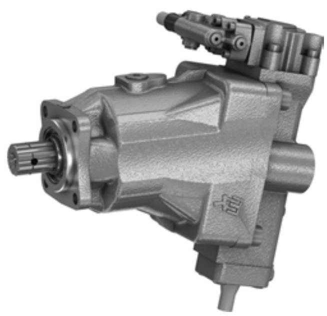
Axial piston variable pump A18VO Series 11

RE 92270
Edition: 06.2018
Replaces: 06.2015



- High-pressure pump for use in commercial vehicles
- Sizes 55 to 107
- Nominal pressure 350 bar
- Maximum pressure 400 bar
- Open circuit

Features

- Variable pump with axial tapered piston rotary group in bent-axis design with special properties and dimensions for use in commercial vehicles.
- Flow is proportional to the drive speed and displacement.
- The flow can be infinitely varied by adjusting the swivel angle.
- Favorable power/weight ratio, small dimensions, optimum efficiency and economic design
- High self-suction capability
- Flange and shaft designed for direct mounting on the power take-off of commercial vehicles
- Low noise level

Contents

Type code

01	02	03	04	05	06		07	08	09	10	11	12	13	14		15
A18V	**O**				**0**	**/**	**11**	**N**		**W**	**K0**				**–**	

Axial piston unit

01	Bent-axis design, variable, nominal pressure 350 bar, maximum pressure 400 bar, for commercial vehicles (trucks)	**A18V**

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	U = 12 V	●	●	●	**EP1**
			U = 24 V	●	●	●	**EP2**
		negative control	U = 12 V	–	–	●	**EP5**
			U = 24 V	–	–	●	**EP6**

Connector for solenoids

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

Auxiliary functions 1

06	Without auxiliary functions	**0**

Series

07	Series 1, Index 1	**11**

Design of ports and fastening threads

08	Volumetric ports according to DIN 3852 with profile seal, volumetric fastening thread according to DIN 13	**N**

Direction of rotation

09	Viewed on drive shaft	clockwise	**R**
		counter-clockwise	**L**

Sealing material

10	FKM (fluoroelastomer) 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**

Working port

13	Threaded ports **A** and **S** at rear	**1**
	Threaded ports **A** and **S** at rear, with mounted suction adapter	**2**

Speed sensor

		055	**080**	**107**	
14	Without speed sensor	●	●	●	**0**
	DSA speed sensor mounted[1)]	–	●	–	**V**
	DSM speed sensor mounted[1)]	–	●	–	**M**

1) Specify type key of sensor in accordance with data sheet 95133 (DSA) and/or 95132 (DSM) separately and observe the requirements for the electronics

01	02	03	04	05	06		07	08	09	10	11	12	13	14		15
A18V	**O**				**0**	**/**	**11**	**N**		**W**	**K0**				**–**	

Standard / special version

15	Standard version	**0**
	Standard version with installation variants, e.g. thread adapter mounted on the **X** port	**Y**
	Special version	**S**

● = Available – = Not available

Notice
Note the project planning notes on page 23.

Hydraulic fluid

The A18VO variable pump is designed for operation with HLP mineral oil according to DIN 51524.
Application instructions and requirements for hydraulic fluids 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)

Variable pump A18VO is not suitable for operation with water-containing HF hydraulic fluids.

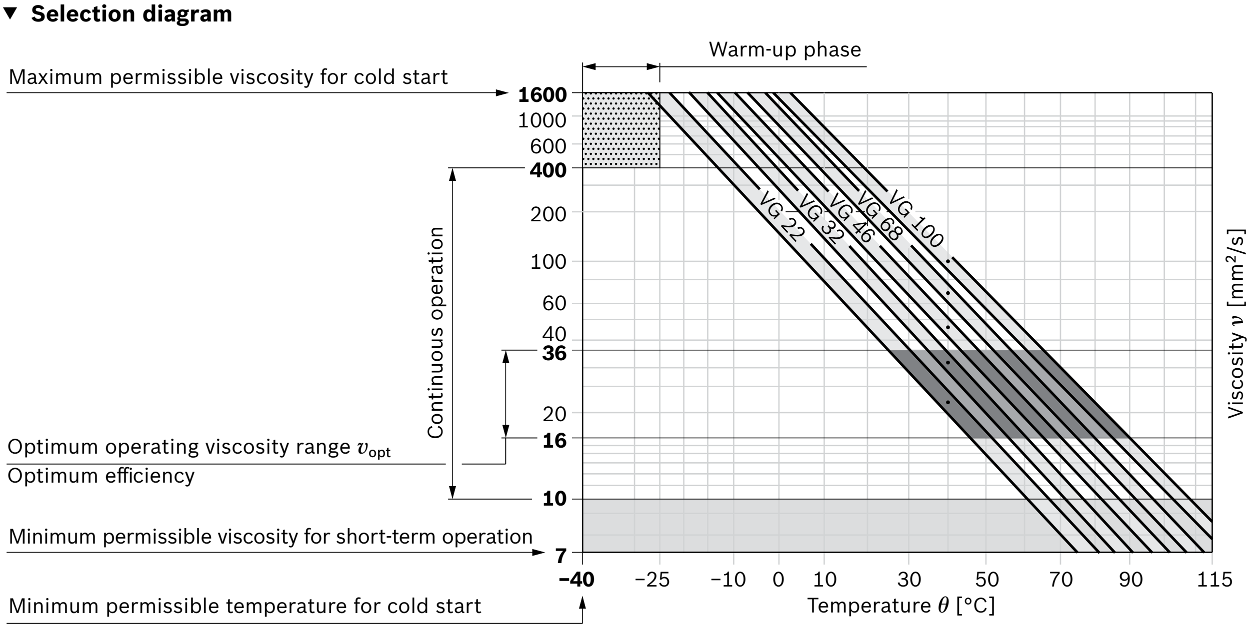
Notes on selection of hydraulic fluid
The hydraulic fluid should be selected so that the operating viscosity in the operating temperature range is within the optimum range (ν_{opt} see selection diagram).

Observe
At no point of the component may the temperature be higher than 115 °C. The temperature difference specified in the table is to be taken into account when determining the viscosity in the bearing.
Please contact us if the above conditions cannot be met due to extreme operating parameters.

Viscosity and temperature of hydraulic fluids

	Viscosity	Temperature	Comment
Cold start	$\nu_{max} \leq 1600$ mm²/s	$\theta_{St} \geq -40$ °C[1]	$t \leq 3$ min, without load ($p \leq 50$ bar), $n \leq 1000$ rpm
Permissible temperature difference		$\Delta T \leq 25$ K	between axial piston unit and hydraulic fluid in the system
Warm-up phase	ν = 1600 to 400 mm²/s	θ = -40 °C to -25 °C	at $p \leq 0.7 \cdot p_{nom}$, $n \leq 0.5 \cdot n_{nom}$ and $t \leq 15$ min
Continuous operation	ν = 400 to 10 mm²/s		this corresponds, for VG 46 for example, to a temperature range of +5 °C to +85 °C (see selection diagram)
		θ = -25 °C to +103 °C	measured at air bleed port **R** Note the permissible temperature range of the shaft seal[1] (ΔT = approx. 12 K between the bearing/shaft seal and port **R**)
	ν_{opt} = 36 to 16 mm²/s		Range of optimum operating viscosity and efficiency
Short-term operation	$\nu_{min} \geq 7$ mm²/s		$t < 3$ min, $p < 0.3 \times p_{nom}$

▼ **Selection diagram**



1) The FKM shaft seal is permissible for temperatures of -25 °C to +115 °C, please contact us for temperatures below −25 °C.

