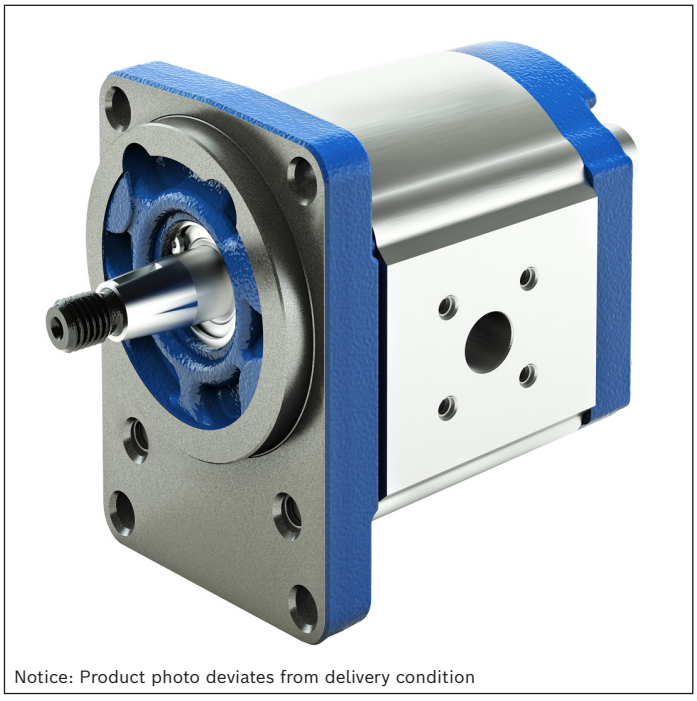
RE 10094/2023-03-16
Replaces: 2020-05-18

rexroth
A Bosch Company

External gear pump SILENCE PLUS AZPJ



Notice: Product photo deviates from delivery condition

- Platform F
- Low noise fixed pump
- Nominal size 12 to 28
- Continuous pressure up to 250 bar
- Intermittent pressure up to 280 bar

Features

- Optimized pressure pulsation, reduces noise emissions and oscillations in the system
- Pleasant pitch due to low frequency
- Consistent high quality based on large-volume production
- Long service life
- Slide bearings for high loads
- Drive shafts according to ISO or SAE and customer-specific solutions
- Port connections: connection flanges or screw thread
- Combination of several pumps possible

Contents

Product description

General information

It is the central task of external gear pumps to convert mechanical energy (torque and speed) into hydraulic energy (flow and pressure). To reduce heat losses, Rexroth's external gear units offer very high efficiencies. They are realized by pressure-dependent gap sealing and highly precise production technology.
Rexroth external gear pumps are built in four frame sizes: Platform B, F, N and G. Within each platform different sizes can be realized by different gear widths. The pumps are available in the versions Standard, High-Performance, SILENCE und SILENCE PLUS. Further configuration variants are given by different flanges, ports, shafts, valve arrangements and multiple pump combinations.
With extremely low-noise SILENCE PLUS pumps, the intrinsic noise is reduced by 15 dB (A) on average as compared with standard external gear pumps and the flow pulsation is also decreased by 75%.

Pumping principle

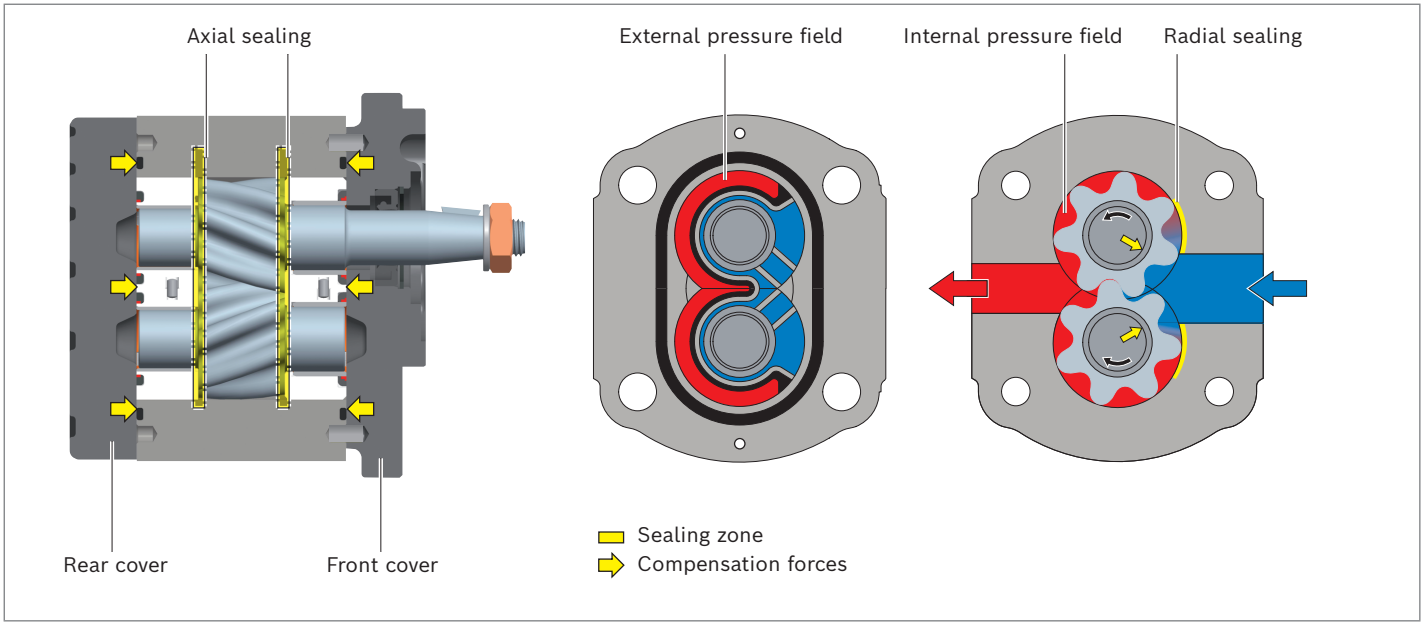
Continuous tooth contact reduces operating noise:
A non-involute rounded tooth profile, combined with helical gearing, forms the heart of the SILENCE PLUS. Thanks to permanent tooth contact, the hydraulic fluid is transported almost continuously and noiselessly. The possibility of noise developing from trapped oil between the tooth flanks is prevented in the first place.

A hydrostatic bearing ensures long service life: The high performance and long service life of the SILENCE PLUS is due to a Rexroth patented solution: Hydrostatic grooves provide wear-free compensation for the internal axial forces generated in the helical gearing – even at pressures up to 280 bar.

Construction

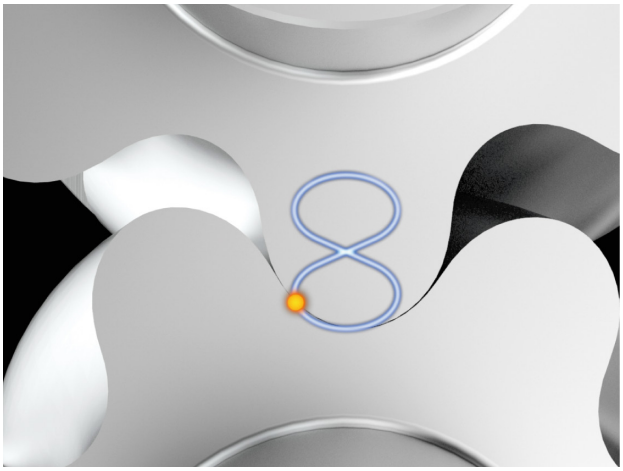
The external gear pump consists essentially of a pair of gear wheels supported in bearing bushings and the housing with a front cover and a rear cover.
The drive shaft protrudes from the front cover where it is usually sealed by the shaft seal. The bearing forces are absorbed by slide bearings. These bearings were designed for high pressures and have excellent emergency running properties, especially at low rotational speeds.
The gear wheels have 7 teeth. This keeps both flow pulsation and noise emission to a minimum. The sealing of the pressure chambers is achieved by forces depending on the working pressure. This ensures optimum efficiency. The working pressure generated in the gear chambers is transferred to the outside of the bearing bushings in specifically designed pressure fields in such a way that they are pressed against the gears and seal them up. The pressurized compression areas are limited by special seals. The seal in the area between the gear teeth and the housing is ensured by the smallest of gaps that are set depending on the pressure between the gear teeth and housing.

▼ **Axial and radial sealing of gear chambers**

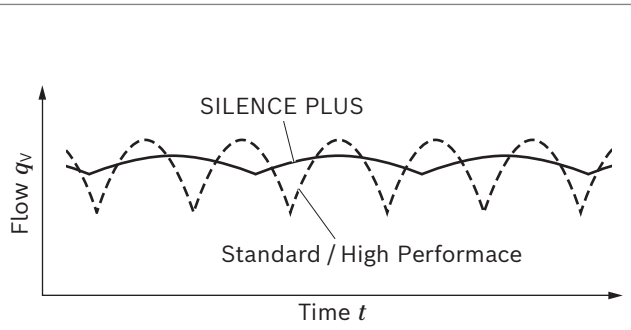


▼ Standard / High Performace

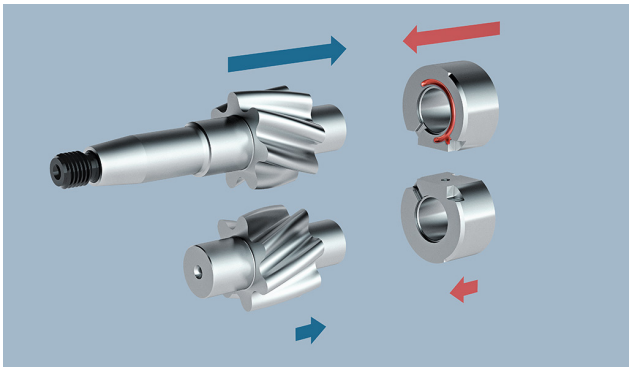
▼ SILENCE PLUS



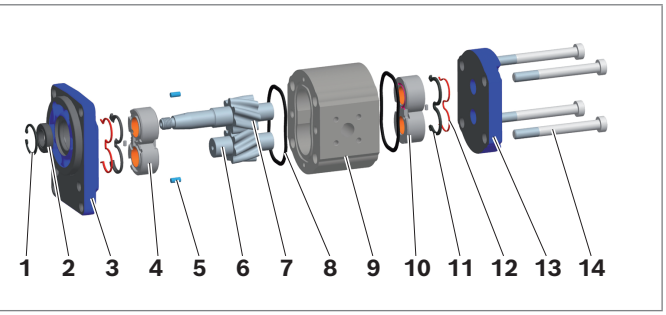
▼ Flow pulsation



▼ Hydrostatic bearing SILENCE PLUS



▼ Principle design of external gear pump



1 Retaining ring
2 Shaft seal
3 Front cover
4 Slide bearings
5 Centering pin
6 Gear wheel
7 Drive shaft
8 Housing seal ring
9 Pump housing
10 Bearing bushing
11 Axial field seal
12 Supporting element
13 Rear cover
14 Torx screws

Gear pumps with integrated valves

In order to reduce piping complexity, a flow control valve or pressure-relief valve can be integrated in the cover of the gear pump. Such solutions are used, for instance, for the hydraulic oil supply of power steering systems. The pump delivers a constant flow or maximum pressure irrespective of the rotational speed. The residual flow is either returned internally to the suction port or distributed externally to other consumers.

Notice

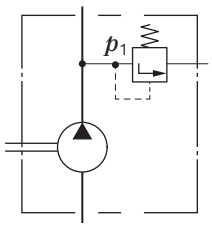
In case of external gear pumps with integrated valves, the code of the port connection defines the code of the valve ports:

- For pumps with port connection 02, 07, 20, 30 and 50 the valve ports are metric
- For pumps with port connection 12 and 15 the valve ports are UNF threaded (ISO 11926-1)
- For pumps with port connection 01 the valve ports are pipe threaded (ISO 228-1) (BSP)
- Deviations are described by a special number.

Pressure relief valve, with external residual flow

p_1 = 5 to 250 bar

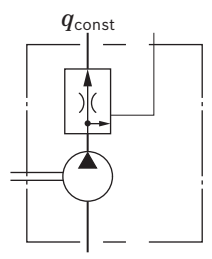
T180XX (example)



Flow control valve, with external residual flow

q_{const} = 2 to 30 l/min

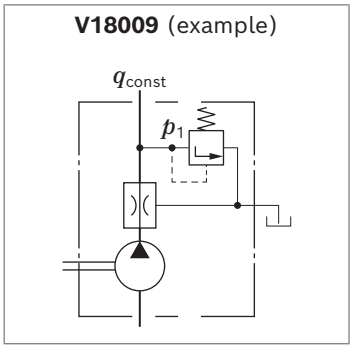
EXXX12 (example)



Flow control valve with pressure relief valve, with external residual flow only

q_{const} = 2 to 30 l/min; p_1 = 5 to 250 bar

V18009 (example)



Type code

Type code single pump

01	02	03		04	05		06	07	08	09	10	11	12	13		14
AZ	**P**	**J**	**–**	**2**	**2**	**–**									**–**	

Product

01	External gear unit	**AZ**

Function

02	Pump	**P**

Model

03	SILENCE PLUS, platform F (12 ... 28 cm³/rev)	**J**

Series

04	Bearing diameter 20 mm	**2**

Version

05	Zinc plated, high precision cover fixation[1)]	**2**

Nominal size (NG)

06	Geometric displacement V_g [cm³/rev], see “Technical data”	**012**	**014**	**016**	**019**	**022**	**025**	**028**

Direction of rotation

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

Drive shaft			**Typical front cover**	
08	Tapered keyed shaft	1 : 5	B, P, N	**C**
		1 : 5	A, G	**S**
		1 : 8	O	**H**
	Tang drive		M, T	**N**
	Splined shaft	SAE J744 16-4 9T	R, C	**R**
		SAE J744 19-4 11T, length 38 mm	R, C	**P**
		B17 × 14 acc. to DIN 5482	B, P, N	**F**
	Parallel keyed shaft	SAE J744 16-1, length 32 mm	R	**Q**
		SAE J744 19-1, length 32 mm	R	**K**
		dia. 18 mm	B	**A**

Front cover

09	Rectangular flange	spigot dia. 80 mm	**B**
		spigot dia. 36.47 mm (M8)	**O**
	2-bolt flange	SAE J744 82-2 (A) spigot dia. 82.55 mm	**R**
		SAE J744 101-2 (B) spigot dia. 101.6 mm	**C**
	2-bolt mounting	spigot dia. 52 mm, with O-ring	**M**
		spigot dia. 50 mm (option 1) 	**N**
		spigot dia. 50 mm (option 2) 	**P**
	4-bolt mounting	spigot dia. 52 mm, with O-ring	**T**
	Outrigger bearing	spigot dia. 80 mm (type 1)	**A**
		spigot dia. 80 mm (type 2)	**G**

1) Corrosion-protected version, details see “Technical data”

01	02	03		04	05		06	07	08	09	10	11	12	13		14
AZ	**P**	**J**	**–**	**2**	**2**	**–**									**–**	

Port connection

		012	014	016	019	022	025	028	
10	Pipe thread acc. to ISO 228-1	●	●	●	●	●	●	●	**01**
	UN-thread acc. to ISO 11926-1 / ASME B 1.1, O-ring	●	●	●	●	●	●	●	**12**
	Square flange (German version)	●	●	●	●	●	●	●	**20**
	Square flange (Italian version)	●	●	●	–	–	–	–	**30**

Sealing material

11	NBR (nitrile rubber)	**M**
	FKM (fluorocarbon rubber)	**P**
	NBR (nitrile rubber), shaft seal in FKM (fluorocarbon rubber)	**K**

Rear cover

12	Standard (cast iron)		**B**
	Pressure relief valve	with external residual flow	**T**
	Flow control valve	with external residual flow	**E**
	Flow control valve and pressure relief valve	with external residual flow only	**V**

Valve settings

13	Flow in l/min, 2-digit, e.g. 9 l/min	**XXX09**
	Cracking pressure in bar, 3-digit, e.g. 180 bar	**180XX**
	Cracking pressure in bar, 3-digit, e.g. 180 bar & flow in l/min, 2-digit, e.g. 9 l/min	**18009**

Non standard version

14	Special version[1)] (characteristics not covered by type code)	**SXXXX**

● = Available – = Not available

Notice

- Not all of the variants according to the type code are possible.
- Please select the desired pump with the help of the selection table (preferred types) or after consultation with Bosch Rexroth.
- Special options are available on request.

