Rexroth
Bosch Group

Axial Piston Fixed Pump KFA

RE 91501/07.09 1/20
Replaces: 06.03

Data sheet

Series 63
Sizes NG23 to 125
NG23 to 107 Nominal pressure 300 bar
Maximum pressure 350 bar
NG125 Nominal pressure 250 bar
Maximum pressure 300 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 unit with 40° swivel angle, i.e. high power density, small dimensions, optimum efficiency, economic design
- Simple change of direction
- Self aspirating
- 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 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

KFA2F	O		/	63	–	M	E	K	64
01	02	03		04		05	06	07	08

Axial piston unit

01	Bent axis design, fixed, for commercial vehicles	**KFA2F**

Operation mode

02	Pump, open circuit	**O**

Size

03	≈ Displacement V_g in cm^3	**23**	**32**	**45**	**63**	**80**	**107**	**125**

Series

04	Series 6, index 3	**63**

Seals

05	NBR (nitrile-caoutchouc), 2 shaft seal rings in FKM (fluor-caoutchouc)	**M**

Drive shaft

06	Splined shaft similar to DIN ISO 14 (for truck use)	**E**

Mounting flange

07	Special flange ISO 7653-1985 (for truck use)	**K**

Service line ports

08	Threaded port A(B) and S rear	**64**

Note

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

Technical data

Hydraulic fluid

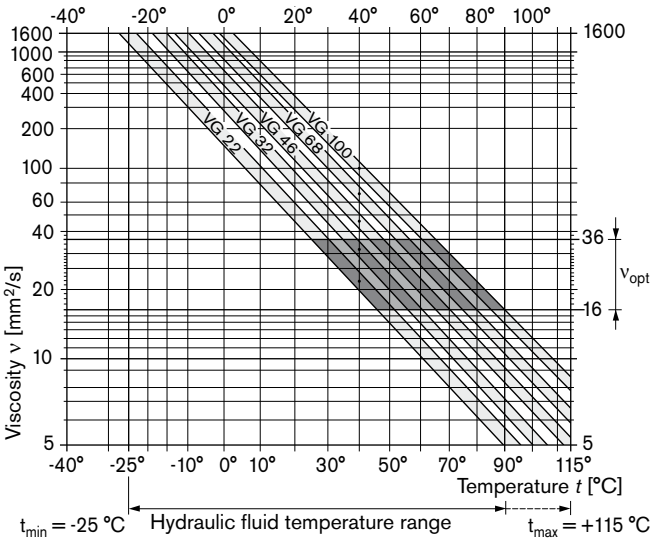
Before starting project planning, please refer to our data sheets RE 90220 (mineral oil) and RE 90221 (environmentally acceptable hydraulic fluids) for detailed information regarding the choice of hydraulic fluid and application conditions.

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 KFA 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 (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, 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
Storage		$T_{min} \geq$ -50 °C T_{opt} = +5 °C to +20 °C	up to 12 months with standard factory conservation up to 24 months with long-term factory conservation
(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		ΔT ≤ 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 or B

NG23 to 107
Nominal pressure p_{nom} _____ 300 bar absolute

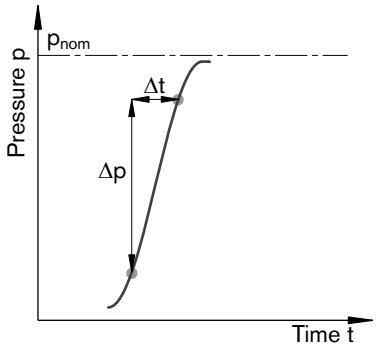
Maximum pressure p_{max} _____ 350 bar absolute
Single operating period _____ 5 s
Total operating period _____ 50 h

NG125
Nominal pressure p_{nom} _____ 250 bar absolute

Maximum pressure p_{max} _____ 300 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.

