Rexroth
Bosch Group

External Gear Motors
F & N Series

RA 14 025/04.07 **1**/52
Replaces: 07.04

AZMF ... , AZMN ...

Model F = 8.2...22.9 cm³ (0.51...1.40 in³)
N = 20.4...36.4 cm³ (1.24...2.28 in³)

Contents

General

Rexroth external gear motors are produced in two different models, with a wide range of displacements, and a variety of port, shaft and mounting options.

Features

- Nominal pressure 3000 psi (210 bar)
- Plain Bearings for heavy duty applications
- Drive Shafts to SAE or DIN
- Port connections: flange or screw thread
- Consistent high quality
- Considerably longer life due to reinforced shaft and housing

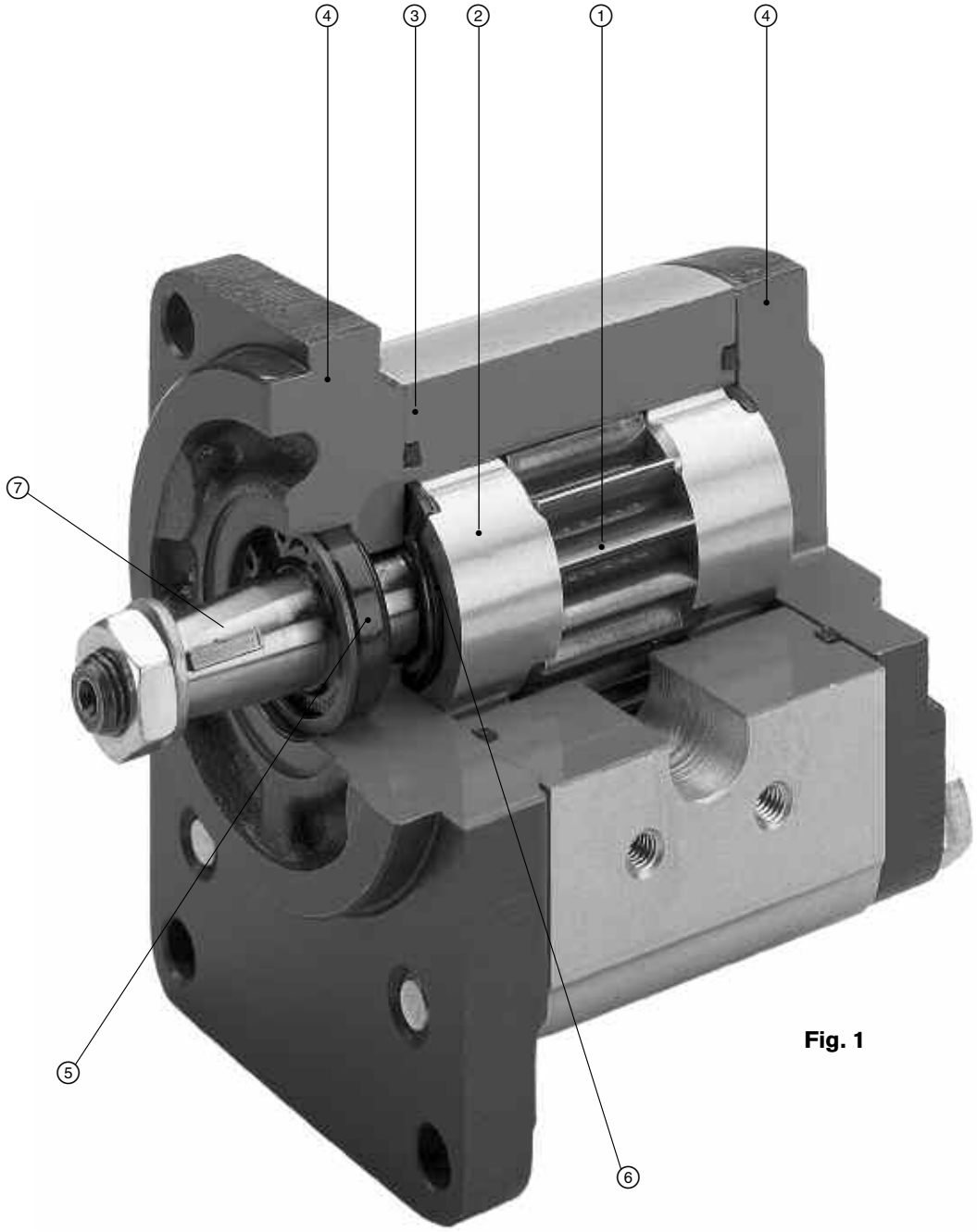


Fig. 1

General

Basic design
Referencing Fig. 1, the motor essentially consists of a pair of gears ① supported in bearing blocks ②, and a housing ③ with front and rear covers ④. The output shaft ⑦ extends from the front cover where it is sealed by a shaft seal ⑤.

The bearing forces are absorbed by special bearings with sufficient elasticity to produce surface contact instead of line contact ②. They also assure good operation under emergency conditions, especially at low speed. The internal sealing is pressure-sensitive, which ensures optimum efficiency.

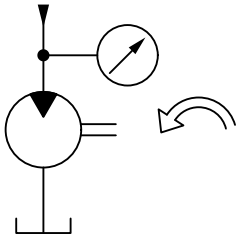
The bearing blocks ② provide the seal at the ends of the gaps between the teeth which carry the pressurized oil. The sealing zone between the gear teeth and the bearings is controlled by the communication of operating pressure to the rear of the bearings.

Special seals ⑥ form the boundary of the zone.

If pressurized oil is fed into the motor, a torque can be obtained from the shaft leading out of the housing. Here, a distinction is made between motors for one direction of rotation and reversible motors.

Motors for one direction of rotation
These are of asymmetrical design, i.e. the high and low pressure sides are defined and not interchangeable at will. In this case, reversible operation is not possible.

In order to ensure a high efficiency level, a special running in method is used for motors. Leakage oil is discharged internally to the outlet side. Pressure loading of the outlet is limited by the shaft seal.

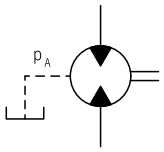


Reversible motors
These motors are of symmetrical design. Depending upon the effective direction of the high pressure, the gears and bearing blocks are pressed against one of the sides of the housing. Depending upon the direction of rotation, sealing zones are formed which provide radial clearance. There are therefore two sealing zones opposite one another. The pressure zones which provide axial clearance are defined by symmetrical shaped seal rings.

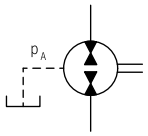
The leakage oil from the bearing bushings is discharged through a separate leakage-oil fitting in the housing cover. Here, the faces of the two gears are joined by means of a bore in the shaft which is not used for power take-off. Due to this external discharge of leakage oil, the return port in question can be loaded. (Series connection of a number of motors.)

Reversible motors are distinguished as follows:

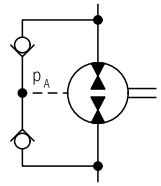
– Motors for 2-quadrant operation,
  i.e. output torque in both directions.



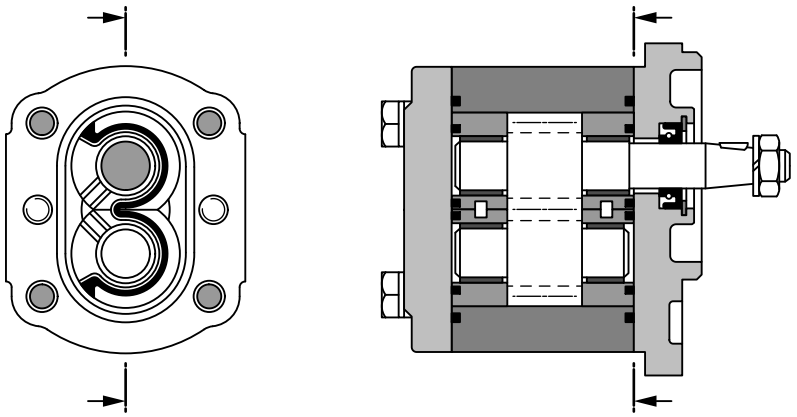
– Motors for 4-quadrant operation,
  i.e. both output and input torque in both directions.
  (Hydraulic motor becomes a pump if load reversal occurs.)



– To avoid the need for an additional leakage-oil connection, the internal leakage oil may be routed into the respective outlet via internal check valves. The pressure in the outlet p_A is limited correspondingly.



Motor for One Direction of Rotation



Bi-Rotational Motor

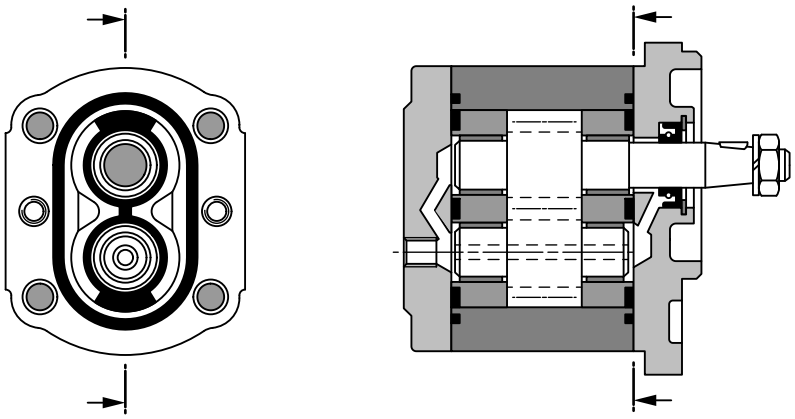


Fig. 2

Bosch Rexroth Gear Motors

Specification

General	
Construction	External gear-type motor
Mounting	Flange or through-bolting with pilot
Line connections	Flange
Direction of rotation (Fig. 3)	One direction of rotation or reversible
Mounting position	any
Ambient temperature range	– 15 °C ... + 60 °C (+5° F... 140° F)
Fluid	Mineral oil-based hydraulic fluids to DIN/ISO, other fluids to order
Viscosity	12 ... 800 mm²/s permitted range 20 ... 100 mm²/s recommended range ... 2000 mm²/s permitted for starting
Fluid temperature range	– 15 °C ... + 80 °C (+5° F... 176°F)
Filtration	NAS 1638, class 10; ISO/DIS 4406, class 19/16; obtained with filter fineness $\beta_{25} \geq 75$[1])

[1]) Dirt particles retention > 25 µm is 1 : 75, i.e. 98.67 %

Safety requirements pertaining to the whole system must be observed.
In the case of applications with high numbers of load cycles, please consult us.

Direction of Rotation

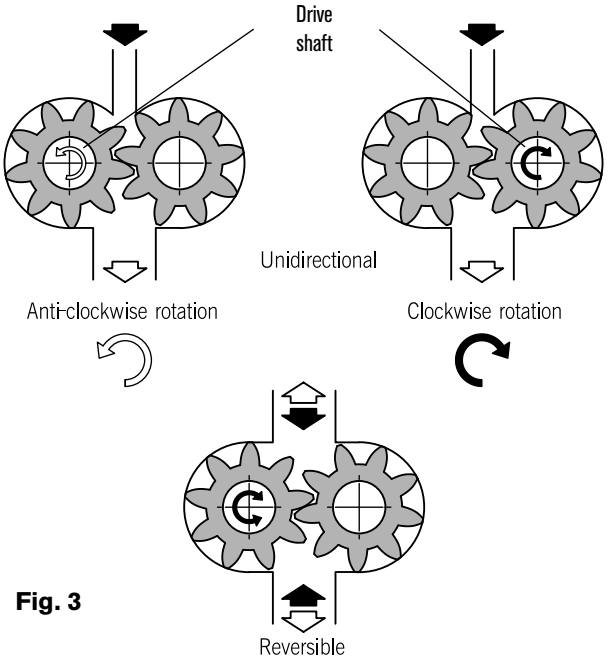
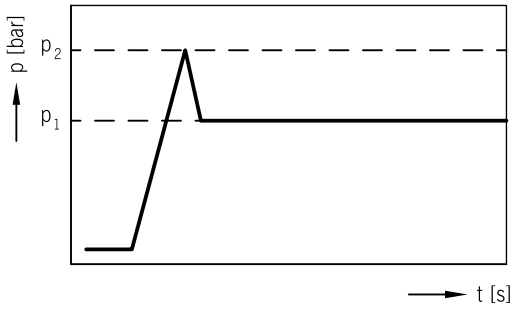


Fig. 3

* As viewed looking at end of drive shaft.

Definition of Pressure



p_1 max. continuous pressure
p_2 max. starting pressure (depending on the application, this must be taken into consideration when setting the pressure of the hydraulic system's pressure-relief valve).

Bosch Rexroth Gear Motors

Design Calculations of Gear Motors (Reference chart 1)

The design calculations for motors are based on the following parameters:

V	[cm³/rev]	Displacement
Q	[l/min]	Flow consumption
Δp	[bar]	Pressure (p_1, p_A)
M	[Nm]	Output torque
n	[rev/min]	Speed
P	[kW]	Power output

It is also necessary to allow for different efficiencies such as:

η_v	Volumetric efficiency
η_{hm}	Hydraulic-mechanical efficiency
η_t	Total efficiency

The following formulas describe the various relationships. They include correction factors for adapting the parameters to the usual units encountered in practice.

Note: For approximate selection data, please use the graphs on the following pages. These graphs contain the levels of efficiency in each case.

Installation and commissioning

- Fill the motor with fluid before installing.
- Check the direction of rotation.
- Before installing the motor, clean the pipes thoroughly of all dirt, scale, sand, swarf, etc. Welded pipes in particular must be pickled or flushed out.
- Before starting up the motor for the first time, the entire hydraulic system must be thoroughly purged of air.
- Cover the shaft seal when spraying or brush-painting the equipment.
- Pay close attention to the specification, especially speeds and pressures.

For further information, see "Service Instruction Manual", RA 14 025-S

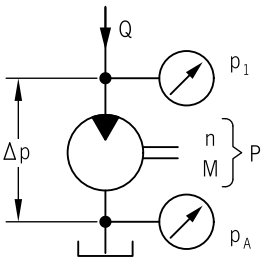
Filter recommendations

By far the largest number of premature failures of gear motors are due to contaminated fluid. Our guarantee does not apply to wear resulting from dirt in the system. We recommend filtering, which reduces the size and concentration of the contamination particles to a permitted minimum.

Operating pressure [bar]	>160	<160
Contamination class NAS 1638	9	10
Contamination class ISO 4406	18/15	19/16
Achieved with filter $\beta_X = 75$	20	25

Full-flow filtering is always recommended. The initial contamination of the fluid with which the system is filled must not exceed Class 10 to NAS 1638. Past experience has shown that even brand new fluids often exceed this value. In such cases, filling appliance incorporating a special filter will have to be used.

Chart 1



$Q = \frac{V \cdot n}{\eta_{v\%}} \cdot 10^{-1}$	$V = \frac{Q \cdot \eta_{v\%}}{n} \cdot 10$	$n = \frac{Q \cdot \eta_{v\%}}{V} \cdot 10$
$\Delta p = \frac{M}{1{,}59 \cdot V \cdot \eta_{hm}} \cdot 10^4$	$V = 1{,}59 \cdot \frac{M}{\Delta p \cdot \eta_{hm\%}} \cdot 10^4$	$M = 1{,}59 \cdot V \cdot \Delta p \ \eta_{hm\%} \cdot 10^{-4}$
$P = \frac{Q \cdot \Delta p \cdot \eta_{t\%}}{6} \cdot 10^{-4}$		

[%]

Q —— η_v ——➤ n
Δp —— η_{hm} ——➤ M
Δp · Q —— η_t ——➤ P

V cm³/U Q l/min Δp bar Achtung
Note η %
n U/min P kW M Nm Attention

Drive Arrangements

1. Flexible couplings (Fig. 4)
The coupling must not transfer any radial or axial forces to the motor.

The maximum radial runout of shaft spigot is 0.2 mm.

Refer to the fitting instructions provided by the coupling manufacturer for details of the maximum permitted shaft misalignment.

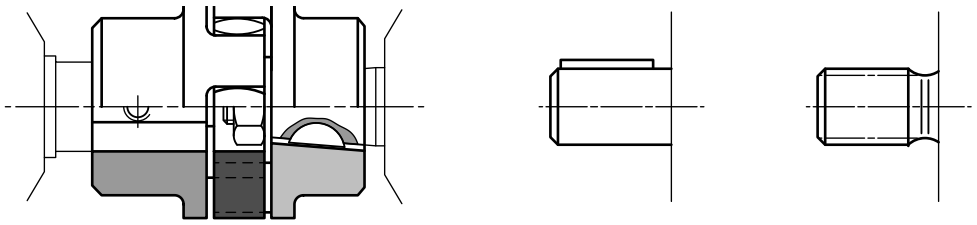


Fig. 4

2. Sleeve couplings (Fig. 5)
Used on shafts with DIN or SAE splining.
Note: There must be no radial or axial forces exerted on the motor shaft or sleeve coupling.
The sleeve must be free to move axially. The distance between the motor shaft and drive shaft must be 2^{+1}.
Oil-bath lubrication is necessary.

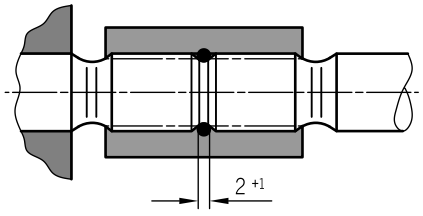


Fig. 5

Size **F**
B 17 x 14 DIN 5482
$M_{max.}$ = 190 Nm

3. Drive shaft with dog (Fig. 6)
For the close-coupling of the motors to gearboxes, etc. the motors shaft has a special drive dog which combines with a center coupling ③ (included with the motors). There is no shaft seal.

The recommended arrangements and dimensions for the drive end and sealing are as follows:

① **Drive shaft**
Case-hardening steel DIN 17 210, e.g. 20 Mn CrS 5.
case-hardened 0.6 deep; HRc 60 ±3.
Surface for sealing ring ground without rifling $R_t \leqq 4$ µm.

② **Radial shaft seal**
Rubber-covered seal (see DIN 3760, Type AS or double-lipped ring). Cut 15° chamfer or fit shaft seal with protective sleeve.

Permitted pressure p_A/p_L to be regarded. Support ring if necessary.

Size F

$M_{max.}$ [Nm]	V [cm^3/rev]	$p_{max.}$ [bar]
65	16	230
	19	190
	22.5	160

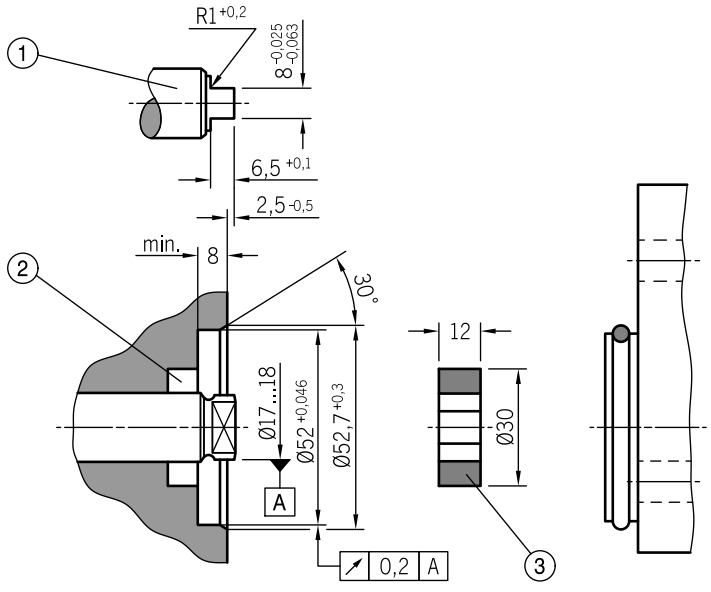


Fig. 6

5. Outrigger bearings

Outrigger bearings eliminate possible problems associated with side load when the motors are driven by V-belts or gearwheels. The diagrams below show the maximum overhung and thrust loads that can be tolerated referred to a bearing life of $L_H = 1{,}000$ hours.

Size F Typ 1

$M_{max.}$ [Nm]	V [cm^3/rev]	$p_{max.}$ [bar]
65	16	230
	19	190
	22.5	160

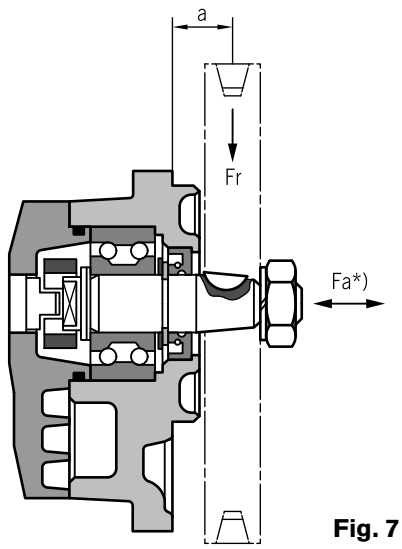
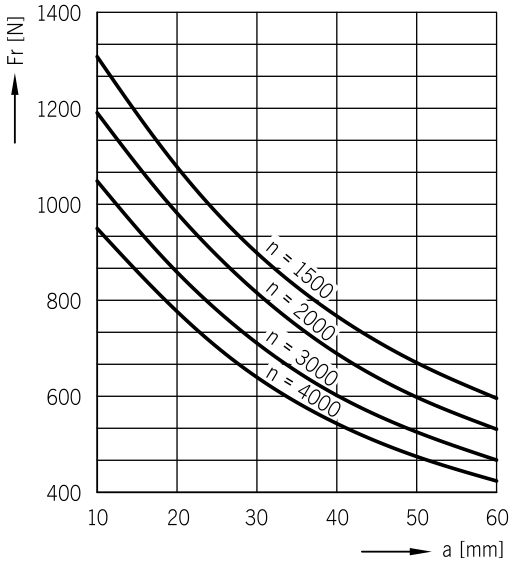


Fig. 7

* Fr is reduced by 0.7 Fa when axial loading Fa is applied.



