

Axial Piston Variable Pump A17VO Series 11

RE 92260

Issue: 06.2012

Replaces: 03.2010



- ▶ Sizes 55 to 107
- ▶ Nominal pressure 300 bar
- ▶ Maximum pressure 350 bar
- ▶ For commercial vehicles
- ▶ Open circuit

Features

- ▶ Variable pump with axial tapered piston rotary group of bent-axis design with special characteristics and dimensions for use in commercial vehicles
- ▶ The flow is proportional to the drive speed and displacement.
- ▶ The flow can be infinitely varied by adjusting the bent-axis angle.
- ▶ Favorable power-to-weight ratio, compact dimensions, optimum efficiency, economical design
- ▶ High self-suction capability
- ▶ Flange and shaft designed for direct mounting on the power take-off of commercial vehicles
- ▶ Low noise levels
- ▶ Optionally available with speed sensor

Contents

Ordering code	2
Technical data	3
DRS – Pressure controller with load sensing	8
EP – Proportional control electric	10
Dimensions size 55	12
Dimensions size 80	14
Dimensions size 107	16
Suction stud	19
Coupling flange	20
Connector for solenoids	21
Speed sensor	21
Installation instructions	22
Other related documents	23
General instructions	24

Ordering code

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
A17V	O				0	/	11	N		W	K0			-

Axial piston unit

01	Bent-axis design, variable, nominal pressure 300 bar, maximum pressure 350 bar, for commercial vehicles (trucks)	A17V
----	--	-------------

Operating mode

02	Pump, open circuit	O
----	--------------------	----------

Sizes (NG)

03	Geometric displacement, see table of values on page 6	055	080	107
----	---	------------	------------	------------

Control devices

		055	080	107	
04	Pressure controller with load sensing	●	●	●	DRS
	Proportional control electric				
	positive control	●	●	●	EP2
	negative control	○	○	●	EP6

Connector for solenoids (see page 21)

05	Without connector (without solenoid, only for hydraulic controls)	0
	DEUTSCH – molded connector, 2-pin – without suppressor diode	P

Additional functions

06	Without additional functions	0
----	------------------------------	----------

Series

07	Series 1, index 1	11
----	-------------------	-----------

Configuration of ports and fastening threads

08	Metric, port threads with profiled sealing ring according to DIN 3852	N
----	---	----------

Direction of rotation

09	Viewed on drive shaft	clockwise	R
		counter-clockwise	L

Seals

10	FKM (fluor-caoutchouc) including the 2 shaft seal rings in FKM	W
----	--	----------

Mounting flange

11	Special flange ISO 7653-1985 (for trucks)	K0
----	---	-----------

Drive shaft

12	Splined shaft similar to DIN ISO 14 (for trucks)	E8
	Splined shaft E8 with coupling flange	C8

Port plate for service lines

13	Threaded ports A and S at rear	1
	Threaded ports A and S at rear, with suction stud mounted in S	2

Speed sensor (see page 21)

		55	80	107	
14	Without speed sensor	●	●	●	0
	DSA speed sensor mounted ¹⁾	-	●	-	V

Standard / special version

15	Standard version	0
	Special version	S

¹⁾ Specify ordering code of sensor acc. to data sheet (DSA – RE 95133) separately and observe the requirements on the electronics.

● = Available ○ = On request - = Not available

Technical data

Hydraulic fluid

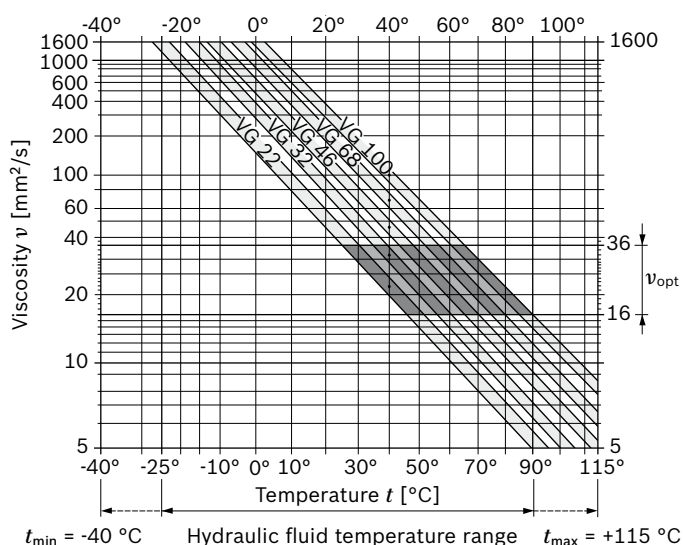
Before starting project planning, please refer to our data sheets RE 90220 (mineral oil) and RE 90221 (environmentally acceptable hydraulic fluids) for detailed information regarding the choice of hydraulic fluid and application conditions.

If environmentally acceptable hydraulic fluids are used, the limitations regarding technical data or other seals must be observed. Please contact us.

Note

Variable pump A17VO is not suitable for operation with water-containing HF hydraulic fluid.

▼ 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 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 (ν_{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 operating viscosity range (ν_{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 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, please contact us.

Viscosity and temperature of hydraulic fluid

	Viscosity [mm²/s]	Temperature	Comment
Transport and storage at ambient temperature		$T_{min} \geq -40\text{ °C}$ $T_{opt} = +5\text{ °C to }+20\text{ °C}$	factory preservation: up to 12 months with standard, up to 24 months with long-term
(Cold) start-up	$\nu_{max} = 1600$	$T_{St} \geq -40\text{ °C}$	$t \leq 3\text{ min}$, without load ($p \leq 50\text{ bar}$), $n \leq 1000\text{ rpm}$
Permissible temperature difference		$\Delta T \leq 25\text{ K}$	between axial piston unit and hydraulic fluid
Warm-up phase	$\nu < 1600\text{ to }400$	$T = -40\text{ °C to }-25\text{ °C}$	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 R
Maximum temperature		115 °C 103 °C	in the bearing measured at port R
Continuous operation	$\nu = 400\text{ to }10$ $\nu_{opt} = 36\text{ to }16$	$T = -25\text{ °C to }+90\text{ °C}$	measured at port R, no restriction within the permissible data
Short-term operation	$\nu_{min} \geq 7$	$T_{max} = +103\text{ °C}$	measured at port R, $t < 3\text{ min}$, $p < 0.3 \cdot p_{nom}$
Shaft seal FKM		$T \leq +115\text{ °C}$	see page 4

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.

Case drain fluid

The case drain chamber is connected to the suction chamber. A case drain line from the case to the reservoir is not required (port "R" is plugged).

On versions with DRS control, a case drain line for discharge from port "T" to the reservoir is absolutely essential (not necessary for EP control).

Shaft seal

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

Note

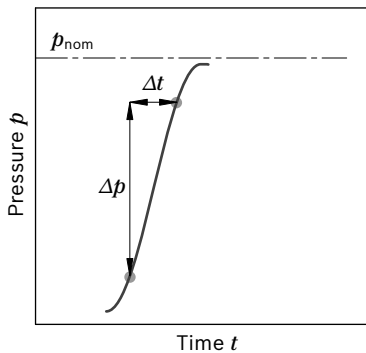
For the temperature range below -25 °C, the values in the table on page 3 are to be observed.

Operating pressure range

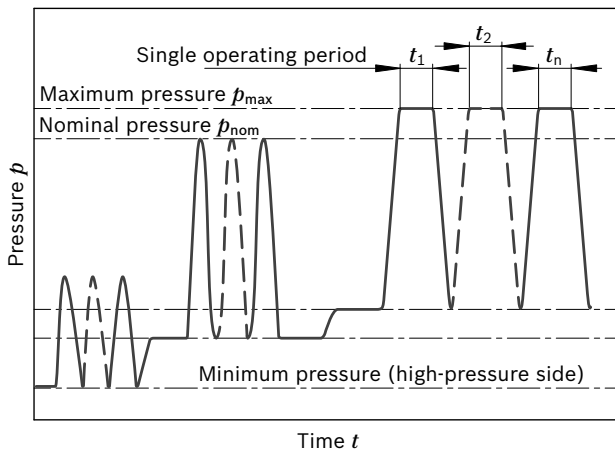
Valid when using hydraulic fluids based on mineral oils

Pressure at service line port A		Definition
Nominal pressure p_{nom}	300 bar absolute	The nominal pressure corresponds to the maximum design pressure.
Maximum pressure p_{max}	350 bar absolute	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.
Single operating period	5 s	
Total operating period	50 h	
Minimum pressure (high-pressure side)	10 bar absolute	Minimum pressure at the high-pressure side (A) which is required in order to prevent damage to the axial piston unit.
Rate of pressure change $R_{A max}$	9000 bar/s	Maximum permissible rate of pressure rise and reduction during a pressure change over the entire pressure range.
Pressure at suction port S (inlet)		
Minimum pressure $p_{S min}$	0.8 bar absolute	Minimum pressure at suction port S (inlet) which is required in order to prevent damage to the axial piston unit. The minimum pressure is dependent on the speed and displacement of the axial piston unit.
Maximum pressure $p_{S max}$	2 bar absolute	

▼ Rate of pressure change $R_{A max}$



▼ Pressure definition



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

Note

Values for other hydraulic fluids, please contact us.