1) For more information about special version, please contact us.

Type code multiple pump

01	02	03		04	05		06	07	08	09	10	11	12		13
AZ	**P**		**–**			**–**								**–**	

Product

01	External gear unit	**AZ**

Function

02	Pump	**P**

Model[1)]

03	Standard Performance	4.0 ... 25 cm^3/rev	Data sheet 10090	**W**
	High Performance	1.0 ... 7.1 cm^3/rev	Data sheet 10088	**B**
		4.0 ... 28 cm^3/rev	Data sheet 10089	**F**
	SILENCE	4.0 ... 28 cm^3/rev	Data sheet 10095	**S**
	SILENCE PLUS	12.0 ... 28 cm^3/rev	Data sheet 10094	**J**

Series (according to data sheet of pump stage 1)

04	Bearing diameter 20 mm	**2**

Version (according to data sheet of pump stage 1)

05	Phosphated, pinned	**1**
	Corrosion-protected, pinned	**2**

Nominal size (NG)[2)]

06	In accordance with data sheet for the individual series	

Direction of rotation

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

Drive shaft (according to pump stage1)

08	In accordance with data sheet of pump stage 1	

Front cover (according to pump stage1)

09	In accordance with data sheet of pump stage 1	

Port connection (per pump stage)[3)]

10	In accordance with data sheet for the individual series	

Sealing material

11	NBR (nitrile rubber)	**M**
	FKM (fluorocarbon rubber)	**P**
	NBR (nitrile rubber), shaft seal in FKM (fluorocarbon rubber)	**K**

Rear cover (according to last pump stage)

12	In accordance with data sheet of the last pump stage	

Non standard version

13	Special version (characteristics not covered by type code)	**SXXX**

1) A letter is to be selected for each pump stage, e.g. triple pump AZPJ + AZPJ + AZPB: AZP**JJB**
2) A numerical value is to be selected for each pump stage, e.g. triple pump **028/016/2.0**
3) A numerical value is to be selected for each pump stage, e.g. triple pump **202020**

Notice

- Not all of the variants according to the type code are possible.
- Please select the desired pump with the help of the selection table (preferred types) or after consultation with Bosch Rexroth.
- Special options are available on request.

Example triple pump:

AZPJ...028... + AZPJ...016... + AZPB...1.0...

01	02	03		04	05		06	07	08	09	10	11	12
AZ	**P**	**JJB**	**–**	**2**	**2**	**–**	**028/016/2.0**	**R**	**D**	**C**	**20202020**	**K**	**B**

Technical data

Operating conditions

Nominal size					**12**	**14**	**16**	**19**	**22**	**25**	**28**
Series					2x						
Displacement, geometric, per revolution			V_g	cm^3	12	14	16	19	22.5	25	28
Pressure at suction port S[1]		absolute	p_e	bar	0.7 ... 3						
Maximum continuous pressure			p_1	bar	250	250	250	250	210	185	130
Maximum intermittent pressure[2]			p_2	bar	280	280	280	280	240	215	160
Maximum pressure peaks			p_3	bar	300	300	300	300	260	235	180
Minimum speed at	ν =12 mm^2/s	p < 100 bar	n_{min}	rpm	500	500	500	500	500	500	500
		p = 100 ... 180 bar	n_{min}	rpm	1000	800	800	800	800	800	800
		p = 180 bar ... p_2	n_{min}	rpm	1200	1000	1000	1000	1000	1000	1000
	ν =25 mm^2/s	at p_2	n_{min}	rpm	600	500	500	500	500	500	500
Maximum speed		at p_2	n_{max}	rpm	3500	3000	3000	3000	3000	2800	2600

Rotary stiffness of drive shaft

Drive shaft			**C**	**S**	**H**	**N**	**R**	**P**	**F**	**Q**	**K**	**A**
Rotary stiffness	c	Nm/rad	246	352	287	312	251	370	292	268	383	349

General technical data

Weight	m	kg	See chapter “Dimensions”
Installation position			No restrictions
Mounting type			Flange or through-bolting with spigot
Port connections			See chapter “Port connections” on page 23
Direction of rotation, viewed on drive shaft			Clockwise or counter-clockwise, the pump may only be driven in the direction indicated
Drive shaft loading			Axial and radial forces only after consultation
Ambient temperature range	t	°C	-30 ... +80 with NBR seals (NBR = nitrile rubber)
			-20 ... +110 with FKM seals (FKM = fluorocarbon rubber)

Corrosion protection

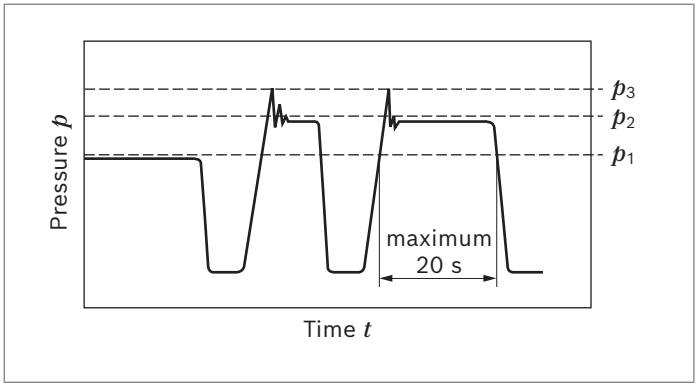
Version 2 (galvanized, passivated): Unit with corrosion protection	Degree of corrosion and rust according to DIN EN ISO 9227	Test duration 96 h: no red rust

Notice

- Safety requirements pertaining to the whole systems are to be observed.
- Please contact us for applications with frequent load changes.

1) In the case of tandem pumps, the suction-side pressure difference between the individual pump stages must not exceed 0.5 bar.
2) Limited service life with threaded ports (applicable for applications with p_2 > 210 bar)

▼ **Pressure definition**

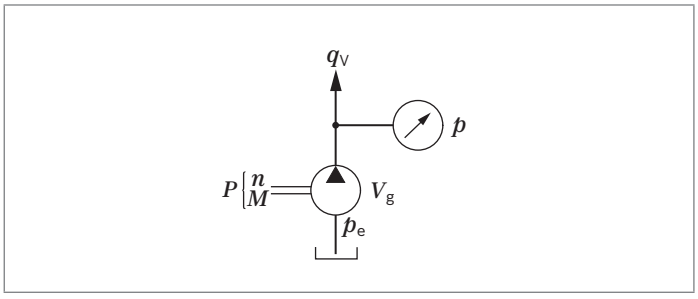


p_1: Maximum continuous pressure
p_2: Maximum intermittent pressure
p_3: Maximum pressure peaks

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

Key

V_g	Displacement per revolution [cm^3]
Δp	Differential pressure [bar] ($\Delta p = p - p_e$)
n	Rotational speed [rpm]
η_v	Volumetric efficiency
η_{hm}	Hydraulic-mechanical efficiency
η_t	Total efficiency ($\eta_t = \eta_v \times \eta_{hm}$)

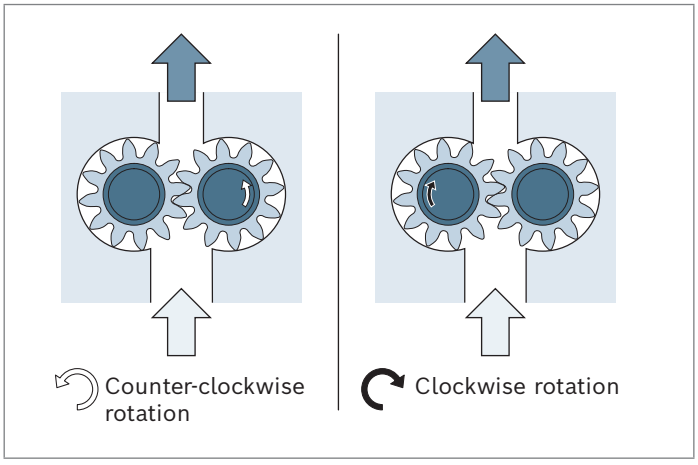


Notice
You can find diagrams for a rough calculation in chapter “Diagrams / Characteristic curves”.

Direction of rotation

The dimensional drawings in the chapter Dimensions represent pumps for clockwise rotation. The position of the drive shaft and/or the position of suction and pressure port changes for counter-clockwise rotation.

▼ **Direction of rotation, viewed on drive shaft**



Hydraulic fluid

The external gear unit is designed for operation with HLP mineral oil according to DIN 51524, 1-3. Under higher load, however, Bosch Rexroth recommends at least HLP compliant with DIN 51524 Part 2.
See the following data sheet for application instructions and requirements for selecting hydraulic fluid, behavior during operation as well as disposal and environmental protection before you begin project planning:

- 90220: Hydraulic fluids based on mineral oils and related hydrocarbons

Other hydraulic fluids on request.

Selection of hydraulic fluid
Bosch Rexroth evaluates hydraulic fluids on the basis of the Fluid Rating according to the technical data sheet 90235.
Hydraulic fluids with positive evaluation in the Fluid Rating are provided in the following technical data sheet:

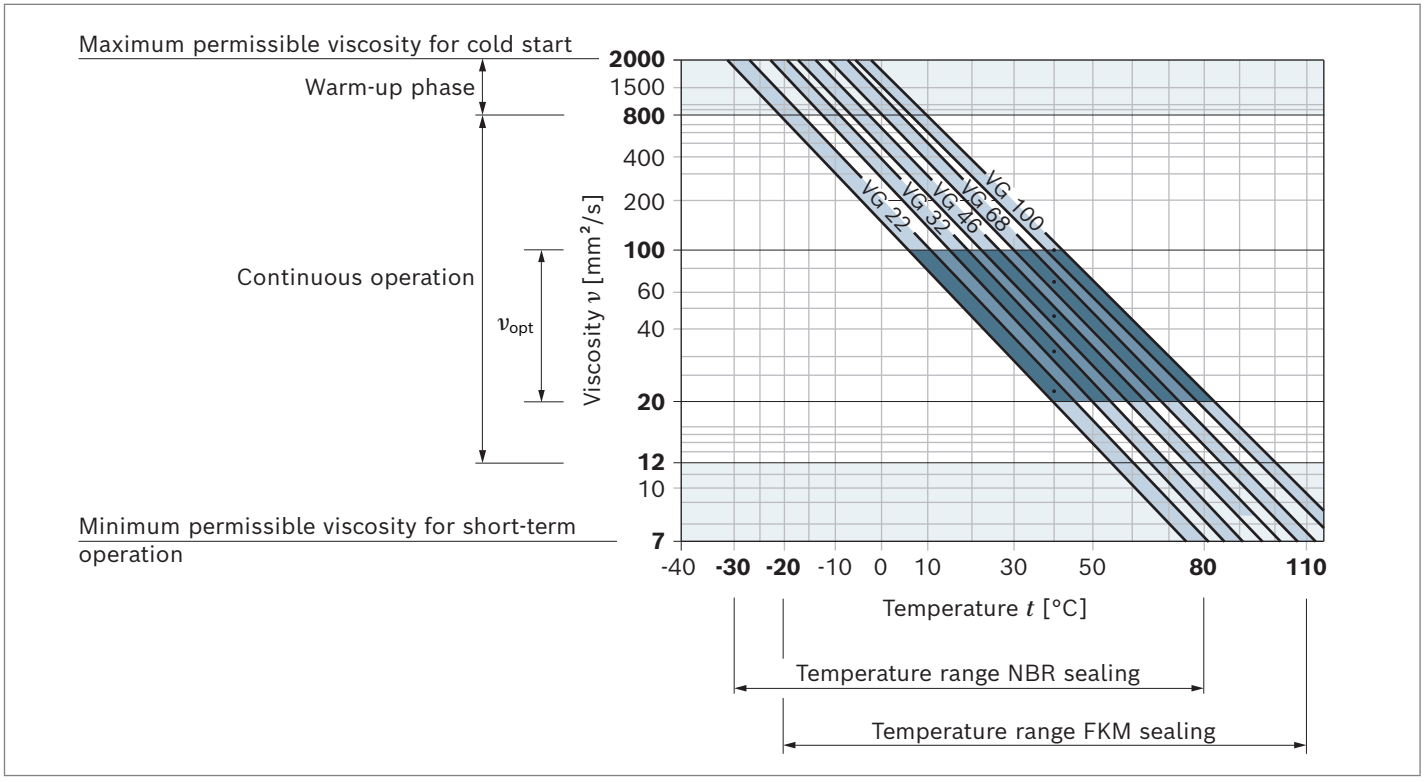
- 90245: Bosch Rexroth Fluid Rating List for Rexroth hydraulic components (pumps and motors)

Selection of hydraulic fluid shall make sure that the operating viscosity in the operating temperature range is within the optimum range (v_{opt} see “Selection diagram”)

Viscosity and temperature of hydraulic fluids

Viscosity range	
Permissible in continuous operation	v = 12 ... 800 mm²/s
Recommended in continuous operation	v_{opt} = 20 ... 100 mm²/s
Permissible for cold start	v_{max} ≤ 2000 mm²/s
Temperature range	
With NBR seals (NBR = nitrile rubber)	t = -30 °C ... +80 °C
With FKM seals (FKM = fluorocarbon rubber)	t = -20 °C ... +110 °C

▼ **Selection diagram**

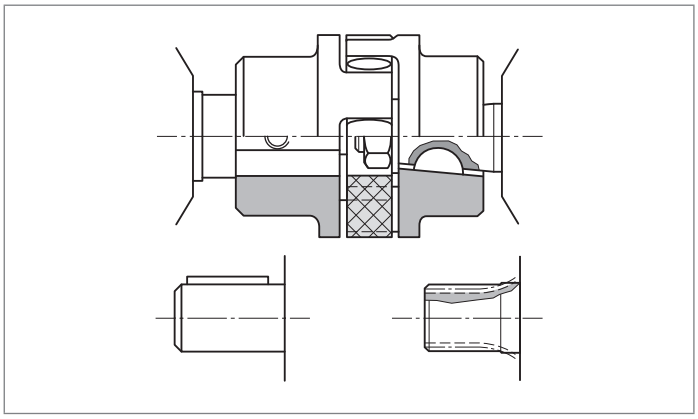


Observe the instructions for the filtration of the hydraulic fluid (see chapter “Project planning information”).

Drive

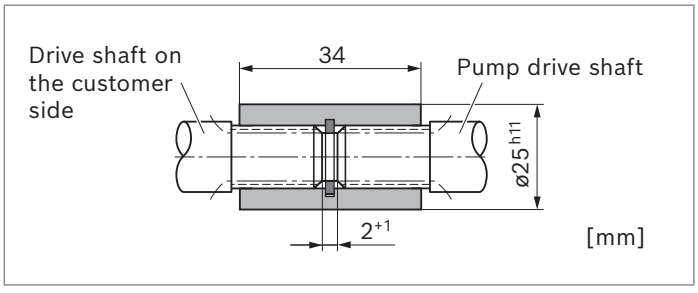
1. Elastic couplings

- The coupling may not transfer any radial or axial forces to the pump.
- The radial runout deviation from the shaft to the spigot should not exceed 0.2 mm.
- See the coupling manufacturer's assembly instructions for shaft misalignment tolerances.