Ordering Code (F Series Motor)

AZ M F -1□ or 2□ -016 U R R 12 M L -□□□ - S□□□□

Function

M = Motor

Size (F)

.51 in³ (8.2 cm³) = 008
.69 in³ (11.3 cm³) = 011
.87 in³ (14.3 cm³) = 014
1.01 in³ (16.5 cm³) = 016
1.19 in³ (19.5 cm³) = 019
1.40 in³ (22.9 cm³) = 022

Direction of rotation

Right = R
Left = L
Universal = U (Bi-rotational)

PRV Setting (bar)

EXAMPLE:
180 bar = 180

Special Design

End cover

B - Standard
A - Rear ports
L - Case drain port
L S0018 - Internal case drain
D - PRV (bar)

Seals

NBR = M
FPM = P
NBR, shaft seal in FPM = K

Drive shafts

		Matching front flange	
C	Conical 1:5 (Tapered key)	B	P
S	Conical 1:5 metric for flange A (Tapered key)	A	
H	Conical 1:8 metric (Tapered key)	O	
N	Dog (Tang)	M	
A	Cylindrical (Straight key) ISO Ø 18mm	B	
Q	Cylindrical (Straight key) SAE A 5/8″	R	
Q	SAE 5/8″ Keyed, Long *Use **S0022** suffix	R	
R	Spline shaft SAE A 9T	R	C
P	Spline shaft SAE 11T	R	C
F	Splne shaft DIN 5482 B17x14	B	P

Front flange

B	Square flange Centring Ø 80 mm
R	SAE A 2-bolt
P	Transmission flange Centring Ø 50 mm
O	Square flange Centring Ø 36.47 mm
C	SAE B 2-bolt
M	Transmission flange Centring Ø 52 mm with O-ring
A	Outrigger bearing Centring Ø 80 mm (outboard bearing)

Line connections

20	Rectangular flange
12	Thread (UN-2B) SAE O-ring BOSS
01	BSP Pipe thread ISO 228
30	Rectangular flange
07	Split flange SAE Code 61 Metric bolts
40	Split flange SAE Code 61 UNC bolts

* Common S0 Codes:
S0018 – Cross check valves in rear cover (internal case drain)
S0022 – 5/8″ Long keyed shaft
S0030 – S0018 & S0022
S0028 – Pressure relief valve and anti-cavitation valve

Size F

4 ... 28 cm³/rev

F Series Motor Product Index

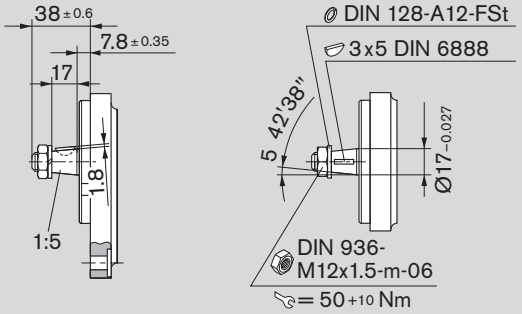
(Reference page 10 for ordering code designators)

AZPF-XX-XXXX _ _ _ ML

Page Number	Ordering code	Shaft Type	Mounting Flange	Ports	Port Orientation	Case Drain
18	AZMF-12-XXXURR12ML	R	R	12	side	rear
19	AZMF-12-XXXURR12MA	R	R	12	rear	rear
20	AZMF-12-XXXURR12ML-S0018	R	R	12	side	internal
21	AZMF-12-XXXUQR12ML	Q	R	12	side	rear
22	AZMF-12-XXXUQR12MA	Q	R	12	rear	rear
23	AZMF-12-XXXUQR12ML-S0018	Q	R	12	side	internal
24	AZMF-12-XXXUQR12ML-S0022	Q-S0022	R	12	side	rear
25	AZMF-12-XXXUQR12MA-S0022	Q-S0022	R	12	side	rear
26	AZMF-12-XXXUQR12ML-S0030	Q-S0022	R	12	rear	internal
27	AZMF-1X-XXXXCB20MB	C	B	20	side	no case
28	AZMF-1X-XXXXFB20MB	F	B	20	side	no case
29	AZMF-1X-XXXXSA20MB	S	A	20	side	no case
30	AZMF-1X-XXXXNM20MB	N	M	20	side	no case
31	AZMF-1X-XXXUCB20ML	C	B	20	side	rear
32	AZMF-1X-XXXUFB20ML	F	B	20	side	rear
33	AZMF-1X-XXXUSA20ML	S	A	20	side	rear
34	AZMF-1X-XXXUNT20ML	N	T	20	side	rear
35	AZMF-1X-XXXUCN20ML	C	N	20	side	rear
36	AZMF-1X-XXXUCN20ML-S0018	C	N	20	side	internal
37	AZMF-1X-XXXUFN01ML	F	N	01	side	rear
38	AZMF-1X-XXXUFN20ML-S0018	F	N	20	side	internal
39	AZMF-1X-XXXUFN01ML-S0018	F	N	01	side	internal

F Series Drive Shafts

C



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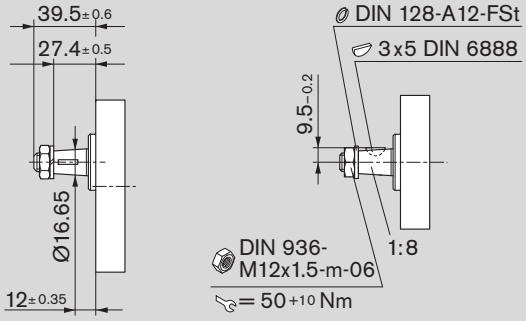

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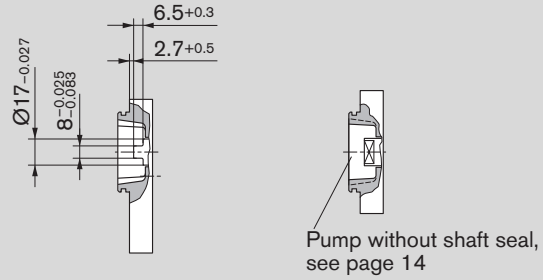

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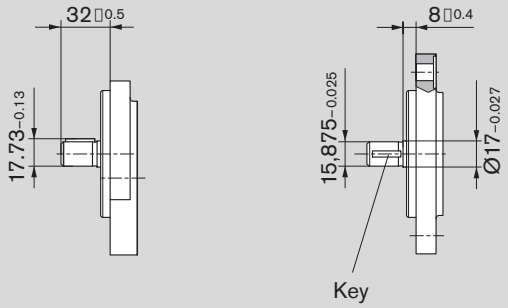

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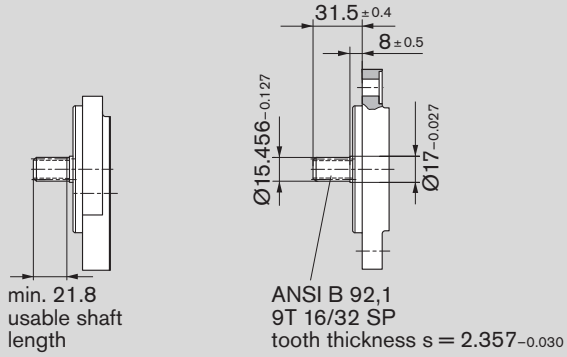
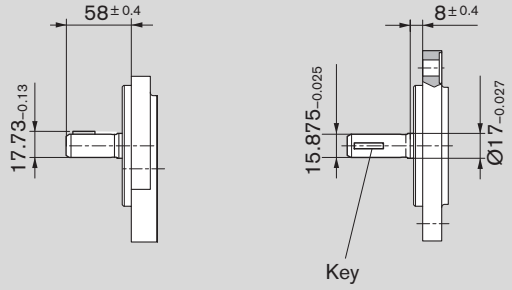
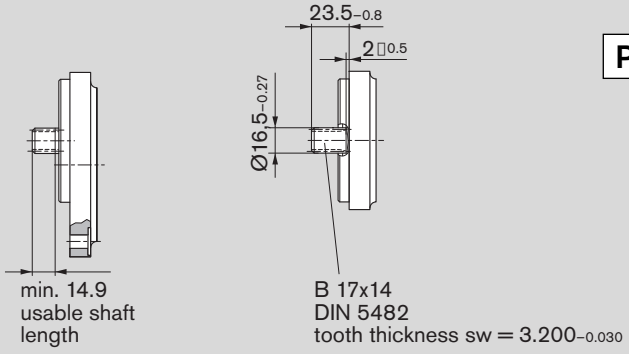


Q w/ S0022 Elongated Shaft



F



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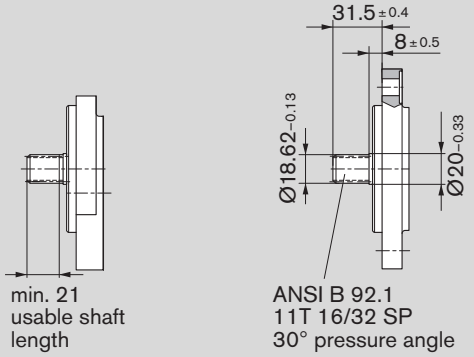

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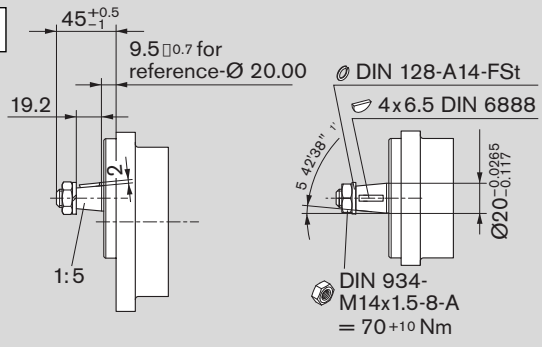
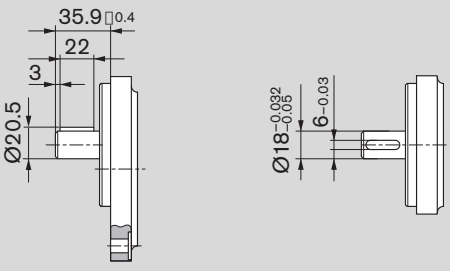
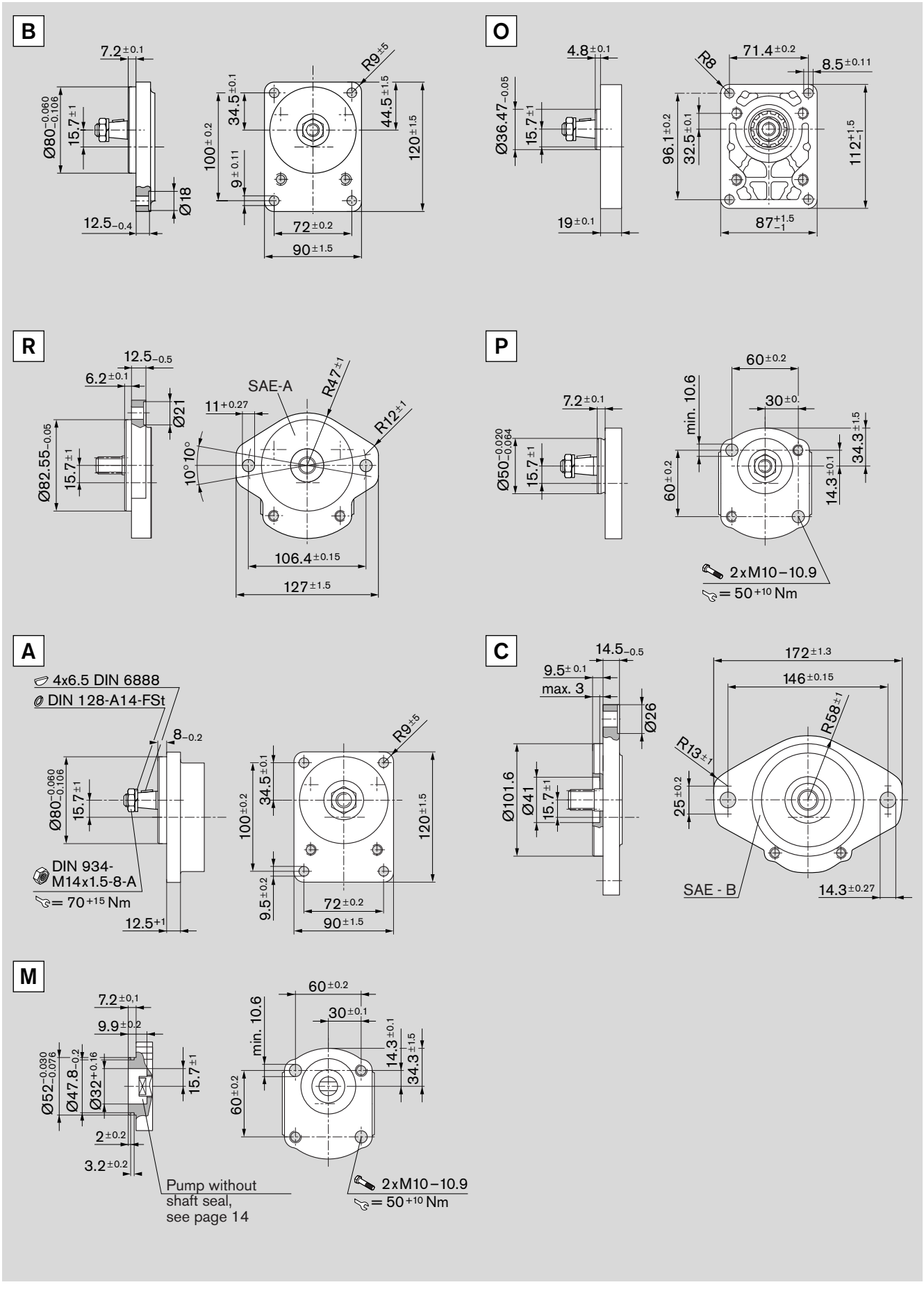


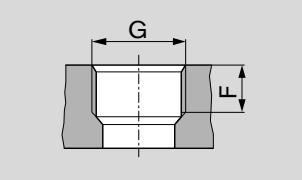
A



F Series Front Cover



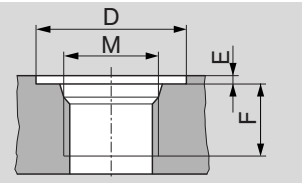
F Series Port Connections



01 **Pipe thread ISO 228/1**

when pressure $p_2 > 210$ bar limited fatigue strength

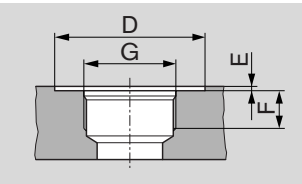
Synopsis of Types	Size	Pressure port G	Pressure port F	Suction port G	Suction port F
01	4 ... 16 cm³	G 1/2	16	G 3/4	16
	19 ... 28 cm³	G 3/4		G1	19



03 **Thread metric ISO 6149 with O-ring**

when pressure $p_2 > 210$ bar limited fatigue strength

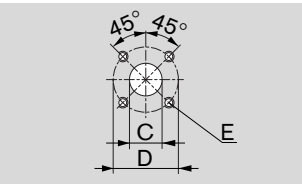
Synopsis of Types	Size	Pressure port M	D	E	F	Suction port M	D	E	F
03	4 ... 5.5 cm³	M 18 x 1.5	29	0.5	14.5	M 18 x 1.5	29	0.5	14.5
	8 ... 16 cm³	M 22 x 1.5	34		18	M 27 x 1.5	40		19
	19 ... 28 cm³					M 33 x 1.5	46		22



12 **Thread (UN-2B) SAE O-ring BOSS**

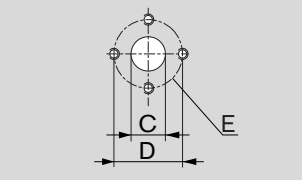
when pressure $p_2 > 210$ bar limited fatigue strength

Synopsis of Types	Size	Pressure port G	D	E	F	Suction port G	D	E	F
12	4 ... 5.5 cm³	SAE - 12	25	0.5	13	SAE - 12	25	0.5	13
	8 cm³	SAE - 12	35		16	SAE - 12	35		16
	11 ... 22 cm³					SAE - 12	45		19



20 **Rectangular flange DIN 3901/3902**

Synopsis of Type	Size	Pressure port C	D	E	Suction port C	D	E
20	4 ... 5.5 cm³	15	35	M 6 depth 13	15	40	M 6 depth 13
	8 ... 16 cm³				20		
	19 ... 28 cm³				26	55	M 8 depth 13

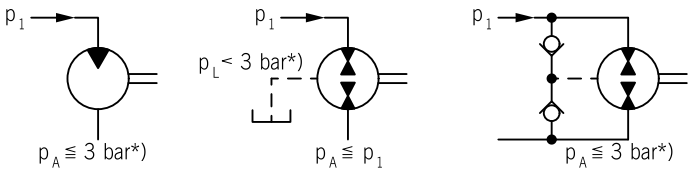


30 **Rectangular flange**

Synopsis of Type	Size	Pressure port C	D	E	Suction port C	D	E
30	4 ... 8 cm³	13.5	30.2	M 6 depth 13	13.5	30.2	M 6 depth 13
	11 ... 28 cm³				20.0	39.7	M 8 depth 13

F Series Performance Ratings

Size			**008**	**011**	**014**	**016**	**019**	**022**
Displacement		cm^3/rev	8.2	11.3	14.3	16.5	19.5	22.9
max. continuous pressure	p_1	bar	210	210	210	210	180	180
		psi	3045	3045	3045	3045	2610	2610
max. starting pressure	p_2	bar	280	280	280	280	210	210
		psi	4060	4060	4060	4060	3045	3045
min. rotational speed		min^{-1}	500	500	500	500	500	500
max. rotational speed	p_1		4000	3500	3000	3000	3000	3000
Motor outlet pressure	p_A	bar						
Leakage-oil line pressure	p_L							



*) Short-term when starting 10 bar

F Series Motor
SAE O-Ring BOSS - Standard Porting

	Side Ports		Rear Port	
Displacement (cc)	Inlet	Outlet	Inlet	Outlet
4	-12	-12	-12	-12
5	-12	-12	-12	-12
8	-12	-12	-12	-12
11	-12	-12	-12	-12
14	-12	-12	-12	-12
16	-12	-12	-12	-12
19	-12	-12	-12	-12
22	-12	-12	-12	-12

SAE Porting - Specifications and Dimensions per SAE J1926/1

Dash Size	**Thread Size (in)**
-2	5/16-24 UNF-2B
-3	3/8-24 UNF-2B
-4	7/16-20 UNF-2B
-5	1/2-20 UNF-2B
-6	9/16-18 UNF-2B
-8	3/4-16 UNF-2B
-10	7/8-14 UNF-2B
-12	1-1/16-12 UN-2B
-14	1-3/16-12 UN-2B
-16	1-5/16-12 UN-2B
-20	1-5/8-12 UN-2B
-24	1-7/8-12 UN-2B
-32	2-1/2-12 UN-2B

Note: Ratings represent units incorporating SAE O-Ring BOSS threaded ports.
Pressure ratings may differ for other types of ports.

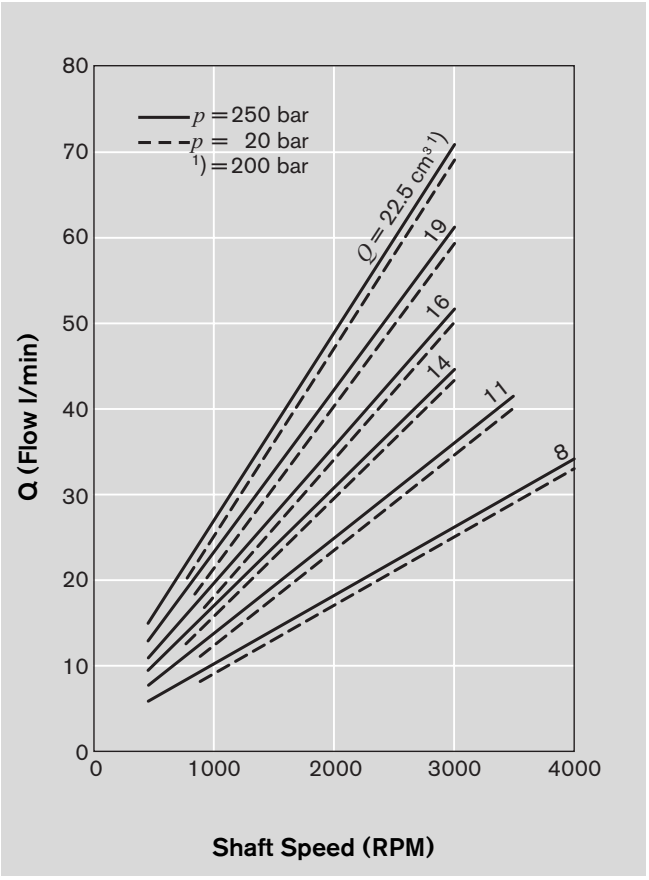
Diagrams

Size F

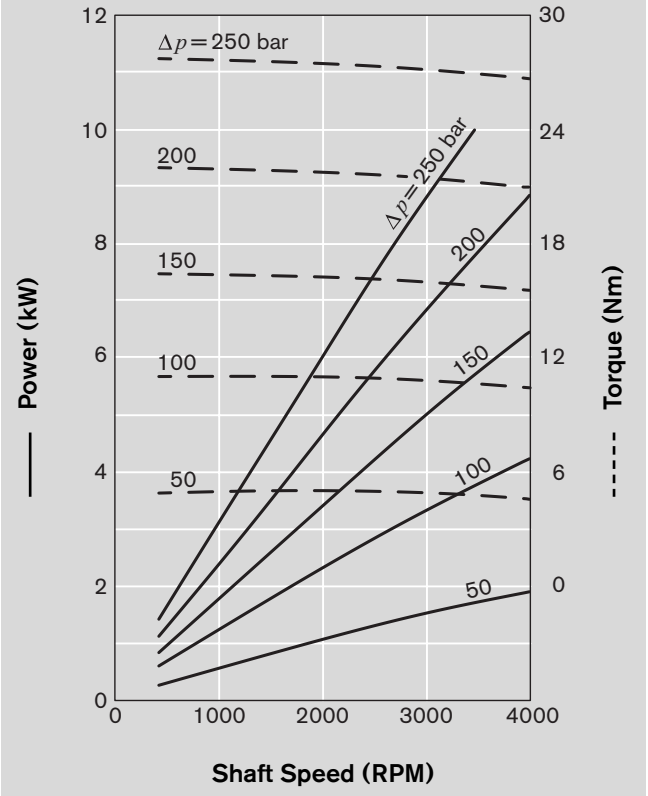
ν = 35 mm²/s, T = 50 °C

Unit Conversions

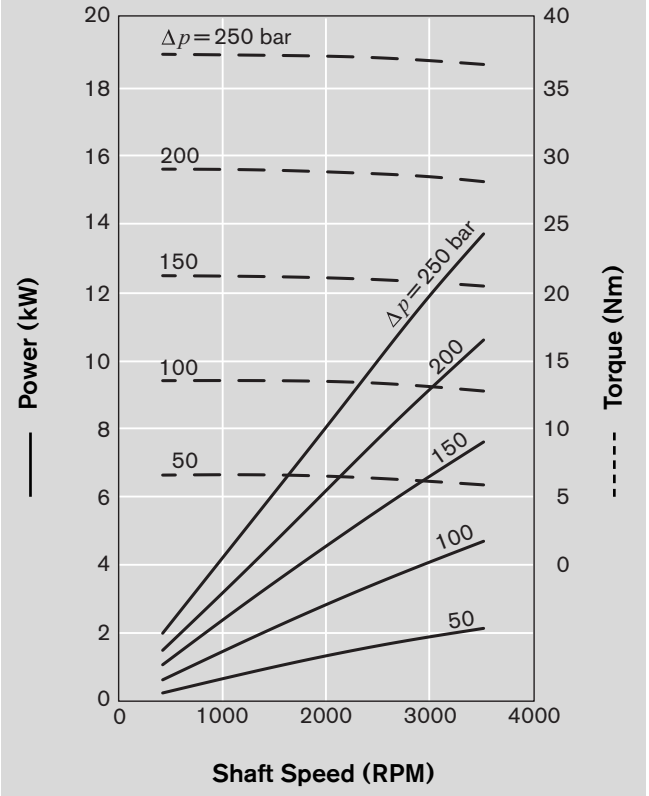
Pressure: psi = bar x 14.7
Torque: ft-lbs = (Nm) x .738
Power: hp = (kW) x 1.341
Volume: in^3 = (cc) x 0.061
gpm = (LPM) x 0.2642



