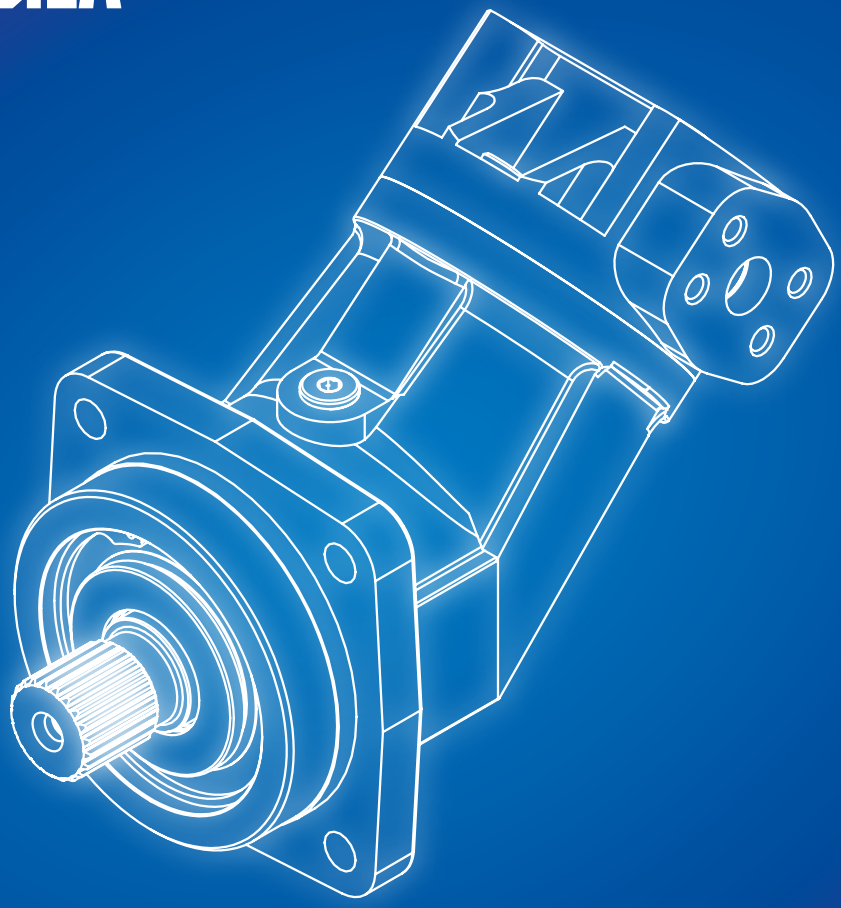
HYDROSILA



Axial piston bent-axis pumps and motors

series BF10/BF20/BF20T/BV10

HS-AB-04/042025

CODING OF CATALOGUES

HS-AB-03/122021

HS	–	A	B	–	03	/	12	2021
HYDROSILA					№ EDITION		MONTH OF EDITION	YEAR OF EDITION

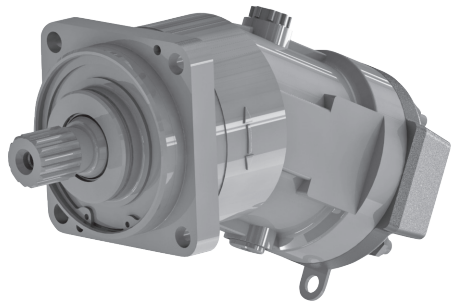
TYPE OF HYDRAULIC MACHINES	TYPE	SERIES
Gear pumps	GP	K
		T
Gear motors	GM	K
Axial piston machines for closed circuit	A	C
Axial piston machines for open circuit		O
Bent-axis axial piston machines		B
Control valves	V	-
In-line mounting hydraulic valves	LV	-
Hydraulic cylinders	C	-
Quick-release coupling	Q	-
Hydraulic components for truck applications	HCT	-
Quick-release coupling, Fitting, High pressure hoses	QFH	-

CONTENTS

CONTENTS

PBF10

PBF10 - series of axial piston fixed displacement pumps in bent-axis design. They have an aluminum alloy body and designed for hydraulic systems of mobile machines of different purposes.
The **PBF10** model range includes pumps with displacement 28, 56 and 112 cm^3.

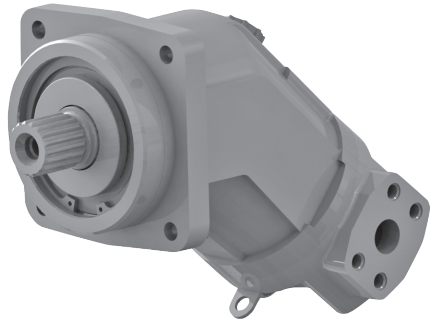


DESIGN FEATURES

- Open circuit.
- The angle of inclination the block cylinder 26 degrees.
- High hydromechanical efficiency.
- Tapered roller bearings, allow the pump shaft to withstand high radial and axial loads.
- Bimetallic block cylinder of unit has a high wear resistance.
- Resistant to corrosion durable and lightweight body with high strength aluminum alloy.
- Maximum pressure 400 bar.

PBF20

PBF20 - series of axial piston fixed displacement pumps in bent-axis design. They have an cast iron body and designed for hydraulic systems of mobile machines operating in severe conditions.
The **PBF20** model range includes pumps with displacement 56, 80 and 107 cm^3.

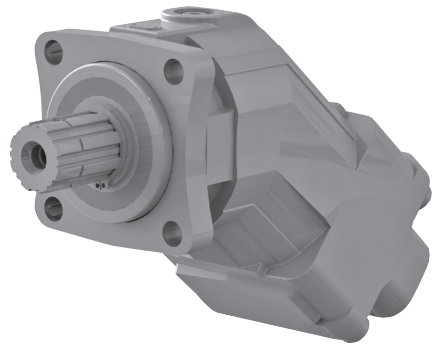


DESIGN FEATURES

- Open circuit.
- The angle of inclination the block cylinder 40 degrees.
- High hydromechanical efficiency.
- Tapered roller bearings, allow the pump shaft to withstand high radial and axial loads.
- Bimetallic block cylinder of unit has a high wear resistance.
- Conical plungers with compression rings.
- High cast iron body.
- Maximum pressure 450 bar.

PBF20T, PBF20TH

PBF20T(TH) - series of axial piston fixed displacement pumps in bent-axis design. They have variants in aluminum alloy body **(PBF20T)** and cast iron body **(PBF20TH)** and designed for hydraulic systems of commercial vehicles and truck applications.
The **PBF20T(TH)** model range includes pumps with displacement 56, 63, 80 and 107 cm^3.



DESIGN FEATURES

- Open circuit.
- The angle of inclination the block cylinder 40 degrees.
- High hydromechanical efficiency.
- Tapered roller bearings, allow the pump shaft to withstand high radial and axial loads.
- Bimetallic block cylinder of unit has a high wear resistance.
- Conical plungers with compression rings.
- Aluminum alloy ro high cast iron body.
- Mounting flange acc. to ISO 7653-1985.
- Drive shaft acc. to DIN ISO 14.
- Maximum pressure 400 bar.

PBF10

FIXED DISPLACEMENT AXIAL PISTON PUMPS

Order code

PBF10	.	4	.	56	.	03	.	06	N			

FIXED DISPLACEMENT BENT-AXIS AXIAL PISTON PUMP	PBF10

MODEL [1]	2*	4
	●	●

DISPLACEMENT, CM³		CODE
28	●	28
56	●	56
112	●	112

ROTATION	SHAFT OPTIONS	28	56	112	CODE
Clockwise	Splined shaft ГОСТ 6033-51	●	-	-	03
	Splined shaft ГОСТ 6033-80	-	●	●	
Counterclockwise	Splined shaft ГОСТ 6033-51	●	-	-	04
	Splined shaft ГОСТ 6033-80	-	●	●	
Clockwise	Keyed shaft ГОСТ 23360	●	●	●	05
Counterclockwise		●	●	●	06
Clockwise	Splined shaft ГОСТ 6033-80	●	-	-	08
Counterclockwise		●	-	-	09
Clockwise	Splined shaft [2] DIN 5480	-	●	●	OG
Counterclockwise		-	●	●	OI
Clockwise	Splined shaft [3] DIN 5480	-	●	●	OH
Counterclockwise		-	●	●	OJ

SPECIAL FEATURES**	CODE

CLIMATIC VERSION	CODE
Temperate	N
Tropical	T

WORKING PORTS OPTION	28	56	112	CODE
Two threaded ports on the rear (at 25° to the shaft axis)	●	-	-	00
Two threaded ports on the rear (parallel to the shaft axis)	●	-	-	01
Two threaded ports on the rear (at 50° to the shaft axis)	●	-	-	02
Two threaded ports, one on the side, one on the rear	●	-	-	05
Two flanged ports on the rear	-	●	●	06

[1] * 2 - with ball bearings and brass cylinder block (only for size 28)
4 - with cone bearings, bimetallic cylinder block
[2] side balanced
[3] side balanced, reduced diameter
** Special option code - assigned if necessary after agreement of special conditions with the customer

Notes: ● Standart; ○ Optional; **-** Not available

PBF20

FIXED DISPLACEMENT AXIAL PISTON PUMPS | Order code

PBF20	.	107	/	R	-	B	A	B	05	N			

FIXED DISPLACEMENT BENT-AXIS AXIAL PISTON PUMP	PBF20

DISPLACEMENT, CM³		CODE
56,1	●	56
80,4	●	80
106,7	●	107

ROTATION	CODE
Clockwise	R
Counterclockwise	L

SEAL	56	80	107	CODE
NBR	●	●	●	B
FKM	○	○	○	F

SHAFT OPTIONS		56	80	107	CODE
Splined shaft DIN 5480	2)	●	●	●	A
	3)	●	●	●	Z
Splined shaft ГОСТ 6033	-	●	-	●	0
Keyed shaft DIN 6885	-	●	●	●	B
		●	●	●	P
Splined shaft SAE J744	-	-	●	●	C
		●	-	-	BB

SPECIAL FEATURES*	CODE

CLIMATIC VERSION	CODE
Temperate	N
Tropical	T

WORKING PORTS OPTION	56	80	107	CODE
Two flanged ports, one on the side, one on the rear	●	●	●	05

MOUNTING FLANGES	56	80	107	CODE
ISO 3019/2 4-holes	●	●	●	B

[2] side balanced
[3] side balanced, reduced diameter
* Special option code - assigned if necessary after agreement of special conditions with the customer

Notes: ● Standart; ○ Optional; - Not available

PBF20T

FIXED DISPLACEMENT AXIAL PISTON PUMPS

Order code

PBF20	T	.	63	/	R	E8	1	N			

FIXED DISPLACEMENT BENT-AXIS AXIAL PISTON PUMP	PBF20T

SERIES	CODE
Aluminum alloy body	T
Cast iron body	TH

DISPLACEMENT, CM³		CODE
56	●	56
63	●	63
80	●	80
107	●	107

ROTATION	CODE
Clockwise	R
Counterclockwise	L

SHAFT OPTIONS		CODE
Splined shaft to DIN ISO 14	●	E8
Splined shaft to DIN ISO 14 with coupling	○	C8

SPECIAL FEATURES*	CODE

CLIMATIC VERSION	CODE
Temperate	N
Tropical	T

WORKING PORTS OPTION		CODE
Two threaded ports on the rear	●	1
Two threaded ports on the rear with suction branch pipe	○	2

SUCTION SLEEVE	CODE
Straight	0
Angle 45°	1
Angle 90°	2

* Special option code - assigned if necessary after agreement of special conditions with the customer

Notes: ● Standart; ○ Optional; **–** Not available

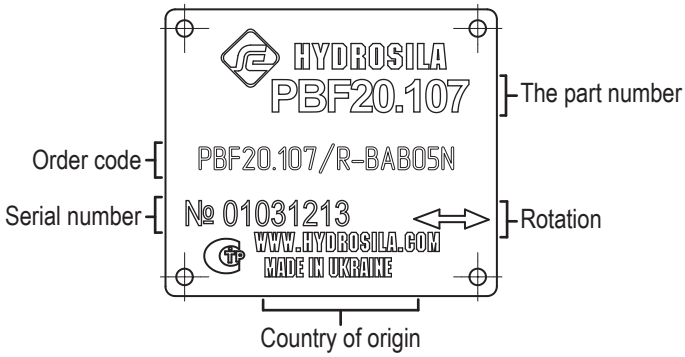
ORDERING EXAMPLE

PBF10.4.56.03.06N

PBF10 - fixed displacement bent-axis axial piston pump,
4 - pump with cone bearings and bimetallic cylinder block,
56 - displacement 56 cm³,
03 - with clockwise rotation and drive shaft - splined, acc. to GOST 6033-80,
06 - port: two rear flanged ports,
N - climate version: temperate.

PBF20.107/R-BAB05N

PBF20 - fixed displacement bent-axis axial piston pump,
107 - displacement 106,7 cm³,
R - clockwise rotation,
B - with seal material NBR,
A - shaft option:splind, acc. to DIN 5480,
B - mounting flange ISO 4 holes,
05 - two flanged ports, one on the side, one on the rear,
N - climate version: temperate.



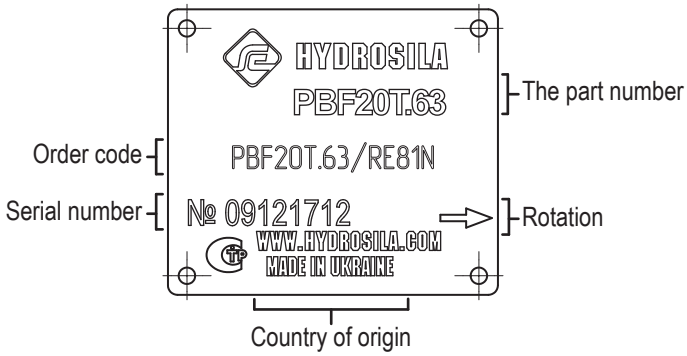
ORDERING EXAMPLE

PBF20T.63/RE81N

PBF20 - fixed displacement bent-axis axial piston pump,
T - aluminum body,
63 - displacement 63 cm^3,
R - clockwise rotation,
E8 - drive shaft: splined, acc. to DIN ISO 14,
1 - ports options,
N - climatic version - temperate.

PBF20TH.80/RE81N

PBF20 - fixed displacement bent-axis axial piston pump,
TH - cast iron body,
80 - displacement 80 cm^3,
R - clockwise rotation,
E8 - drive shaft: splind, acc. to DIN ISO 14,
1 - ports options,
N - climatic version - temperate.



TECHNICAL SPECIFICATIONS

SIZE		PBF10.2.28	PBF10.4.56	PBF10.4.112	PBF20.56	PBF20.80	PBF20.107
Displacement, Vg	cm^3	28	56	112	56,1	80,4	106,7
Speed							
minimum		400					
rated, at inlet pressure P_{abs}=0,8 bar	min^{-1}	1920	1800	1200	2000	1800	1600
maximum, at inlet pressure P_{abs}=1,0 bar		3000	2500	2000	3000	2680	2400
maximum, at inlet pressure P_{abs}=2,0 bar		4750	3750	3000	3750	3350	3000
Pressure, P							
rated	bar	200	250		400		
maximum, t≤6 sec		320	400		450		
Maximum drain pressure	bar	1	2,5				
Inlet pressure, P							
minimum	bar	0,8					
rated		1					
maximum		2					
Flow*, Q							
minimum	l/min	11	22	45	22	32	43
rated		54	101	134	112	145	171
maximum		84	140	224	168	215	256
limit		133	210	336	209	269	320
Input power*, N							
rated	кW	18	42	56	75	96	114
maximum		45	93	149	126	162	192
Efficiency							
hydromechanical		0,96					
volumetric		0,95					
Weight (without fluid), no more	kg	9	17	29	18	23	32

* Without efficiency

FORMULAS

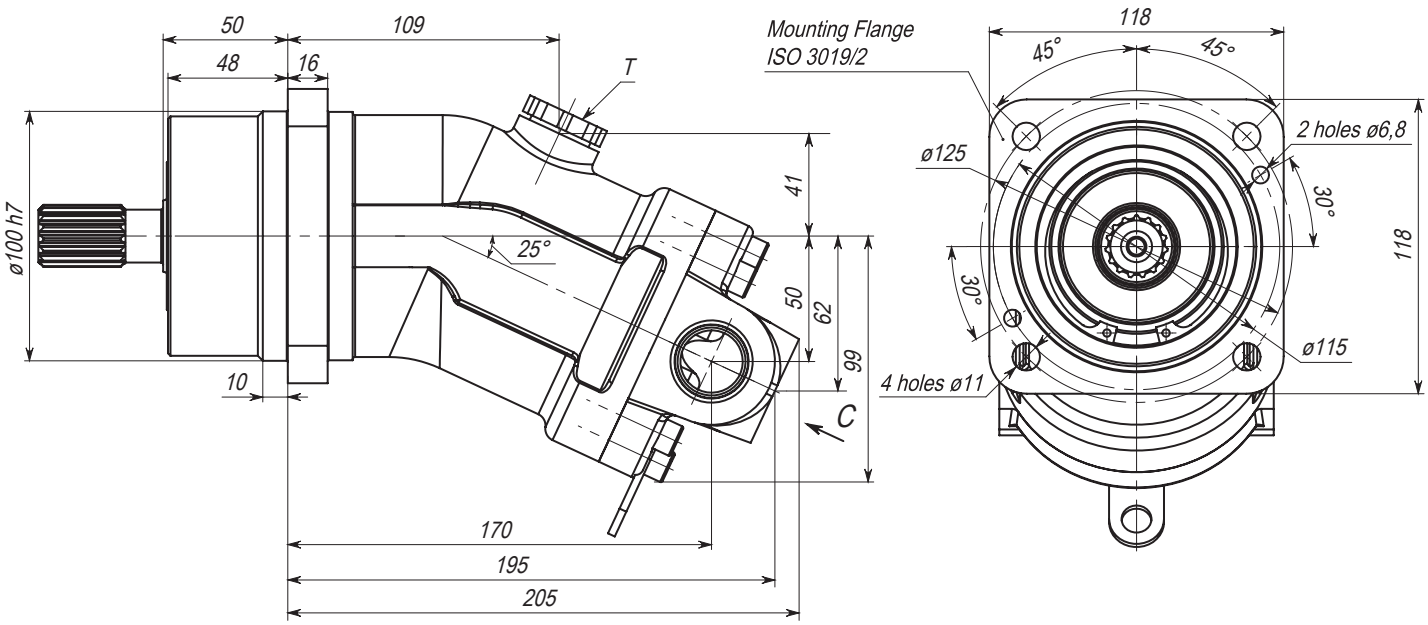
Flow $$Q = \frac{V_g \cdot n \cdot \eta_v}{1000} \text{ [l/min]}$$

Input torque $$T = \frac{V_g \cdot \Delta p}{20 \cdot \pi \cdot \eta_{mh}} = \frac{1.59 \cdot V_g \cdot \Delta p}{100 \cdot \eta_{mh}} \text{ [N·m]}$$

Input power $$P = \frac{2 \cdot \pi \cdot T \cdot n}{60000} = \frac{Q \cdot \Delta p}{600 \cdot \eta_t} \text{ [kW]}$$

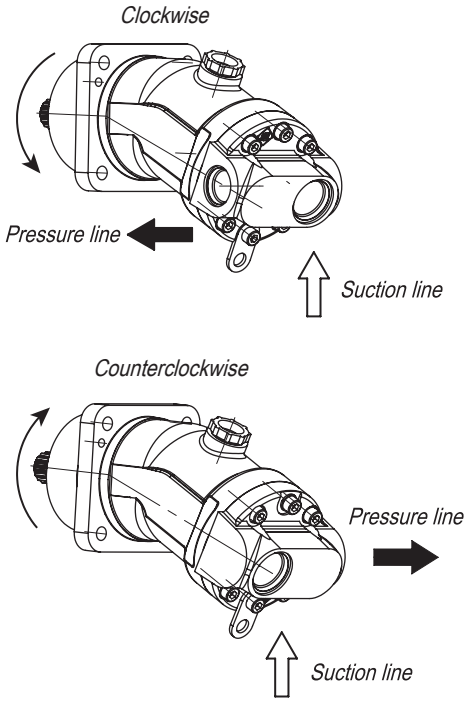
V_g – displacement (cm^3)
Δp – pressure drop (bar)
n – speed (min^{-1})
η_v – volumetric efficiency
η_{mh} – hydromechanical efficiency
η_t – overall efficiency