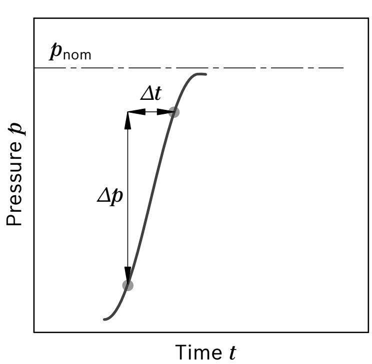
Filtration of the hydraulic fluid

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 very high hydraulic fluid temperatures (90 °C to maximum 103 °C, measured at air bleed port **R**), a cleanliness level of at least 19/17/14 according to ISO 4406 is necessary.

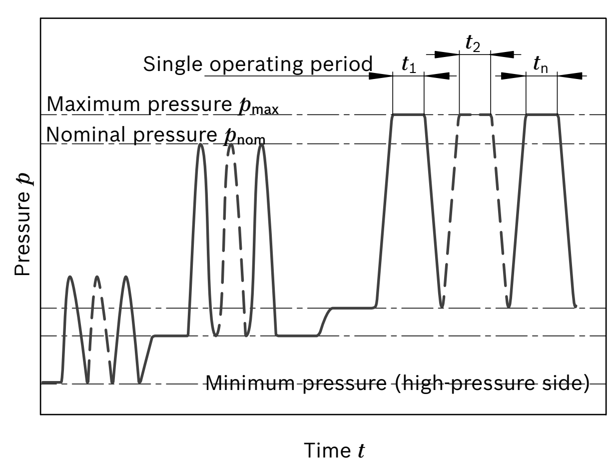
Working pressure range

Pressure at working port A (high-pressure side)		**Definition**
Nominal pressure p_{nom}	350 bar absolute	The nominal pressure corresponds to the maximum design pressure.
Maximum pressure p_{max}	400 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.
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 speed of pressure build-up and reduction during a pressure change across 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 required pressure is dependent on the rotational speed and displacement of the axial piston unit (see diagram on page 6).
Maximum pressure $p_{S\ max}$	2 bar absolute	

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



▼ **Pressure definition**



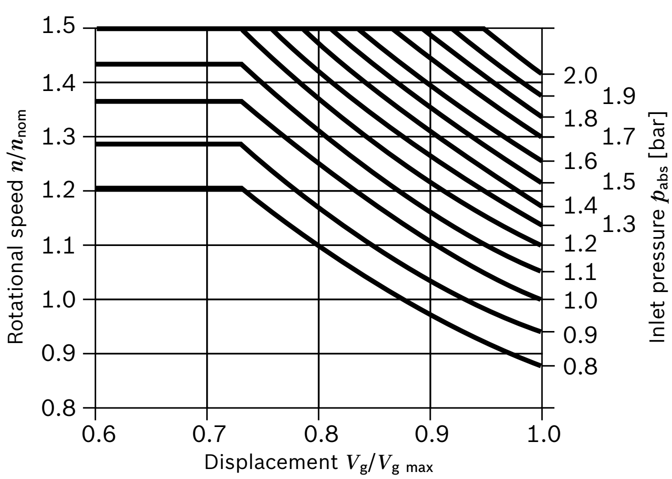
Total operating period = $t_1 + t_2 + \ldots + t_n$

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

Technical data

Size		**NG**		**55**	**80**	**107**
Displacement, geometric, per revolution		$V_{g\ max}$	cm³	54.8	80	107
Rotational speed maximum[1)]	at $V_{g\ max}$	n_{nom}	rpm	2500	2240	2150
	at V_g < 0.74 × $V_{g\ max}$	n_{max1}	rpm	3400	3000	2900
Rotational 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 Δp = 350 bar	P	kW	80	105	134
Torque	at $V_{g\ max}$ and Δp = 350 bar	T	Nm	305	446	596
Rotary stiffness	$V_{g\ max}$ to 0.5 × $V_{g\ max}$	c_{min}	Nm/rad	10594	15911	21469
	0.5 × $V_{g\ max}$ to 0 (interpolated)	c_{max}	Nm/rad	32103	48971	67666
Moment of inertia for rotary group		J_{TW}	kgm²	0.0034	0.0066	0.0109
Maximum angular acceleration		α	rad/s²	31600	24200	19200
Case volume		V	l	0.6	0.8	1.2
Mass moment		T_G	Nm	21	32	41
Weight (approx.)		m	kg	16	21	25

▼ **Maximum rotational speed (speed limit)**



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 ($\eta_t = \eta_v \times \eta_{hm}$)

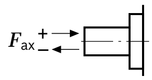
Notice

- 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. 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:
– At absolute pressure p_{abs} = 1 bar at suction port **S**
– For the optimal viscosity range of ν_{opt} = 36 to 16 mm²/s
– For hydraulic fluid based on mineral oils.

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

Permissible axial forces of the drive shaft

Size		NG		55	80	107
Maximum axial force at standstill or pressure-free operation		$+F_{ax\ max}$	N	0	0	0
		$-F_{ax\ max}$	N	66	86	103

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 service life of the bearing is reduced.
- Radial forces are not permissible.

DRS – Pressure controller with load sensing

Function of the pressure controller

The pressure controller limits the maximum pressure at the pump output within the control range of the pump. The variable pump only delivers as much hydraulic fluid as the consumers actually need. If the working pressure exceeds the pressure command value at the pressure valve, the pump will regulate to a smaller displacement to reduce the control differential.

When depressurized, the pump is swiveled to its initial position $V_{g\,max}$ by an adjustment spring.

- Setting range for pressure control 100 to 400 bar
- Standard setting 350 bar

Notice

- Any pressure-relief valve included in the system to limit the maximum pressure must have its start of opening at least 20 bar above the pressure controller setting.
- The pressure controller overrides the load-sensing controller, i.e. the load-sensing function operates below the pressure command value.
- To ensure thermal stability, with a DRS controller a drain line from port **T** to the reservoir is generally required (not needed for EP control).

When ordering, state in plain text:

- Pressure controller setting
- Δp setting for load sensing function

If there is no ordering code, the pump will be delivered with standard settings.

Zero-stroke operation

The standard version is designed for intermittent constant pressure operation. Short-term zero-stroke operation (< 1 min) is permissible up to an working pressure of p_{nom} = 350 bar at a reservoir temperature of ≤ 50 °C.

Load-sensing function

The load sensing controller works as a load-pressure controlled flow controller and adjusts the displacement of the pump to the volume required by the consumer.

The flow of the pump is then dependent on the cross section of the external metering orifice (**1**), which is located between the pump and the consumer. Below the setting of the pressure controller and within the control range of the pump, the flow is not dependent on the load pressure.

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

The load sensing controller compares the pressure before the metering orifice with that after the orifice and maintains the pressure drop encountered here (differential pressure Δp) and thus the flow constant.

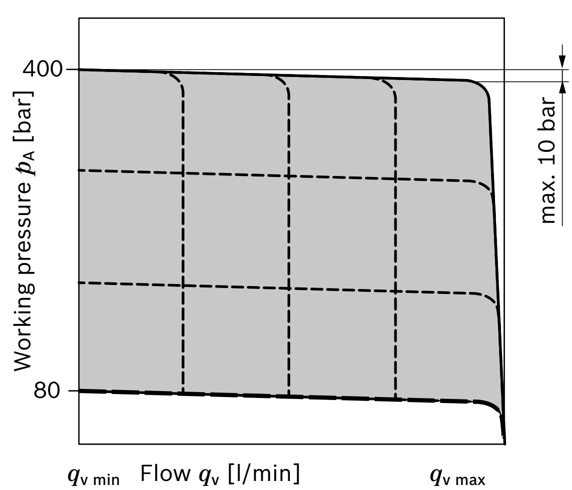
If the differential pressure Δp at the metering orifice rises, the pump is swiveled back (toward $V_{g\,min}$). If the differential pressure Δp drops, the pump is swiveled out (toward $V_{g\,max}$) until equilibrium at the metering orifice is restored.

