Axial piston variable displacement unit A10VZG

- For variable-speed operation with synchronous and asynchronous motors
- Size 3 to 10
  Nominal pressure/maximum pressure 250/315 bar
- Size 18 to 63
  Nominal pressure/maximum pressure 280/315 bar
- Open and closed circuits

Features

- For use in one-, two- or four-quadrant operation
- Suitable for start/stop operation
- Suitable for long pressure holding operation
- Proven A10 rotary group technology

Product description

The proven axial piston units from the A10 product family have now been further developed for use in speed-controlled drives. They are approved for start/stop operation and designed for a changing direction of rotation. Even at the lowest speed between 0 and 200 rpm, they provide a constant pressure and offer extremely high efficiency in pressure holding operation. The A10VZG units can be used as a pump in one-, two- and four-quadrant operation.

Type code A10VZG

01	02	03	04	05		06	07		08	9	10	11	12	13
A10V	**Z**	**G**			**/**	**10**	**W**	**–**	**V**		**C**		**N00**	

Axial piston unit

01	Swashplate design, variable, nominal pressure 250/280 bar, maximum pressure 315 bar	**A10V**

Application area

02	Variable-speed drives	**Z**

Operating mode

03	Pump, closed circuit	**G**

Size (NG)

04	Geometric displacement, see table of values on page 82		**003**	**006**	**008**	**010**	**018**	**028**	**045**	**063**	

Control device[2)]

05	Two-point control, electric	U = 12 V	●	●	●	●	●	●	○	○	**EZ300**[1)]
		U = 24 V	●	●	●	●	●	●	○	○	**EZ400**[1)]
	Two-point control, hydraulic		●	●	●	●	●	●	○	○	**DG000**[1)]

Series

06	Series 1, index 0	**10**

Direction of rotation

07	Viewed on drive shaft	changing	**W**

Sealing material

08	FKM (fluoroelastomer)	**V**

Drive shaft

9	Splined shaft	standard shaft	●	●	●	●	–	–	–	–	**S**
	ANSI B92.1a	similar to shaft “S” however for higher torque	–	–	–	–	●	●	○	○	**R**

Mounting flange

10	ISO 3019-1 (SAE)	**C**

Working port

11	SAE flange ports **A** and **B**, opposite sides, metric fastening thread	–	–	–	–	●	●	○	○	**02**
	DIN 3852 threaded ports **A** and **B**, opposite sides	●	●	●	●	–	–	–	–	**03**

Through drive

12	without through drive	**N00**

Connector for solenoids

13	without, with hydraulic controllers	**0**
	HIRSCHMANN connector – without suppressor diode	**H**

● = Available ○ = On request – = Not available

Notice

- Note the project planning notes on page 105.
- In addition to the type code, please specify the relevant technical data when placing your order.

1) Please specify mechanical flow control $V_{g\,max}$ and $V_{g\,min}$ in the order text.
2) Further controllers on request

Preferred program A10VZG

Overview of common configurations

Type	Material number
A10VZG003EZ400/10W -VSC03N00H	R902557901
A10VZG006EZ400/10W -VSC03N00H	R902557902
A10VZG008EZ400/10W -VSC03N00H	R902557903
A10VZG010EZ400/10W -VSC03N00H	R902543656
A10VZG018EZ400/10W -VRC02N00H	R902550318
A10VZG028EZ400/10W-VRC02N00H	R902535127

Please specify settings $V_{g\ min}$ and $V_{g\ max}$ in plain text.

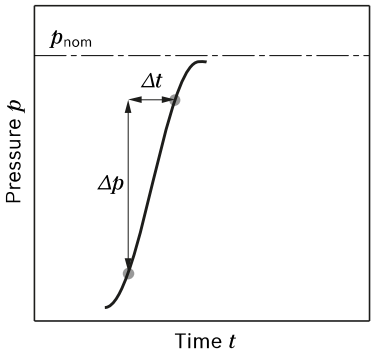
Setting ranges stop $V_{g\ min}$ / $V_{g\ max}$

Size	Vg min	Vg max
3	0 to 3 cm^3; 0.9 cm^3/U	3 cm^3
6	0 to 4 cm^3; 0.9 cm^3/U	6 cm^3
8	0 to 4 cm^3; 0.9 cm^3/U	8 cm^3
10	0 to 4 cm^3; 0.9 cm^3/U	10 cm^3
18	0 to 7 cm^3; 1.3 cm^3/U	9 to 18 cm^3; 1.3 cm^3/U
28	0 to 11 cm^3; 1.7 cm^3/U	14 to 28 cm^3; 1.7 cm^3/U

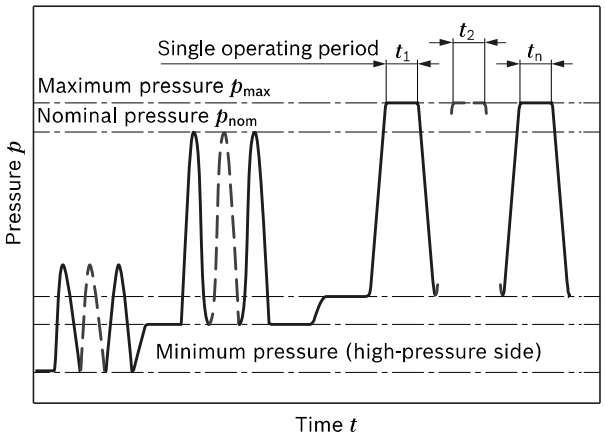
Working pressure range A10VZG

Pressure at working port B or A			**Definition**
Nominal pressure p_{nom}	Size 10	250 bar absolute	The nominal pressure corresponds to the maximum design pressure.
	Size 18 to 63	280 bar absolute	
Maximum pressure p_{max}	Size 10	315 bar absolute	The maximum pressure corresponds to the maximum working pressure within the single operating period. The sum of the single operating periods must not exceed the total operating period.
	Size 18 to 63	315 bar absolute	
Single operating period		2.0 ms	
Total operating period		300 h	
Minimum pressure p_{abs} (high-pressure side)		10 bar absolute[1)]	Minimum pressure on the high-pressure side that is required in order to prevent damage to the axial piston unit.
Rate of pressure change $R_{A\,max}$		16000 bar/s	Maximum permissible speed of pressure build-up and reduction during a pressure change across the entire pressure range.
Pressure at port A or B (low-pressure side)			
Minimum pressure p_{min}	Standard	0.8 bar absolute	Minimum pressure on the low-pressure side that is required in order to prevent damage to the axial piston unit. The minimum pressure depends on the rotational speed and displacement of the axial piston unit.
Summation pressure			
			The sum of the pressures on ports A and B must not rise above 280 bar.
Case pressure at port L			
Maximum pressure $p_{L\,max}$		2 bar absolute[2)]	Maximum 0.5 bar higher than inlet pressure at port **A**, but not higher than $p_{L\,max}$. A drain line to the reservoir is required.

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



▼ **Pressure definition**



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

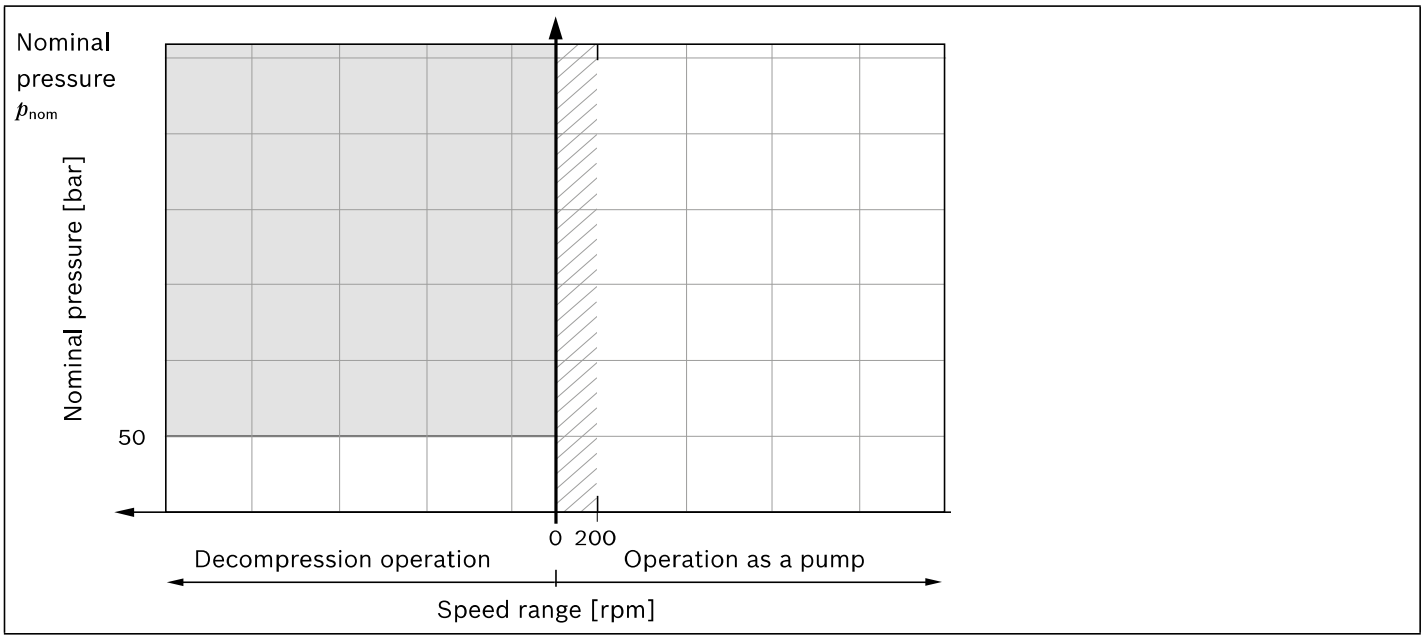
Notice
Working pressure range valid when using hydraulic fluids based on mineral oils. Please contact us for values for other hydraulic fluids.