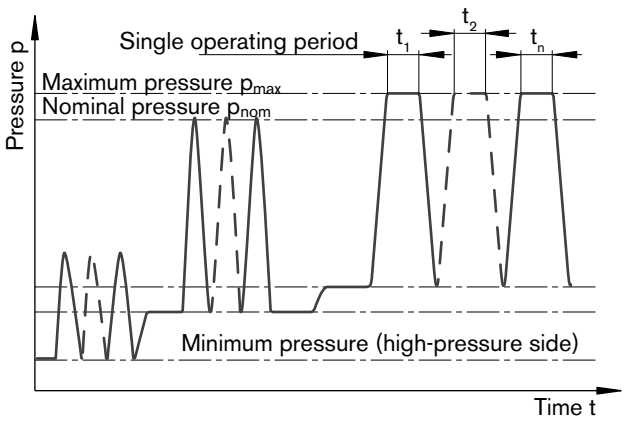
Definition

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 or B) 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	125
Displacement		V_g	cm^3	22.9	32	45.6	63	80.4	106.7	125
Speed maximum[1]	at $p_{abs} = 1$ bar	n_{max}	rpm	2920	2900	2560	2300	2130	1860	1800
Flow	at n_{max}	$q_{v\,max}$	l/min	67	93	117	145	171	198	225
Power	at $q_{v\,max}$ and $\Delta p = 300$ bar	P_{max}	kW	33	46	58	72	86	99	94[2]
Torque	at $\Delta p = 300$ bar	T	Nm	109	153	218	301	384	509	497[2]
Rotary stiffness		c	Nm/rad	304	304	435	520	711	806	806
Moment of inertia for rotary group		J_{GR}	kgm^2	0.0012	0.0012	0.003	0.0042	0.0072	0.0116	0.0116
Mass (approx.)		m	kg	5.8	5.8	8.0	9.0	11.6	14.5	14.5

1) The values apply at suction port "S" and for mineral-based operating materials with a specific mass from 0.88 kg/L.
2) $\Delta p = 250$ bar

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]

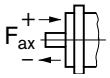
Torque $T = \dfrac{V_g \cdot \Delta p}{20 \cdot \pi \cdot \eta_{mh}}$ [Nm]

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 on 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	125
When standstill or when axial piston unit operation in pressureless conditions		$\pm F_{ax\,max}$	N	0	0	0	0	0	0	0
Permissible axial force per bar operating pressure		$+ F_{ax\,per}$	N/bar	24	33	43	53	60	71	77
		$- F_{ax\,per}$	N/bar	5.2	5.2	7.0	8.7	10.6	12.9	12.9

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

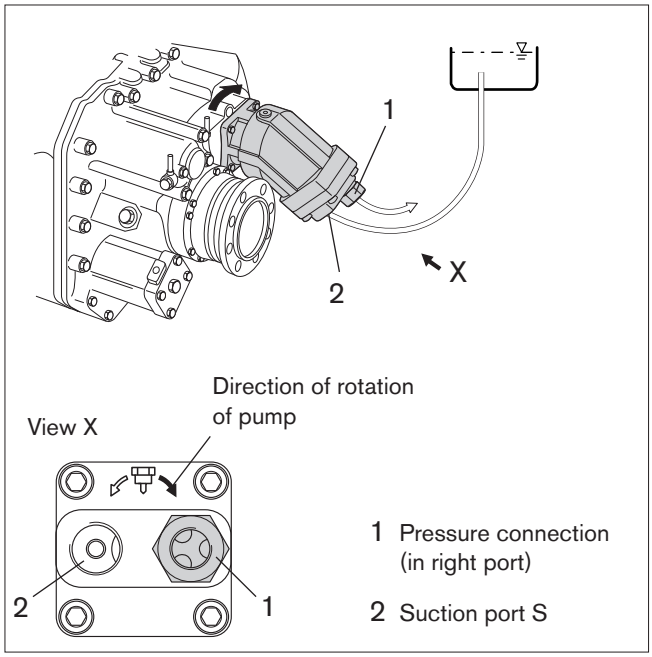
The direction of rotation of the axial piston unit is defined by means of a pressure connection screwed into the service line port and can easily be changed.

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 with the torque specified for the respective threaded size before installation (see table for tightening torque M_D).

