Bosch Rexroth A6VM060DA100Q007B/71MWV0M4Z81B0-S axial piston variable motor

Manufacturer: Bosch Rexroth

Manufacturer part number / published order designation: R902189465

Published model: A6VM060DA100Q007B/71MWV0M4Z81B0-S

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: selected pages relevant to the identified size and configuration. Other options or neighbouring models retained on an original page apply only where explicitly identified.

Execution notes and conditions

Supplied displacement stops and control settings are not specified. Shaft dimensions, connector pinout and valve-option suffix geometry are not assigned from an unmatched standard drawing. The Q connector is outside the selected standard connector table; its electrical interface requires the execution drawing.

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.

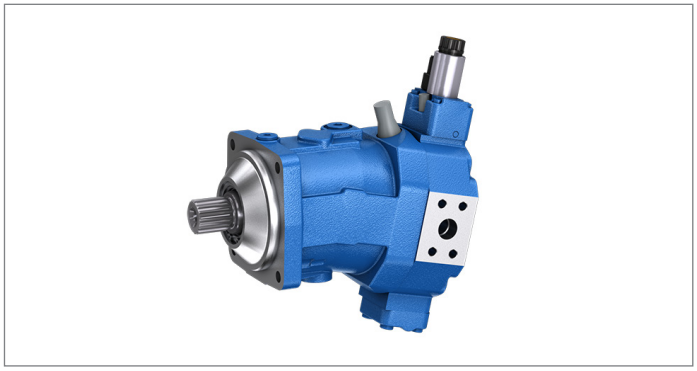
Source A: Bosch Rexroth A6Vm Series 65 71 Re91610 2025

Original pages	Compiled pages	Relevant content
1-12	2-13	Fluid, shaft-seal, displacement and safe installation conditions; no unmatched execution dimensions assigned; Ordering key and regional execution applicability; Pressure definitions, duty limits and braking-inlet requirements
30-33	14-17	Control function and required operating conditions
101-105	18-22	Fluid, shaft-seal, displacement and safe installation conditions; no unmatched execution dimensions assigned

RE 91610/2025-01-29
Replaces: 2024-08-14

rexroth
A Bosch Company

Axial piston variable motor A6VM series 65 and 71



- Series 65, size 28 to 200
  - Nominal pressure 400 bar
  - Maximum pressure 450 bar (size 28)
  - Maximum pressure 530 bar (size 55 to 200)
- Series 71, size 60 to 280
  - Nominal pressure 450 bar
  - Maximum pressure 530 bar (size 60 to 215)
  - Maximum pressure 500 bar (size 280)
- Open and closed circuit

Features

- Robust motor with long service life
- Approved for very high rotational speeds
- High starting efficiency
- For series 71, especially good slow-running behavior
- High control range (can be swiveled to zero)
- High torque
- Large variety of controls
- Optionally with mounted flushing and boost-pressure valve
- Optionally with mounted counterbalance valve
- Bent-axis design

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Type code

01	02	03	04	05	06	07	08	09	10		11	12	13	14	15	16	17	18	19	20		21
A6V	**M**						**0**			**/**			**W**	**V**	**0**						**–**	

Axial piston unit

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

Operating mode

02	Motor	**M**

Size (NG)

03	Geometric displacement, see technical data on page 10	**028**	**055**	**060**	**080**	**085**	**107**	**115**	**140**	**150**	**160**	**170**	**200**	**215**	**280**

Control device

				028	055	060	080	085	107	115	140	150	160	170	200	215	280	
04	Proportional control, hydraulic	positive control	Δp_{St} = 10 bar	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**HP1**
			Δp_{St} = 25 bar	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**HP2**
		negative control	Δp_{St} = 10 bar	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**HP5**
			Δp_{St} = 25 bar	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**HP6**
	Proportional control, electric	positive control	U = 12 V	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**EP1**
			U = 24 V	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**EP2**
		negative control	U = 12 V	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**EP5**
			U = 24 V	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**EP6**
	Two-point control, hydraulic	negative control		●	–	–	–	–	–	–	●	●	●	●	●	●	●	**HZ5**
				–	●	●	●	●	●	●	–	–	–	–	–	–	–	**HZ7**
	Two-point control, electric	negative control	U = 12 V	●	–	–	–	–	–	–	●	●	●	●	●	●	●	**EZ5**
			U = 24 V	●	–	–	–	–	–	–	●	●	●	●	●	●	●	**EZ6**
			U = 12 V	–	●	●	●	●	●	●	–	–	–	–	–	–	–	**EZ7**
			U = 24 V	–	●	●	●	●	●	●	–	–	–	–	–	–	–	**EZ8**
	Automatic high-pressure related control, positive control	With minimum pressure increase	Δp ≤ approx. 10 bar	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**HA1**
		with pressure increase	Δp = 100 bar	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**HA2**
	Automatic speed-related control, negative control	hydr. travel direction valve		●	●	●	●	●	●	●	●	●	●	●	●	●	–	**DA0**
		electr. travel direction valve + electr. $V_{g\,max}$ override	U = 12 V	●	●	●	●	●	●	●	●	●	●	●	●	●	–	**DA1**
	p_{St}/p_{HD} = 5/100		U = 24 V	●	●	●	●	●	●	●	●	●	●	●	●	●	–	**DA2**
	p_{St}/p_{HD} = 3/100	hydr. travel direction valve		–	–	–	–	–	–	–	–	–	–	–	–	–	●	**DA7**

Pressure control/override

			028	055	060	080	085	107	115	140	150	160	170	200	215	280	
05	Without pressure control/override		●	●	●	●	●	●	●	●	●	●	●	●	●	●	**00**
	Pressure control fixed setting, only for HP5, HP6, EP5 and EP6		●	●	●	●	●	●	●	●	●	●	●	●	●	●	**D1**
	Override of the HA1 and HA2 controls	Hydraulic, remote controlled, proportional	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**T3**
		electric, two-point U = 12 V	●	●	●	●	●	●	●	●	●	●	●	●	●	–	**U1**
		U = 24 V	●	●	●	●	●	●	●	●	●	●	●	●	●	–	**U2**
		electric and travel direction valve, electric U = 12 V	●	●	●	●	●	●	●	●	●	●	●	●	●	–	**R1**
		U = 24 V	●	●	●	●	●	●	●	●	●	●	●	●	●	–	**R2**

Connector for solenoids[1)]

06	Without connectors (only for purely hydraulic control)	**0**
	DEUTSCH - molded connector, 2-pin, without suppressor diode	**P**

● = Available ○ = On request – = Not available

1) Connectors for other electric components may deviate.

01	02	03	04	05	06	07	08	09	10		11	12	13	14	15	16	17	18	19	20		21
A6V	**M**						**0**			**/**			**W**	**V**	**0**						**–**	

Swivel angle sensor

		028	055	060	080	085	107	115	140	150	160	170	200	215	280	
07	Without swivel angle sensor	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**0**
	Neutral position switch	–	–	–	●	●	●	●	●	●	●	●	●	●	–	**N**

Additional function

08	Without additional function	**0**

Stroking time damping (for selection, see control)

09	Without damping (standard with HP and EP)		**0**
	Damping	HP, EP, HP5,6D. and EP5,6D., HZ, EZ, HA with BVD/BVE counterbalance valves	**1**
		One-sided in inlet to large stroking chamber (HA)	**4**
		One-sided in outlet from large stroking chamber (DA)	**7**

Setting range for displacement[2)]

			028	055	060	080	085	107	115	140	150	160	170	200	215	280	
10	$V_{g\,max}$ setting screw	$V_{g\,min}$ setting screw															
	Without setting screw[3)]	short (0-adjustable)	●	●	●	●	●	●	●	●	●	●	●	●	●	–	**A**
		moderate	●	●	●	●	●	●	●	●	●	●	●	●	●	–	**B**
		long	●	●	●	●	●	●	●	●	●	●	●	●	●	–	**C**
		extra long	–	–	–	●	●	●	●	●	●	●	●	●	●	●	**D**
	Short	short (0-adjustable)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**E**
		moderate	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**F**
		long	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**G**
		extra long	–	–	–	●	●	●	●	●	●	●	●	●	●	●	**H**
	Medium[4)]	short (0-adjustable)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**J**
		moderate	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**K**
		long	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**L**
		extra long	–	–	–	●	●	●	●	●	●	●	●	●	●	●	**M**