PBF10 PUMPS DIMENSIONS, SIZE 28 CM³



T - drain line M18x1,5-18 DIN 3852

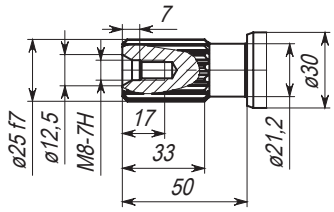
ROTATION



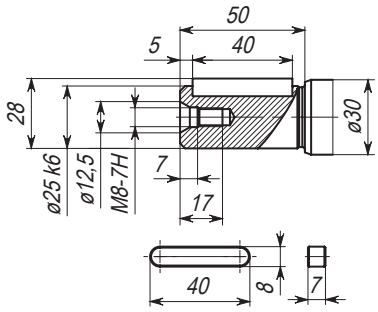
DRIVE SHAFTS

08; 09 | Splined shaft 25xf7x1,5x9g
GOST 6033-80, z15

03; 04 | Splined shaft 25x1,5x16S X
GOST 6033-51, z16

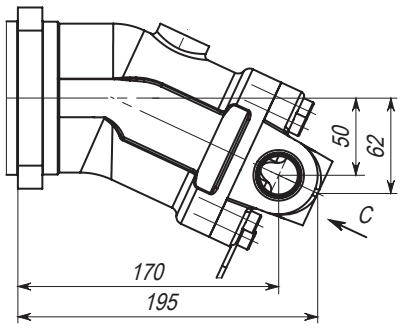


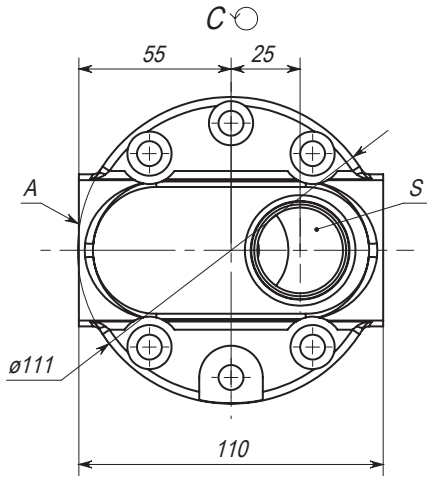
05; 06 | Keyed shaft 8x7x40
GOST 23360



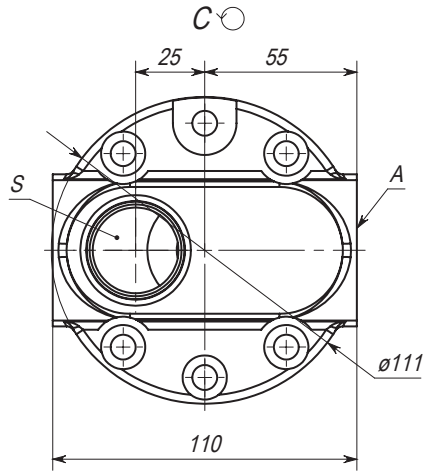
WORKING PORTS OPTION

05 | two threaded ports, one on the side, one on the rear





Clockwise

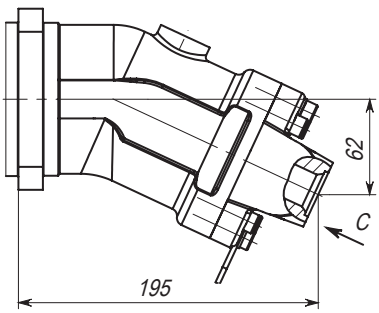


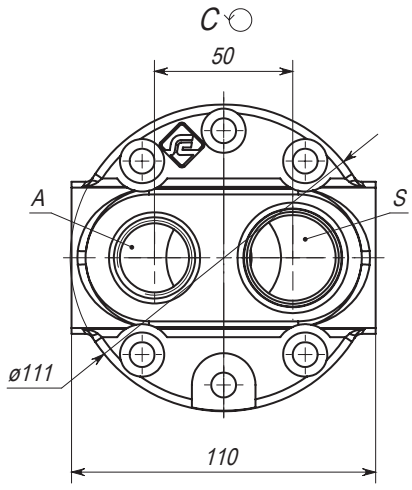
Counterclockwise

A - pressure line
M27x2-24 GOST 25065

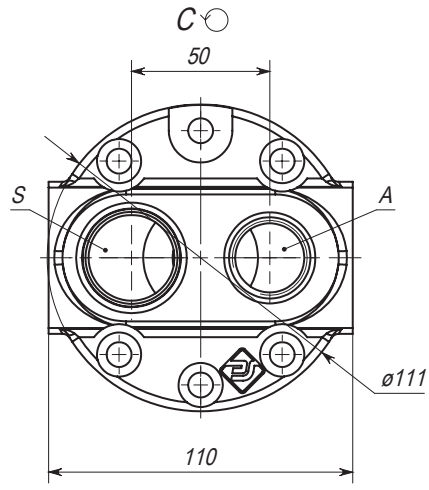
S - suction line
M33x2-24 GOST 25065

00 | two threaded ports on the rear (at 25° to the shaft axis)





Clockwise

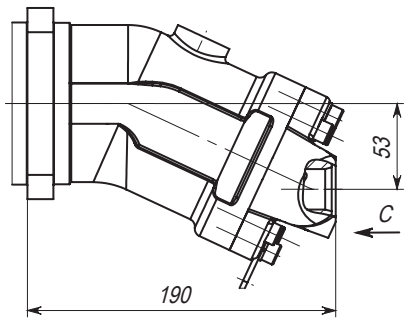


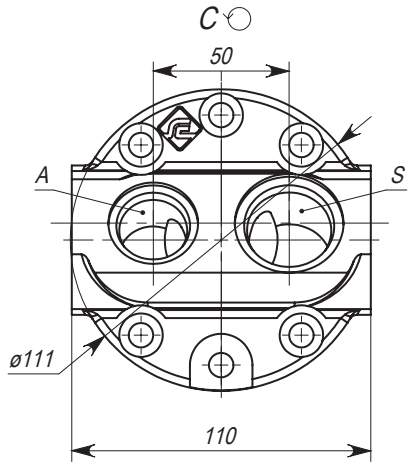
Counterclockwise

A - pressure line
M27x2-24 GOST 25065

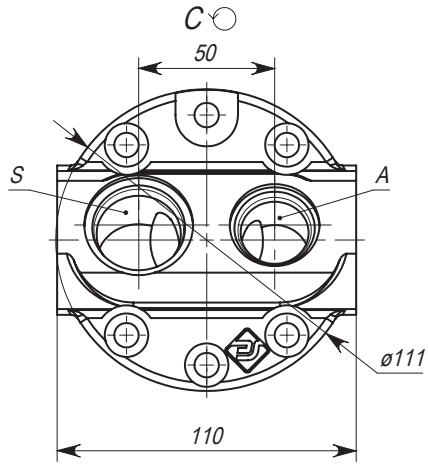
S - suction line
M33x2-24 GOST 25065

01 two threaded ports on the rear (parallel to the shaft axis)





Clockwise

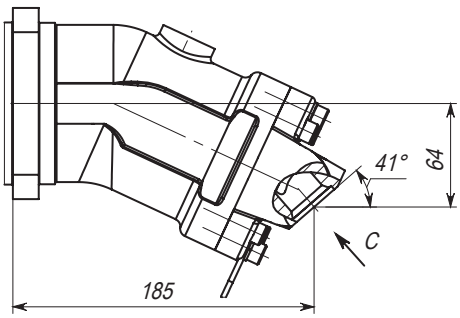


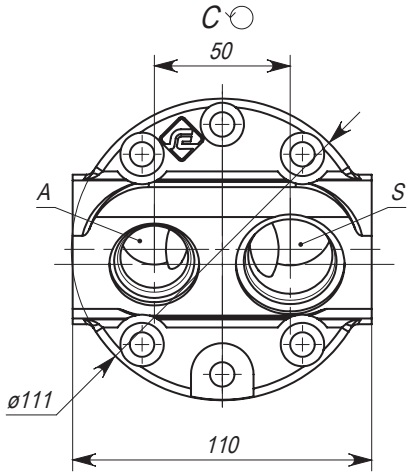
Counterclockwise

A - pressure line
M27x2-20 GOST 25065

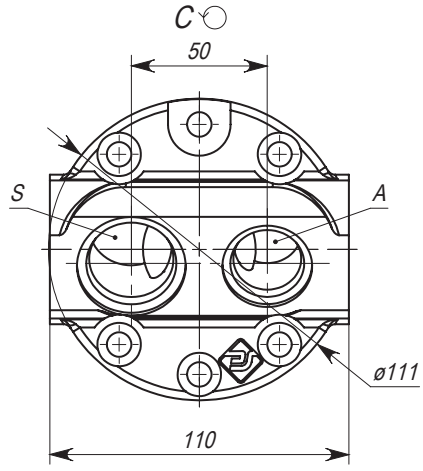
S - suction line
M33x2-20 GOST 25065

02 two threaded ports on the rear (at 50° to the shaft axis)





Clockwise

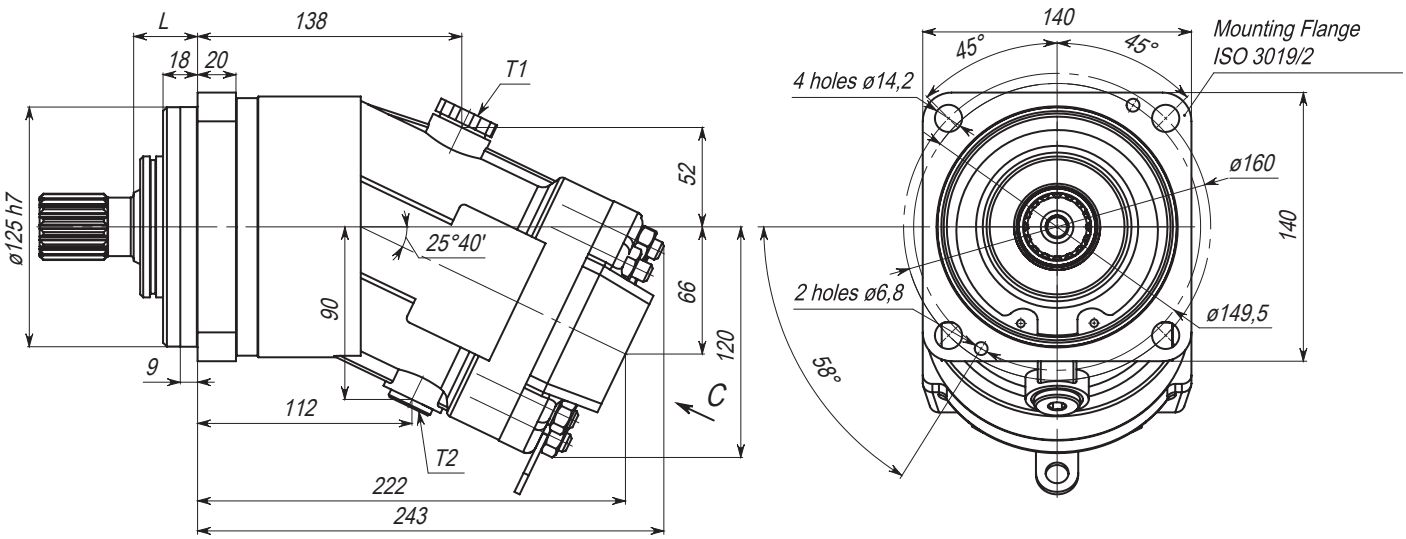


Counterclockwise

A - pressure line
M27x2-20 GOST 25065

S - suction line
M33x2-20 GOST 25065

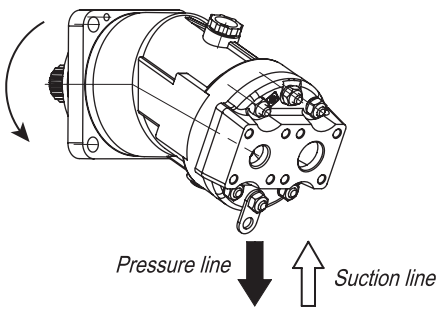
PBF10 PUMPS DIMENSIONS, SIZE 56 CM³



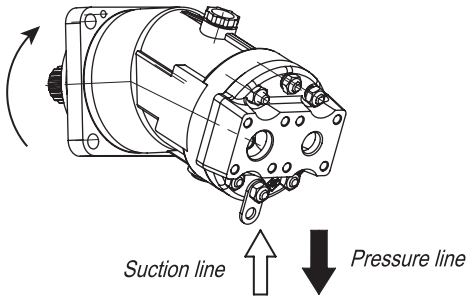
T1, T2 - drain line M18x1,5-18 DIN 3852
L = 32 mm for splined shafts according to DIN, for all other L = 33,5 mm

ROTATION

Clockwise

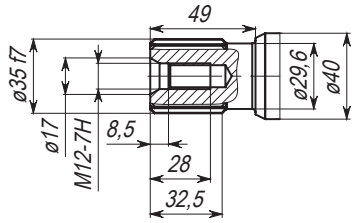


Counterclockwise

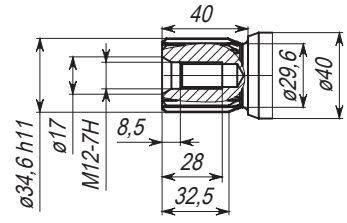


DRIVE SHAFTS

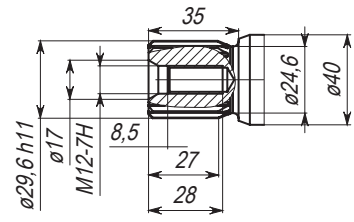
03; 04 | Splined shaft 35xf7x2x9g
GOST 6033-80, z16



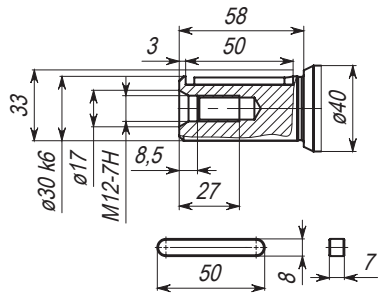
OG; OI | Splined shaft W35x2x30x16x9g
DIN5480, z16



OH; OJ | Splined shaft W30x2x30x14x9g
DIN5480, z14

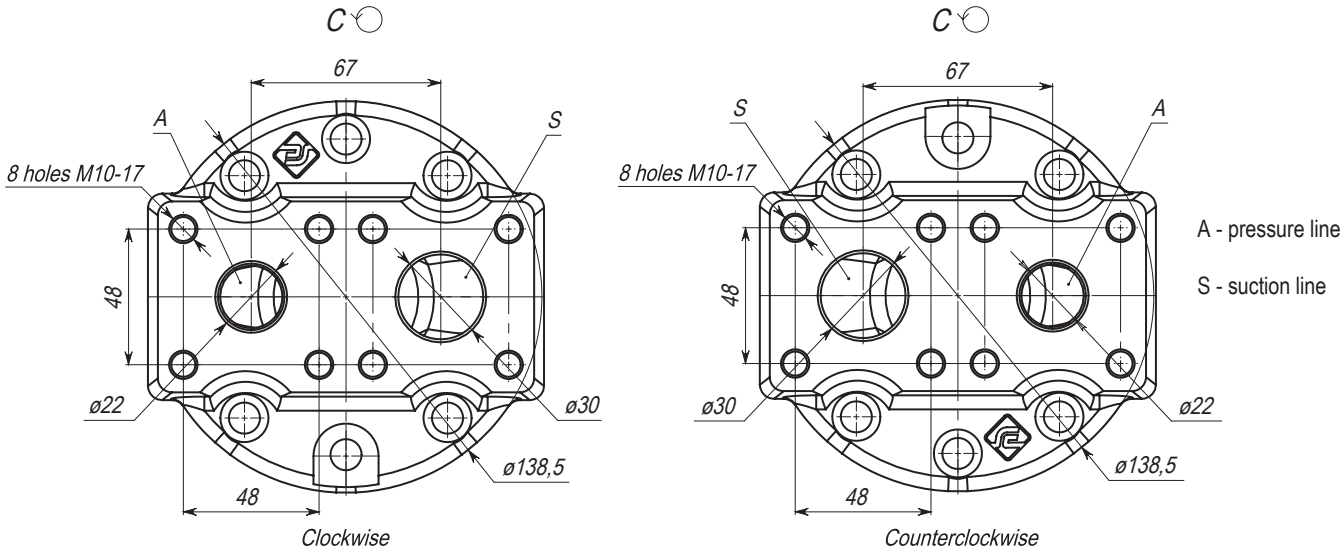


05; 06 | Keyed shaft 8x7x50
GOST 23360

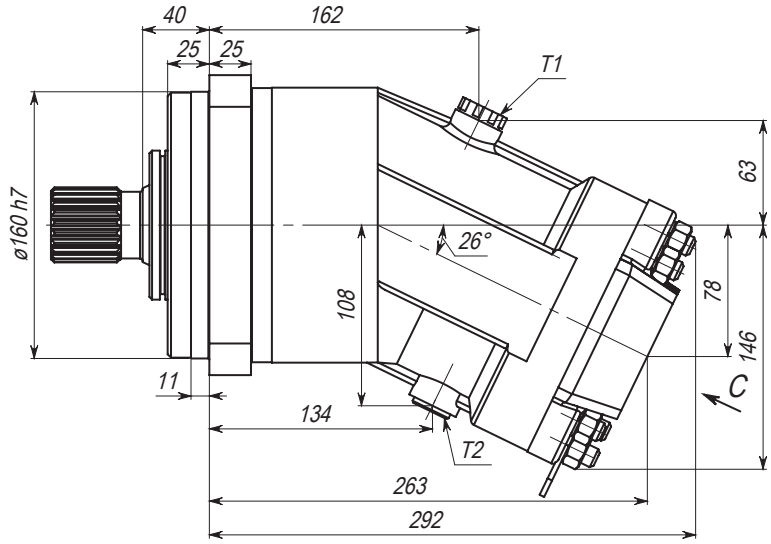


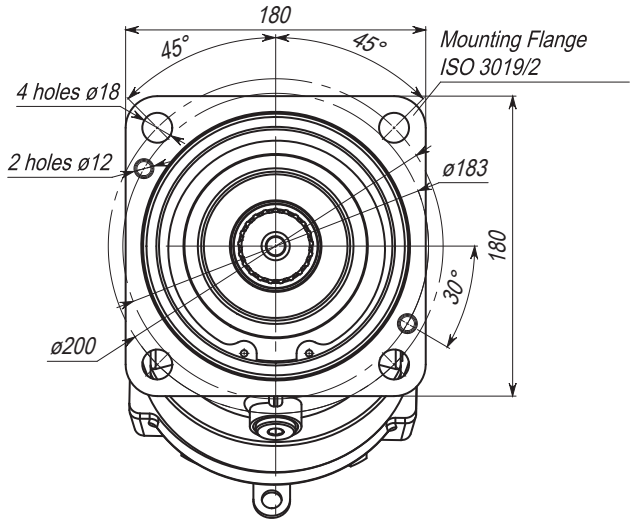
WORKING PORTS OPTION

06 | two flanged ports on the rear



PBF10 PUMPS DIMENSIONS, SIZE 112 CM³

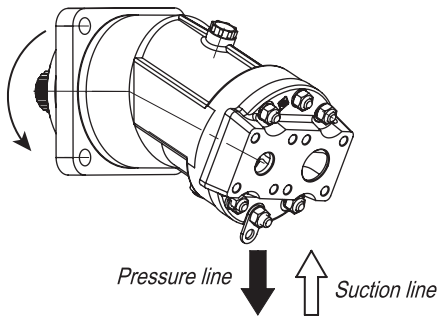




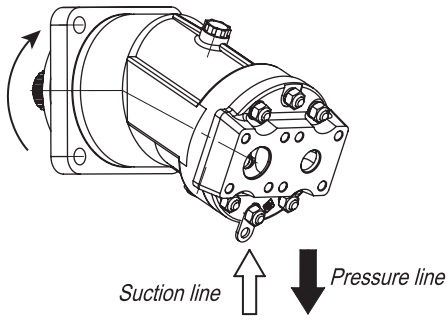
T1, T2 - drain line M18x1,5-18 DIN 3852

ROTATION

Clockwise

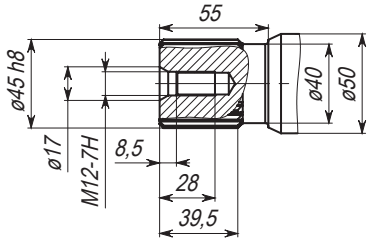


Counterclockwise

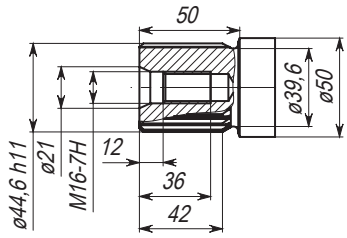


DRIVE SHAFTS

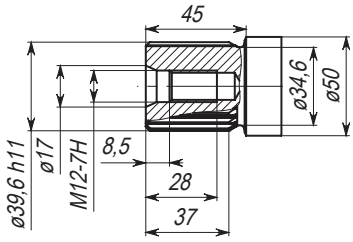
03; 04 | Splined shaft 45xh8x2x9g
GOST 6033-80, z21



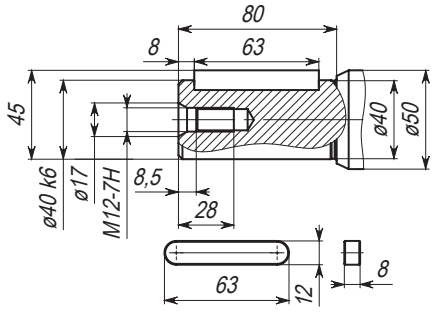
OG; OI | Splined shaft W45x2x30x21x9g
DIN5480, z21