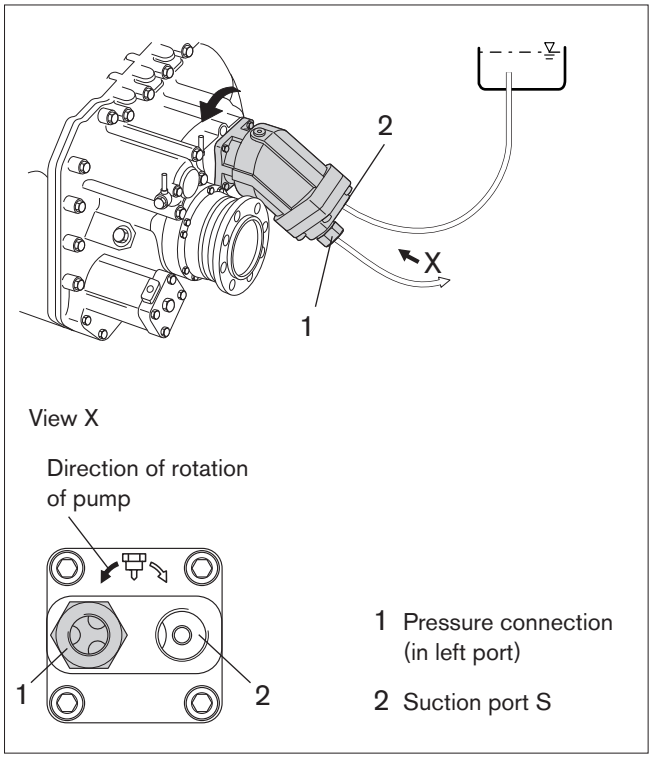


Changing the direction of rotation

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, 125
Tightening torque M_D	Nm	145	270	525
Size WAF	mm	36	41	50

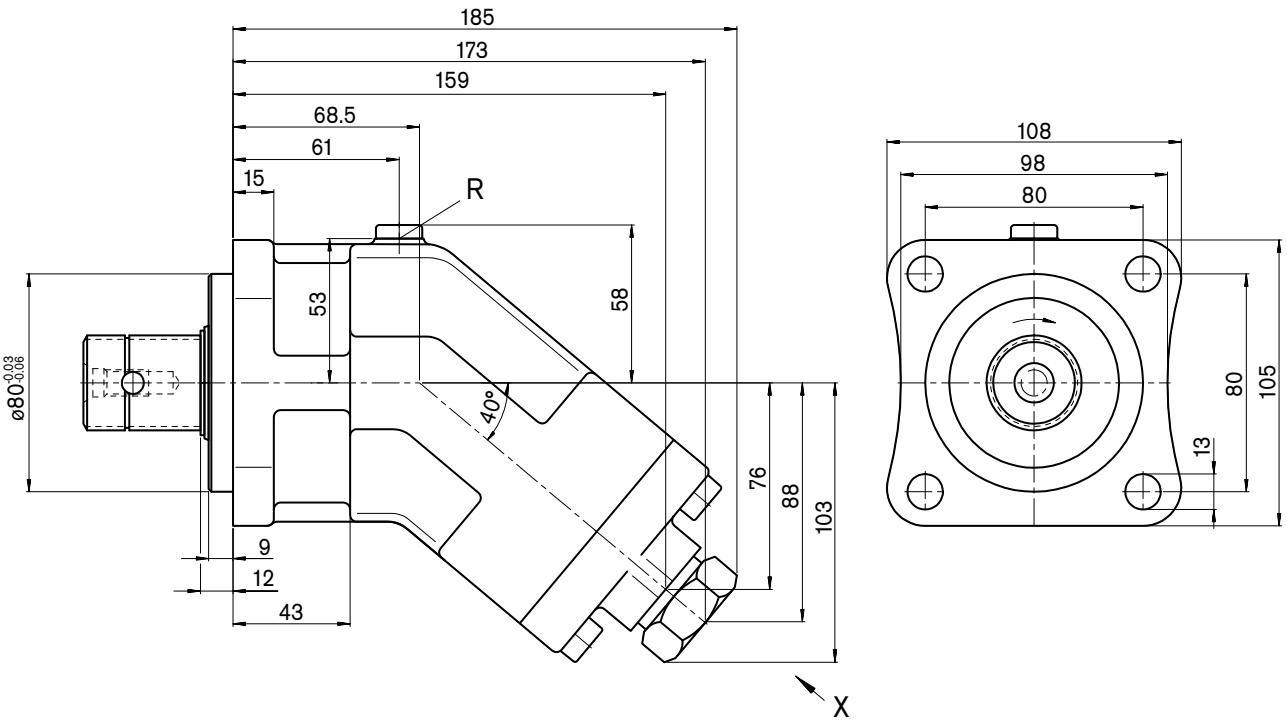
Connecting the line to the pressure connection

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.