Flow direction

Direction of rotation, viewed on drive shaft	**Direction of rotation**	**Flow**
Type code "**W**"	Clockwise	**A** to **B**
	Counterclockwise	**B** to **A**

1) Please contact us about lower pressures
2) Higher values on request

A10VZG: Permissible operating data and operating ranges



Operating range	
☐	Operation without restriction
▨	With V_g <40%, no time restriction With $V_{g\,max}$ single operating period t<3 min, maximum cycle share 80%
▩	Operation as a motor possible with restrictions, please contact us. With V_g <40%, no time restriction With $V_{g\,max}$ permissible for short-term decompression operation t ≤ 200 ms

Technical data A10VZG

Size		NG		3	6	8	10	18	28
Displacement, geometric, per revolution		$V_{g\,max}$	cm³	3.5	6	8	10.5	18	28
Rotational speed maximum[1]	at $V_{g\,max}$								
Operation as a pump[1]		n_{nom}	rpm	3300	3300	3300	3300	3300	3000
Decompression operation[2]		n_{nom}	rpm	3300	3300	3300	3300	3300	3000
Flow, operation as a pump	at n_{nom} and $V_{g\,max}$	q_v	l/min	12	20	26	35	59	84
Power operation as a pump	at n_{nom}, $V_{g\,max}$ and Δp = 250 bar	P	kW	5	8	11	14	–	–
	at n_{nom}, $V_{g\,max}$ and Δp = 280 bar	P	kW	–	–	–	–	28	39
Torque	at $V_{g\,max}$ and Δp = 250 bar	T	Nm	14	24	32	42	–	–
	at $V_{g\,max}$ and Δp = 280 bar	T	Nm	–	–	–	–	80	125
	at $V_{g\,max}$ and Δp = 100 bar	T	Nm	6	10	13	17	29	45
Rotary stiffness of drive shaft	S	c	Nm/rad	9200	9200	9200	9200	–	–
	R	c	Nm/rad	–	–	–	–	14800	26300
Moment of inertia for rotary group		J_{TW}	kgm²	0.0006	0.0006	0.0006	0.0006	0.0009	0.0017
Maximum angular acceleration[2][3]		α	rad/s²	14000	14000	14000	14000	12600	11200
Case volume		V	l	0.2	0.2	0.2	0.2	0.32	0.5
Weight (approx.)		m	kg	11.3	11.3	11.3	11.3	13.5	20

Determining the characteristics					
Flow	q_v	=	$\frac{V_g \times n \times \eta_v}{1000}$		[l/min]
Torque	T	=	$\frac{V_g \times \Delta p}{20 \times \pi \times \eta_{hm}}$		[Nm]
Power	P	=	$\frac{2 \pi \times T \times n}{60000}$	= $\frac{q_v \times \Delta p}{600 \times \eta_t}$	[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 ($\eta_t = \eta_v \times \eta_{hm}$)

Notice

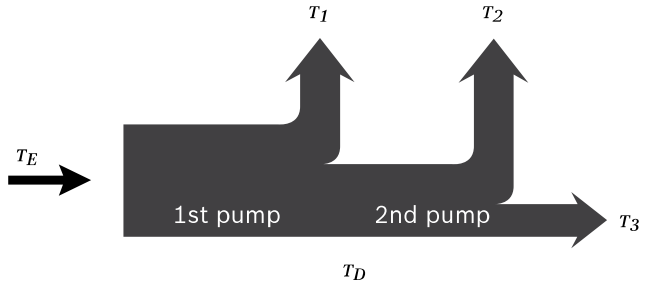
- Theoretical values, without efficiency and tolerances; values rounded
- Operation above the maximum values or below the minimum values may result in a loss of function, a reduced service life or in the destruction of the axial piston unit. Bosch Rexroth recommends testing the load by means of experiment or calculation / simulation and comparison with the permissible values.

1) The values are applicable:
– At absolute pressure $p_{abs} \geq 1$ bar on the low-pressure side (input)
– For the optimal viscosity range of v_{opt} = 36 to 16 mm²/s
– For hydraulic fluid based on mineral oils
2) Higher values on request
3) The limit value is only valid for a single pump, multiple pump version available on request. The load capacity of the connecting parts must be considered.

Permissible input and through-drive torques

Size				10	18	28
Torque at $V_{g\,max}$ and Δp = 250 bar[1)]		T_{max}	Nm	42	–	–
Torque at $V_{g\,max}$ and Δp = 280 bar[1)]		T_{max}	Nm	–	80	125
Maximum input torque at drive shaft[2)]						
	S	$T_{E\,max}$	Nm	126	–	–
		Ø	in	3/4	–	–
	R	$T_{E\,max}$	Nm	–	160	250
		Ø	in	–	3/4	7/8

▼ **Distribution of torques**



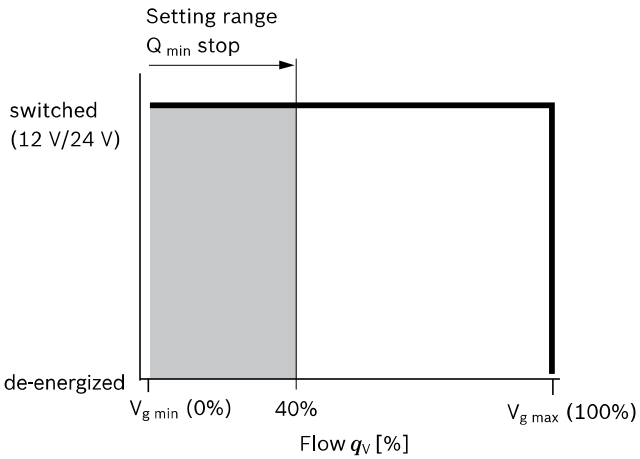
Torque at 1st pump	T_1		
Torque at 2nd pump	T_2		
Torque at 3rd pump	T_3		
Input torque	T_E	=	$T_1 + T_2 + T_3$
	T_E	<	$T_{E\,max}$
Through-drive torque	T_D	=	$T_2 + T_3$
	T_D	<	$T_{D\,max}$

1) Efficiency not considered
2) For drive shafts with no radial force

EZ300/EZ400 – Two-point control, electric

The variable displacement unit is set to minimum swivel angle by actuating switching solenoid. The control pressure is taken internally via the shuttle valve from the current high-pressure side. A minimum system pressure depending on the operating data is required for the pump to be adjusted (please contact us).
The axial piston unit can only be switched between $V_{g\,max}$ and $V_{g\,min}$.
Please specify the pre-setting in plain text.

▼ **Characteristic curve EZx00**

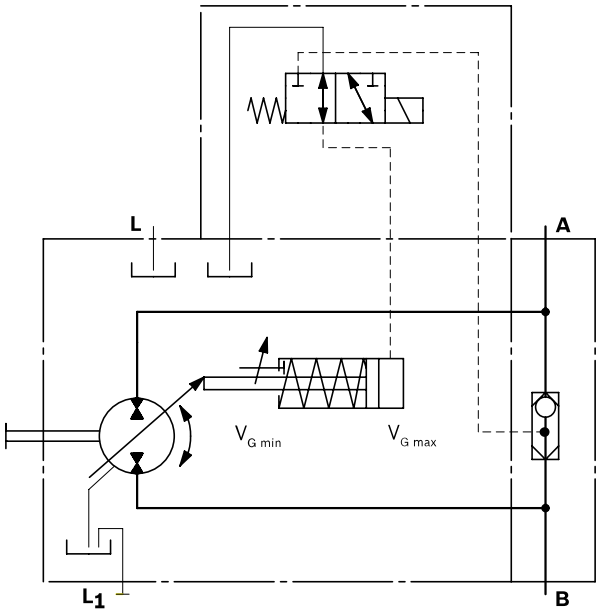


De-energized ≙ $V_{g\,max}$
Current switch on ≙ $V_{g\,min}$

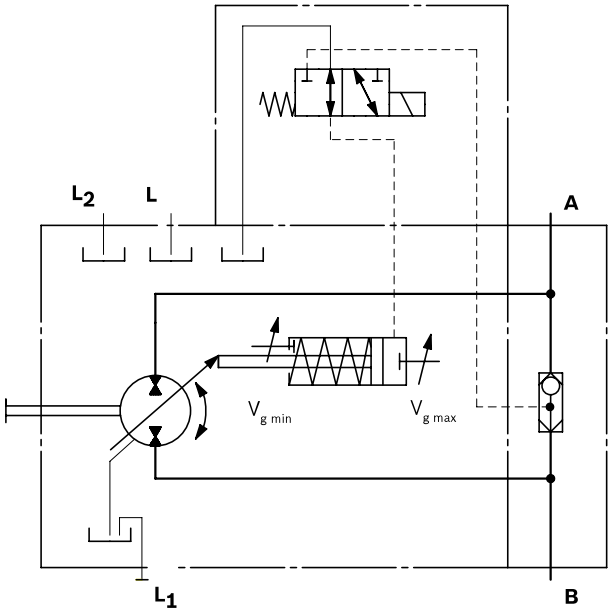
Technical data, solenoid	EZ300	EZ400
Voltage	12 V (±15%)	24 V (±15%)
Position $V_{g\,max}$	de-energized	de-energized
Position $V_{g\,min}$	Current switched on	Current switched on
Nominal current at 20 °C	1.5 A	0.8 A
Duty cycle	100%	100%
Type of protection: see connector version page 102		