2. Coupling sleeve

- To be used for splined shaft profile according to DIN and SAE
- Attention: Make sure no radial or axial forces act on the pump drive shaft or coupling sleeve. The coupling sleeve should freely move in the axial direction.
- The distance between the pump drive shaft and the output shaft on the customer side should be 2+1 mm
- Reserve installation space for the retaining ring.
- Oil-bath or oil-mist lubrication required

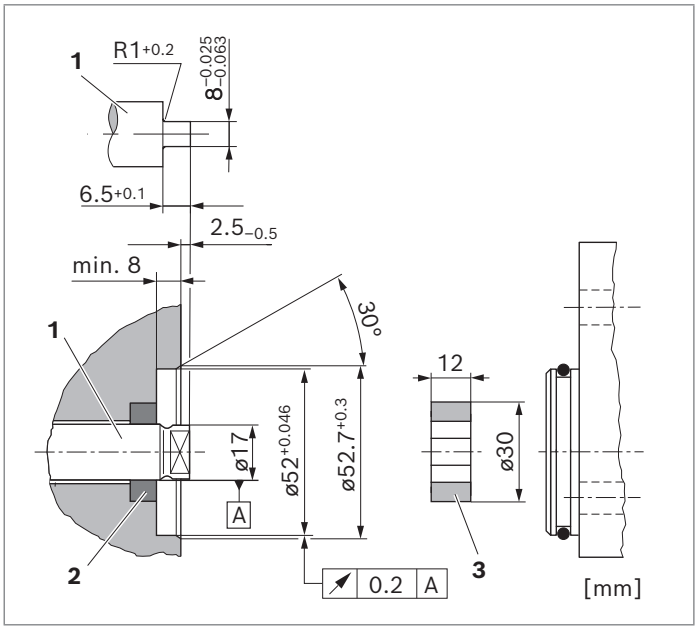


3. Tang drive coupling

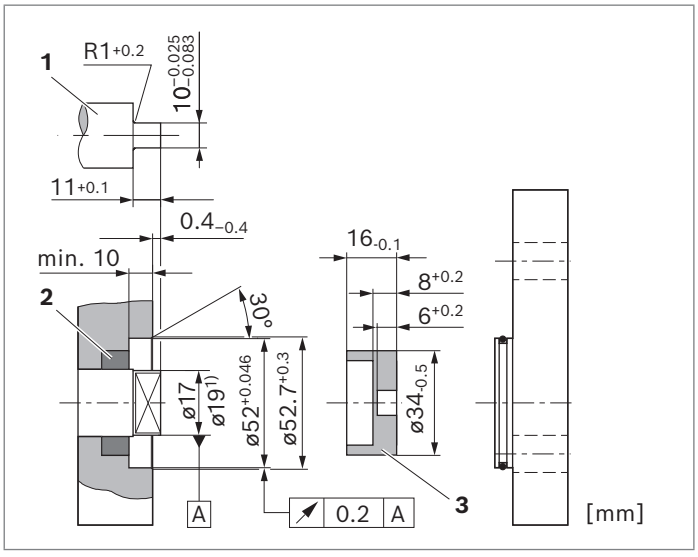
- For attaching the pump directly to an electric motor or combustion engine, gearbox, etc.
- Pump drive shaft with special tang drive coupling and driver (**3**) (scope of delivery see offer drawing)
- No shaft seal
- Drive-side installation and sealing according to the following recommendations and dimensions

- Drive shaft on the customer side (**1**)
  - Case-hardened steel DIN 17210, e.g. 20MnCrS5 case-hardened 0.6 deep; HRC 60±3
  - Seal ring contact surface ground without rifling $R_t \leq 4$ µm
- Radial shaft seal ring on the customer side (**2**)
  - Provide with rubber cover (see DIN 3760, type AS, or double-lipped ring)
  - Provide installation edges with 15° chamfer or install shaft seal with protection sleeve

▼ **Nominal sizes 12 ... 16**



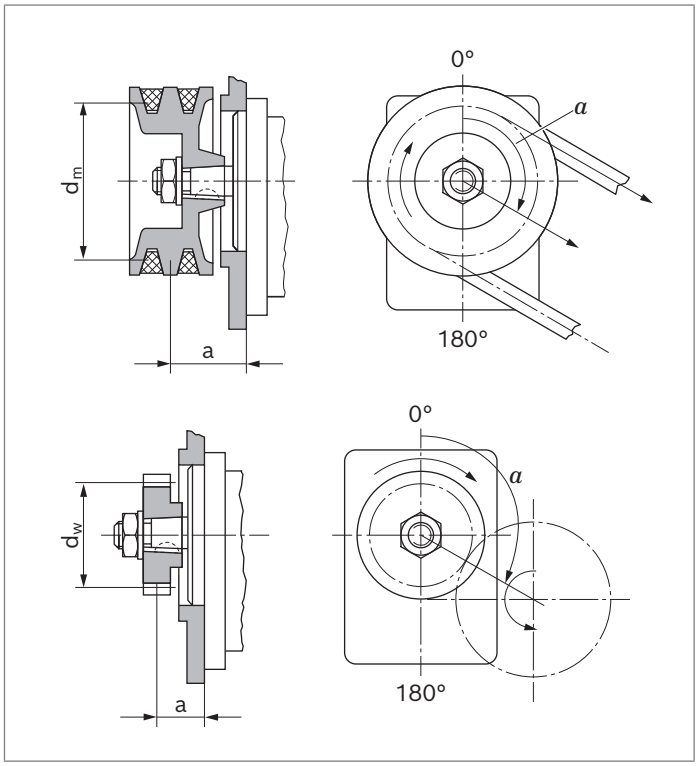
▼ **Nominal sizes 19 ... 28**



1) See offer drawing (maximum 34 mm)

4. V-belts and straight gear wheels or helical toothed gear drives without outrigger bearing

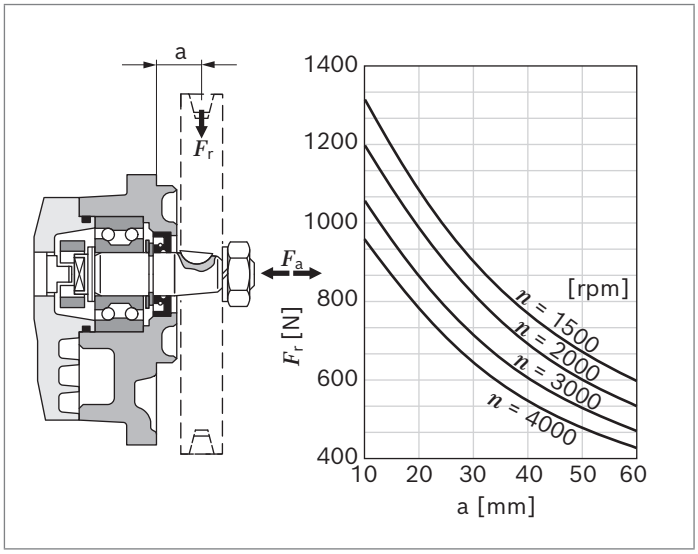
For V-belt or gear wheel drives, please contact us specifying the application and mounting conditions (dimensions a, d_m, d_w and angle α). For helical toothed gear drives, details of the helix angle β are also required.



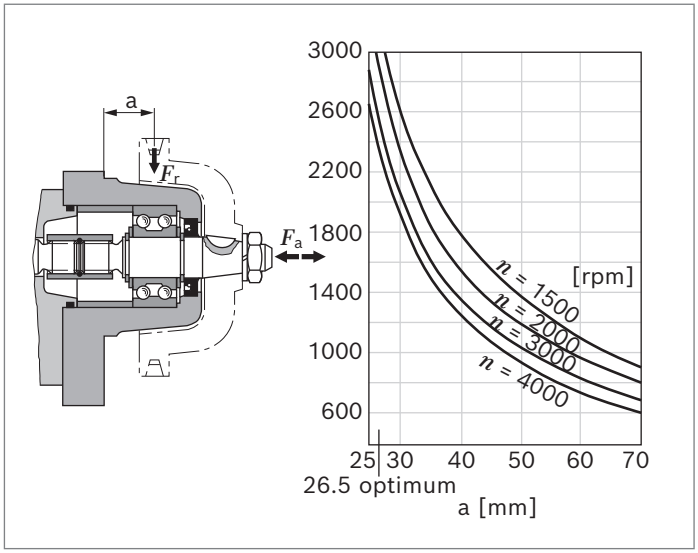
5. Outrigger bearing

Outrigger bearing are offered to eliminate possible problems when the pumps are driven by V-belts or gear wheels. The diagrams show the radial and axial load capacity in relation to a bearing service life of L_H = 1000 h.

▼ **Front cover A (type 1)**



▼ **Front cover G (type 2)**



Maximum transferable drive torques

▼ **Tapered keyed shafts**

Drive shaft		M_{max}	Nominal size	$p_{2\ max}$
Code	Designation	Nm		bar
C	1 : 5	155	12 ... 19	280
			22	240
			25	215
			28	160
H	1 : 8	160	12 ... 19	280
			22	240
			25	215
			28	160

▼ **Tang drive**

Drive shaft		M_{max}	Nominal size	$p_{2\ max}$
Code	Designation	Nm		bar
N	Tang drive	65	12	280
			14	260
			16	230
		85	19	250
			22	210
			25	190
			28	160

▼ **Splined shafts**

Drive shaft		M_{max}	Nominal size	$p_{2\ max}$
Code	Designation	Nm		bar
R	SAE J744 16-4 9T	110	12 ... 19	280
			22	240
			25	215
			28	160
P	SAE J744 19-4 11T, length 38 mm	180	12 ... 19	280
			22	240
			25	215
			28	160
F	B17 × 14 acc. to DIN 5482	100	12 ... 19	280
			22	240
			25	215
			28	160

▼ **Parallel keyed shafts**

Drive shaft		M_{max}	Nominal size	$p_{2\ max}$
Code	Designation	Nm		bar
Q	SAE J744 16-1, length 32 mm	55	12	250
			14	220
			16	190
			19	160
			22	140
			25	120
			28	110
K	SAE J744 19-1, length 32 mm	140	12 ... 19	280
			22	240
			25	215
			28	160
A	dia. 18 mm	75	12, 14	280
			16	260
			19	220
			22	190
			25	170
			28	150

▼ **With outrigger bearing**

Drive shaft	Outrigger bearing	M_{max}	Nominal size	$p_{2\ max}$
Code	Designation	Nm		bar
S	Type 1 (A) (with tang drive coupling)	65	12	280
			14	260
			16	230
			19	190
			22	160
			25	140
			28	130
	Type 1 (A) (with sleeve)	160	12 ... 19	280
			22	240
			25	215
			28	160
	Type 2 (G)		12 ... 19	280
			22	240
			25	215
			28	160

Multiple gear pumps

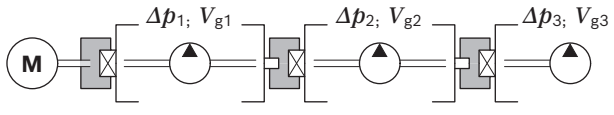
Gear pumps are well-suited to multiple arrangements, whereby the drive shaft of the first pump stage is extended to a second and possibly third pump stage. The shaft of the individual pump sections are normally connected via a driver or via a splined coupling (reinforced through drive). The individual pump stages are usually hydraulically isolated and have separate suction ports. On request a common suction port or separated but hydraulically connected suction ports are available.
For the configuration of multiple pumps, Bosch Rexroth recommends arranging the pump stage with the largest displacement on the drive side.

Notice
Basically, the parameters of the single pumps apply, however certain restrictions need to be observed:

- **Maximum rotational speed:**
  This is determined by the largest pump stage used.
- **Pressures:**
  These are restricted by the maximum transmissible torques of the drive shaft, the through drive and the driver.

Addition of drive torques

Please note, that in multiple pump arrangements the drive torques of the individual pump stages will add up according to the following formula:



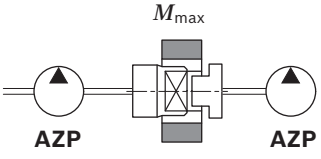
$$\frac{\Delta p_1 \times V_{g1} + \Delta p_2 \times V_{g2} + \Delta p_3 \times V_{g3}}{18 \times \pi} \leq M_{max}\ ^{1)}$$

Δp [bar]
V_g [cm³]

This may result in pressure restrictions for the respective pump stages.

Standard through drive (tang drive coupling)

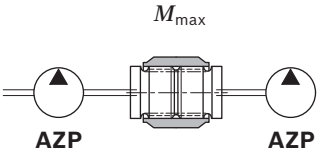
For AZPJ pumps, the driver for the next pump stage can support loads up to M_{max} = 65 Nm. This may result in pressure limitations for subsequent pump stages. Subsequent pumps of a smaller series determine the maximum transmissible torque.



Following pump		M_{max} [Nm]
Platform F	AZPW	52
	AZPF-1x	65
	AZPF-2x	85
	AZPS-1x	65
	AZPS-2x	85
	AZPJ	65
Platform B	AZPB-3x	25

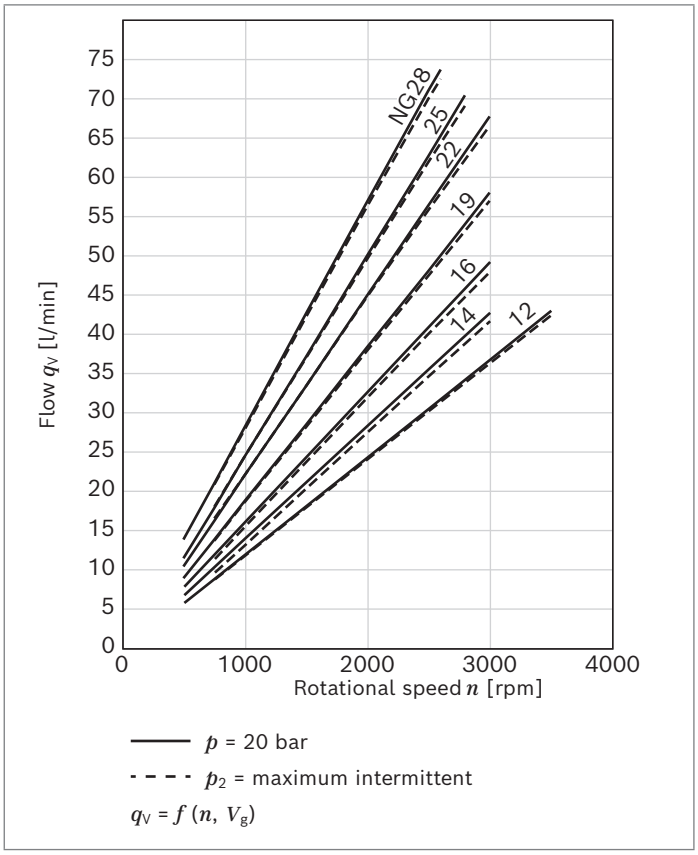
Reinforced through drive

Reinforced through drives (for up to M_{max} = 160 Nm) are available for applications with higher torques/torsional vibrations. Design available on request**.**



1) M_{max}: see table above “Maximum transferable drive torques”