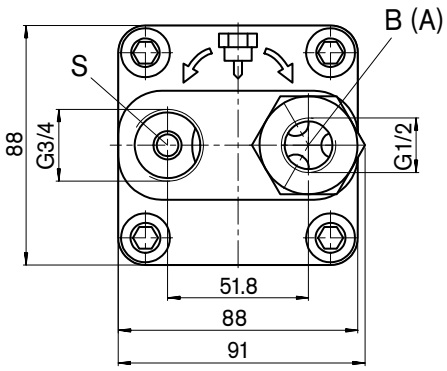
Notes

Dimensions size 23, 32

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



View X

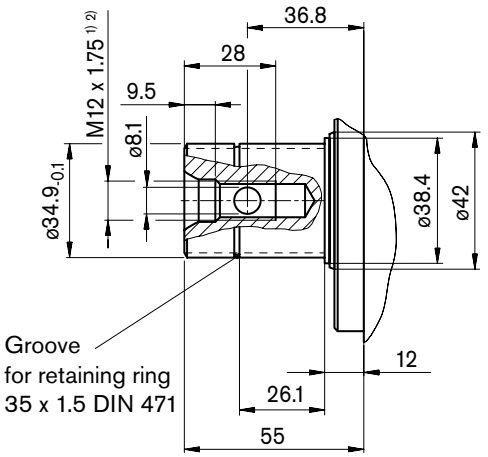


Dimensions size 23, 32

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

Drive shaft

E8 Splined shaft similar DIN ISO 14
8x32x35



Ports

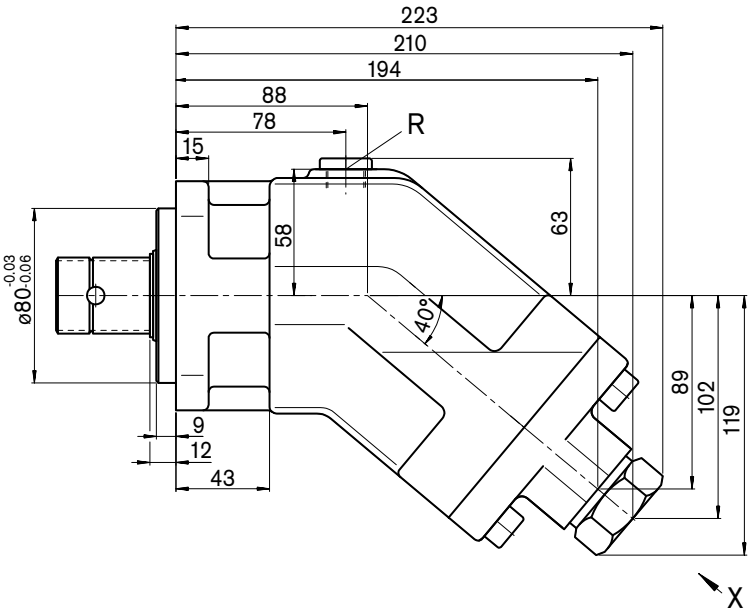
Designation	Port for	Standard	Size[2)]	Maximum pressure [bar][3)]	State
A, B	Service line	DIN ISO 228	G1/2; 14 deep	350	O
S	Suction	DIN ISO 228	G3/4; 16 deep	2	O
R	Air bleed	DIN 3852	M10 x 1; 8 deep	2	X[4)]

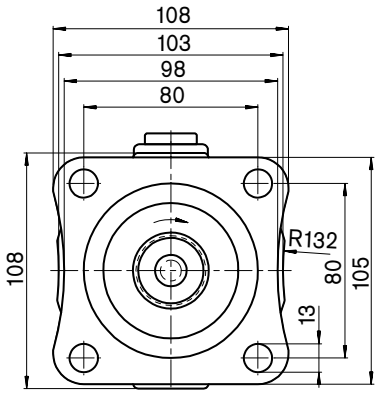
1) Center bore according to DIN 332 (thread according to DIN 13)
2) Observe the general instructions on page 20 for the maximum tightening torques.
3) Short-term pressure spikes may occur depending on the application. Keep this in mind when selecting measuring devices and fittings.
4) Only open port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