Ambient temperature range -20 °C to +60 °C.
If these temperatures cannot be complied with, please contact us

▼ **Schematic A10VZG...EZ 3/4 sizes 3 to 10**



▼ **Schematic A10VZG...EZ 3/4 sizes 18 to 28**

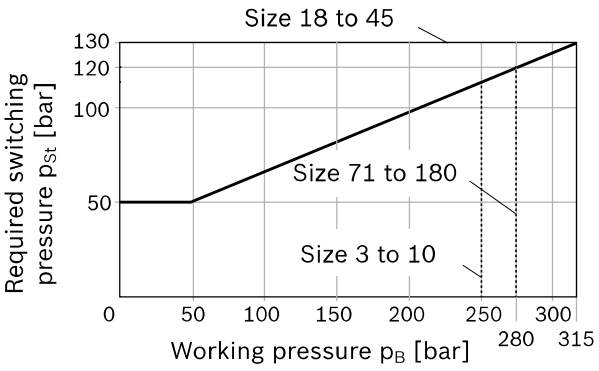


DG000 – Two-point control, hydraulic

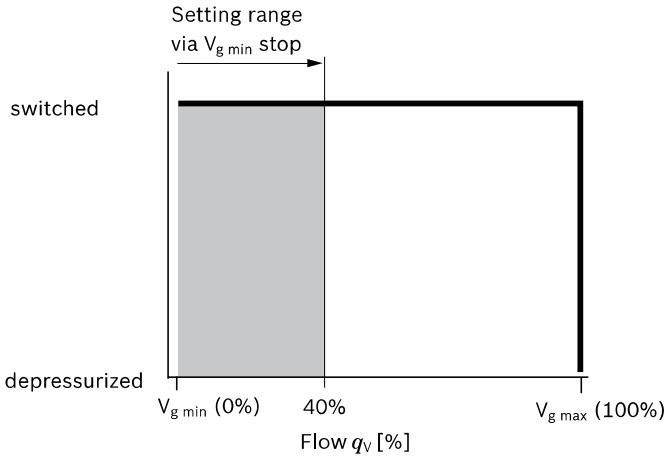
The variable pump can be set to a minimum swivel angle by connecting an external switching pressure to port **X.**
This will supply control fluid directly to the stroking piston; a minimum pressure of $p_{st} \geq 50$ bar is required.
The variable pump can only be switched between $V_{g\,min}$ and $V_{g\,max.}$ Specify the pre-setting in plain text.
Please note that the required switching pressure at port **X** is directly dependent on the actual working pressure p_B on working port **A** or **B**. (See switching pressure characteristic curve).
The maximum permissible switching pressure corresponds to the nominal pressure of the pump.

- Switching pressure p_{st} in X= 0 bar ≙ $V_{g\,max}$
- Switching pressure p_{st} in X≥ 50 bar ≙ $V_{g\,min}$

▼ **Switching pressure characteristic curve**

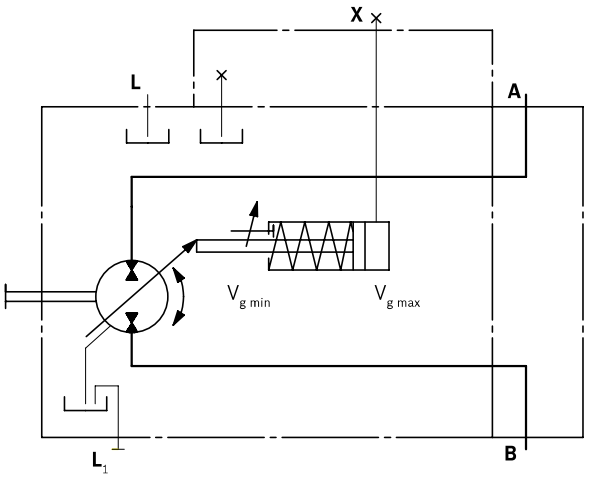


▼ **Characteristic curve DG000**

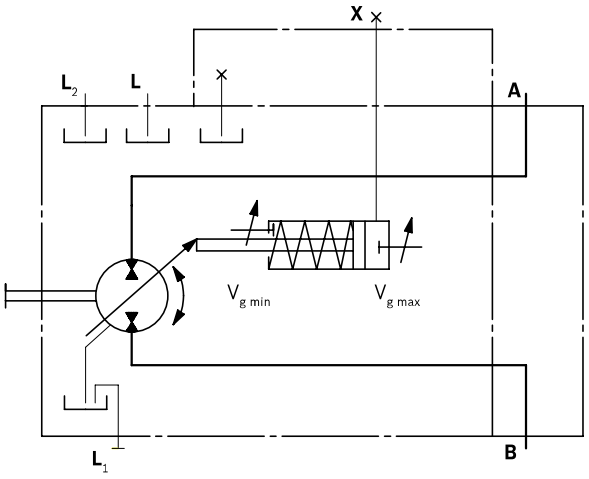


Depressurized ≙ $V_{g\,max}$
Pressure switch on ≙ $V_{g\,min}$

▼ **Circuit diagram DG; A10VZG size 3 to 10**

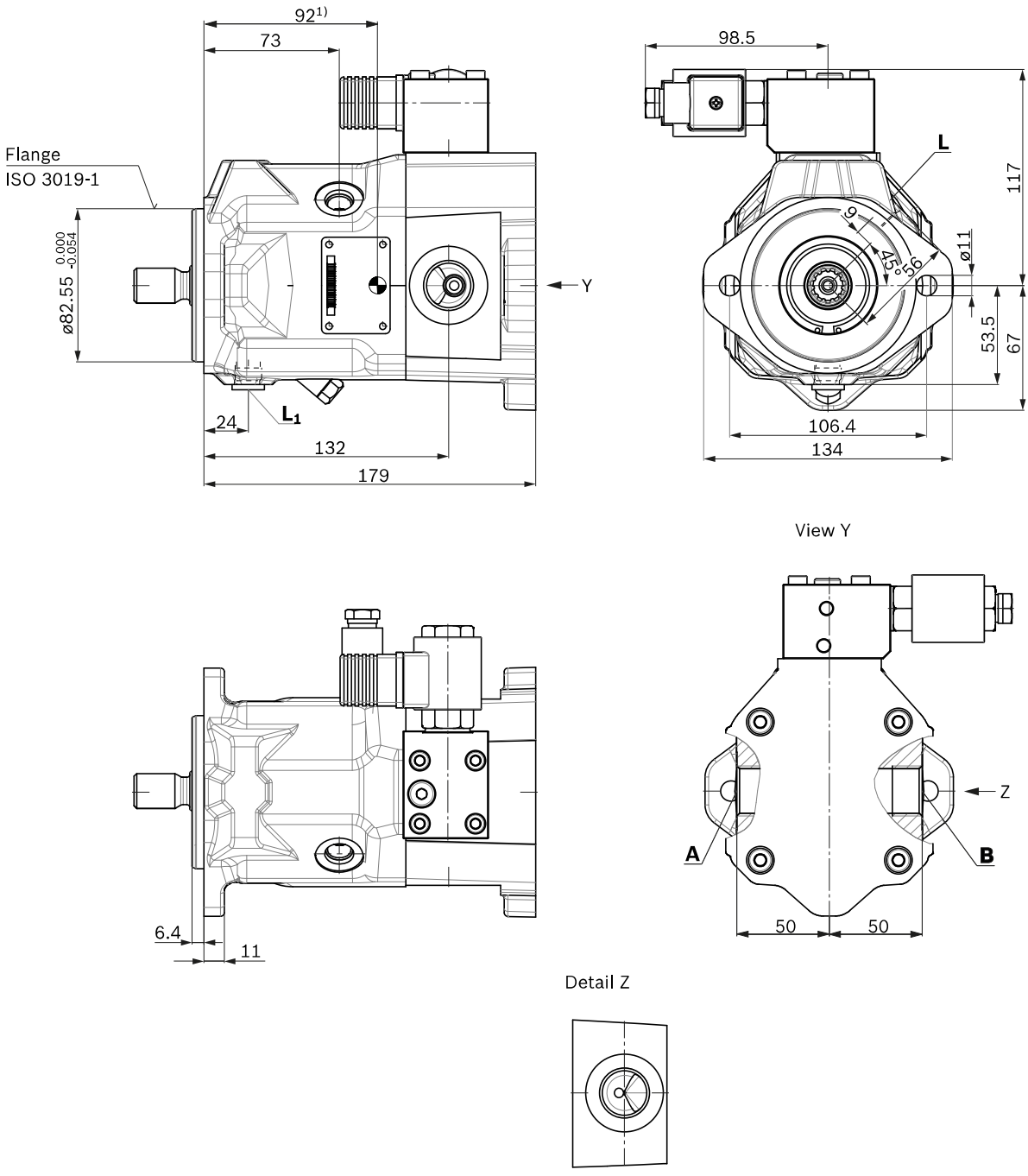


▼ **Circuit diagram DG; A10VZG size 18 to 28**



Dimensions A10 VZG, sizes 3 to 10

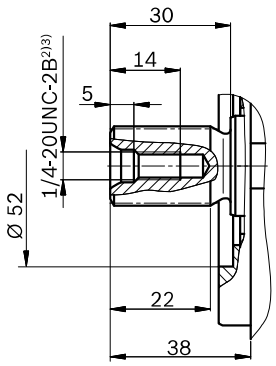
EZx – two-point control electric, direction of rotation changing (flow direction see table page 80)



