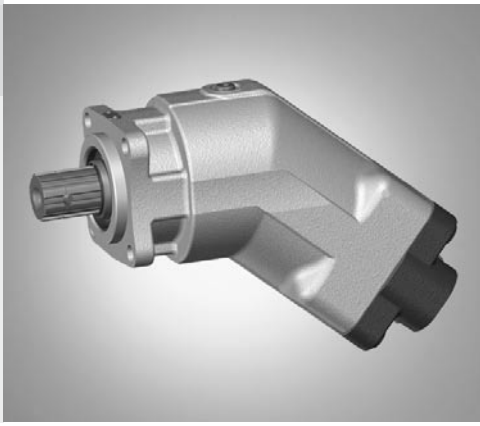
Rexroth
Bosch Group

Axial Piston Fixed Pump A17FO

RE 91520/03.10 1/20
Replaces: RE 91501

Data sheet



Series 10
Size 23 to 107
Nominal pressure 300 bar
Maximum pressure 350 bar
For commercial vehicles, open circuit

Contents

Features

- Fixed 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.
- Large-angle machine with 40° swivel angle, i.e. high power density, compact dimensions, optimum efficiency, economical design
- Simple change of direction
- Self-priming
- No case drain line necessary
- Flange and shaft designed for direct mounting on the power take-off of commercial vehicles
- Reduced noise
- Other pumps with special characteristics and dimensions for use in commercial vehicles can be found in the following data sheets:
  - RE 91510: Fixed pump A17NFO, 250/300 bar
  - RE 91540: 2-circuit fixed pump A18FDO, 350/400 bar
  - RE 92260: Variable pump A17VO, 300/350 bar
  - RE 92270: Variable pump A18VO, 350/400 bar
  - RE 92280: Variable pump A18VLO, 350/400 bar

Ordering code for standard program

A17F	O		/	10	M	L	W	K0	E8	1	–	
01	02	03		04	05	06	07	08	9	10		11

Axial piston unit

01	Bent axis design, fixed, nominal pressure 300 bar, maximum pressure 350 bar, for commercial vehicles (truck)	**A17F**

Operation mode

02	Pump, open circuit	**O**

Size (NG)

03	Theoretical displacement see table of values on page 5	**023**	**032**	**045**	**063**	**080**	**107**

Series

04	Series 1, index 0	**10**

Version of port and fixing threads

05	Metric	**M**

Direction of rotation[1)]

06	Viewed from drive shaft, counter-clockwise	**L**

Seals

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

Mounting flange

08	Special flange ISO 7653-1985 (for trucks)	**K0**

Drive shaft

09	Splined shaft similar to DIN ISO 14 (for trucks)	**E8**

Service line ports

10	Threaded port A and S at rear	**1**

Standard / special version

11	Standard version	**0**
	Special version	**S**

Note

Short designation X refers to a special version not covered by the ordering code.

1) Changing the direction of rotation, see page 6

Technical data

Hydraulic fluid

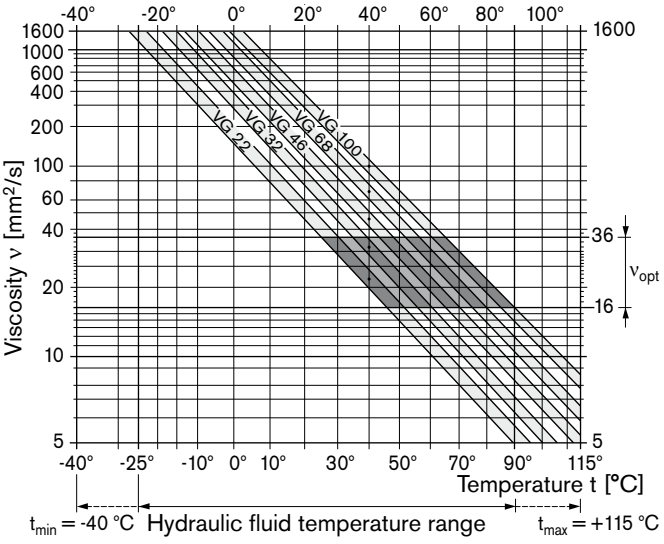
Before starting project planning, please refer to our data sheets RE 90220 (mineral oil) and RE 90221 (environmentally acceptable hydraulic fluids) for detailed information regarding the choice of hydraulic fluid and application conditions.

If environmentally acceptable hydraulic fluids are being used, the limitations regarding technical data and seals mentioned in RE 90221 must be observed.

When ordering, indicate the hydraulic fluid that is to be used.

Note
The fixed pump A17FO 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 tank 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 ($\nu_{opt.}$ 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, is always higher than the tank temperature. At no point of the component may the temperature be higher than 115 °C, however. 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.

Filtration of the hydraulic fluid

Filtration improves the cleanliness level of the hydraulic fluid, which, in turn, increases the service life of the axial piston unit.

To ensure the functional reliability of the axial piston unit, a gravimetric evaluation is necessary for the hydraulic fluid to determine the amount of contamination by solid matter 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.