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

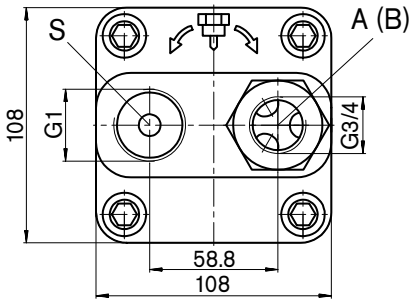
Dimensions size 45

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





View X

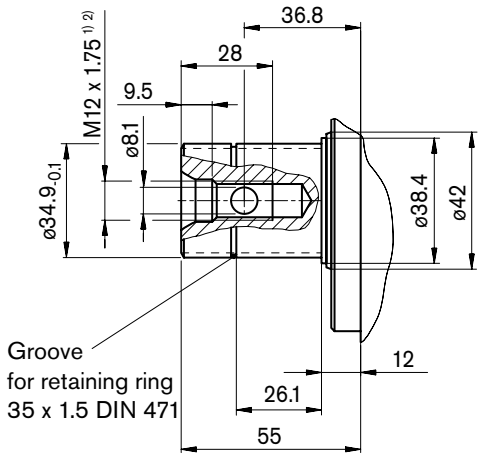


Dimensions size 45

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

Drive shaft

E8 Splined shaft similar DIN ISO 14
8x32x35



Ports

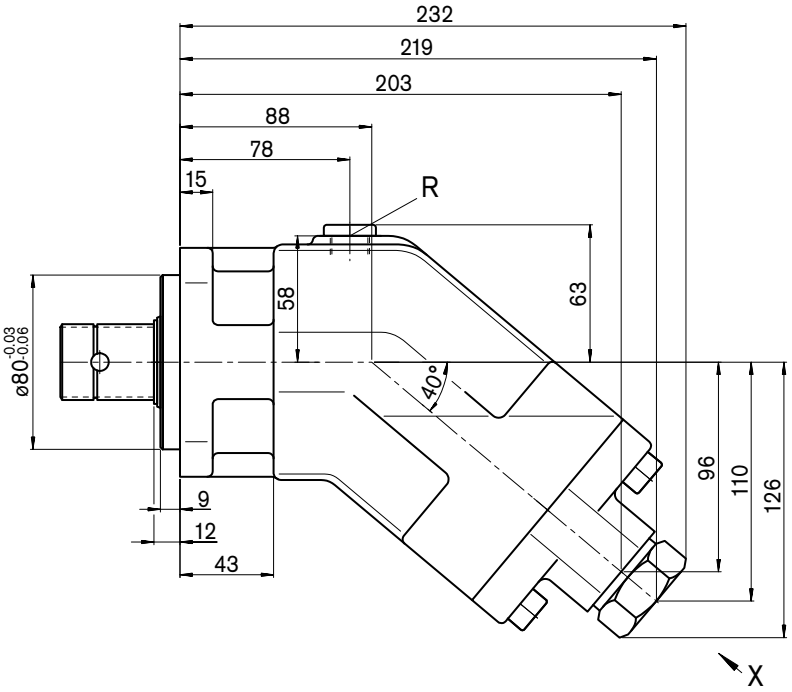
Designation	Port for	Standard	Size[2)]	Maximum pressure [bar][3)]	State
A, B	Service line	DIN ISO 228	G 3/4, 16 deep	350	O
S	Suction	DIN ISO 228	G1; 18 deep	2	O
R	Air bleed	DIN 3852	M10 x 1; 8 deep	2	X[4)]

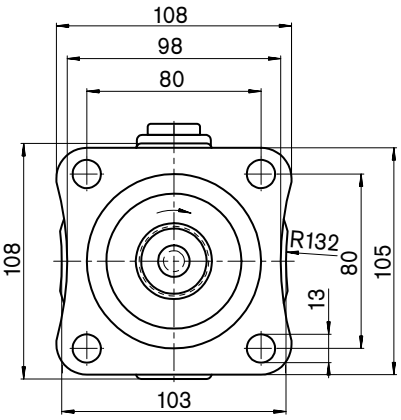
1) Center bore according to DIN 332 (thread according to DIN 13)
2) Observe the general instructions on page 20 for the maximum tightening torques.
3) Short-term pressure spikes may occur depending on the application. Keep this in mind when selecting measuring devices and fittings.
4) Only open port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