1) Center of gravity

▼ **Splined shaft 3/4 in SAE J744**

S – 11T 16/32DP[1)]

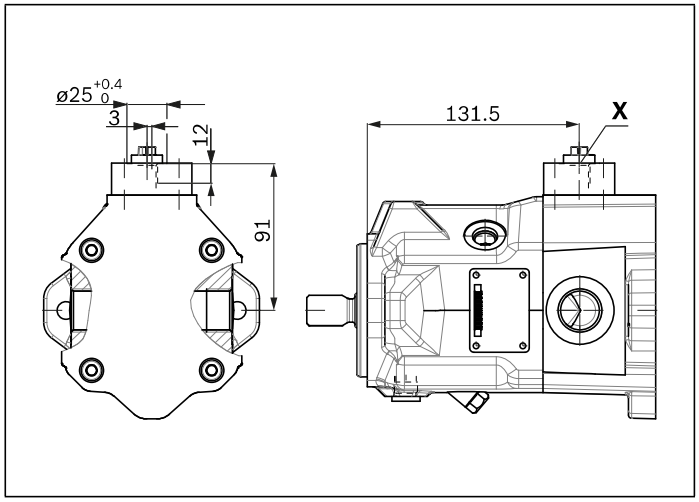


Connection table **A10VZG**

Ports		Standard	Size[3)]	$p_{max\ abs}$ [bar][4)]	State[7)]
A/B	Working port (standard pressure series)	DIN 3852-1	M27 × 2; 16 deep	315	O
L	Drain port	ISO 11926[5)]	9/16-18UNF-2B; 12.5 deep	2	O[6)]
L_1	Drain port	ISO 11926[5)]	9/16-18UNF-2B; 12.5 deep	2	X[6)]
X	Pilot pressure port (DG only)	DIN ISO 228[5)]	G 1/4; 12 deep	315	O

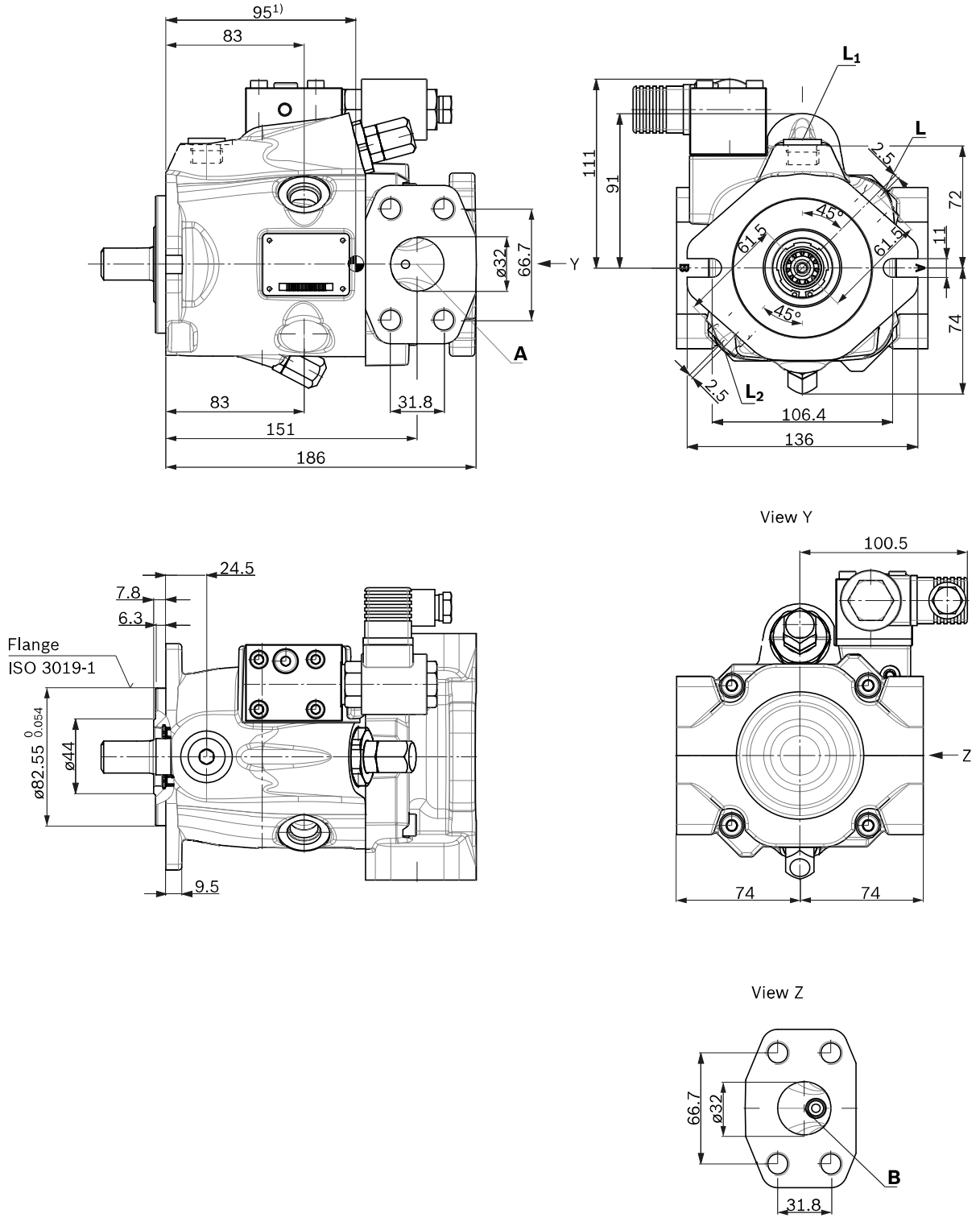
1) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
2) Thread according to ASME B1.1
3) For notes on tightening torques, see the instruction manual.
4) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
5) The countersink can be deeper than as specified in the standard.
6) Depending on the installation position, L or L_1 must be connected (also see installation instructions starting on page 103).
7) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

▼ **DG – Two-point control, direct operated**



Dimensions A10 VZG size 18

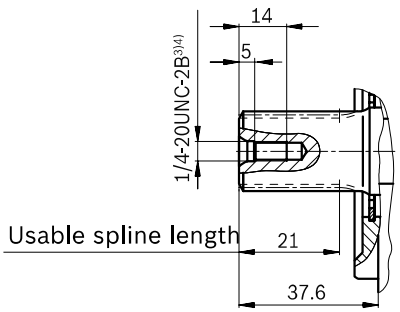
EZx – two-point control electric, direction of rotation changing (flow direction see table page 80)



1) Center of gravity

▼ **Splined shaft 3/4 in SAE J744**

R – 11T 16/32DP[1)2)]

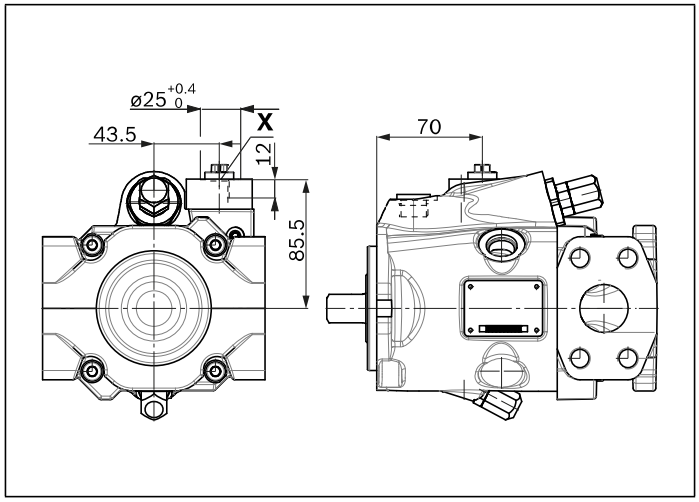


Connection table **A10VZG**

Ports		Standard	Size[4)]	$p_{max\ abs}$ [bar][5)]	State[9)]
A/B	Working port (high-pressure series) Fastening thread	SAE J518[6)] DIN 13	1 1/4 in M14 × 2; 19 deep	315	O
L	Drain port	ISO 11926[7)]	3/4-16UNF-2B; 14 deep	2	O[8)]
L_1, L_2	Drain port	ISO 11926[7)]	3/4-16UNF-2B; 14 deep	2	X[8)]
X	Pilot pressure port (DG only)	DIN ISO 228[7)]	G 1/4; 12 deep	315	O