Viscosity and temperature

	Viscosity [mm²/s]	Temperature	Comment
Transport and storage		$T_{min} \geq$ -50 °C T_{opt} = +5 °C to +20 °C	up to 12 months with standard factory preservation up to 24 months with long-term factory preservation
(Cold) start-up	ν_{max} = 1600	$T_{St} \geq$ -40 °C	t ≤ 3 min, without load (p ≤ 50 bar), n ≤ 1000 rpm
Permissible temperature difference		$\Delta T \leq$ 25 K	between axial piston unit and hydraulic fluid
Warm-up phase	ν < 1600 to 400	T = -40 °C to -25 °C	at p_{nom}, 0.5 • n_{nom} and t ≤ 15 min
Operating phase			
Temperature difference		ΔT = approx. 12 K	The temperature of the hydraulic fluid in the bearing is (depending on pressure and speed) approx. 12 K higher than that of the case drain fluid at port R.
Continuous operation	ν = 400 to 10 ν_{opt} = 16 to 36	T = -25 °C to +90 °C	no restriction within the permissible data
Short-term operation	ν_{min} = < 10 to 5	T_{max} = +115 °C	t < 3 min, p < 0.3 • p_{nom}
Shaft seal ring FKM		T ≤ +115 °C	see page 4

Technical data

Operating pressure range

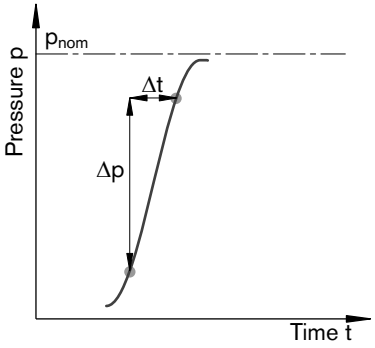
Pressure at service line port A

Nominal pressure p_{nom} _____ 300 bar absolute

Maximum pressure p_{max} _____ 350 bar absolute
Single operating period _____ 5 s
Total operating period _____ 50 h

Minimum pressure (high-pressure side) _____ 10 bar

Rate of pressure change $R_{A\,max}$ _____ 9000 bar/s



Pressure at suction port S (inlet)
Minimum suction pressure $p_{S\,min}$ _____ 0.8 bar absolute
Maximum suction pressure $p_{S\,max}$ _____ 2 bar absolute

Minimum pressure (inlet)
In order to avoid damage to the axial piston unit, a minimum pressure must be ensured at the suction port S (inlet). The minimum pressure is dependent on the speed of the axial piston unit.

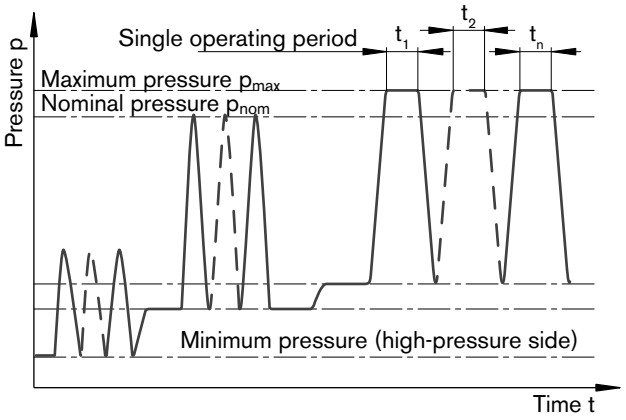
Definition

Nominal pressure p_{nom}
The nominal pressure corresponds to the maximum design pressure.

Maximum pressure p_{max}
The maximum pressure corresponds to the maximum operating pressure within the single operating period. The sum of the single operating periods must not exceed the total operating period.

Minimum pressure (high-pressure side)
Minimum pressure on the high-pressure side (A) that is required in order to prevent damage to the axial piston unit.

Rate of pressure change R_A
Maximum permissible rate of pressure build-up and pressure reduction during a pressure change over the entire pressure range.



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

Case drain fluid

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

Shaft seal ring

The FKM shaft seal ring is permissible 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.

Technical data

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

Size		NG		23	32	45	63	80	107
Displacement		V_g	cm^3	22.9	32	45.6	63	80.4	106.7
Speed maximum[1)]	at V_g	n_{nom}	rpm	2920	2900	2560	2300	2130	1860
Flow	at n_{nom} and V_g	$q_{v\,max}$	l/min	67	93	117	145	171	198
Power	at n_{nom}, V_g and $\Delta p = 300$ bar	P_{max}	kW	33	46	58	72	86	99
Torque	at V_g and $\Delta p = 300$ bar	T	Nm	109	153	218	301	384	509
Mass moment		T_G	Nm	On request					
Rotary stiffness		c	Nm/rad	304	304	435	520	711	806
Moment of inertia for rotary group		J_{GR}	kgm^2	0.0012	0.0012	0.003	0.0042	0.0072	0.0116
Maximum angular acceleration		α	rad/s^2	On request					
Filling capacity		V	L	On request					
Mass (approx.)		m	kg	5.8	5.8	8.0	9.0	11.6	14.5

1) The values shown are valid for an absolute pressure p_{abs}= 1 bar at suction port "S" and for operation with mineral fluid with a specific mass of 0.88 kg/l.