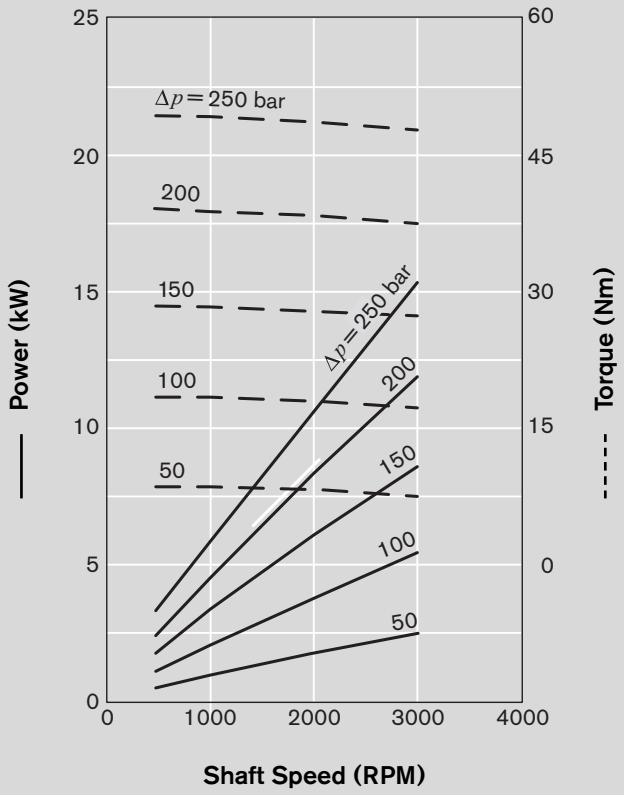
8 cm^3/rev



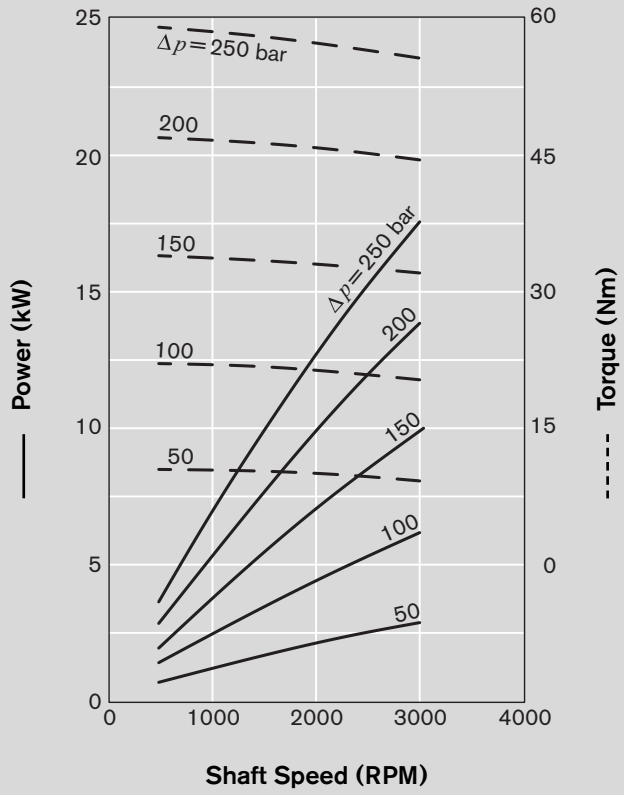
11 cm^3/rev



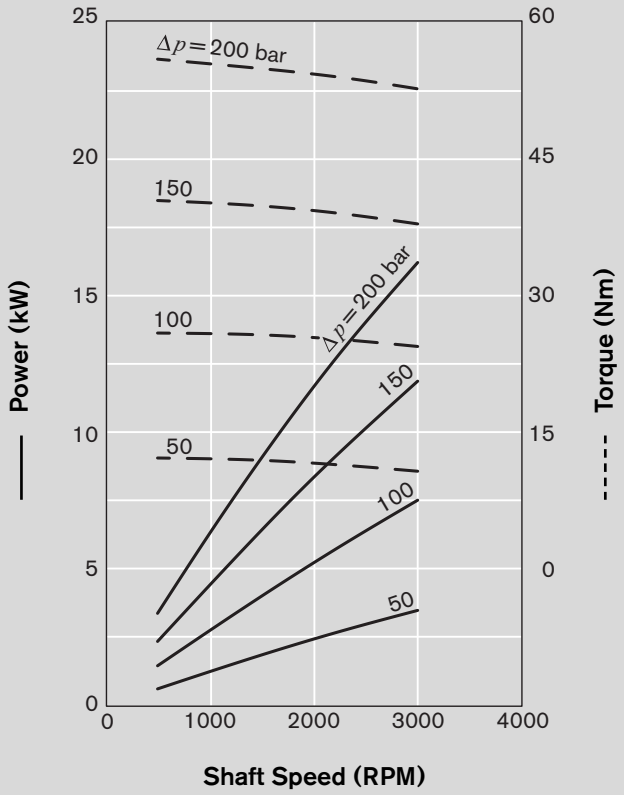
14 cm³/rev



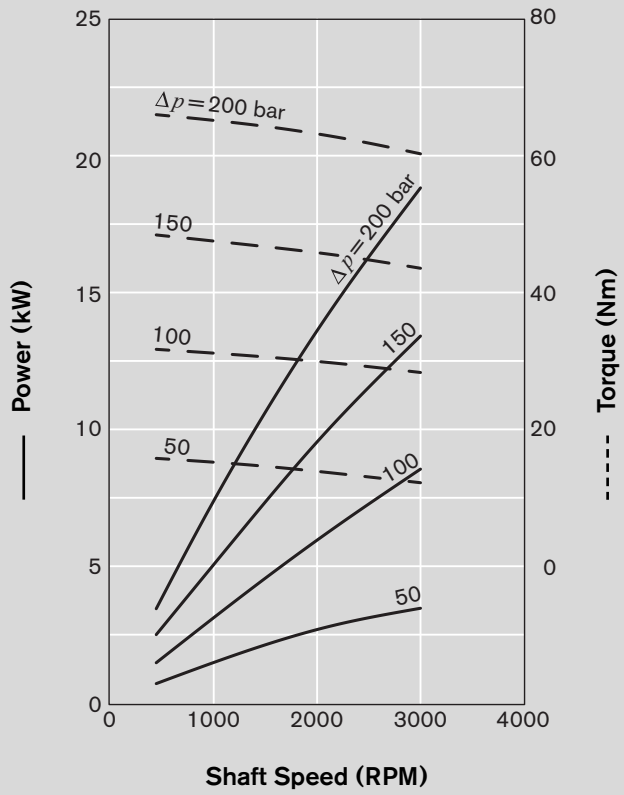
16 cm³/rev

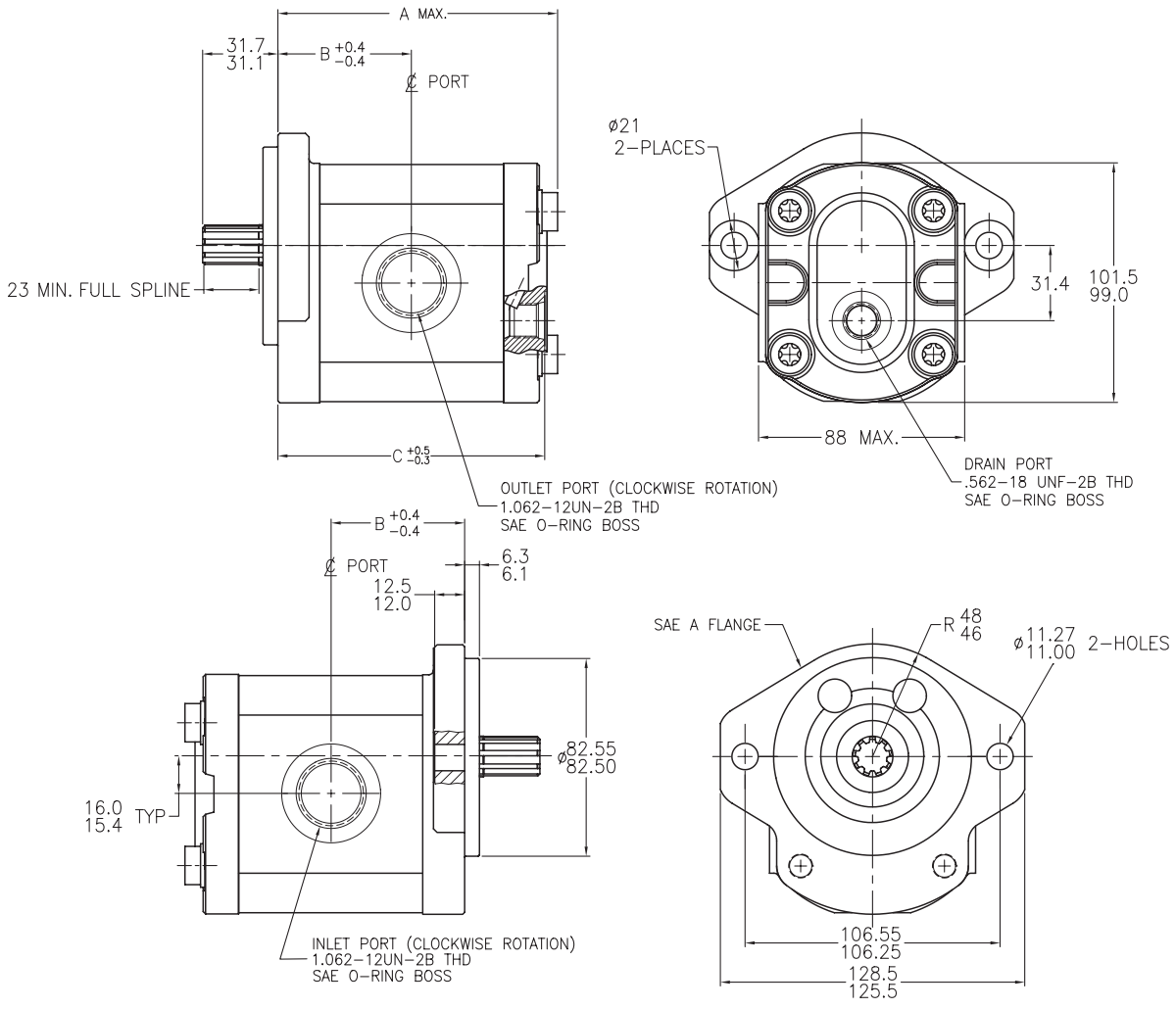


19 cm³/rev



22.5 cm³/rev



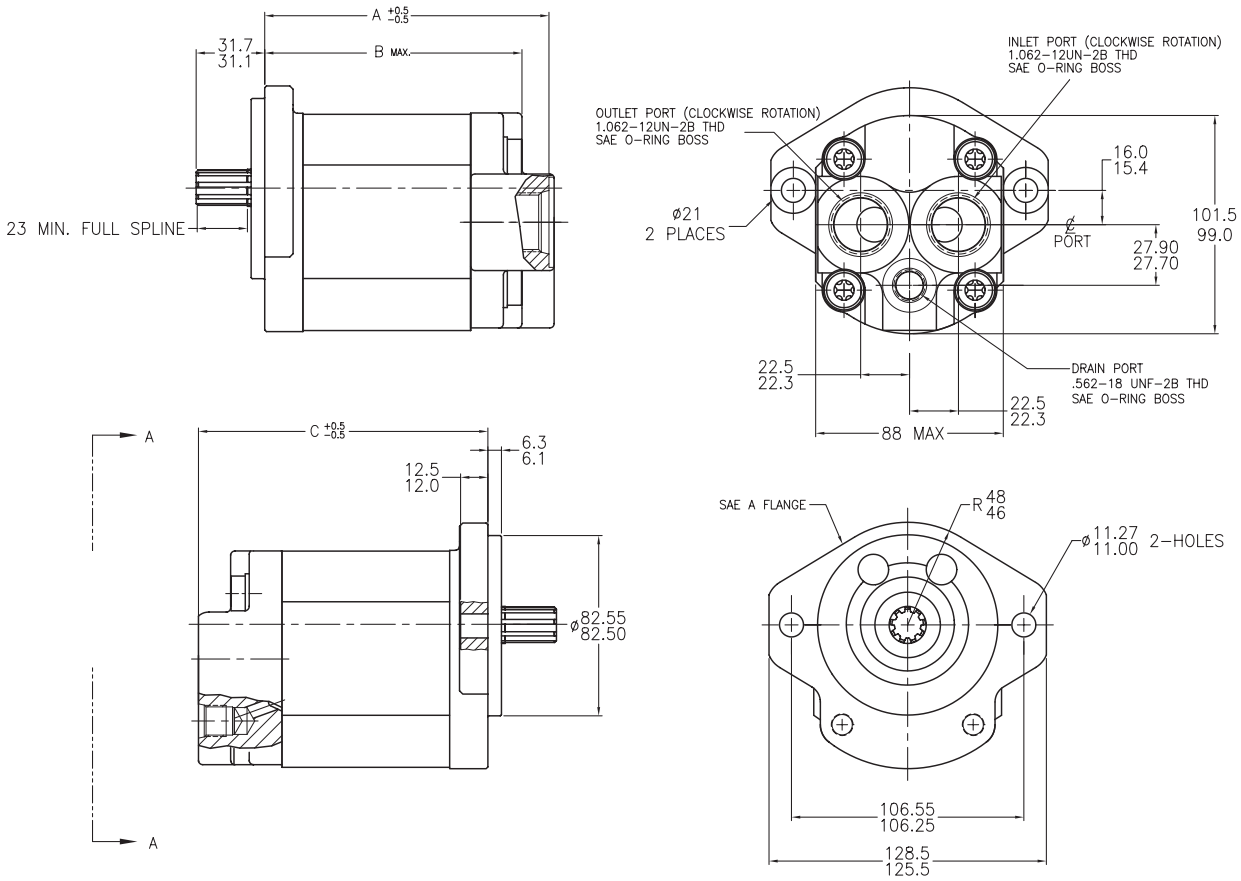


Features	Details
Shaft	9t spline
Front Cover	SAE A 2-bolt
Ports	SAE ORB
Rear Cover	Case drain

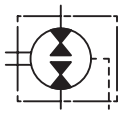
Ordering code
AZMF – 12 – ☐☐☐ U R R 12 ML

Displacement [cm³/rev]	Ordering-Number * Bi-Rotational		Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B	C	Inlet Port ** (SAE O-Ring BOSS)	Outlet Port (SAE O-Ring BOSS)
8.0		**9 511 290 001**	210	4000	91.6	43.2	85.8	-12	-12
11.0		**9 511 290 002**	210	3500	96.6	45.7	90.8	-12	-12
14.0		**9 511 290 003**	210	3000	101.6	48.2	95.8	-12	-12
16.0		**9 511 290 004**	210	3000	105.0	49.9	99.2	-12	-12
19.0		**9 511 290 005**	180	3000	110.0	52.4	104.2	-12	-12
22.0		**9 511 290 006**	180	3000	115.4	55.1	109.6	-12	-12

* Contact factory for availabilty of units with no ordering number listed.
** Case drain port size: SAE -6 O-Ring BOSS (.562-18 UNF-2B THD)



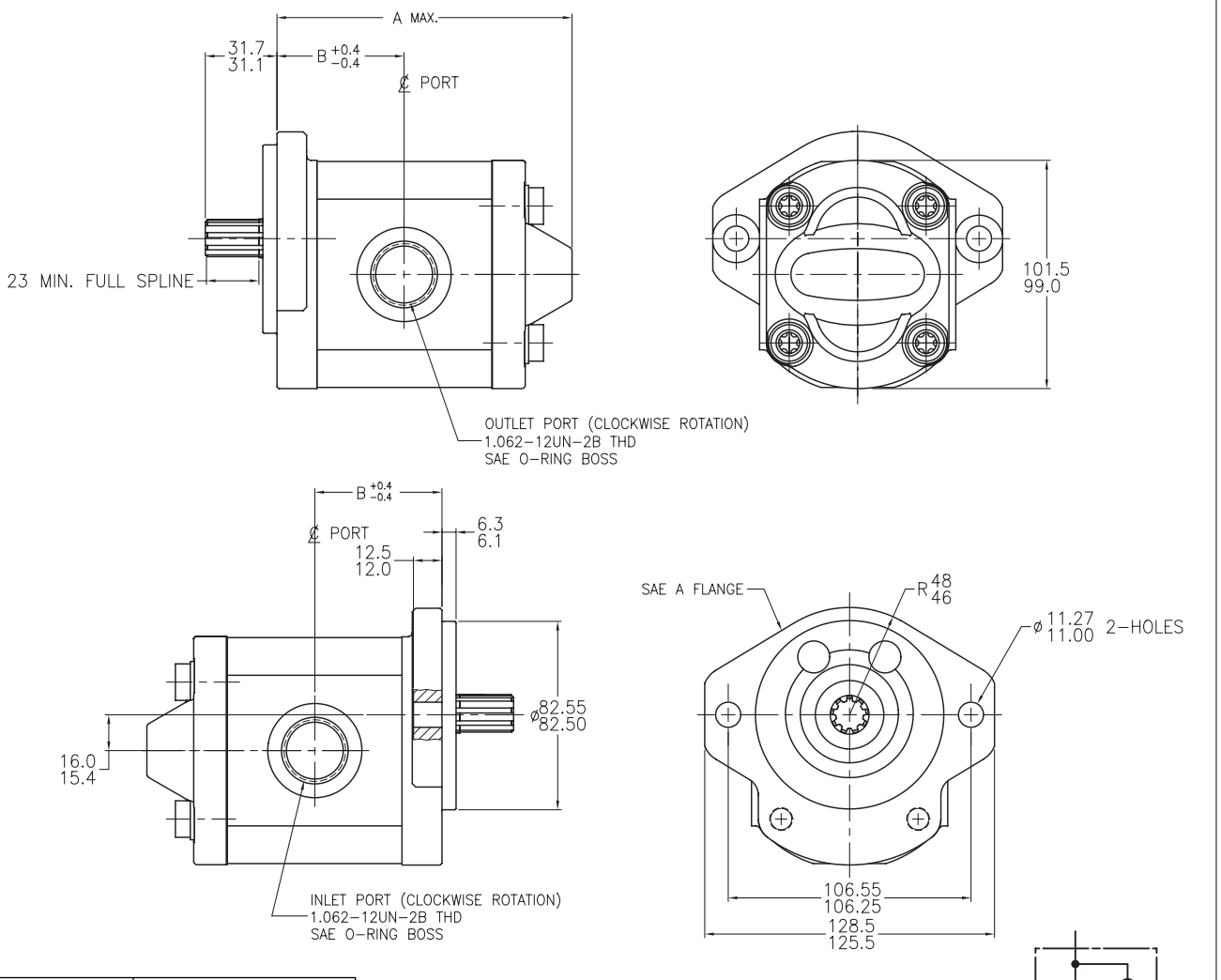
Features	Details
Shaft	9t spline
Front Cover	SAE A 2-bolt
Ports	SAE ORB
Rear Cover	Rear ports/case drain



Ordering code
AZMF – 12 – ☐ ☐ ☐ U R R 12 MA

Displacement [cm³/rev]	Ordering-Number * Bi-Rotational	Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B	C	Inlet Port ** (SAE O-Ring BOSS)	Outlet Port (SAE O-Ring BOSS)
8.0	**9 511 290 052**	210	4000	107.1	93.7	107.1	-12	-12
11.0	**9 511 290 053**	210	3500	112.1	98.7	112.1	-12	-12
14.0	**9 511 290 054**	210	3000	117.1	103.7	117.1	-12	-12
16.0	**9 511 290 055**	210	3000	120.5	107.1	120.5	-12	-12
19.0	**9 511 290 056**	180	3000	125.5	112.1	125.5	-12	-12
22.0	**9 511 290 057**	180	3000	130.9	117.5	130.9	-12	-12

* Contact factory for availabilty of units with no ordering number listed.
** Case drain port size: SAE -6 O-Ring BOSS (.562-18 UNF-2B THD)



Features	Details
Shaft	9t spline
Front Cover	SAE A 2-bolt
Ports	SAE ORB
Rear Cover	Internal case drain

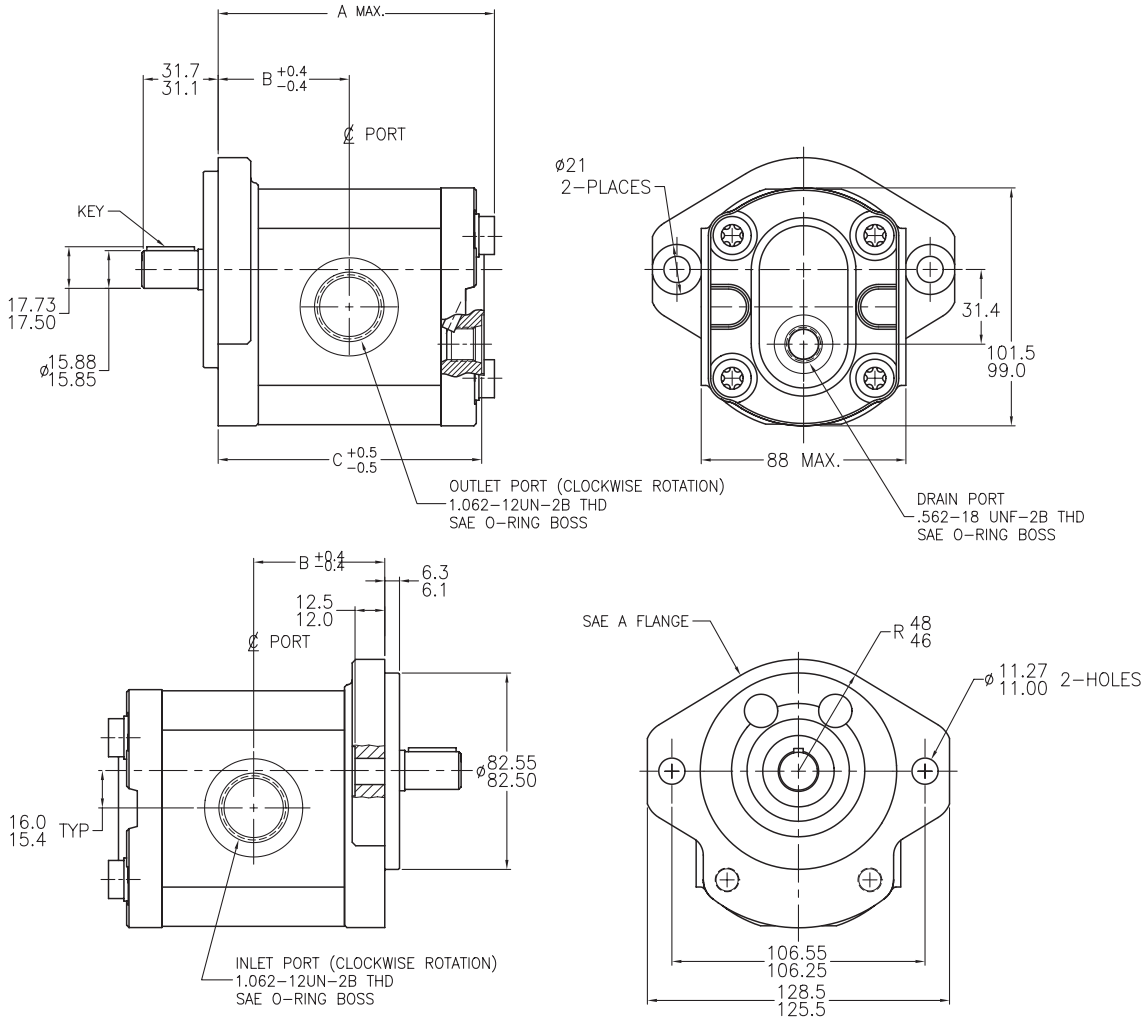
Ordering code

AZMF – 12 – ☐☐☐ U R R 12 ML – S0018

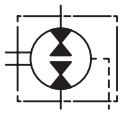
Displacement [cm³/rev]	Ordering-Number * Bi-Rotational	Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B	Inlet Port ** (SAE O-Ring BOSS)	Outlet Port (SAE O-Ring BOSS)
8.0	**9 511 290 019**	210	4000	105.7	43.2	-12	-12
11.0	**9 511 290 020**	210	3500	110.7	45.7	-12	-12
14.0	**9 511 290 021**	210	3000	115.7	48.2	-12	-12
16.0	**9 511 290 022**	210	3000	119.1	49.9	-12	-12
19.0	**9 511 290 023**	180	3000	124.1	52.4	-12	-12
22.0	**9 511 290 024**	180	3000	129.5	55.1	-12	-12

* Contact factory for availabilty of units with no ordering number listed.