Series

		028	055	060	080	085	107	115	140	150	160	170	200	215	280	
11	Series 6, index 5 (nominal pressure 400 bar)	●	●	–	●	–	●	–	●	–	●	–	●	–	–	**65**
	Series 7, index 1 (nominal pressure 450 bar)	–	–	●	–	●	–	●	–	●	–	●	–	●	●	**71**

Version of port and fastening threads

		028	055	060	080	085	107	115	140	150	160	170	200	215	280	
12	Metric ports based on ISO 6149 with O-ring seal, metric fastening thread according to DIN 13	–	●	●	●	●	●	●	●	●	●	●	●	●	●	**M**
	Metric ports threads with profile sealing ring based on DIN 3852, metric fastening thread according to DIN 13	●	–	–	–	–	–	–	–	–	–	–	–	–	–	**N**

Direction of rotation

13	Viewed on drive shaft, bi-directional	**W**

Sealing material

14	FKM (fluorocarbon rubber)	**V**

● = Available ○ = On request – = Not available

2) Please refer to the tables for the setting values associated with the setting screws (from page 96).
3) For size 28 with short threaded pin, not adjustable
4) $V_{g\,max}$ not adjustable for size 280, limitation due to cap

01	02	03	04	05	06	07	08	09	10		11	12	13	14	15	16	17	18	19	20		21
A6V	**M**						**0**			**/**			**W**	**V**	**0**						**–**	

Drive shaft bearing

15	Standard bearing	**0**

Mounting flange

			028	055	060	080	085	107	115	140	150	160	170	200	215	280	
16	ISO 3019-2	100-4	●	–	–	–	–	–	–	–	–	–	–	–	–	–	**L4**
		125-4	–	●	●	–	–	–	–	–	–	–	–	–	–	–	**M4**
		140-4	–	–	–	●	●	–	–	–	–	–	–	–	–	–	**N4**
		160-4	–	–	–	–	–	●	●	–	–	–	–	–	–	–	**P4**
		180-4	–	–	–	–	–	–	–	●	●	●	●	–	–	–	**R4**
		200-4	–	–	–	–	–	–	–	–	–	–	–	●	●	●	**S4**

Drive shaft

			028	055	060	080	085	107	115	140	150	160	170	200	215	280	
17	Splined shaft ANSI B92.1a–1976	1 1/4 in 14T 12/24DP	–	●	●	●	○	–	–	–	–	–	–	–	–	–	**S7**
		1 1/2 in 17T 12/24DP	–	–	○	○	●	–	–	–	–	–	–	–	–	–	**S9**
		1 3/4 in 13T 8/16DP	–	–	–	–	–	●	●	●	●	●	○	–	–	–	**T1**
		2 in 15T 8/16DP	–	–	–	–	–	–	–	–	●	●	●	●	●	–	**T2**
		2 1/4 in 17T 8/16DP	–	–	–	–	–	–	–	–	–	–	–	–	–	●	**T3**
	Splined shaft DIN 5480	W25×1.25×18×9g	●	–	–	–	–	–	–	–	–	–	–	–	–	–	**Z5**
		W30×2×14×9g	●	●	○	–	–	–	–	–	–	–	–	–	–	–	**Z6**
		W35×2×16×9g	–	●	●	●	○	–	–	–	–	–	–	–	–	–	**Z8**
		W40×2×18×9g	–	–	–	●	●	●	●	–	–	–	–	–	–	–	**Z9**
		W45×2×21×9g	–	–	–	–	–	●	●	●	●	●	●	–	–	–	**A1**
		W50×2×24×9g	–	–	–	–	–	–	–	–	–	●	●	●	●	○	**A2**
		W60×2×28×9g	–	–	–	–	–	–	–	–	–	–	–	–	–	●	**A4**

Working port

			028	055	060	080	085	107	115	140	150	160	170	200	215	280	
18	SAE working port **A** and **B** at rear		●	●	●	●	●	●	●	●	●	●	●	●	●	●	**1**
	SAE working ports **A** and **B** lateral, opposite		●	●	●	●	●	●	●	●	●	●	●	●	●	●	**2**
	SAE working port **A** and **B** at rear, with lateral measuring ports		–	–	–	●	●	●	●	●	●	●	●	●	●	–	**4**
	SAE working port **A** and **B** at bottom, with integrated counterbalance valve[5]		–	–	–	–	–	○	○	●	●	●	●	–	–	–	**6**
	Port plate for mounting a counterbalance valve, with 1-stage pressure relief valve (pilot operated)[6]	BVD20	–	●	●	●	●	●	●	–	–	–	–	–	–	–	**7**
		BVD25	–	–	–	–	–	●	●	●	●	●	●	–	–	–	**8**
		BVE25	–	–	–	–	–	●	●	–	–	–	–	–	–	–	**8**
	Port plate for mounting a counterbalance valve, with 1-stage pressure relief valve (direct operated)[6]	BVD25	–	–	–	–	–	–	–	–	–	–	–	●	●	○	**5**
		BVE25	–	–	–	–	–	–	–	–	–	●	●	●	●	○	**5**
		BVD/BVE32	–	–	–	–	–	–	–	–	–	–	–	●	●	●[7]	**9**

● = Available ○ = On request – = Not available

5) Only in combination with HZ5, EZ5, EZ6, HP or EP with respective negative control

6) Only possible in combination with HP, EP and HA control.

7) A port plate for mounting the MHB32 counterbalance valve with a 1-stage pressure relief valve (pilot operated) is available as a special version for applications without boost pressure supply.

01	02	03	04	05	06	07	08	09	10		11	12	13	14	15	16	17	18	19	20		21
A6V	**M**						**0**			**/**			**W**	**V**	**0**						**–**	

Valve

			028	055	060	080	085	107	115	140	150	160	170	200	215	280	
19	Without valve		●	●	●	●	●	●	●	●	●	●	●	●	●	●	**0**
	With integrated brake release valve (only with port plate 6)		–	–	–	–	–	○	○	●	●	●	●	–	–	–	**Y**
	With BVD/BVE counterbalance valves mounted[8)]		–	●	●	●	●	●	●	●	●	●	●	●	●	●	**W**
	With flushing and boost-pressure valve mounted, flushing on both sides Flushing flow at: $\Delta p = p_{ND} - p_G$ = 25 bar and v = 10 mm²/s (p_{ND} = low pressure, p_G = case pressure) Only possible with port plates 1, 2 and 4	**Flushing flow q_v [l/min]**															
		3.5	●	●	●	●	●	●	●	–	–	–	–	–	–	–	**A**
		5	●	●	●	●	●	●	●	–	–	–	–	–	–	–	**B**
		8	●	●	●	●	●	●	●	●	●	●	●	●	●	–	**C**
		10	●	●	●	●	●	●	●	●	●	●	●	●	●	–	**D**
		14	–	●	●	●	●	●	●	–	–	–	–	–	–	–	**F**
		15	–	–	–	–	–	–	–	●	●	●	●	●	●	–	**G**
		16	–	●	●	●	●	●[9)]	●[10)]	–	–	–	–	–	–	–	**H**
		18	–	–	–	–	–	●[9)]	●[10)]	●	●	●	●	●	●	–	**I**
		21	–	–	–	–	–	●[9)]	●[10)]	●	●	●	●	●	●	–	**J**
		27	–	–	–	–	–	●[9)]	●[10)]	●	●	●	●	●	●	–	**K**
		31	–	–	–	–	–	●[9)]	●[10)]	●	●	●	●	●	●	–	**L**
		37	–	–	–	–	–	–	–	●	●	●	●	●	●	–	**M**
	adjustable	0 ... 60	–	–	–	–	–	–	–	–	–	–	–	–	–	●	**V**

Speed sensor

		028	055	060	080	085	107	115	140	150	160	170	200	215	280	
20	Without speed sensor	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**0**
	Prepared for sensor DSA/20 and DST	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**W**
	Speed sensor DSA/20 mounted[11)]	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**C**
	Speed sensor DST mounted[12)]	●	●	●	●	●	●	●	●	●	●	●	●	●	–	**E**

Standard/special version

21	Standard version	**0**
	Standard version with installation variants, e.g. **T** ports open or closed, contrary to standard	**Y**
	Special version	**S**

● = Available ○ = On request – = Not available

Notice

- Please observe the project planning notes on 103!
- In addition to the type code, please specify the relevant technical data when placing your order.
- Please note that not all type code combinations are available although the individual functions are marked as being available.