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

Determining the size

Flow $q_v = \dfrac{V_g \cdot n \cdot \eta_v}{1000}$ [l/min]

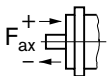
Torque $T = \dfrac{V_g \cdot \Delta_p}{20 \cdot \pi \cdot \eta_{mh}}$ [Nm]

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

V_g = Displacement per revolution in cm^3
Δp = Differential pressure in bar
n = Speed in rpm
η_v = Volumetric efficiency
η_{mh} = Mechanical-hydraulic efficiency
η_t = Total efficiency ($\eta_t = \eta_v \cdot \eta_{mh}$)

Permissible axial loading 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		23	32	45	63	80	107
When standstill or when axial piston unit operation in non-pressurized conditions		$\pm F_{ax\,max}$	N	0	0	0	0	0	0
Permissible axial force per bar operating pressure		$+ F_{ax\,per}$	N/bar	24	33	43	53	60	71
		$- F_{ax\,per}$	N/bar	0	0	0	0	0	0

Note
Force-transfer 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)

Direction of rotation and changing the direction of rotation

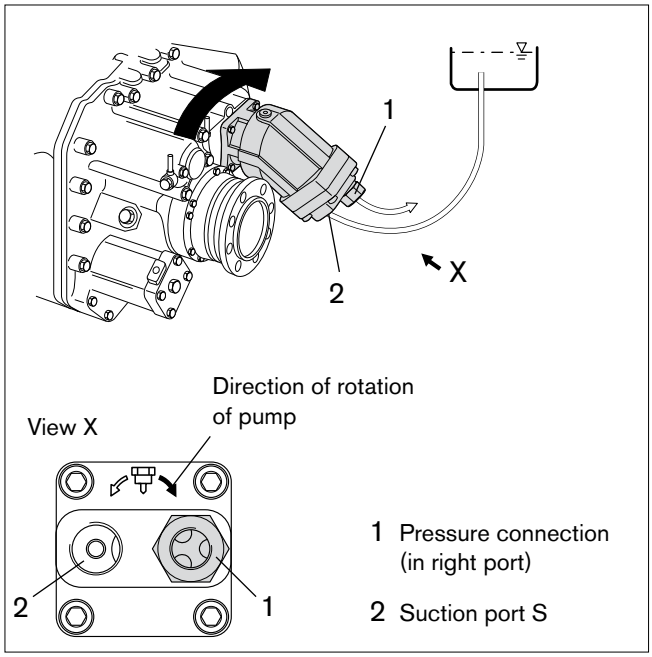
The direction of rotation of the axial piston unit is defined by means of a pressure connection screwed into the service line port and can easily be changed.

By changing the pressure connection, the service line port and the suction port are exchanged. As a result, the permissible drive direction is changed.

Direction of rotation on delivery

On delivery, the pressure connection (1) is pre-assembled in the right service line port of the axial piston unit. The permissible drive direction of the pump looking at the drive shaft: counter-clockwise. The power take-off turns clockwise.

Note
The pressure connection is pre-assembled on delivery and must be tightened to the torque specified for the respective threaded size before installation (see table of tightening torques M_D).

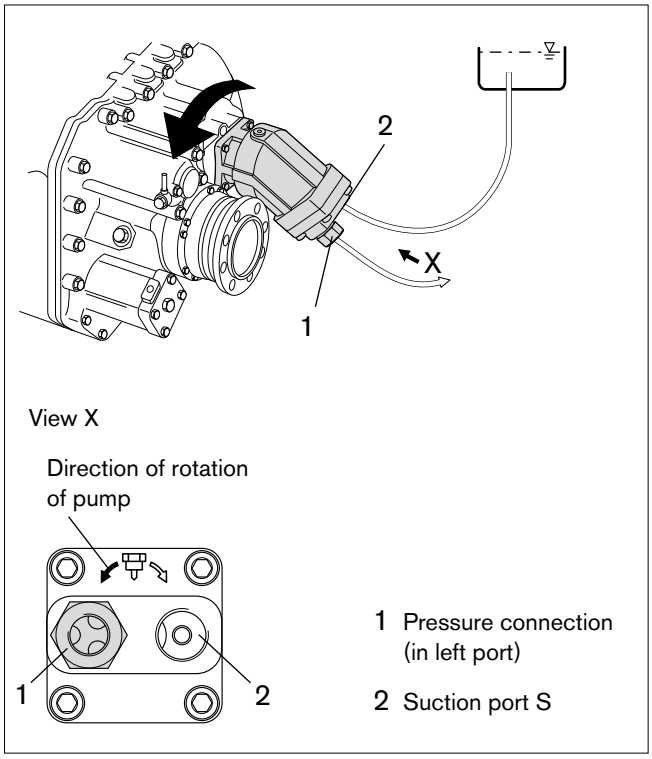


Changing the direction of rotation

For power take-offs with counter-clockwise rotation, the direction of rotation of the axial piston unit must be changed.

To change the direction of rotation of the axial piston unit, you must change the pressure connection (1) from the right port to the left port.

Note
If the pump drive shaft moves while making the change, the axial piston unit may be damaged.
After unscrewing the pressure connection, do not turn the drive shaft of the pump!