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

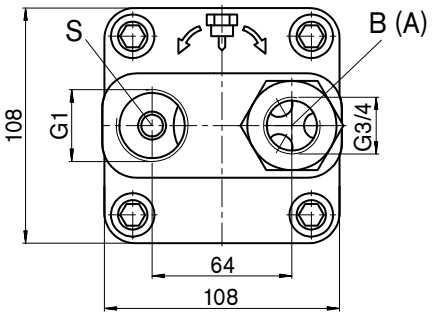
Dimensions size 63

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





View X

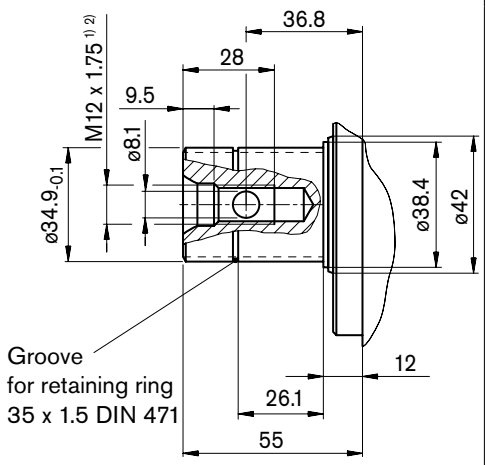


Dimensions size 63

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

Drive shaft

E8 Splined shaft similar DIN ISO 14 8x32x35



Ports

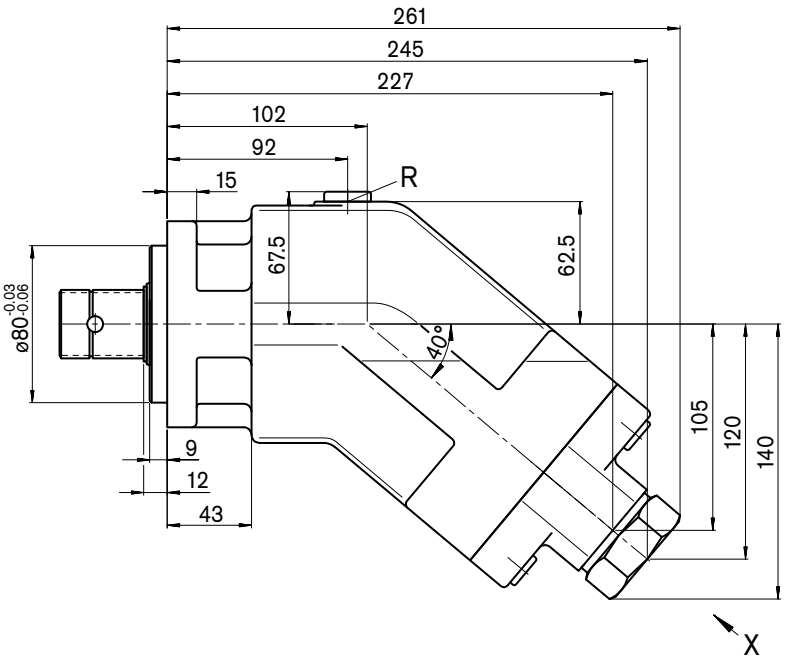
Designation	Port for	Standard	Size[2)]	Maximum pressure [bar][3)]	State
A, B	Service line	DIN ISO 228	G3/4; 16 deep	350	O
S	Suction	DIN ISO 228	G1; 18 deep	2	O
R	Air bleed	DIN 3852	M10 x 1; 8 deep	2	X[4)]

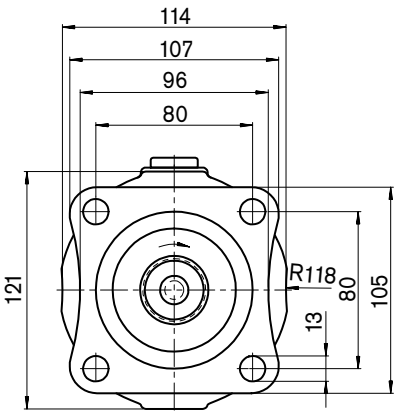
1) Center bore according to DIN 332 (thread according to DIN 13)
2) Observe the general instructions on page 20 for the maximum tightening torques.
3) Short-term pressure spikes may occur depending on the application. Keep this in mind when selecting measuring devices and fittings.
4) Only open port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