8) Type code of counterbalance valve according to data sheet 95522 (BVD20, BVD25), 95526 (BVE25), 95528 (BVE/BVD32), specify separately.
9) Not for EZ3, 4, 7, 8 and HZ3, 7.
10) Not for EZ7, EZ8 and HZ7.
11) Specify type code of the sensor acc. to data sheet 95126 (DSA/20) separately and observe the requirements for the electronics.
12) Specify type code of the sensor acc. to data sheet 95131 (DST) separately and observe the requirements for the electronics.

Hydraulic fluid

The axial piston unit is designed for operation with HLP mineral oil according to DIN 51524.
Application instructions and requirements for hydraulic fluid selection, behavior during operation as well as disposal and environmental protection should be taken from the following data sheets before the start of project planning:

- 90220: Hydraulic fluids based on mineral oils and related hydrocarbons
- 90221: Environmentally acceptable hydraulic fluids
- 90222: Fire-resistant, water-free hydraulic fluids (HFDR/HFDU)
- 90223: Fire-resistant, water-containing hydraulic fluids (HFC/HFB/HFAE/HFAS)
- 90225: Limited technical data for operation with water-free and water-containing fire-resistant hydraulic fluids (HFDR, HFDU, HFAE, HFAS, HFB, HFC)

Selection of hydraulic fluid
Bosch Rexroth evaluates hydraulic fluids on the basis of the Fluid Rating according to the technical data sheet 90235.
Hydraulic fluids with positive evaluation in the Fluid Rating are listed in the following data sheet:

- 90245: Bosch Rexroth Fluid Rating List for Rexroth hydraulic components (pumps and motors)

Selection of hydraulic fluid shall make sure that the operating viscosity in the operating temperature range is within the optimum range (v_{opt}; see selection diagram).

Notice
The axial piston unit is not suitable for operation with HFA hydraulic fluids.

Viscosity and temperature of hydraulic fluids

	Viscosity	Shaft seal	Temperature[3]	Comment
Cold start	v_{max} ≤ 1600 mm²/s	NBR[2]	ϑ_{St} ≥ −40°C	t ≤ 3 min, without load (p ≤ 50 bar), n ≤ 1000 rpm Permissible temperature difference between axial piston unit and hydraulic fluid in the system maximum 25 K
		FKM	ϑ_{St} ≥ −25°C	
Warm-up phase	v = 1600 ... 400 mm²/s			t ≤ 15 min, p ≤ 0.7 × p_{nom} and n ≤ 0.5 × n_{nom}
Permissible operating range	v = 400 ... 10 mm²/s[1]	NBR[2]	ϑ ≤ +78 °C	Measured at port **T**
		FKM	ϑ ≤ +103 °C	
	v_{opt} = 36 ... 16 mm²/s			Optimal operating viscosity and efficiency range
Short-term operation	v_{min} = 10 ... 7 mm²/s	NBR[2]	ϑ ≤ +78 °C	t ≤ 3 min, p ≤ 0.3 × p_{nom}, measured at port **T**
		FKM	ϑ ≤ +103 °C	

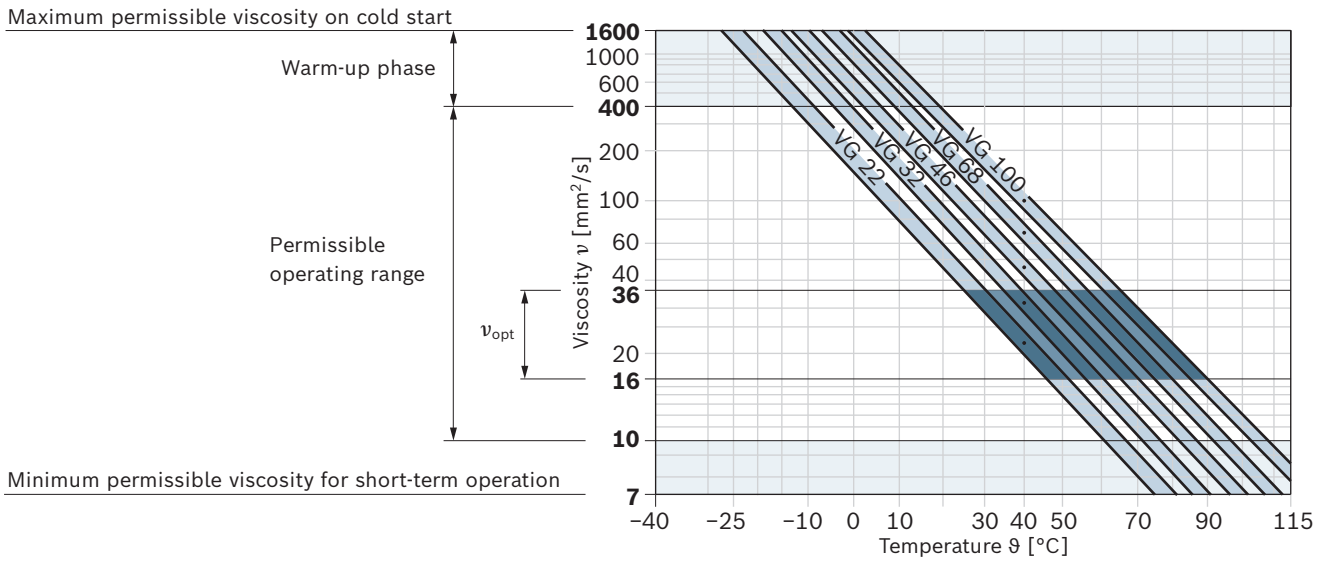
Notice:
The maximum circuit temperature of +115 °C must not be exceeded at the working ports **A** and **B** in compliance with the permissible viscosity.

1) This corresponds, e.g. on the VG 46, to a temperature range of +4 °C to +85 °C (see selection diagram)

2) Special version, please contact us

3) If the temperature at extreme operating parameters cannot be adhered to, please contact us.

▼ **Selection diagram**



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.

A cleanliness level of at least 20/18/15 is to be maintained according to ISO 4406.

At a hydraulic fluid viscosity of less than 10 mm²/s (e.g. due to high temperatures during short-term operation), a cleanliness level of at least 19/17/14 according to ISO 4406 is required.