$\Delta p_{\text{Metering orifice}} = p_{\text{Pump}} - p_{\text{Consumer}}$

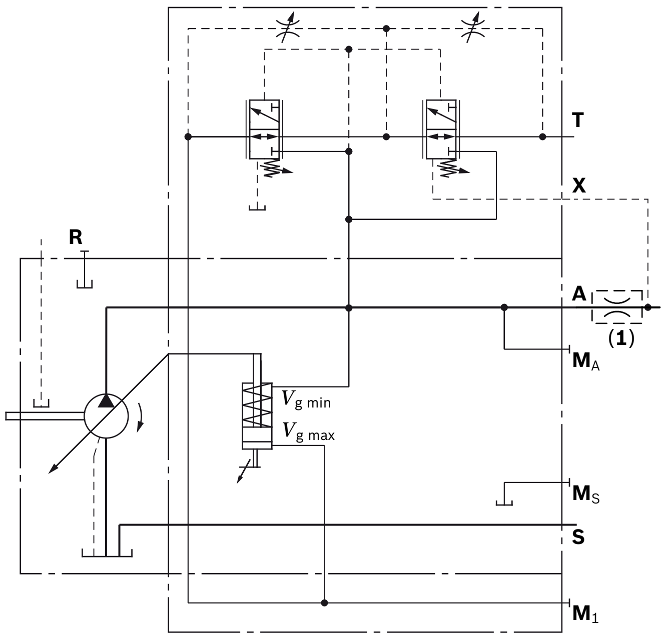
- Setting range for Δp 19 to 40 bar
- Standard setting 30 bar

The stand-by pressure in zero-stroke operation (metering orifice closed) is slightly higher than the Δp setting.

▼ **Characteristic curve DRS**



▼ **Circuit diagram DRS**



The metering orifice (control block) (**1**) is not included in the scope of delivery.

EP – Proportional control, electric

The electric proportional control provides infinite control of the displacement. Control is proportional to the electric control current applied to the solenoid.

EP1, EP2 – Positive control

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

With increasing control current, the pump swivels to a larger displacement. A control pressure is needed to swivel the pump from its initial position $V_{g\,min}$ to $V_{g\,max}$. The control power required is drawn from the working pressure.

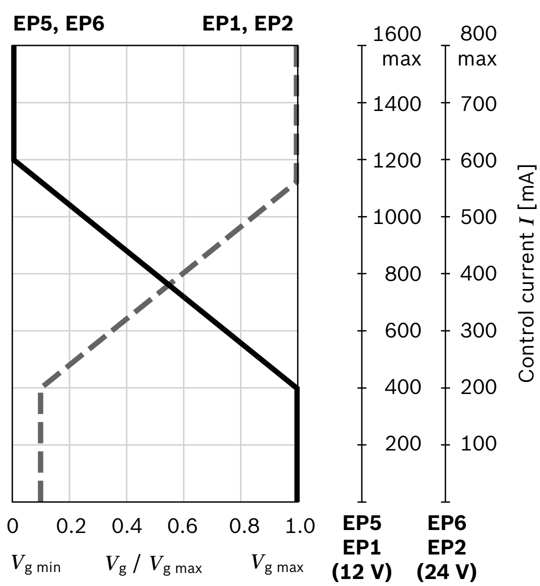
To enable a pressure to be built up, a residual volume of approx. 10 % of $V_{g\,max}$ is a fixed setting.

EP5, EP6 – Negative control

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

With increasing control current, the pump swivels to a smaller displacement. The control power required is drawn from the working pressure.

▼ **Characteristic curve EP**

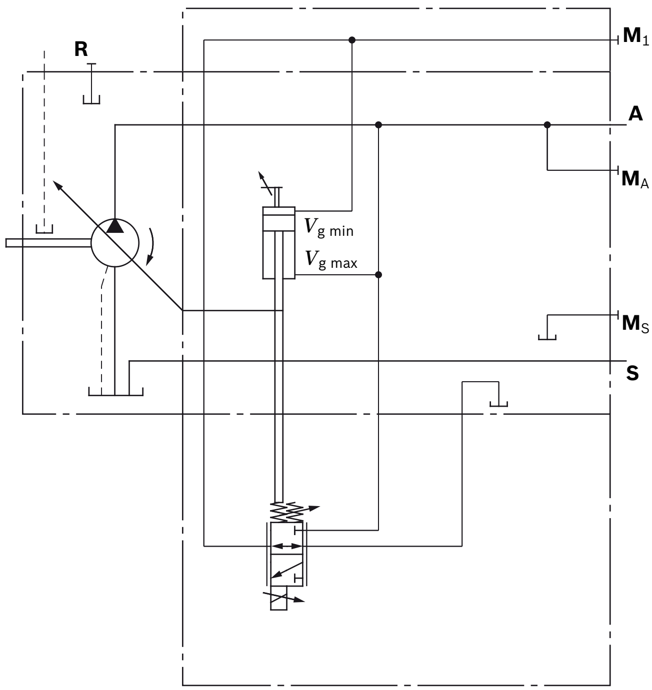


Technical data, solenoid	EP1, EP5	EP2, EP6
Voltage	12 V (±20 %)	24 V (±20 %)
Control current		
Beginning of control	400 mA	200 mA
End of control	1200 mA	600 mA
Current limit	1.54 A	0.77 A
Nominal resistance (at 20 °C)	5.5 Ω	22.7 Ω
Dither frequency	100 Hz	100 Hz
Duty cycle	100 %	100 %
Type of protection: see connector version page 18		

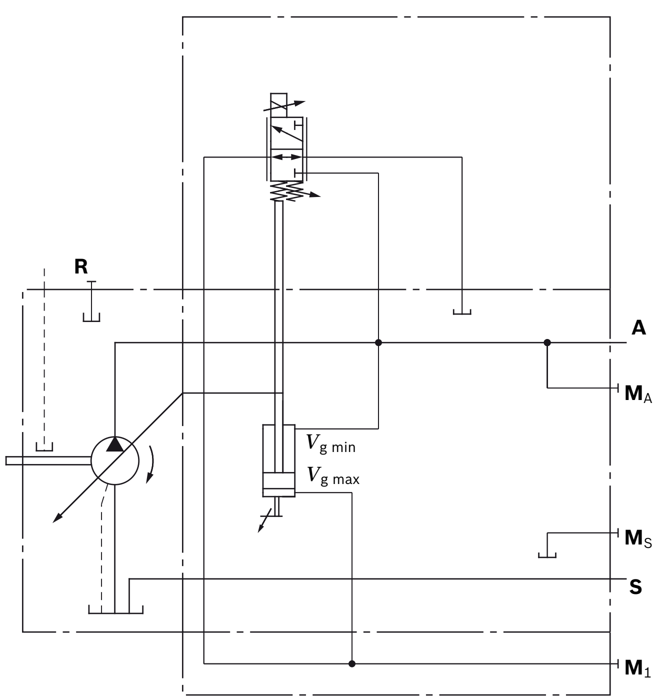
Various BODAS controllers with application software and amplifiers are available for controlling the proportional solenoids.

Further information can also be found on the internet at www.boschrexroth.de/mobilelektronik.