Table of values

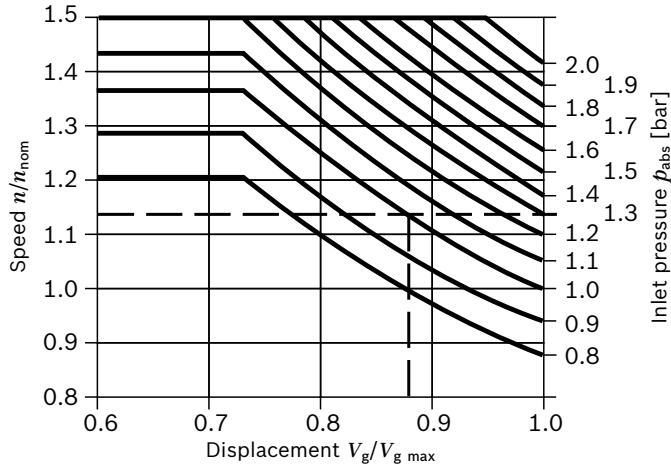
Theoretical values, without efficiency and tolerances;
values rounded

Size		NG		55	80	107
Displacement geometric, per revolution		$V_{g \max}$	cm ³	54.8	80	107
Speed maximum ¹⁾	at $V_{g \max}$	n_{nom}	rpm	2500	2240	2150
	at $V_g < 0.74 \cdot V_{g \max}$	n_{max1}	rpm	3400	3000	2900
Speed maximum ²⁾		n_{max2}	rpm	3750	3350	3200
Flow	at n_{nom} and $V_{g \max}$	q_v	L/min	137	179	230
Power	at n_{nom} , $V_{g \max}$ and $\Delta p = 300$ bar	P	kW	69	90	115
Torque	at $V_{g \max}$ and $\Delta p = 300$ bar	T	Nm	262	382	511
Rotary stiffness	$V_{g \max}$ to $0.5 \cdot V_{g \max}$	c_{min}	Nm/rad	10594	15911	21469
	$0.5 \cdot V_{g \max}$ bis 0 (interpolated)	c_{max}	Nm/rad	32103	48971	67666
Moment of inertia for rotary group		J_{GR}	kgm ²	0.0034	0.0066	0.0109
Maximum angular acceleration		α	rad/s ²	31600	24200	19200
Case volume		V	L	0.6	0.8	1.2
Mass moment		T_G	Nm	21	32	41
Mass (approx.)		m	kg	16	21	25

1) The values are valid:

- at an absolute pressure $p_{\text{abs}} = 1$ bar at suction port S
- for the optimum viscosity range from $\nu_{\text{opt}} = 36$ to $16 \text{ mm}^2/\text{s}$
- with hydraulic fluid based on mineral oils

2) Maximum rotational speed (limit speed) for increased inlet pressure p_{abs} at suction port S and $V_g < V_{g \max}$, see the following diagram.

**Determining the operating characteristics****Formulas**

$$\text{Flow} \quad q_v = \frac{V_g \cdot n \cdot \eta_v}{1000} \quad [\text{L/min}]$$

$$\text{Torque} \quad T = \frac{V_g \cdot \Delta p}{20 \cdot \pi \cdot \eta_{\text{mh}}} \quad [\text{Nm}]$$

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

Key

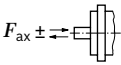
- V_g = Displacement per revolution in cm³
- Δp = Differential pressure in bar
- n = Speed in rpm
- η_v = Volumetric efficiency
- η_{mh} = Mechanical-hydraulic efficiency
- η_t = Total efficiency ($\eta_t = \eta_v \cdot \eta_{\text{mh}}$)

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 start up angular acceleration (lower than the maximum angular acceleration) can be found in data sheet RE 90261.

Permissible axial forces of the drive shaft

The values given are maximum values and do not apply to continuous operation. For drives with radial loading (pinion, V-belt drives), please contact us!

Size	NG	55	80	107
When standstill or when axial piston unit operating in non-pressurized conditions	$\pm F_{ax\ max}$ N	0	0	0
Permissible axial force per bar operating pressure 	$+ F_{ax\ max}$ N/bar	66	86	103
	$- F_{ax\ max}$ N/bar	0	0	0

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)

DRS – Pressure controller with load sensing

Function of the pressure controller

The pressure controller limits the maximum pressure at the pump outlet within the control range of the pump. The variable pump only delivers as much hydraulic fluid as the consumers actually need. If the operating pressure exceeds the pressure setpoint set at the integrated pressure valve, the pump will regulate to a smaller displacement to reduce the control deviation.

In a non-pressurized state, the pump is swiveled to its initial position to $V_{g \max}$ by a return spring.

- Setting range for pressure control: 80 to 320 bar
- Standard setting: 300 bar

Note

A pressure-relief valve is provided to limit the maximum pressure in the system. This must be at least 20 bar above the control setting at the start of opening.

The pressure controller overrides the load sensing controller, i.e. the load sensing function operates below the set pressure.

Load sensing function

The load sensing controller is a flow control option that operates as a function of the load pressure to regulate the pump displacement to match the consumer flow requirement.

The flow of the pump depends here on the cross section of the external sensing orifice (1) fitted between the pump and the consumer. Below the setting for the pressure control and within the control range of the pump, the flow is independent of load pressure.

The sensing orifice is usually a separately mounted load-sensing directional valve (control block). The position of the directional valve piston determines the opening cross section of the sensing orifice and thus the flow of the pump.

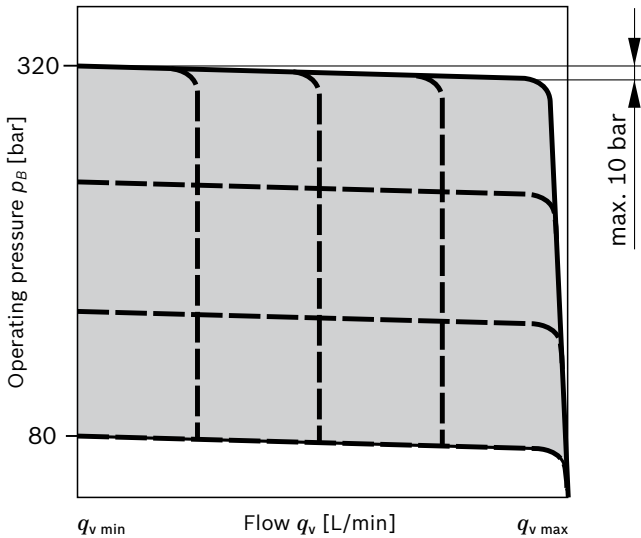
The load sensing controller compares pressure before and after the sensing orifice and keeps the pressure drop (differential pressure Δp) and with it the pump flow constant. If the differential pressure Δp at the sensing orifice increases, the pump is swivelled back (towards $V_{g \min}$) and if the differential pressure Δp decreases, the pump is swivelled out (towards $V_{g \max}$) until equilibrium is at the sensing orifice is restored.

$$\Delta p_{\text{sensing orifice}} = p_{\text{pump}} - p_{\text{consumer}}$$

- Setting range for Δp 19 to 40 bar
- Standard setting: 30 bar

The stand-by pressure during zero-stroke operation (sensing orifice closed) is slightly above the Δp setting.

▼ Characteristic DRS



Zero-stroke mode

The standard version is designed for intermittent, constant-pressure operation. Short-term (< 1 min), zero-stroke operation is permissible up to an operating pressure $p_{nom} = 300$ bar with reservoir temperature ≤ 50 °C.

Note

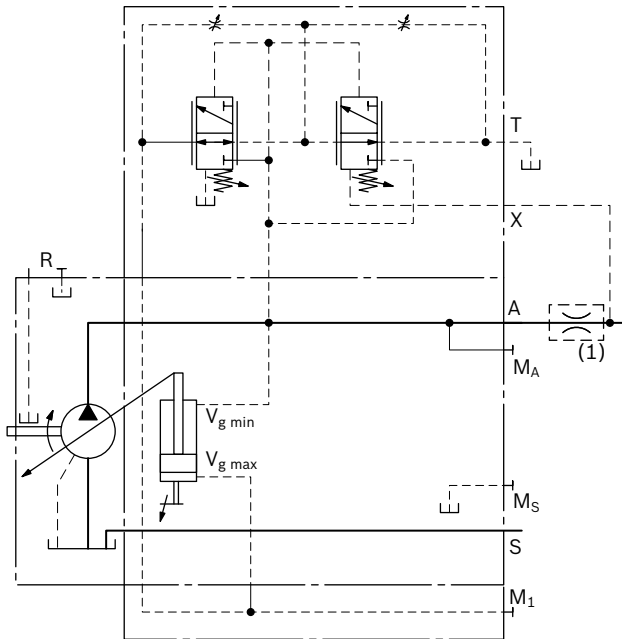
To ensure thermal stability, a case drain line from port "T" to the reservoir is generally required with the DRS controller (not needed for EP control).

When ordering, please state in plain text:

- Pressure control setting
- Δp setting for load sensing function

If these details are missing from the order, the pump will be delivered with the standard setting, see page 8.

▼ Schematic DRS



(1) The sensing orifice (control block) is not included in the delivery contents.