Flow characteristic curves

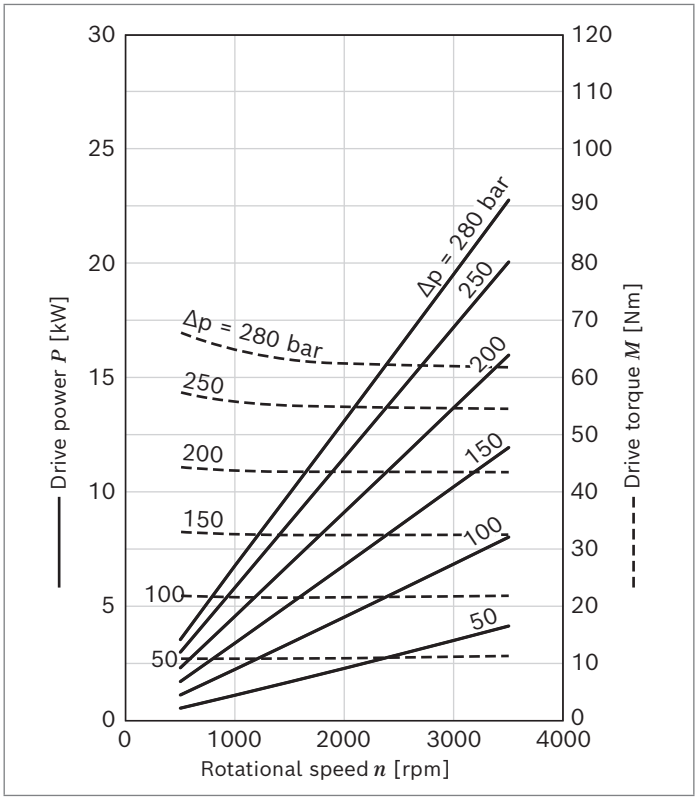


Notice

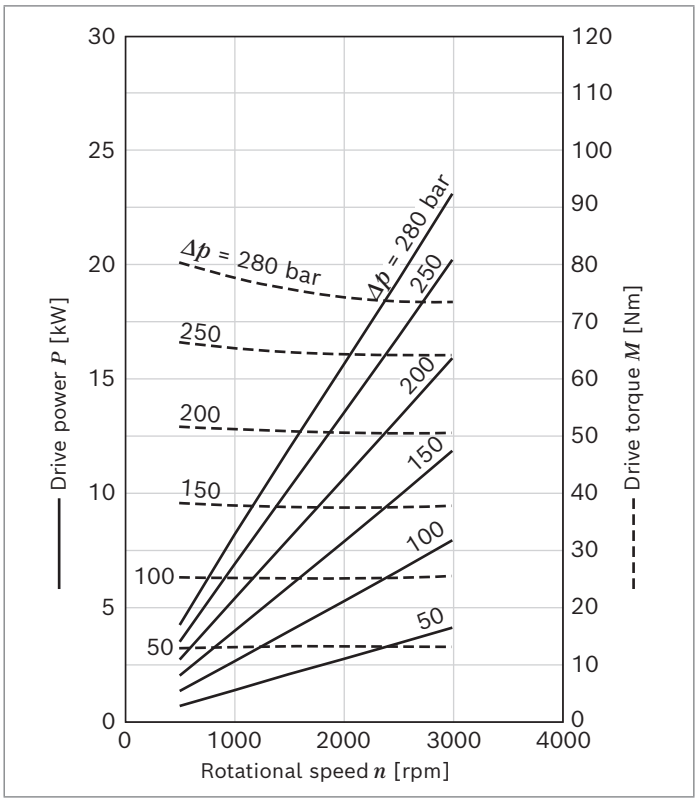
- Characteristic curves measured at ν = 32 mm²/s and t = 50 °C

Power diagrams

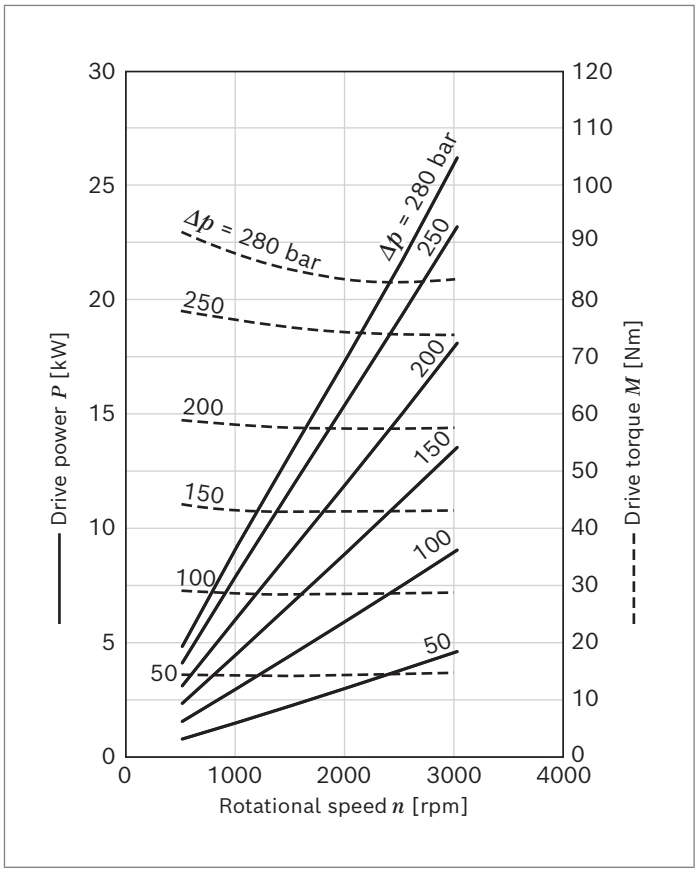
▼ **Nominal size 12**



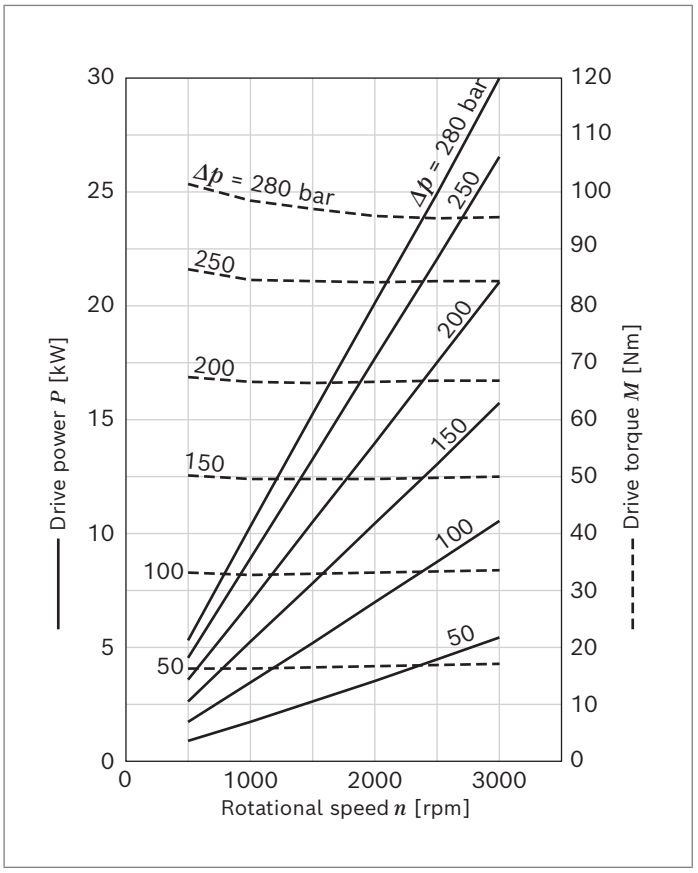
▼ **Nominal size 14**



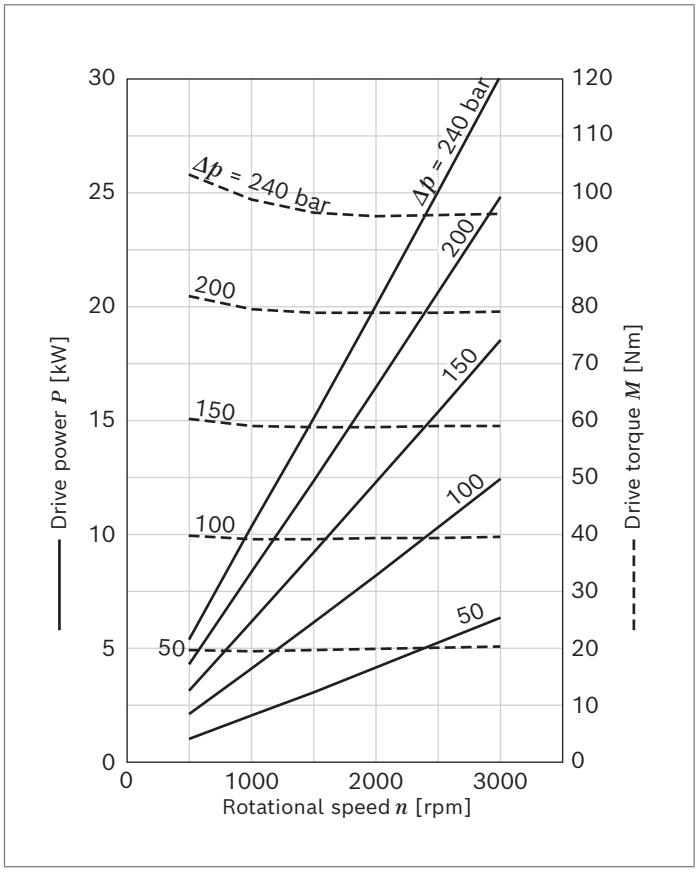
▼ **Nominal size 16**



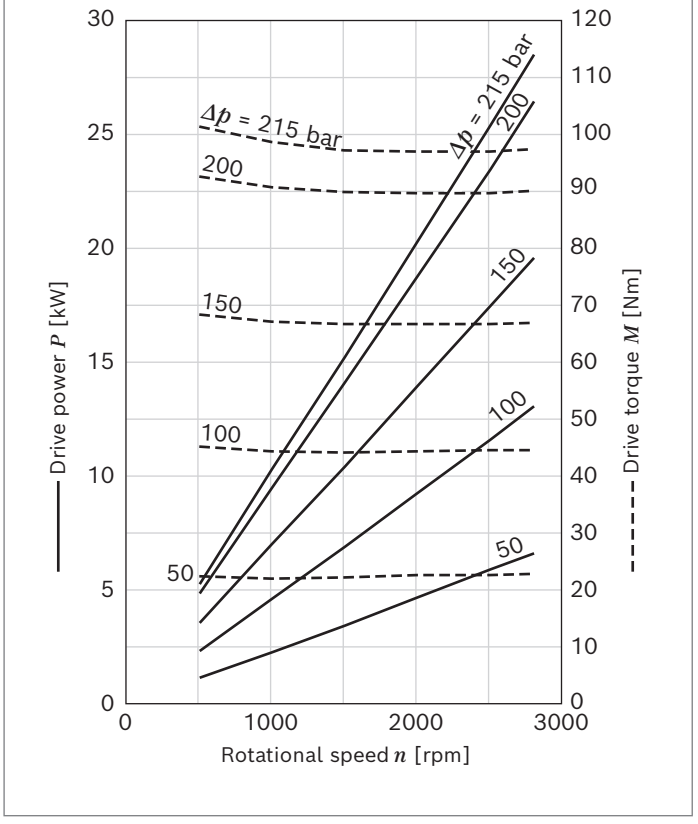
▼ **Nominal size 19**



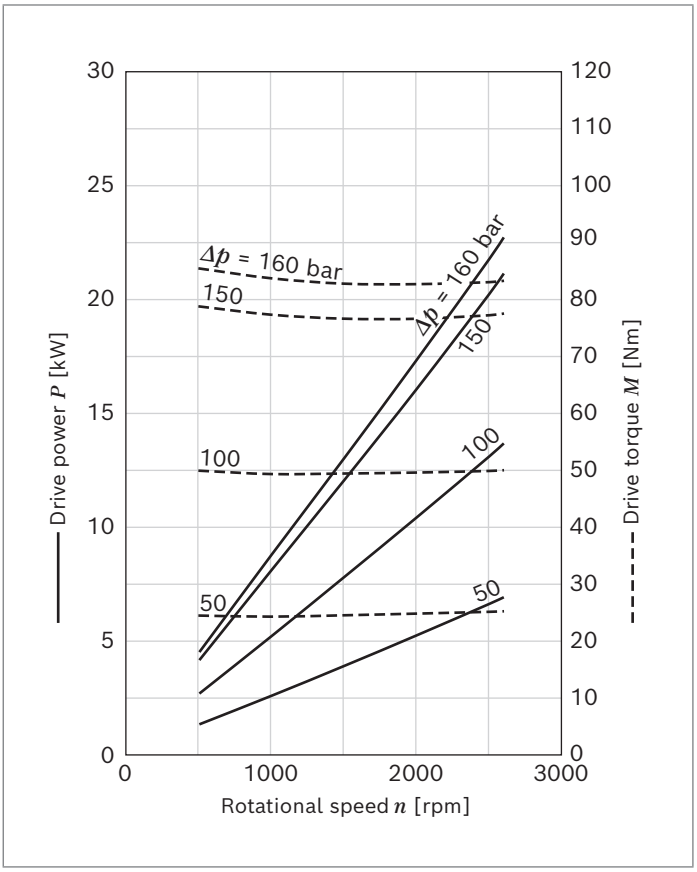
▼ **Nominal size 22**



▼ **Nominal size 25**



▼ **Nominal size 28**



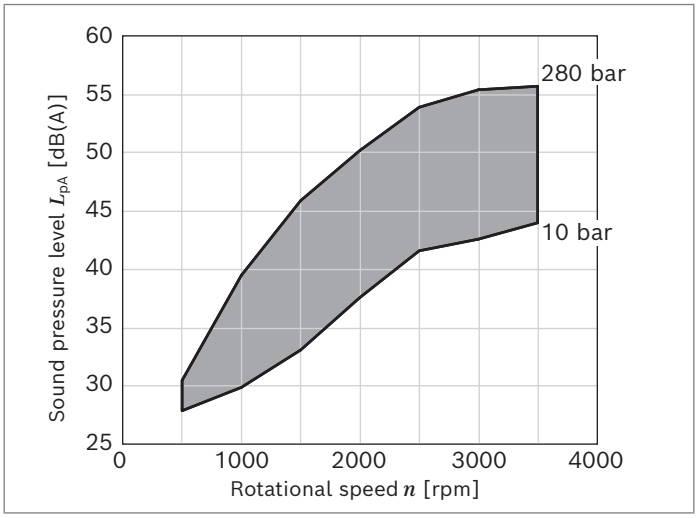
Noise charts

Apart from the low levels, the much lower frequency also contributes to the substantial noise benefits of the SILENCE PLUS compared with other pump designs.
Noise levels dependent on the rotational speed, pressure range between 10 bar and pressure value p_2 (see chapter “Technical data”).
These are typical characteristic values for the respective size. They describe the airborne sound emitted solely by the pump.
Ambient influences (installation site, piping, other system components) were not taken into account.
The values refer to one individual pump.

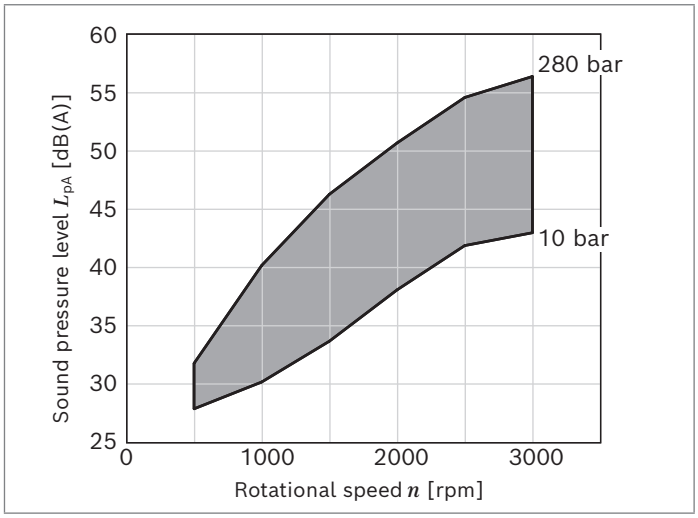
Notice

- Characteristic curves measured at ν = 32 mm²/s and t = 50 °C.
- Sound pressure level calculated from noise measurements made in the low reflection measuring room according to DIN 45635, Part 26.
- Distance from measuring sensor to pump: 1 m.