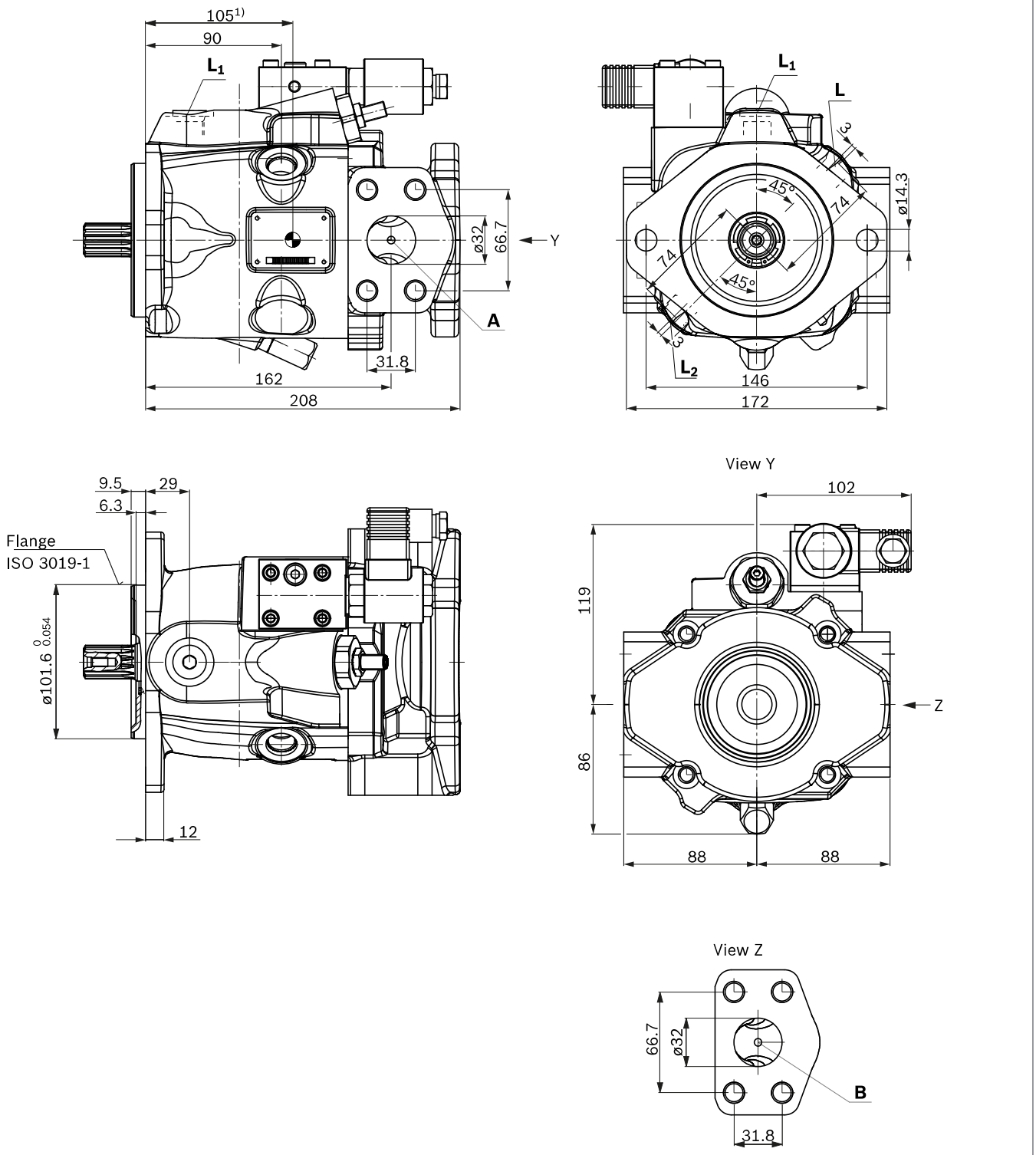
1) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
2) Splines according to ANSI B92.1a, spline runout is a deviation from standard.
3) Thread according to ASME B1.1
4) For notes on tightening torques, see the instruction manual.
5) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
6) Metric fastening thread is a deviation from standard.
7) The countersink can be deeper than as specified in the standard.
8) Depending on the installation position, L, L_1 or L_2 must be connected (also see installation instructions starting on page 103).
9) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

▼ **DG – Two-point control, direct operated**



Dimensions A10 VZG size 28

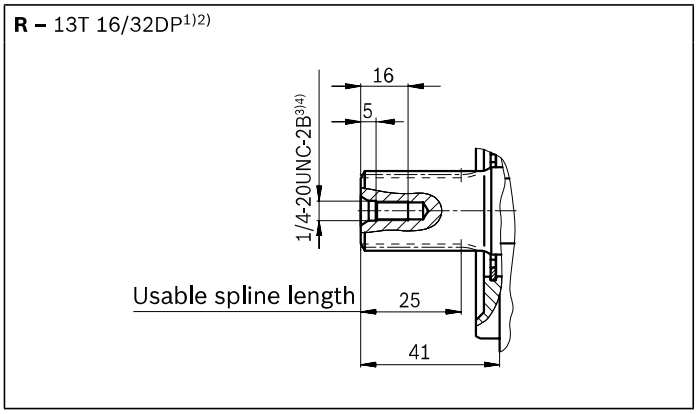
EZx – two-point control electric, direction of rotation changing (flow direction see table page 80)



1) Center of gravity

▼ **Splined shaft 7/8 in SAE J744**

R – 13T 16/32DP[1)2)]

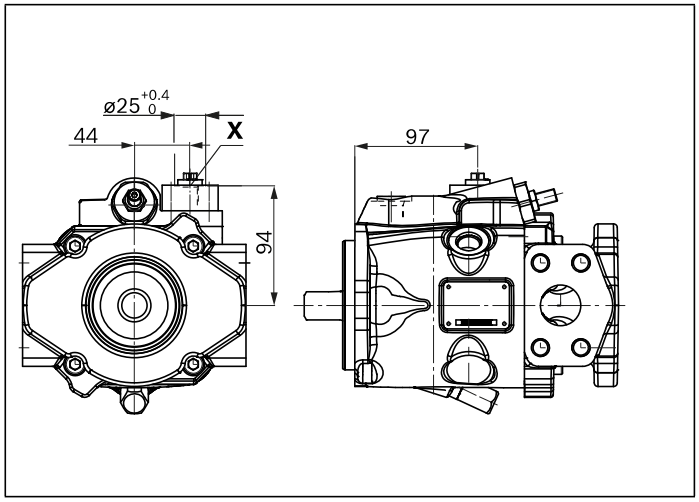


Connection table **A10VZG**

Ports		Standard	Size[4)]	$p_{max\ abs}$ [bar][5)]	State[9)]
A/B	Working port (high-pressure series) Fastening thread	SAE J518[6)] DIN 13	1 1/4 in M14 × 2; 19 deep	315	O
L	Drain port	ISO 11926[7)]	3/4-16UNF-2B; 14 deep	2	O[8)]
L_1, L_2	Drain port	ISO 11926[7)]	3/4-16UNF-2B; 14 deep	2	X[8)]
X	Pilot pressure port (DG only)	DIN ISO 228[7)]	G 1/4; 12 deep	315	O

1) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
2) Splines according to ANSI B92.1a, spline runout is a deviation from standard.
3) Thread according to ASME B1.1
4) For notes on tightening torques, see the instruction manual.
5) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
6) Metric fastening thread is a deviation from standard.
7) The countersink can be deeper than as specified in the standard.
8) Depending on the installation position, L, L_1 or L_2 must be connected (also see installation instructions starting on page 103).
9) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

▼ **DG – Two-point control, direct operated**

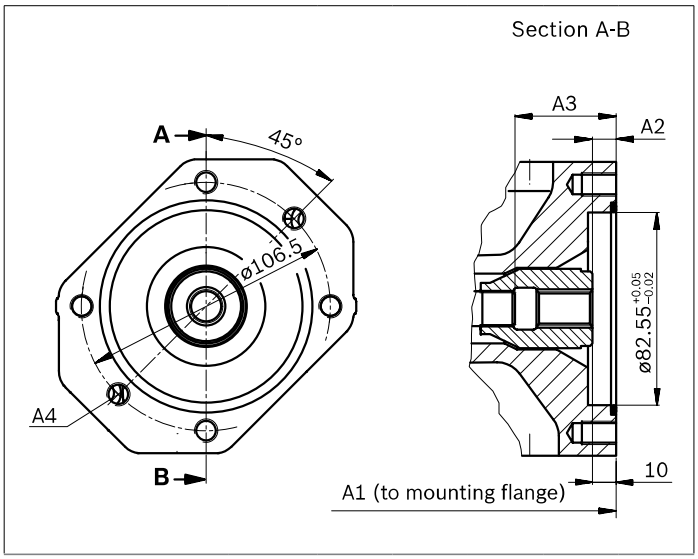


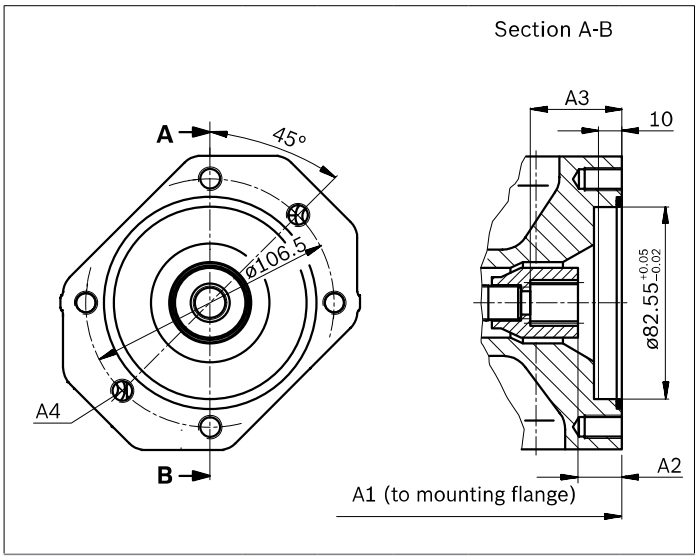
Dimensions through drive for port plates 07 and 12 (A10VZO)