For example, a viscosity of 10 mm²/s is achieved with the following hydraulic fluid and temperature:

- HLP 32 a temperature of 73°C
- HLP 46 a temperature of 85 °C

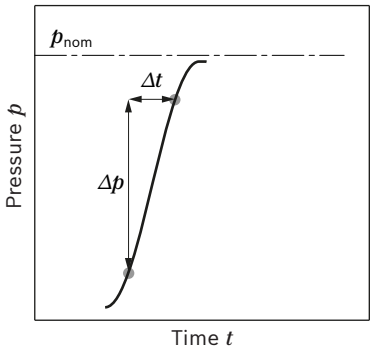
Flow direction

Direction of rotation, viewed on drive shaft	
Clockwise	Counter-clockwise
A to **B**	**B** to **A**

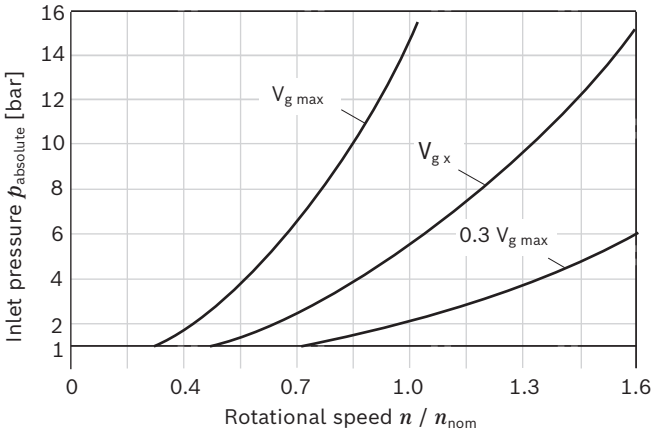
Working pressure range

Pressure at working port A or B				**Definition**
Nominal pressure p_{nom}	Series 65		400 bar	The nominal pressure corresponds to the maximum design pressure.
	Series 71		450 bar	
Maximum pressure p_{max}	Series 65	NG 28 to 200	450 bar	The maximum pressure corresponds to the maximum working pressure within a single operating period. The sum of single operating periods must not exceed the total operating period. Within the total operating period of 300 h, a maximum pressure of 450 bar to 530 bar for series 65 (size 55 to 200) or 500 bar to 530 bar for series 71 (size 60 to 215) is permissible for a limited period of 50 h.
	Series 71	NG 60 to 280	500 bar	
Maximum single operating period			10 s	
Total operating period			300 h	
Swivel angle			100%	
Maximum pressure p_{max}	Series 65	NG 55 to 200	530 bar	
	Series 71	NG 60 to 215	530 bar	
Maximum single operating period			10 s	
Total operating period			50 h	
Minimum pressure (high-pressure side)			25 bar	Minimum pressure on the high-pressure side (**A** or **B**) required to prevent damage to the axial piston unit.
Minimum pressure – operation as a pump (inlet)			see diagram (next page)	To prevent damage to the axial piston motor during operation as a pump (change of the high-pressure side with constant direction of rotation, e.g. during brake applications) a minimum pressure has to be ensured at the working port (inlet). The minimum pressure depends on the rotational speed and displacement of the axial piston unit.
Summation pressure p_{Su} (pressure **A** + pressure **B**)			700 bar	The summation pressure is the sum of the pressures at the ports for the working lines (**A** and **B**)
Rate of pressure change $R_{A\,max}$				Maximum permissible speed of pressure build-up and reduction during a pressure change across the entire pressure range.
With integrated pressure relief valve			9000 bar/s	
Without pressure relief valve			16000 bar/s	
Case pressure at port T				
Continuous differential pressure $\Delta p_{T\,cont}$			2 bar	Maximum, averaged differential pressure at the shaft seal (housing to ambient pressure)
Maximum differential pressure $\Delta p_{T\,max}$			see diagram (next page)	Permissible differential pressure at the shaft seal (case pressure to ambient pressure)
Pressure peaks $p_{T\,peak}$			10 bar	t < 0.1 s

▼ **Rate of pressure change $R_{A\,max}$**

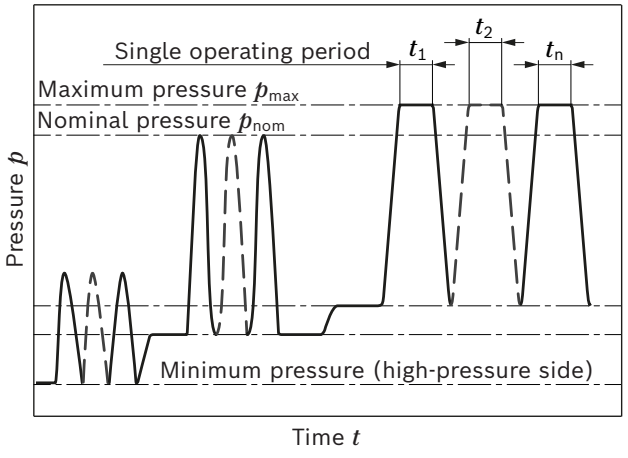


▼ **Minimum pressure – operation as a pump (inlet)**



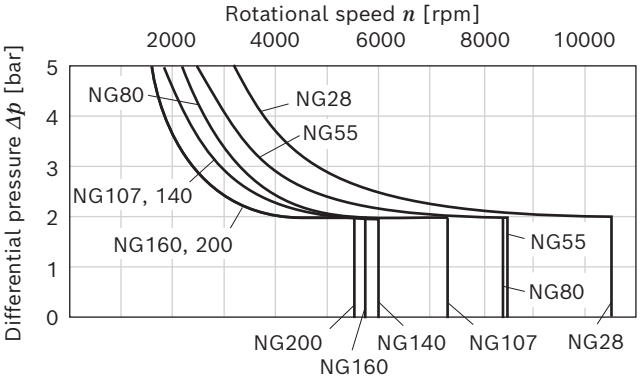
This diagram is valid only for the optimum viscosity range from v_{opt} = 36 to 16 mm²/s.
If the above-mentioned conditions cannot be ensured, please contact us.

▼ **Pressure definition**

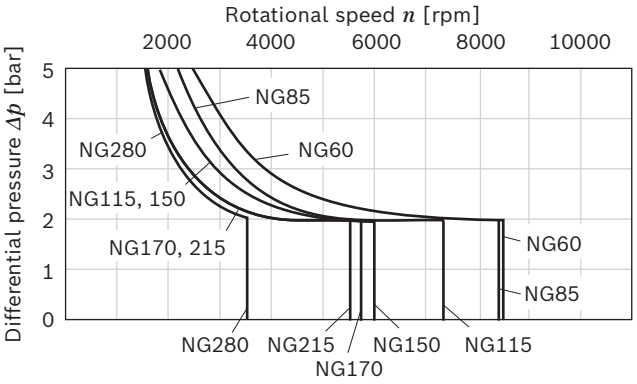


Total operating period = $t_1 + t_2 + ... + t_n$

▼ **Maximum differential pressure at the shaft seal ring, series 65**



▼ **Maximum differential pressure at the shaft seal ring, series 71**



Notice

- Working pressure range applies when using hydraulic fluids based on mineral oils. Please contact us for values for other hydraulic fluids.
- In addition to the hydraulic fluid and the temperature, the service life of the shaft seal is influenced by the rotational speed of the axial piston unit and the case pressure.
- The service life of the shaft seal decreases with increasing frequency of pressure peaks and increasing mean differential pressure.
- The case pressure must be greater than the external pressure (ambient pressure) at the shaft seal.

Effect 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:
HP, HA.T3: increase
DA: reduction
With the following settings, an increase in case pressure will have no effect on the beginning of control:
HA.R and HA.U, EP, HA
The factory settings for the beginning of control are made at
$p_{absolute}$ = 2 bar case pressure (size 28 to 215) or
$p_{absolute}$ = 1 bar case pressure (size 280).

Technical data

Series 65

Size		NG		28	55	80	107	140	160	200
Displacement geometric, per revolution		$V_{g\,max}$	cm^3	28.1	54.8	80.3	106.7	140.2	160.2	200
		$V_{g\,min}$	cm^3	0	0	0	0	0	0	0
		$V_{g\,x}$	cm^3	18	35	51	68	88	61	76
Maximum rotational speed[1] (complying with the maximum permissible inlet flow)	at $V_{g\,max}$	n_{nom}	rpm	5550	4450	3900	3550	3250	3100	2900
	at $V_g < V_{g\,x}$ (see diagram)	n_{max}	rpm	8750	7000	6150	5600	5150	4900	4600
	at $V_{g\,0}$	n_{max}	rpm	10450	8350	7350	6300	5750	5500	5100
Inlet flow[2]	at n_{nom} and $V_{g\,max}$	$q_{v\,max}$	l/min	156	244	312	380	455	496	580
Torque[3]	at $V_{g\,max}$ and Δp = 400 bar	M	Nm	179	349	509	681	891	1019	1273
Rotary stiffness	$V_{g\,max}$ to $V_g/2$	c_{min}	kNm/rad	6	10	16	21	34	35	44
	$V_g/2$ to 0 (interpolated)	c_{min}	kNm/rad	18	32	48	65	93	105	130
Moment of inertia of the rotary group		J_{TW}	kgm^2	0.0014	0.0042	0.008	0.0127	0.0207	0.0253	0.0353
Case volume		V	l	0.5	0.75	1.2	1.5	1.8	2.4	2.7
Weight approx.		m	kg	16	28	36	46	61	62	78