EP – Proportional control electric

The proportional control electric, provides infinite adjustment of the displacement, proportional to the control current applied to the solenoid.

EP2 – positive control

Adjustment from $V_{g \min}$ to $V_{g \max}$

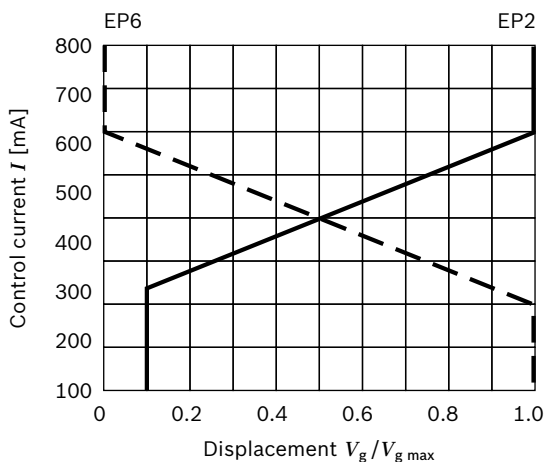
With increasing control current, the pump swivels to a higher displacement. A control pressure is required to swivel the pump from its initial position $V_{g \min}$ to $V_{g \max}$. The necessary control power is taken from the operating pressure. To enable a pressure to be built up, a residual volume of approx. 10% of $V_{g \max}$ is a fixed setting.

EP6 – negative control

Adjustment from $V_{g \max}$ to $V_{g \min}$

With increasing control current, the pump swivels to a lower displacement. The necessary control power is taken from the operating pressure.

▼ Characteristic EP



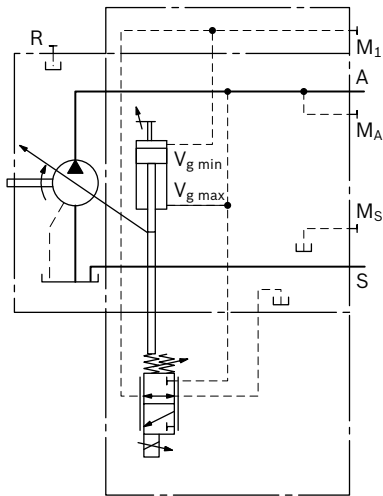
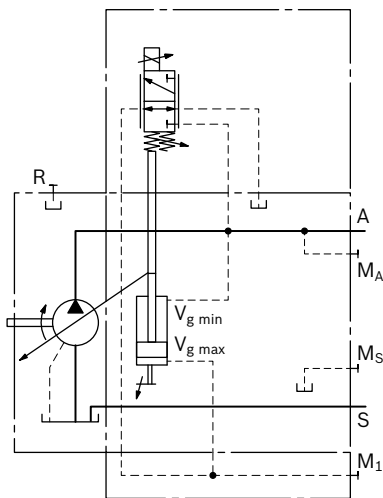
Technical data, solenoid

	EP2	EP6
Voltage	24 V $\pm$ 20%	24 V $\pm$ 20%
Control current		
Beginning of control	approx. 230 mA	200 mA
End of control	600 mA	600 mA
Limiting current	0.77 A	0.77 A
Nominal resistance (at 20 °C)	22.7 Ω	22.7 Ω
Dither frequency	100 Hz	100 Hz
Duty cycle	100 %	100 %
Type of protection see connector design page 21		

The following electronic controllers and amplifiers are available for controlling the proportional solenoids:

- BODAS controller RC
 - RE 95200 – series 20
 - RE 95201 – series 21
 - RE 95202 – series 22
 - RE 95203, RE 95204 – series 30
- and application software
- RE 95230 – Analog amplifier RA

Further information can also be found on the Internet at www.boschrexroth.com/mobile-electronics.

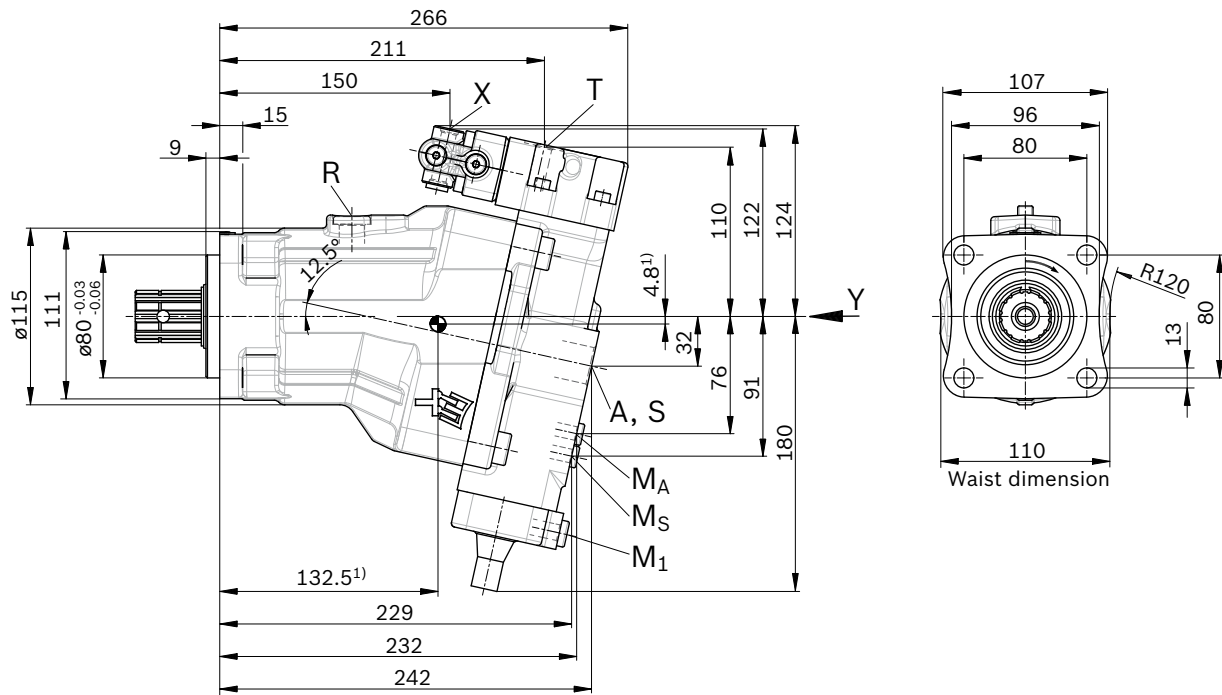
▼ **Schematic EP2**▼ **Schematic EP6****Note**

The spring return feature in the controller is not a safety device. The controller can stick in an undefined position by internal contamination (contaminated hydraulic fluid, abrasion or residual contamination from system components). As a result, the control will no longer respond correctly to the operator's commands.

Check whether the application on your machine requires additional safety measures, in order to bring the driven actuator into a controlled and safe position (e. g. immediate stop).