Flange ISO 3019-1 (SAE)		Hub for splined shaft[1]		Availability over sizes				Code
Diameter	Symbol[2]	Diameter		3 to 10	18	28	45	
82-2 (A)		5/8 in	9T 16/32DP	●	●	●	●	K01
		3/4 in	11T 16/32DP	●	●	●	●	K52

● = Available ○ = On request – = Not available

▼ **82-2**





K01 (SAE J744 16-4 (A))	NG	A1	A2	A3	A4[3]
	10	176	9.3	31.8	M10×1.5; 14.5 deep
	18	182	10	43.3	M10×1.5; 14.5 deep
	28	204	10	33.7	M10×1.5; 16 deep
	45	229	10.7	33.7	M10×1.5; 16 deep

K52 (SAE J744 19-4 (A-B))	NG	A1	A2	A3	A4[3]
	10	176	16	38	M10×1.5; 14.5 deep
	18	182	18.8	38.7	M10×1.5; 14.5 deep
	28	204	18.8	38.7	M10×1.5; 16 deep
	45	229	18.9	38.7	M10×1.5; 16 deep

1) According to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

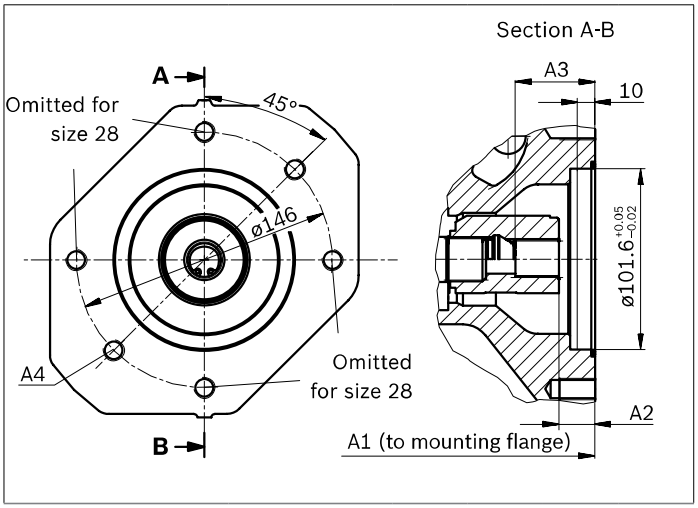
2) Mounting holes pattern viewed on through drive with control at top

3) Thread according to DIN 13, see instruction manual for details on tightening torques.

Flange ISO 3019-1 (SAE)		Hub for splined shaft[1]		Availability over sizes				Code
Diameter	**Symbol[2]**	**Diameter**		**3 to 10**	**18**	**28**	**45**	
101-2 (B)	☍, ⚯	7/8 in	13T 16/32DP	–	–	●	●	K68
		1 in	15T 16/32DP	–	–	–	●	K04

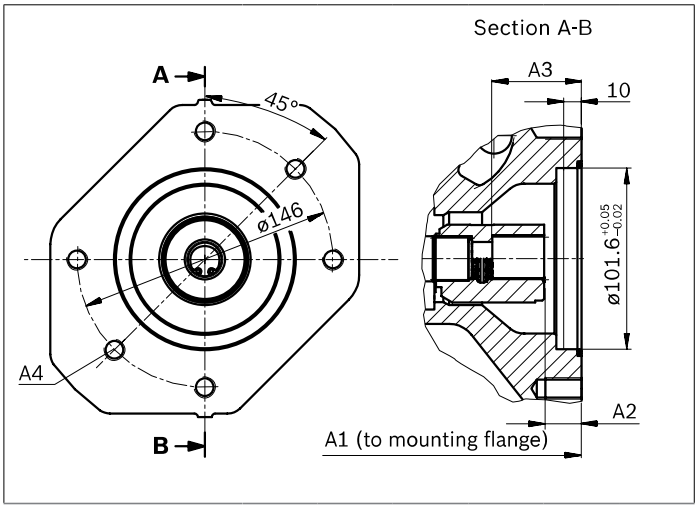
● = Available ○ = On request – = Not available

▼ **101-2**



K68 (SAE J744 22-4 (B))	NG	A1	A2	A3	A4[3]
	28	204	17.8	41.7	M12×1.75; 18 deep
	45	229	17.9	41.7	M12×1.75; 18 deep

▼ **101-2**



K04 (SAE J744 25-4 (B-B))	NG	A1	A2	A3	A4[3]
	45	229	18.4	46.7	M12×1.75; 18 deep

1) According to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

2) Mounting holes pattern viewed on through drive with control at top

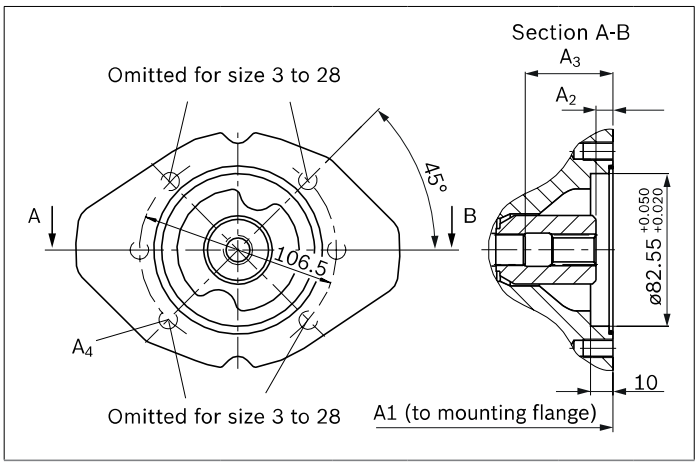
3) Thread according to DIN 13, see instruction manual for details on tightening torques.

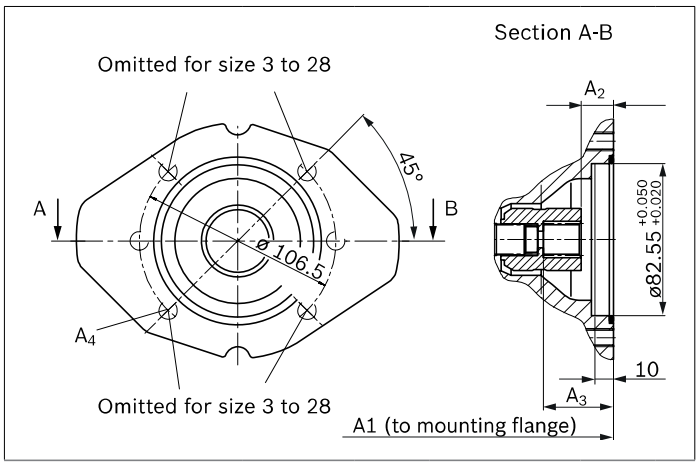
Dimensions through drive for port plate 02 (A10FZO and FZG)

Flange ISO 3019-1 (SAE)		Hub for splined shaft[1]		Availability over sizes					Code
Diameter	**Symbol[2]**	**Diameter**		**3 to 10**	**12 to 18**	**21 to 28**	**37 to 45**	**58 to 63**	
82-2 (A)	☍, ⚮	5/8 in	9T 16/32DP	●	●	●	●	●	K01
		3/4 in	11T 16/32DP	●	●	●	●	●	K52

● = Available ○ = On request – = Not available

▼ **82-2**





K01 (SAE J744 16-4 (A))	NG	A1	A2	A3	A4[3]
	3 to 10	163	10.8	33.3	M10×1.5; 14.5 deep
	12 to 18	168	9.3	43.3	M10×1.5; 14.5 deep
	21 to 28	194	9.9	47	M10×1.5; 16 deep
	37 to 45	217	10.7	53	M10×1.5; 16 deep
	58 to 63	243	9.5	59	M10×1.5; 16 deep

K52 (SAE J744 19-4 (A-B))	NG	A1	A2	A3	A4[3]
	3 to 10	163	17.6	39.6	M10×1.5; 14.5 deep
	12 to 18	168	18.8	39	M10×1.5; 14.5 deep
	21 to 28	194	18.8	39.3	M10×1.5; 16 deep
	37 to 45	217	18.7	39.2	M10×1.5; 16 deep
	58 to 63	243	18.9	39.4	M10×1.5; 16 deep

1) According to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

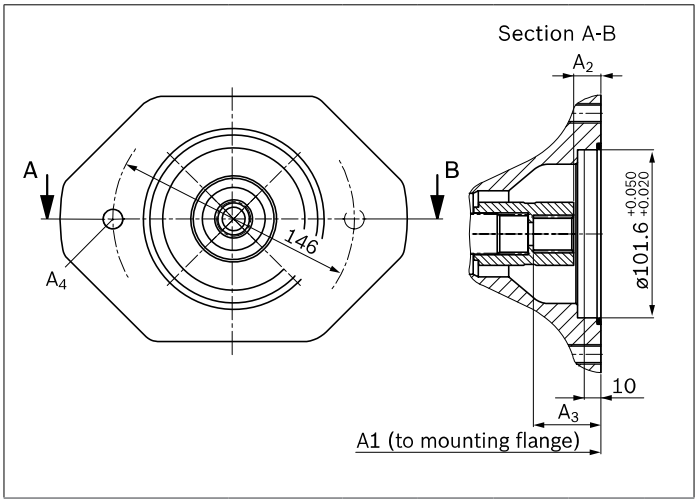
2) Mounting holes pattern viewed on through drive with control at top

3) Thread according to DIN 13, see instruction manual for details on tightening torques.