** This unit contains internal leakage valves



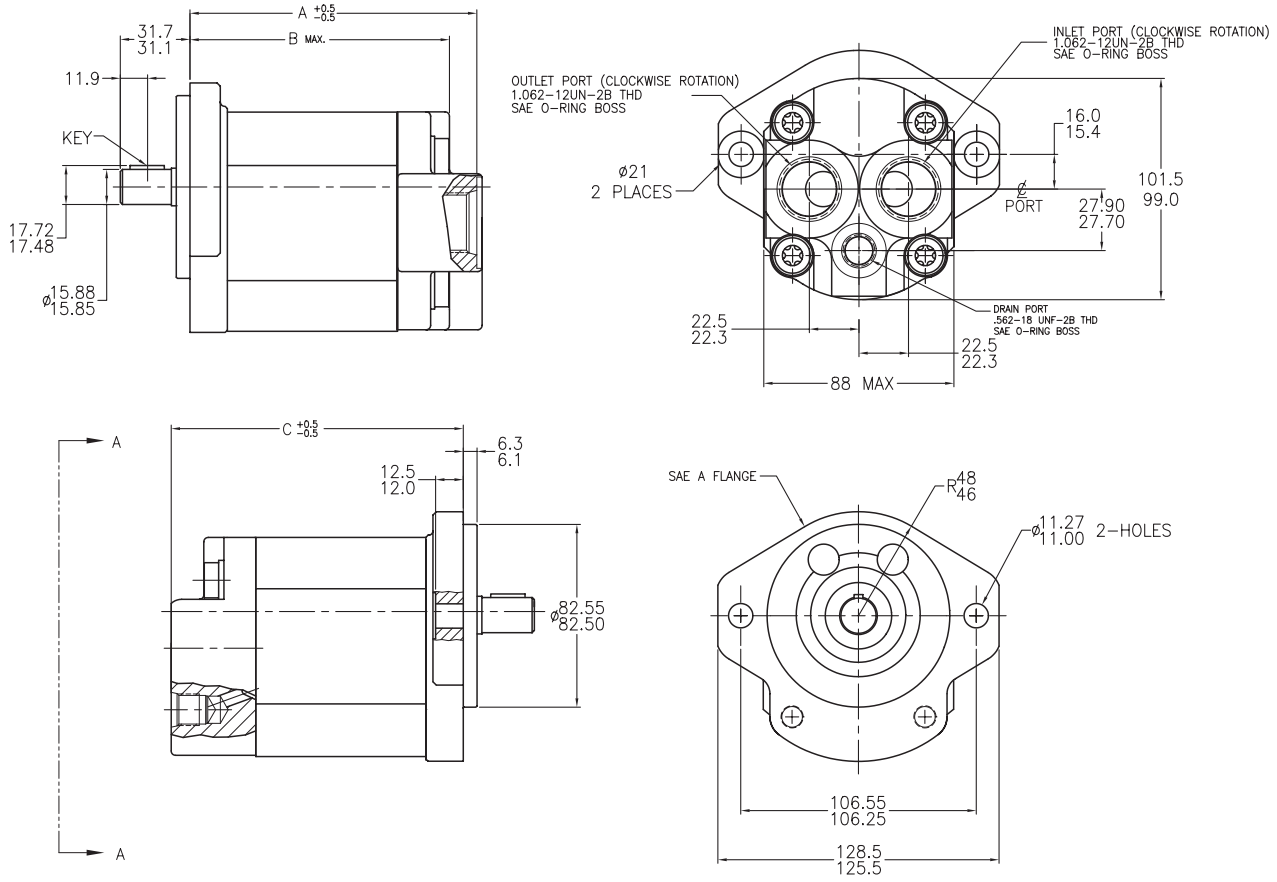
Features	Details
Shaft	5/8” keyed
Front Cover	SAE A 2-bolt
Ports	SAE ORB
Rear Cover	Case drain



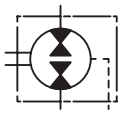
Ordering code
AZMF – 12 – ☐ ☐ ☐ U Q R 12 ML

Displacement [cm³/rev]	Ordering-Number * Bi-Rotational		Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B	C	Inlet Port ** (SAE O-Ring BOSS)	Outlet Port (SAE O-Ring BOSS)
8.0		**9 511 290 007**	210	4000	91.6	43.2	85.8	-12	-12
11.0		**9 511 290 008**	210	3500	96.6	45.7	90.8	-12	-12
14.0		**9 511 290 009**	210	3000	101.6	48.2	95.8	-12	-12
16.0		**9 511 290 010**	210	3000	105.0	49.9	99.2	-12	-12
19.0		**9 511 290 011**	180	3000	110.0	52.4	104.2	-12	-12
22.0		**9 511 290 012**	180	3000	115.4	55.1	109.6	-12	-12

* Contact factory for availabilty of units with no ordering number listed.
** Case drain port size: SAE -6 O-Ring BOSS (.562-18 UNF-2B THD)



Features	Details
Shaft	5/8" keyed
Front Cover	SAE A 2-bolt
Ports	SAE ORB
Rear Cover	Rear ports/case drain



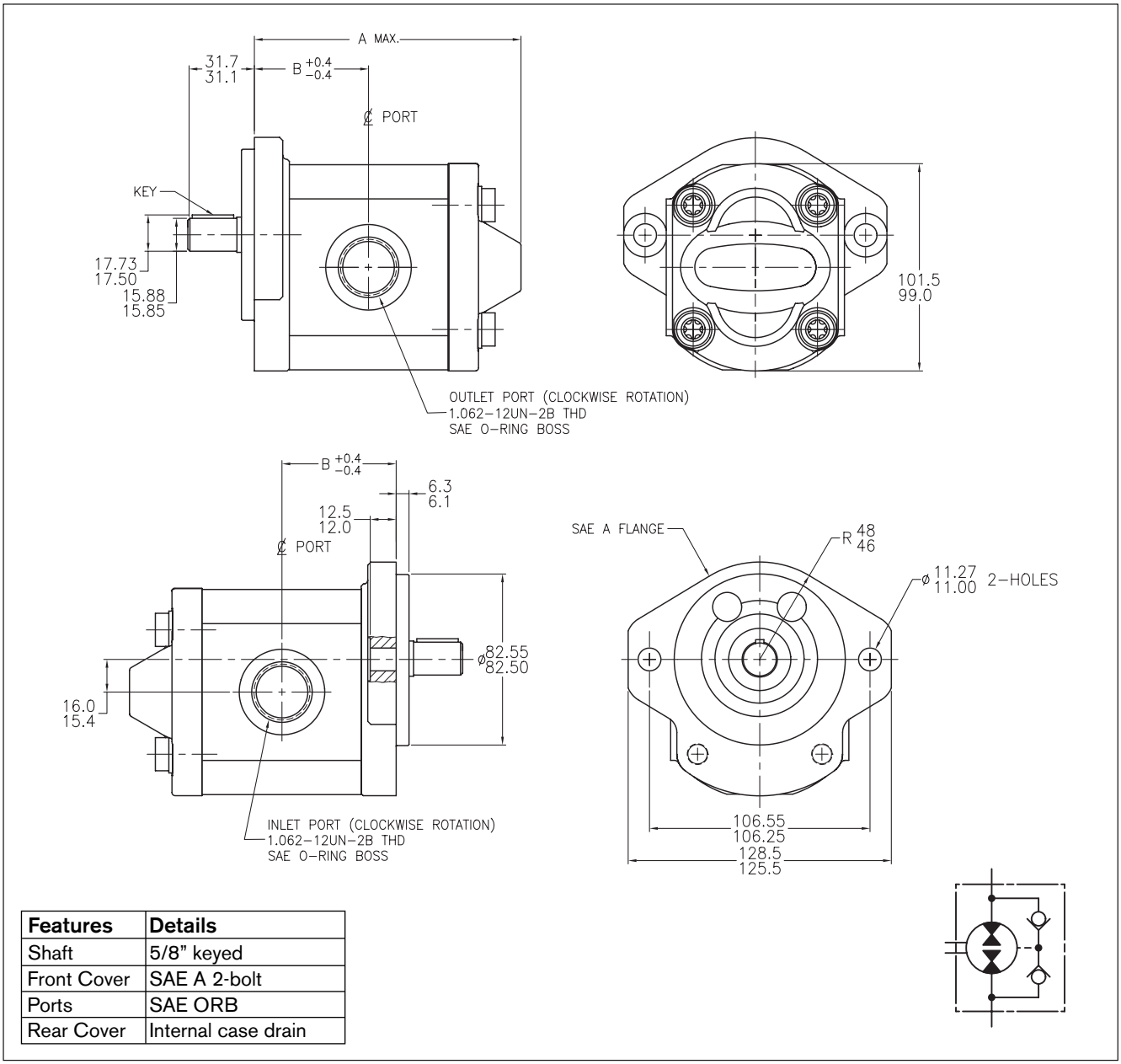
Ordering code

AZMF – 12 – ☐ ☐ ☐ U Q R 12 MA

Displacement [cm³/rev]	Ordering-Number * Bi-Rotational		Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B	C	Inlet Port ** (SAE O-Ring BOSS)	Outlet Port (SAE O-Ring BOSS)
8.0		**9 511 290 058**	210	4000	107.1	93.7	107.1	-12	-12
11.0		**9 511 290 059**	210	3500	112.1	98.7	112.1	-12	-12
14.0		**9 511 290 060**	210	3000	117.1	103.7	117.1	-12	-12
16.0		**9 511 290 061**	210	3000	120.5	107.1	120.5	-12	-12
19.0		**9 511 290 062**	180	3000	125.5	112.1	125.5	-12	-12
22.0		**9 511 290 063**	180	3000	130.9	117.5	130.9	-12	-12

* Contact factory for availabilty of units with no ordering number listed.

** Case drain port size: SAE -6 O-Ring BOSS (.562-18 UNF-2B THD)



Features	Details
Shaft	5/8” keyed
Front Cover	SAE A 2-bolt
Ports	SAE ORB
Rear Cover	Internal case drain

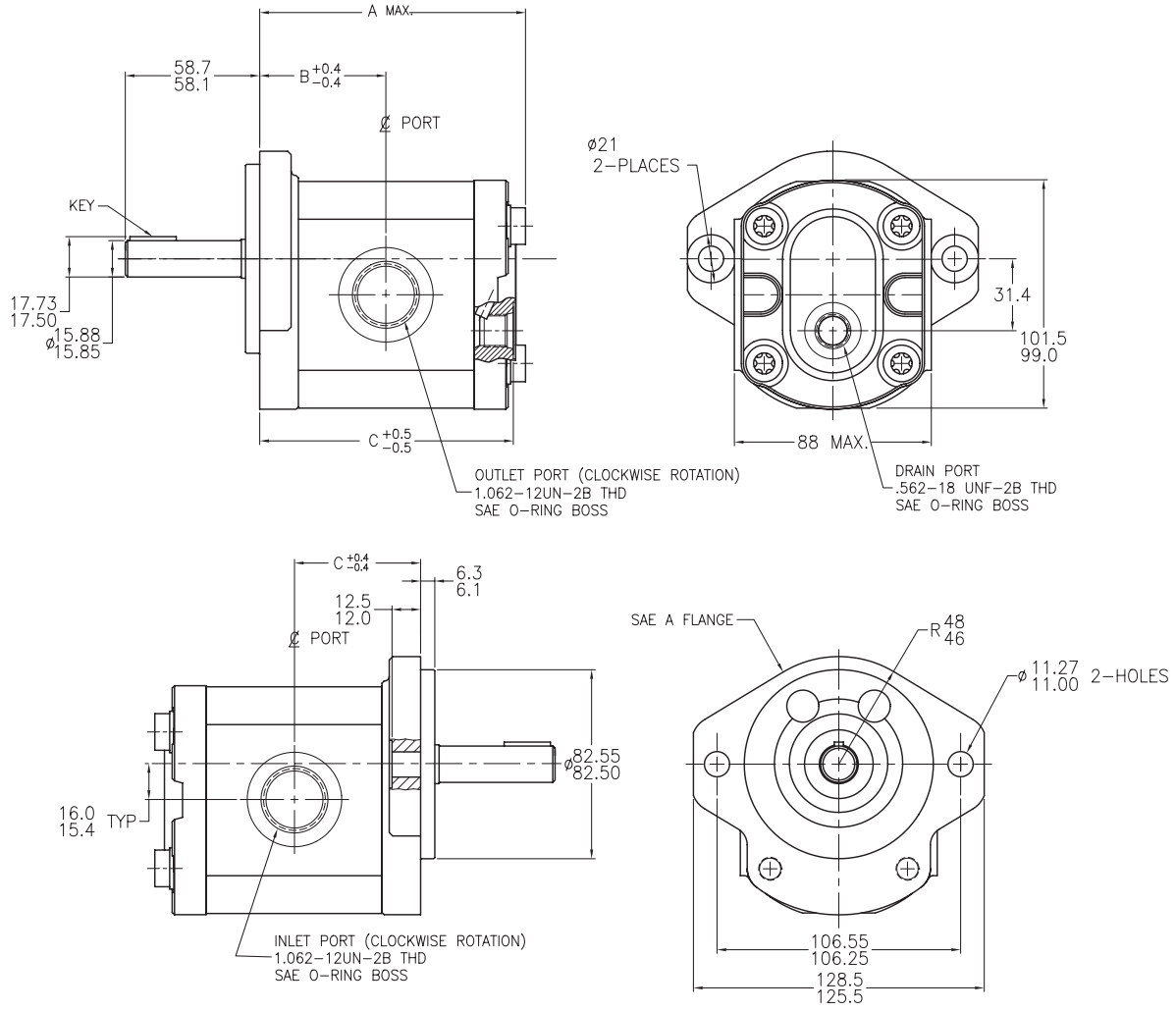
Ordering code

AZMF – 12 – ☐ ☐ ☐ U Q R 12 ML – S0018

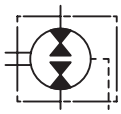
Displacement [cm³/rev]	Ordering-Number * Bi-Rotational		Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B		Inlet Port ** (SAE O-Ring BOSS)	Outlet Port (SAE O-Ring BOSS)
8.0		**9 511 290 025**	210	4000	105.7	43.2		-12	-12
11.0		**9 511 290 026**	210	3500	110.7	45.7		-12	-12
14.0		**9 511 290 027**	210	3000	115.7	48.2		-12	-12
16.0		**9 511 290 028**	210	3000	119.1	49.9		-12	-12
19.0		**9 511 290 029**	180	3000	124.1	52.4		-12	-12
22.0		**9 511 290 030**	180	3000	129.5	55.1		-12	-12

* Contact factory for availabilty of units with no ordering number listed.

** This unit contains internal leakage valves



Features	Details
Shaft	5/8" keyed – long
Front Cover	SAE A 2-bolt
Ports	SAE ORB
Rear Cover	Case drain



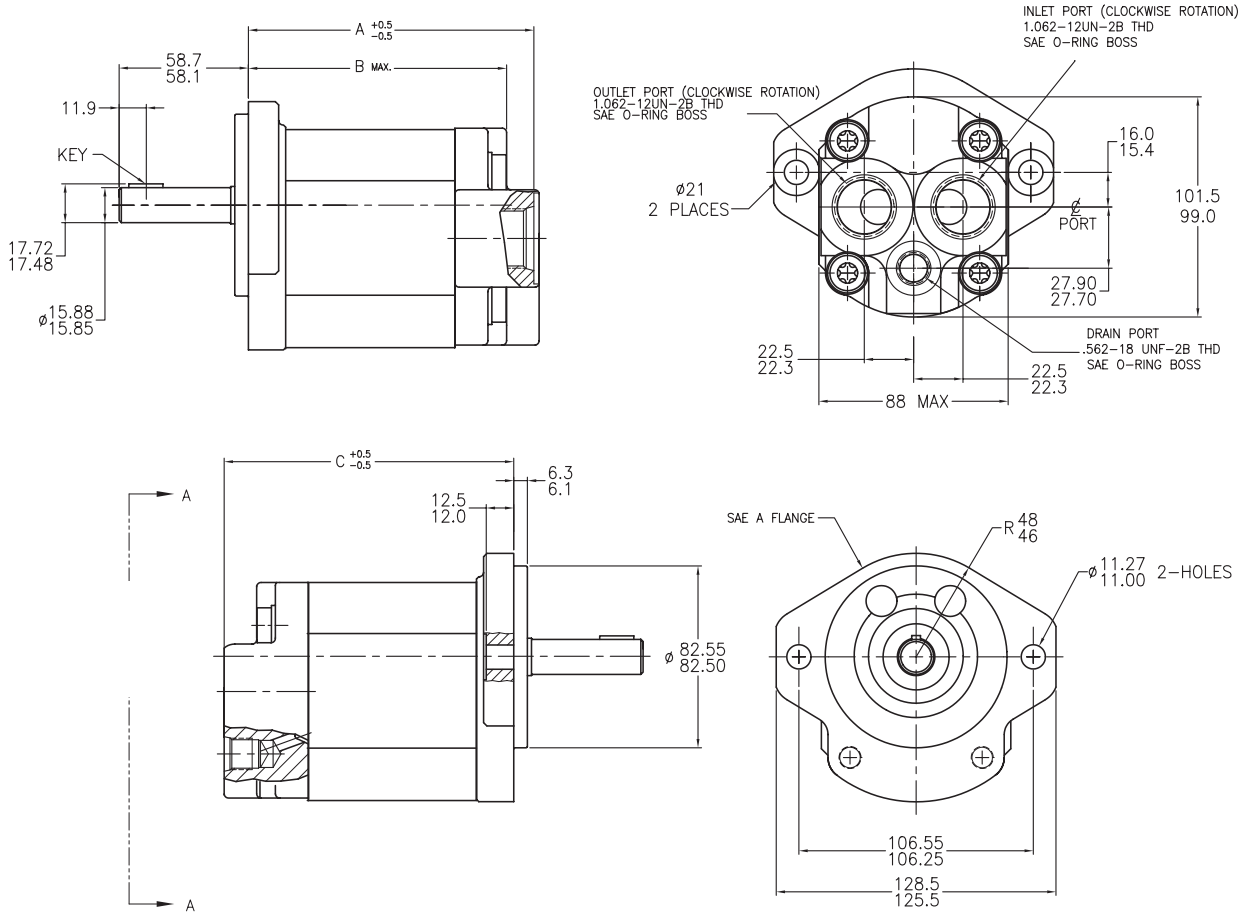
Ordering code

AZMF – 12 – ☐ ☐ ☐ U Q R 12 ML – S0022

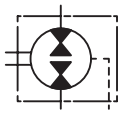
Displacement [cm³/rev]	Ordering-Number * Bi-Rotational		Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B	C	Inlet Port ** (SAE O-Ring BOSS)	Outlet Port (SAE O-Ring BOSS)
8.0		**9 511 290 013**	210	4000	91.6	43.2	85.8	-12	-12
11.0		**9 511 290 014**	210	3500	96.6	45.7	90.8	-12	-12
14.0		**9 511 290 015**	210	3000	101.6	48.2	95.8	-12	-12
16.0		**9 511 290 016**	210	3000	105.0	49.9	99.2	-12	-12
19.0		**9 511 290 017**	180	3000	110.0	52.4	104.2	-12	-12
22.0		**9 511 290 018**	180	3000	115.4	55.1	109.6	-12	-12

* Contact factory for availabilty of units with no ordering number listed.

** Case drain port size: SAE -6 O-Ring BOSS (.562-18 UNF-2B THD)



Features	Details
Shaft	5/8” keyed – long
Front Cover	SAE A 2-bolt
Ports	SAE ORB
Rear Cover	Rear ports/case drain



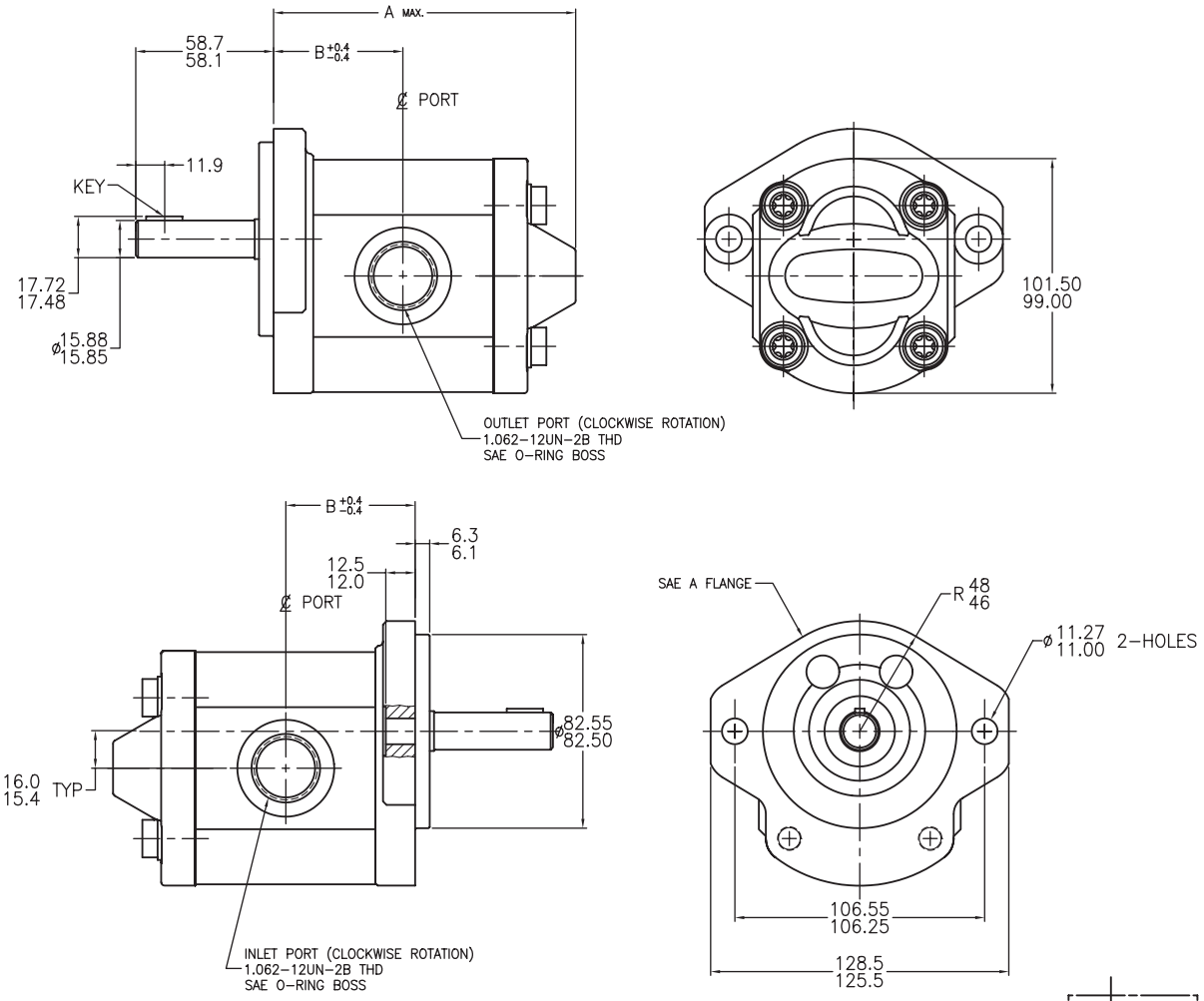
Ordering code

AZMF – 12 – ☐ ☐ ☐ U Q R 12 MA – S0022

Displacement [cm³/rev]	Ordering-Number * Bi-Rotational		Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B	C	Inlet Port ** (SAE O-Ring BOSS)	Outlet Port (SAE O-Ring BOSS)
8.0		**9 511 290 064**	210	4000	107.1	93.7	107.1	-12	-12
11.0		**9 511 290 065**	210	3500	112.1	98.7	112.1	-12	-12
14.0		**9 511 290 066**	210	3000	117.1	103.7	117.1	-12	-12
16.0		**9 511 290 067**	210	3000	120.5	107.1	120.5	-12	-12
19.0		**9 511 290 068**	180	3000	125.5	112.1	125.5	-12	-12
22.0		**9 511 290 069**	180	3000	130.9	117.5	130.9	-12	-12

* Contact factory for availabilty of units with no ordering number listed.

** Case drain port size: SAE -6 O-Ring BOSS (.562-18 UNF-2B THD)



Features	Details
Shaft	5/8” keyed – long
Front Cover	SAE A 2-bolt
Ports	SAE ORB
Rear Cover	Internal case drain

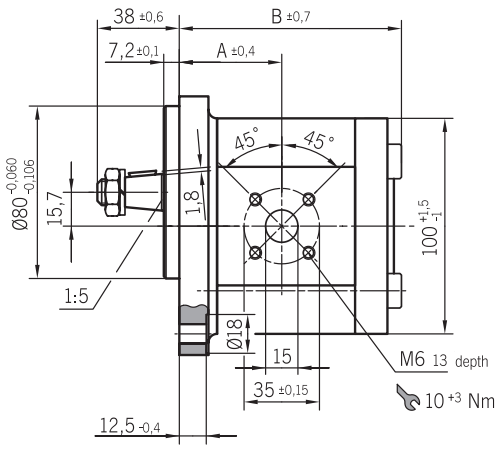
Ordering code

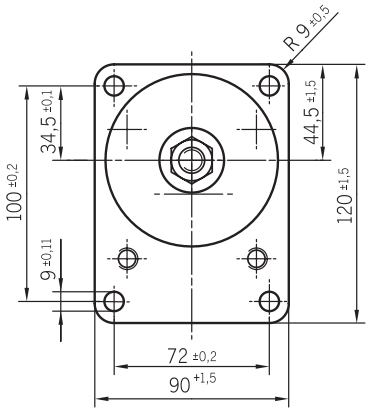
AZMF – 12 – ☐☐☐ U Q R 12 ML – S0030

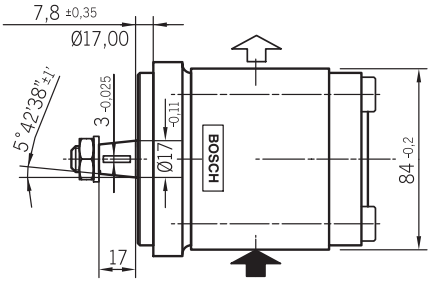
Displacement [cm³/rev]	Ordering-Number * Bi-Rotational	Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B	C	Inlet Port ** (SAE O-Ring BOSS)	Outlet Port (SAE O-Ring BOSS)
8.0	**9 511 290 031**	210	4000	105.7	43.2	105.7	-12	-12
11.0	**9 511 290 032**	210	3500	110.7	45.7	110.7	-12	-12
14.0	**9 511 290 033**	210	3000	115.7	48.2	115.7	-12	-12
16.0	**9 511 290 034**	210	3000	119.1	49.9	119.1	-12	-12
19.0	**9 511 290 035**	180	3000	124.1	52.4	124.1	-12	-12
22.0	**9 511 290 036**	180	3000	129.5	55.1	129.5	-12	-12

* Contact factory for availabilty of units with no ordering number listed.