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

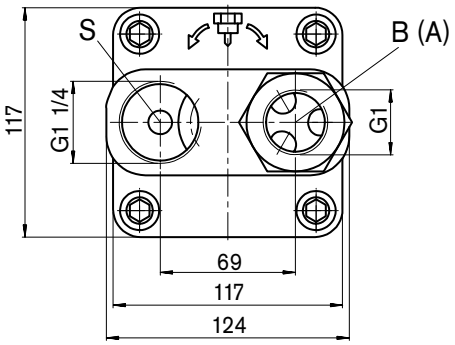
Dimensions size 80

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





View X

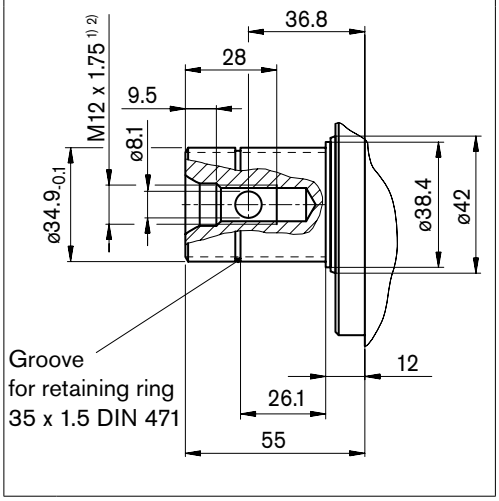


Dimensions size 80

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

Drive shaft

E8 Splined shaft similar DIN ISO 14
8x32x35



Ports

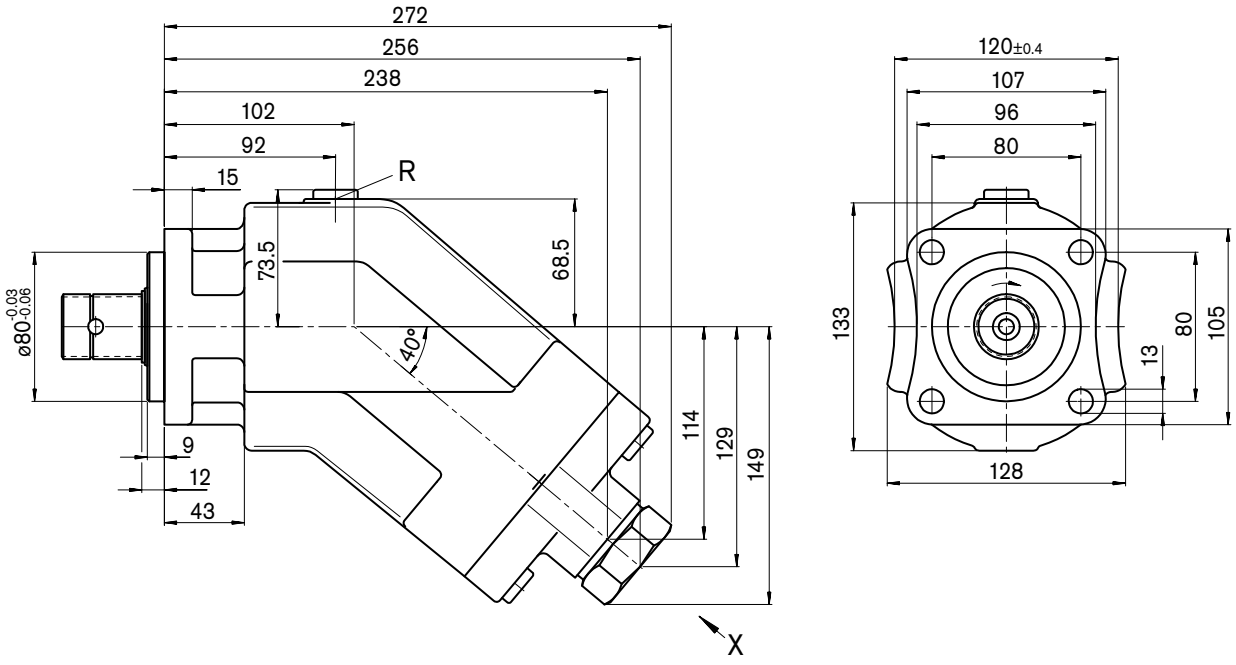
Designation	Port for	Standard	Size[2)]	Maximum pressure [bar][3)]	State
A, B	Service line	DIN ISO 228	G1, 18 deep	350	O
S	Suction	DIN ISO 228	G1 1/4; 20 deep	2	O
R	Air bleed	DIN 3852	M10 x 1; 8 deep	2	X[4)]

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

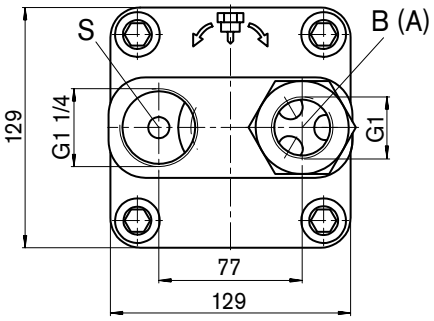
O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Dimensions size 107, 125