Flange ISO 3019-1 (SAE)		Hub for splined shaft[1]		Availability over sizes					Code
Diameter	Symbol[2]	Diameter		3 to 10	12 to 18	21 to 28	37 to 45	58 to 63	
101-2 (B)	⚯	7/8 in	13T 16/32DP	–	–	●	●	●	K68
		1 in	15T 16/32DP	–	–	–	●	●	K04

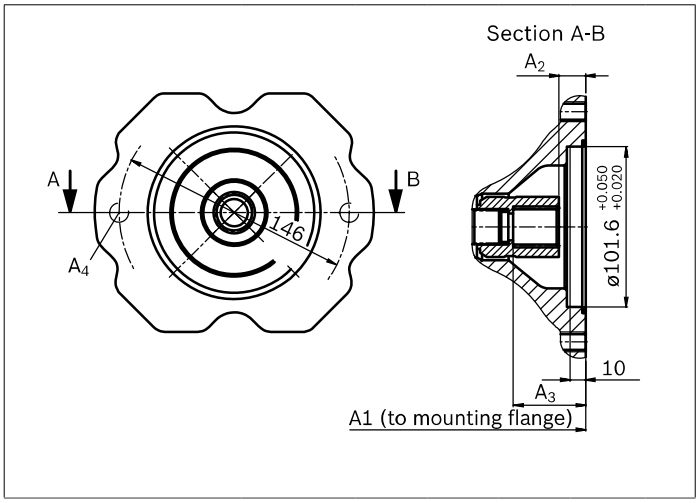
● = Available ○ = On request – = Not available

▼ **101-2**



K68 (SAE J744 22-4 (B))	NG	A1	A2	A3	A4[3]
	21 to 28	194	17.8	42.3	M12×1.75; 18 deep
	37 to 45	217	17.7	42.2	M12×1.75; 18 deep
	58 to 63	243	17.9	42.4	M12×1.75; 18 deep

▼ **101-2**



K04 (SAE J744 25-4 (B-B))	NG	A1	A2	A3	A4[3]
	37 to 45	217	18.9	47.9	M12×1.75; 18 deep
	58 to 63	243	18.2	47.2	M12×1.75; 18 deep

1) According to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

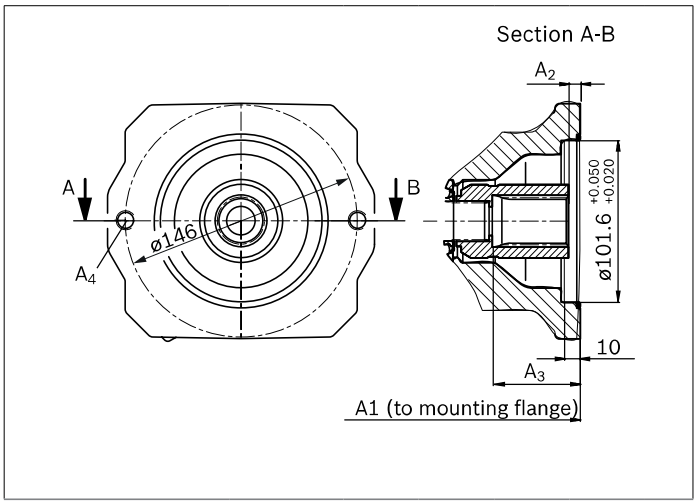
2) Mounting holes pattern viewed on through drive with control at top

3) Thread according to DIN 13, see instruction manual for details on tightening torques.

Flange ISO 3019-1 (SAE)		Hub for splined shaft[1]		Availability over sizes					Code
Diameter	Symbol[2]	Diameter		3 to 10	12 to 18	21 to 28	37 to 45	58 to 63	
101-2 (B)	⚯	1 1/4 in	14T 12/24DP	–	–	–	–	●	K06

● = Available ○ = On request – = Not available

▼ **101-2**



K06 (SAE J744 32-4 (C))	NG	A1	A2	A3	A4[3]
	58 to 63	243	7.4	55.4	M12×1.75; 18 deep

1) According to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

2) Mounting holes pattern viewed on through drive with control at top

3) Thread according to DIN 13, see instruction manual for details on tightening torques.

Overview of mounting options for A10VZO with port plate 07 and 12 or A10FZO, A10FZG with port plate 02

Through drive			Mounting options – 2nd pump			
Flange ISO 3019-1	**Hub for splined shaft**	**Code**	**A10VZO/10 NG (shaft)**	**A10FZO**	**A10FZG**	**A10VZG**
82-2 (A)	3/4 in	K52	3 to 10 (S) 18 (S) 18 (R)	3 to 10 (S) 11 to 18 (R)	3 to 10 (S) 11 to 18 (R)	3 to 10 (S) 18 (R)
101-2 (B)	7/8 in	K68	28 (R)	21 to 28 (R)	21 to 28 (R)	28 (R)
	1 in	K04	–	37 to 45 (R)	37 to 45 (R)	45 (R)
	1 1/4 in	K06	–	63 (R)	–	–

Overview of mounting options for A10VZO with port plate 22U

Through drive			Mounting options – 2nd pump			
Flange (SAE) ISO 3019-1	**Hub for splined shaft**	**Code**	**A10VZO/10 NG (shaft)**	**A10FZO**	**A10FZG**	**A10VZG**
82-2 (A)	3/4 in	U52	10 (S) , 18 (R)	3 to 10 (S) 11 to 18 (R)	3 to 10 (S) 11 to 18 (R)	3 to 10 (S) 18 (R)
101-2 (B)	7/8 in	U68	28 (R)	21 to 28 (R)	21 to 28 (R)	28 (R)
	1 in	U04	–	37 to 45 (R)	37 to 45 (R)	45 (R)
	1 1/4 in	U06	–	63 (R)	–	–
127-4 (C)	1 in	UE2	45 (R)			
127-4 (C)	1 1/4 in	U15	71 (R)			
152-4 (D)	1 1/2 in	U96	100 (S)			
	1 3/4 in	U17	140, 180 (S)			

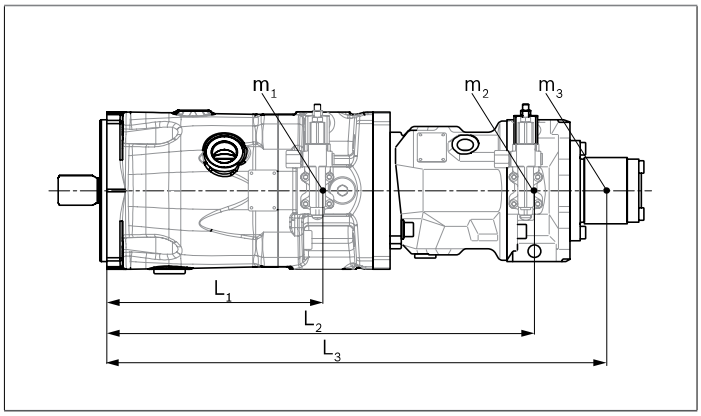
Combination pumps A10VZO + A10VZO, A10VZG, A10FZO or A10FZG

By using combination pumps, it is possible to have independent circuits without the need for splitter gearboxes. When ordering combination pumps, the type designations of the 1st and 2nd pumps must be linked by a "**+**".

Order example:
A10VZO71LA5D/10R-VRD22UE2+
A10VZO45DRG/10R-VRD12N00

It is permissible to use a combination of two single pumps of the same nominal size (tandem pump) considering a dynamic mass acceleration of maximum 10 g (= 98.1 m/s^2) without additional support brackets.