Tightening torque M_D of the pressure connection

Size	NG	23, 32	45, 63	80, 107
Tightening torque M_D	Nm	145	270	525
Size WAF	mm	36	41	50

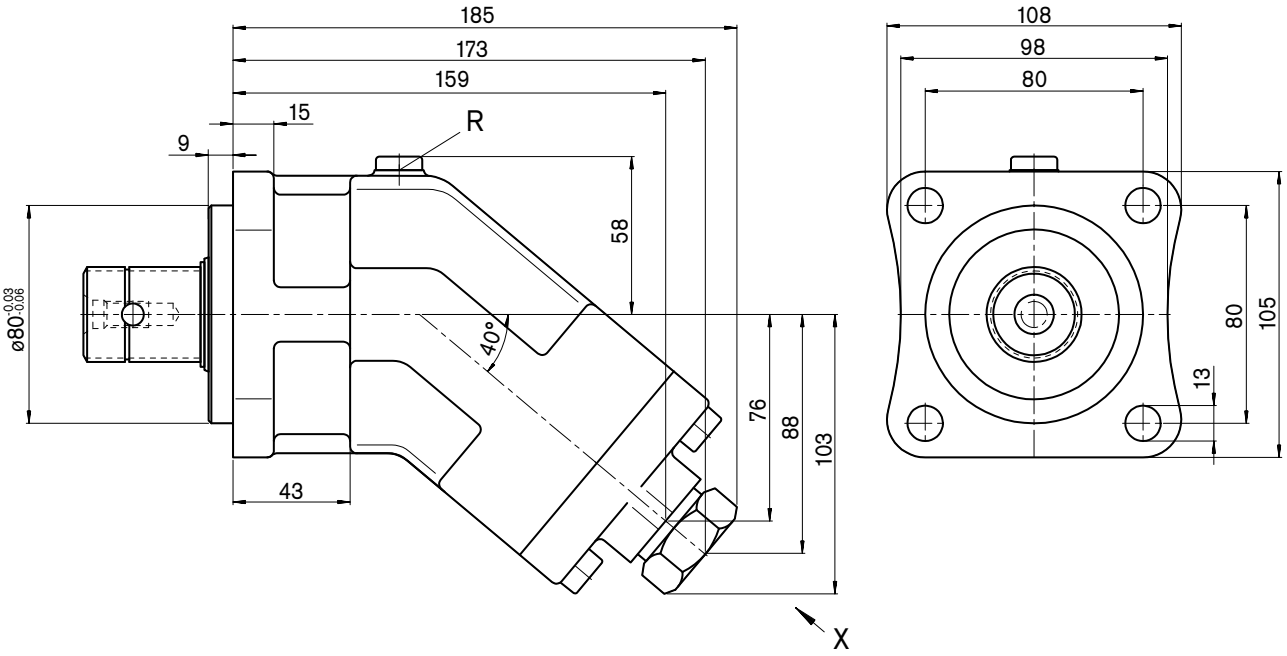
Connecting the line to the pressure connection

If the tightening torque required for connecting the used fittings exceeds the tightening torque of the pressure connection, the pressure connection must be counterheld. The maximum permissible tightening torque of the threaded hole (see page 20) must not be exceeded.