▼ **Circuit diagram EP1, EP2**

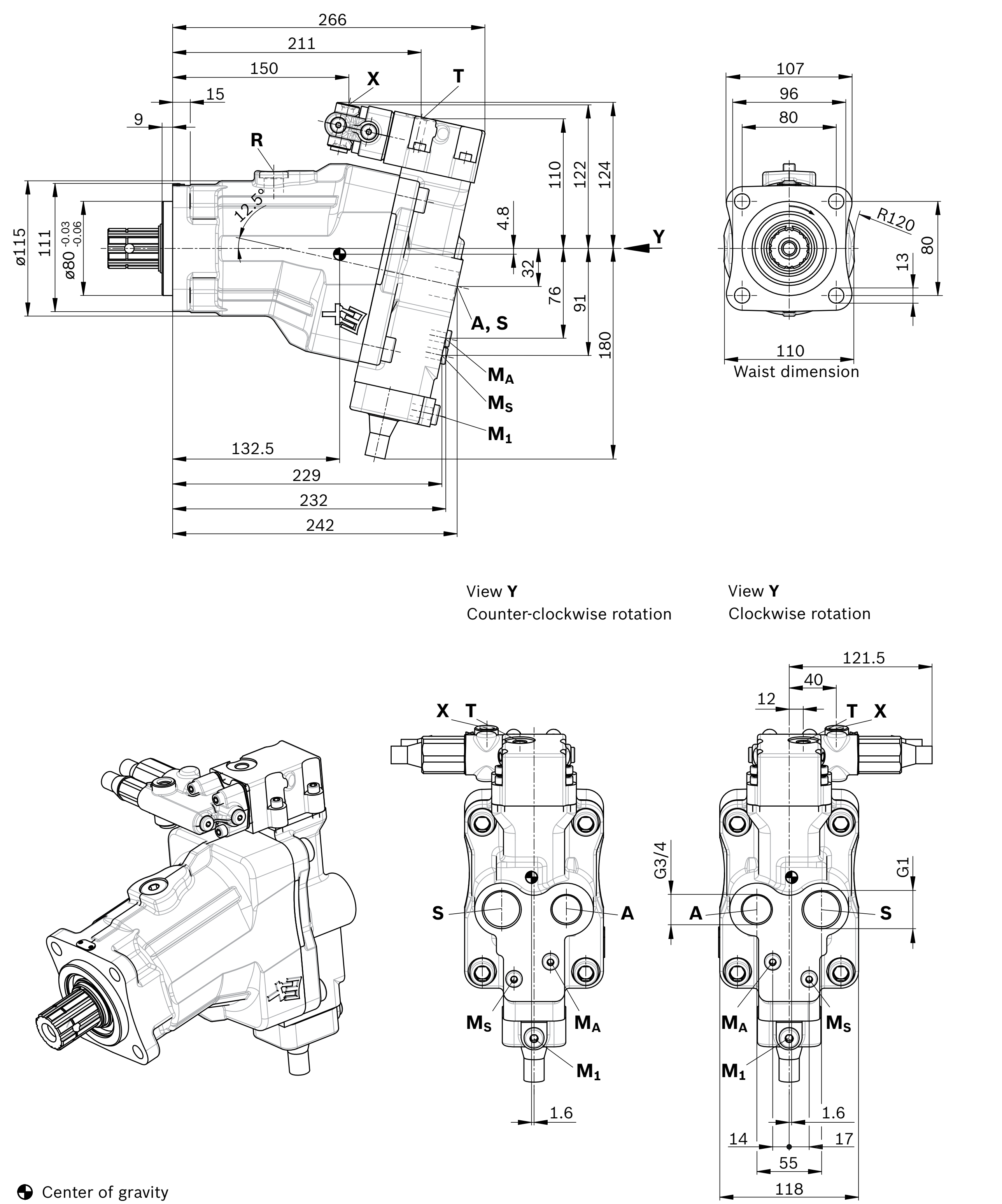


▼ **Circuit diagram EP5, EP6**

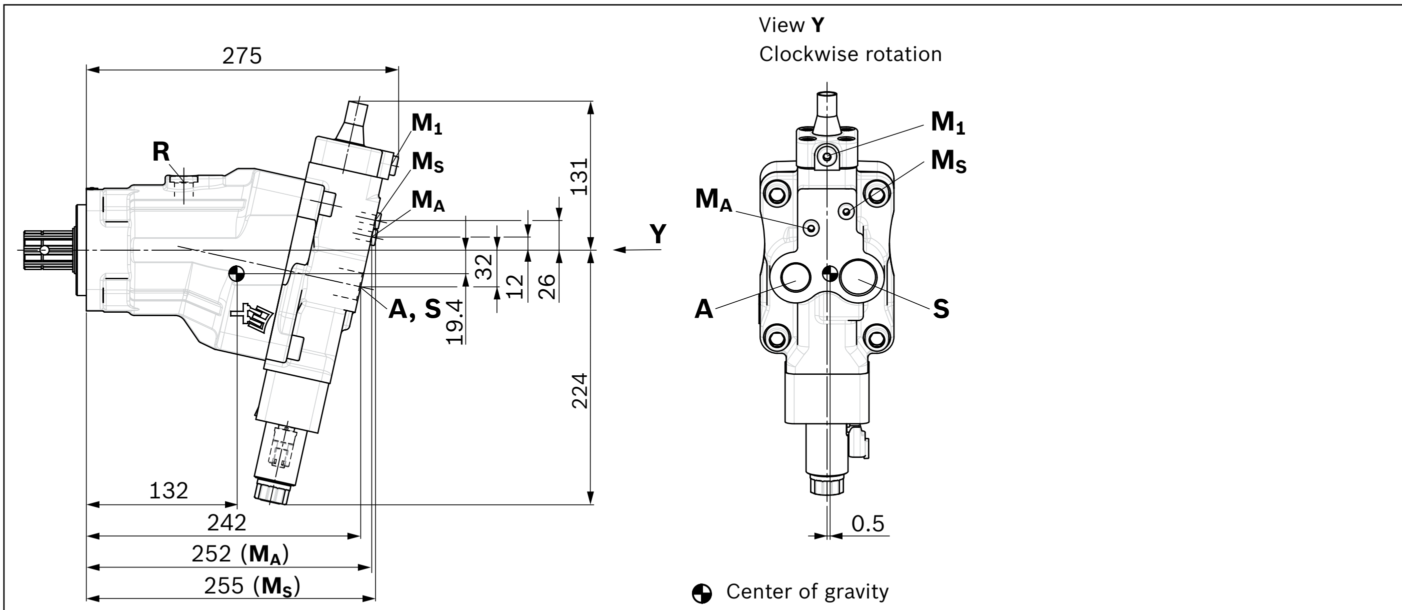


Dimensions, size 55

DRS – Pressure controller with load sensing

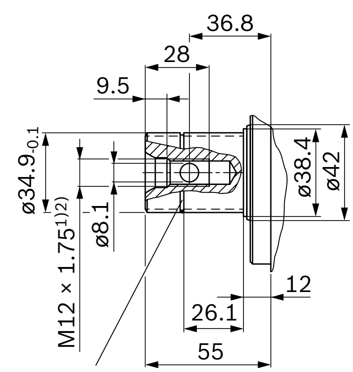


EP1, EP2 – Proportional electric control, positive control



▼ **Splined shaft similar to DIN ISO 14**

E8 – 8x32x35



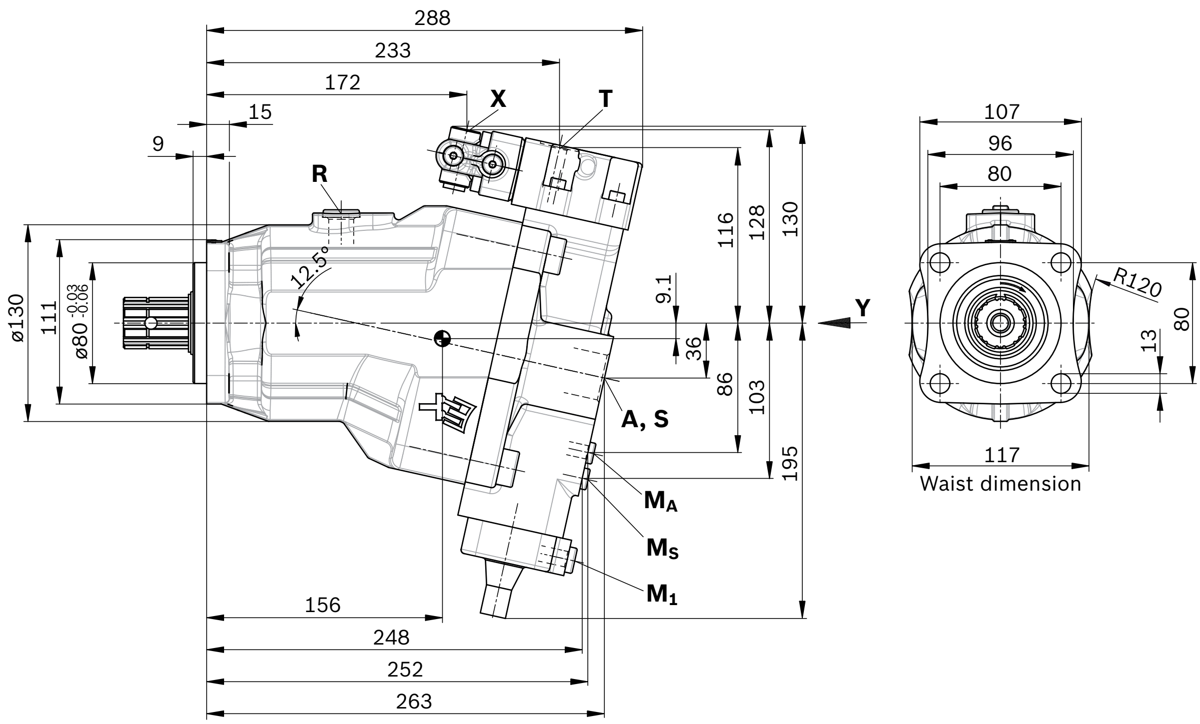
Groove for retaining ring 35 × 1.5 DIN 471

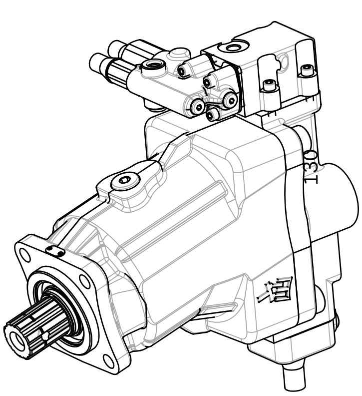
Ports		Standard	Size[2]	$p_{max\ abs}$ [bar][3]	State[6]
A	Working port	DIN ISO 228	G3/4; 16 deep	400	O
S	Suction port	DIN ISO 228	G1; 18 deep	2	O
T	Drain port (DRS only)	DIN 3852[5]	M12 × 1.5; 12 deep	2	O
$\mathbf{M_A}$	Measuring port pressure A	DIN 3852[5]	M10 × 1; 8 deep	400	X
$\mathbf{M_S}$	Measuring port suction pressure	DIN 3852[5]	M10 × 1; 8 deep	2	X
$\mathbf{M_1}$	Measuring port control pressure	DIN 3852[5]	M12 × 1.5; 12 deep	400	X
R	Air bleed port	DIN 3852[5]	M18 × 1.5; 12 deep	2	X[4]
X	Pilot pressure port load sensing	ISO 11926[5]	7/16-20UNF-2B; 11.5 deep	400	O

1) Center bore according to DIN 332 (thread according to DIN 13)
2) For notes on tightening torques, see the instruction manual
3) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
4) Only open port **R** for filling and air bleeding.
5) The countersink can be deeper than as specified in the standard.
6) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