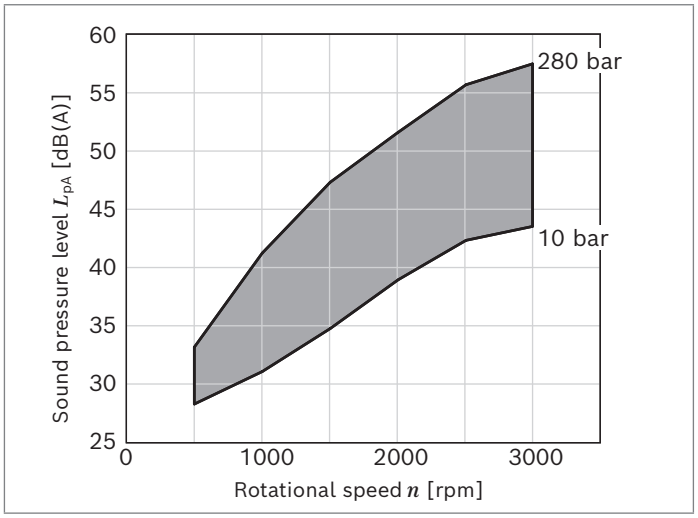
▼ **Nominal size 12**



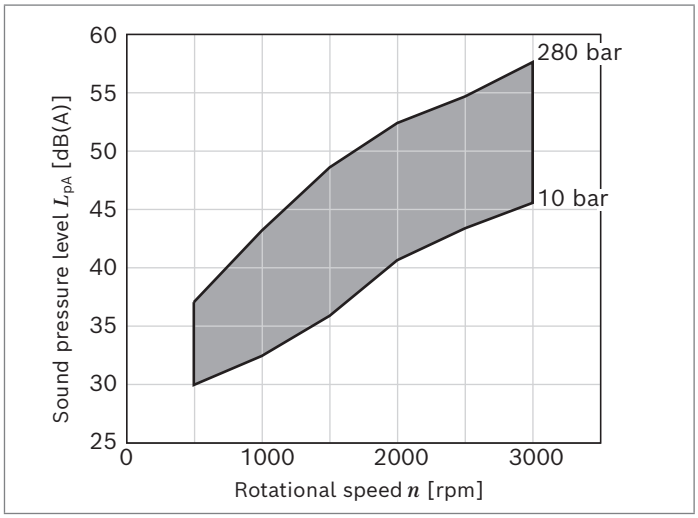
▼ **Nominal size 14**



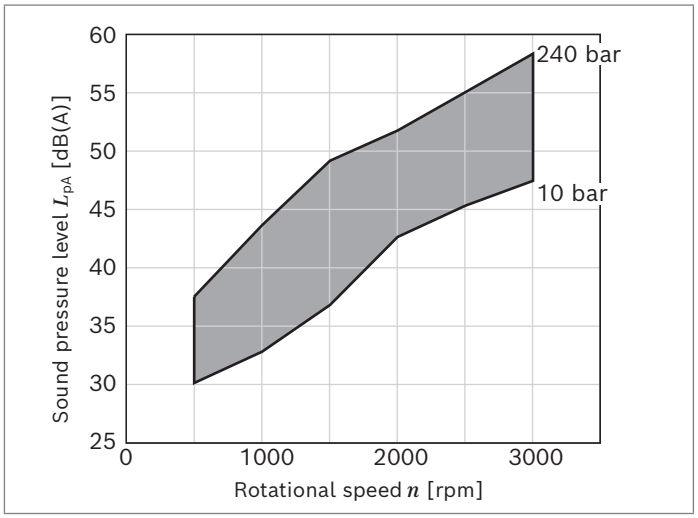
▼ **Nominal size 16**



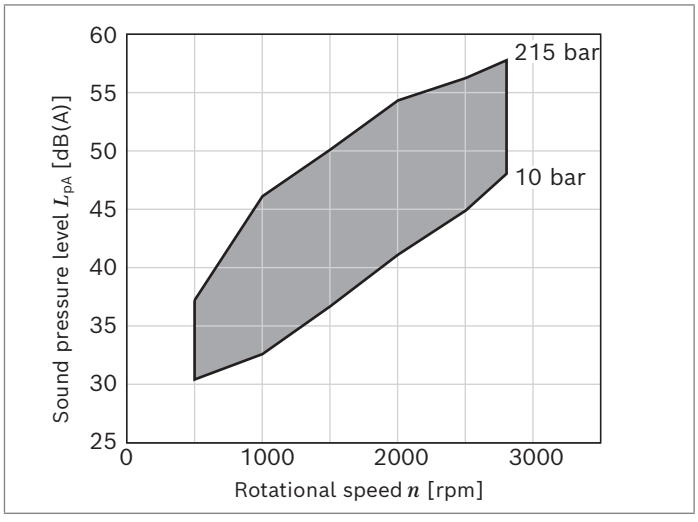
▼ **Nominal size 19**



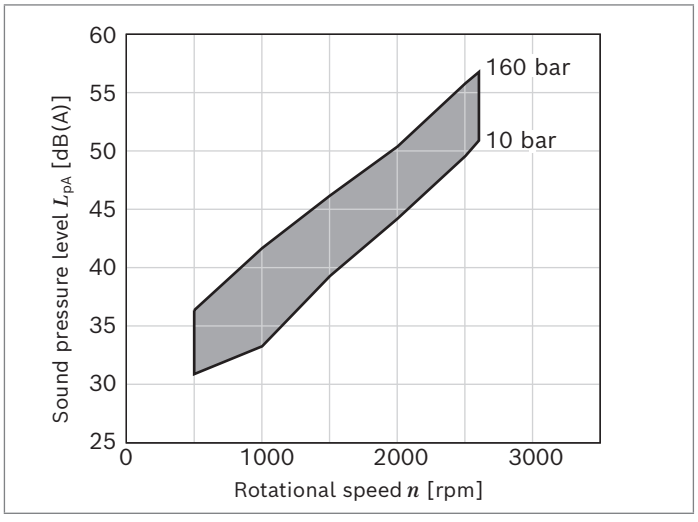
▼ **Nominal size 22**



▼ **Nominal size 25**



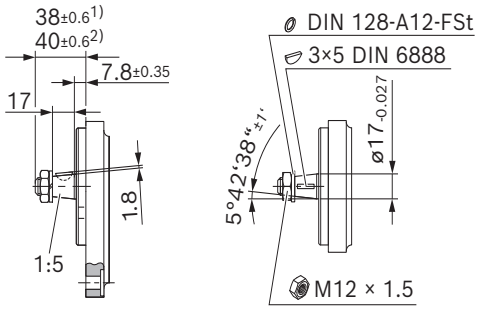
▼ **Nominal size 28**



Drive shafts

▼ **Tapered keyed shaft 1:5 (for front cover B, P, N)**

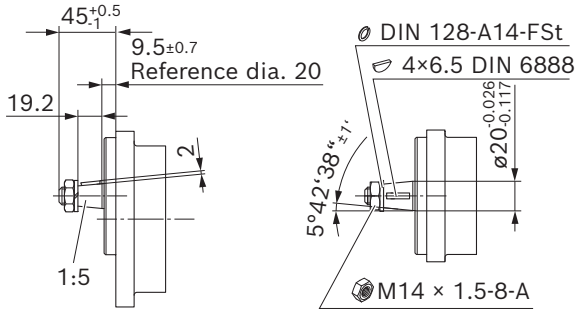
C



1) In combination with front cover B
2) In combination with front cover P and front cover N

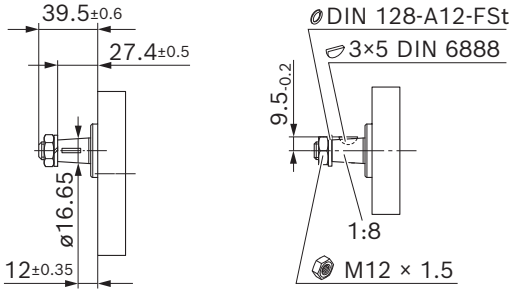
▼ **Tapered keyed shaft 1:5 (for front cover A, G)**

S



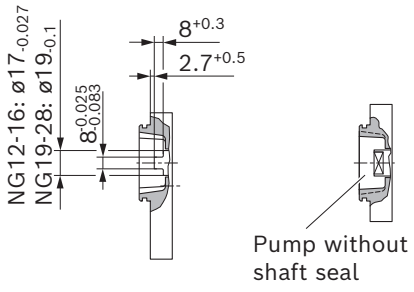
▼ **Tapered keyed shaft 1:8**

H



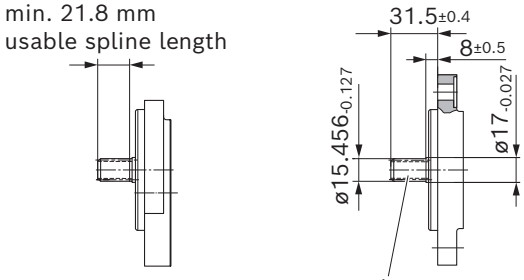
▼ **Tang drive**

N



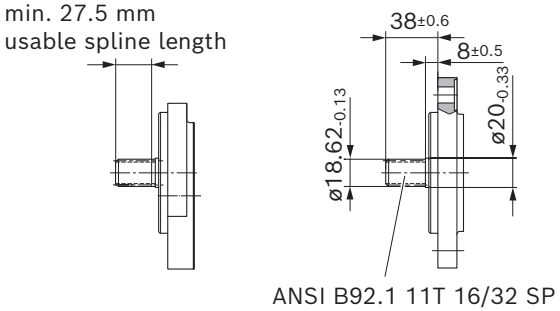
▼ **Splined shaft SAE J744 16-4 9T**

R



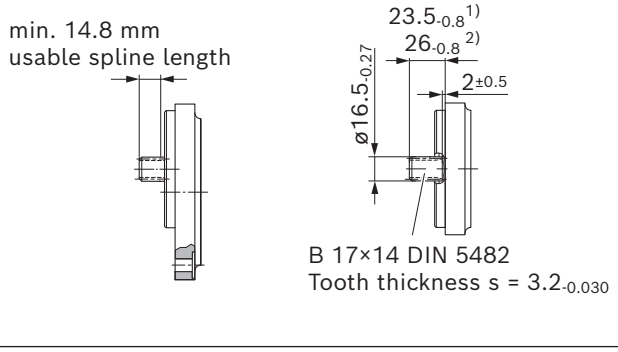
▼ **Splined shaft SAE J744 19-4 11T, length 38 mm**

P



▼ **Splined shaft B17x14 acc. to DIN 5482**

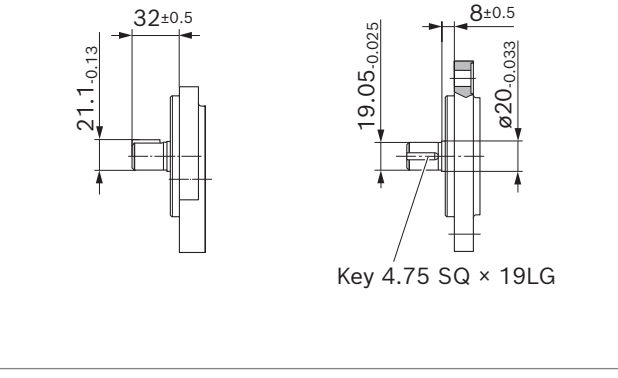
F



1) In combination with front cover B
2) In combination with front cover P and front cover N

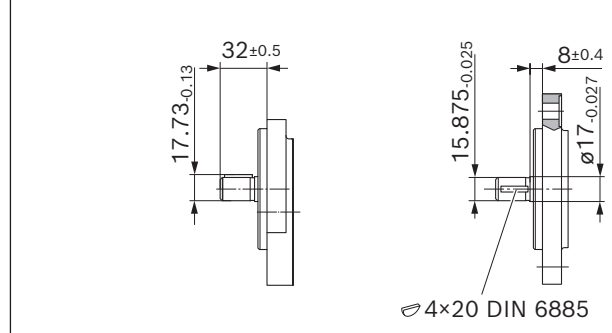
▼ **Parallel keyed SAE J744 19-1, length 32 mm**

K



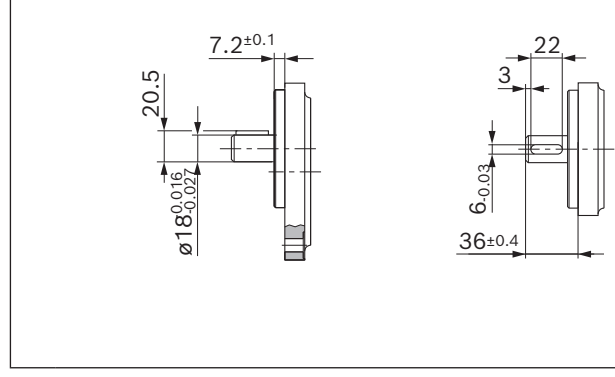
▼ **Parallel keyed SAE J744 16-1, length 32 mm**

Q



▼ **Parallel keyed dia. 18 mm**

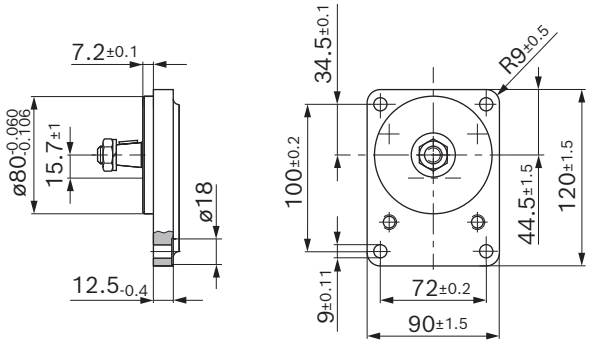
A



Front covers

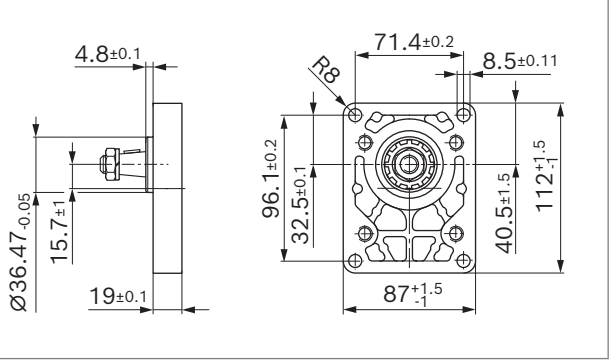
▼ **Rectangular flange spigot dia. 80 mm**

B



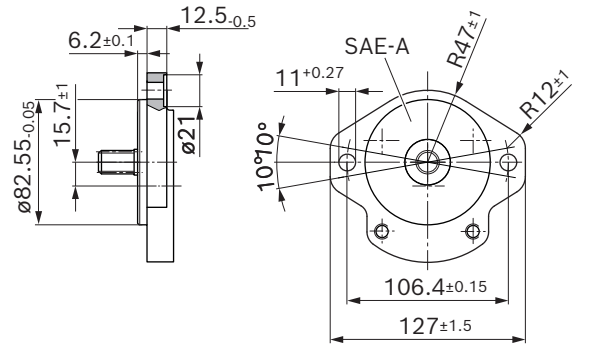
▼ **Rectangular flange spigot dia. 36.47 mm (M8)**

O



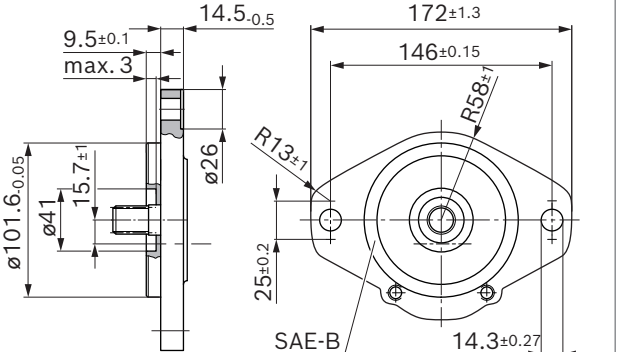
▼ **2-bolt flange SAE J744 82-2 (A) spigot dia. 82.55 mm**

R



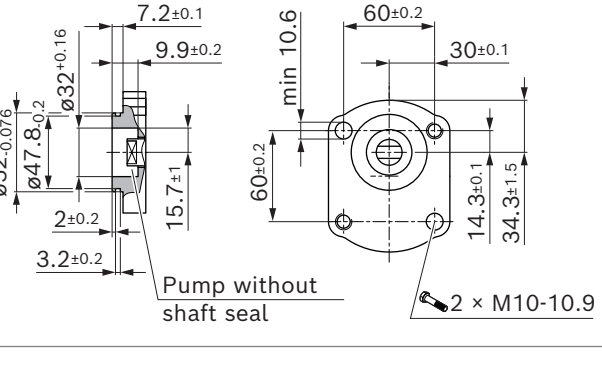
▼ **2-bolt flange SAE J744 101-2 (B) spigot dia. 101.6 mm**