OH; OJ | Splined shaft W40x2x30x18x9g
DIN5480, z18

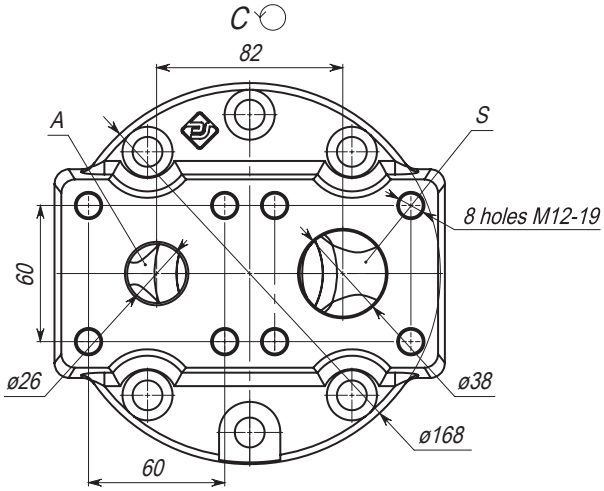


05; 06 | Keyed shaft 12x8x63
GOST 23360

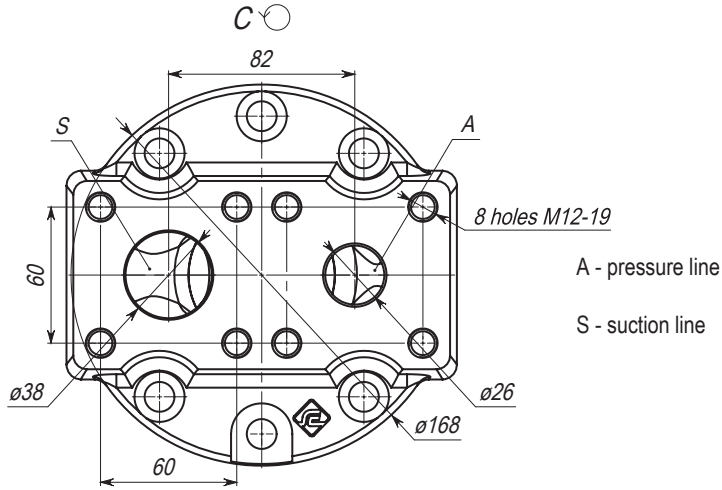


WORKING PORTS OPTION

06 | two flanged ports on the rear



Clockwise

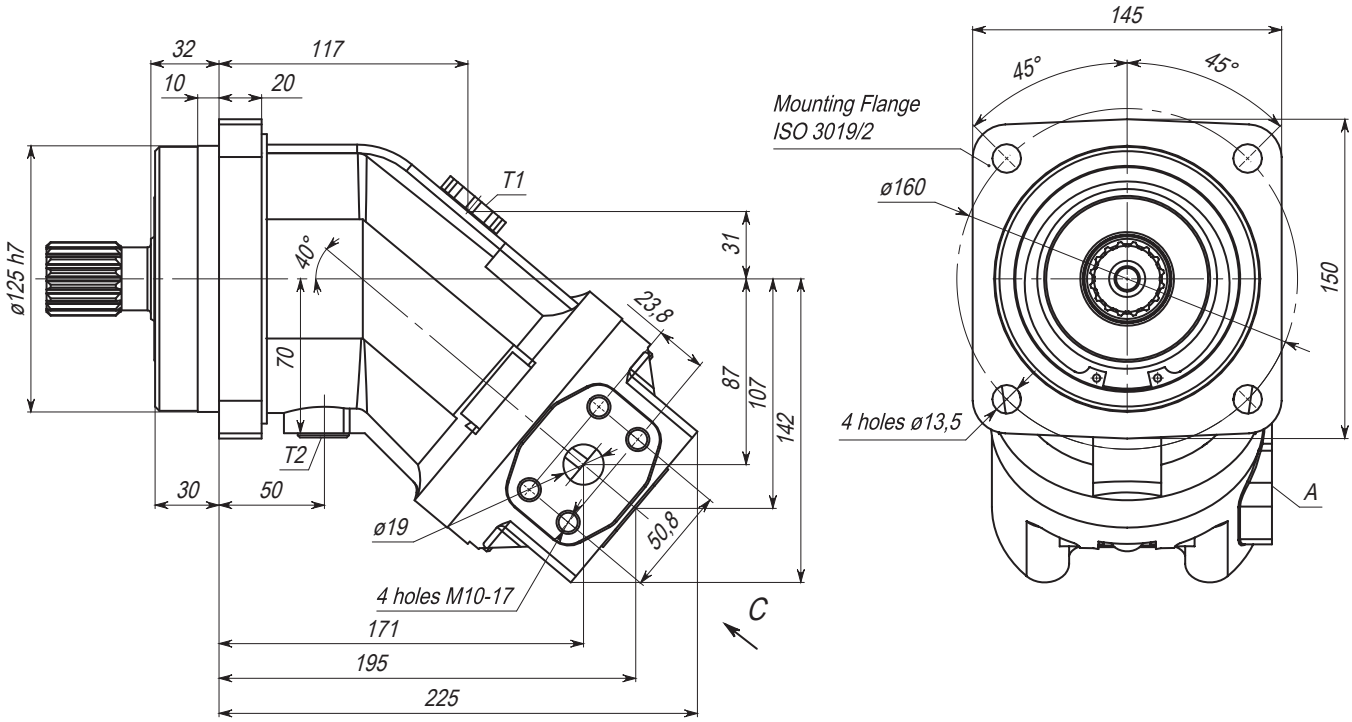


Counterclockwise

A - pressure line

S - suction line

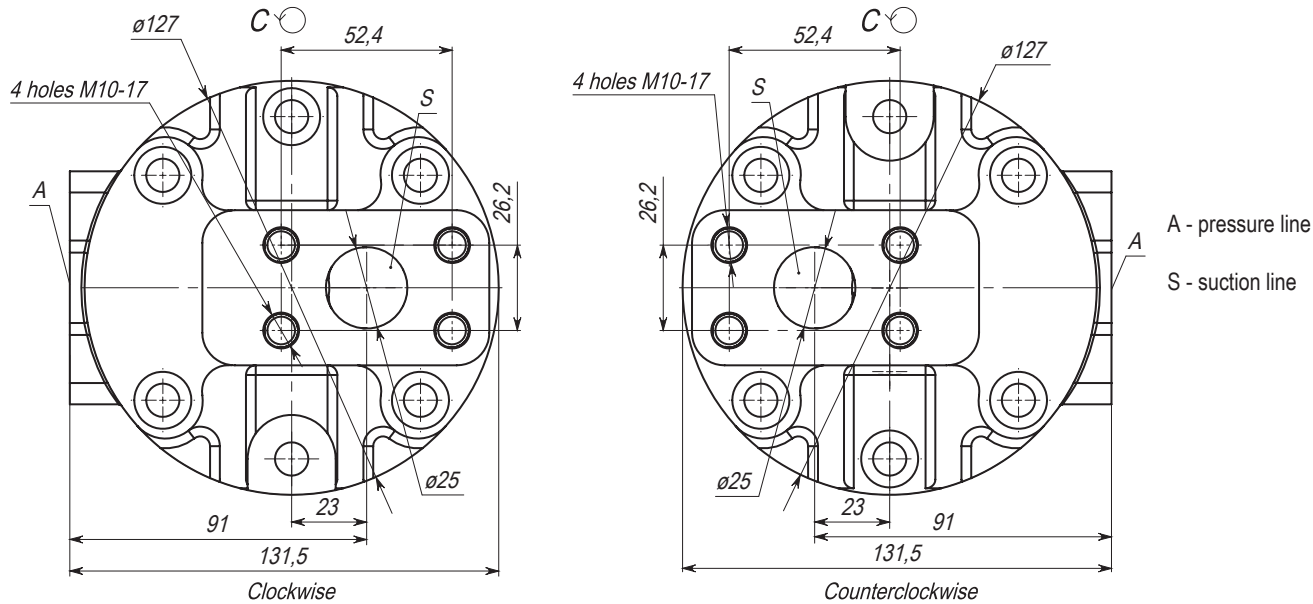
PBF20 PUMPS DIMENSIONS, SIZE 56 CM³



T1, T2 - drain line M18x1,5-12 DIN 3852

WORKING PORTS OPTION

05 | two flanged ports, one on the side, one on the rear

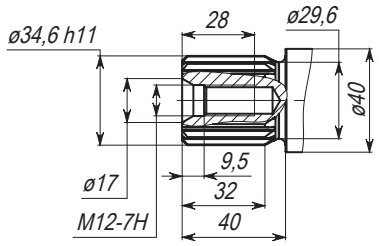


A - pressure line

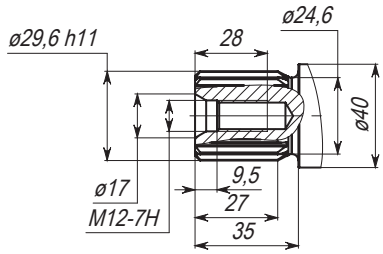
S - suction line

DRIVE SHAFTS

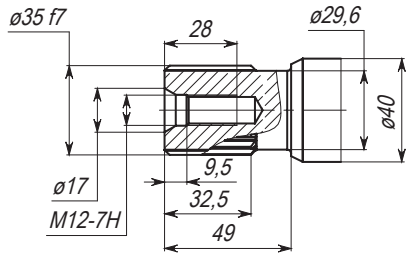
A | Splined shaft W35x2x30x16x9g
DIN 5480, z16



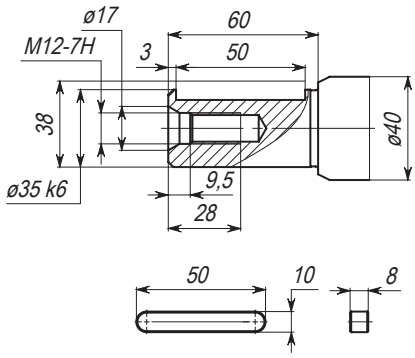
Z | Splined shaft W30x2x30x14x9g
DIN 5480, z14



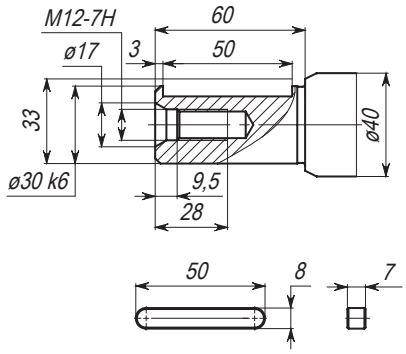
O | Splined shaft 35xf7x2x9g
GOST 6033-80, z16



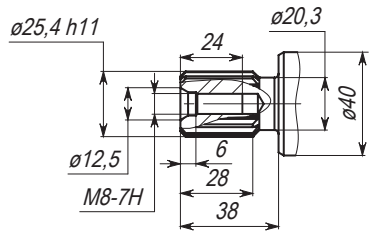
B | Keyed shaft 10x8x50
DIN 6885



P | Keyed shaft 8x7x50
DIN 6885

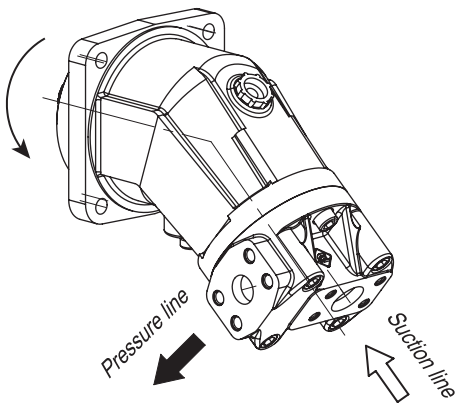


BB | Splined shaft 1 in 15T 16/32 DP
SAE J744-25-4(B-B), z14

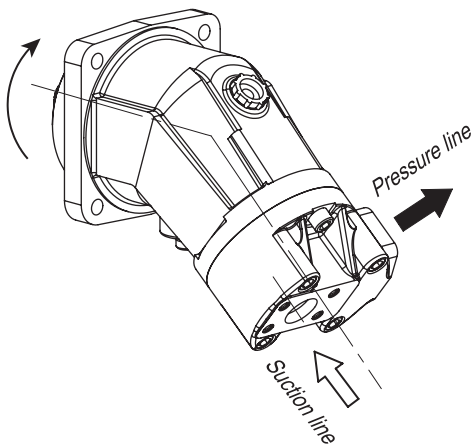


ROTATION

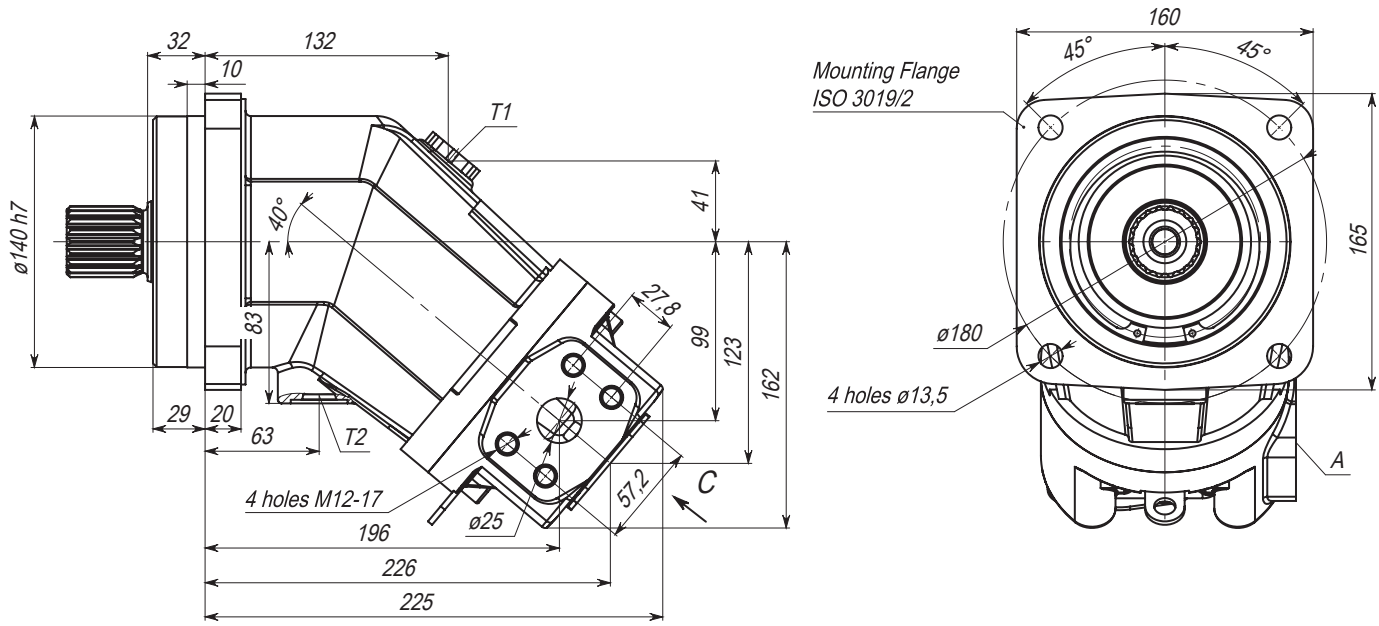
Clockwise



Counterclockwise



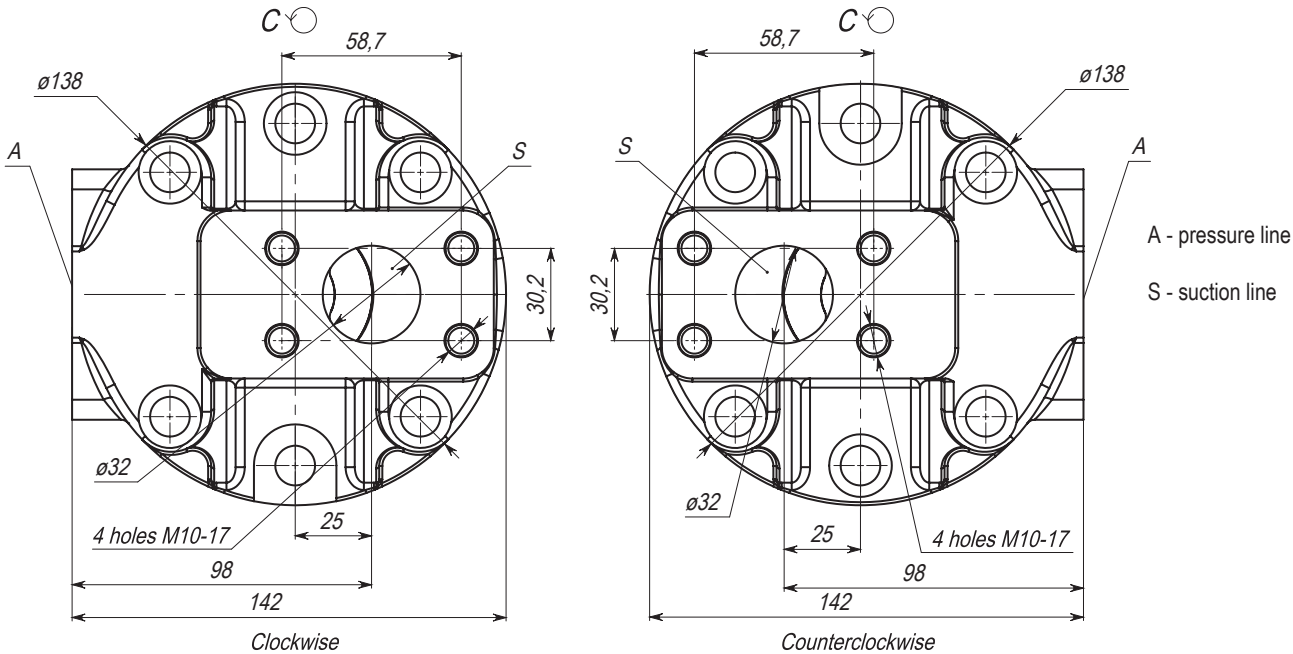
PBF20 PUMPS DIMENSIONS, SIZE 80 CM³



T1, T2 - drain line M18x1,5-12 DIN 3852

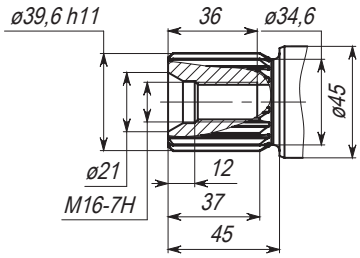
WORKING PORTS OPTION

05 | two flanged ports, one on the side, one on the rear

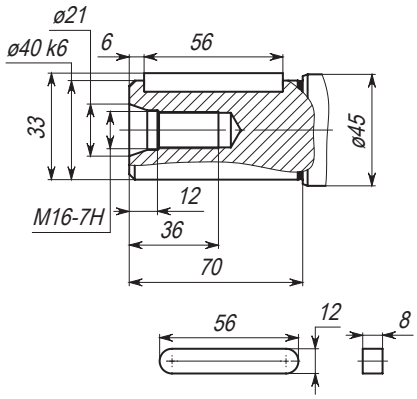


DRIVE SHAFTS

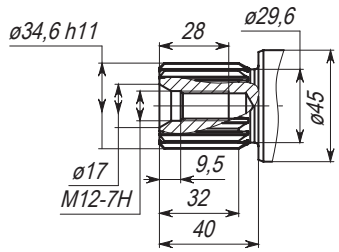
A | Splined shaft W40x2x30x18x9g
DIN 5480, z18



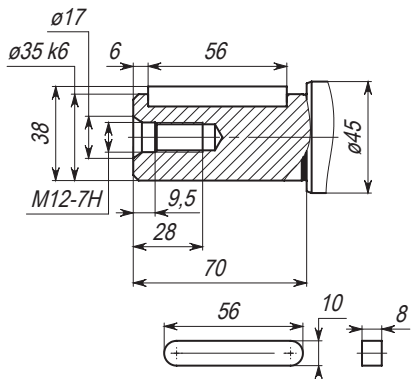
B | Keyed shaft 12x8x56
DIN 6885



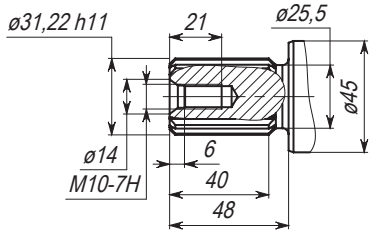
Z | Splined shaft W35x2x30x16x9g
DIN 5480, z16



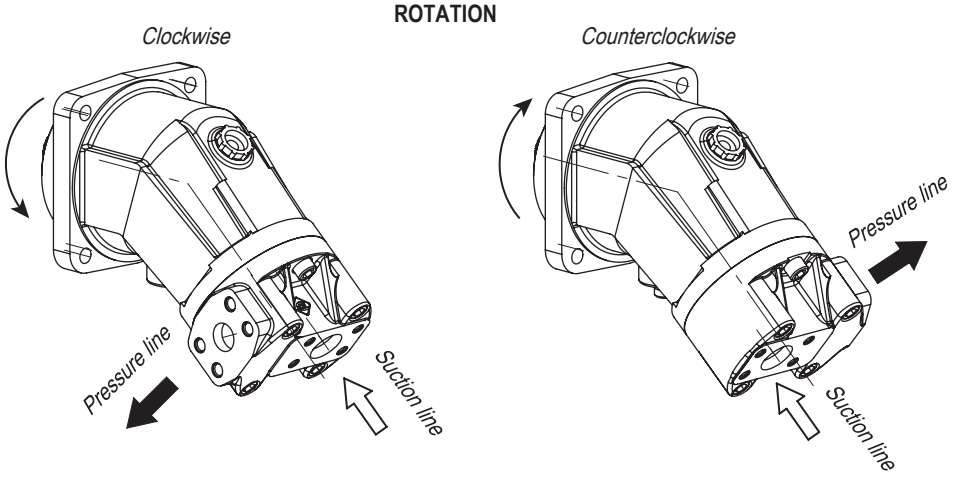
P | Keyed shaft 10x8x56
DIN 6885



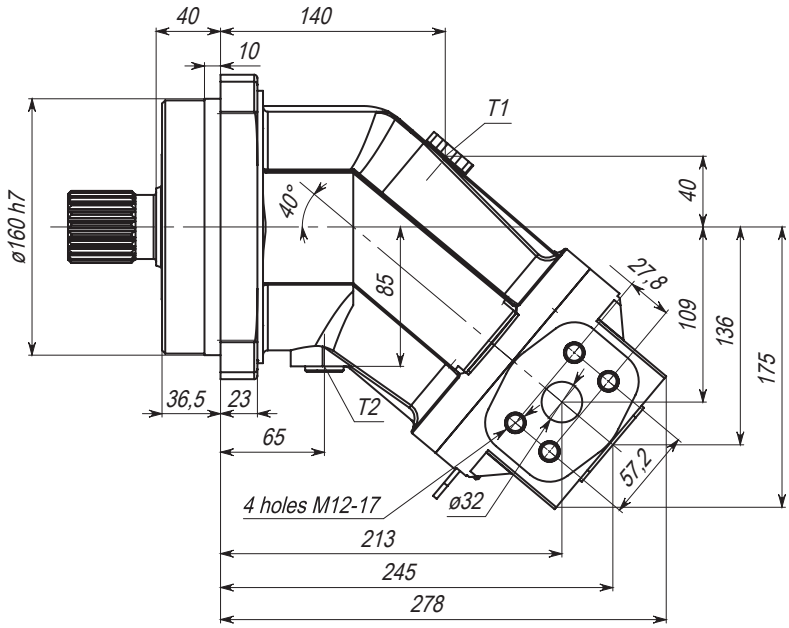
C | Splined shaft 1 1/4 in 14T 12/24 DP
SAE J744-25-4(C), z14