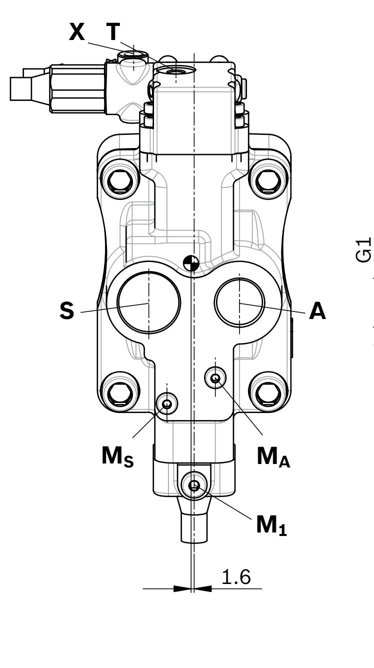
Dimensions, size 80

DRS – Pressure controller with load sensing

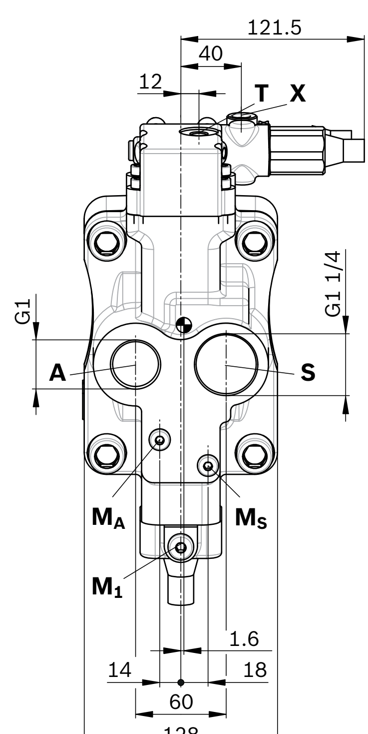




View **Y**
Counter-clockwise rotation

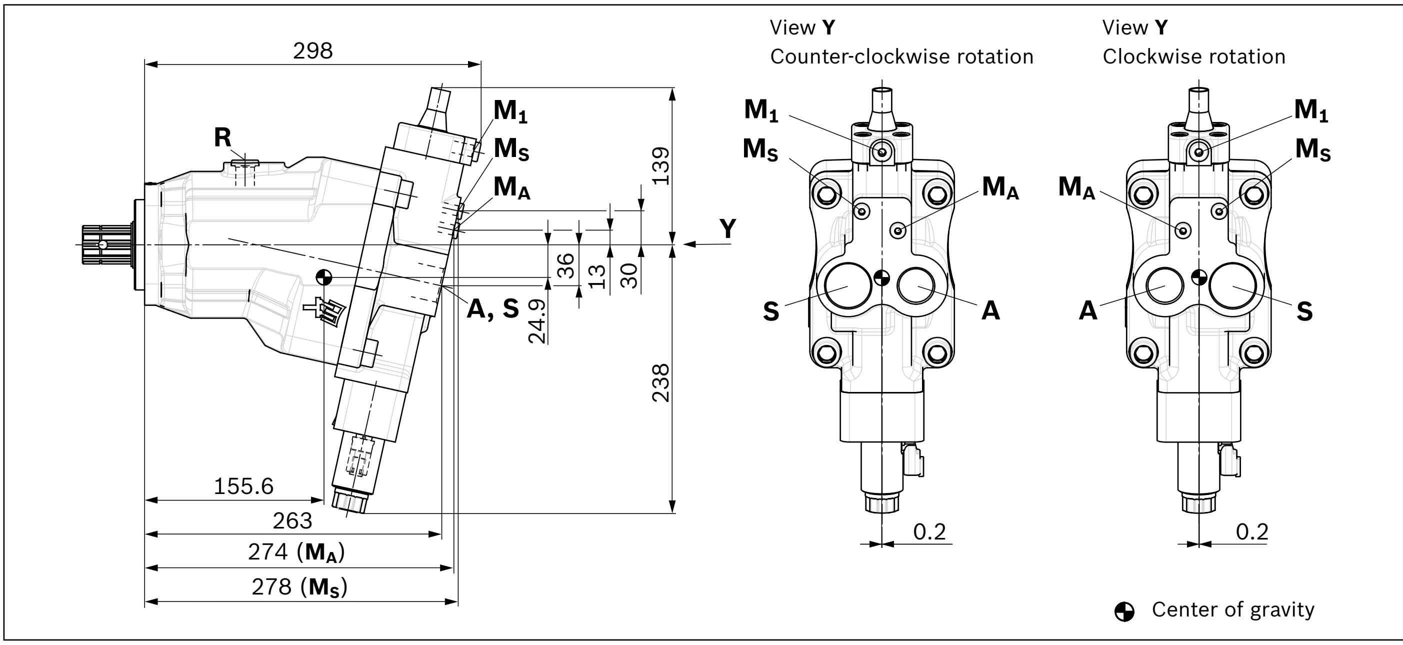


View **Y**
Clockwise rotation

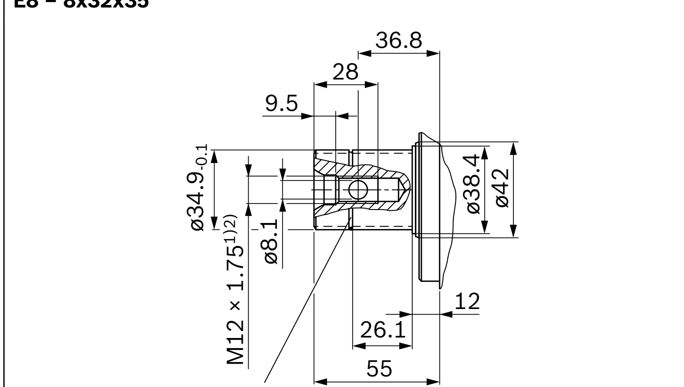


◕ Center of gravity

EP1, EP2 – Proportional electric control, positive control



▼ **Splined shaft similar to DIN ISO 14**

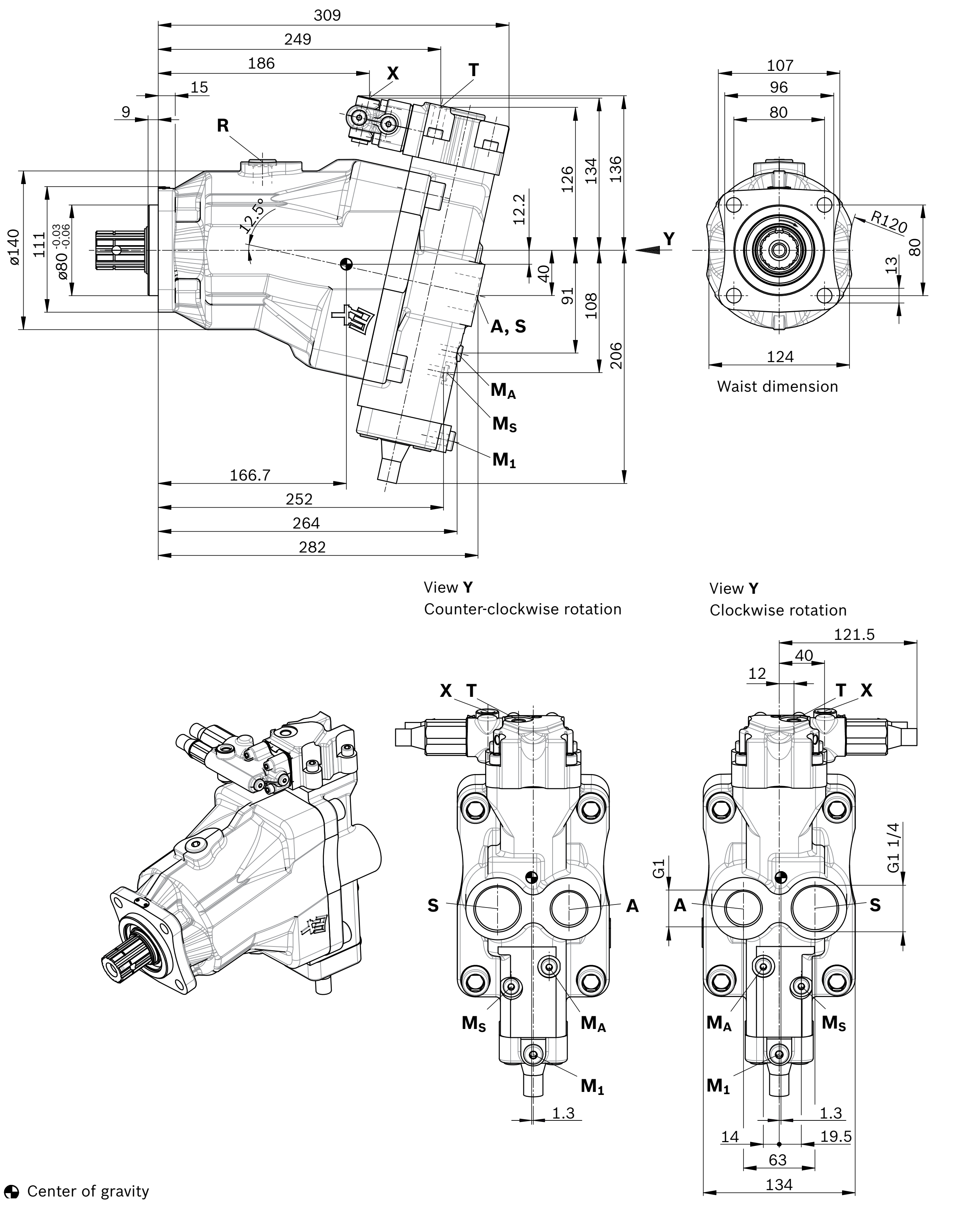


Ports		Standard	Size[2]	$p_{max\ abs}$ [bar][3]	State[6]
A	Working port	DIN ISO 228	G1; 18 deep	400	O
S	Suction port	DIN ISO 228	G1 1/4; 20 deep	2	O
T	Drain port (DRS only)	DIN 3852[5]	M12 × 1.5; 12 deep	2	O