Series 71

Size		NG		60	85	115	150	170	215	280
Displacement geometric, per revolution		$V_{g\,max}$	cm^3	62.0	85.2	115.6	152.1	171.8	216.5	280.1
		$V_{g\,min}$	cm^3	0	0	0	0	0	0	0
		$V_{g\,x}$	cm^3	37	51	69	91	65	130	118
Maximum rotational speed[1] (complying with the maximum permissible inlet flow)	at $V_{g\,max}$	n_{nom}	rpm	4450	3900	3550	3250	3100	2900	2500
	at $V_g < V_{g\,x}$ (see diagram)	n_{max}	rpm	7200	6800	6150	5600	4900	4800	3550
	at $V_{g\,0}$	n_{max}	rpm	8400	8350	7350	6000	5750	5500	3550
Inlet flow[2]	at n_{nom} and $V_{g\,max}$	$q_{v\,max}$	l/min	275	332	410	494	533	628	700
Torque[3]	at $V_{g\,max}$ and Δp = 450 bar	M	Nm	444	610	828	1089	1230	1550	2006
Rotary stiffness	$V_{g\,max}$ to $V_g/2$	c_{min}	kNm/rad	15	22	37	44	52	70	72
	$V_g/2$ to 0 (interpolated)	c_{min}	kNm/rad	45	68	104	124	156	196	209
Moment of inertia of the rotary group		J_{TW}	kgm^2	0.0043	0.0072	0.0110	0.0181	0.0213	0.0303	0.0479
Case volume		V	l	0.8	1.0	1.5	1.7	2.3	2.8	3.4
Weight approx.		m	kg	28	36	46	61	62	78	101

Speed range

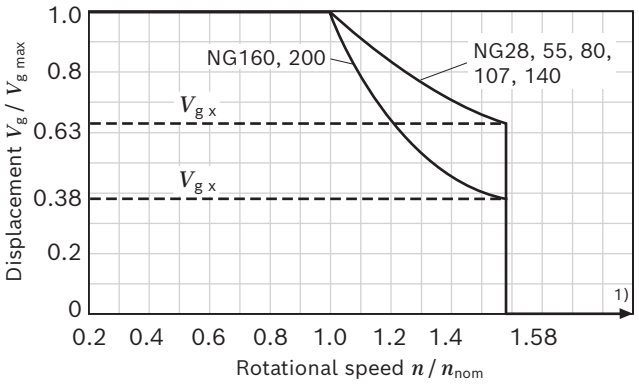
The minimum rotational speed n_{min} is not limited.
For applications with requirements on the evenness of the rotation at low rotational speeds, please contact us.

Notice

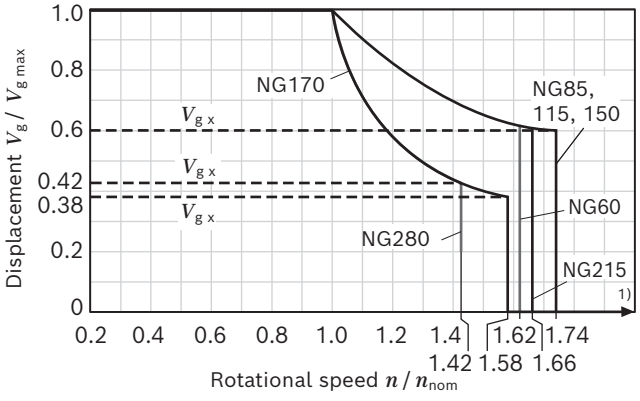
- Theoretical values, without efficiency and tolerances; values rounded
- Operation above the maximum values or below the minimum values may result in a loss of function, a reduced service life or in the destruction of the axial piston unit. Other permissible limit values, such as speed variation, reduced angular acceleration as a function of the frequency and the permissible angular acceleration at start (lower than the maximum angular acceleration) can be found in data sheet 90261

1) The values are applicable:
   – for the optimum viscosity range from v_{opt} = 36 to 16 mm^2/s
   – with hydraulic fluid based on mineral oils
2) Note inlet flow limitation due to counterbalance valve (page 86).
3) Torque without radial force, with radial force see page 12.

Permissible displacement in relation to rotational speed Series 65



Permissible displacement in relation to rotational speed Series 71



Determination of the characteristics				
Inlet flow	q_v	$= \frac{V_g \times n}{1000 \times \eta_v}$		[l/min]
Rotational speed	n	$= \frac{q_v \times 1000 \times \eta_v}{V_g}$		[rpm]
Torque	M	$= \frac{V_g \times \Delta p \times \eta_{hm}}{20 \times \pi}$		[Nm]
Power	P	$= \frac{2 \pi \times M \times n}{60000}$	$= \frac{q_v \times \Delta p \times \eta_t}{600}$	[kW]

Key

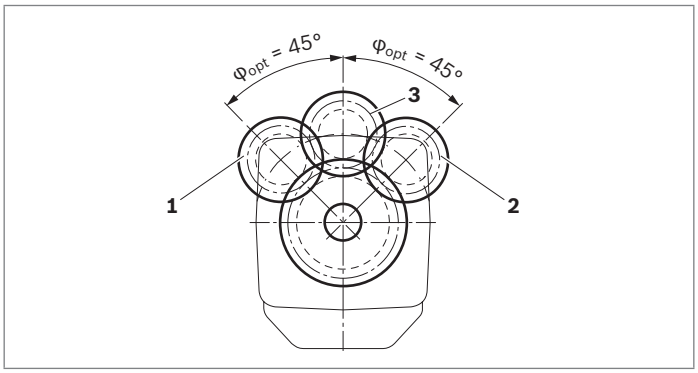
V_g	Displacement per revolution [cm³]
Δp	Differential pressure [bar]
n	Rotational speed [rpm]
η_v	Volumetric efficiency
η_{hm}	Hydraulic-mechanical efficiency
η_t	Total efficiency ($\eta_t = \eta_v \times \eta_{hm}$)

1) Values in this range on request

Effect of the radial force F_q on the bearing service life

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 bearing service life. Recommended position of mating gear is dependent on the direction of rotation. Examples:

▼ **Gear output drive**



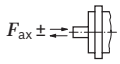
1 "Counter-clockwise" rotation, pressure at port **B**
2 "Clockwise" rotation, pressure at port **A**
3 "Bi-directional" direction of rotation

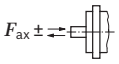
Notice

- The values given are maximum values and do not apply to continuous operation.
- The permissible axial force in direction $-F_{ax}$ is to be avoided as the bearing service life is reduced.
- Special requirements apply in the case of belt output drives. Please contact us.