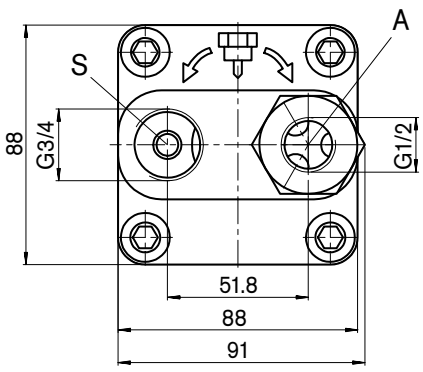
Notes

Dimensions size 23, 32

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



View X

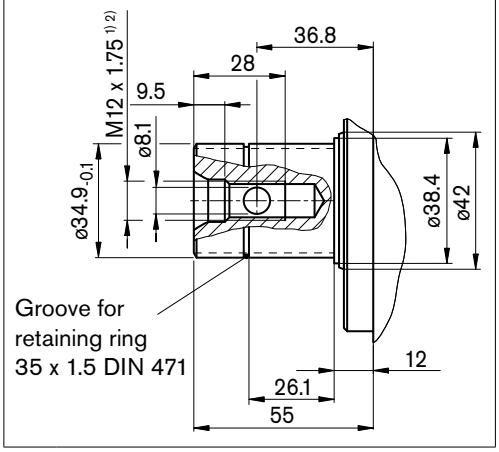


Dimensions size 23, 32

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

Drive shaft

E8 Splined shaft similar DIN ISO 14
8x32x35



Ports

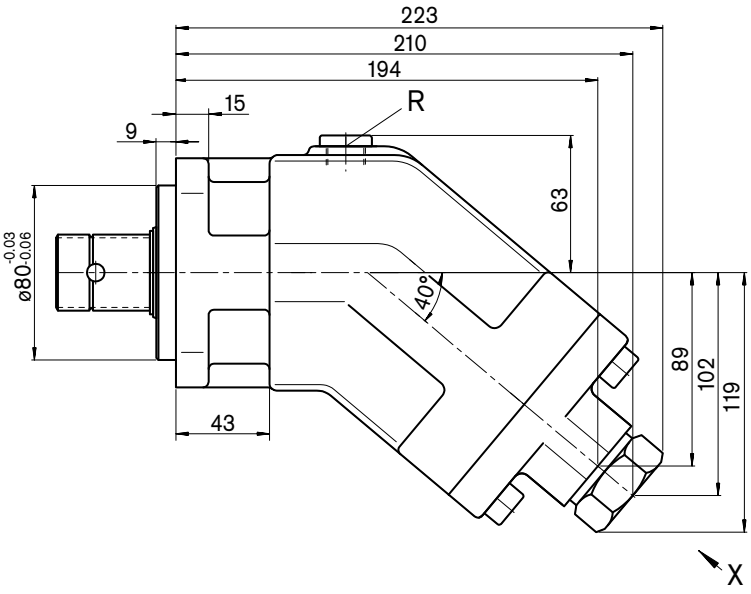
Designation	Port for	Standard	Size[2)]	Maximum pressure [bar][3)]	State
A	Service line	DIN ISO 228	G1/2; 14 deep	350	O
S	Suction	DIN ISO 228	G3/4; 16 deep	2	O
R	Air bleed	DIN 3852[5)]	M10 x 1; 8 deep	2	X[4)]

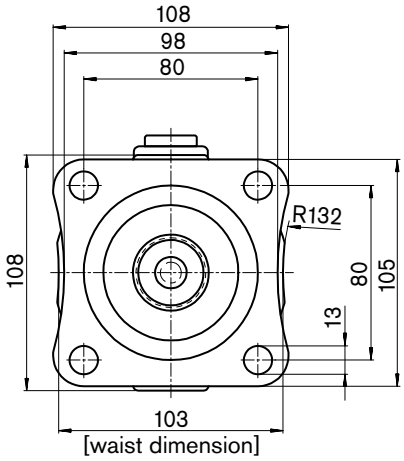
1) Center bore according to DIN 332 (thread according to DIN 13)
2) Observe the general instructions on page 20 for the maximum tightening torques.
3) Short-term pressure spikes may occur depending on the application. Keep this in mind when selecting measuring devices and fittings.
4) Only open port R for filling and air bleed
5) The spot face can be deeper than specified in the appropriate standard.

O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

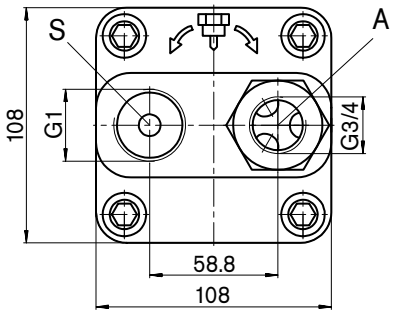
Dimensions size 45

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





View X

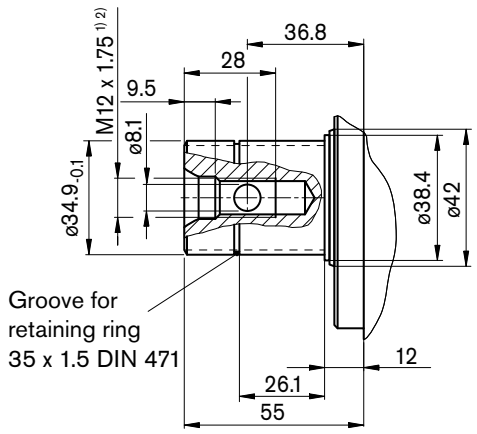


Dimensions size 45

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

Drive shaft

E8 Splined shaft similar DIN ISO 14
8x32x35



Ports

Designation	Port for	Standard	Size[2)]	Maximum pressure [bar][3)]	State
A	Service line	DIN ISO 228	G 3/4, 16 deep	350	O
S	Suction	DIN ISO 228	G1; 18 deep	2	O
R	Air bleed	DIN 3852[5)]	M10 x 1; 8 deep	2	X[4)]

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3) Short-term 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
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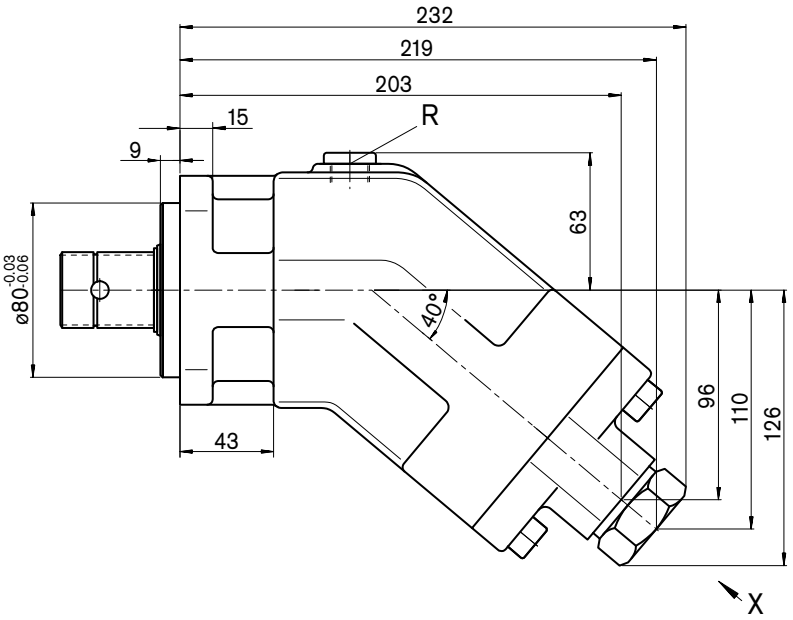
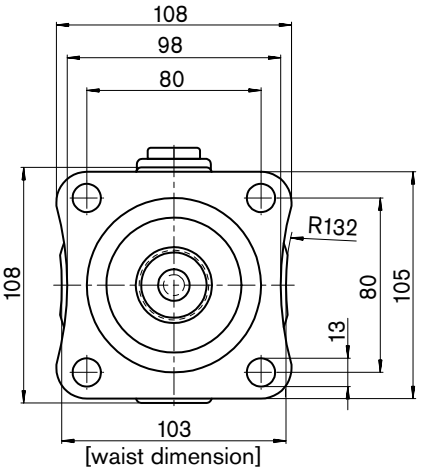
Dimensions size 63