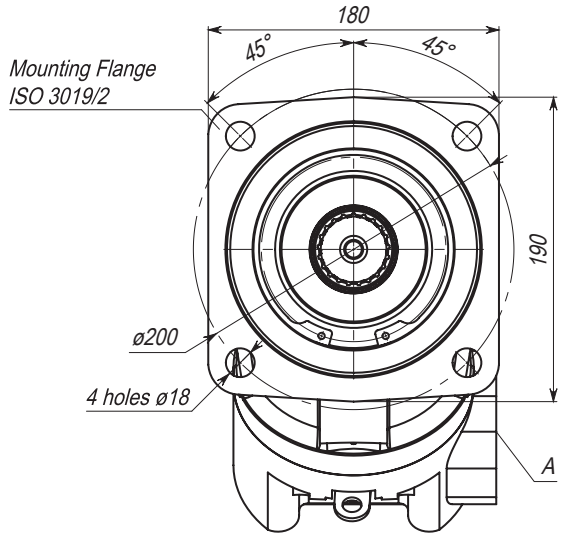


ROTATION



PBF20 PUMPS DIMENSIONS, SIZE 107 CM³

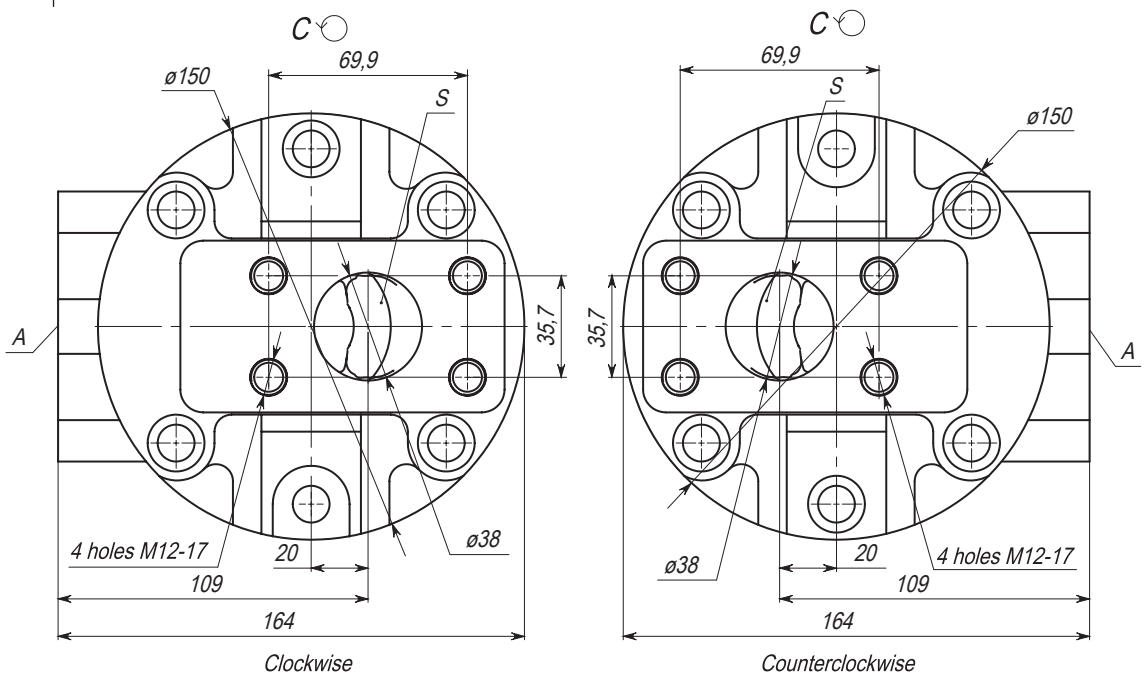




T1, T2 - drain line M18x1,5-12 DIN 3852

WORKING PORTS OPTION

05 | two flanged ports, one on the side, one on the rear

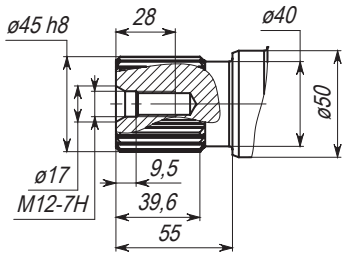


A - pressure line

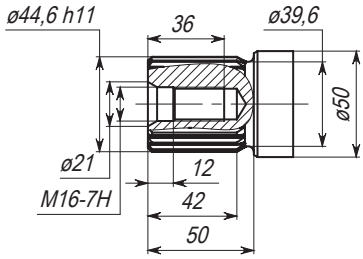
S - suction line

DRIVE SHAFTS

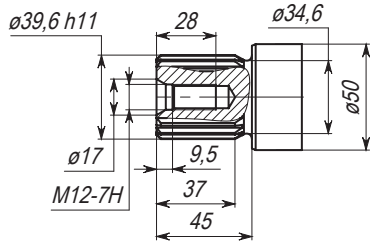
O | Splined shaft W45xh8x2x9g
GOST 6033-80, z21



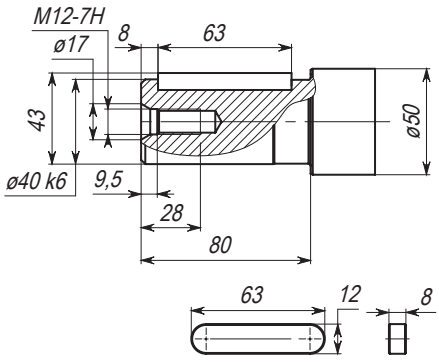
A | Splined shaft W45x2x30x21x9g
DIN 5480, z21



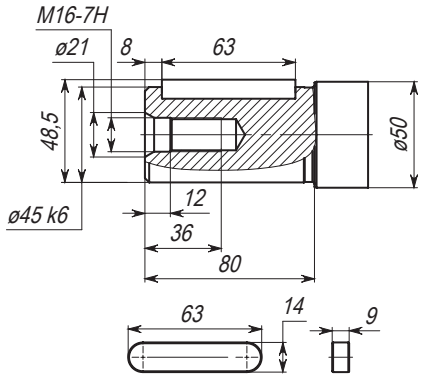
Z | Splined shaft W40x2x30x18x9g
DIN 5480, z18



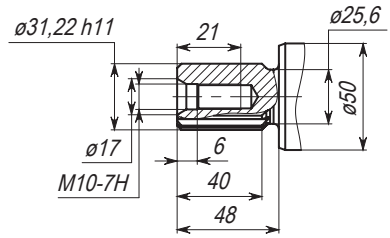
P | Keyed shaft 12x8x63
DIN 6885



B | Keyed shaft 14x9x63
DIN 6885

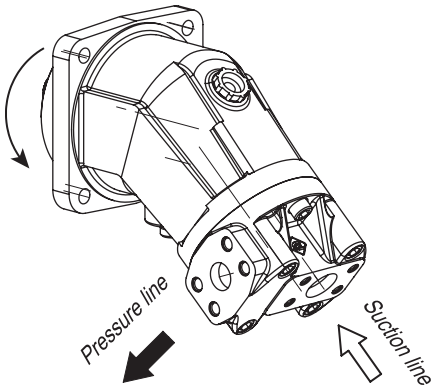


C | Splined shaft 1 1/4 in 14T 12/24 DP
SAE J744-25-4(C), z14

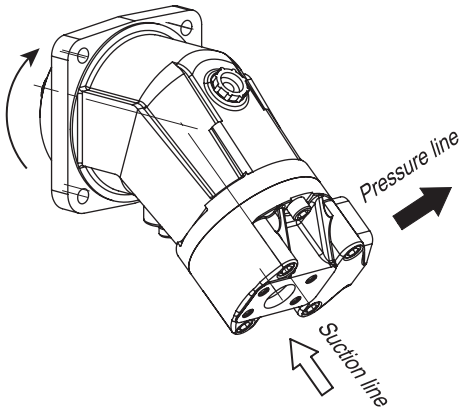


ROTATION

Clockwise



Counterclockwise



TECHNICAL SPECIFICATIONS

SIZE		PBF20T.56	PBF20T.63	PBF20T.80	PBF20T.107
Displacement, Vg	cm^3	56,1	63	80,4	106,7
Speed					
minimum		500			
rated, at inlet pressure P_{abs}=0,8 bar	min^{-1}	1870		1830	1700
maximum, at inlet pressure P_{abs}=1,0 bar		2200		2150	2000
maximum, at inlet pressure P_{abs}=2,0 bar		3200		3100	2800
Pressure, P					
rated	bar	300			
maximum, t≤6 sec		350			
Inlet pressure, P					
minimum	bar	0,8			
rated		1			
максимальное / maximum		2			
Flow*, Q					
minimum		28	32	40	53
rated	l/min	105	118	147	181
maximum		123	139	173	213
limit		180	202	249	299
Input power*, N					
rated, at inlet pressure P_{abs}=0,8 bar and pressure drop Δp=300 bar	кW	52	59	74	91
maximum, at inlet pressure P_{abs}=1,0 bar and pressure drop Δp=350 bar		72	81	101	124
Efficiency					
hydromechanical		0,96			
volumetric		0,95			
Weight (without fluid), no more	kg	8,2		10,6	15,0

* Without efficiency

FORMULAS

Flow $$Q = \frac{V_g \cdot n \cdot \eta_v}{1000} \text{ [l/min]}$$

Input torque $$T = \frac{V_g \cdot \Delta p}{20 \cdot \pi \cdot \eta_{mh}} = \frac{1.59 \cdot V_g \cdot \Delta p}{100 \cdot \eta_{mh}} \text{ [N·m]}$$

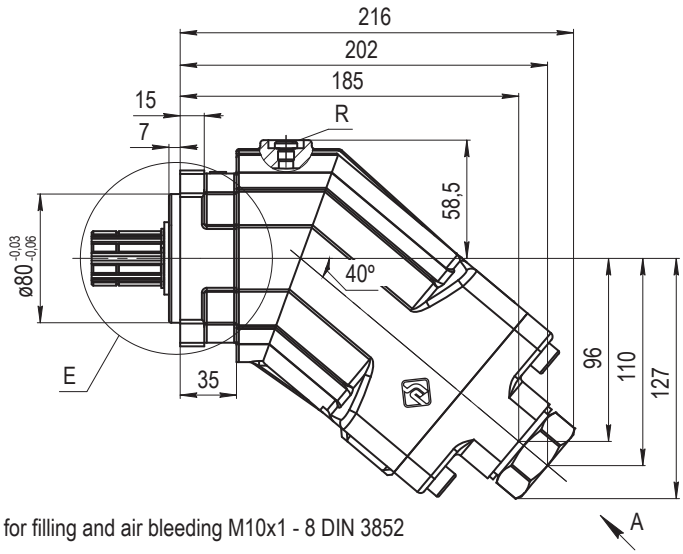
Input power $$P = \frac{2 \cdot \pi \cdot T \cdot n}{60000} = \frac{Q \cdot \Delta p}{600 \cdot \eta_t} \text{ [kW]}$$

V_g – displacement (cm^3)
Δp – pressure drop (bar)
n – speed (min^{-1})
η_v – volumetric efficiency
η_{mh} – hydromechanical efficiency
η_t – overall efficiency

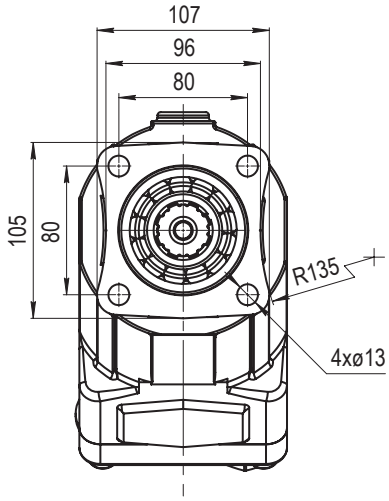
TECHNICAL SPECIFICATIONS

SIZE		PBF20TH.56	PBF20TH.63	PBF20TH.80	PBF20TH.107
Displacement, Vg	cm^3	56,1	63	80,4	106,7
Speed					
minimum		500			
rated, at inlet pressure P_{abs}=0,8 bar	min^{-1}	1870		1830	1700
maximum, at inlet pressure P_{abs}=1,0 bar		2200		2150	2000
maximum, at inlet pressure P_{abs}=2,0 bar		3200		3100	2800
Pressure, P					
rated	bar	350			
maximum, t≤6 sec		400			
Inlet pressure, P					
minimum	bar	0,8			
rated		1			
maximum		2			
Flow*, Q					
minimum		28	32	40	53
rated	l/min	105	118	147	181
maximum		123	139	173	213
limit		180	202	249	299
Input power*, N					
rated, at inlet pressure P_{abs}=0,8 bar and pressure drop Δp=350 bar	κW	61	69	86	106
maximum, at inlet pressure P_{abs}=1,0 bar and pressure drop Δp=400 bar		82	92	115	142
Efficiency					
hydromechanical		0,96			
volumetric		0,95			
Weight (without fluid), no more	kg	11		13,9	19,2

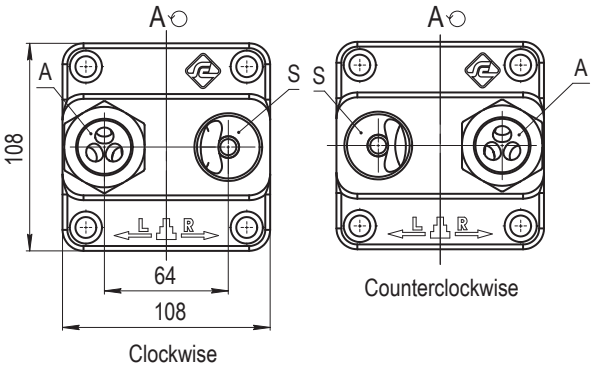
PBF20T(TH) PUMPS DIMENSIONS, SIZE 56 AND 63 CM³



Mounting flange ISO 7653-1985



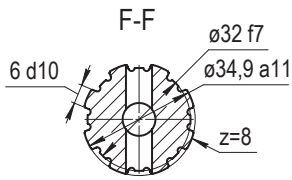
R - port for filling and air bleeding M10x1 - 8 DIN 3852



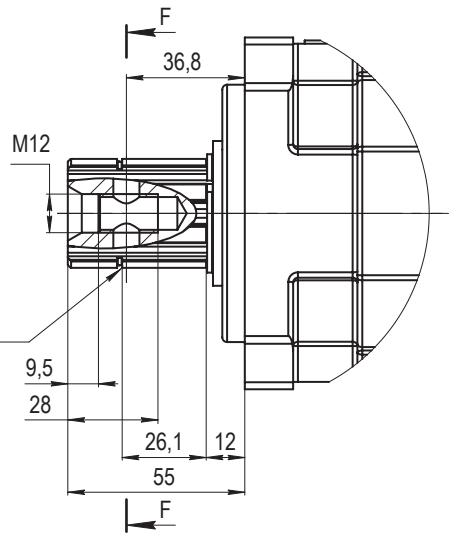
A - pressure line G3/4 - 16 DIN ISO 228
S - suction line G1 - 18 DIN ISO 228

E

Splined shaft E8 - 8x32x35 DIN ISO 14

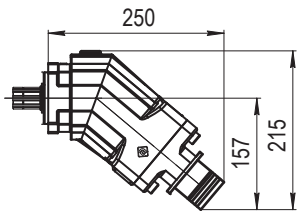


Lock ring groove
35 x 1,5 DIN 471

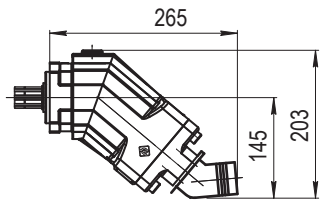


Suction branch pipes

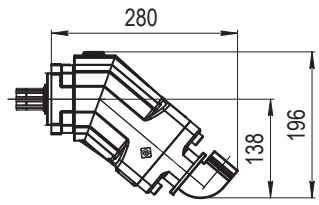
Straight



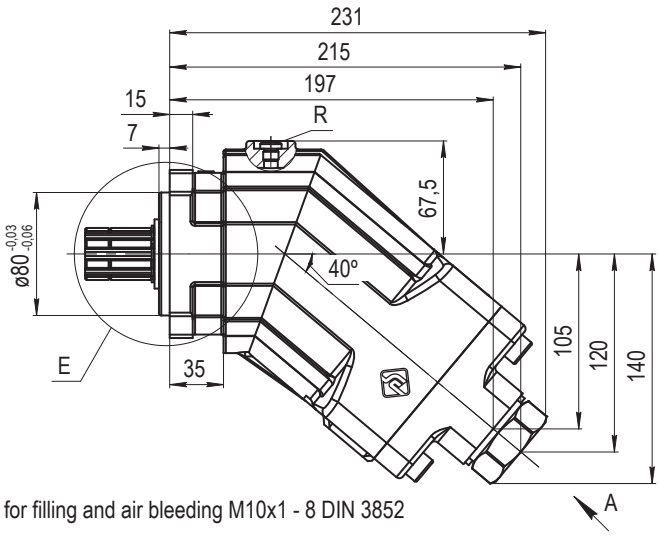
Angle 45°



Angle 90°

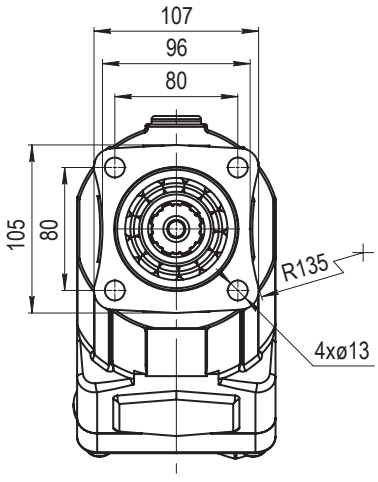


PBF20T(TH) PUMPS DIMENSIONS, SIZE 80 CM³



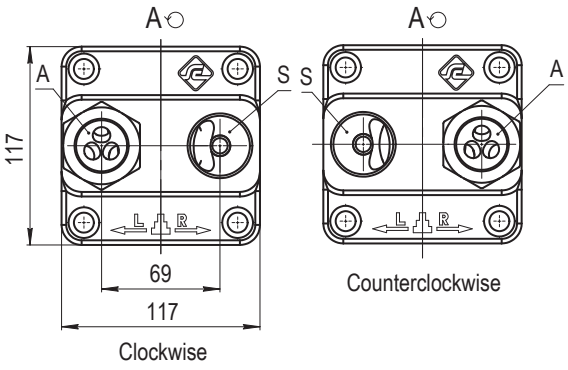
R - port for filling and air bleeding M10x1 - 8 DIN 3852

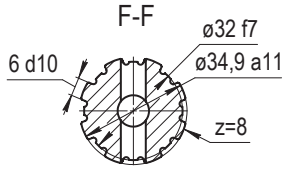
Mounting flange ISO 7653-1985



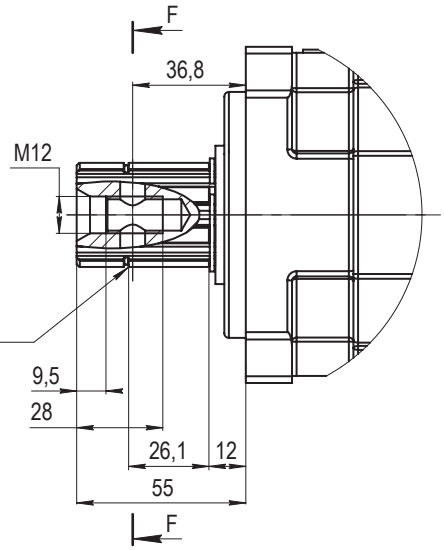
E

Splined shaft E8 - 8x32x35 DIN ISO 14





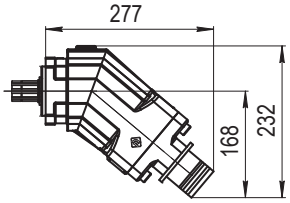
Lock ring groove
35 x 1,5 DIN 471



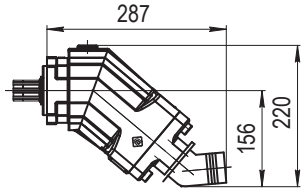
A - pressure line G1 - 18 DIN ISO 228
S - suction line G1 1/4 - 20 DIN ISO 228

Suction branch pipes

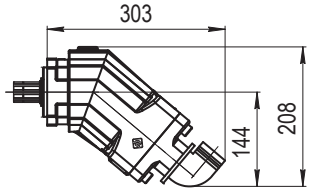
Straight



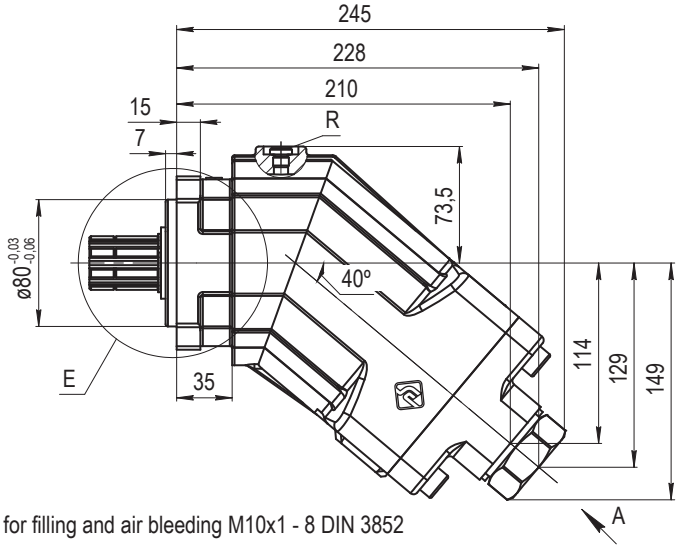
Angle 45°



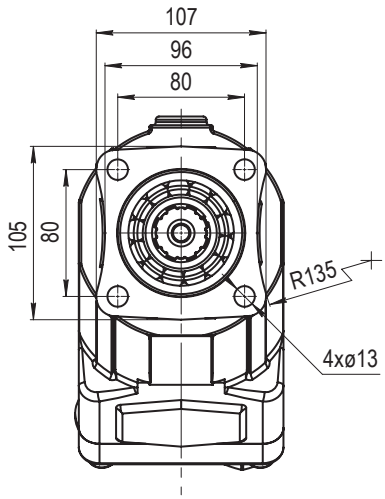
Angle 90°



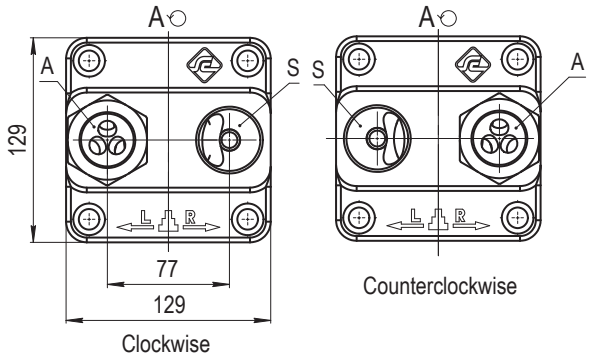
PBF20T(TH) PUMPS DIMENSIONS, SIZE 107 CM³



Mounting flange ISO 7653-1985

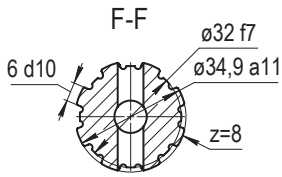


R - port for filling and air bleeding M10x1 - 8 DIN 3852

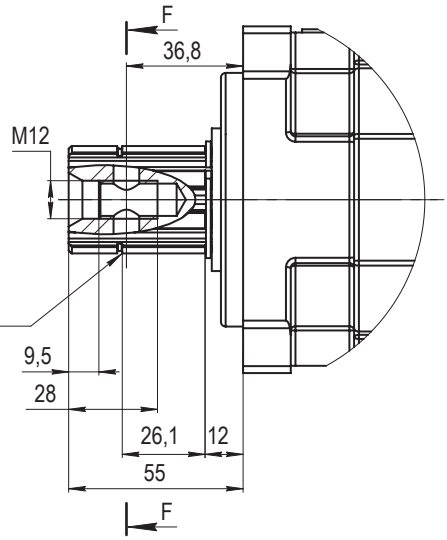


E

Splined shaft E8 - 8x32x35 DIN ISO 14



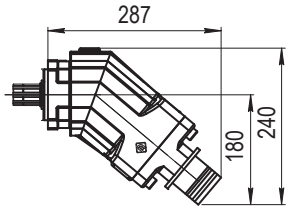
Lock ring groove
35 x 1,5 DIN 471



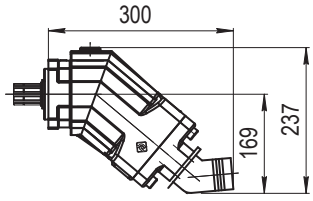
A - pressure line G1 - 18 DIN ISO 228
S - suction line G1 1/4 - 20 DIN ISO 228

Suction branch pipes

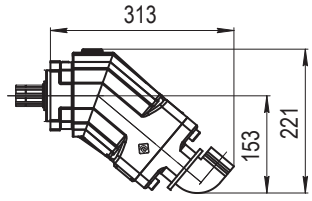
Straight



Angle 45°



Angle 90°



ROTATION

The rotation of the shaft is determined by the location of the pressure “A” and suction “S” lines. Adapter is located in the pressure line.
Changing the rotation of the pump shaft is done by reinstalling the pressure line adapter (line “A”) from one port to another. For details of changing the direction of rotation see "Instruction for changing the direction of rotation of the pumps PBF20T, PBF20TH".

