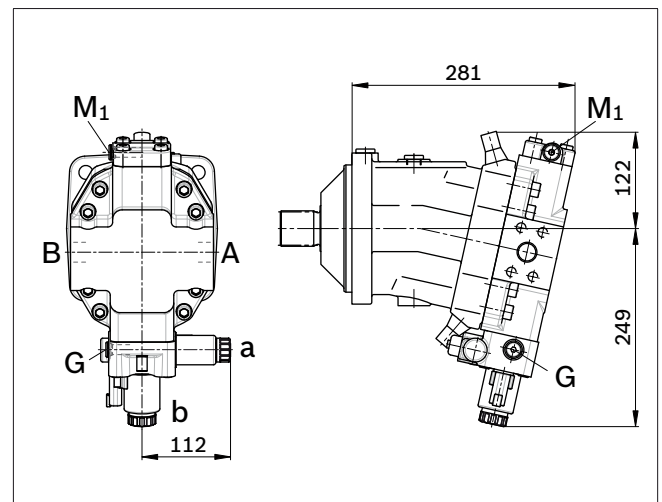
HA1U1, HA2U2

Automatic control high-pressure related,
with override electric, two-point



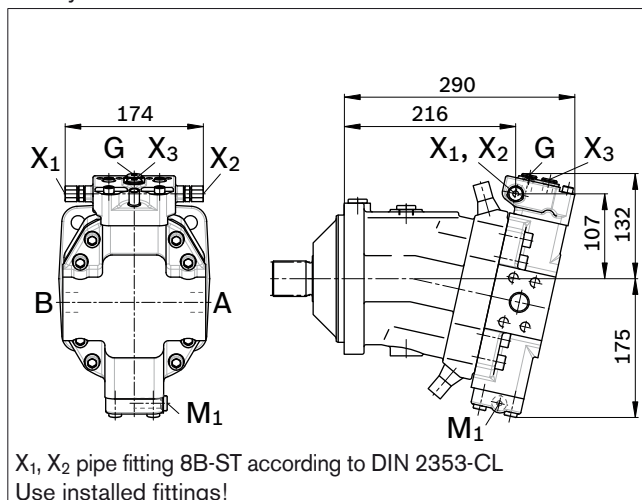
HA1R1, HA2R2

Automatic control high-pressure related,
with override electric and travel direction valve electric



DA1, DA4

Automatic control speed related,
with hydraulic travel direction valve



DA2, DA3, DA5, DA6

Automatic control speed related,
with electric travel direction valve and electric V_{g max}-circuit