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





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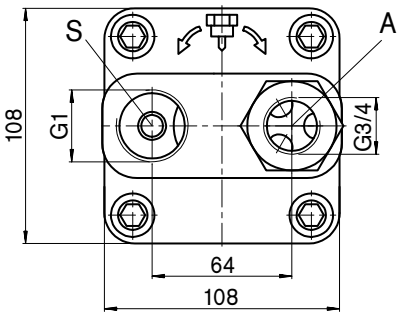
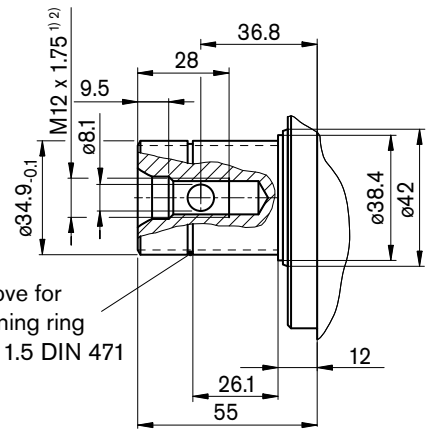


Dimensions size 63

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

Drive shaft

E8 Splined shaft similar DIN ISO 14
8x32x35



Ports

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R	Air bleed	DIN 3852[5)]	M10 x 1; 8 deep	2	X[4)]

1) Center bore according to DIN 332 (thread according to DIN 13)
2) Observe the general instructions on page 20 for the maximum tightening torques.
3) Short-term 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
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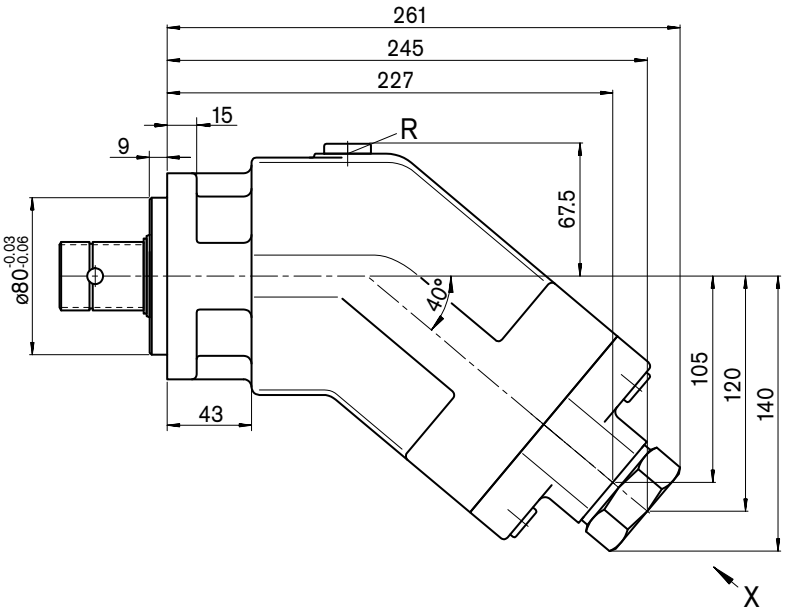
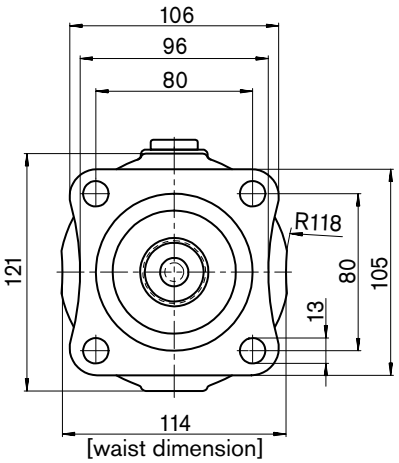
Dimensions size 80