Tightening of threaded connections

	Air bleed R	Pressure line "A"		Suction line "S"
	M10x1	G3/4	G1	G1 ¼
Tightening torque, Nm	5	60	60	60

Counterclockwise rotation
(pressure line adapter on the right side)

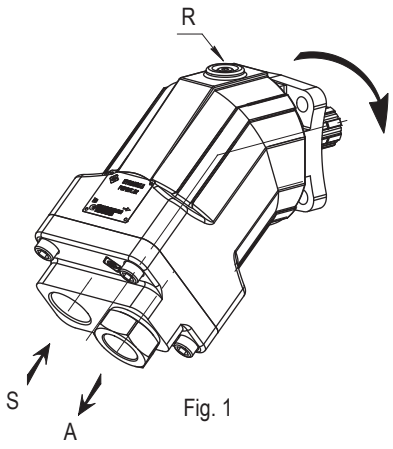


Fig. 1

Clockwise rotation
(pressure line adapter on the left side)

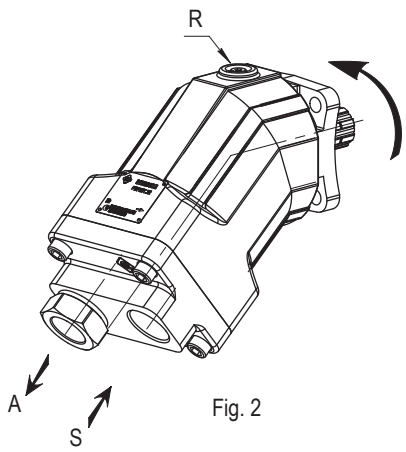
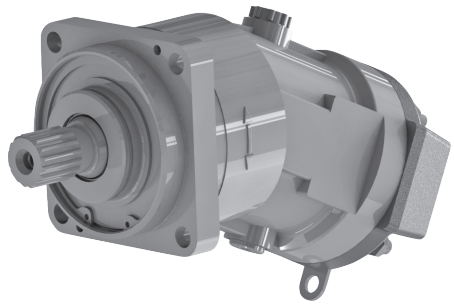


Fig. 2

MBF10

MBF10 - series of axial piston fixed displacement motors in bent-axis design. They have an aluminum alloy body and designed for hydraulic systems of mobile machines of different purposes.
The **MBF10** model range includes motors with displacement 28, 56 and 112 cm^3.

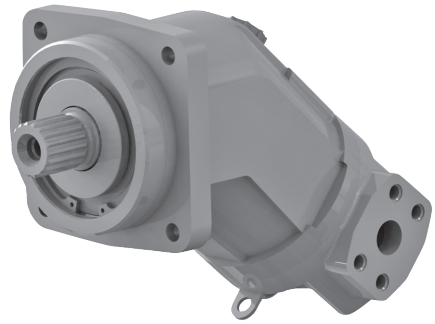


DESIGN FEATURES

- Open and closed circuits.
- The angle of inclination the block cylinder 26 degrees.
- Tapered roller bearings, allow the motor shaft to withstand high radial and axial loads.
- Bimetallic block cylinder of motor has a high wear resistance.
- Resistant to corrosion durable and lightweight body with high strength aluminum alloy.
- Hydraulic equipment optional.
- Maximum pressure 400 bar.

MBF20

MBF20 - series of axial piston fixed displacement motors in bent-axis design. They have an cast iron body and designed for hydraulic systems of mobile machines operating in severe conditions.
The **MBF20** model range includes motors with displacement 56, 80 and 107 cm^3.



DESIGN FEATURES

- Open and closed circuits.
- The angle of inclination the block cylinder 40 degrees.
- High hydromechanical efficiency.
- Tapered roller bearings, allow the motor shaft to withstand high radial and axial loads.
- Bimetallic block cylinder of unit has a high wear resistance.
- Conical plungers with compression rings.
- High cast iron body.
- Hydraulic equipment optional.
- Maximum pressure 450 bar.

MBF10

FIXED DISPLACEMENT AXIAL PISTON MOTORS

Order code

MBF10	.	4	.	56	.	00	.	0	6	N			

FIXED DISPLACEMENT BENT-AXIS AXIAL PISTON MOTOR	MBF10

MODEL [1]	2*	4
	●	●

DISPLACEMENT, CM³		CODE
28	●	28
56	●	56
112	●	112

SHAFT OPTIONS	28	56	112	CODE
Splined shaft GOST 6033-80	-	●	●	00
Splined shaft GOST 6033-51	●	-	-	
Splined shaft GOST 23360	●	●	●	01
Splined shaft GOST 6033-80	●	-	-	07
Splined shaft DIN 5480 [2]	-	●	●	OE
Splined shaft DIN 5480 [3]	-	●	●	OF

BUILD-IN HYDRAULIC AND ELECTRICAL EQUIPMENT	28	56	112	CODE
Not available	●	●	●	0
Flushing valve	●	●	-	7
Speed sensor (no hydraulic equipment)	-	●	●	9

SPECIAL FEATURES**	CODE
Speed sensor (with build-in hydraulic equipment)	7

CLIMATIC VERSION	CODE
Temperate	N
Tropical	T

WORKING PORTS OPTION	28	56	112	CODE
Two threaded ports on the rear (at 25° to the shaft axis)	●	-	-	0
Two threaded ports on the rear (parallel to the shaft axis)	●	-	-	1
Two threaded ports on the rear (at 50° to the shaft axis)	●	-	-	2
Four threaded ports, two on the sides, two on the rear	●	●	-	3
Four threaded ports, two on the sides, two on the rear (M33x2)	-	●	-	D
Two flanged ports on the rear	-	●	●	6
Two flanged ports on the sides (only with flushing valve)	-	●	-	E
Two threaded ports on the sides (only with flushing valve)	●	-	-	9
Two flanged ports on the sides	-	●	-	F

[1] * 2- with ball bearings and brass cylinder block (only for size 28)
4 - with cone bearings, bimetallic cylinder block
[2] side balanced
[3] side balanced, reduced diameter
** Special option code - assigned if necessary after agreement of special conditions with the customer

Notes:

● Standart; ○ Optional; - Not available

MBF20

FIXED DISPLACEMENT AXIAL PISTON MOTORS

Order code system

MBF20	.	107	/	W	-	B	A	B	020	N			

FIXED DISPLACEMENT BENT-AXIS AXIAL PISTON MOTOR	MBF20

DISPLACEMENT, CM³		CODE
56,1	●	56
80,4	●	80
106,7	●	107

ROTATION	CODE
Reversible	W

SEAL	56	80	107	CODE
NBR	●	●	●	B
FKM	○	○	○	F

SHAFT OPTIONS		56	80	107	CODE
Splined shaft DIN 5480	[2]	●	●	●	A
	[3]	●	●	●	Z
Splined shaft GOST 6033	-	●	●	●	O
Splined shaft DIN 6885	-	●	●	●	B
		●	●	●	P
Splined shaft SAE J744	-	-	●	●	C
		●	-	-	BB

MOUNTING FLANGES	56	80	107	CODE
ISO 3019/2, 4 holes	●	●	●	B

SPECIAL FEATURES*	CODE
Speed sensor (with build-in hydraulic equipment)	7

CLIMATIC VERSION	CODE
Temperate	N
Tropical	T

WORKING PORTS OPTION	56	80	107	CODE
Two flanged ports on the rear	●	●	●	010
Two flanged ports on the sides	●	●	●	020
Two flanged ports on the sides (only with flushing valve)	●	●	●	027
Four threaded ports, two on the sides, two on the rear	●	-	-	040
Two flanged ports on the rear (at 90° to the shaft axis)	●	●	●	100
Two flanged ports on the rear (with manifold block)	●	-	-	191

* Special option code - assigned if necessary after agreement of special conditions with the customer

Notes:

● Standart; ○ Optional; - Not available

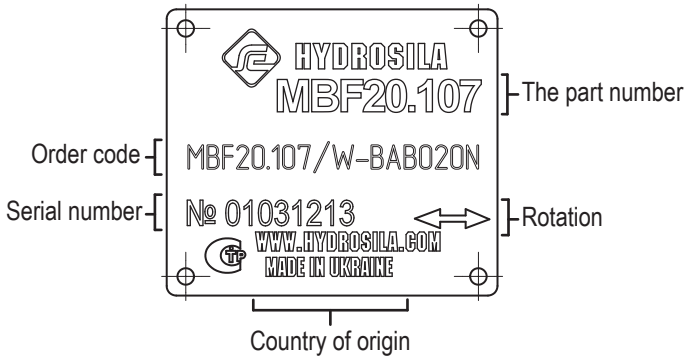
ORDERING EXAMPLE

MBF10.4.56.00.06N

MBF10 - fixed displacement bent-axis axial piston motor,
4 - with cone bearings and bimetallic cylinder block,
56 - displacement 56 cmm,
00 - with splined shaft, acc. to GOST 6033-80,
06 - two flanged ports on the rear,
N - climate version: temperate.

MBF20.107/W-BAB020N

MBF20 - fixed displacement bent-axis axial piston motor,
107 - displacement 106,7 cmm,
W - reversible,
B - with seal material NBR,
A - splined shaft, acc. to DIN 5480,
B - mounting flange acc. to ISO 3019/2, 4 holes,
020 - two flanged ports,
N - climate version: temperate.



TECHNICAL SPECIFICATIONS

SIZE		MBF10.2.28	MBF10.4.56	MBF10.4.112	MBF20.56	MBF20.80	MBF20.107
Displacement, Vg	cm^3	28	56	112	56,1	80,4	106,7
Speed:	min^{-1}						
minimum		50					
rated		1920	1800	1200	2000	1800	1600
maximum		4750	3750	3000	5000	4500	4000
Inlet pressure, P	bar						
rated		200	250		400		
maximum		320	400		450		
Outlet pressure, P	bar						
maximum		200			250		
rated					200		
Maximum drain pressure	bar	1	2,5				
Inlet flow*, Q	l/min						
minimum		1	3	6	3	4	5
rated		54	101	134	112	145	171
maximum		133	210	336	281	362	427
Torque*, T	Hm						
rated		89	223	446	357	512	680
maximum		143	357	713	402	576	765
Output power*, N	κW						
rated		18	42	56	75	96	114
maximum		71	140	224	210	271	320
Efficiency							
hydromechanical		0,95			0,94		
total efficiency		0,95					
Weight (without fluid)	kg	9	17	29	18	23	32

* Without efficiency

FORMULAS

Inlet flow $$Q = \frac{V_g \cdot n}{1000 \cdot \eta_v} \text{ [l/min]}$$

Torque $$T = \frac{1.59 \cdot V_p \cdot \Delta p \cdot \eta_{mh}}{10} = \frac{V_g \cdot \Delta p \cdot \eta_{mh}}{20 \cdot \pi} \text{ [N·m]}$$

Power $$P = \frac{T \cdot n}{9549} = \frac{2 \cdot \pi \cdot T \cdot n}{60000} = \frac{Q \cdot \Delta p \cdot \eta_t}{600} \text{ [kW]}$$

V_g – displacement [cm^3]

Δp – pressure drop [bar]

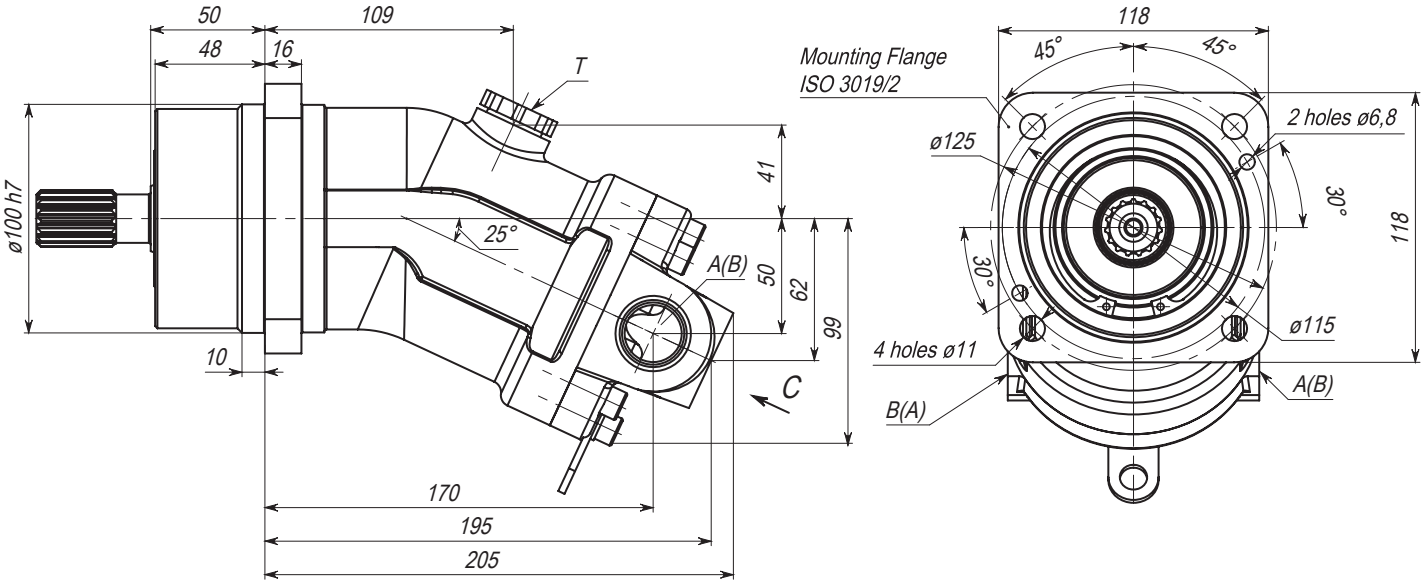
n – speed [min^{-1}]

η_v – volumetric efficiency

η_{hm} – hydromechanical efficiency

η_t – overall efficiency

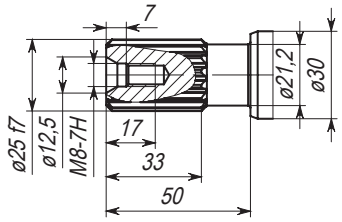
MBF10 MOTORS DIMENSIONS, SIZE 28 CM³



T - drain line M18x1,5-18 DIN 3852

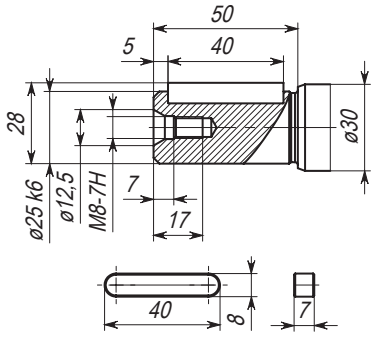
DRIVE SHAFTS

07 | Splined shaft 25xf7x1,5x9g
GOST 6033-80, z15



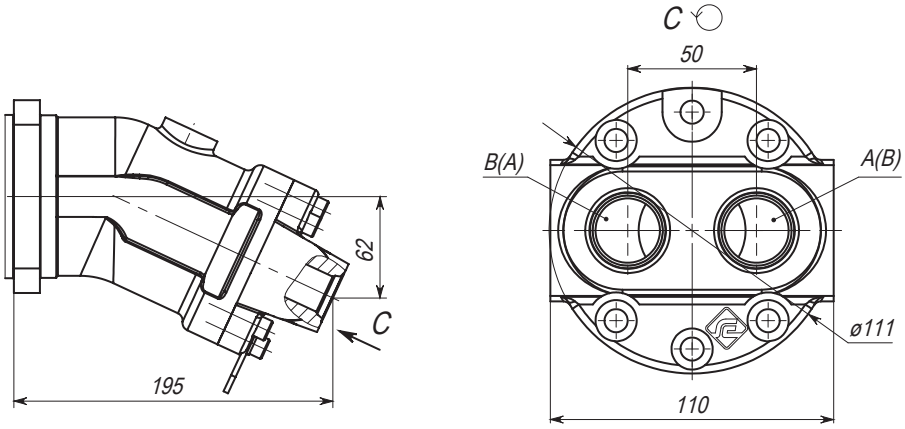
00 | Splined shaft 25x1,5x16S X
GOST 6033-51, z16

01 | Keyed shaft 8x7x40
GOST 23360



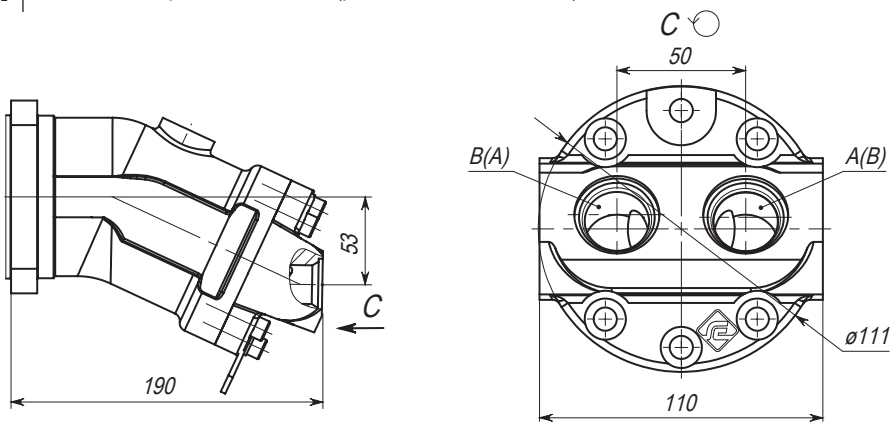
WORKING PORTS OPTION

0 two threaded ports on the rear (at 25° to the shaft axis)



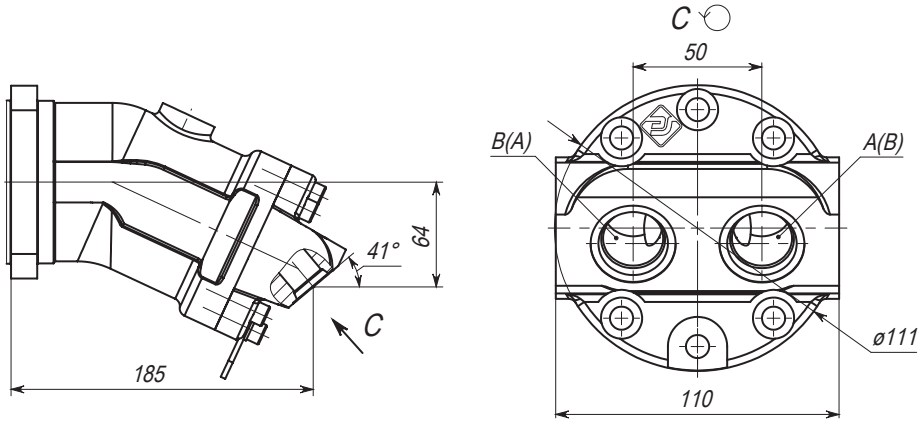
A; B - working lines
M27x2-24 GOST 25065

1 two threaded ports on the rear (parallel to the shaft axis)



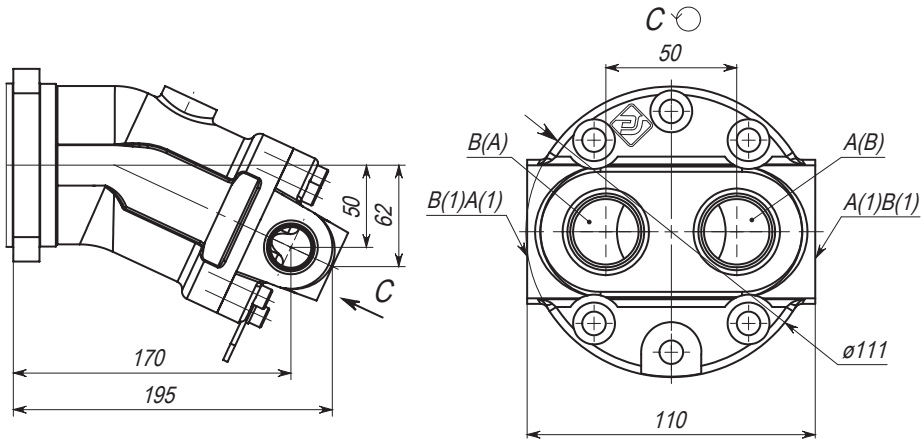
A; B - working lines
M27x2-20 GOST 25065

2 two threaded ports on the rear (at 50° to the shaft axis)



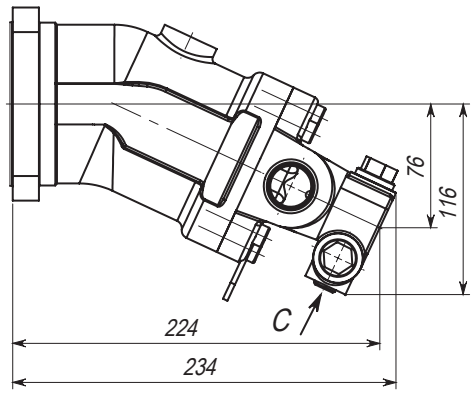
A; B - working lines
M27x2-20 GOST 25065

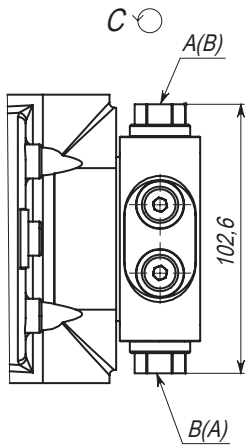
3 four threaded ports, two on the sides, two on the rear