** This unit contains internal leakage valves.

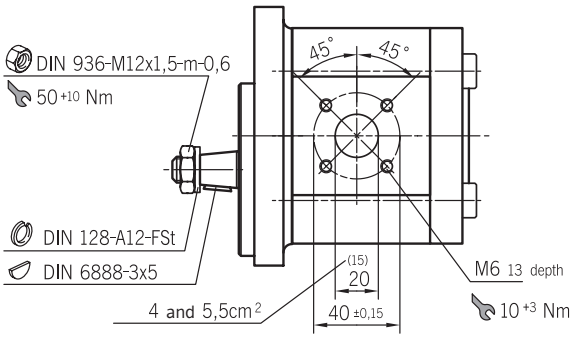


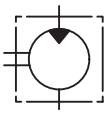




Clockwise
As shown in drawing

Counter-Clockwise
Inlet and outlet port changed





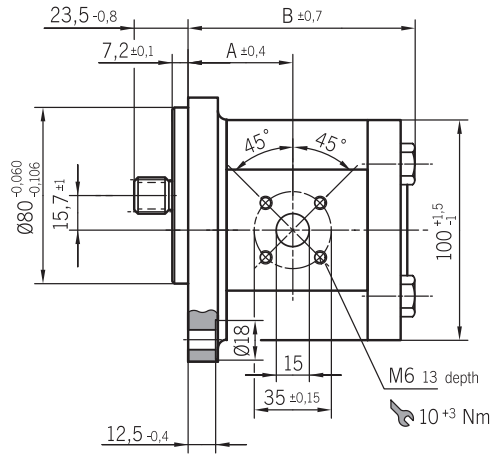
Features	Details
Shaft	1:5 taper keyed
Front Cover	Sq flange 80mm
Ports	DIN 8901/8902
Rear Cover	Standard

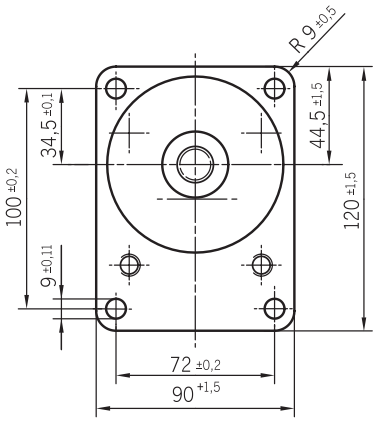
Ordering code

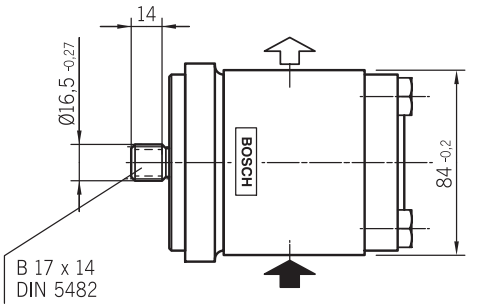
AZ M F – 1 X – ☐☐☐ ☐ C B 20 MB

Displacement [cm³/rev]	Ordering-Number * L	Ordering-Number * R	Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B	C		
8.0	**0 511 425 300**	**0 511 425 001**	210	4000	43.2	91.6			
11.0	**0 511 525 300**	**0 511 525 001**	210	3500	47.0	96.6			
14.0	**0 511 525 304**		210	3000	47.5	101.6			
16.0		**0 511 625 005**	210	3000	47.5	105.0			
19.0		**0 511 625 003**	180	3000	47.5	110.0			
19.0		**0 511 625 009**	180	3000	47.5	110.0			
19.0	**0 511 625 308**		180	3000	47.5	110.0			
22.0	**0 511 725 304**	**0 511 725 005**	180	3000	61.1	127.4			

* Contact factory for availabilty of units with no ordering number listed.

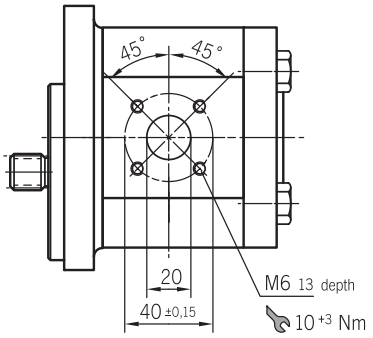


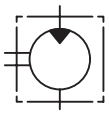





Clockwise
As shown in drawing


Counter-Clockwise
Inlet and outlet port changed





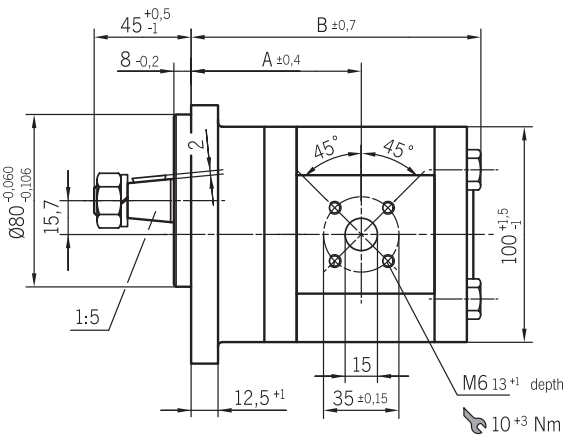
Features	Details
Shaft	DIN 5482 spline
Front Cover	Sq flange 80mm
Ports	DIN 8901/8902
Rear Cover	Standard

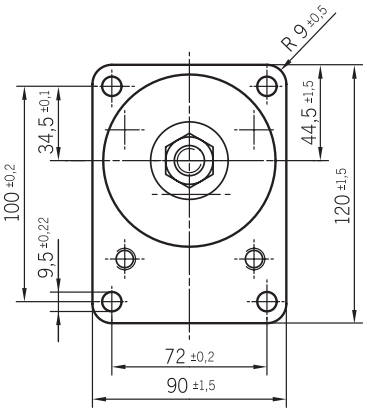
Ordering code

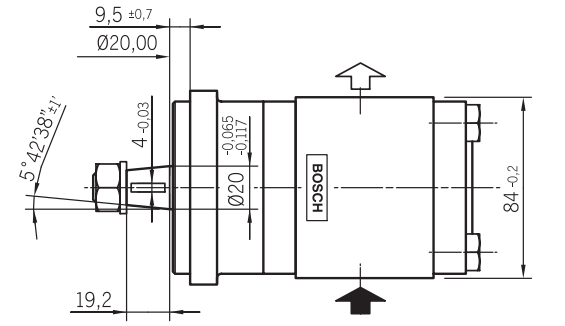
AZ M F – 1 X – □□□ □ F B 20 MB

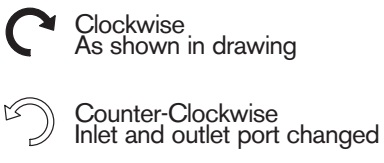
Displacement [cm³/rev]	Ordering-Number * L	Ordering-Number * R	Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B
8.0	**0 511 425 301**	**0 511 425 002**	210	4000	43.2	91.6
11.0	**0 511 525 301**	**0 511 525 002**	210	3500	47.0	96.6
14.0	**0 511 525 303**		210	3000	47.5	101.6
16.0	**0 511 625 301**	**0 511 625 001**	210	3000	47.5	105.0
19.0	**0 511 625 300**	**0 511 625 002**	180	3000	47.5	110.0
22.0	**0 511 725 303**	**0 511 725 004**	180	3000	61.1	127.4

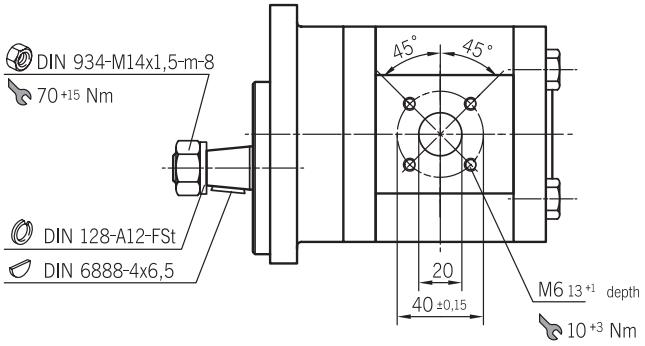
* Contact factory for availabilty of units with no ordering number listed.

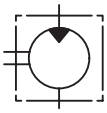












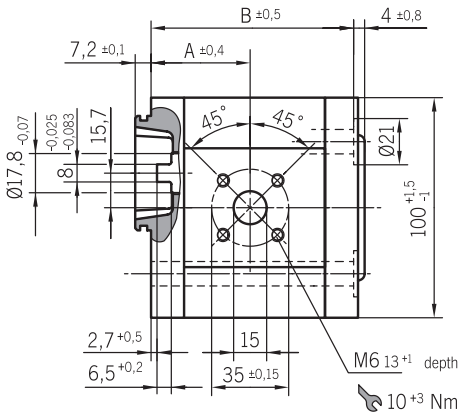
Features	Details
Shaft	1:5 taper keyed
Front Cover	Sq flange 80mm, OB
Ports	DIN 8901/8902
Rear Cover	Standard

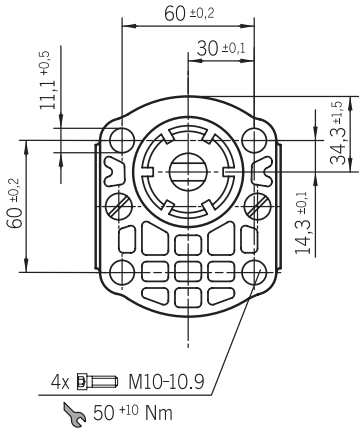
Ordering code

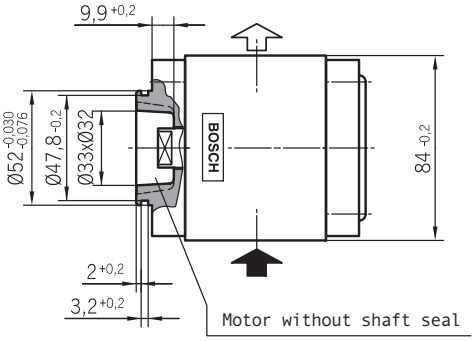
AZ M F – 1 X – ☐☐☐ ☐ S A 20 MB

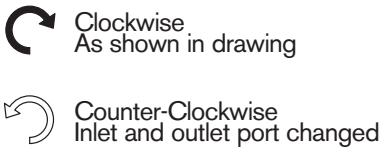
Displacement [cm³/rev]	Ordering-Number * L	Ordering-Number * R	Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	Dimension [mm] B
8.0	**0 511 445 300**	**0 511 445 001**	210	4000	74.7	121.3
11.0	**0 511 545 300**	**0 511 545 001**	210	3500	78.5	126.3
14.0	**0 511 545 301**		210	3000	79.0	131.3
16.0	**0 511 645 300**	**0 511 645 001**	210	3000	79.0	134.7
19.0	**0 511 645 302**		180	3000	79.0	139.7
22.0	**0 511 745 300**	**0 511 745 001**	180	3000	92.6	157.1

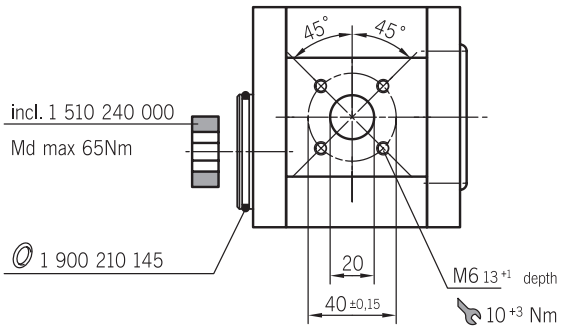
* Contact factory for availabilty of units with no ordering number listed.

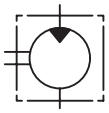












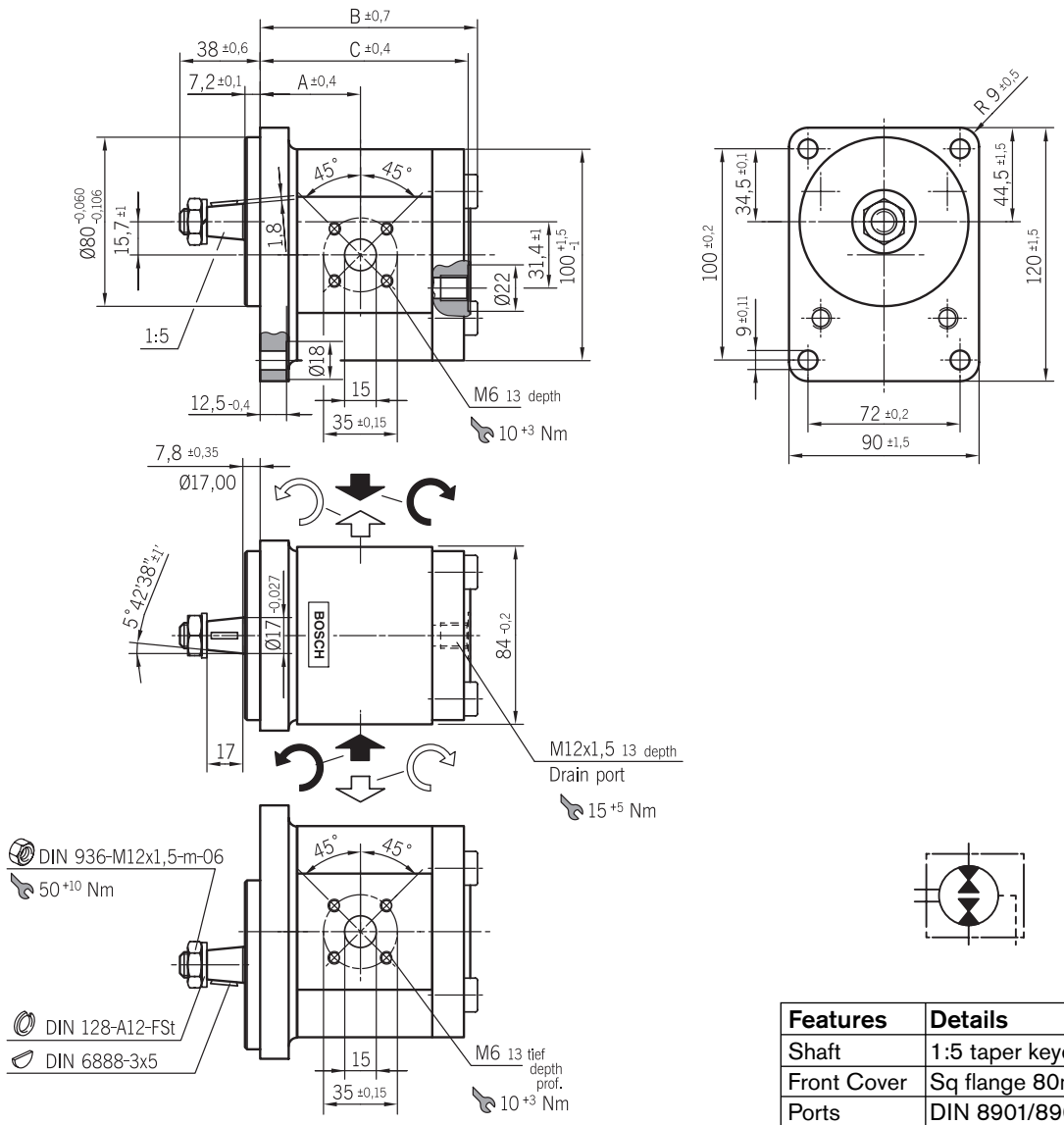
Features	Details
Shaft	Tang
Front Cover	Transmission
Ports	DIN 8901/8902
Rear Cover	Standard

Ordering code

AZ M F – 1 X – ☐☐☐ ☐ N M 20 MB

Displacement [cm³/rev]	Ordering-Number * L	Ordering-Number * R	Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B			
8.0	**0 511 415 300**	**0 511 415 001**	210	4000	40.7	80.3			
11.0	**0 511 515 300**	**0 511 515 001**	210	3500	44.5	85.3			
16.0	**0 511 615 301**	**0 511 615 002**	210	3000	45.0	93.7			
19.0	**0 511 615 300**	**0 511 615 001**	180	3000	45.0	98.7			
22.0	**0 511 715 300**	**0 511 715 001**	180	3000	52.6	104.1			

* Contact factory for availabilty of units with no ordering number listed.



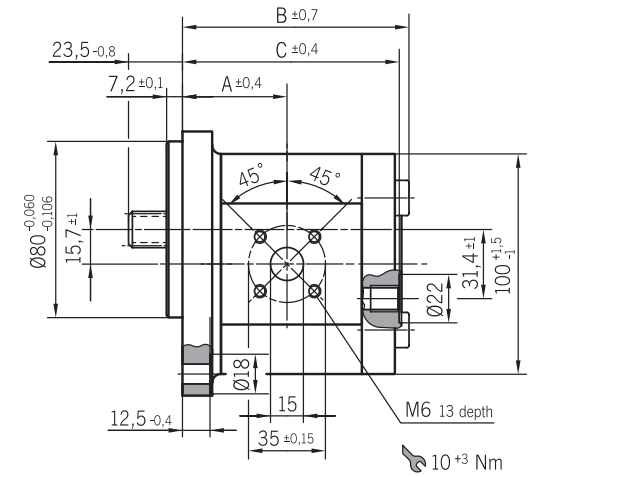
Features	Details
Shaft	1:5 taper keyed
Front Cover	Sq flange 80mm
Ports	DIN 8901/8902
Rear Cover	Case drain

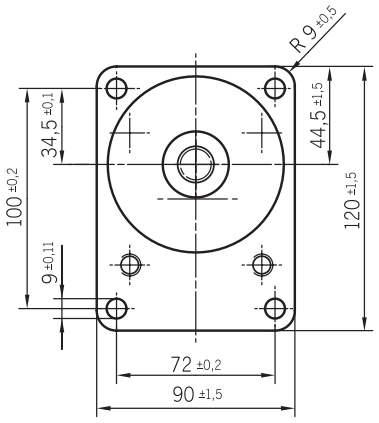
Ordering code

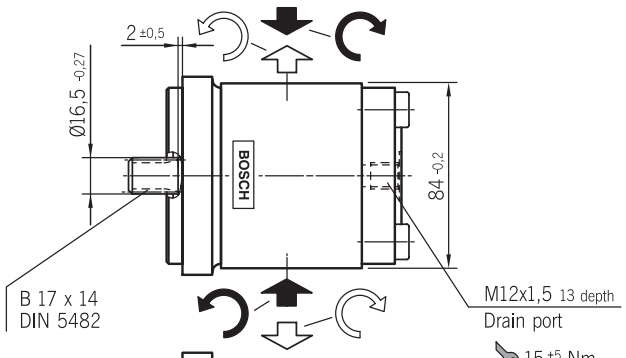
AZ M F – 1 X – □□□ U C B 20 ML

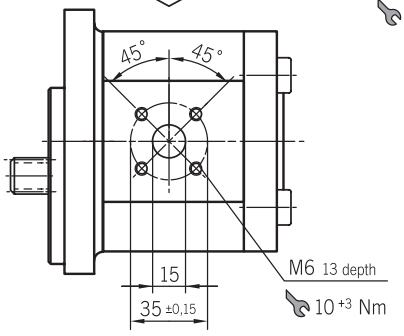
Displacement [cm³/rev]	Ordering-Number * Bi-Rotational	Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B	C
8.0	**0 511 425 601**	210	4000	43.2	91.6	85.8
11.0	**0 511 525 604**	210	3500	47.0	96.6	90.8
16.0	**0 511 625 602**	210	3000	47.5	105.0	99.2
22.0	**0 511 725 601**	180	3000	55.1	115.4	109.6

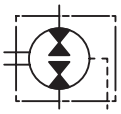
* Contact factory for availabilty of units with no ordering number listed.











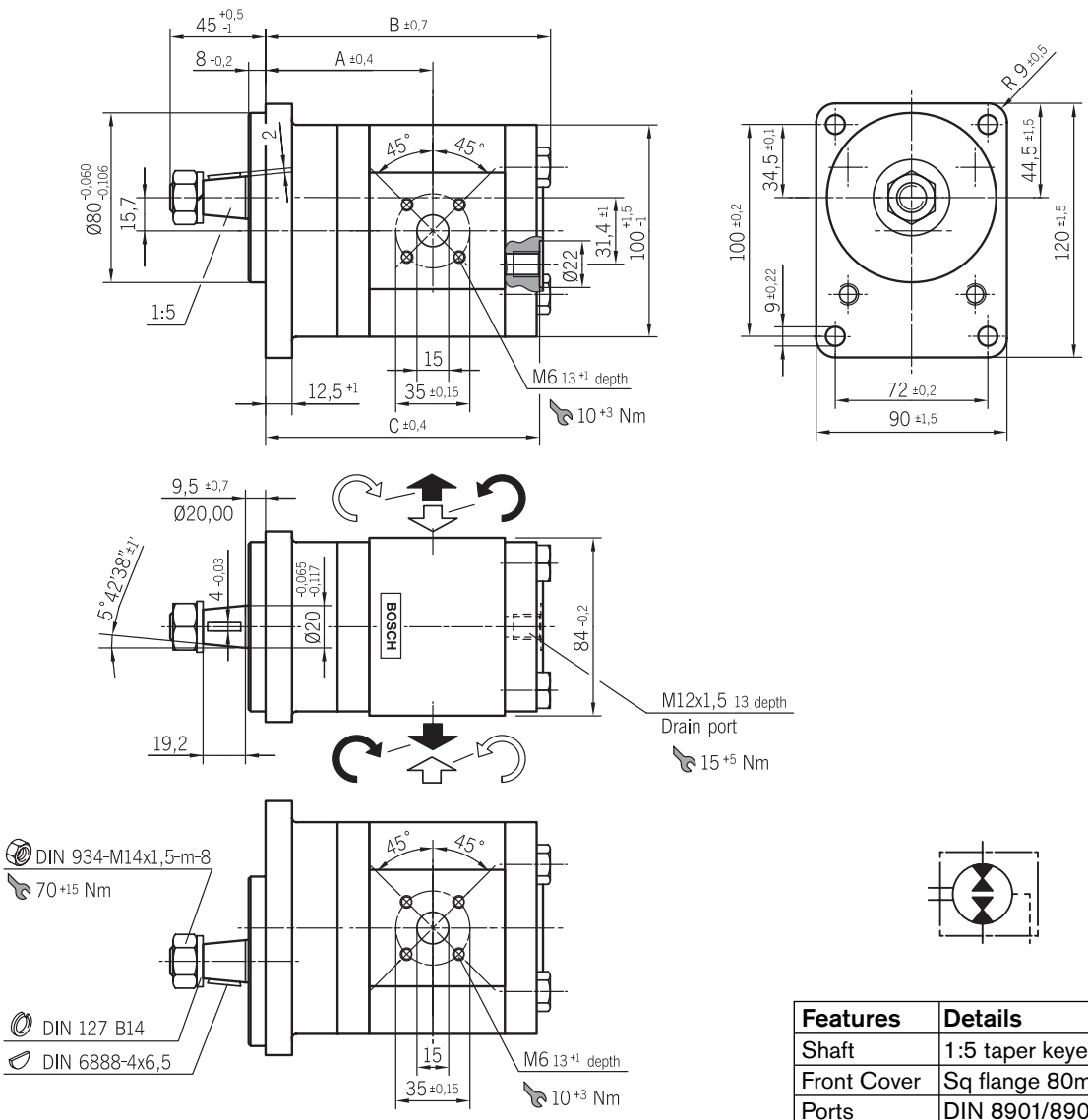
Features	Details
Shaft	DIN 5482 spline
Front Cover	Sq flange 80mm
Ports	DIN 8901/8902
Rear Cover	Case drain

Ordering code

AZ M F – 1 X – □ □ □ U F B 20 ML

Displacement [cm³/rev]	Ordering-Number * Bi-Rotational	Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B	C
8.0	**0 511 425 603**	210	4000	43.2	91.6	85.8
11.0	**0 511 525 601**	210	3500	47.0	96.6	90.8
16.0	**0 511 625 603**	210	3000	47.5	105.0	99.2
19.0	**0 511 625 605**	180	3000	47.5	110.0	104.2
22.0	**0 511 725 602**	180	3000	55.1	115.4	109.6

* Contact factory for availabilty of units with no ordering number listed.