M_A	Measuring port pressure A	DIN 3852[5]	M10 × 1; 8 deep	400	X
M_S	Measuring port suction pressure	DIN 3852[5]	M10 × 1; 8 deep	2	X
M_1	Measuring port control pressure	DIN 3852[5]	M12 × 1.5; 12 deep	400	X
R	Air bleed port	DIN 3852[5]	M18 × 1.5; 12 deep	2	X[4]
X	Pilot pressure port load sensing	ISO 11926[5]	7/16-20UNF-2B; 11.5 deep	400	O

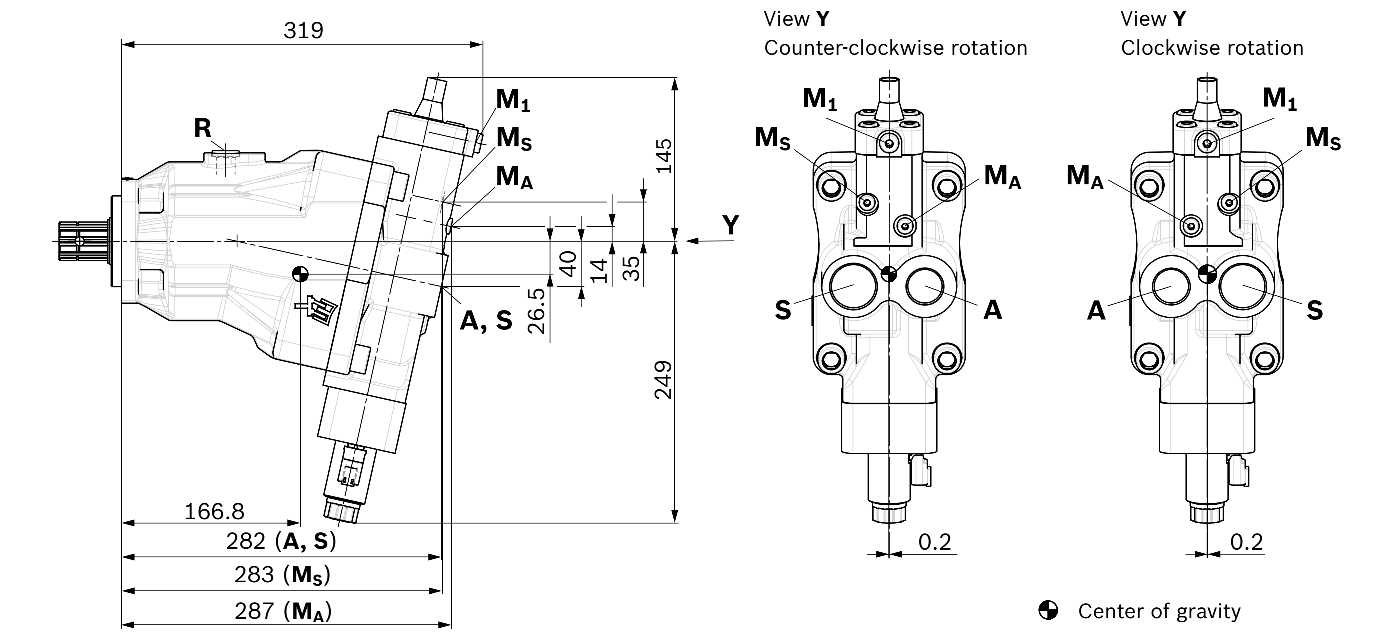
1) Center bore according to DIN 332 (thread according to DIN 13)
2) For notes on tightening torques, see the instruction manual
3) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
4) Only open port **R** for filling and air bleeding.
5) The countersink can be deeper than as specified in the standard.
6) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