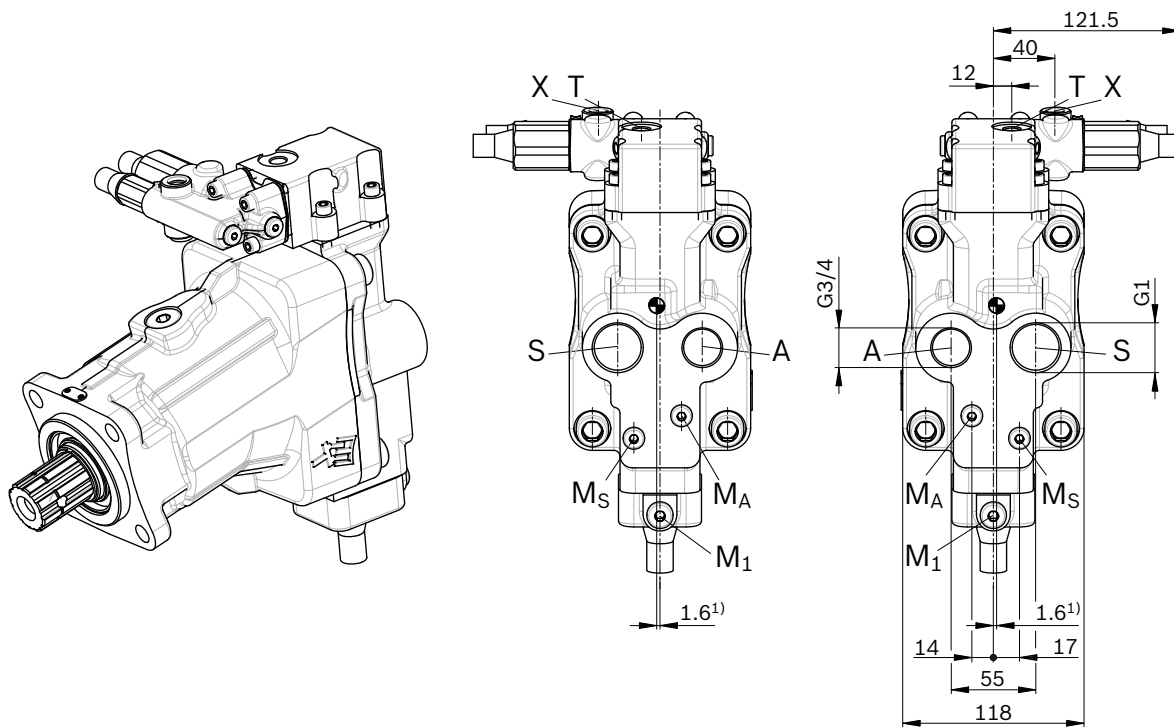
Dimensions size 55

DRS – Pressure controller with load sensing



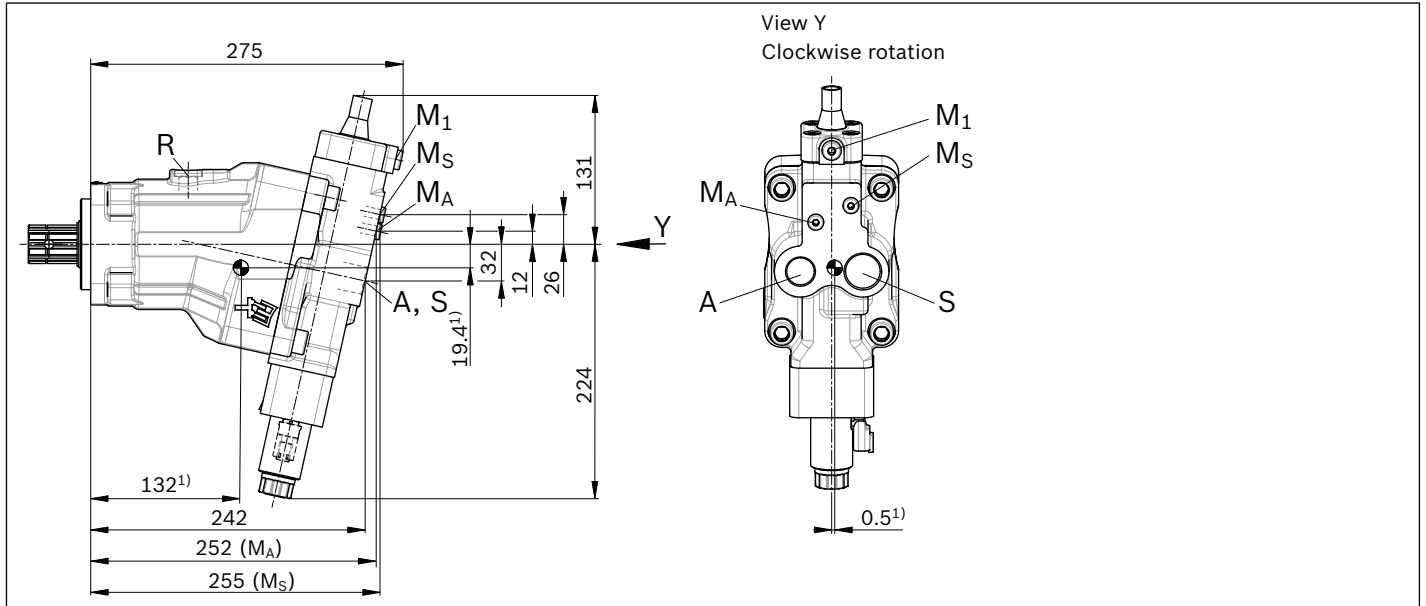
View Y
Counter-clockwise rotation

View Y
Clockwise rotation



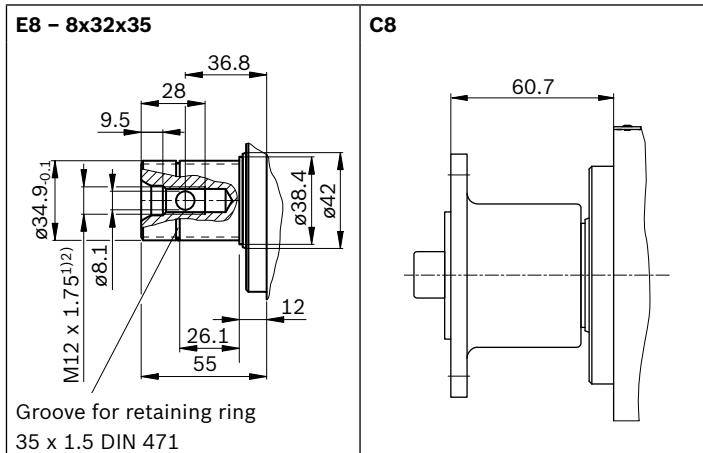
1) Center of gravity

EP2 – Proportional control electric, positive control



Drive shaft

Splined shaft similar to DIN ISO 14 ...with coupling flange



Ports

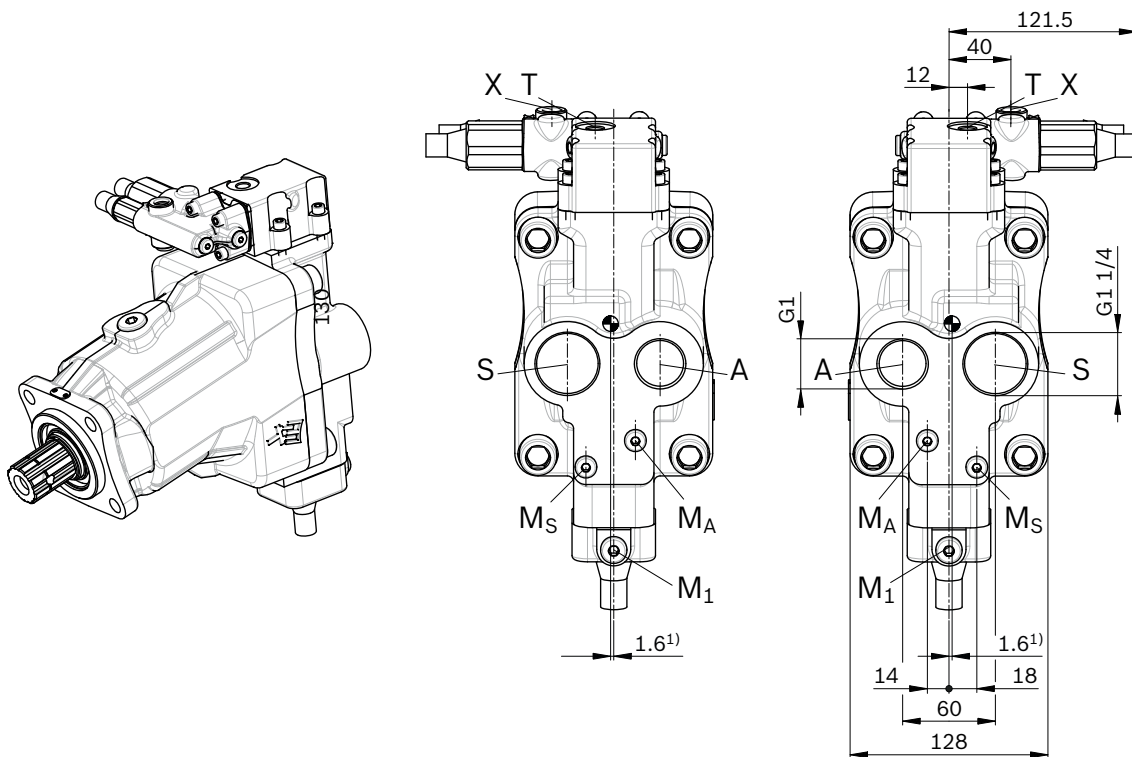
Designation	Port for	Standard	Size ²⁾	Maximum pressure [bar] ³⁾	State ⁶⁾
A	Service line	DIN ISO 228	G3/4; 16 deep	350	O
S	Suction line	DIN ISO 228	G1; 18 deep	2	O
T	Drain line (DRS only)	DIN 3852 ⁵⁾	M12 x 1.5; 12 deep	2	O
M _A	Measuring pressure A	DIN 3852 ⁵⁾	M10 x 1; 8 deep	350	X
M _S	Measuring suction pressure	DIN 3852 ⁵⁾	M10 x 1; 8 deep	2	X
M ₁	Measuring stroking chamber	DIN 3852 ⁵⁾	M12 x 1.5; 12 deep	350	X
R	Air bleed	DIN 3852 ⁵⁾	M18 x 1.5; 12 deep	2	X ⁴⁾
X	Load pressure (load sensing)	ISO 11926 ⁵⁾	7/16-20UNF-2B; 11.5 deep	350	O

- 1) Center bore according to DIN 332 (thread according to DIN 13)
- 2) Observe the general instructions on page 24 for the maximum tightening torques.
- 3) Momentary pressure spikes may occur depending on the application. Keep this in mind when selecting measuring devices and fittings.