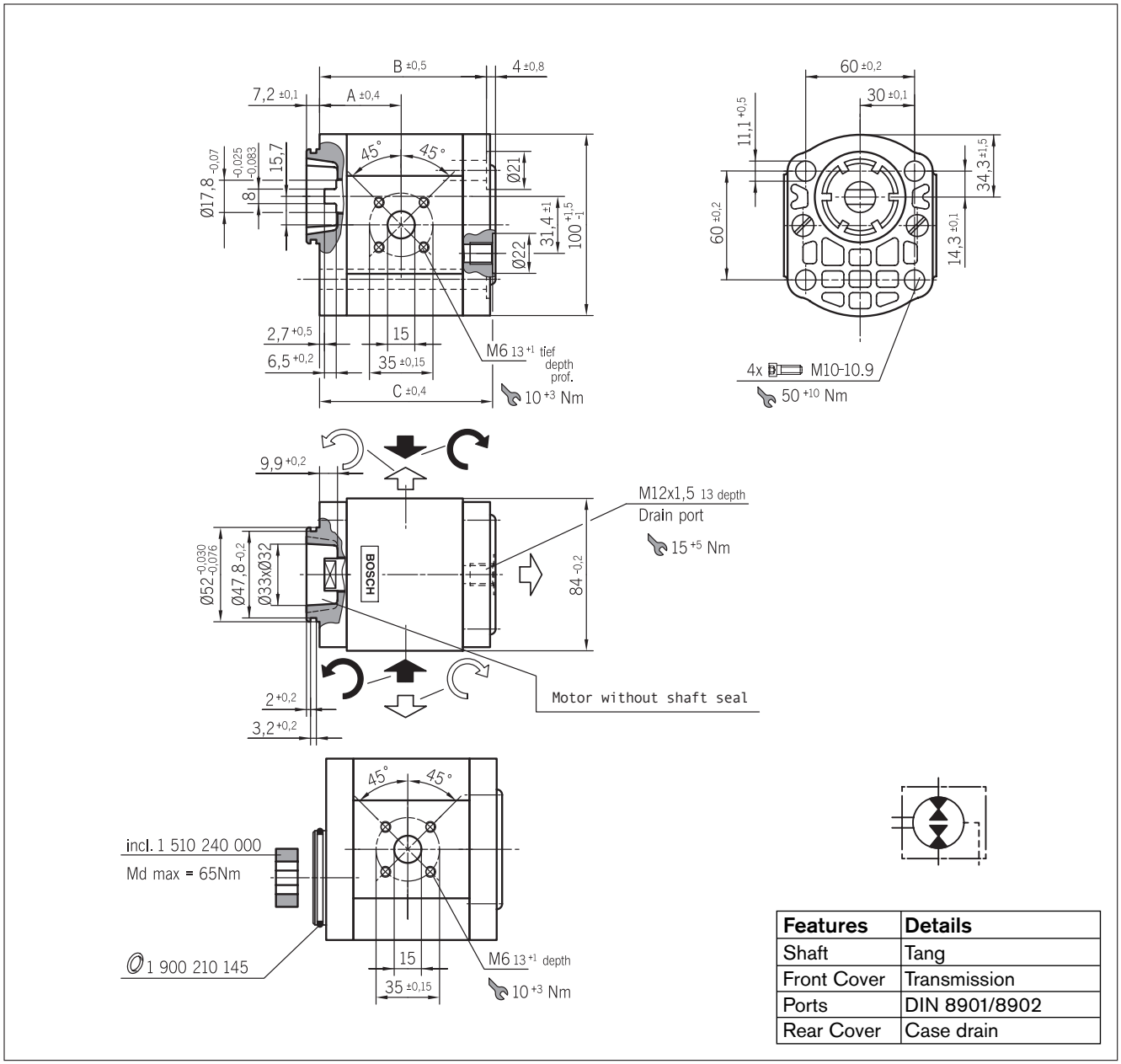
Features	Details
Shaft	1:5 taper keyed
Front Cover	Sq flange 80mm, OB
Ports	DIN 8901/8902
Rear Cover	Case drain

Ordering code

AZ M F – 1 X – □□□ U S A 20 ML

Displacement [cm³/rev]	Ordering-Number * Bi-Rotational	Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B	C
8.0	**0 511 445 601**	210	4000	74.7	121.3	117.3
11.0	**0 511 545 601**	210	3500	78.5	126.3	122.3
16.0	**0 511 645 601**	210	3000	79.0	134.7	130.7
19.0	**0 511 645 603**	180	3000	79.0	139.7	135.7

* Contact factory for availabilty of units with no ordering number listed.



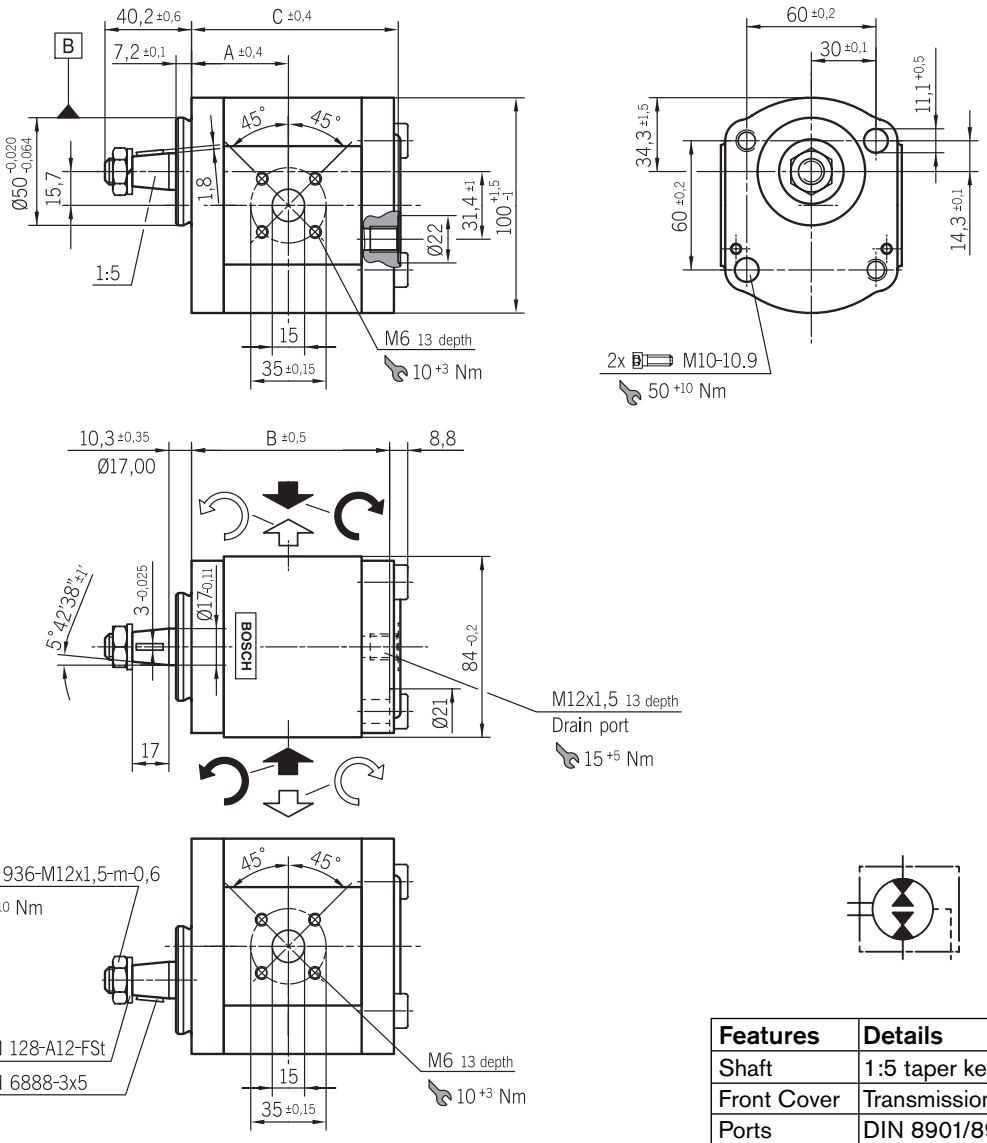
Features	Details
Shaft	Tang
Front Cover	Transmission
Ports	DIN 8901/8902
Rear Cover	Case drain

Ordering code

AZ M F – 1 X – □ □ □ U N T 20 ML

Displacement [cm³/rev]	Ordering-Number * Bi-Rotational	Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B	C
8.0	**0 511 415 605**	210	4000	40.7	80.3	83.1
11.0	**0 511 515 602**	210	3500	44.5	85.3	88.1
16.0	**0 511 615 607**	210	3000	45.0	93.7	96.5
19.0	**0 511 615 608**	180	3000	45.0	98.7	101.5
22.0	**0 511 715 601**	180	3000	52.6	104.1	106.9

* Contact factory for availabilty of units with no ordering number listed.



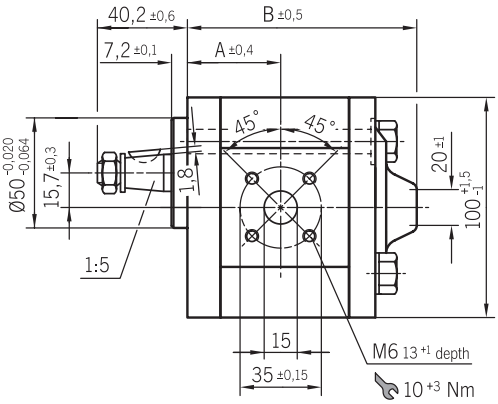
Features	Details
Shaft	1:5 taper keyed
Front Cover	Transmission
Ports	DIN 8901/8902
Rear Cover	Case drain

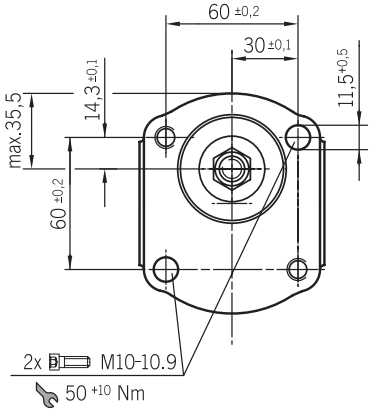
Ordering code

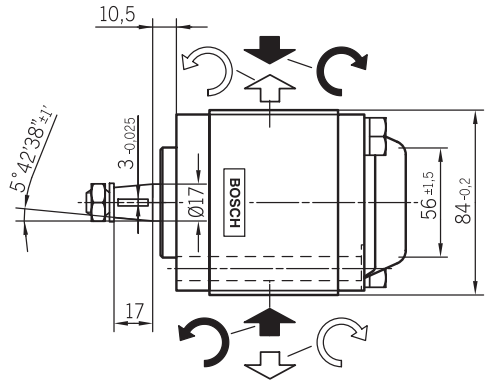
AZ M F – 1 X – □□□ U C N 20 ML

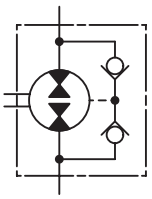
Displacement [cm³/rev]	Ordering-Number * Bi-Rotational	Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B	C		
8.0	**0 511 415 606**	210	4000	40.7	80.3	83.3		
11.0	**0 511 515 601**	210	3500	44.5	85.3	88.3		
14.0	**0 511 515 605**	210	3000	45.0	90.3	93.3		

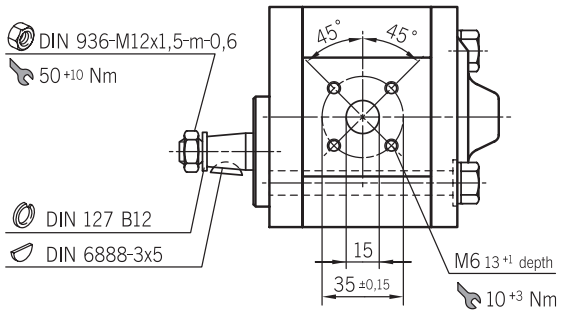
* Contact factory for availabilty of units with no ordering number listed.











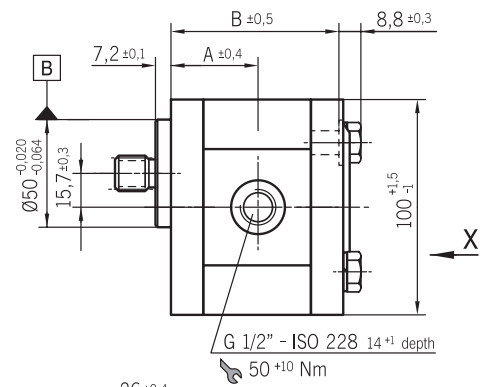
Features	Details
Shaft	1:5 taper keyed
Front Cover	Transmissiom
Ports	DIN 8901/8902
Rear Cover	Internal case drain

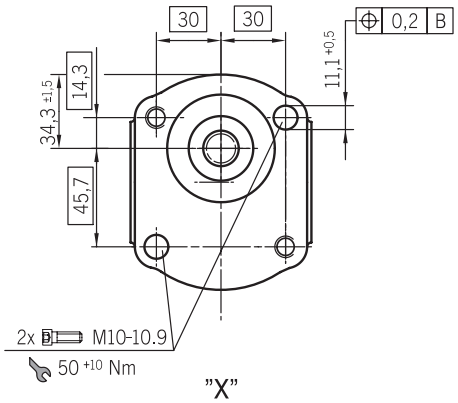
Ordering code

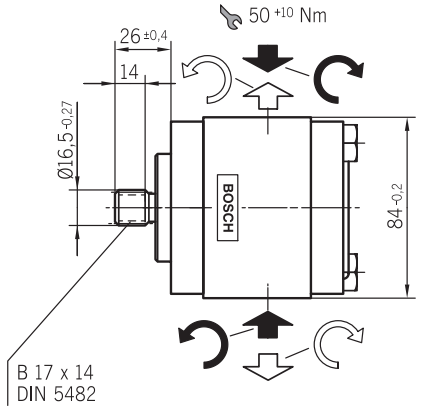
AZ M F – 1 X – ☐ ☐ ☐ – U C N 20 M ☐ – S0018

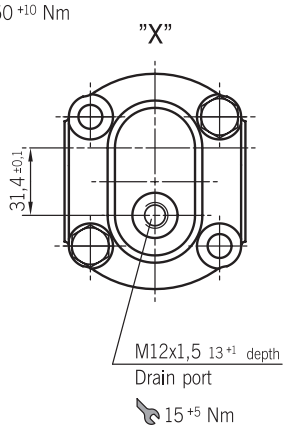
Displacement [cm³/rev]	Ordering-Number * Bi-Rotational		Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B	C		
8.0		**0 511 415 603**	210	4000	40.7	80.3	104.0		

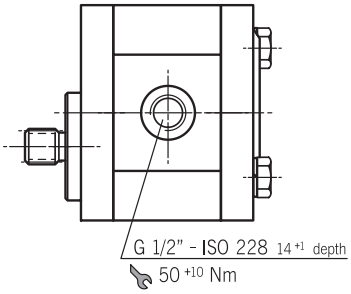
* Contact factory for availabilty of units with no ordering number listed.

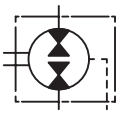












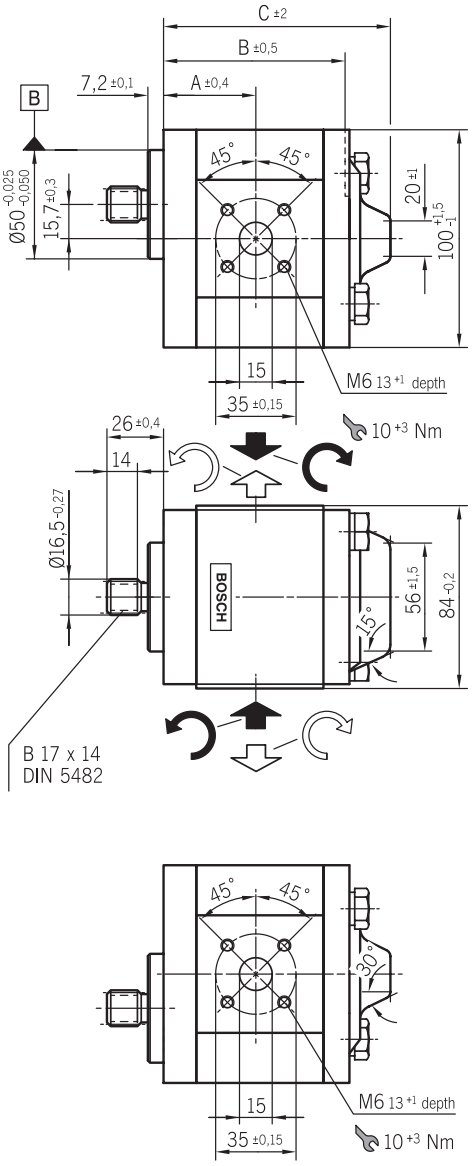
Features	Details
Shaft	DIN 5485 spline
Front Cover	Transmission
Ports	ISO threaded
Rear Cover	Case drain

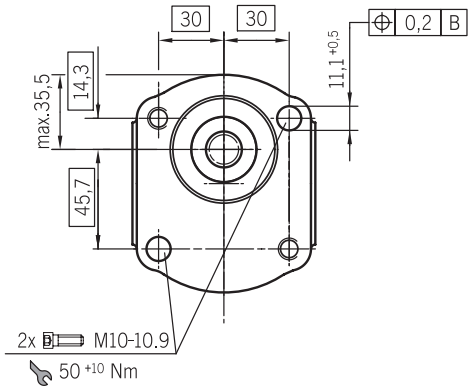
Ordering code

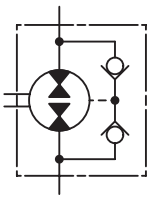
AZ M F – 1 X – □□□ U F N 01 ML

Displacement [cm³/rev]	Ordering-Number * Bi-Rotational		Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B			
8.0		**0 511 415 608**	210	4000	40.7	80.3			

* Contact factory for availabilty of units with no ordering number listed.







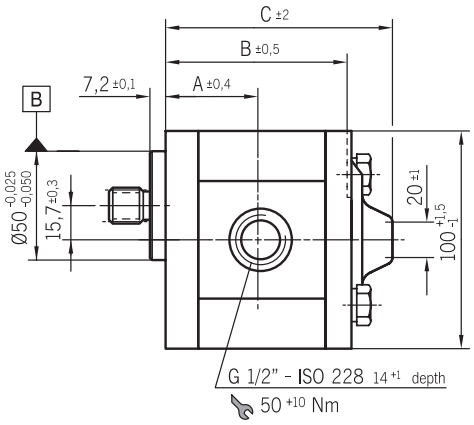
Features	Details
Shaft	DIN 5485 spline
Front Cover	Transmission
Ports	DIN 8901/8902
Rear Cover	Internal case drain

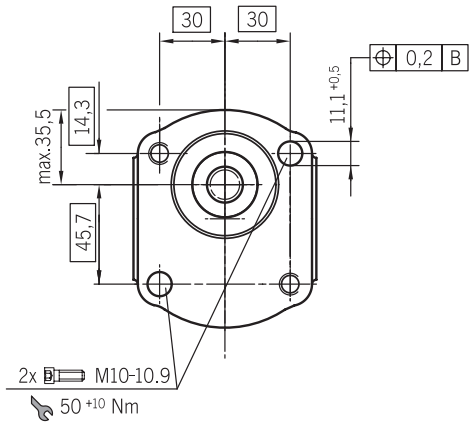
Ordering code

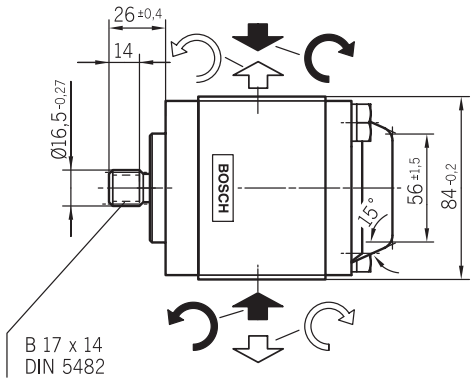
AZ M F – 1 X – □ □ □ U F N 20 M L – S0018

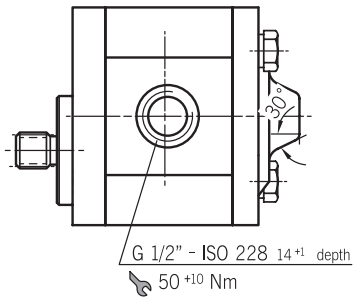
Displacement [cm³/rev]	Ordering-Number * Bi-Rotational	Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B	C		
16.0	**0 511 615 606**	210	3000	45.0	93.7	114.5		

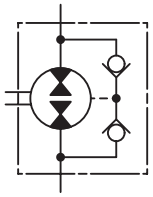
* Contact factory for availabilty of units with no ordering number listed.











Features	Details
Shaft	DIN 5485 spline
Front Cover	Transmission
Ports	ISO threaded
Rear Cover	Internal case drain

Ordering code

AZ M F – 1 X – □□□ U F N 01 M L – S0018

Displacement [cm³/rev]	Ordering-Number * Bi-Rotational	Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B	C
8.0	**0 511 415 604**	210	4000	40.7	80.3	101.1

* Contact factory for availabilty of units with no ordering number listed.