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



View X

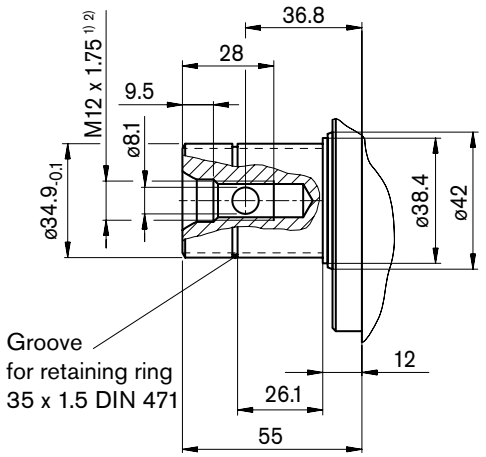


Dimensions size 107, 125

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
				NG107	NG125	
A, B	Service line	DIN ISO 228	G1; 18 deep	350	300	O
S	Suction	DIN ISO 228	G1 1/4; 20 deep	2	2	O
R	Air bleed	DIN 3852	M10 x 1; 8 deep	2	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 bleeding

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

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 separate case drain line from the case to the tank is not required.

The minimum suction pressure at port S must not fall below 0.8 bar absolute.

In all operational states, the suction line must flow into the tank below the minimum fluid level.

Installation position

See examples below.

Recommended installation positions: 1 and 2.

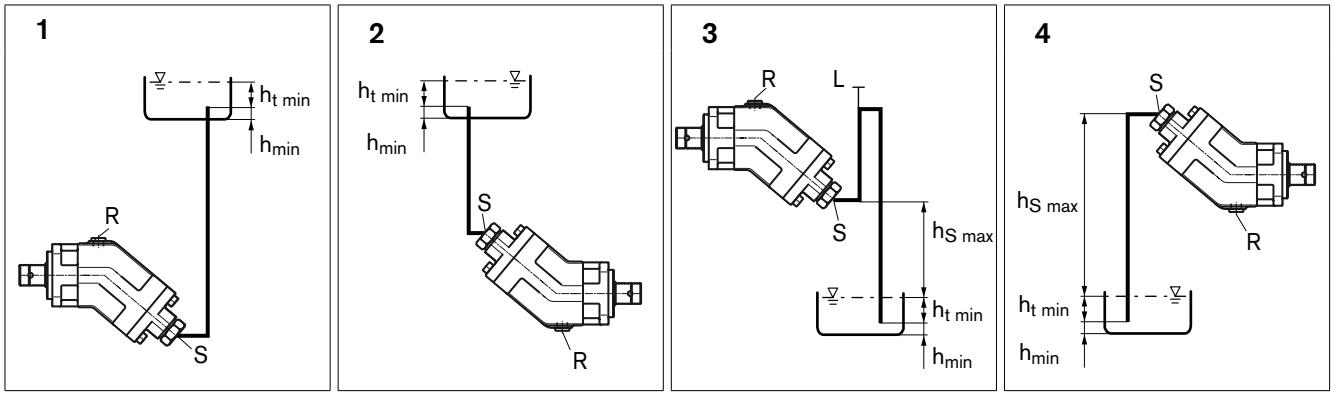
Below-tank installation (standard)

Pump below minimum fluid level of the tank.

Above-tank installation

Pump above minimum fluid level of the tank.

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



Installation position	Air bleed	Filling
1	R	S
2	–	S

Installation position	Air bleed	Filling
3	R	L
4	S	S

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

Notes

General instructions

– The KFA pump is designed to be used in open circuit.

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

– 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).

– 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 for axial piston unit:
The maximum permissible tightening torques $M_{G\,max}$ are maximum values for the threaded holes that 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 in individually according to VDI 2230.

- Locking screws:
For the metal 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.

Threaded port sizes		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
M10 x 1	DIN 3852	13 Nm	12 Nm	5 mm
G1/2	DIN ISO 228	200 Nm	–	–
G3/4	DIN ISO 228	330 Nm	–	–
G1	DIN ISO 228	480 Nm	–	–
G1 1/4	DIN ISO 228	720 Nm	–	–

Accessories for KFA

The following accessory parts are available from Rexroth for the KFA:

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

– Suction pipe, in all necessary variations (see RE 95004)

Bosch Rexroth AG
Hydraulics
Axial Piston Units
Glockeraustrasse 2
89275 Elchingen, Germany
Phone +49 (0) 73 08 82-0
Fax +49 (0) 73 08 72 74
info.brm-ak@boschrexroth.de
www.boschrexroth.com/axial-piston-pumps