- 4) Only open port R for filling and air bleed.
- 5) The spot face can be deeper than specified in the appropriate standard.
- 6) O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

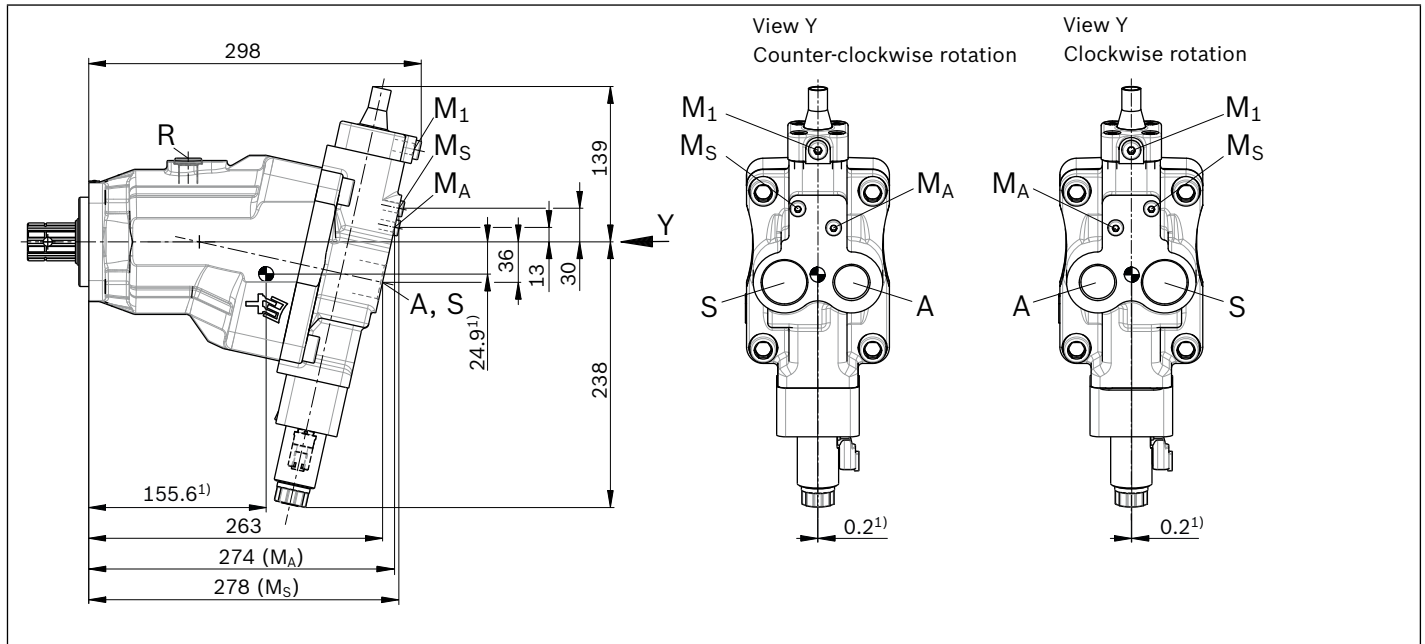
[illegible]

View Y
Clockwise rotation



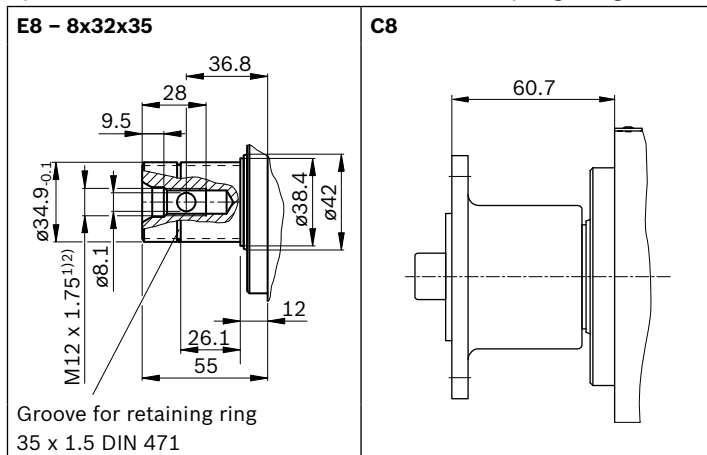
Dimensions in mm

EP2 – Proportional control electric, positive control



Drive shaft

Splined shaft similar to DIN ISO 14 ...with coupling flange



Ports

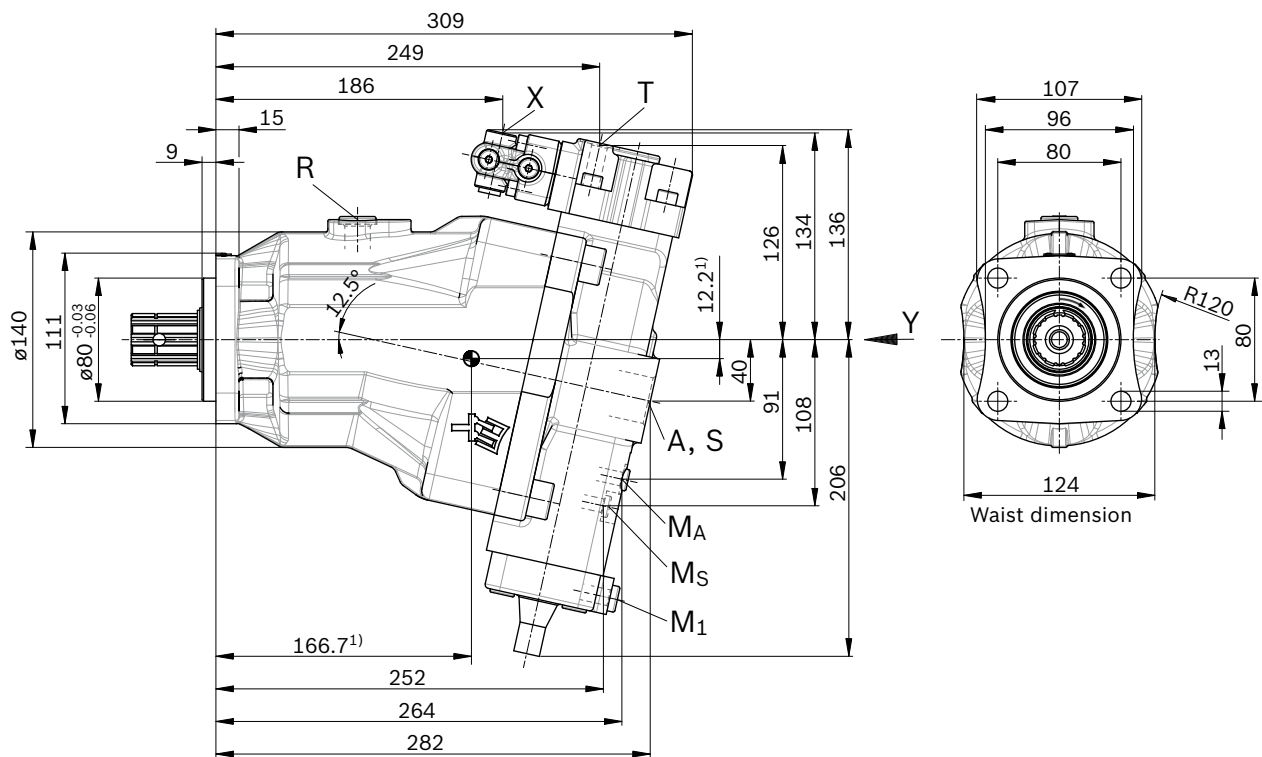
Designation	Port for	Standard	Size ²⁾	Maximum pressure [bar] ³⁾	State ⁶⁾
A	Service line	DIN ISO 228	G1; 18 deep	350	O
S	Suction line	DIN ISO 228	G1 1/4; 20 deep	2	O
T	Drain line (DRS only)	DIN 3852 ⁵⁾	M12 x 1.5; 12 deep	2	O
M _A	Measuring pressure A	DIN 3852 ⁵⁾	M10 x 1; 8 deep	350	X
M _S	Measuring suction pressure	DIN 3852 ⁵⁾	M10 x 1; 8 deep	2	X
M ₁	Measuring stroking chamber	DIN 3852 ⁵⁾	M12 x 1.5; 12 deep	350	X
R	Air bleed	DIN 3852 ⁵⁾	M18 x 1.5; 12 deep	2	X ⁴⁾
X	Load pressure (load sensing)	ISO 11926 ⁵⁾	7/16-20UNF-2B; 11.5 deep	350	O

- Center bore according to DIN 332 (thread according to DIN 13)
- Observe the general instructions on page 24 for the maximum tightening torques.
- Momentary pressure spikes may occur depending on the application. Keep this in mind when selecting measuring devices and fittings.