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





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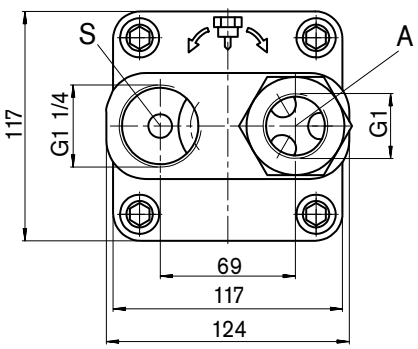
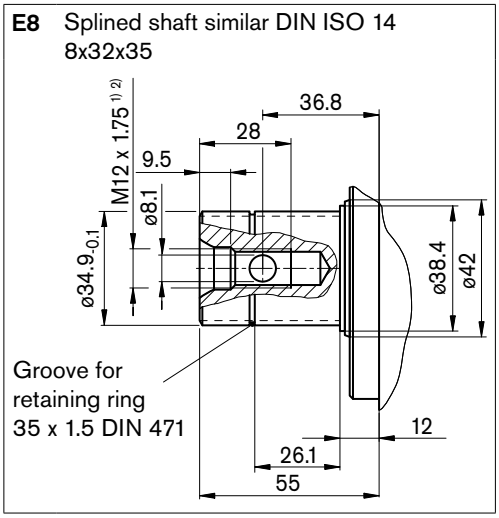


Dimensions size 80

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

Drive shaft

E8 Splined shaft similar DIN ISO 14
8x32x35



Ports

Designation	Port for	Standard	Size[2)]	Maximum pressure [bar][3)]	State
A	Service line	DIN ISO 228	G1, 18 deep	350	O
S	Suction	DIN ISO 228	G1 1/4; 20 deep	2	O
R	Air bleed	DIN 3852[5)]	M10 x 1; 8 deep	2	X[4)]

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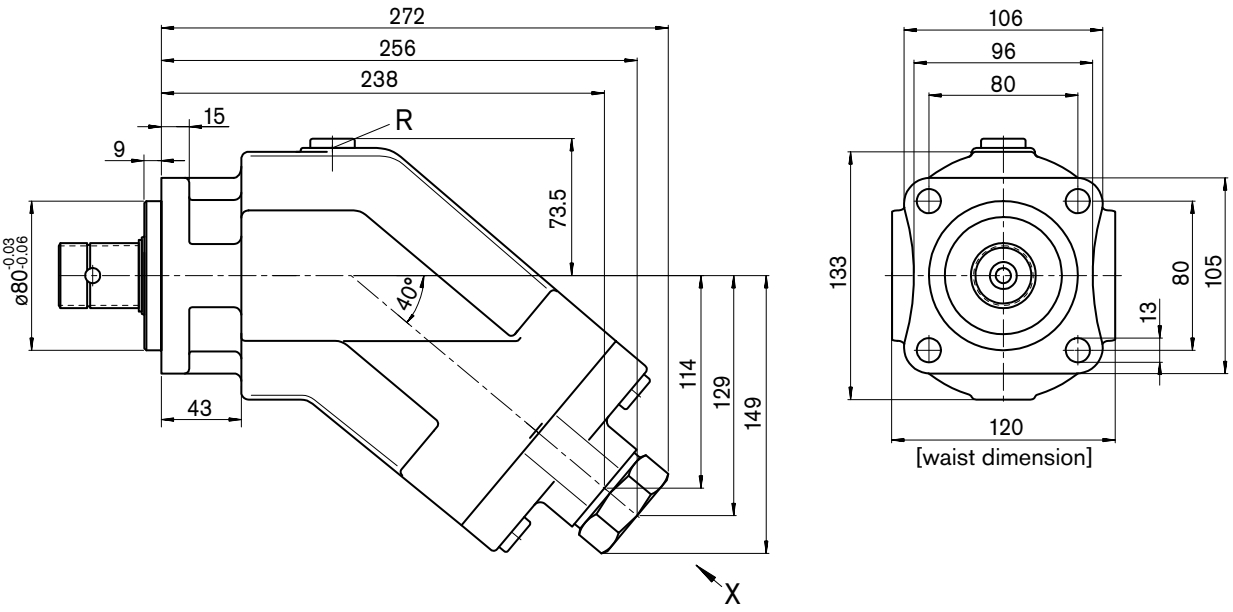
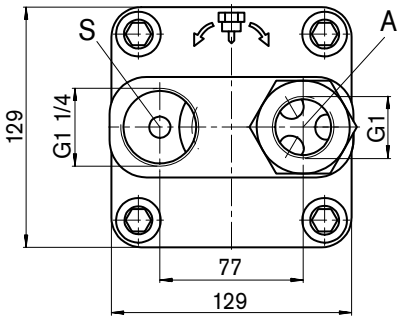
Dimensions, size 107

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



View X

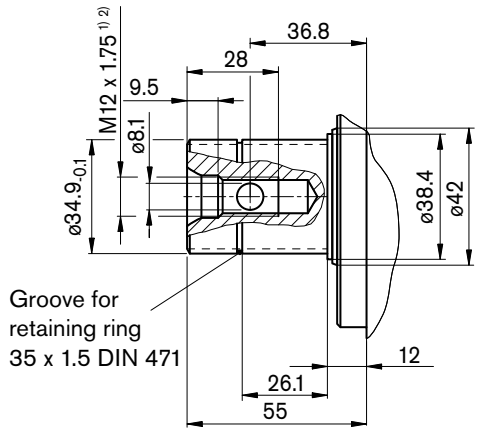


Dimensions, size 107

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

Drive shaft

E8 Splined shaft similar DIN ISO 14 8x32x35



Ports

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R	Air bleed	DIN 3852[5)]	M10 x 1; 8 deep	2	X[4)]

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Installation instructions

General

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

The case drain chamber is internally connected to the suction chamber. A case drain line from the case to the tank is not required.