Ordering Code (N Series Motor)

AZ M N -1□ or 2□ -028 U D C 12 M L –□□□ – S□□□□

Function

M = Motor

Size (N)

1.24 in³ (20.4 cm³) = 020
1.41 in³ (23.1 cm³) = 022
1.57 in³ (25.8 cm³) = 025
1.74 in³ (28.4 cm³) = 028
1.98 in³ (32.4 cm³) = 032
2.22 in³ (36.4 cm³) = 036

Direction of rotation

Right = R
Left = L
Universal = U (Bi-rotational)

PRV (bar)

EXAMPLE:
180 bar = 180

Special Design

End cover

B - Standard
A - Rear ports
L - Case drain port
L S0018 - Internal case drain
D - PRV (bar)

Seals

NBR = M
FPM = P
NBR, shaft seal in FPM = K

Drive shafts

		Matching front flange	
C	Conical 1:5 (Tapered key)	B	
N	Dog (Tang)	M	
D	Spline shaft SAE B 13T	C	
P	Spline shaft SAE 11T	R	C
Q	SAE 3/4″ Keyed - Short	R	C
Q	SAE 3/4″ Keyed - Long *S0022 Suffix	R	C
X	Special (S0 Code Defines Special Shaft)	R	C

Front flange

B	Square flange Pilot Ø 100 mm
C	SAE B 2-bolt
M	Transmission flange Pilot Ø 52 mm with O-ring
R	SAE A 2-bolt

Line connections

20	Rectangular flange
12	Thread (UN-2B) SAE O-ring BOSS
07	Split flange SAE Code 61 Metric bolts
40	Split flange SAE Code 61 UNC bolts

* Common Special Design Codes:
S0018 – Internal case drain
S0022 – 3/4″ Long keyed shaft
S0030 – S0018 & S0022
S0275 – Tapered key shaft with thread per SAE J744 Size 22-3

Size N

20 ... 36 cm³/rev

N Series Motor Product Index

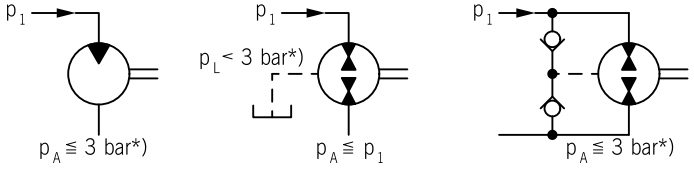
(Reference page 40 for ordering code designators)

AZMN-12-XXXX _ _ _ KL

Page Number	Ordering code	Shaft Type	Mounting Flange	Ports	Port Orientation	Case Drain
45	AZMN-12-XXXUDC12KL	D	C	12	side	rear
46	AZMN-12-XXXUXC12KL-S0275	SAE Taper	C	12	side	rear
47	AZMN-12-XXXUPC12KL	P	C	12	side	rear
48	AZMN-12-XXXUQC12KL	Q	C	12	side	rear
49	AZMN-12-XXXUQC12KL-S0022	Q-S0022	C	12	side	rear
50	AZMN-11-XXXXCB20KB	C	B	20	side	rear

N Series Performance Ratings

Size			020	022	025	028	032	036
Displacement		cm^3/rev	20.4	23.1	25.8	28.4	32.4	36.4
max. continuous pressure	p_1	bar	210	210	210	210	180	160
		psi	3045	3045	3045	3045	2610	2320
max. starting pressure	p_2	bar	240	240	240	240	210	190
		psi	3480	3480	3480	3480	3045	2755
min. rotational speed		min^{-1}	500	500	500	500	500	500
max. rotational speed	p_1		3000	3000	3000	2800	2800	2500
Motor outlet pressure	p_A	bar						
Leakage-oil line pressure	p_L							



*) Short-term when starting 10 bar

N Series Motor
SAE O-Ring BOSS - Standard Porting

	Side Ports		Rear Port	
Displacement (cc)	Inlet	Outlet	Inlet	Outlet
20	-10	-10		
22	-10	-10		
25	-12	-12		
28	-12	-12		
32	-12	-12		
36	-12	-12		

SAE Porting - Specifications and Dimensions per SAE J1926/1

Dash Size	Thread Size (in)
-2	5/16-24 UNF-2B
-3	3/8-24 UNF-2B
-4	7/16-20 UNF-2B
-5	1/2-20 UNF-2B
-6	9/16-18 UNF-2B
-8	3/4-16 UNF-2B
-10	7/8-14 UNF-2B
-12	1-1/16-12 UN-2B
-14	1-3/16-12 UN-2B
-16	1-5/16-12 UN-2B
-20	1-5/8-12 UN-2B
-24	1-7/8-12 UN-2B
-32	2-1/2-12 UN-2B

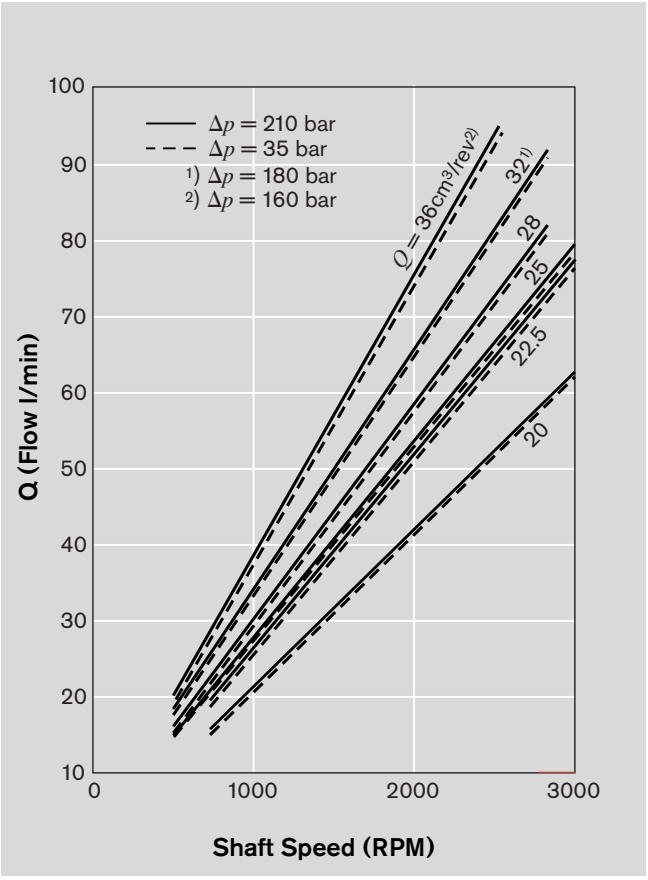
Diagrams

Size N

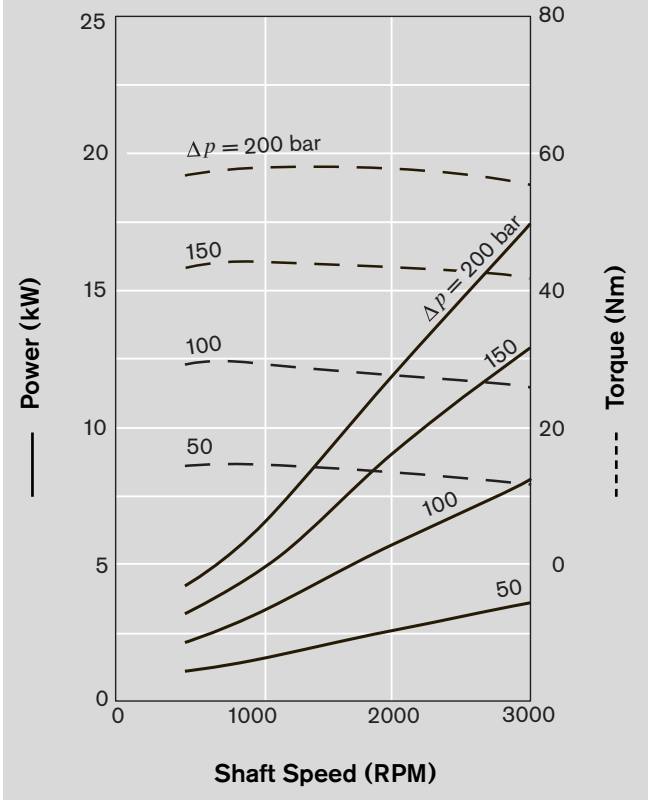
ν = 35 mm²/s, T = 50 °C

Unit Conversions

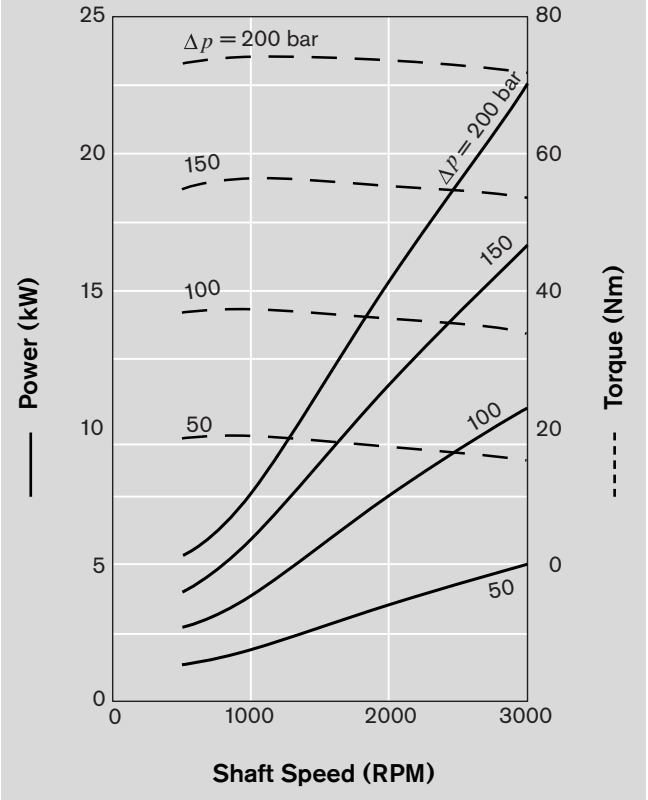
Pressure: psi = bar x 14.7
Torque: ft-lbs = (Nm) x .738
Power: hp = (kW) x 1.341
Volume: in³ = (cc) x 0.061
gpm = (LPM) x 0.2642



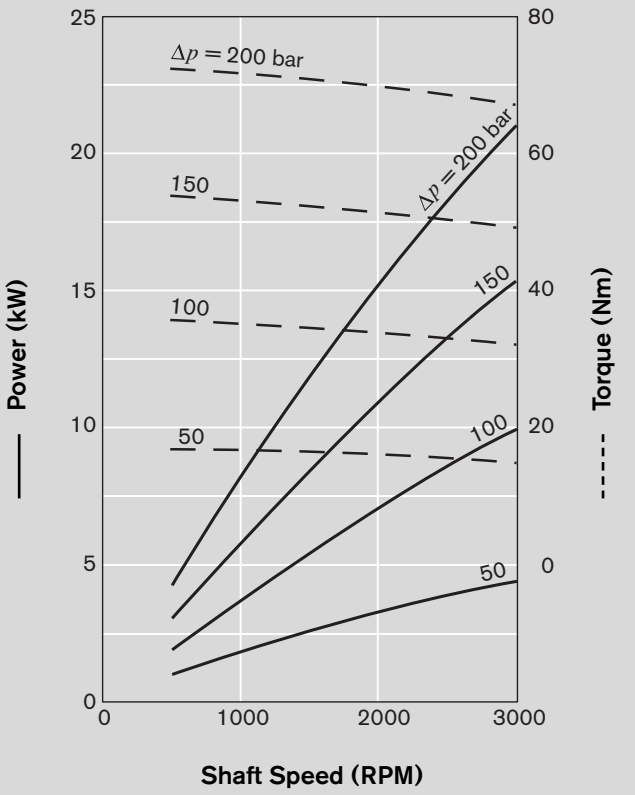
20 cm³/rev



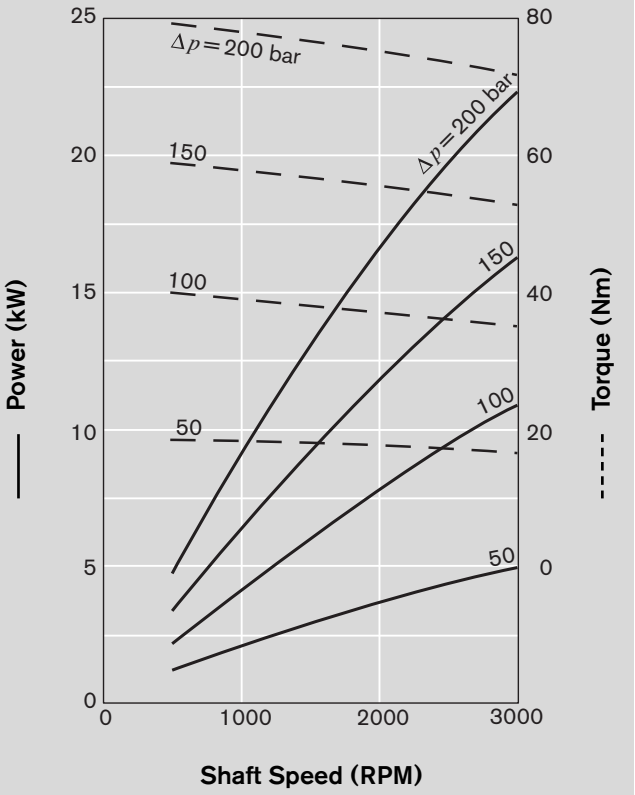
22.5 cm³/rev



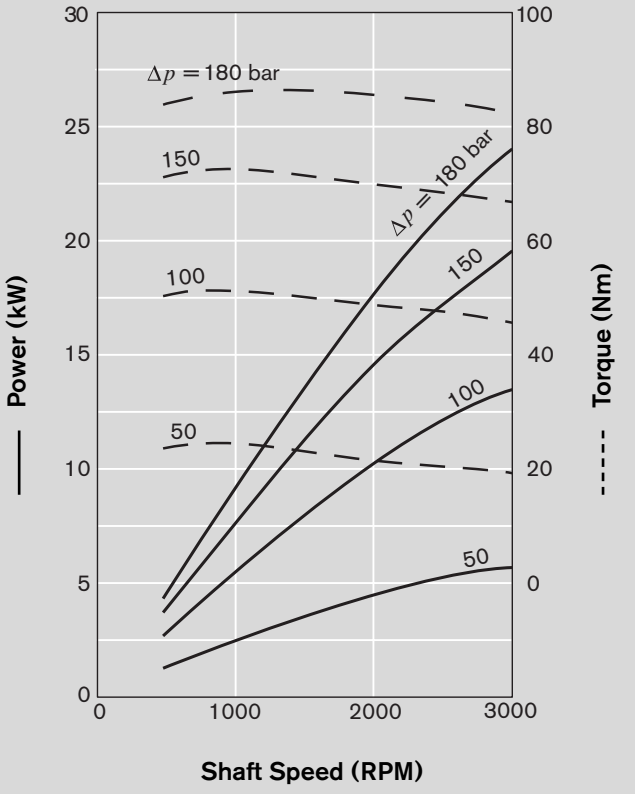
25 cm³/rev



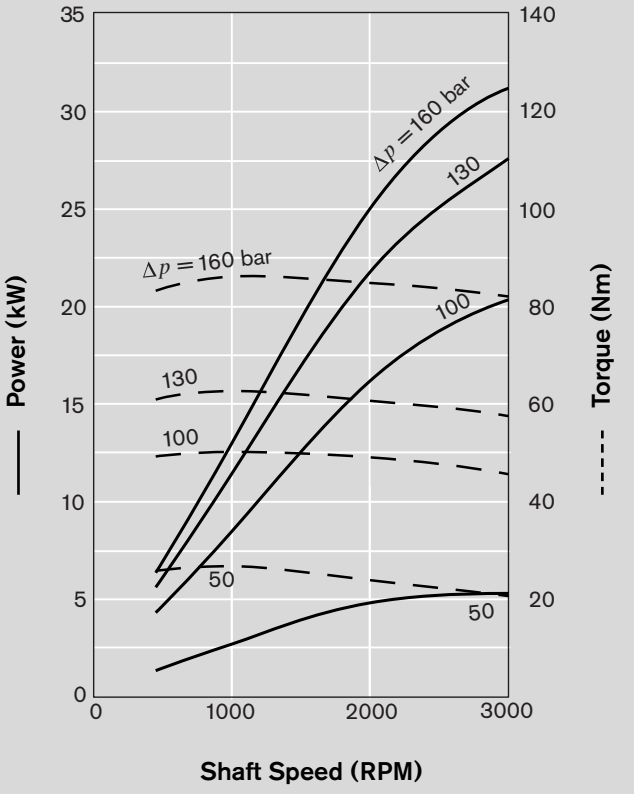
28 cm³/rev

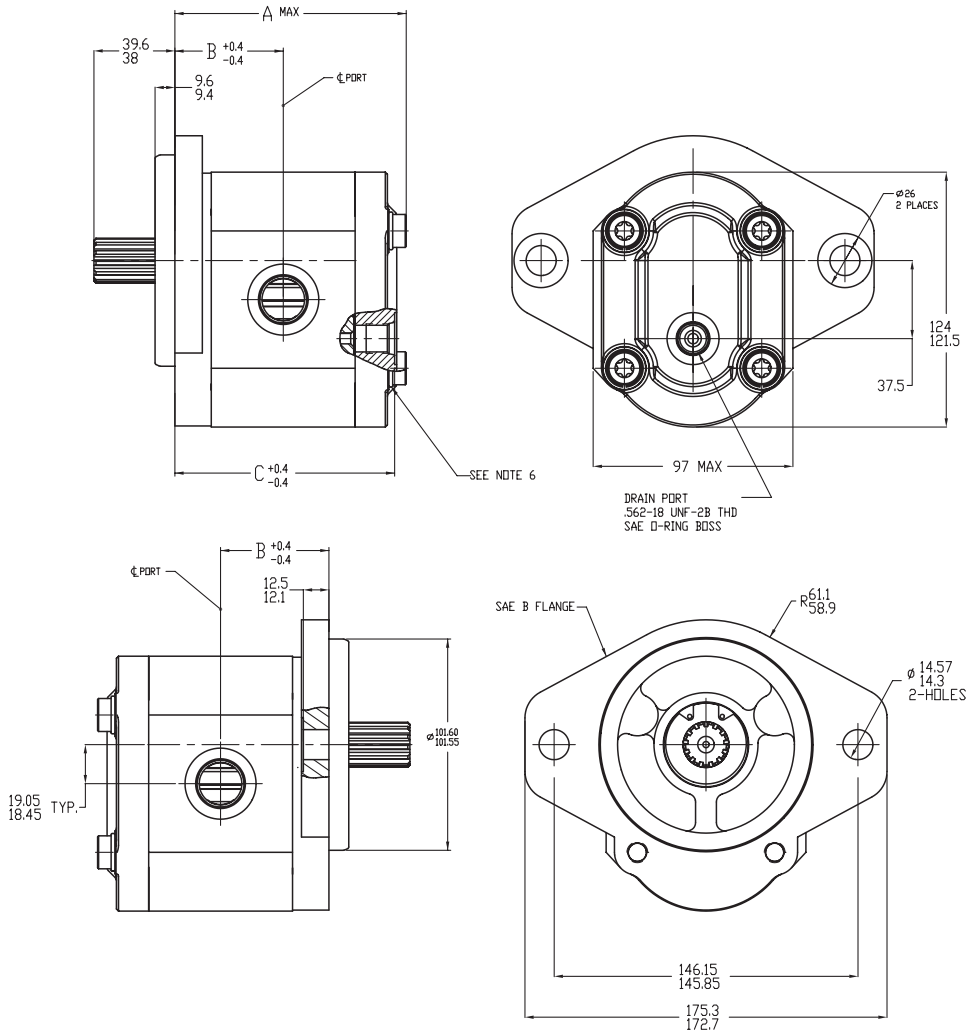


32 cm³/rev

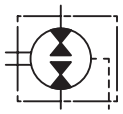


36 cm³/rev





Features	Details
Shaft	13t spline
Front Cover	SAE B 2-bolt
Ports	SAE ORB
Rear Cover	Case drain



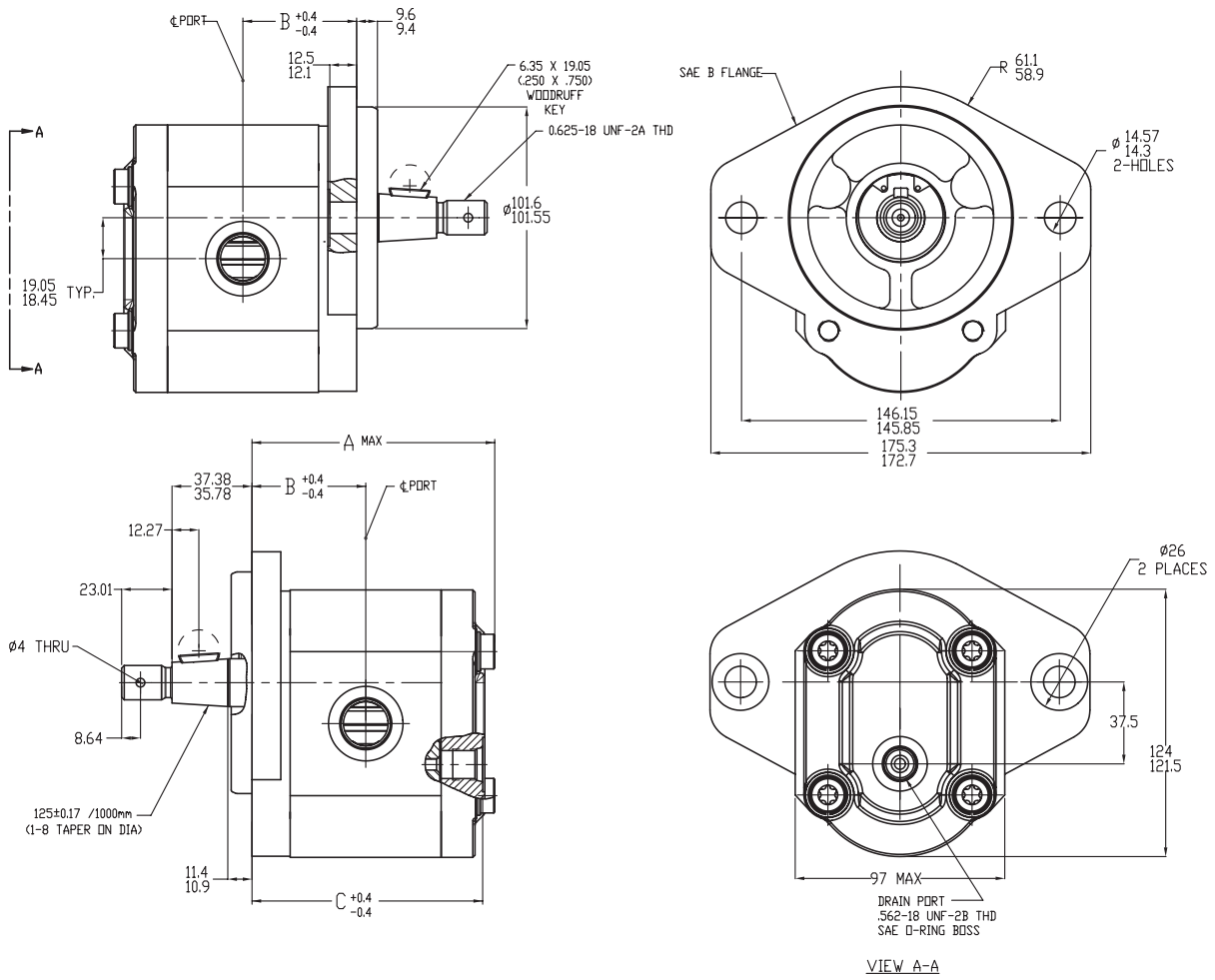
Ordering code

AZMN – 12 – ☐☐☐ U D C 12 KL

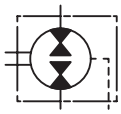
Displacement [cm³/rev]	Ordering-Number * Bi-Rotational		Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B	C	Inlet Port ** (SAE O-Ring BOSS)	Outlet Port (SAE O-Ring BOSS)
20.0		**9 511 390 001**	210	3000	109.8	52.1	105.6	-10	-10
22.5		**9 511 390 002**	210	3000	114.7	53.6	108.6	-10	-10
25.0		**9 511 390 003**	210	3000	115.8	55.1	111.6	-12	-12
28.0		**9 511 390 004**	210	2800	118.8	56.6	114.6	-12	-12
32.0		**9 511 390 005**	180	2800	123.3	58.6	119.1	-12	-12
36.0		**9 511 390 006**	160	2500	129.7	61.1	123.6	-12	-12

* Contact factory for availabilty of units with no ordering number listed.