- Only open port R for filling and air bleed.
- The spot face can be deeper than specified in the appropriate standard.
- O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

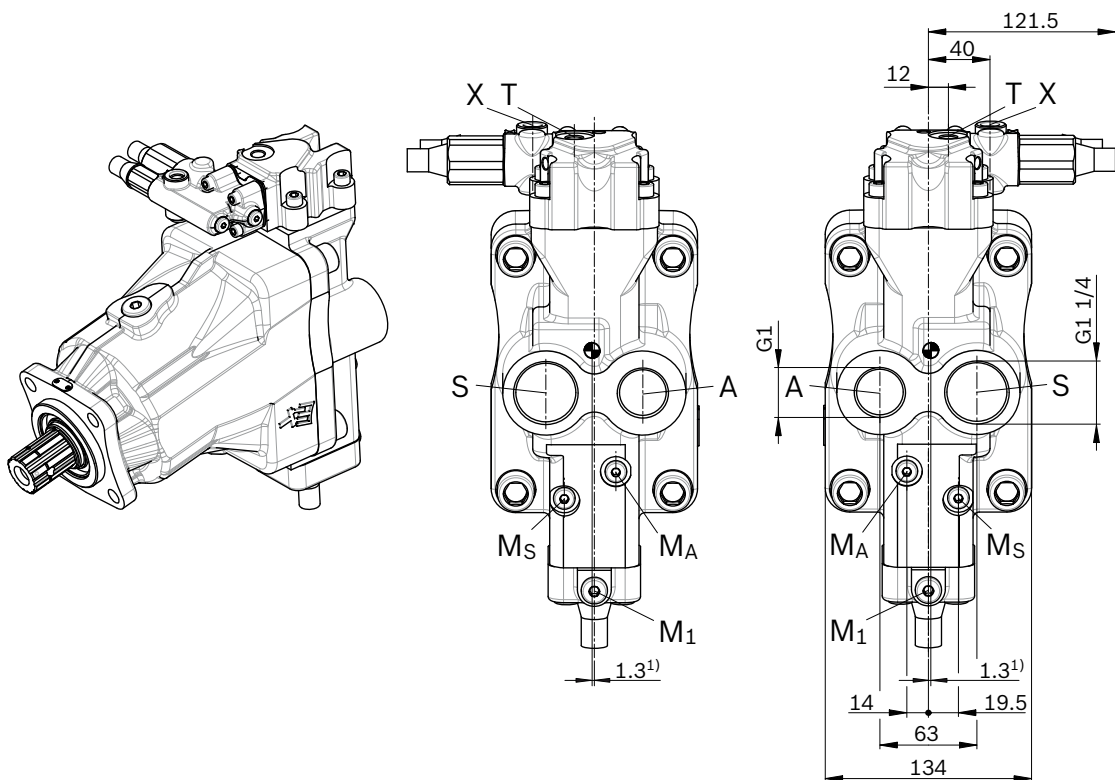
Dimensions size 107

DRS – Pressure controller with load sensing

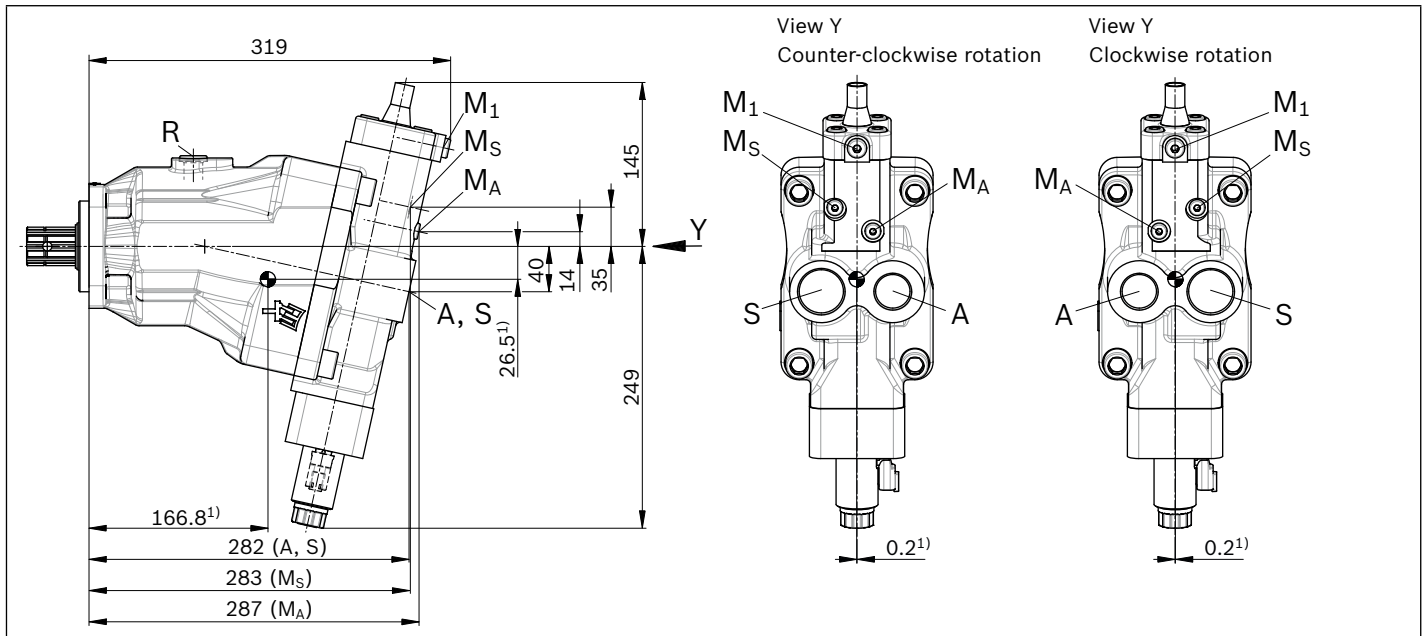
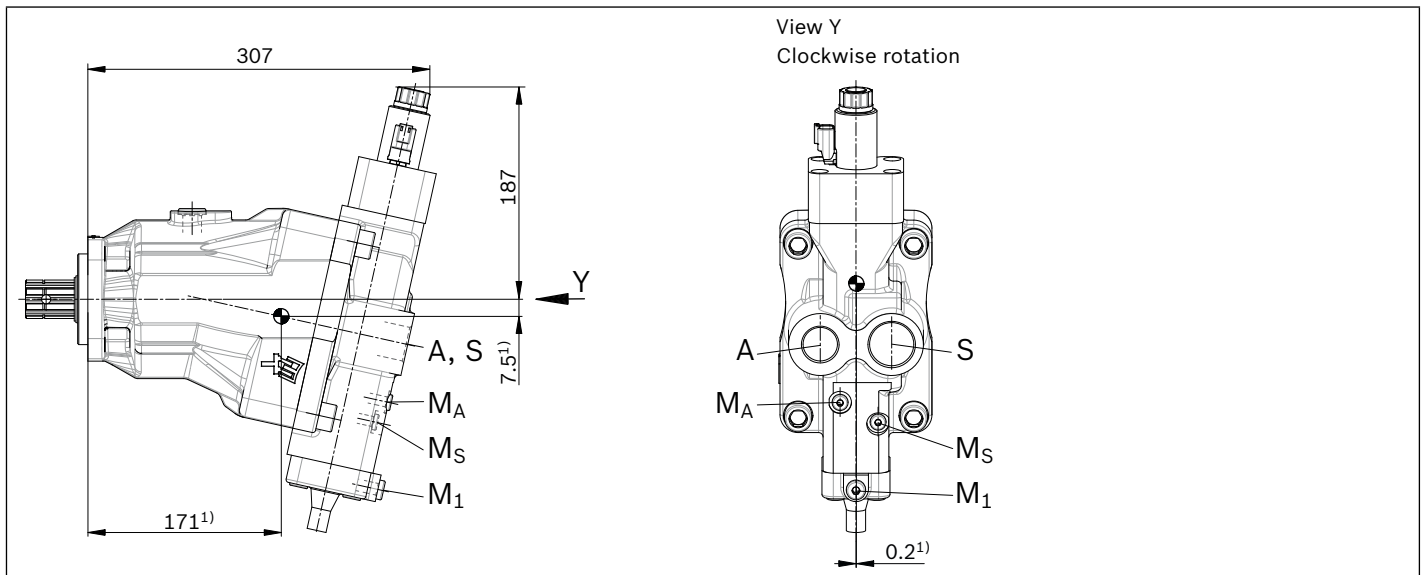