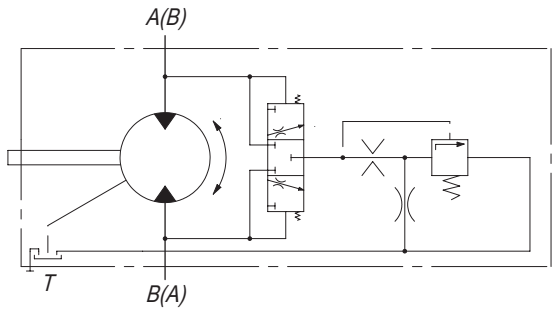
A; B; A1; B1 - working lines
M27x2-24 GOST 25065

9 two threaded ports on the sides (only with flushing valve)



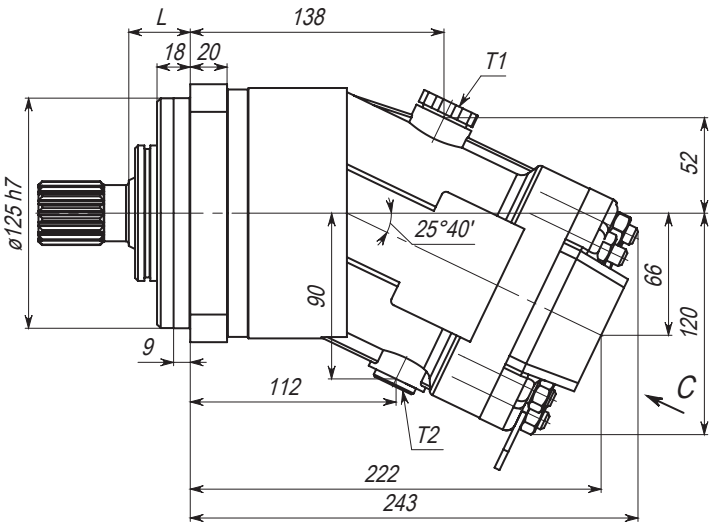


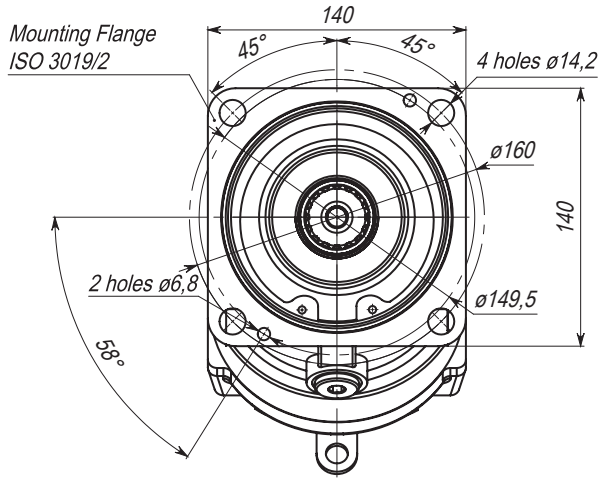
Hydraulic circuit



A; B - working lines
M27x2-20 GOST 25065

MBF10 MOTORS DIMENSIONS, SIZE 56 CM³

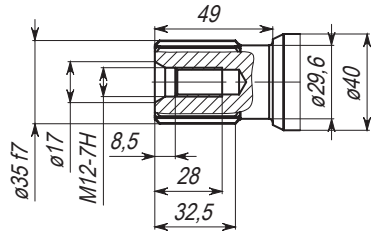




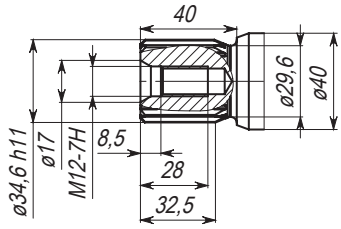
T1, T2 - drain line M18x1,5-18 DIN 3852
L = 32 mm for splined shafts according to DIN, for all other L = 33,5 mm

DRIVE SHAFTS

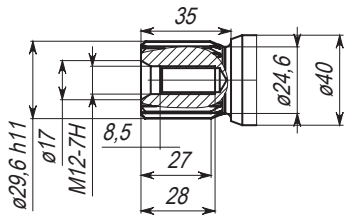
00 | Splined shaft 35xf7x2x9g
GOST 6033-80, z16



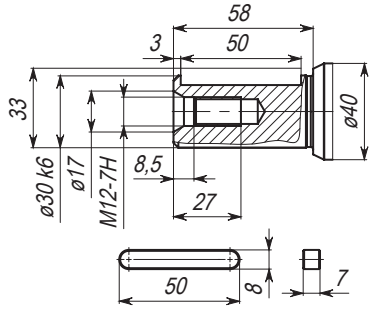
OE | Splined shaft W35x2x30x16x9g
DIN 5480, z16



OF | Splined shaft W30x2x30x14x9g
DIN 5480, z14

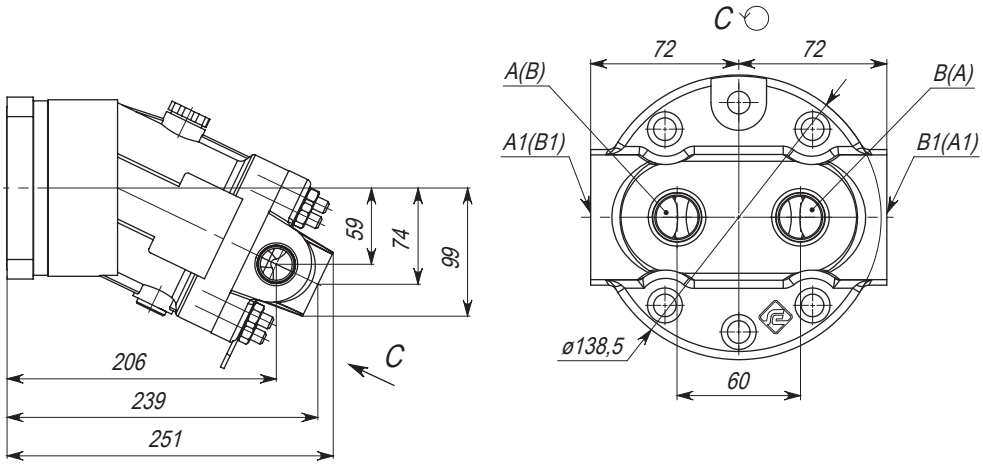


01 | Keyed shaft 8x7x50
GOST 23360



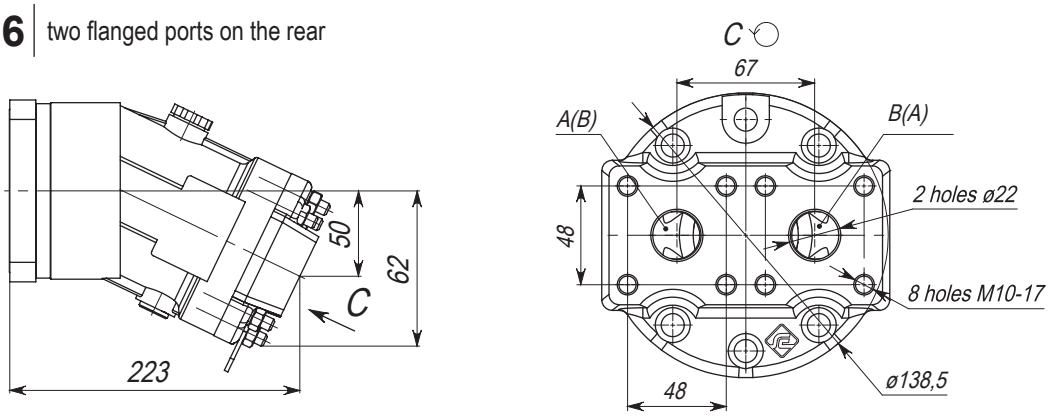
WORKING PORTS OPTION

3 four threaded ports, two on the sides, two on the rear



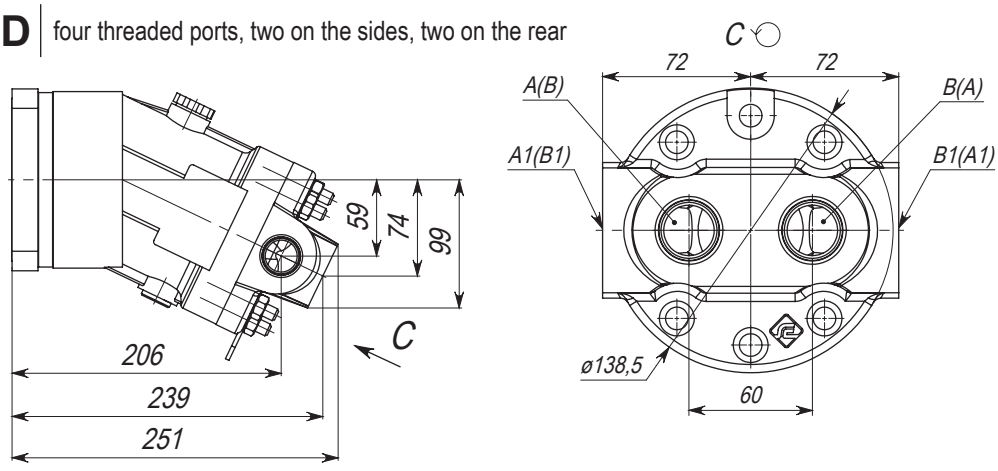
A; B; A1; B1 - working lines
M27x2-24 GOST 25065

6 two flanged ports on the rear



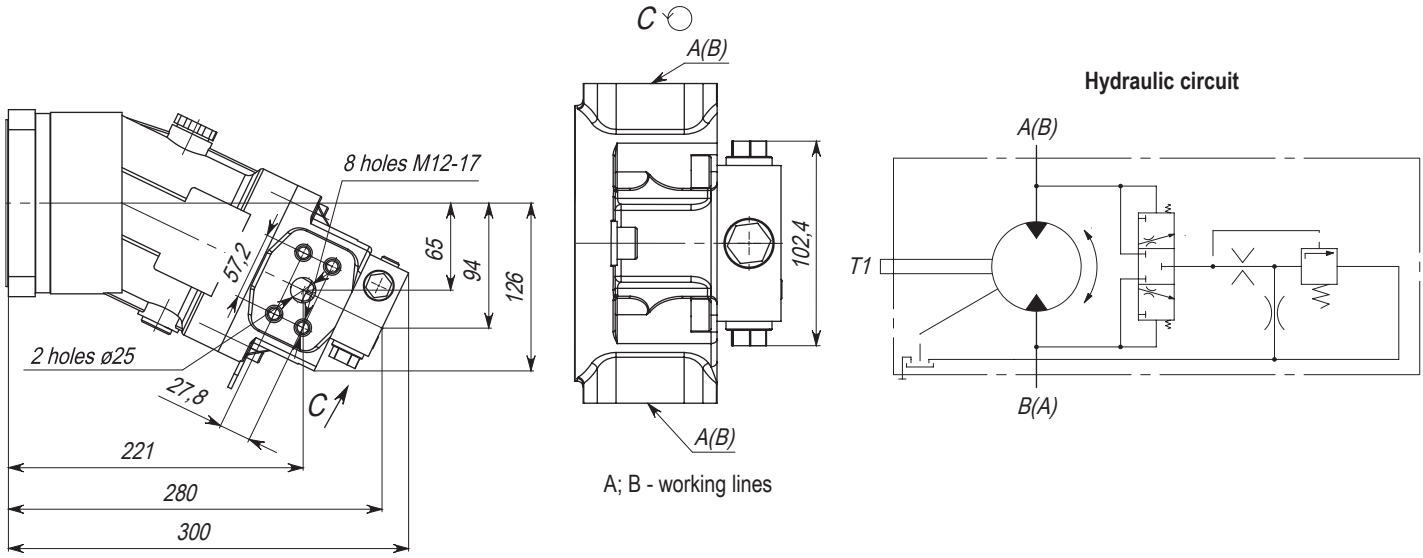
A; B - working lines

D four threaded ports, two on the sides, two on the rear



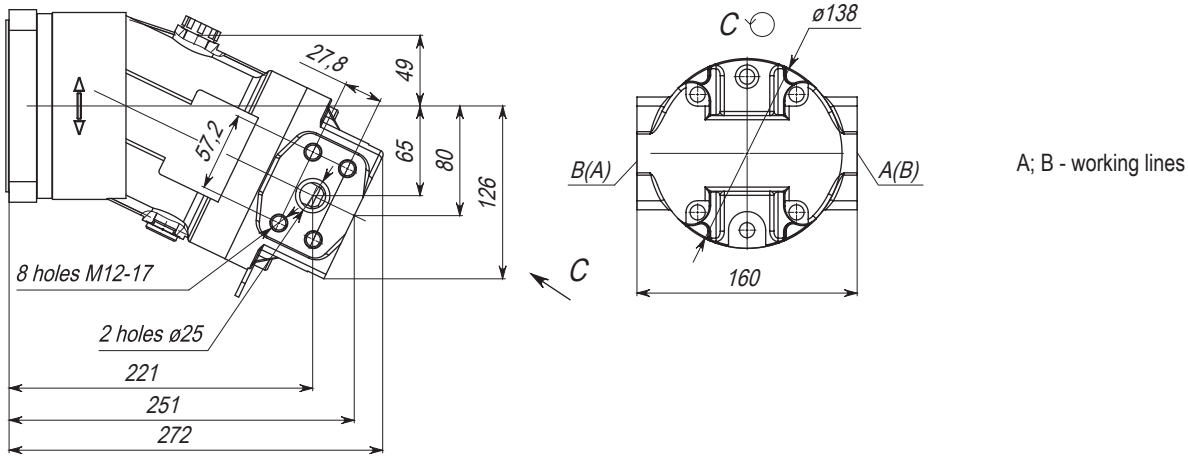
A; B; A1; B1 - working lines
M33x2-24 GOST 25065

E two flanged ports on the sides (only with flushing valve)



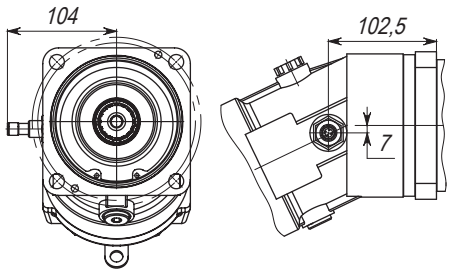
A; B - working lines

F two flanged ports on the sides

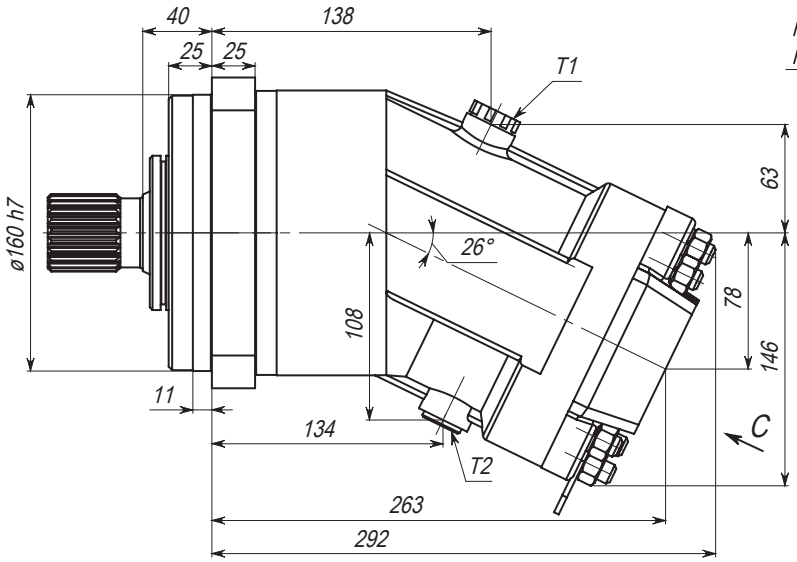


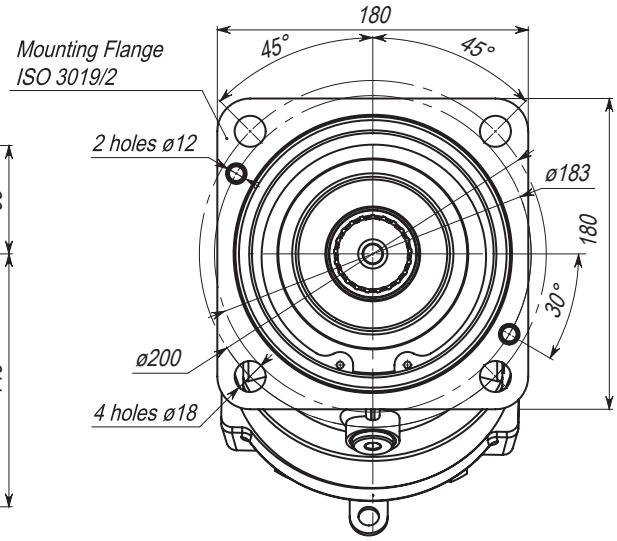
A; B - working lines

SPEED SENSOR LOCATION



MBF10 MOTORS DIMENSIONS, SIZE 112 CM³

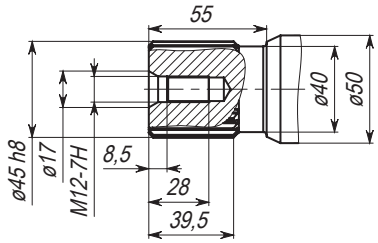




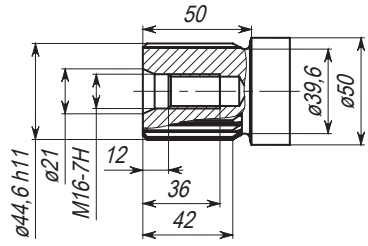
T1, T2 - drain line M18x1,5-18 DIN 3852

DRIVE SHAFTS

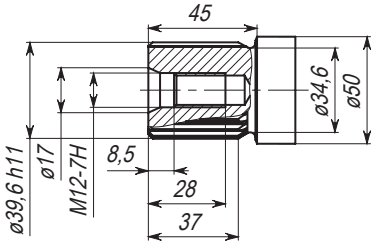
00 | Splined shaft 45xh8x2x9g
GOST 6033-80, z21



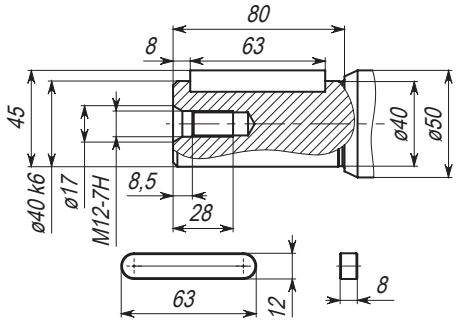
OE | Splined shaft W45x2x30x21x9g
DIN 5480, z21



OF | Splined shaft W40x2x30x18x9g
DIN 5480, z18

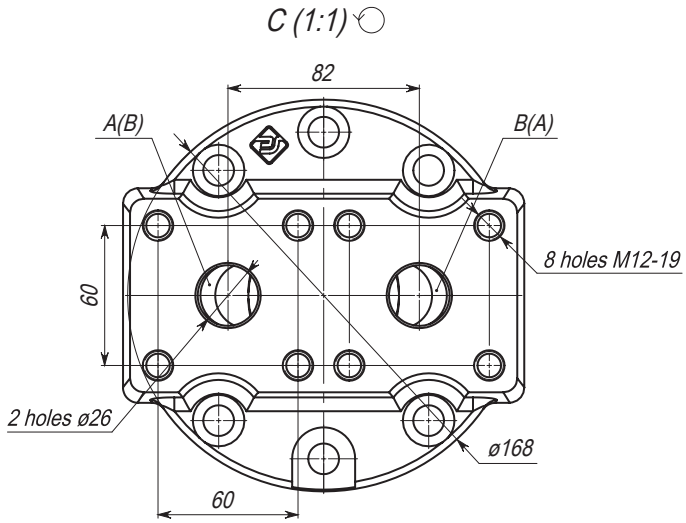


01 | Keyed shaft 12x8x63
GOST 23360



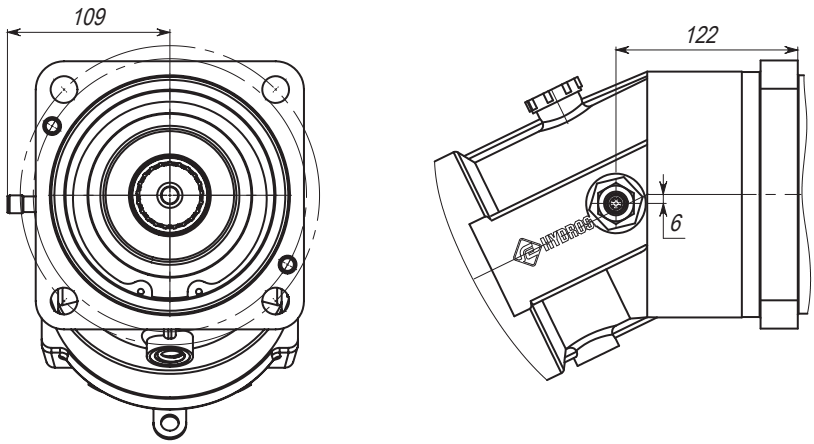
WORKING PORTS OPTION

6 | two flanged ports on the rear

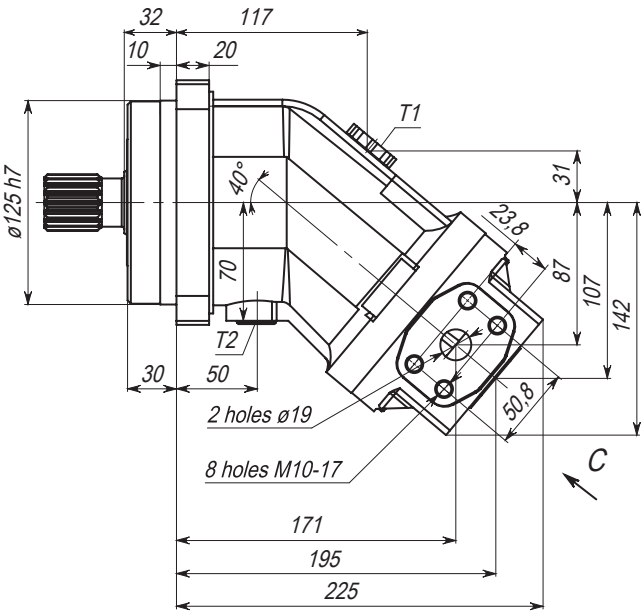


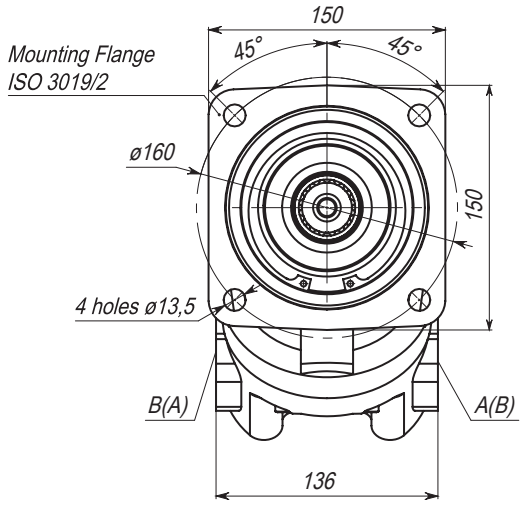
A; B - working lines

SPEED SENSOR LOCATION



MBF20 MOTORS DIMENSIONS, SIZE 56 CM³

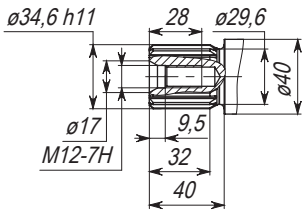




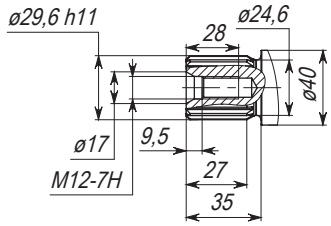
T1, T2 - drain line M18x1,5-12 DIN 3852

DRIVE SHAFTS

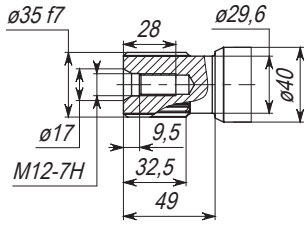
A | Splined shaft W35x2x30x16x9g
DIN 5480, z16