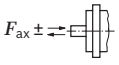
Permissible radial and axial loading on the drive shafts

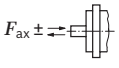
Series 65

Size	NG		55	80	107	140	160	200
Drive shaft	⌀	in	1 1/4	1 1/4	1 3/4	1 3/4	1 3/4	2
Maximum radial force at distance a (from shaft collar)	$F_{q\,max}$	N	7811	7559	12256	16036	14488	20047
	a	mm	24.0	24.0	33.5	33.5	33.5	33.5
Maximum torque at $F_{q\,max}$	$M_{q\,max}$	Nm	310	300	681	891	920	1273
Maximum differential pressure at V_{gmax} and $F_{q\,max}$	$\Delta p_{q\,max}$	bar	315	236	400	400	361	400
Maximum axial force at standstill or depressurized operation 	+ $F_{ax\,max}$	N	0	0	0	0	0	0
	− $F_{ax\,max}$	N	500	710	900	1030	1120	1250
Permissible axial force per bar working pressure	+ $F_{ax\,perm/bar}$	N/bar	7.5	9.6	11.3	13.3	15.1	17.0

Size	NG		28	28	55	55	80	80	107	107	140	160	160	200
Drive shaft	⌀	mm	W25	W30	W30	W35	W35	W40	W40	W45	W45	W45	W50	W50
Maximum radial force at distance a (from shaft collar)	$F_{q\,max}$	N	6436	4838	7581	8069	10867	10283	13758	12215	15982	18278	16435	20532
	a	mm	14.0	17.5	17.5	20.0	20.0	22.5	22.5	25.0	25.0	25.0	27.5	27.5
Maximum torque at $F_{q\,max}$	$M_{q\,max}$	Nm	179	179	281	349	470	509	681	681	891	1019	1019	1273
Maximum differential pressure at V_{gmax} and $F_{q\,max}$	$\Delta p_{q\,max}$	bar	400	400	322	400	369	400	400	400	400	400	400	400
Maximum axial force at standstill or depressurized operation 	+ $F_{ax\,max}$	N	8	0	0	0	0	0	0	0	0	0	0	0
	− $F_{ax\,max}$	N	315	315	500	500	710	710	900	900	1030	1120	1120	1250
Permissible axial force per bar working pressure	+ $F_{ax\,perm/bar}$	N/bar	4.6	4.6	7.5	7.5	9.6	9.6	11.3	11.3	13.3	15.1	15.1	17.0

Series 71

Size	NG		60	85	115	150	150	170	215	280
Drive shaft	⌀	in	1 1/4 in	1 1/2 in	1 3/4 in	1 3/4 in	2 in	2 in	2 in	2 1/4 in
Maximum radial force at distance a (from shaft collar)	$F_{q\,max}$	N	7620	12463	14902	15948	17424	19370	22602	26821
	a	mm	24.0	27.0	33.5	33.5	33.5	33.5	33.5	40.0
Maximum torque at $F_{q\,max}$	$M_{q\,max}$	Nm	310	595	828	890	1089	1230	1445	1916
Maximum differential pressure at V_{gmax} and $F_{q\,max}$	$\Delta p_{q\,max}$	bar	315	440	450	370	450	450	420	430
Maximum axial force at standstill or depressurized operation 	+ $F_{ax\,max}$	N	0	0	0	0	0	0	0	0
	− $F_{ax\,max}$	N	500	710	900	1300	1300	1120	1250	1575
Permissible axial force per bar working pressure	+ $F_{ax\,perm/bar}$	N/bar	7.5	9.6	11.3	13.3	13.3	15.1	17.0	19.4

Size	NG		60	85	115	150	170	215	280
Drive shaft	⌀	mm	W35	W40	W40	W45	W45	W50	W60
Maximum radial force at distance a (from shaft collar)	$F_{q\,max}$	N	10266	12323	16727	19534	21220	25016	26913
	a	mm	20.0	22.5	22.5	25.0	25.0	27.5	35.0
Maximum torque at $F_{q\,max}$	$M_{q\,max}$	Nm	444	610	828	1089	1200	1550	2005
Maximum differential pressure at V_{gmax} and $F_{q\,max}$	$\Delta p_{q\,max}$	bar	450	450	450	450	440	450	450
Maximum axial force at standstill or depressurized operation 	+ $F_{ax\,max}$	N	0	0	0	0	0	0	0
	− $F_{ax\,max}$	N	500	710	900	1300	1120	1250	1575
Permissible axial force per bar working pressure	+ $F_{ax\,perm/bar}$	N/bar	7.5	9.6	11.3	13.3	15.1	17.0	19.4

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 working pressure, regulates the swivel angle of the hydraulic motor.
Increasing drive speed, i.e. increasing pilot pressure, causes the motor to swivel to a smaller displacement (lower torque, higher rotational speed), depending on the working pressure.
If the working pressure exceeds the pressure command value of the controller, the variable motor swivels to a larger displacement (higher torque, lower rotational speed).

- Pressure ratio p_{St}/p_{HD} = 5/100 (NG28 to 215)
- Pressure ratio p_{St}/p_{HD} = 3/100 (NG280)

DA control is only suitable for certain types of travel drive systems and requires review of the motor and vehicle parameters to ensure that the motor is used properly and that machine operation is safe and efficient. We recommend that all DA applications be reviewed by a Bosch Rexroth application engineer.
Our Sales department will provide you detailed information.

Notice
The beginning of control and the DA characteristic curve are influenced by case pressure. An increase in case pressure causes a reduction in the beginning of control (see page 9) and thus a parallel shift of the characteristic curve.

Stroking time damping
The stroking time damping impacts the swivel behavior of the motor and consequently the machine response speed.
Standard for size 28 to 280
DA with throttle pin on one side, throttle from $V_{g\ min}$ to $V_{g\ max}$ (see table)

▼ **Throttle pin overview**

NG	28	55 60	80 85	107 115	140 150	160 170	200 215	280
Groove size [mm]	0.30	0.45	0.45	0.55	0.55	0.55	0.65	2×1.0

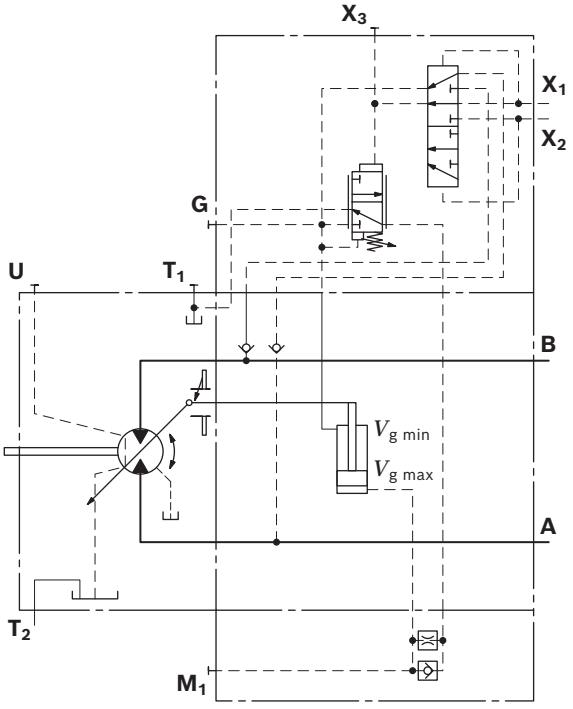
DA0, DA7

Hydraulic travel direction valve, negative control

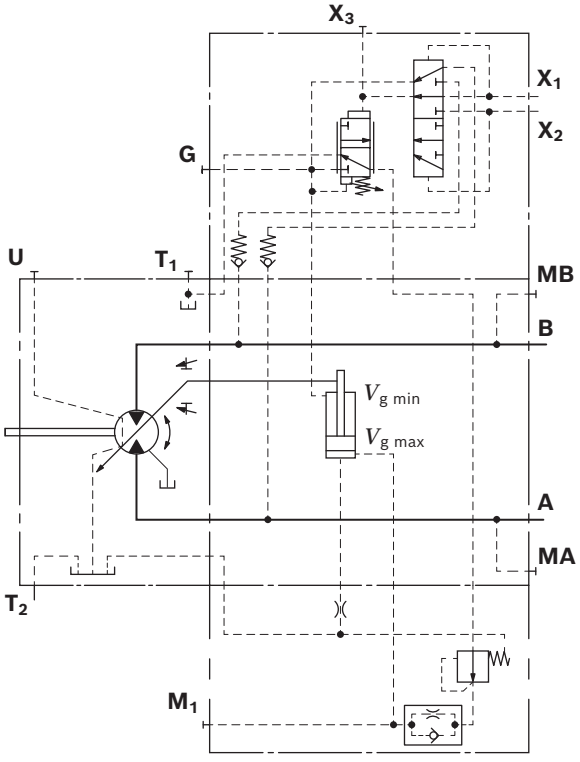
Depending on the direction of rotation (travel direction), the travel direction valve is switched by using pilot pressure ports X_1 or X_2.