View Y
Counter-clockwise rotation

View Y
Clockwise rotation

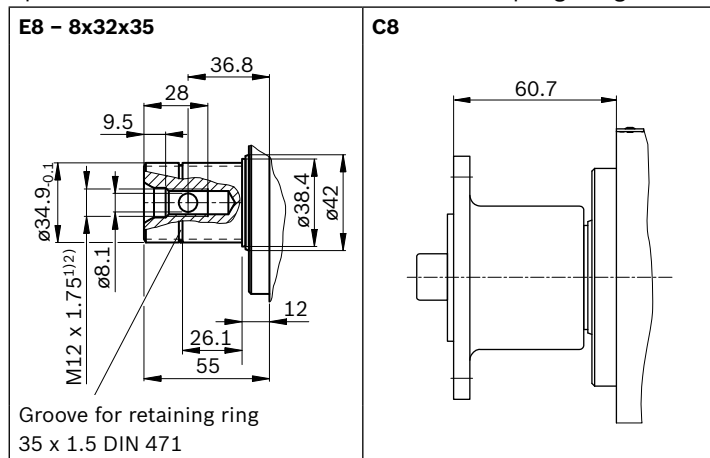


¹⁾ Center of gravity

EP2 – Proportional control electric, positive control

EP6 – Proportional control electric, negative control


Drive shaft

Splined shaft similar to DIN ISO 14 ...with coupling flange

**Ports**

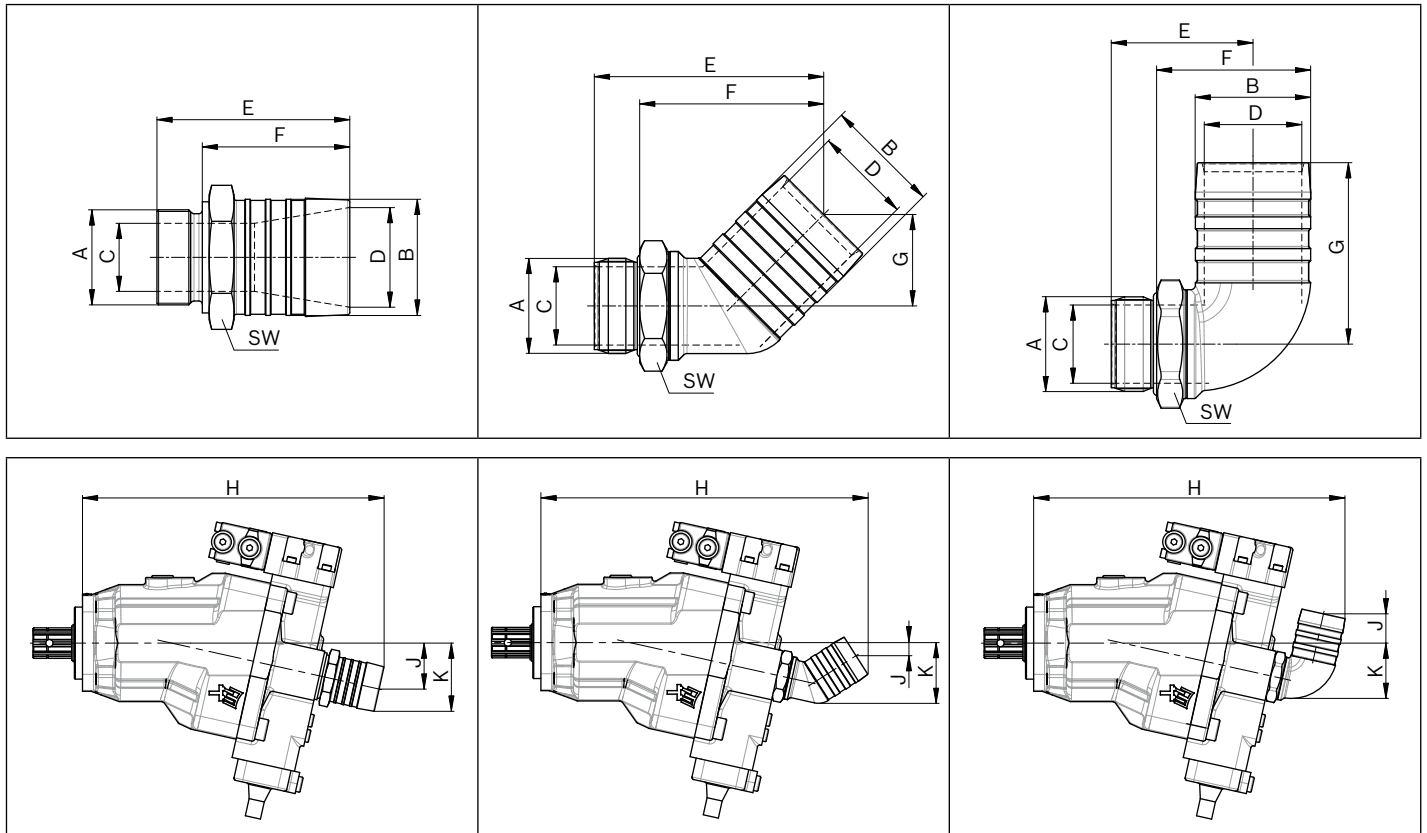
Designation	Port for	Standard	Size ²⁾	Maximum pressure [bar] ³⁾	State ⁶⁾
A	Service line	DIN ISO 228	G1; 18 deep	350	O
S	Suction line	DIN ISO 228	G1 1/4; 20 deep	2	O
T	Drain line (DRS only)	DIN 3852 ⁵⁾	M12 x 1.5; 12 deep	2	O
M _A	Measuring pressure A	DIN 3852 ⁵⁾	M10 x 1; 8 deep	350	X
M _S	Measuring suction pressure	DIN 3852 ⁵⁾	M10 x 1; 8 deep	2	X
M ₁	Measuring stroking chamber	DIN 3852 ⁵⁾	M12 x 1.5; 12 deep	350	X
R	Air bleed	DIN 3852 ⁵⁾	M18 x 1.5; 12 deep	2	X ⁴⁾
X	Load pressure (load sensing)	ISO 11926 ⁵⁾	7/16-20UNF-2B; 11.5 deep	350	O

- 1) Center bore according to DIN 332 (thread according to DIN 13)
- 2) Observe the general instructions on page 24 for the maximum tightening torques.
- 3) Momentary pressure spikes may occur depending on the application. Keep this in mind when selecting measuring devices and fittings.

- 4) Only open port R for filling and air bleed.
- 5) The spot face can be deeper than specified in the appropriate standard.
- 6) O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Suction stud

Dimensions



Axial piston unit		Suction stud		Version	Material number	ØC	ØD	E	F	G	SW	H	J	K
NG	Port S	Inner Ø	B [in] B [mm]											
55	G1	1 1/2	39	Straight	R902600251	23.5	33.5	72	54	–	41	301	44	63
55	G1	2	51		R902602028	26	44	82	64	–	55	312	47	70
80	G1 1/4	2	51		R902600252	30	44	85	65	–	55	335	51	76
107												354	55	79
107	G1 1/4	2 1/2	63	45°	R902601630	31	54	82	64	–	65	354	54	79
55	G1	1 1/2	39		R909831600	26	31	101	82	45	41	342	7	59
55	G1	2	51		R902602029	26	43	100	81	44	41	344	7	61
80	G1 1/4	2	51		R909831597	34	43	101	81	40	50	364	15	68
107				90°								383	18	71
107	G1 1/4	2 1/2	63		R902601631	35	54	100	81	44	50	387	14	74
55	G1	1 1/2	39		R909831599	26	31	64	44	85	41	321	41	56
55	G1	2	51		R902602030	26	43	62	42	81	41	324	38	58
80	G1 1/4	2	51	90°	R909831598	35	43	63	43	80	50	346	33	66
107												365	29	70

Notes on suction line

- Keep as short and straight as possible, without bend
- Use a supporting ring for plastic hoses
- Use two hose clamps to protect the suction hose against air suction
- Note pressure resistance of suction hose compared to ambient pressure

Replacing seals

The O-rings used as seals to prevent air from entering the suction line are to be replaced after every removal and new installation in order to guarantee complete sealing.

Material number for O-rings:

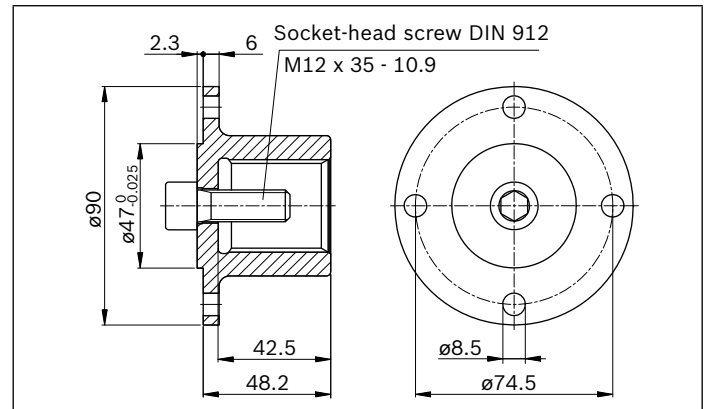
- R902083802: O-ring for suction stud G1
- R902083808: O-ring for suction stud G1 1/4

Coupling flange

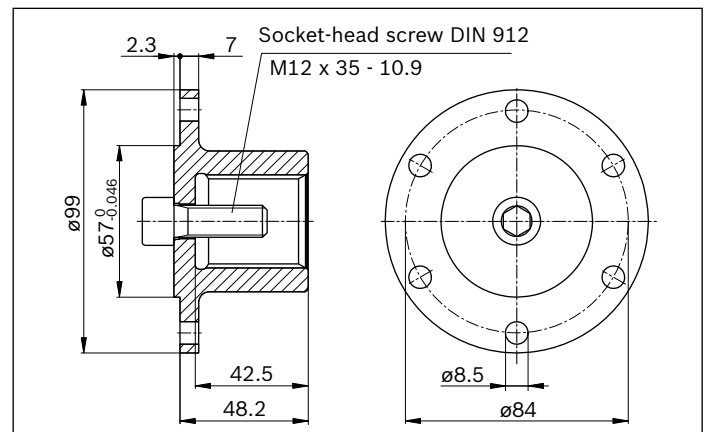
There are specially modified coupling flanges in 4-hole and 6-hole designs for the cardan-shaft drive.

4-hole coupling flange, complete – Ø90

Material number: R902060152

**6-hole coupling flange, complete – Ø100**

Material number: R902060153

**Note**

The coupling flange is installed by screwing it onto the drive shaft with the help of the threaded bore in the end of the drive shaft.

The coupling flange must be glued onto the splined drive shaft with Loctite 574 and clamped (= 130 Nm).

Sudden or abrupt forces acting on the drive shaft could lead to damage to the rotary group and must therefore be avoided.