C



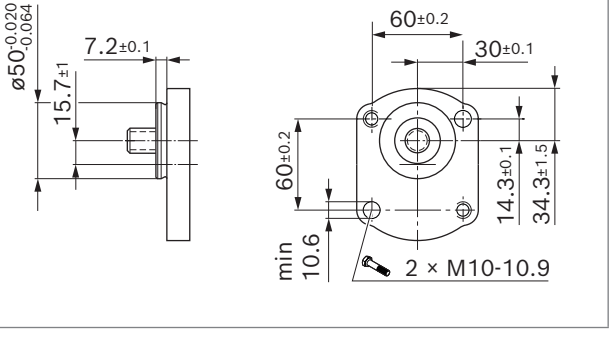
▼ **2-bolt mounting, spigot dia. 52 mm, with O-ring**

M



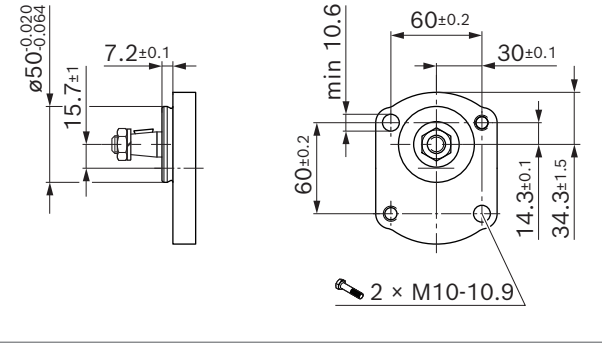
▼ **2-bolt mounting, spigot dia. 50 mm (option 1)**

N



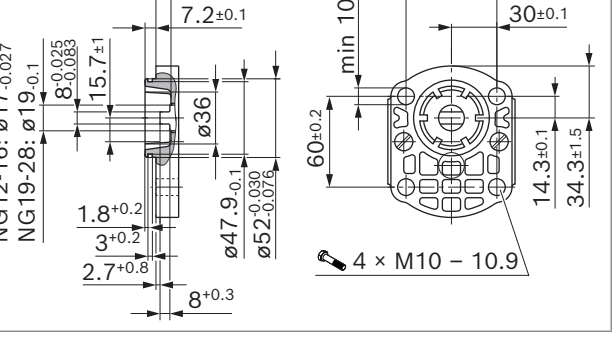
▼ **2-bolt mounting, spigot dia. 50 mm (option 2)**

P

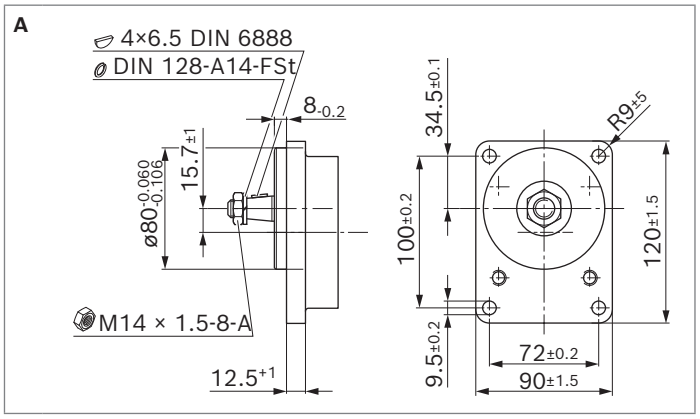


▼ **4-bolt mounting, spigot dia. 52 mm, with O-ring**

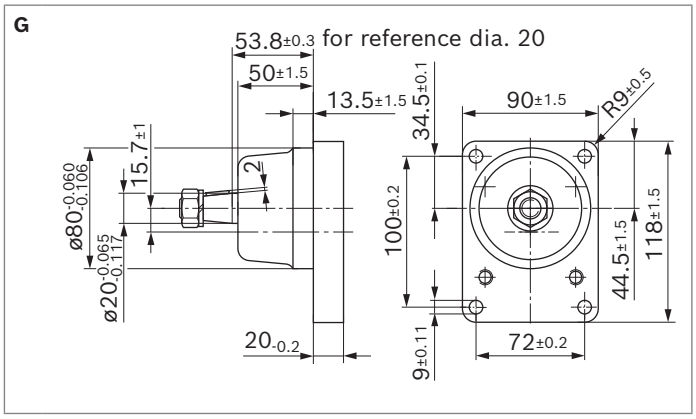
T



▼ **Outrigger bearing spigot dia. 80 mm (type 1)**



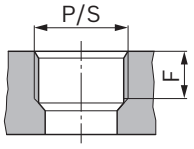
▼ **Outrigger bearing spigot dia. 80 mm (type 2)**



Port connections

▼ **Pipe thread acc. to ISO 228-1**[1)]

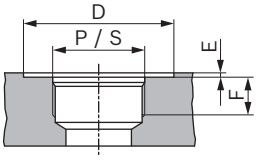
01



Nominal size	Pressure side		Suction side	
	P	F	S	F
		mm		mm
12 ... 16	G 1/2	16	G 3/4	16
25 ... 28	G 3/4			

▼ **UN-thread acc. to ISO 11926-1 / ASME B 1.1, O-ring**[1)]

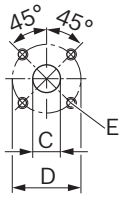
12



Nominal size	Pressure side				Suction side			
	P	D	E	F	S	D	E	F
		mm	mm	mm		mm	mm	mm
12 ... 16	7/8-14 UNF-2B	35	0.5	17	1 1/16-12 UN-2B	45	0.5	19
19 ... 22					7/8-14 UNF-2B	35		17
25 ... 28					1 1/16-12 UN-2B	45		19

▼ **Square flange (German version)**

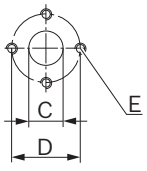
20



Nominal size	Pressure side			Suction side		
	C	D	E	C	D	E
	mm	mm		mm	mm	
12 ... 16	15	35	M6; 13 mm deep	20	40	M6; 13 mm deep
19				22	55	
22 ... 28				26		M8; 13 mm deep

▼ **Square flange (Italian version)**

30



Nominal size	Pressure side			Suction side		
	C	D	E	C	D	E
	mm	mm		mm	mm	
12 ... 16	13.5	30.2	M6; 13 mm deep	20	39.7	M8; 13 mm deep

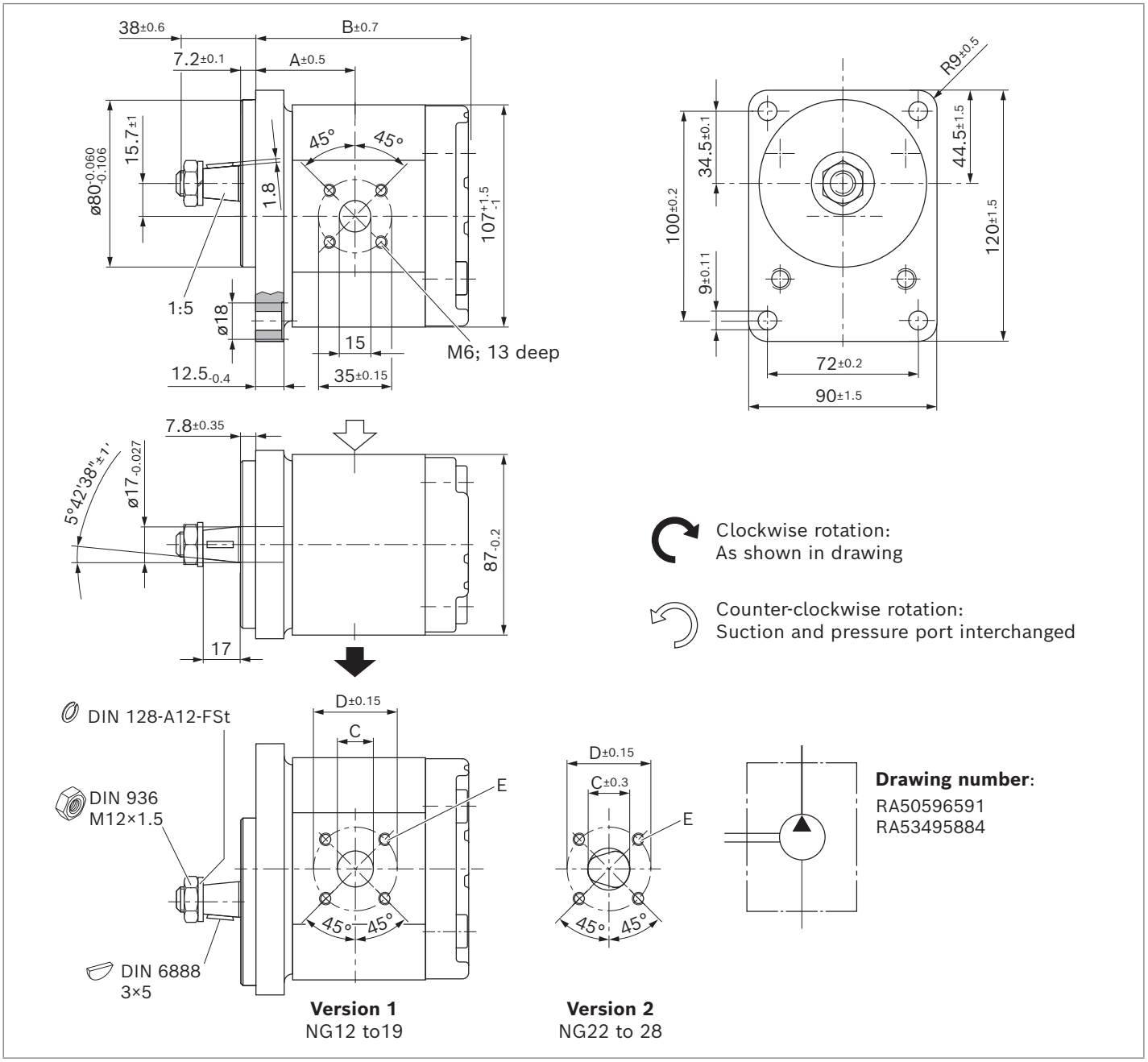
Notice
Depending on the design variant, the size of the threaded connections may differ from the sizes specified in the table. See information in the dimensional drawings.

1) Limited service life with threaded ports (applicable for applications with p_2 > 210 bar)

Dimensions – Preferred program

Tapered keyed shaft 1:5 with rectangular flange spigot dia. 80 mm

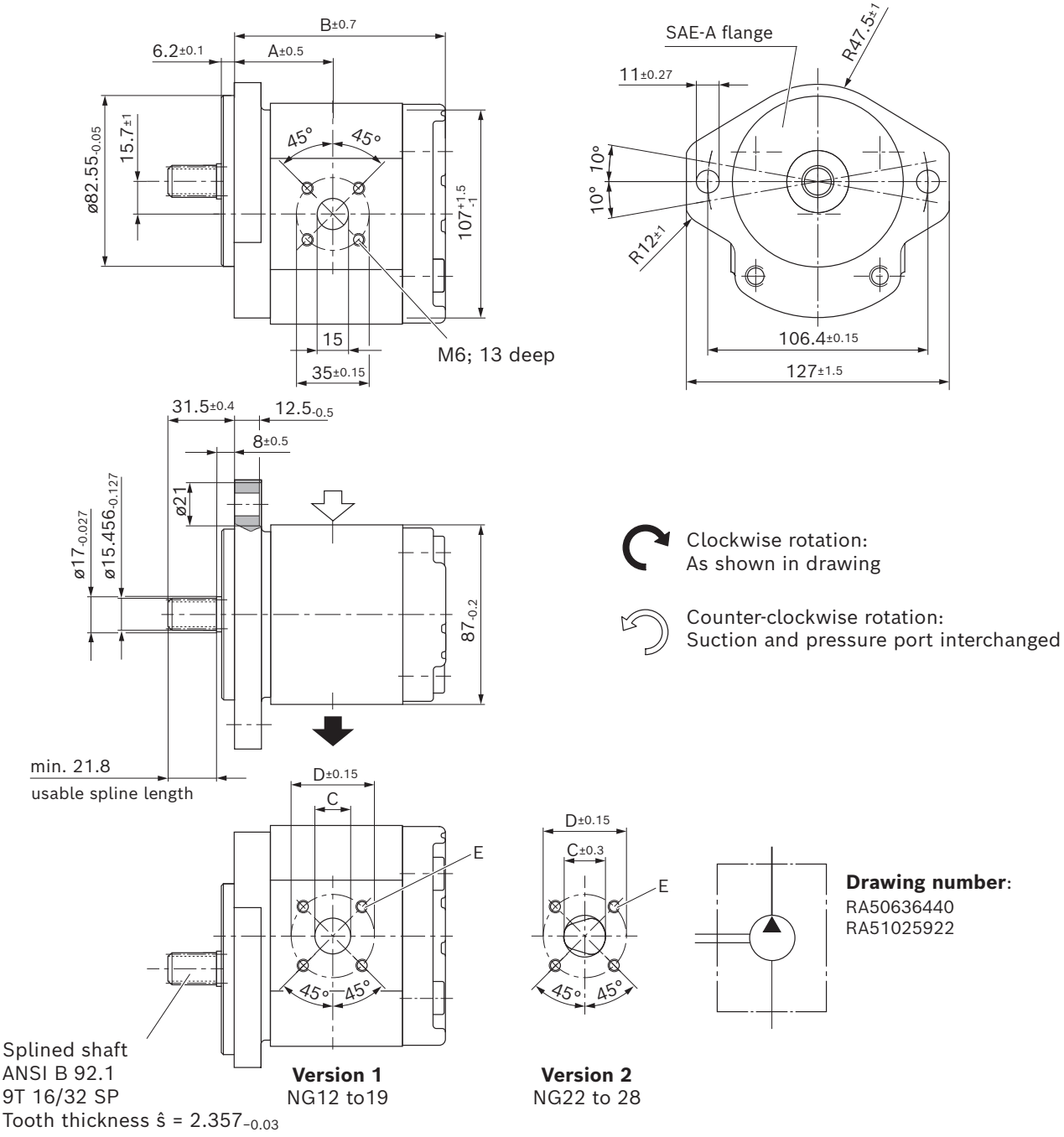
AZPJ–22– ... **CB20**MB



NG	Material number Direction of rotation		Maximum intermittent pressure p_2	Maximum speed n_{max}	Weight m	Dimensions A	 B	 C	 D	E
	counter-clockwise	clockwise	bar	rpm	kg	mm	mm	mm	mm	
12	0 518 525 302	0 518 525 001	280	3500	3.9	46.5	96.3	20	40	
14	0 518 525 303	0 518 525 002	280	3000	4	47.5	99.5	20	40	M6; 13 mm deep
16	0 518 625 301	0 518 625 001	280	3000	4.1	47.5	102.9	20	40	
19	0 518 625 309	0 518 625 010	280	3000	4.5	57.9	107.9	22	55	
22	0 518 725 310	0 518 725 011	240	3000	4.6	60.6	113.3	26	55	M8; 13 mm deep
25	0 518 725 311	0 518 725 012	215	2800	4.8	64.8	117.5	26	55	
28	0 518 725 312	0 518 725 013	160	2600	4.9	69.6	122.3	26	55	

Splined shaft SAE J744 16-4 9T with 2-bolt flange SAE J744 82-2 (A) spigot dia. 82.55 mm