Direction of rotation	Working pressure in	Pilot pressure in
Clockwise	**A**	X_1
Counter-clockwise	**B**	X_2

▼ **Circuit diagram DA0**
Size 28 to 215



▼ **Circuit diagram DA7**
Size 280



DA1, DA2 Electric travel direction valve + electric $V_{g\,max}$ override, negative control

Depending on the direction of rotation (direction of travel), the travel direction valve is actuated through the compression spring or the switching solenoid **a**.
When switching solenoid **b** is energized, the control can be overridden and the motor can be swiveled to maximum displacement (high torque, lower rotational speed) (electric $V_{g\,max}$ override).

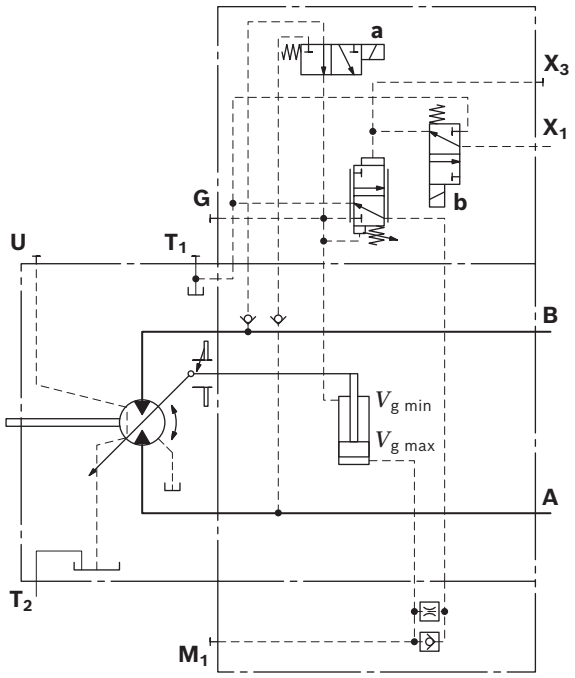
Travel direction valve, electric

Technical data, solenoid a with Ø37		DA1	DA2
Voltage		12 V (±20%)	24 V (±20%)
Direction of rotation	Working pressure in		
Counter-clockwise	**B**	De-energized	De-energized
Clockwise	**A**	Energized	Energized
Nominal resistance (at 20 °C)		5.5 Ω	21.7 Ω
Nominal power		26.2 W	26.5 W
Minimum active current required		1.32 A	0.67 A
Duty cycle		100%	100%
Type of protection: see connector version page 80			

Electric override

Technical data, solenoid b with Ø37	DA1	DA2
Voltage	12 V (±20%)	24 V (±20%)
No override	De-energized	De-energized
Position $V_{g\,max}$	Energized	Energized
Nominal resistance (at 20 °C)	5.5 Ω	21.7 Ω
Nominal power	26.2 W	26.5 W
Minimum active current required	1.32 A	0.67 A
Duty cycle	100%	100%
Type of protection: see connector version page 80		

▼ **Circuit diagram DA1, DA2**
Size 28 to 215



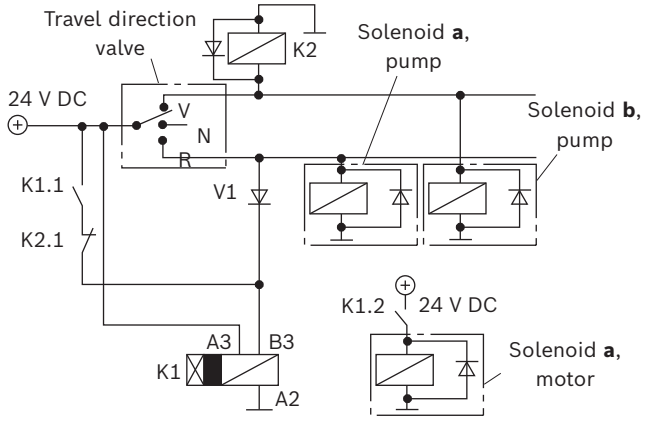
Electric travel direction valve (for DA, HA.R)

Application in travel drives in closed circuits. The travel direction valve of the motor is actuated by an electric signal that also switches the swivel direction of the travel drive pump (e.g. A4VG with DA control valve).
If the pump in the closed circuit is switched to the neutral position or into reverse, the vehicle may experience jerky deceleration or braking, depending on the vehicle weight and current travel speed.
When the travel direction valve of the pump (e.g. 4/3-way directional valve of the DA control) is switched to

- Neutral position, the electrical circuitry, which must be logically coordinated with the pump control, causes the previous signal on the travel direction valve on the motor to be retained.
- Reversing, the electrical circuitry, which must be logically coordinated with the pump control, causes the travel direction valve of the motor to switch to the other travel direction following a time delay (approx. 0.8 s) with respect to the pump.

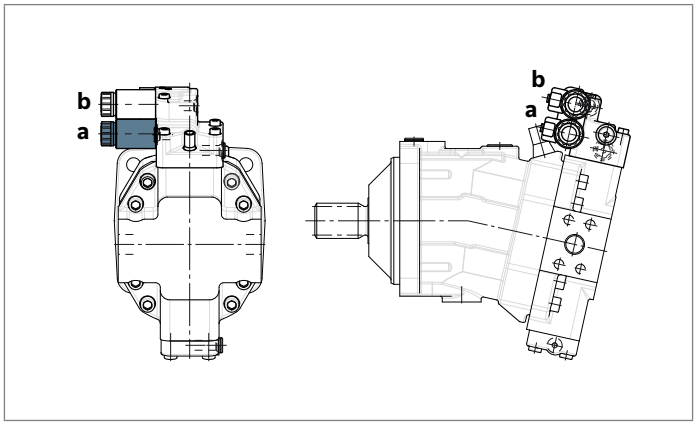
As a result, jerky deceleration or braking is prevented in both cases.

▼ **Circuit diagram, electric travel direction valve**

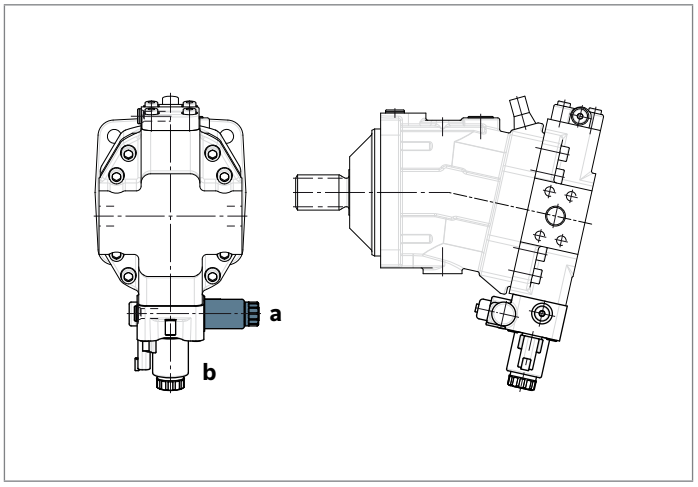


Notice
The shown diodes and relays are not included in the scope of delivery of the motor.