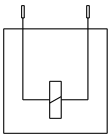
Connector for solenoids

DEUTSCH DT04-2P-EP04

Molded, 2-pin, without bidirectional suppressor diode
There is the following type of protection with mounted mating connector:

- ▶ IP67 (DIN/EN 60529) and
- ▶ IP69K (DIN 40050-9)

▼ Circuit symbol



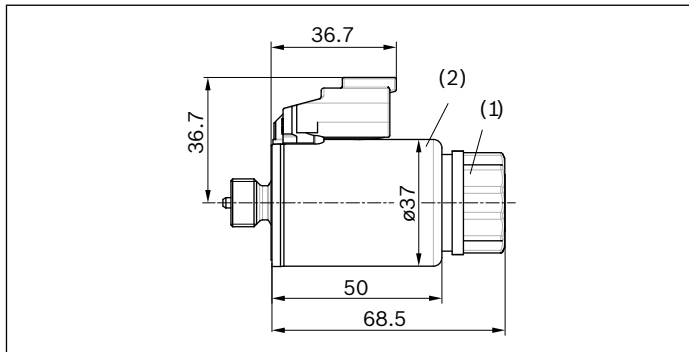
Mating connector

DEUTSCH DT06-2S-EP04

Bosch Rexroth Mat. No. R902601804

Consisting of:	DT designation
1 housing	DT06-2S-EP04
1 wedge	W2S
2 sockets	0462-201-16141

The mating connector is not included in the delivery contents. This can be supplied by Bosch Rexroth on request.



Changing connector orientation

If necessary, you can change the connector orientation by turning the solenoid housing.

To do this, proceed as follows:

- ▶ Loosen the mounting nut (1) of the solenoid. To do this, turn the mounting nut (1) one turn counter-clockwise.
- ▶ Turn the solenoid body (2) to the desired orientation.
- ▶ Retighten the mounting nut. Tightening torque: 5+1 Nm. (WAF26, 12-sided DIN 3124)

On delivery, the connector orientation may differ from that shown in the brochure or drawing.

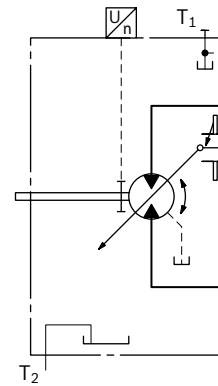
Speed sensor

With the speed sensor DSA mounted a signal proportional to pump speed can be generated. The DSA sensor measures the speed and direction of rotation.

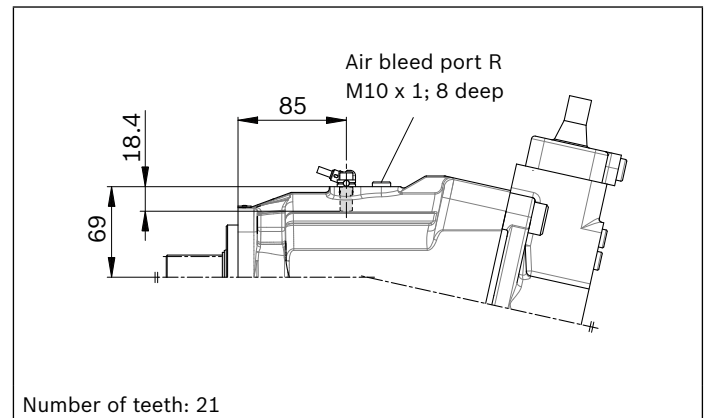
Ordering code, technical data, dimensions and details on the connector, plus safety information about the sensor can be found in the relevant data sheet (DSA – RE 95133).

The sensor is mounted on the port provided for this purpose with a mounting bolt.

▼ Schematic



Dimensions



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 chamber is internally connected to the suction chamber. A case drain line from the case to the reservoir is not required. However, to ensure thermal stability, a case drain line from port "T" to the reservoir is generally required with the DRS controller.

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

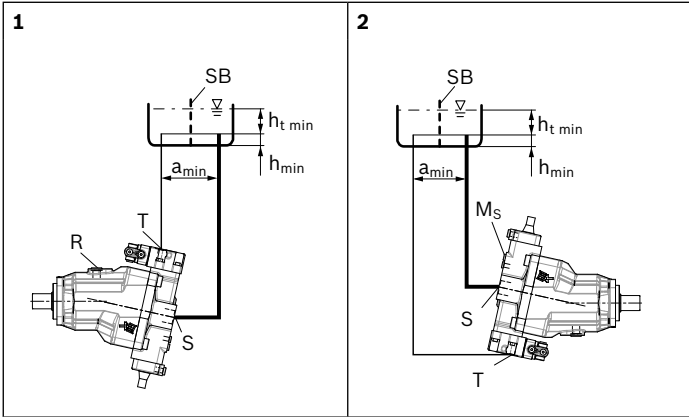
In all operating conditions, the suction and case drain lines must flow into the reservoir below the minimum fluid level. The permissible suction height h_s results from the overall loss of pressure; it must not, however, be higher than $h_{s\ max} = 800\text{ mm}$. The minimum suction pressure at port S must also not fall below 0.8 bar absolute during operation and during cold start.

Installation position

See the following examples 1 to 4.
Further installation positions are available upon request.
Recommended installation position: 1 and 2.

Below-reservoir installation (standard)

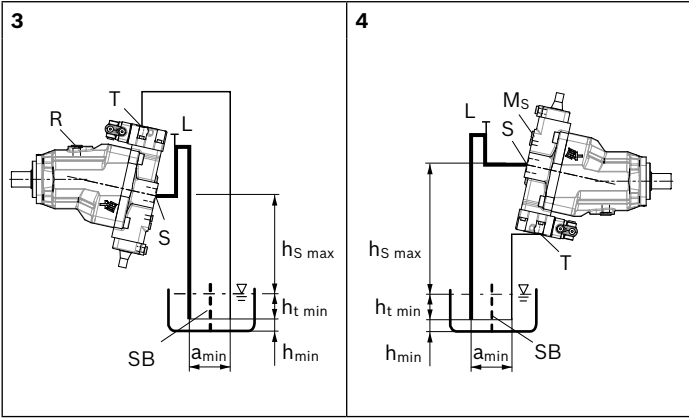
Below-reservoir installation means that the axial piston unit is installed outside of the reservoir below the minimum fluid level.



Installation position	Air bleed	Filling
1	R	S
2	M_s	S

Above-reservoir installation

Above-reservoir installation means that the axial piston unit is installed above the minimum fluid level of the reservoir. Observe the maximum permissible suction height $h_{s\ max} = 800\text{ mm}$.



Installation position	Air bleed	Filling
3	R	L
4	M_s	L

Key	
L	Filling / air bleed
R	Air bleed port
S	Suction port
T	Drain port (DRS only)
SB	Baffle (baffle plate)
$h_{t\ min}$	Minimum required immersion depth (200 mm)
h_{min}	Minimum required spacing to reservoir bottom (100 mm)
$h_{s\ max}$	Maximum permissible suction height (800 mm)
M_s	Measuring port suction pressure
a_{min}	When designing the reservoir, ensure adequate space between the suction line and the case drain line. This prevents the heated, return flow from being drawn directly back into the suction line.

Other related documents

Other pumps with special characteristics and dimensions for use in commercial vehicles can be found in the following data sheets:

- ▶ RE 91510: Fixed pump A17FNO, 250/300 bar
- ▶ RE 91520: Fixed pump A17FO, 300/350 bar
- ▶ RE 91540: 2-circuit fixed pump A18FDO, 350/400 bar
- ▶ RE 92270: Variable pump A18VO, 350/400 bar
- ▶ RE 92280: Variable pump A18VLO, 350/400 bar

General instructions

- ▶ The pump A17VO is designed to be used in open 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.
- ▶ Before finalizing your design, request a binding installation drawing.
- ▶ The product is not approved as a component for the safety concept of a general machine according to ISO 13849.
- ▶ Pressure controls are not backups against pressure overload. A pressure-relief valve is to be provided in the hydraulic system.
- ▶ The following tightening torques apply:
 - Fittings:
 - Observe the manufacturer's instructions regarding the tightening torques of 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 of 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				
Standard	Size of thread	Maximum permissible tightening torque of the female threads $M_{G \max}$	Required tightening torque of the threaded plugs M_V	WAF Hexagon socket of the threaded plugs
DIN 3852 ¹⁾	M10 x 1	30 Nm	15 Nm ²⁾	5 mm
	M10 x 1 ³⁾	15 Nm	15 Nm ²⁾	5 mm
	M12 x 1.5	50 Nm	25 Nm ²⁾	6 mm
	M18 x 1.5	66 Nm	60 Nm	8 mm
ISO 11926	7/16-20UNF-2B	40 Nm	15 Nm	3/16 in
DIN ISO 228	G3/4	330 Nm	–	–
	G1	480 Nm	–	–
	G1 1/4	720 Nm	–	–

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 10 Nm for M10 x 1 and 17 Nm for M12 x 1.5.

3) Air bleed port R on version with speed measuring

Bosch Rexroth AG

Mobile Applications
 Glockeraustrasse 4
 89275 Elchingen, Germany
 Tel.: +49 73 08 82-0
 Fax: +49 73 08 72 74
 info.brm@boschrexroth.de
 www.boschrexroth.com/axial-piston-pumps

© 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.