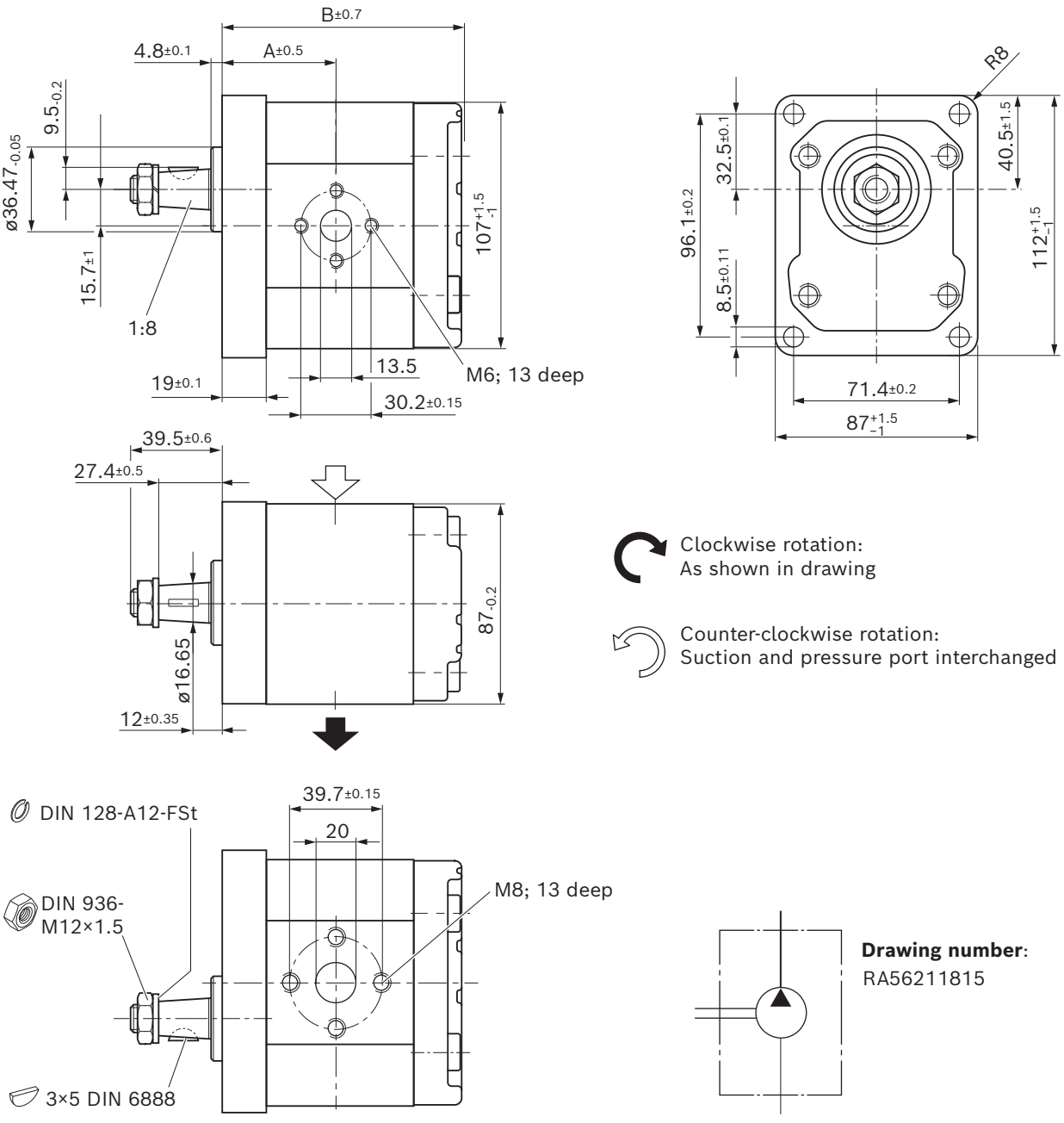
AZPJ–22– ... **RR20**MB



NG	Material number Direction of rotation		Maximum intermittent pressure p_2	Maximum speed n_{max}	Weight m	Dimensions A	B	C	D	E
	counter-clockwise	clockwise	bar	rpm	kg	mm	mm	mm	mm	
12	0 518 525 306	0 518 525 005	280	3500	3.8	46.5	96.3	20	40	
14	0 518 525 307	0 518 525 006	280	3000	3.9	47.5	99.5	20	40	M6; 13 mm deep
16	0 518 625 303	0 518 625 003	280	3000	4	47.5	102.9	20	40	
19	0 518 625 306	0 518 625 007	280	3000	4.4	57.9	107.9	22	55	
22	0 518 725 301	0 518 725 002	240	3000	4.6	60.6	113.3	26	55	M8; 13 mm deep
25	0 518 725 302	0 518 725 003	215	2800	4.7	64.8	117.5	26	55	
28	0 518 725 303	0 518 725 004	160	2600	4.8	69.6	122.3	26	55	

Tapered keyed shaft 1:8 with rectangular flange spigot dia. 36.47 mm

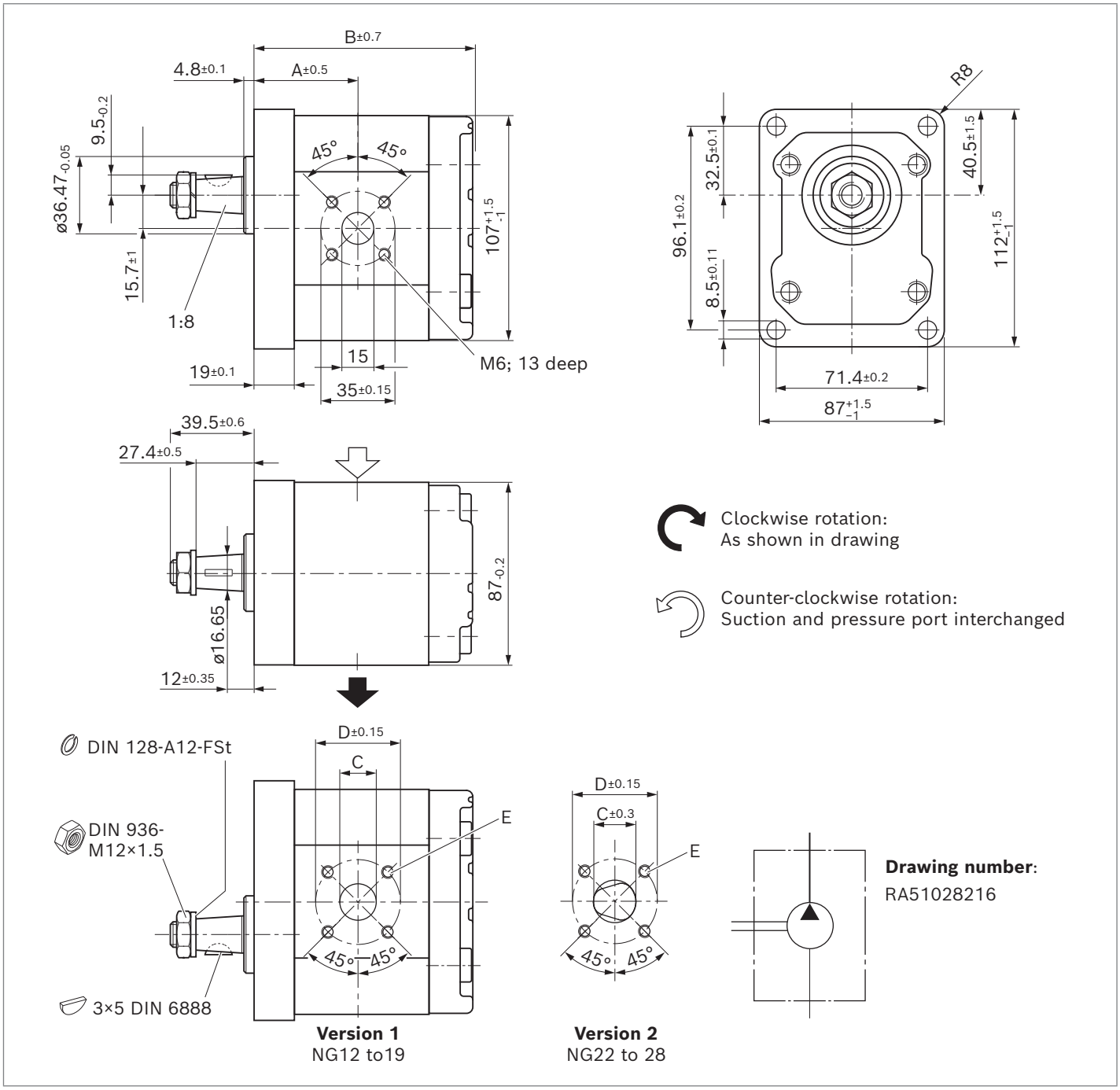
AZPJ–22– ... **HO30**MB



NG	Material number Direction of rotation		Maximum intermittent pressure p_2	Maximum speed n_{max}	Weight m	Dimensions A	B
	counter-clockwise	clockwise	bar	rpm	kg	mm	mm
12	0 518 525 308	0 518 525 007	280	3500	3.7	48	97.8
14	0 518 525 309	0 518 525 008	280	3000	2.8	49	101
16	0 518 625 304	0 518 625 004	280	3000	3.9	49	104.4

Tapered keyed shaft 1:8 with rectangular flange spigot dia. 36.47 mm

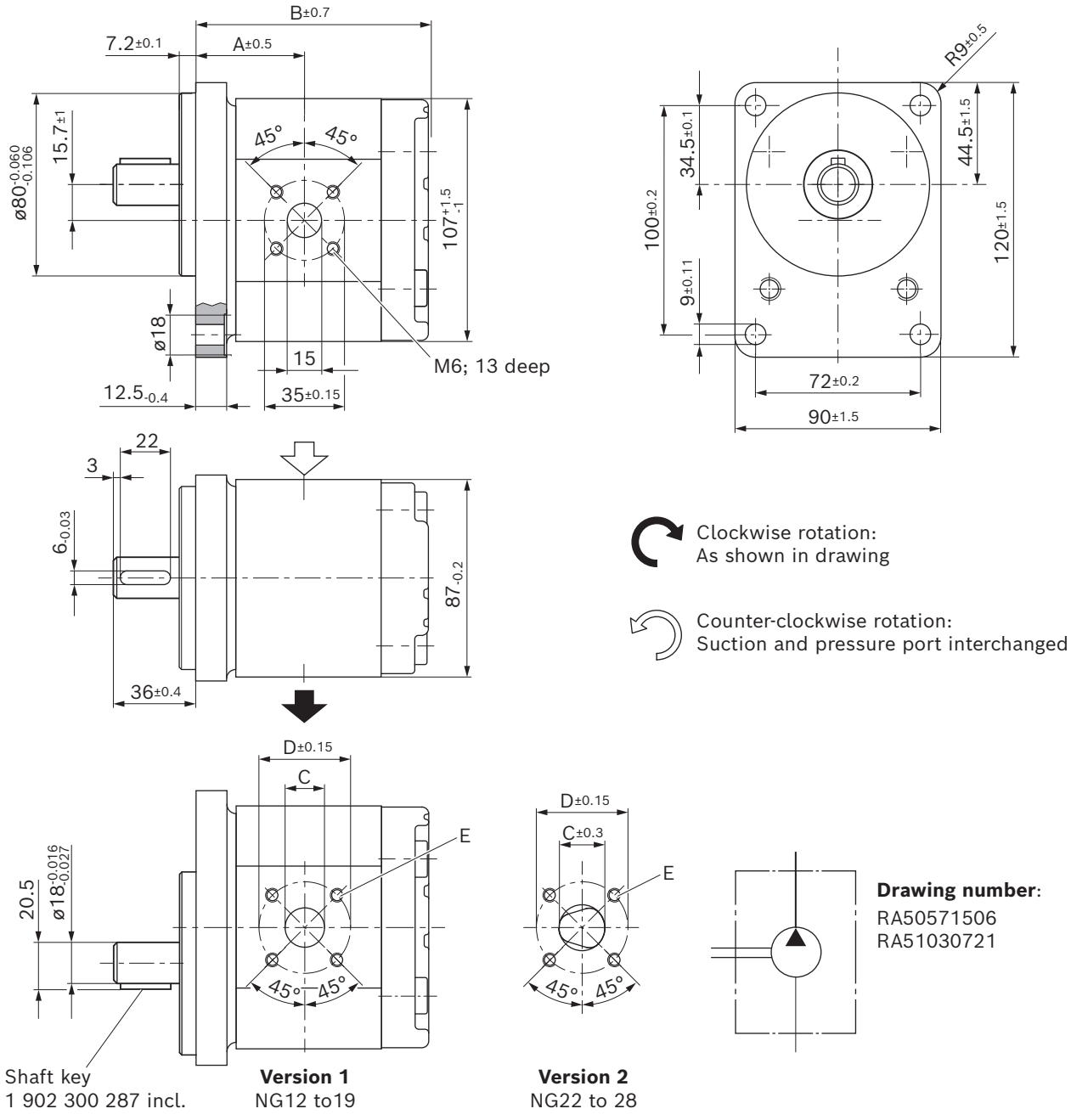
AZPJ–22– ... **HO**20MB



NG	Material number Direction of rotation		Maximum intermittent pressure p_2	Maximum speed n_{max}	Weight m	Dimensions A	B	C	D	E
	counter-clockwise	clockwise	bar	rpm	kg	mm	mm	mm	mm	
19	0 518 625 307	0 518 625 008	280	3000	4.5	59.4	109.4	22	55	M8; 13 mm deep
22	0 518 725 304	0 518 725 005	240	3000	4.6	62.1	114.8	26	55	
25	0 518 725 305	0 518 725 006	215	2800	4.8	66.3	119	26	55	
28	0 518 725 306	0 518 725 007	160	2600	4.9	71.1	123.8	26	55	