Dimensions, size 107

DRS – Pressure controller with load sensing

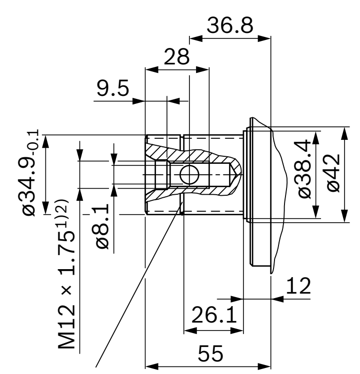


EP1, EP2 – Proportional electric control, positive control



▼ **Splined shaft similar to DIN ISO 14**

E8 – 8x32x35



Groove for retaining ring 35 × 1.5 DIN 471

Ports		Standard	Size[2]	$p_{max\ abs}$ [bar][3]	State[6]
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S	Suction port	DIN ISO 228	G1 1/4; 20 deep	2	O
T	Drain port (DRS only)	DIN 3852[5]	M12 × 1.5; 12 deep	2	O
$\mathbf{M_A}$	Measuring port pressure A	DIN 3852[5]	M10 × 1; 8 deep	400	X
$\mathbf{M_S}$	Measuring port suction pressure	DIN 3852[5]	M10 × 1; 8 deep	2	X
$\mathbf{M_1}$	Measuring port control pressure	DIN 3852[5]	M12 × 1.5; 12 deep	400	X
R	Air bleed port	DIN 3852[5]	M18 × 1.5; 12 deep	2	X[4]
X	Pilot pressure port load sensing	ISO 11926[5]	7/16-20UNF-2B; 11.5 deep	400	O

1) Center bore according to DIN 332 (thread according to DIN 13)
2) For notes on tightening torques, see the instruction manual
3) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
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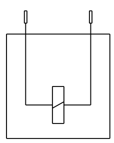
X = Plugged (in normal operation)

Connector for solenoids

DEUTSCH DT04-2P-EP04
Molded connector, 2-pin, without bidirectional suppressor diode
There is the following type of protection with the installed mating connector:
- IP67 (DIN/EN 60529) and
- IP69K (DIN 40050-9)

▼ **Switching symbol**



▼ **Mating connector DEUTSCH DT06-2S-EP04**

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 scope of delivery. This can be supplied by Bosch Rexroth on request (material number R902601804).

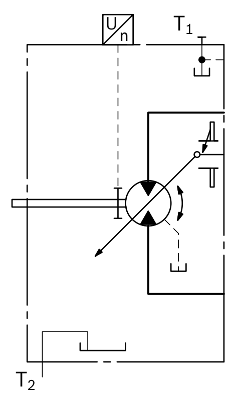
Notice
- If necessary, you can change the position of the connector by turning the solenoid.
- The procedure is defined in the instruction manual.

Speed sensors DSA and DSM

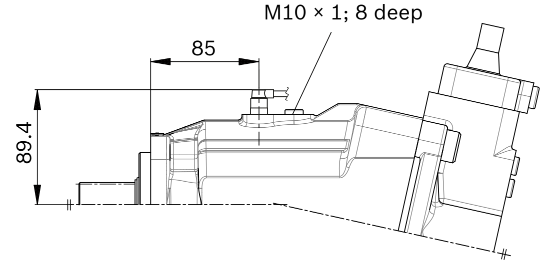
A signal proportional to the rotational speed of the pump can be generated with the fitted DSA/DSM speed sensor. The DSA/DSM sensor measures the rotational speed and direction of rotation.
Type code, technical data, dimensions and details on the connector, plus safety instructions about the sensor can be found in the relevant data sheet 95133 (DSA) and 95132 (DSM).
The sensor is mounted on the port provided for this purpose with a mounting bolt.