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

In all operational states, the suction line must flow into the tank 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 $h_{S\,max} = 800$ mm. The minimum suction pressure at port S must also not fall below 0.8 bar absolute during operation and during cold start.

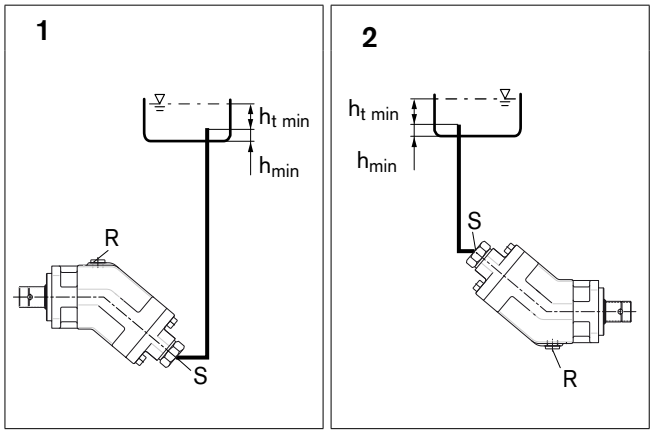
Installation position

See the following examples 1 to 4.
Additional installation positions are available upon request.

Recommended installation position: 1 and 2.

Below-tank installation (standard)

Below-tank installation is when the axial piston unit is installed outside of the tank below the minimum fluid level.

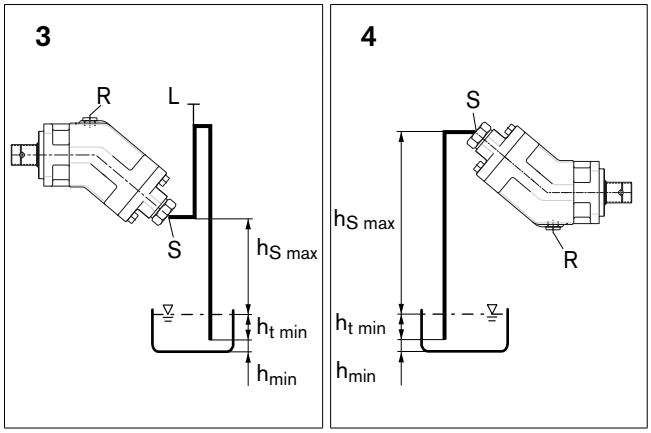


Installation position	Air bleed	Filling
1	R	S
2	–	S

Above-tank installation

Above-tank installation is when the axial piston unit is installed above the minimum fluid level of the tank.

Observe the maximum permissible suction height $h_{S\,max} = 800$ mm.



Installation position	Air bleed	Filling
3	R	L
4	S	S

L	Filling / air bleed
R	Air bleed port
S	Suction port
$h_{t\,min}$	Minimum permissible immersion depth (200 mm)
h_{min}	Minimum permissible spacing from suction port to tank base (100 mm)
$h_{S\,max}$	Maximum permissible suction height (800 mm)

Notes

General instructions

– The A17FO pump is designed to be used in open circuits.

– Project planning, assembly and commissioning of the axial piston unit require the involvement of qualified personnel.

– Before using the axial piston unit, please read the corresponding operating instructions completely and thoroughly. If necessary, these can be requested from Rexroth.

– The service line ports and function ports are only designed to accommodate hydraulic lines.

– During and shortly after operation, there is a risk of burns on the axial piston unit. Take appropriate safety measures (e.g. by wearing protective clothing).

– Depending on the operational state of the axial piston unit (operating pressure, fluid temperature), the characteristic may shift.

– Pressure ports:
The ports and fixing 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 operating conditions (pressure, flow, hydraulic fluid, temperature) with the necessary safety factors.

– The data and notes contained herein must be adhered to.

– The following tightening torques apply:

- Threaded hole of the axial piston unit:
The maximum permissible tightening torques $M_{G\,max}$ are maximum values of the threaded holes and must not be exceeded. For values, see the following table.

- Fittings:
Observe the manufacturer's instruction regarding the tightening torques of the used fittings.

- Fixing screws:
For fixing screws according to DIN 13, we recommend checking the tightening torque individually according to VDI 2230.

- Locking screws:
For the metallic locking screws supplied with the axial piston unit, the required tightening torques of locking screws M_V apply. For values, see the following table.

– The product is not approved as a component for the safety concept of a general machine according to DIN EN ISO 13849.

Ports		Maximum permissible tightening torque of the threaded holes $M_{G\,max}$	Required tightening torque of the locking screws M_V	WAF hexagon socket of the locking screws
Standard	Threaded size			
DIN 3852	M10 x 1	13 Nm	12 Nm	5 mm
DIN ISO 228	G1/2	200 Nm	–	–
	G3/4	330 Nm	–	–
	G1	480 Nm	–	–
	G1 1/4	720 Nm	–	–

Accessories for A17FO

The following accessories are available from Rexroth for the A17FO:

– Coupling flange, for pumps driven via a cardan shaft (see RE 95001)

– Suction studs, in all variations (see RE 95004)

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