Parallel keyed shaft dia. 18 with rectangular flange spigot dia. 80 mm

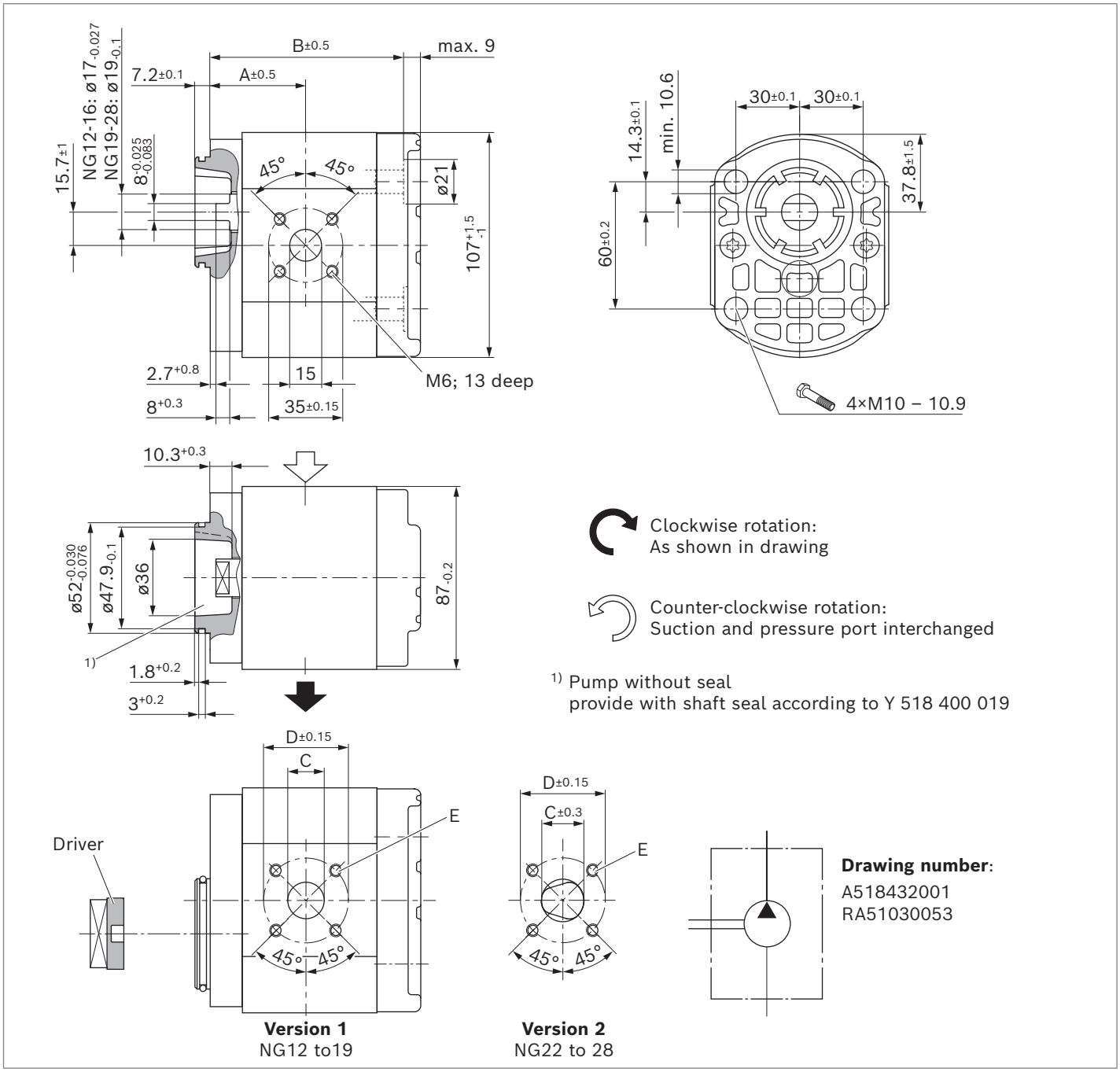
AZPJ–22– ... **AB20**MB



NG	Material number Direction of rotation		Maximum intermittent pressure p_2	Maximum speed n_{max}	Weight m	Dimensions A	B	C	D	E
	counter-clockwise	clockwise	bar	rpm	kg	mm	mm	mm	mm	
12	0 518 525 304	0 518 525 003	280	3500	3.9	46.5	96.3	20	40	
14	0 518 525 305	0 518 525 004	280	3000	4	47.5	99.5	20	40	M6; 13 mm deep
16	0 518 625 302	0 518 625 002	270	3000	4.1	47.5	102.9	20	40	
19	0 518 625 308	0 518 625 009	230	3000	4.5	57.9	107.9	22	55	
22	0 518 725 307	0 518 725 008	190	3000	4.6	60.6	113.3	26	55	M8; 13 mm deep
25	0 518 725 308	0 518 725 009	170	2800	4.8	64.8	117.5	26	55	
28	0 518 725 309	0 518 725 010	150	2600	4.9	69.6	122.3	26	55	

Tang drive with 4-bolt mounting spigot dia. 52 mm

AZPJ–22– ... **NT20**MB



NG	Material number Direction of rotation		Maximum intermittent pressure p_2	Maximum speed n_{max}	Weight m	Dimensions A	B	C	D	E
	counter-clockwise	clockwise	bar	rpm	kg	mm	mm	mm	mm	
12	0 518 515 301	0 518 515 001	280	3500	2.5	44	87.1	20	40	
14	0 518 515 302	0 518 515 002	280	3000	2.6	45	90.3	20	40	M6; 13 mm deep
16	0 518 615 301	0 518 615 001	280	3000	2.7	45	93.7	20	40	
19	0 518 615 303	0 518 615 003	250	3000	3	55.4	98.7	22	55	
22	0 518 715 301	0 518 715 001	215	3000	3.2	58.1	104.1	26	55	M8; 13 mm deep
25	0 518 715 302	0 518 715 002	190	2800	3.3	62.3	108.3	26	55	
28	0 518 715 303	0 518 715 003	160	2600	3.4	67.1	113.1	26	55	

Project planning information

Technical data
All mentioned technical data are dependent on manufacturing tolerances and are applicable for certain boundary conditions.
Note that certain deviations are therefore possible and that technical data may vary when certain boundary conditions (e.g., viscosity) change.
Pumps delivered by Bosch Rexroth are tested for function and performance.
The pump may only be operated with the permissible data (see chapter “Technical data”).

Characteristic curves
When dimensioning the gear pump, observe the maximum possible application data on the basis of the characteristic curves shown.

Application information
External gear units are not approved in on-highway vehicles for safety-relevant functions, as well as functions in the drive train, for steering, braking and level regulation. Classified as on-highway vehicles are e.g. vehicles such as motorbikes, private cars, trucks, vans, freight cars, buses and trailers. The European vehicle classes L (motorbikes), M (private cars), N (vehicles for transporting goods such as trucks and vans) and O (trailers and semi-trailers) serve as reference.

Notice
When used as an auxiliary steering pump, the vehicle manufacturer should make sure that the steering system continues to operate safely, even if the auxiliary steering pump fails (regulation similar to ECE R-79 can be referred).

Filtration of the hydraulic fluid
Since the majority of premature failures in gear pumps occur due to contaminated hydraulic fluid, filtration should maintain a cleanliness level of 20/18/15 as defined by ISO 4406. Thus contamination can be reduced to an acceptable degree in terms of particle size and concentration.
Bosch Rexroth generally recommends full-flow filtration.
The basic contamination of the hydraulic fluid filled in should not exceed class 20/18/15 as defined by ISO 4406. New fluids are often above this value. In such instances, a filling device with a special filter should be used.
Bosch Rexroth is not liable for wear due to contamination.
For hydraulic systems or devices with function-related, critical failure effects, such as steering and brake valves, the type of filtration selected must be adapted to the sensitivity of these devices.

Further information
Installation drawings and dimensions are valid at date of publication, subject to modifications.
Further information and notes on project planning can be found in the “General Operating Instructions for External Gear Units” (07012-B, chapter 5.5).

Information

AZ configurator

With our practical product selector, it will take you next to no time to find the right solution for your applications, no matter whether it is SILENCE PLUS or another external gear unit.

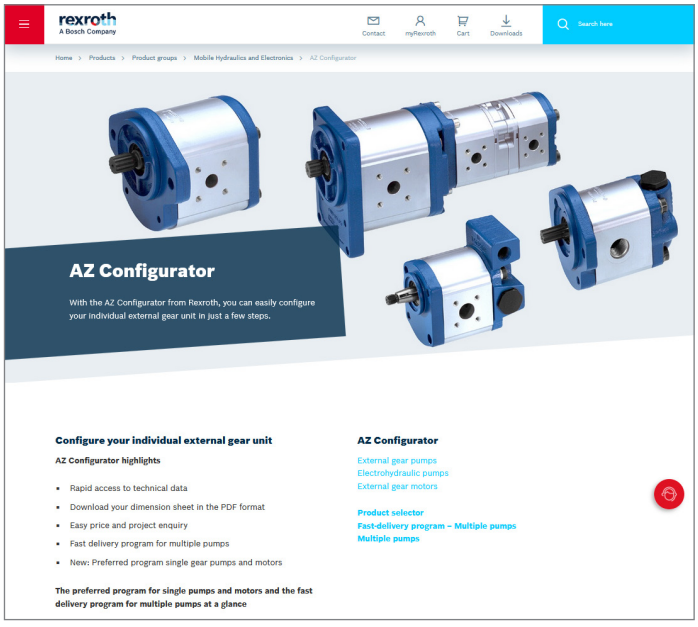
The selector guides you through a selection of features to all of the products available for order. By clicking on the order number, you can view and download the following product information: Data sheet, dimension sheet, operating conditions, and tightening torques.

You can order your selection directly via our online shop and at the same time benefit from an additional discount of 2%. And if you need something really quickly, simply use our fast delivery and preferred programs (GoTo). Then the goods will be sent within 10 working days.

You also have the possibility to easily and conveniently configure your individual external gear unit with our AZ configurator. All the necessary data that you need for the project planning of external gear units is requested by means of the menu navigation.

For an already existing configuration you receive as a result the order number, the type code, as well as further information. If your configuration does not lead to a product that is available for order, our online tools provide you with the possibility of sending a project request directly to Bosch Rexroth. We will then get in contact with you.

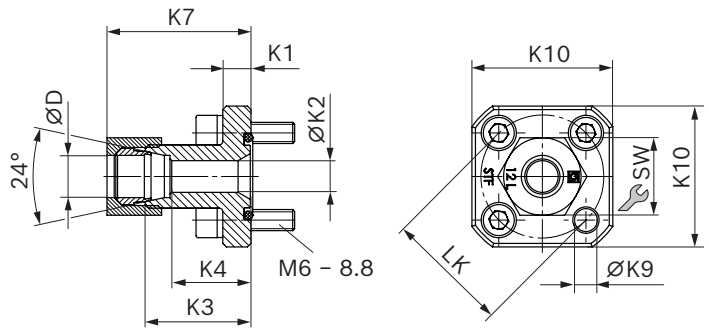
Link: www.boschrexroth.com/az-configurator



Accessories

Straight flange, for square flange (German version) 20

Complete screw connections with O-ring, metric screw set, nuts and olive.

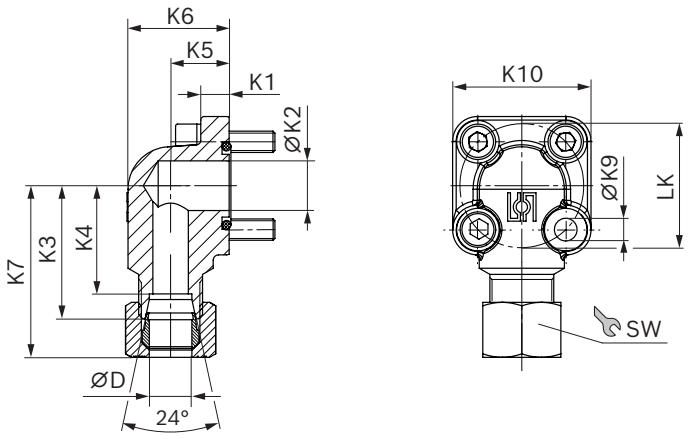


LK	D	Series [1]	Material number	p_{max}	K1	K2	K3	K4	K7	K9	K10	SW	Screws	O-ring	Weight
mm	mm			bar	mm	mm	mm	mm	mm	mm	mm	mm	4 ×	NBR	kg
35	10	L	1 515 702 064	315	8	7	30	23	38	6.5	40	19	M6 × 22	20 × 2.5	0.13
35	12	L	1 515 702 065	315	8	9	30	23	38.5	6.5	40	22	M6 × 22	20 × 2.5	0.14
35	15	L	1 515 702 066	250	8	11	30	23	39	6.5	40	27	M6 × 22	20 × 2.5	0.15
40	15	L	1 515 702 067	100	8	11	35	28	44	6.5	40	27	M6 × 22	26 × 2.5	0.16
40	18	L	1 515 702 068	100	8	14	35	27.5	44	6.5	40	32	M6 × 22	26 × 2.5	0.17
40	22	L	1 515 702 069	100	8	18	35	27.5	45	6.5	40	36	M6 × 22	26 × 2.5	0.16
40	28	L	1 515 702 008	100	8	19	35	27.5	45	6.5	40	41	M6 × 22	26 × 2.5	0.18

1) See DIN EN ISO 8434-1

90° angle flange, for square flange (German version) 20

Complete screw connections with O-ring, metric screw set, nuts and olive.

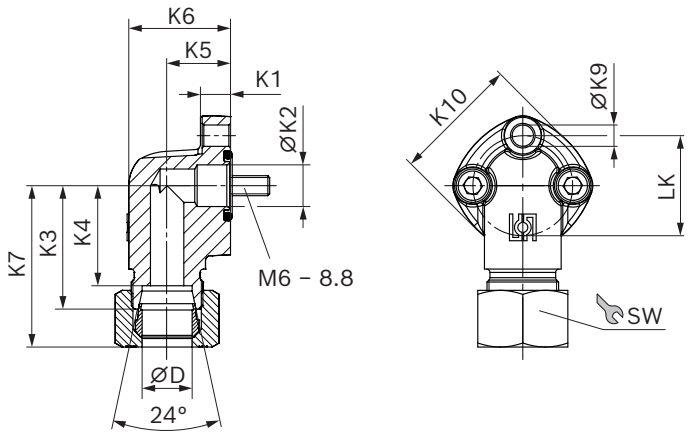


LK	D	Series[1)]	Material number	p_{max}	K1	K2	K3	K4	K5	K6	K7	K9	K10	SW	Screws		O-ring	Weight
mm	mm			bar	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	2 ×	2 ×	NBR	kg
35	10	L	1 515 702 070	315	8	14	37,5	30,5	16,5	28,5	45	6,4	39	19	M6 × 22	M6 × 35	20 × 2.5	0,18
35	12	L	1 515 702 071	315	8	14	37,5	30,5	16,5	28,5	46	6,4	39	22	M6 × 22	M6 × 35	20 × 2.5	0,19
35	15	L	1 515 702 072	250	8	14	37,5	30,5	16,5	28,5	46	6,4	39	27	M6 × 22	M6 × 35	20 × 2.5	0,2
35	16	S	1 515 702 002	315	8	15	38	29,5	20	33	49	6,4	39	30	M6 × 22	M6 × 40	20 × 2.5	0,25
35	18	L	1 545 702 006	250	8	15	37,5	30	20	33	47	6,4	39	32	M6 × 22	M6 × 40	20 × 2.5	0,22
35	20	S	1 515 702 017	315	8	15	45	34,5	25	38	57	6,4	39	36	M6 × 22	M6 × 45	20 × 2.5	0,3
40	15	L	1 515 702 073	100	9	20	38	31	22,5	38	47	6,4	42	27	M6 × 22	M6 × 22	26 × 2.5	0,26
40	18	L	1 515 702 074	100	9	20	38	30,5	22,5	38	47,5	6,4	42	32	M6 × 22	M6 × 22	26 × 2.5	0,27
40	20	S	1 515 702 011	250	9	20	40	29,5	22,5	37	52	6,4	42	36	M6 × 22	M6 × 45	26 × 2.5	0,26
40	22	L	1 515 702 075	100	9	20	38	30,5	22,5	38	48	6,4	42	36	M6 × 22	M6 × 22	26 × 2.5	0,27
40	28	L	1 515 702 010	100	9	20	40	32,5	28	44	50,5	6,4	42	41	M6 × 22	M6 × 50	26 × 2.5	0,37
40	35	L	1 515 702 018	100	9	20	41	30,5	34	53	53	6,4	42	50	M6 × 22	M6 × 60	26 × 2.5	0,41
55	20	S	1 515 702 004	250	13	18,2	45	34,5	24	38	57	8,4	58	36	M8 × 25	M8 × 50	32 × 2.5	0,62
55	30	S	1 545 719 006	250	12	26,5	49	38,5	32	51	63,5	8,4	58	50	M8 × 25	M8 × 50	32 × 2.5	0,63
55	35	L	1 515 702 005	100	12	26,5	49	38,5	32	52	61	8,4	58	50	M8 × 25	M8 × 60	32 × 2.5	0,77
55	42	L	1 515 702 019	100	12	26,5	49	38	40	64	61,5	8,4	58	60	M8 × 25	M8 × 70	32 × 2.5	1,04

1) See DIN EN ISO 8434-1

90° angle flange, 3-hole, for square flange (Italian version) 30

Complete screw connections with O-ring, metric screw set, nuts and olive.



LK	D	Series [1]	Material number	p_{max}	K1	K2	K3	K4	K5	K6	K7	K9	K10	SW	Screws	O-ring	Weight
mm	mm			bar	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	3 ×	NBR	kg
30	12	L	1 515 702 146	250	9	12.5	37	30	19	30.5	46	6.4	38	22	M6 × 25	16 × 2.5	0.18
30	15	L	1 515 702 147	250	9	12.5	37	30	19	30.5	45.5	6.4	38	27	M6 × 25	16 × 2.5	0.2
40	22	L	1 515 702 149	160	13.5	19	43	35.5	25	41	53	8.4	48	36	M8 × 30	24 × 2.5	0.4
40	28	L	1 515 702 150	160	13.5	19	43	35.5	25	41	53.5	8.4	48	41	M8 × 30	24 × 2.5	0.36