▼ **Control DA1, DA**



▼ **Control, HA1R., HA2R.**

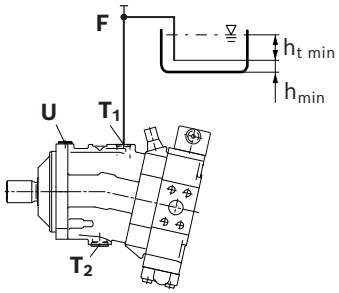


Below-reservoir installation (standard)

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

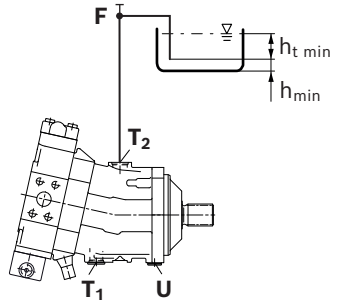
▼ **Installation position 1**

Air bleed	Filling
U	T_1 (**F**)



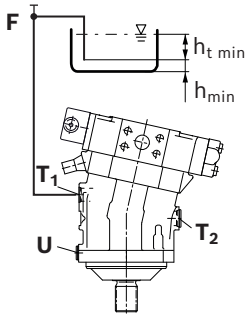
▼ **Installation position 2**

Air bleed	Filling
–	T_2 (**F**)



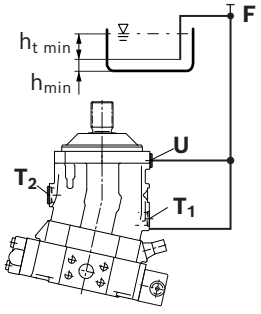
▼ **Installation position 3**

Air bleed	Filling
–	T_1 (**F**)



▼ **Installation position 4**

Air bleed	Filling
U	T_2 (**F**)

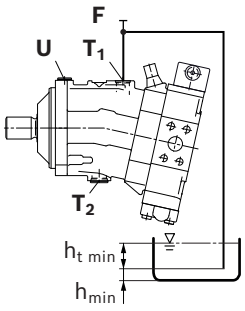


Above-reservoir installation

Above-reservoir installation means that the axial piston unit is installed above the minimum fluid level of the reservoir. Recommendation for installation position 8 (drive shaft up): A check valve in the drain line (cracking pressure 0.5 bar) can prevent draining of the housing area.

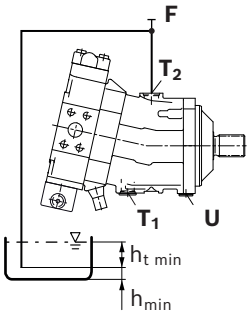
▼ **Installation position 5**

Air bleed	Filling
U, T_1 (**F**)	T_1 (**F**)



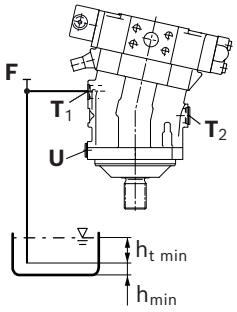
▼ **Installation position 6**

Air bleed	Filling
T_2 (**F**)	T_2 (**F**)



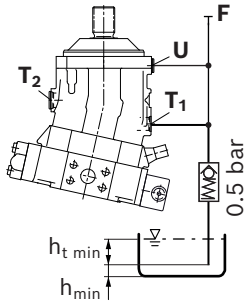
▼ **Installation position 7**

Air bleed	Filling
T_1 (**F**)	T_1 (**F**)



▼ **Installation position 8**

Air bleed	Filling
U, T_1 (**F**)	T_1 (**F**)



Project planning notes

- The motor A6VM is intended to be used in open and closed circuits.
- The project planning, installation and commissioning of the axial piston unit requires the involvement of skilled personnel.
- Before using the axial piston unit, please read the corresponding operating instructions completely and thoroughly. If necessary, this can be requested from Bosch Rexroth.
- Before finalizing your design, please request a binding installation drawing.
- The specified data and information contained herein must be observed.
- For safety reasons, controls with beginning of control at $V_{g\,min}$ (e.g., HA) are not permissible for winch drives, e.g. anchor winches!
- Depending on the operating conditions of the axial piston unit (working pressure, fluid temperature), the characteristic curve may shift.
- Preservation: Our axial piston units are supplied as standard with preservation protection for a maximum of 12 months. If longer preservation protection is required (maximum 24 months), please specify this in plain text when placing your order. The preservation periods apply under optimal storage conditions, details of which can be found in the data sheet 90312 or the operating instructions.
- Not all configuration variants of the product are approved for use in safety functions according to ISO 13849. Please consult the responsible contact person at Bosch Rexroth if you require reliability parameters (e.g. $MTTF_D$) for functional safety.
- Depending on the type of control used, electromagnetic effects can be produced when using solenoids. Applying a direct current signal (DC) to solenoids does not create electromagnetic interference (EMI) nor is the solenoid affected by EMI. Electromagnetic interference (EMI) potential exists when operating and controlling a solenoid with a modulated direct current signal (e.g. PWM signal). The machine manufacturer should conduct appropriate tests and take appropriate measures to ensure that other components or operators (e.g. with a pacemaker) are not affected by this potentiality.
- Pressure control (hydraulic or electronic) is not an adequate safeguard against pressure overload. Therefore, a pressure relief valve must be added to the hydraulic system (integrated into the pump or externally in the system). In this connection, observe the technical limits of the pressure relief valve.
- Please note that a hydraulic system is an oscillating system. This can lead e.g. to the stimulation the natural frequency within the hydraulic system during operation at constant rotational speed over a long period of time. The frequency of the motor to be observed is 7 times (series 65) or 9 times (series 71) the rotational speed frequency. This can be prevented, for example, with suitably designed hydraulic lines.
- Please note the information regarding the tightening torques of connection threads and other screw connections in the operating instructions.
- The ports and fastening threads are designed for the p_{max} permissible pressures of the respective ports, see the connection tables. 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 ports and function ports are only intended to accommodate hydraulic lines.
- Please note that the series connection of motors and the operation under summation pressure affect the efficiency of the units.
- The control behavior of the motor can change slightly due to natural influences, e.g. running-in or setting behavior over time. Calibration may be required.

Safety instructions

- During and shortly after operation, there is a risk of getting burnt on the axial piston unit and especially on the solenoids. Take the appropriate safety measures (e.g. by wearing protective clothing).
- Moving parts in control equipment (e.g. valve spools) can, under certain circumstances, get stuck in position as a result of contamination (e.g. contaminated hydraulic fluid, abrasion, or residual dirt from components). As a result, the hydraulic fluid flow and the build-up of torque in the axial piston unit can no longer respond correctly to the operator's specifications. Even the use of various filter elements (external or internal flow filtration) will not rule out a fault but merely reduce the risk.
  The machine/system manufacturer must test whether remedial measures are needed on the machine for the application concerned in order to bring the driven consumer into a safe position (e.g. safe stop) and ensure any measures are properly implemented.
- In certain conditions, moving parts in high-pressure relief valves might get stuck in an undefined position due to contamination (e.g. contaminated hydraulic fluid). This can result in restriction or loss of load-holding functions in lifting winches.
  Therefore it is the machine and/or system manufacturers responsibility to make sure that the load can always be put in a safe mode if needed. Also, he needs to ensure that these measures are properly implemented.
- When using the axial piston motor in winch drives, make certain that the technical limit values are not exceeded under all operating conditions. If the axial piston motor is extremely overloaded (e.g. if the maximum permissible rotational speeds are exceeded during weighing of the anchor while the ship is in motion), the rotary group may be damaged and, in the worst case, the axial piston motor may burst.
  The machine manufacturer/system manufacturer is to undertake additional measures, up to and including encapsulation.

Related documentation

Product-specific documentation

Document type	Title	Document number
Operating instructions	Variable motor A6VM series 63, 65 and 71	91610-01-B
Data sheet	Technical data for torsional vibration calculation	90261
	Storage and preservation of axial piston units	90312

Documentation for mounted components

Document type	Title	Document number
Data sheet	Counterbalance valve BVD series 41 (size 20, 25)	95522
	Counterbalance valve BVE series 53 (size 25)	95526
	Counterbalance valve BVD/BVE series 52 (size32)	95528
	BODAS speed sensor DSA series 20	95126
	BODAS speed sensor DST series 10	95131
	Neutral position switch NLS series 10	95152

Documentation for hydraulic fluids

Document type	Title	Document number
Data sheet	Hydraulic fluids based on mineral oils and related hydrocarbons	90220
	Environmentally acceptable hydraulic fluids	90221
	Fire-resistant, water-free hydraulic fluids (HFDR/HFDU)	90222
	Fire-resistant hydraulic fluids – containing water (HFAE, HFAS, HFB, HFC, HFC-E)	90223
	Axial piston units for operation with fire-resistant hydraulic fluids (HFDR, HFDU, HFA, HFB, HFC, HFC-E)	90225
	Rating of hydraulic fluids used in Rexroth hydraulic components (pumps and engines)	90235
	Bosch Rexroth Fluid Rating List for Rexroth hydraulic components (pumps and motors)	90245