** Case drain port size: SAE -6 O-Ring BOSS (.562-18 UNF-2B THD)



Features	Details
Shaft	SAE tapered key
Front Cover	SAE B 2-bolt
Ports	SAE ORB
Rear Cover	Case drain



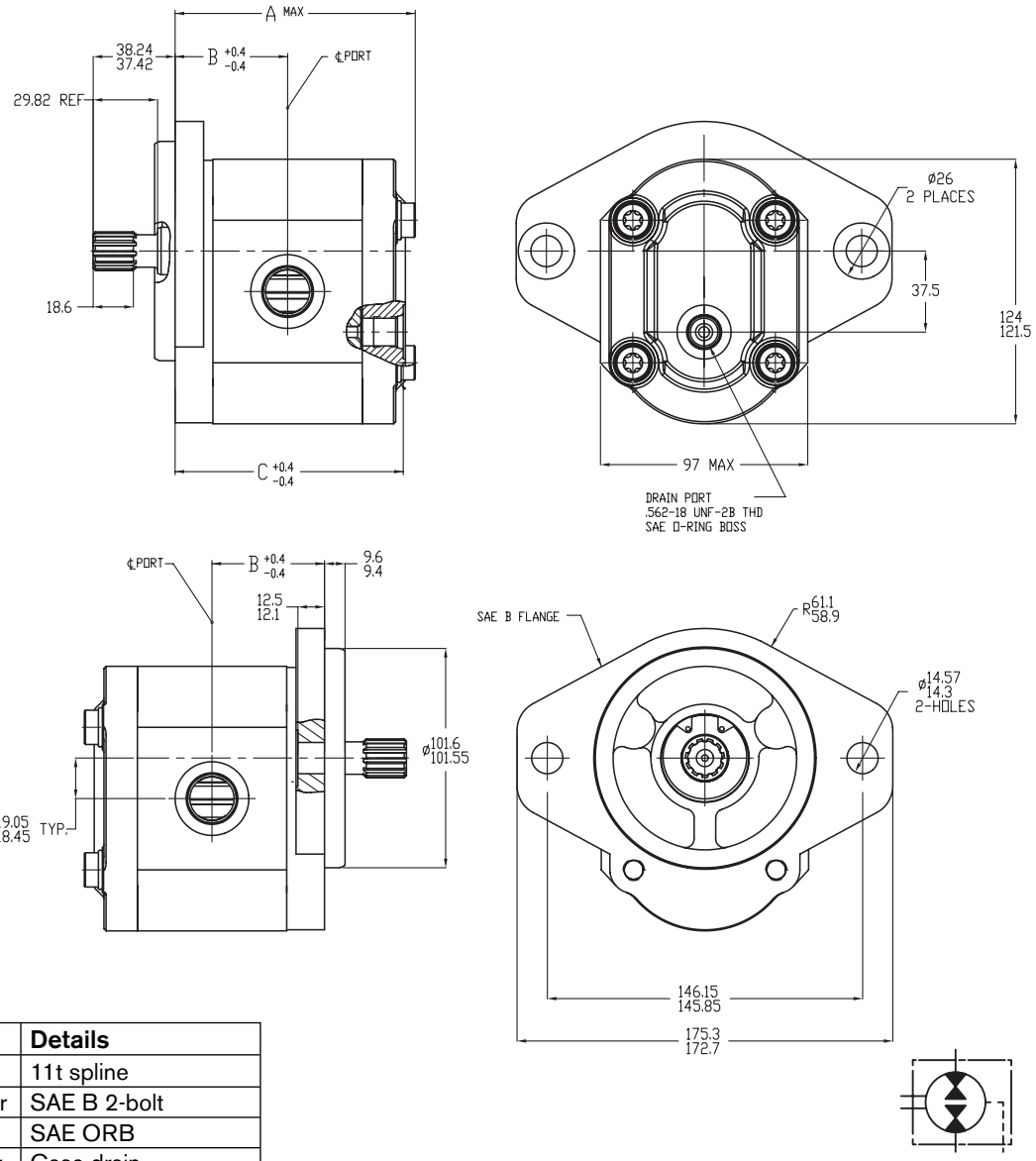
Ordering code

AZMN – 12 – ☐ ☐ ☐ U X C 12 KL – S0275

Displacement [cm³/rev]	Ordering-Number * Bi-Rotational	Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B	C	Inlet Port ** (SAE O-Ring BOSS)	Outlet Port (SAE O-Ring BOSS)
20.0	**9 511 390 031**	210	3000	109.8	52.1	105.6	-10	-10
22.5	**9 511 390 032**	210	3000	114.7	53.6	108.6	-10	-10
25.0	**9 511 390 033**	210	3000	115.8	55.1	111.6	-12	-12
28.0	**9 511 390 034**	210	2800	118.8	56.6	114.6	-12	-12
32.0	**9 511 390 035**	180	2800	123.3	58.8	119.1	-12	-12
36.0	**9 511 390 036**	160	2500	129.7	61.1	123.6	-12	-12

* Contact factory for availabilty of units with no ordering number listed.

** Case drain port size: SAE -6 O-Ring BOSS (.562-18 UNF-2B THD)



Features	Details
Shaft	11t spline
Front Cover	SAE B 2-bolt
Ports	SAE ORB
Rear Cover	Case drain

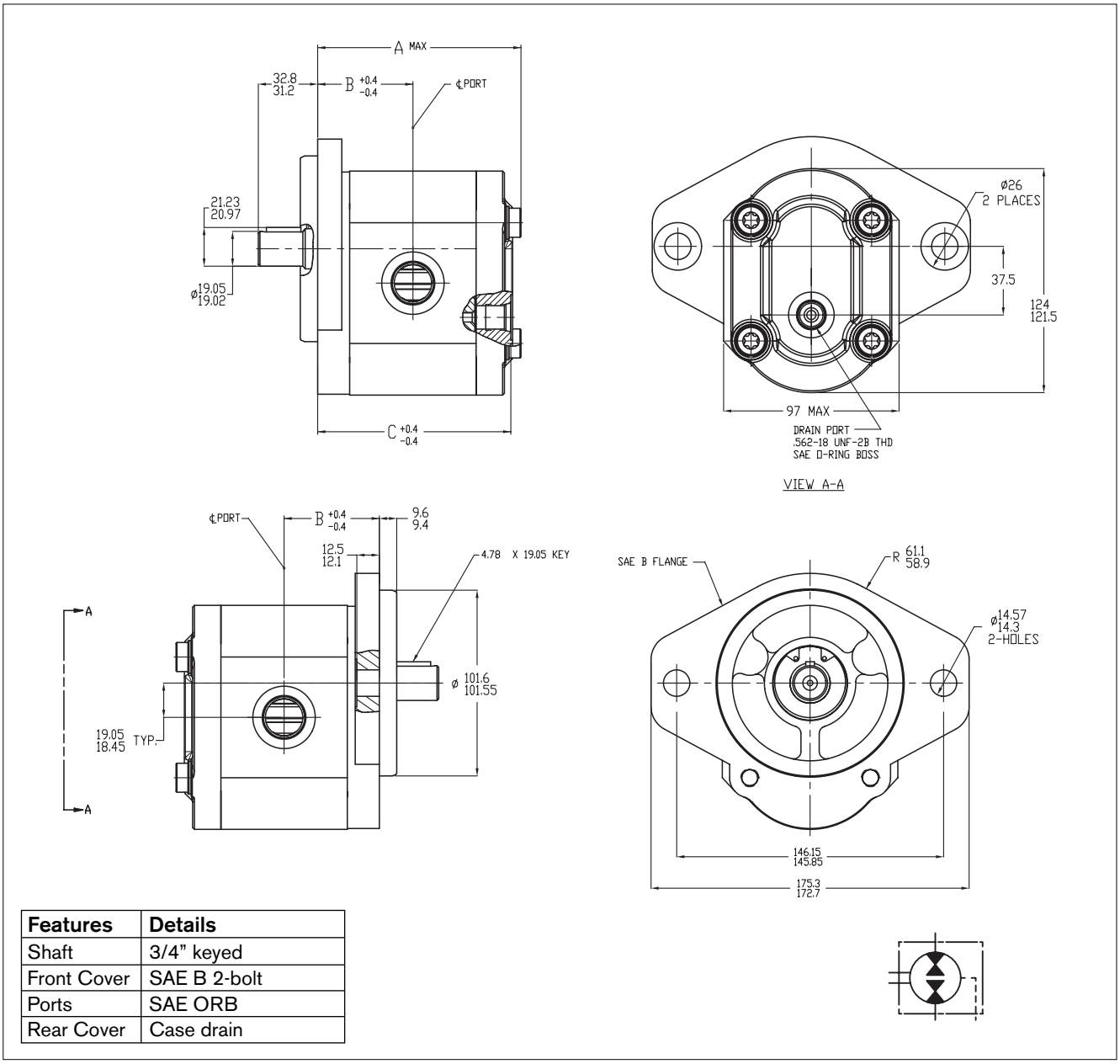
Ordering code

AZMN – 12 – ☐☐☐ U P C 12 KL

Displacement [cm³/rev]	Ordering-Number * Bi-Rotational		Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B	C	Inlet Port ** (SAE O-Ring BOSS)	Outlet Port (SAE O-Ring BOSS)
20.0		**9 511 390 025**	210	3000	109.8	52.1	105.6	-10	-10
22.5		**9 511 390 026**	210	3000	114.7	53.6	108.6	-10	-10
25.0		**9 511 390 027**	210	3000	115.8	55.1	111.6	-12	-12
28.0		**9 511 390 028**	210	2800	118.8	56.6	114.6	-12	-12
32.0		**9 511 390 029**	180	2800	123.3	58.8	119.1	-12	-12
36.0		**9 511 390 030**	160	2500	129.7	61.1	123.6	-12	-12

* Contact factory for availabilty of units with no ordering number listed.

** Case drain port size: SAE -6 O-Ring BOSS (.562-18 UNF-2B THD)

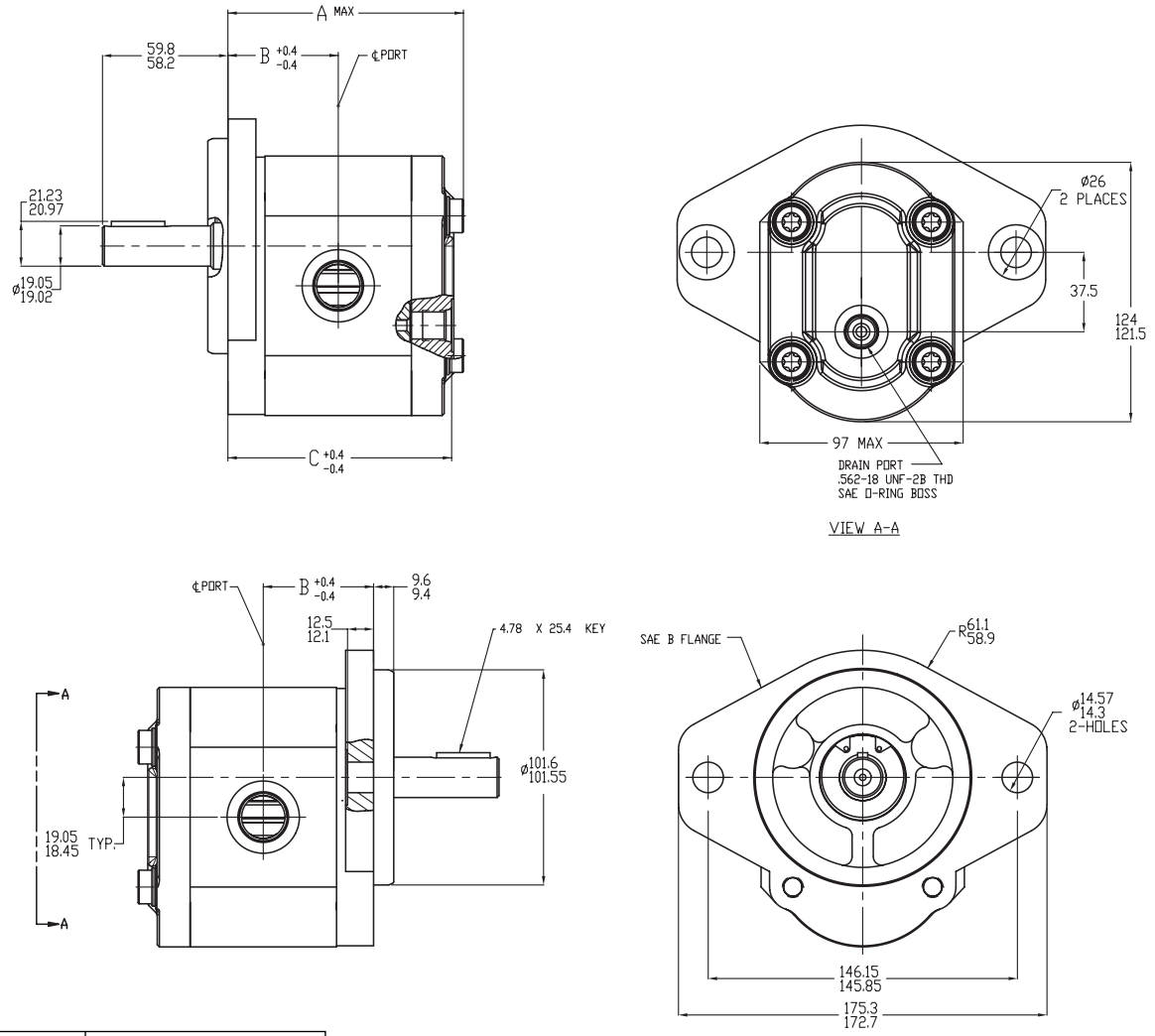


Features	Details
Shaft	3/4" keyed
Front Cover	SAE B 2-bolt
Ports	SAE ORB
Rear Cover	Case drain

Ordering code
AZMN – 12 – ☐☐☐ U Q C 12 KL

Displacement [cm³/rev]	Ordering-Number * Bi-Rotational	Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B	C	Inlet Port ** (SAE O-Ring BOSS)	Outlet Port (SAE O-Ring BOSS)
20.0	**9 511 390 013**	210	3000	109.8	52.1	105.6	-10	-10
22.5	**9 511 390 014**	210	3000	114.7	53.6	108.6	-10	-10
25.0	**9 511 390 015**	210	3000	115.8	55.1	111.6	-12	-12
28.0	**9 511 390 016**	210	2800	118.8	56.6	114.6	-12	-12
32.0	**9 511 390 017**	180	2800	123.3	58.8	119.1	-12	-12
36.0	**9 511 390 018**	160	2500	129.7	61.1	123.6	-12	-12

* Contact factory for availabilty of units with no ordering number listed.
** Case drain port size: SAE -6 O-Ring BOSS (.562-18 UNF-2B THD)



Features	Details
Shaft	3/4” keyed – long
Front Cover	SAE B 2-bolt
Ports	SAE ORB
Rear Cover	Case drain

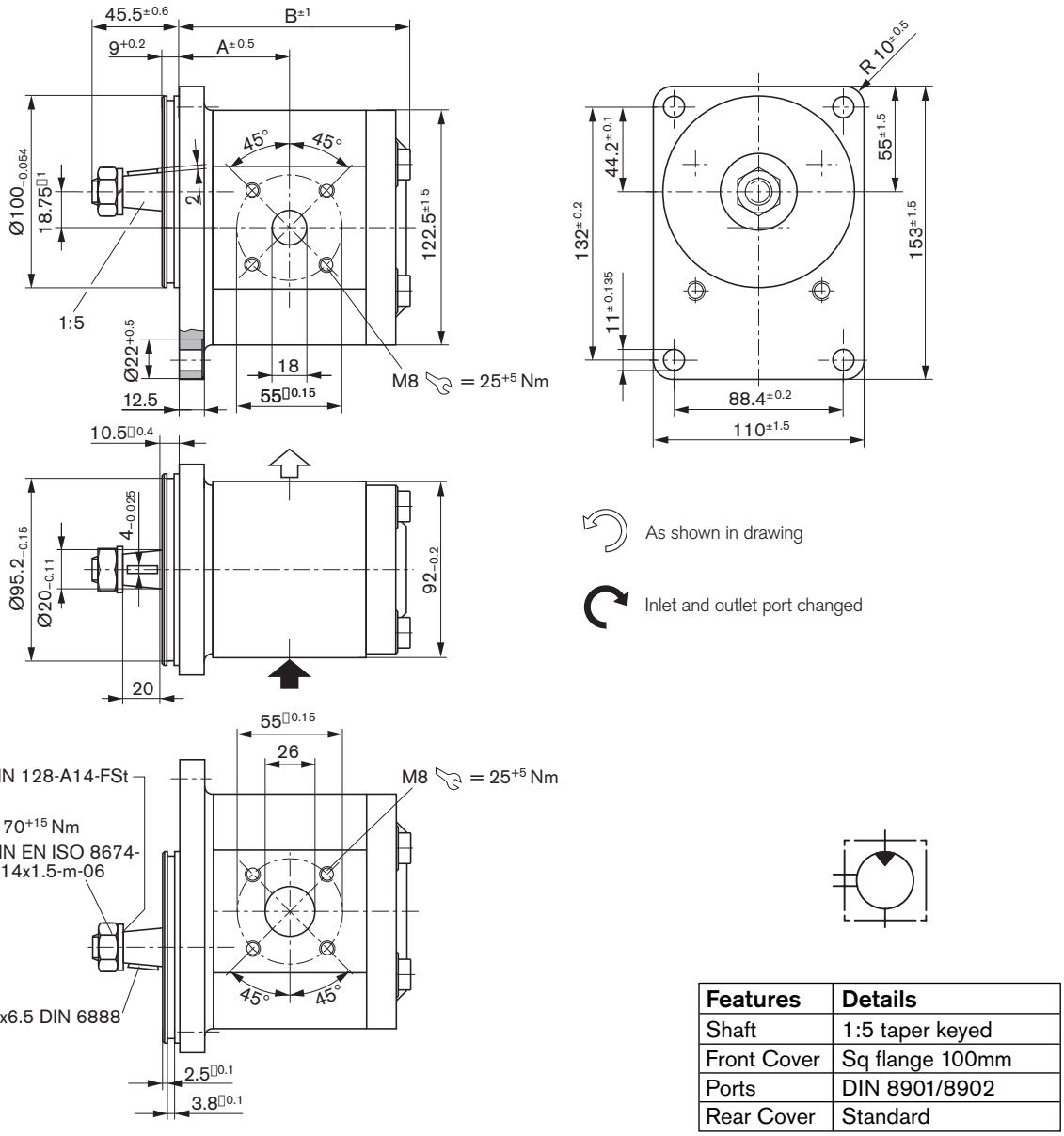
Ordering code

AZMN – 12 – ☐☐☐ U Q C 12 KL – S0022

Displacement [cm³/rev]	Ordering-Number * Bi-Rotational	Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B	C	Inlet Port ** (SAE O-Ring BOSS)	Outlet Port (SAE O-Ring BOSS)
20.0	**9 511 390 043**	210	3000	109.8	52.1	105.6	-10	-10
22.5	**9 511 390 044**	210	3000	114.7	53.6	108.6	-10	-10
25.0	**9 511 390 045**	210	3000	115.8	55.1	111.6	-12	-12
28.0	**9 511 390 046**	210	2800	118.8	56.6	114.6	-12	-12
32.0	**9 511 390 047**	180	2800	123.3	58.6	119.1	-12	-12
36.0	**9 511 390 048**	160	2500	129.7	61.1	123.6	-12	-12

* Contact factory for availabilty of units with no ordering number listed.

** Case drain port size: SAE -6 O-Ring BOSS (.562-18 UNF-2B THD)



Features	Details
Shaft	1:5 taper keyed
Front Cover	Sq flange 100mm
Ports	DIN 8901/8902
Rear Cover	Standard

Ordering code

AZMN – 12 – □ □ □ □ C B 20 KB

Displacement [cm³/rev]	Ordering-Number * L	R	Max. operating pressure [bar]	Max. rotation speed [rpm]	Dimension [mm] A	B	C		
20.0									
22.5									
25.0	**0511 725 307**		210	3000	55.0	116.1			
28.0	**0511 725 309**	**0511 725 019**	200	3000	56.6	119.1			
32.0									
36.0									

* Contact factory for availabilty of units with no ordering number listed.

Spare Parts (reference Fig. 8)

Example Model Code: AZMF – 12 008 – U**R**R 12**M**L

Model Code Designator for Shaft — Model Code Designator for Seal

	Model Code For Shaft	Shaft Description	Model Code For Seal	Seal Material	Bi-Directional Motor Item 1, 2, & 3	Uni-Directional Motor Item 1, 2, & 3	Shaft Seal Item 4
F Series Motor	R	SAE 9T Spline	M	NBR	1517010195	1517010152	1510283065
			P	FPM	1517010196	1517010193	
			K	NBR W/FPM SHAFT SEAL	1517010195	1517010152	
	Q	5/8" Straight Key	M	NBR	1517010195	1517010152	1510283065
			P	FPM	1517010196	1517010193	
			K	NBR W/FPM SHAFT SEAL	1517010195	1517010152	
	P	SAE 11T Spline	M	NBR	1517010195	1517010152	Consult Factory
			P	FPM	1517010196	1517010193	
			K	NBR W/FPM SHAFT SEAL	1517010195	1517010152	
	C	1:5 Tapered Key	M	NBR	1517010195	1517010152	1510283065
			P	FPM	1517010196	1517010193	
			K	NBR W/FPM SHAFT SEAL	1517010195	1517010152	
	S	1:5 Tapered for Flange A	M	NBR	1517010195	1517010152	1510283015
			P	FPM	1517010193	1517010193	
			K	NBR W/FPM SHAFT SEAL	1517010195	1517010152	
	H	1:8 Tapered Key	M	NBR	1517010195	1517010152	1510283065
			P	FPM	1517010196	1517010193	
			K	NBR W/FPM SHAFT SEAL	1517010195	1517010152	
	N	Dog (Tang)	M	NBR	1517010195	1517010152	1510283065
			P	FPM	1517010196	1517010193	
			K	NBR W/FPM SHAFT SEAL	1517010195	1517010152	
	F	Din 5482 B17x14 Spline	M	NBR	1517010195	1517010152	1510283065
			P	FPM	1517010196	1517010193	
			K	NBR W/FPM SHAFT SEAL	1517010195	1517010152	
N Series Motor	D	SAE 13T Spline	M	NBR	R98640146P	—	1510283028
			P	FPM	—	—	
			K	NBR W/FPM SHAFT SEAL	—	—	
	P	SAE 11T Spline	M	NBR	R98640146P	—	1510283028
			P	FPM	—	—	
			K	NBR W/FPM SHAFT SEAL	—	—	
	Q	3/4" Straight Key	M	NBR	R98640146P	—	1510283028
			P	FPM	—	—	
			K	NBR W/FPM SHAFT SEAL	—	—	
	X	S0075 Tapered	M	NBR	R98640146P	—	1510283028
			P	FPM	—	—	
			K	NBR W/FPM SHAFT SEAL	—	—	
	C	1:5 Tapered Key	M	NBR	R98640146P	—	1510283028
			P	FPM	—	—	
			K	NBR W/FPM SHAFT SEAL	—	—	
	N	Dog (Tang)	M	NBR	R98640146P	—	1510283028
			P	FPM	—	—	
			K	NBR W/FPM SHAFT SEAL	—	—	

* Shaft seals are Viton material regardless of material used for other seals

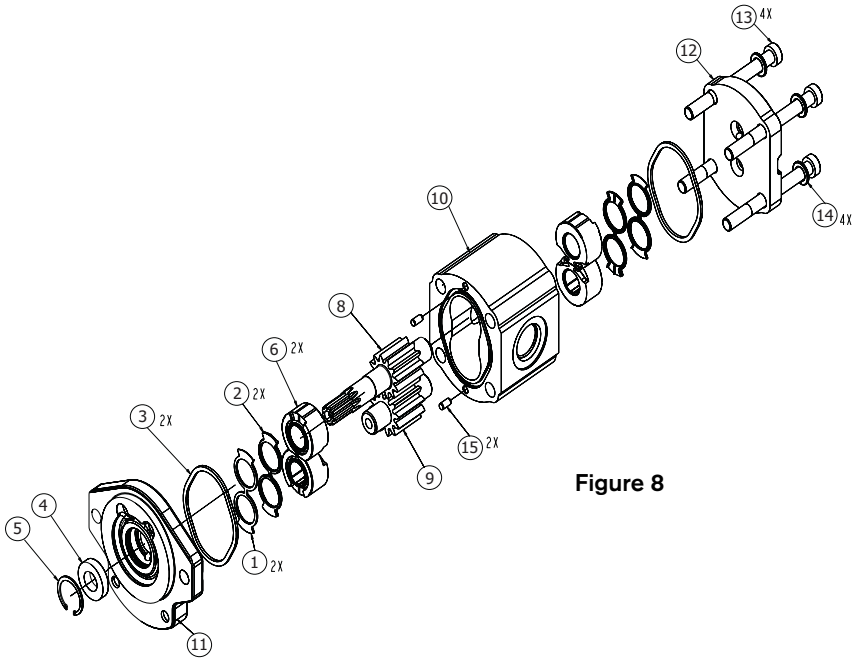


Figure 8

Part Number Index

External Gear Pumps – Multiple Pumps

Bosch Rexroth Corporation
Hydraulics
Product Segment External Gear Units
8 Southchase Court
Fountain Inn, SC 29644-9018
Telephone (864) 967-2777
Facsimile (864) 962-5338
www.boschrexroth-us.com

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