For combination pumps consisting of more than two pumps, the mounting flange must be rated for the permissible mass torque (please contact us).



m_1, m_2, m_3	Weight of pump	[kg]
l_1, l_2, l_3	Distance from center of gravity	[mm]
$T_m = (m_1 \times l_1 + m_2 \times l_2 + m_3 \times l_3) \times \frac{1}{102}$		[Nm]

Permissible mass moment of inertia A10VZO

Size			10	18	28	45	71	100	140	180
static	T_m	Nm	500	500	880	1370	3000	4500	4500	4500
dynamic at 10 g (98.1 m/s^2)	T_m	Nm	50	50	88	137	300	450	450	450
Weight **with** through-drive plate	m	kg	10.5	14	19	30				
Weight **without** through-drive plate (e.g. 2nd pump)			9	12	15	26	47	69	73	78
Distance, center of gravity **without** through drive	l_1	mm		90	110	130	142	169	172	196
Distance, center of gravity **with** through drive	l_1	mm					on request			

Permissible mass moment of inertia A10FZO, A10FZG

Size			3 to 10	12 to 18	21 to 28	37 to 45	58 to 63
static	T_m	Nm	500	500	890	900	1370
dynamic at 10 g (98.1 m/s^2)	T_m	Nm	50	50	89	90	137
Weight **(approx.)**	m	kg	9	10	15.5	21	26
Distance from center of gravity	l_1	mm	92	96	105	125	136

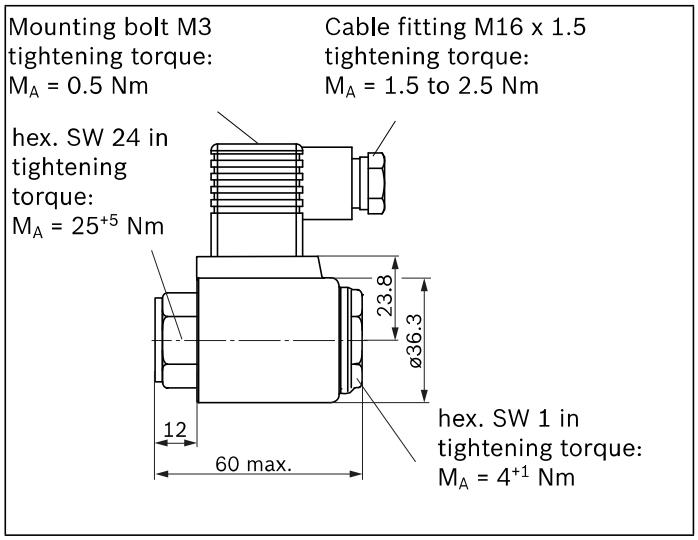
Connector for solenoids

HIRSCHMANN DIN EN 175 301-803-A /ISO 4400
without bidirectional suppressor diode _____H

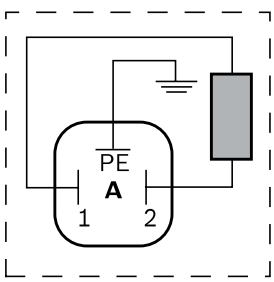
There is the following degree of protection with the installed mating connector:

- IP65 (DIN/EN 60529)

The seal ring in the cable fitting is suitable for lines of diameter 4.5 mm to 10 mm.
The mating connector is not included in the scope of delivery.
This can be supplied by Bosch Rexroth on request.
Bosch Rexroth material number: R902602623



Device connector on solenoid according to DIN 43650



Notice
If necessary, you can change the position of the connector by turning the solenoid.
The procedure is defined in the instruction manual.

Installation instructions A10FZO; A10VZO; A10FZG; A10VZG

General

The axial piston unit must be filled with hydraulic fluid and air bled during commissioning and operation. This must also be observed following a longer standstill as the axial piston unit may empty via the hydraulic lines.
Particularly with the “drive shaft up/down” installation position, filling and air bleeding must be carried out completely as there is, for example, a danger of dry running.
The leakage in the housing area must be discharged to the reservoir via the highest available tank port (**L**, **L_1**).
If a shared drain line is used for several units, make sure that the respective case pressure is not exceeded. The shared drain line must be dimensioned to ensure that the maximum permissible case pressure of all connected units is not exceeded in any operational conditions, particularly at cold start. If this is not possible, separate drain lines must be installed if necessary.
To achieve favorable noise values, decouple all connecting lines using elastic elements and avoid above-reservoir installation.
In all operating conditions, the suction lines and the drain lines must flow into the reservoir below the minimum fluid level.
The permissible suction height h_S results from the total pressure loss. However, it must not be higher than $h_{S\,max}$ = 800 mm. The minimum suction pressure at port **S**(**A**/**B**) must also not fall below 0.8 bar absolute during operation and during cold start. Above-reservoir installation reduces the permissible maximum speed.
When designing the reservoir, ensure that there is adequate spacing between the suction line and the drain line. This reduces turbulence in the hydraulic fluid and carries out degassing, which prevents the heated hydraulic fluid from being sucked directly back in again.

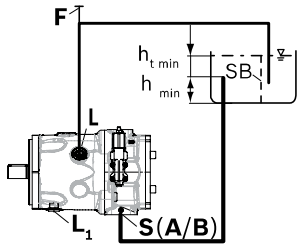
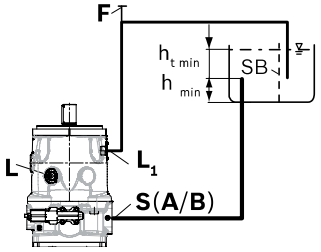
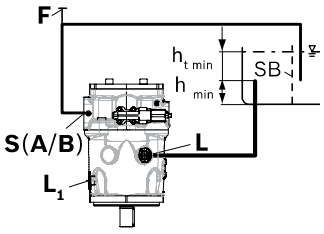
For key, see page 104.

Installation position

See the following examples **1** to **8**.
Further installation positions are available upon request.
Recommended installation position: **1** to **4**

Below-reservoir installation (standard)

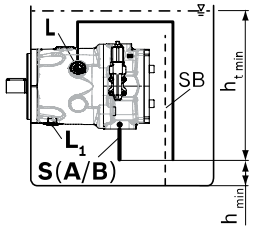
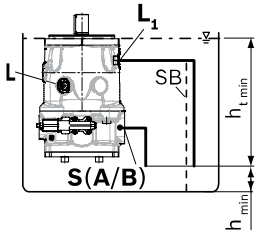
Below-reservoir installation means that the axial piston unit is installed outside of the reservoir and below the minimum fluid level of the reservoir.

Installation position	Air bleed	Filling
1 	**F**	**L** or **L_1**
2[1] 	**F**	**L_1**
3[1] 	**F**	**L_1**

1) Because complete air bleeding and filling are not possible in this position, the pump should be air bled and filled in a horizontal position before installation.

Inside-reservoir installation

Inside-reservoir installation is when the axial piston unit is installed in the reservoir below the minimum fluid level. The axial piston unit is completely below the hydraulic fluid. If the minimum fluid level is equal to or below the upper edge of the pump, see chapter “Above-reservoir installation”. Axial piston units with electric components (e.g. electric controls, sensors) must not be installed in a reservoir below the fluid level.

Installation position	Air bleed	Filling
4 	Via the highest available port **L**	Automatically via the open port **L** or **L_1** due to the position under the hydraulic fluid level
5[1] 	Via the highest available port **L_1**	Automatically via the open port **L**, **L_1** due to the position under the hydraulic fluid level

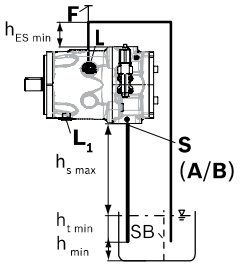
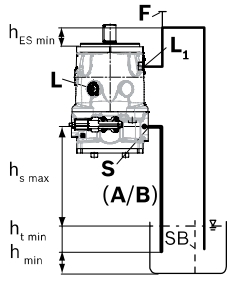
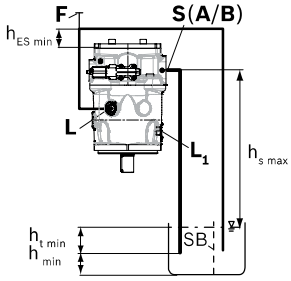
A check valve in the drain line is only permissible in isolated cases. Consult us for approval.

Key and assembly note

Key	
F	Filling / air bleeding
S	Suction port (with A10FZG; A10FZO and A10VZG **A**/**B**)
L; L_1	Tank port
SB	Baffle (baffle plate)
$h_{t\,min}$	Minimum required immersion depth (200 mm)
h_{min}	Minimum required distance to the reservoir bottom (100 mm)
$h_{ES\,min}$	Minimum necessary height required to protect the axial piston unit from draining (25 mm)
$h_{S\,max}$	Maximum permissible suction height (800 mm)

Above-reservoir installation

Above-reservoir installation means that the axial piston unit is installed above the minimum fluid level of the reservoir. To prevent the axial piston unit from draining in position 6 to 8, the height difference hES min must be at least 25 mm. Observe the maximum permissible suction height
$h_{S\,max}$ = 800 mm
The maximum speed in above-reservoir installation is only permissible if at least 1 bar absolute is complied with on input **S(A/B)**.

Installation position	Air bleed	Filling
6 	**F**	**L_1** or **L**
7[1] 	**F**	**L_1**
8[1] 	**F**	**L_1**

Notice

Port **F** is part of the external piping and must be provided on the customer side to make filling and air bleeding easier.

1) Because complete air bleeding and filling are not possible in this position, the pump should be air bled and filled in a horizontal position before installation.

Project planning notes

- The axial piston units A10FZO and A10VZO are designed to be used in open circuit.
- The axial piston units A10FZG and A10VZG are designed to be used in open or closed circuit.
- The project planning, installation and commissioning of the axial piston unit requires the involvement of qualified skilled personnel.
- Before using the axial piston unit, please read the corresponding instruction manual 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 notes contained herein must be observed.
- Depending on the operating conditions of the axial piston unit (working pressure, fluid temperature), the characteristic curves may shift.
- Preservation: Our axial piston units are supplied as standard with preservative protection for a maximum of 12 months. If longer preservative 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 in the instruction manual.
- Not all versions of the product are approved for use in a safety function 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. When a direct current is applied, solenoids do not cause electromagnetic interference nor is their operation impaired by electromagnetic interference.
  Other behavior can result when a modulated direct current (e.g. PWM signal) is applied.
- Potential electromagnetic interference for persons (e.g. persons with a pacemaker) and other components must be tested by the machine manufacturer.
- Pressure controllers are not protection against overpressure. A pressure relief valve is to be provided for the hydraulic system.
- Working 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 working ports and function ports are only intended to accommodate hydraulic lines.

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. impure 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.