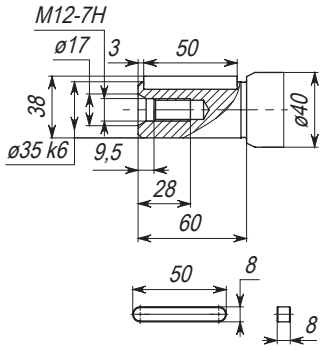
Z | Splined shaft W30x2x30x14x9g
DIN 5480, z14



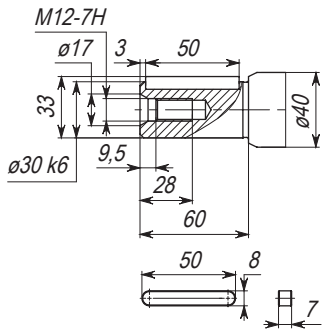
O | Splined shaft 35xf7x2x9g
GOST 6033-80, z16



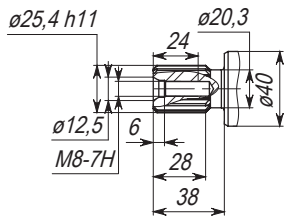
B | Keyed shaft 10x8x50
DIN 6885



P | Keyed shaft 8x7x50
DIN 6885

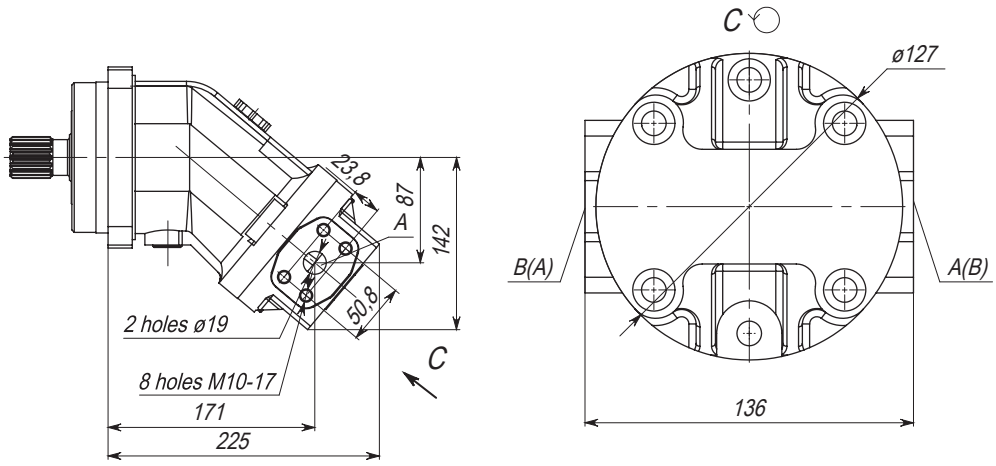


BB | Splined shaft 1 in 15T 16/32 DP
SAE J744-25-4(B-B), z15



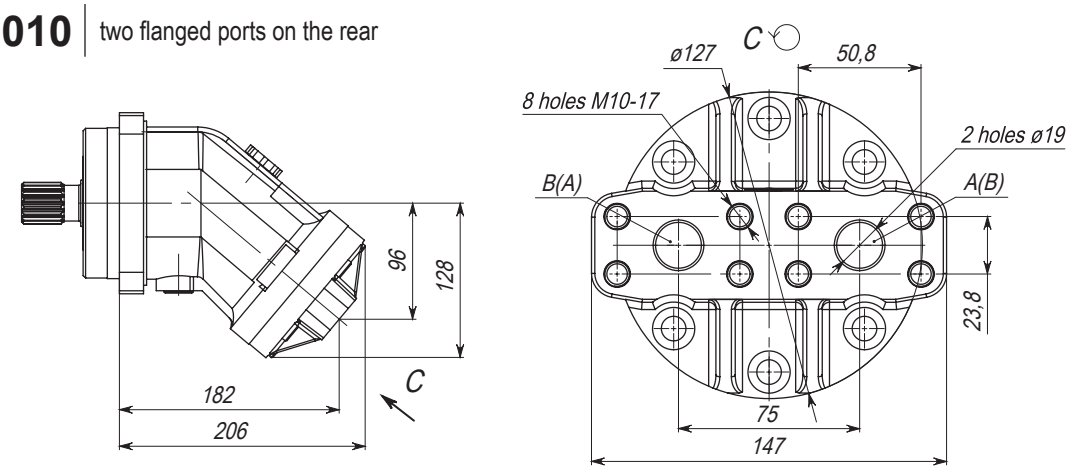
WORKING PORTS OPTION

020 two flanged ports on the sides



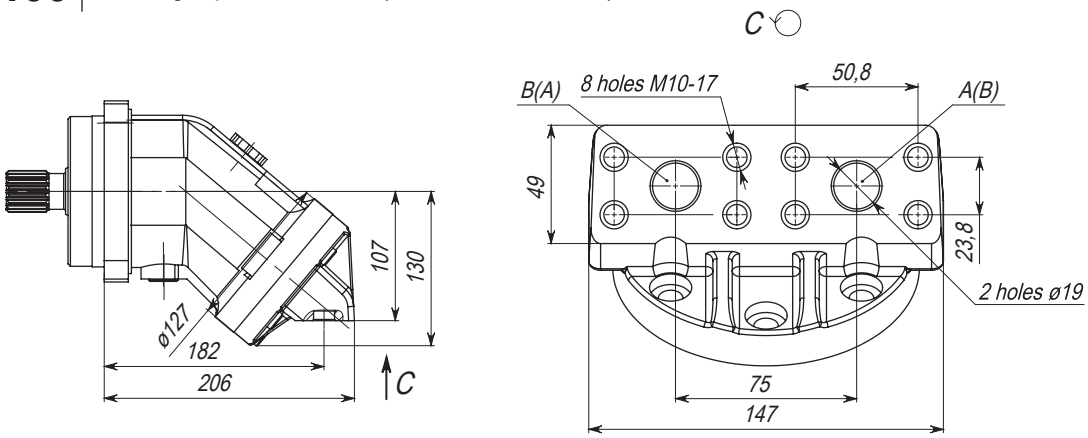
A; B - working lines

010 two flanged ports on the rear



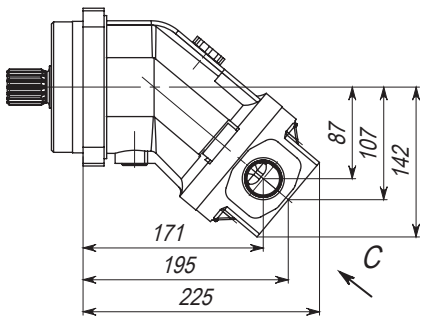
A; B - working lines

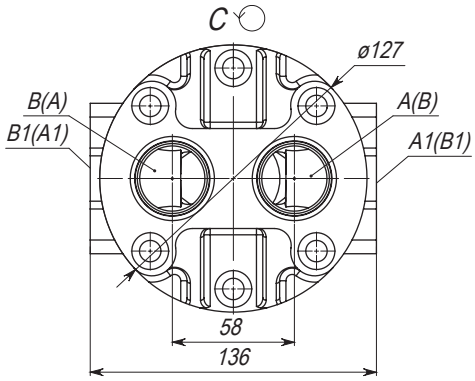
100 two flanged ports on the rear (at 90° to the shaft axis)



A; B - working lines

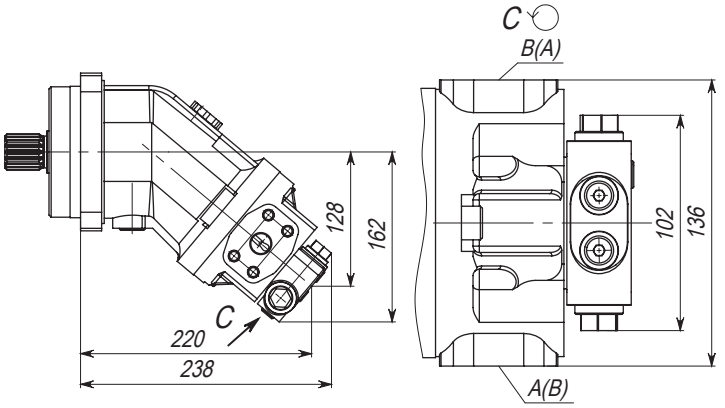
040 four threaded ports, two on the sides, two on the rear



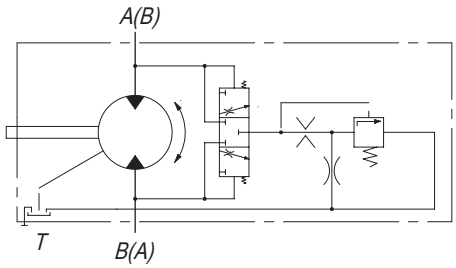


A; A1; B; B1 - working lines
M33x2-18 DIN 3852

027 two flanged ports on the sides (only with flushing valve)

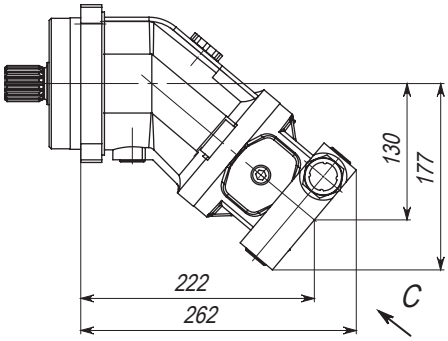


Hydraulic circuit

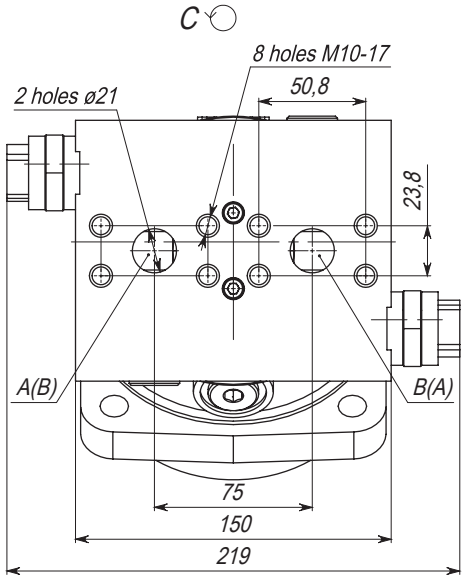


A; B - working lines

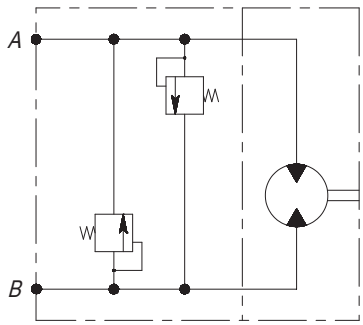
191 two flanged ports on the rear (with manifold block)



A; B - working lines

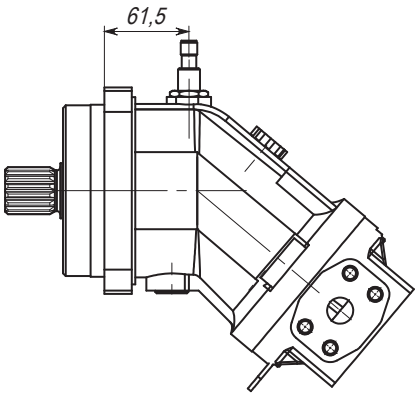


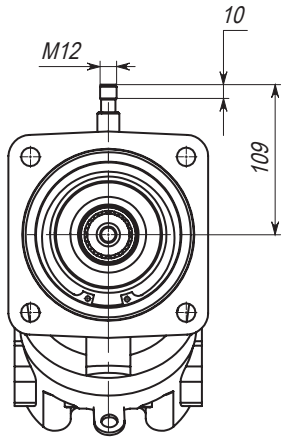
Hydraulic circuit



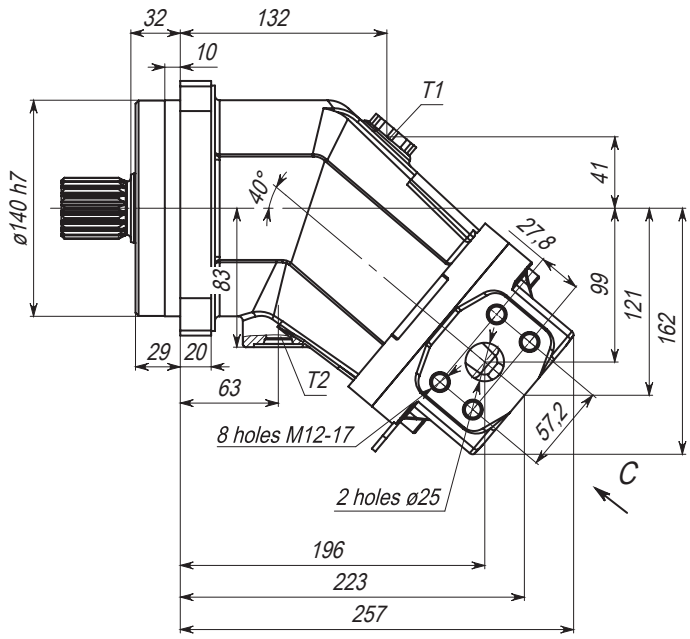
Pressure relief valves standart setting - 350 bar

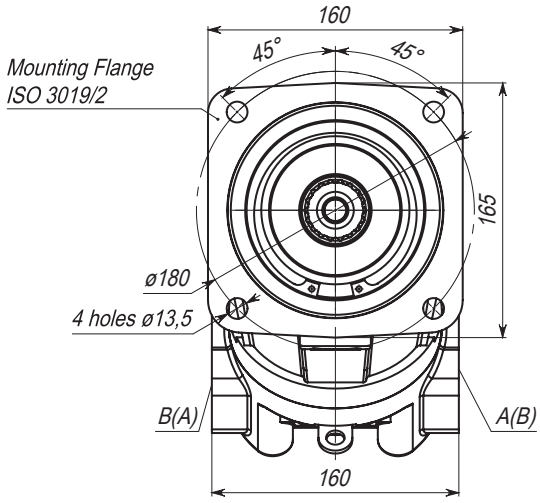
SPEED SENSOR LOCATION





MBF20 MOTORS DIMENSIONS, SIZE 80 CM³

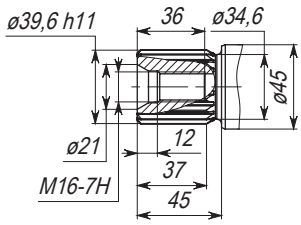




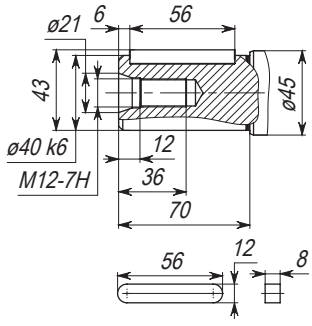
T1, T2 - drain line M18x1,5-12 DIN 3852

DRIVE SHAFTS

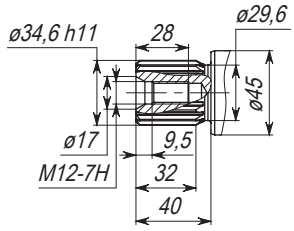
A | Splined shaft W40x2x30x18x9g
DIN 5480, z18



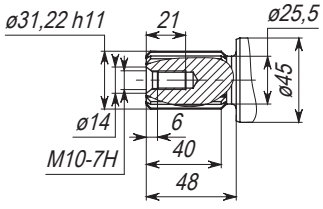
B | Keyed shaft 10x8x50
DIN 6885



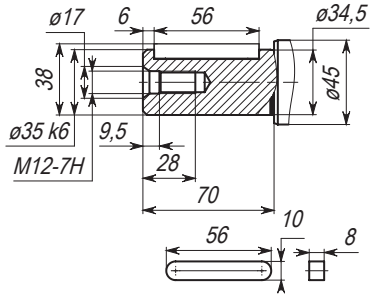
Z | Splined shaft W35x2x30x16x9g
DIN 5480, z16



C | Splined shaft 1 1/4 in 14T 12/24 DP
SAE J744-25-4(C), z14

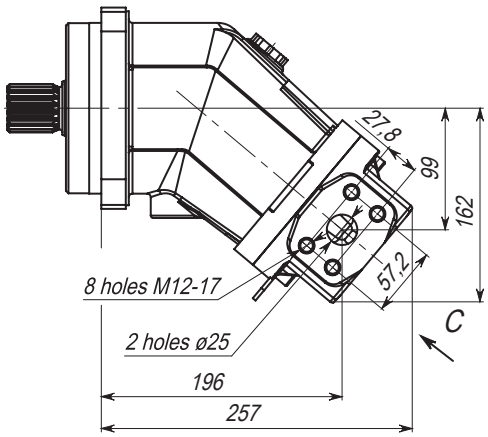


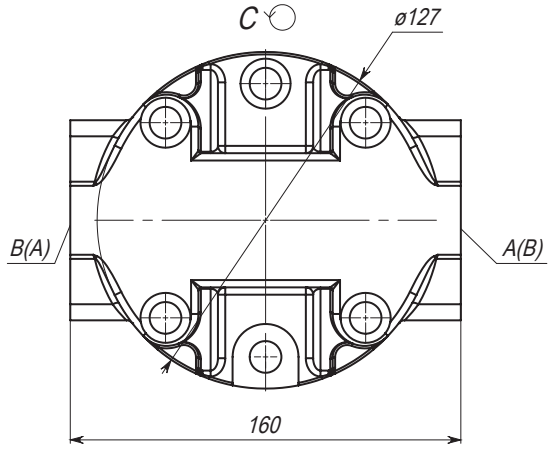
P | Keyed shaft 10x8x56
DIN 6885



WORKING PORTS OPTION

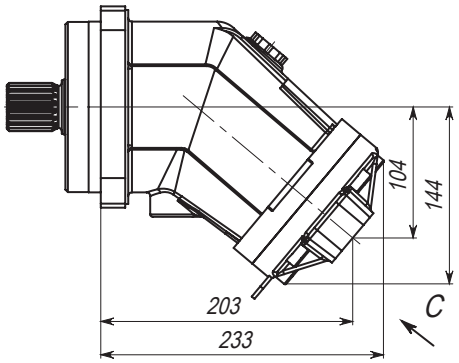
020 two flanged ports on the sides

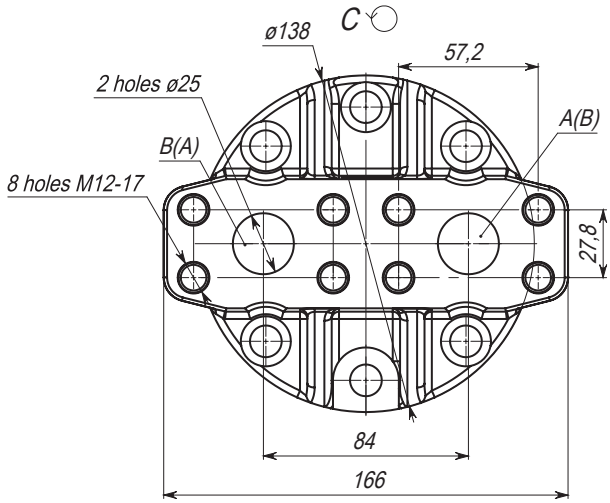




A; B - working lines

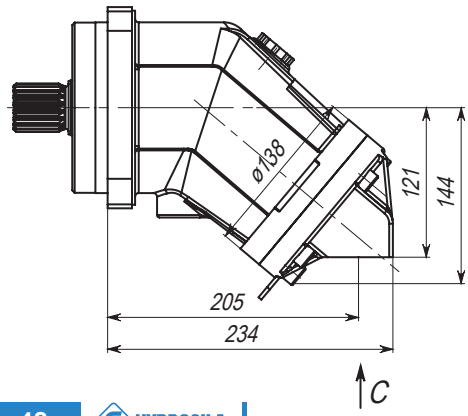
010 two flanged ports on the rear

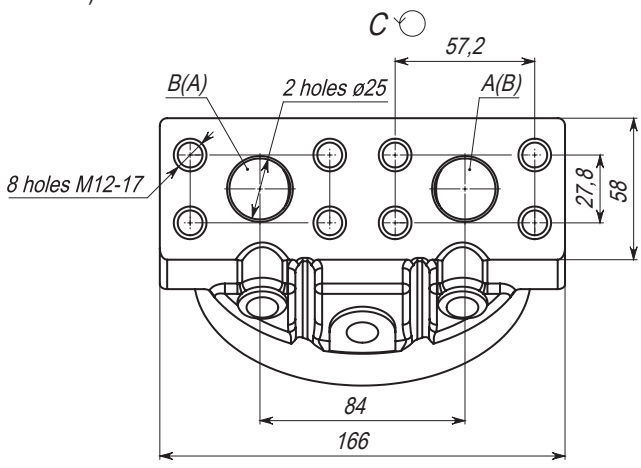




A; B - working lines

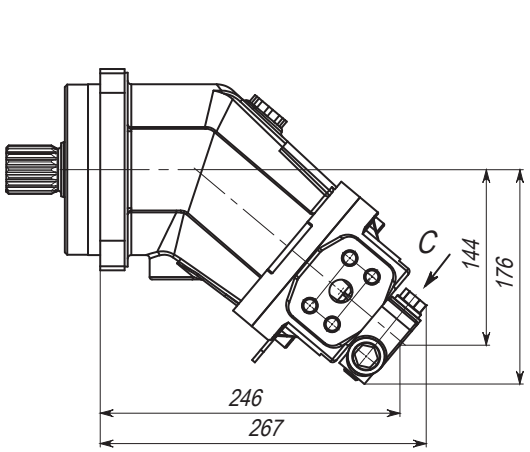
100 two flanged ports on the rear (at 90° to the shaft axis)