Size	**80**
Number of teeth	21

▼ **Circuit diagram**



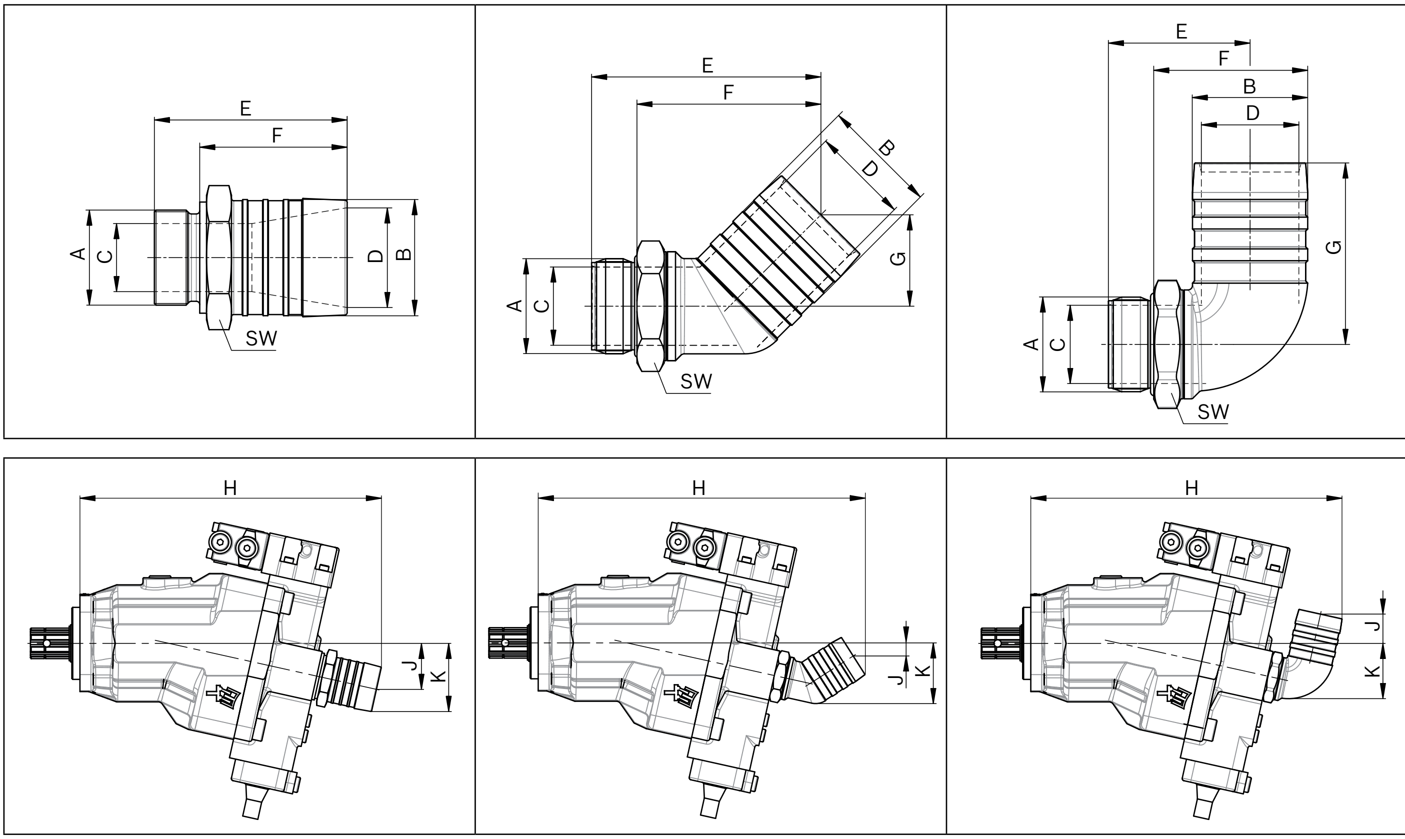
Dimensions



Accessories

Suction adapter

▼ **Dimensions**



Axial piston unit		Suction adapter												
NG	**Port S**	**Inner Ø**		**Version**	**Material number**									
	A	**B [in]**	**B [mm]**			**øC**	**øD**	**E**	**F**	**G**	**SW**	**H**	**J**	**K**
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		R902601630	31	54	82	64	–	65	354	54	79
55	G1	1 1/2	39	45°	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												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	90°	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		R909831598	35	43	63	43	80	50	346	33	66
107												365	29	70

When ordering, quote the material number of the version required

Notes on suction line

- Keep as short and straight as possible, without sharp 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

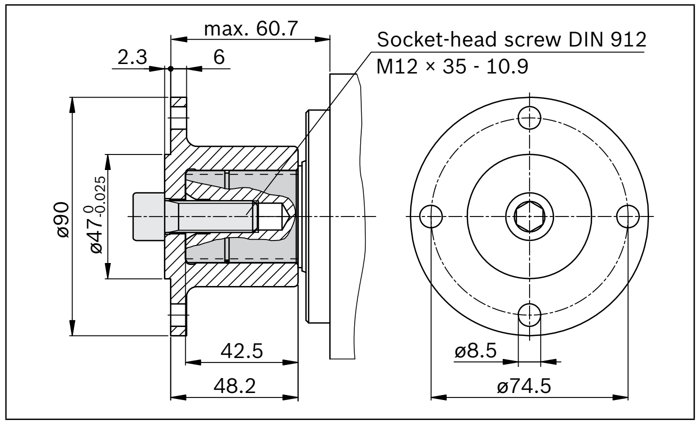
The O-rings used as seals to prevent air from entering the suction line are to be replaced after every removal and new installation in order to guarantee complete sealing.
Material number for O-rings:

- R909083802: O-ring for suction adapter G1
- R909083808: O-ring for suction adapter G1 1/4

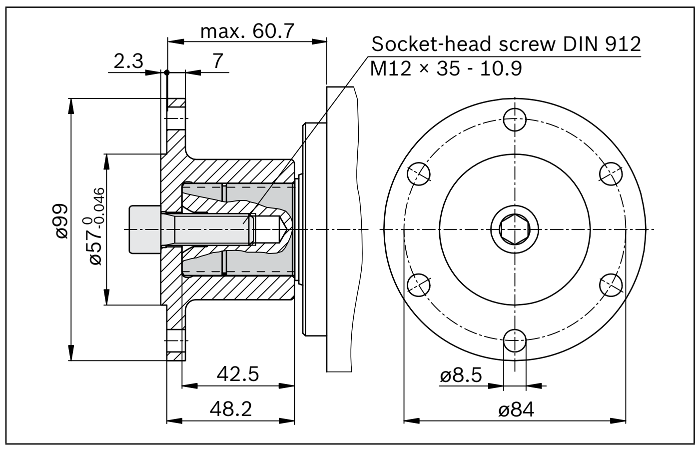
Coupling flange

There are special, modified coupling flanges in 4-hole and 6-hole design for the cardan shaft drive.
The coupling flange is not included in the scope of delivery and must be ordered separately.

▼ **4-hole coupling flange, complete – ø90**
Material number: R902060152



▼ **6-hole coupling flange, complete – ø100**
Material number: R902060153



Notice

- Assembly of the coupling flange is to be carried out by pulling it onto the drive shaft with the aid of the threaded bore in the drive shaft end.
- The coupling flange must be clamped on the drive shaft using a socket-head screw. In addition, permanent lubrication should be applied between the drive shaft and the coupling flange.
- The socket-head screw should be secured in a suitable manner (e.g. gluing with Loctite 276) and tightened with a tightening torque of 130 Nm.
- Sudden axial impact upon the drive shaft will lead to rotary group damage and therefore must be avoided.

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 longer standstill as the axial piston unit may empty via the hydraulic lines.
The pump housing is internally connected to the suction chamber. A separate drain line from the housing to the reservoir is not required. Exception: To ensure thermal stability, a 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.
Under all operating conditions, the suction line and drain line 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** must not fall below 0.8 bar absolute during operation and during cold start.
When designing the reservoir, ensure that there is adequate distance between the suction line and the drain line. This minimizes oil turbulence and carries out degassing, which prevents the heated hydraulic fluid from being sucked directly back in again.

Key	
F	Filling / air bleeding
R	Air bleed port
S	Suction port
T	Drain port (DRS only)
M_S	Measuring port suction pressure
SB	Baffle (baffle plate)
$h_{t\ min}$	Minimum required immersion depth (200 mm)
h_{min}	Minimum required distance to reservoir bottom (100 mm)
$h_{S\ max}$	Maximum permissible suction height (800 mm)

Notice

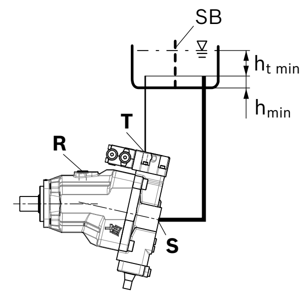
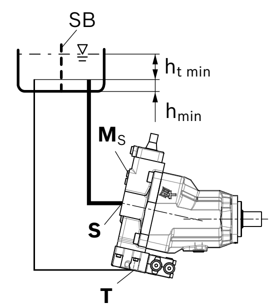
Port **F** is part of the external piping and must be provided on the customer side to make filling and air bleeding easier.

Installation position

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

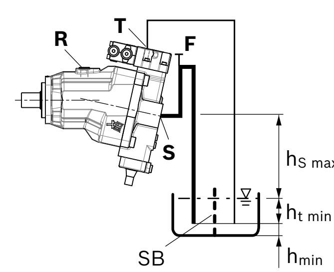
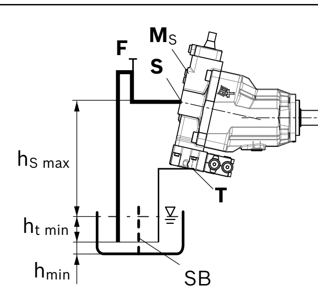
Below-reservoir installation (standard)

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

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 mm.

Installation position	Air bleed	Filling
3 	R	F
4 	M_S	F

Other related documents

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

- 91510: Fixed pump A17FNO, 250/300 bar
- 91520: Fixed pump A17FO, 350/400 bar
- 92280: Variable pump, A18VLO 350/400 bar

Project planning notes

- The A18VO pump is designed to be used in open circuits.
- 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 curve 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 safeguards against pressure overload. Be sure to add a pressure relief valve to 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. 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 additional measures are required on the machine for the relevant application in order to bring the driven consumer into a safe position (e.g. safe stop) and ensure any measures are properly implemented.

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