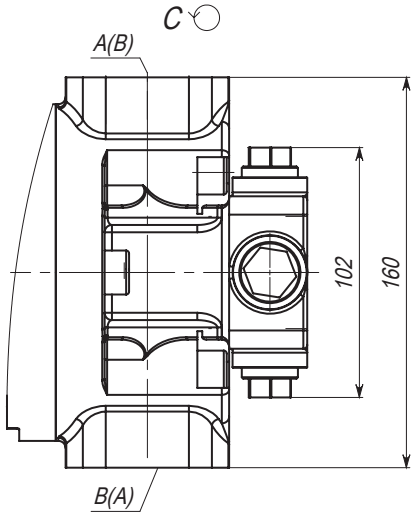




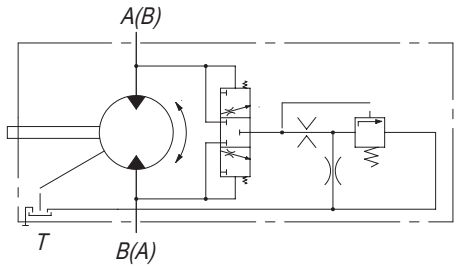
A; B - working lines

027 two flanged ports on the sides (only with flushing valve)



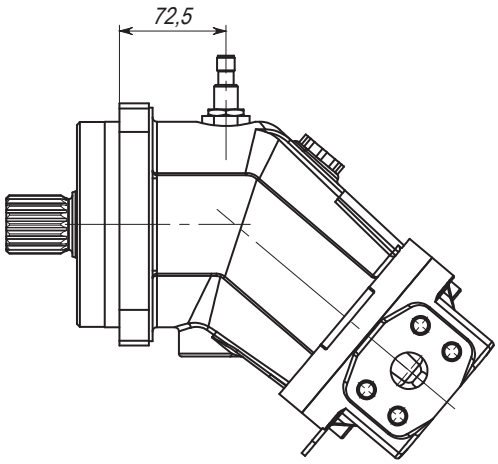


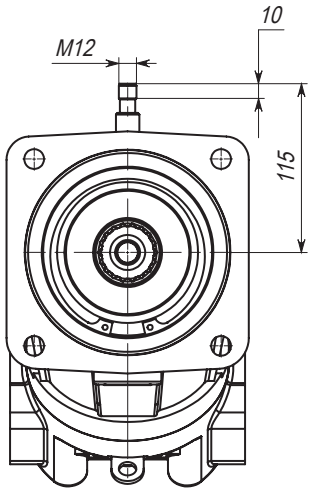
Hydraulic circuit



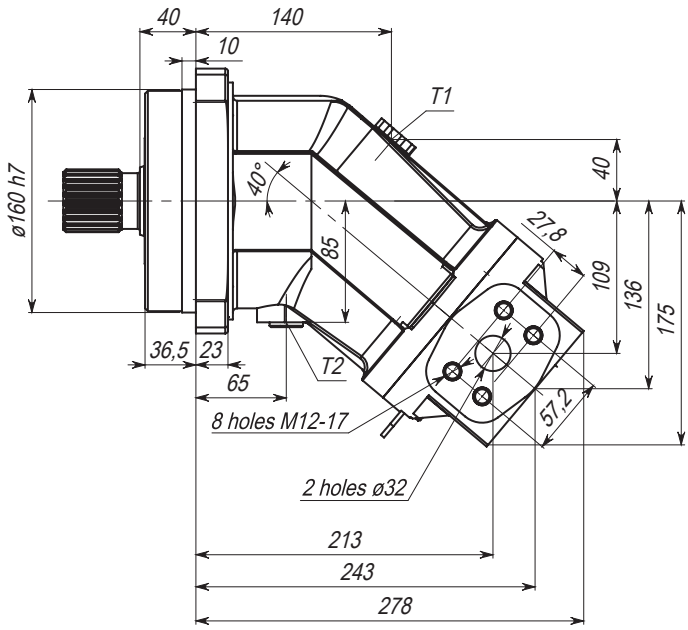
A; B - working lines

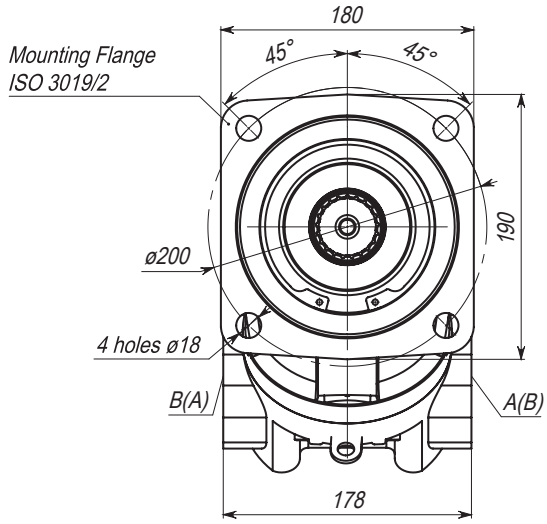
SPEED SENSOR LOCATION





MBF20 MOTORS DIMENSIONS, SIZE 107 CM³

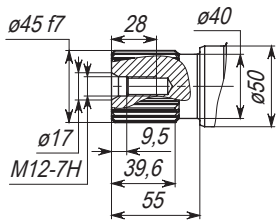




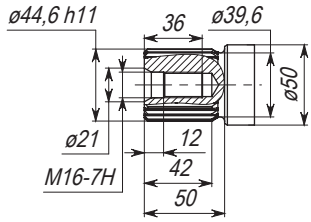
T1, T2 - drain line M18x1,5-12 DIN 3852

DRIVE SHAFTS

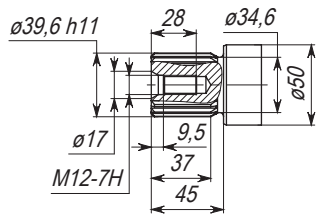
O | Splined shaft W45xh8x2x9g
GOST 6033-80, z21



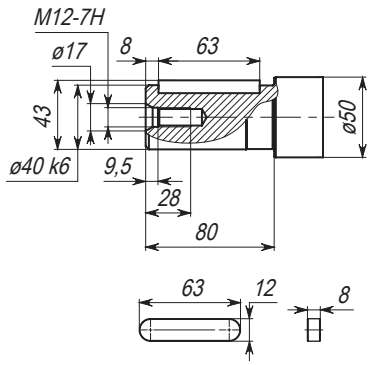
A | Splined shaft W45x2x30x21x9g
DIN 5480, z21



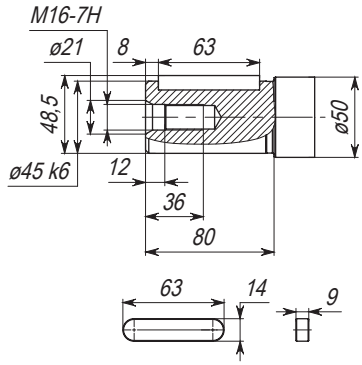
Z | Splined shaft W40x2x30x18x9g
DIN 5480, z18



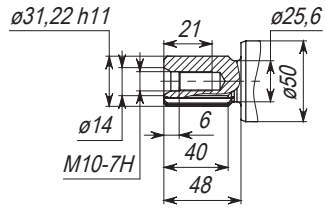
P | Keyed shaft 12x8x63
DIN 6885



B | Keyed shaft 14x9x63
DIN 6885

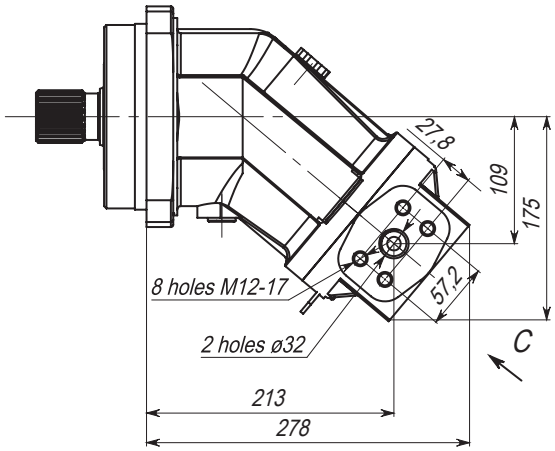


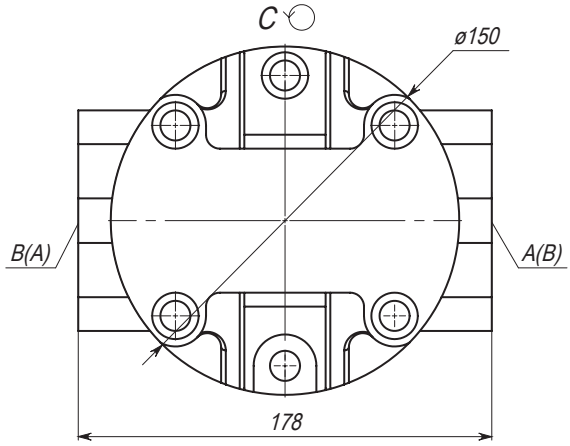
C | Splined shaft 1 1/4 in 14T 12/24 DP
SAE J744-25-4(C), z14



WORKING PORTS OPTION

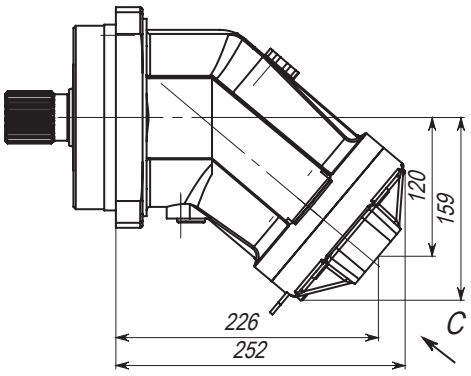
020 two flanged ports on the sides

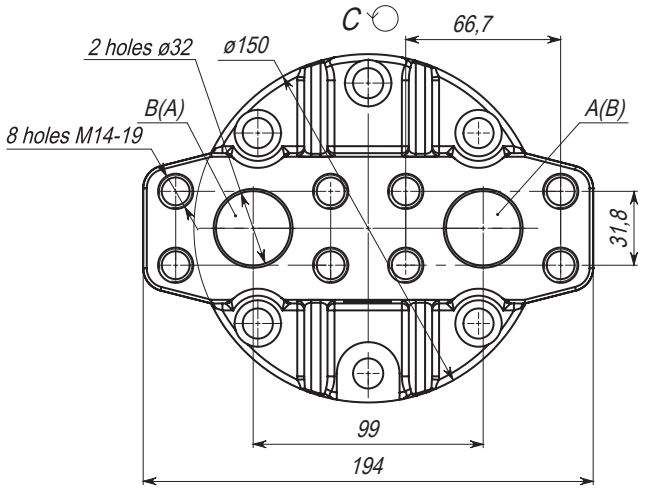




A; B - working lines

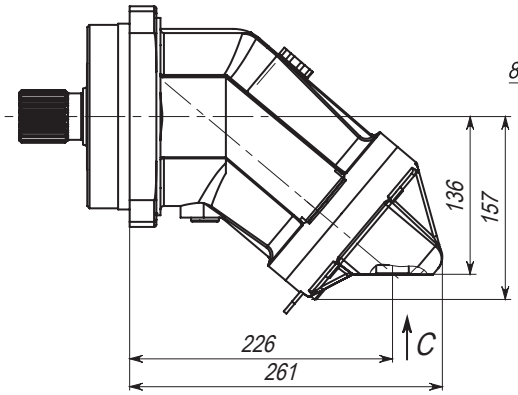
010 two flanged ports on the rear

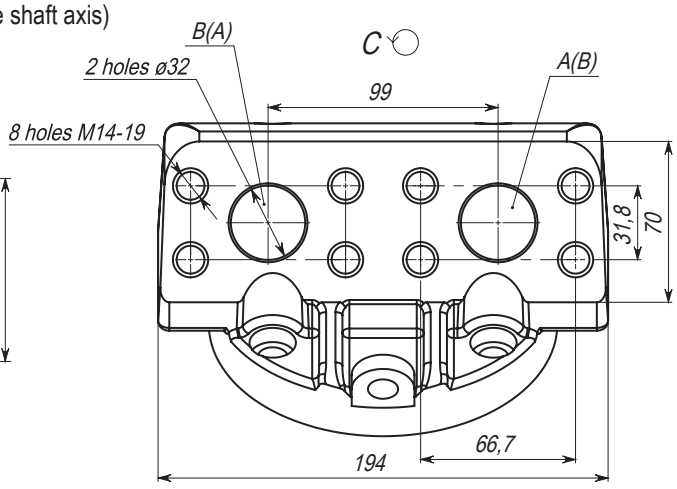




A; B - working lines

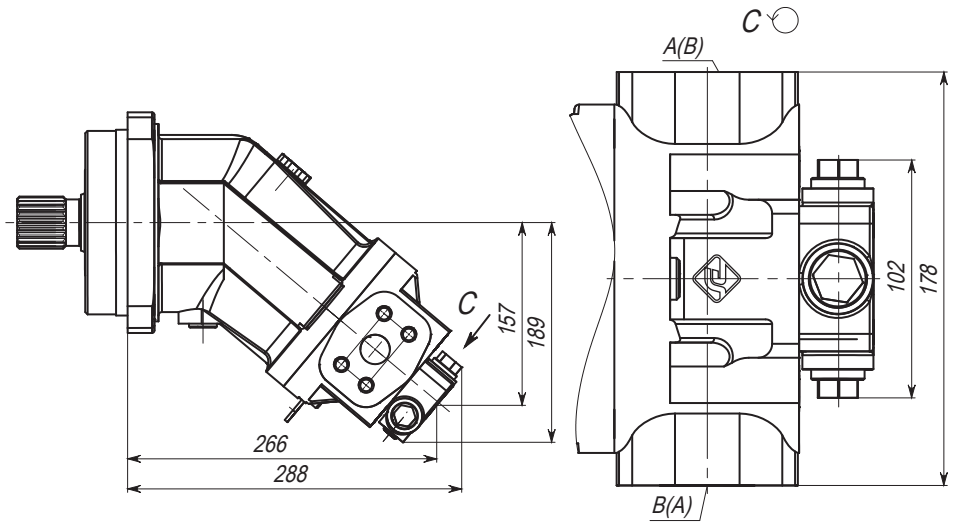
100 two flanged ports on the rear (at 90° to the shaft axis)



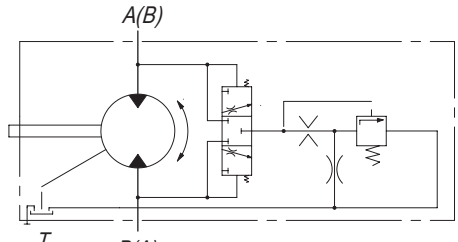


A; B - working lines

027 two flanged ports on the sides (only with flushing valve)

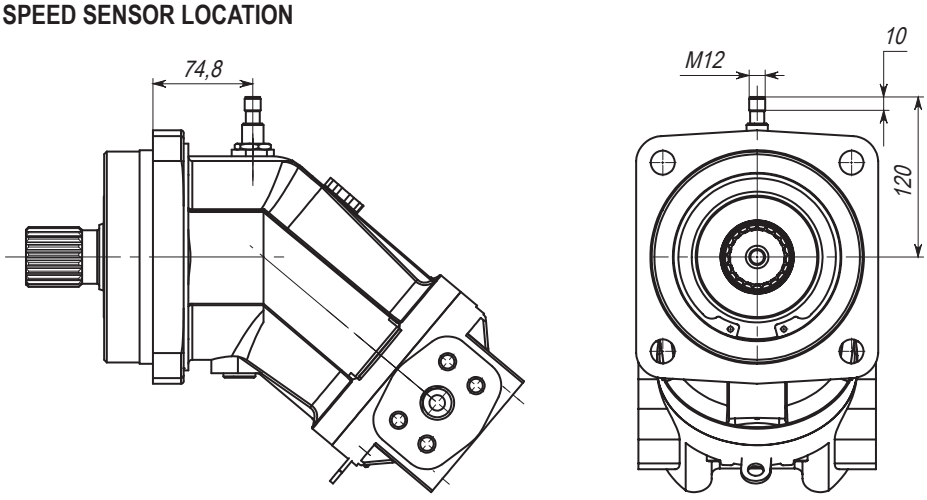


Hydraulic circuit



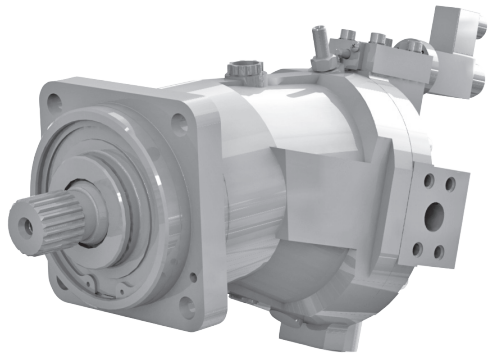
A; B - working lines

SPEED SENSOR LOCATION



MBV10

MBV10 - series of axial piston variable displacement motors in bent-axis design. They have an aluminum alloy body and designed for hydraulic systems of mobile machines of different purposes.
The **MBV10** model range includes motors with displacement 112 cm^3.



DESIGN FEATURES

- Open and closed circuits.
- The angle of inclination the block cylinder 26 degrees.
- Tapered roller bearings, allow the motors shaft to withstand high radial and axial loads.
- Less heat dissipation motor due to better heat dissipation through the housing and the improvement of the washing the bearing assembly.
- Bimetallic block cylinder of motor has a high wear resistance.
- Large variety of controls.
- Hydraulic equipment optional.
- Maximum pressure 400 bar.

MBV10 VARIABLE DISPLACEMENT AXIAL PISTON MOTORS

Order code

MBV10.4	.	112	/	EZ6	S	.	0	0	.	0	P4	0	5	.	B	N	.			

VARIABLE DISPLACEMENT BENT-AXIS AXIAL PISTON MOTOR	MBV10

DISPLACEMENT, CM³		CODE
112	●	112

CONTROL OPTIONS	112	CODE
Hydraulic proportional, positive	●	HP1
Hydraulic proportional, negative	●	HP5
Two-point electrical, negative, 24V	●	EZ6
Two-point electrical, positive, 24V	●	EZ3
Electrical proportional, negative, 24V	○	EP6
Electrical proportional, positive, 24V	○	EP2

CONNECTOR FOR SOLENOIDS	112	CODE
Without connector (for hydraulic control)	●	0
Connector DIN 43650	●	S
Connector DEUTSCH DT06-2S	○	P

BUILD-IN HYDRAULIC EQUIPMENT	112	CODE
None	●	0
Flushing valve	●	1
Manifold block	●	2

BUILD-IN ELECTRICAL EQUIPMENT	112	CODE
None	●	0
Speed sensor	●	1

[1] side balanced
[2] side balanced, reduced diameter
* Special option code - assigned if necessary after agreement of special conditions with the customer

Notes: ● Standart; ○ Optional; – Not available

SPECIAL FEATURES*	CODE

CLIMATIC VERSION	112	CODE
Temperate	●	N
Tropical	●	T
Marine	●	MJ

SHAFT SEALS	112	CODE
NBR	○	B
FKM	●	F

DISPLACEMENT RANGE SETTING	112	CODE
Without settings	●	0
Vg_{min} setting	●	5
Vg_{max} setting	●	7
Vg_{min} and Vg_{max} settings	●	9

WORKING PORTS OPTIONS	112	CODE
Two flanged ports on the sides	●	0
Four flanged ports, two on the sides, two on the rear	●	2

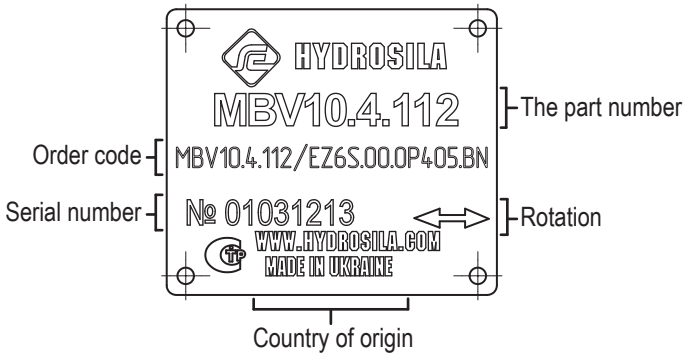
MOUNTING FLANGE	112	CODE
160-4 ISO 3019-2	●	P4

SHAFT OPTIONS	112	CODE
Splined shaft GOST 6033-80	●	0
Keyed shaft GOST 23360	●	1
Splined shaft DIN 5480 [1]	●	7
Splined shaft DIN 5480 [2]	●	8

ORDERING EXAMPLE

MBV10.4.112/EZ6S.00.0P405.BN

MBV10.4 - variable displacement bent-axis axial piston motor,
112 - displacement 112 cmm,
EZ6 - two-point electrical control, negative, 24V,
S - connector for solenoid DIN 43650,
0 - without build-in hydraulic equipment,
0 - without build-in electrical equipment,
0 - drive shaft acc. to GOST 6033-80,
P4 - mounting flange 160-4 ISO 3019-2,
0 - with two flanged ports on the sides,
5 - minimum working volume (Vgmin) setting screw,
B - shaft seal material NBR,
N - climate version: temperate.



TECHNICAL SPECIFICATIONS

SIZE		MBV10.4.112
Displacement, Vg		
maximum	cm^3	112
minimum		31
Speed:		
minimum at Vg_{max}		50
rated at Vg_{max}	min^{-1}	1200
maximum at Vg_{max}		3000
maximum at Vg_{min}		4000
Inlet pressure, P		
rated	bar	200
maximum		400
Outlet pressure, maximum, P	bar	200
Maximum drain pressure	bar	2,5
Flow, Q		
minimum at Vg_{max}		6
rated at Vg_{max}	l/min	134
maximum at Vg_{max}		336
maximum at Vg_{min}		124
Torgue, M		
rated	Hm	357
maximum		713
Input power, N		
rated	кW	56
maximum		224
Efficiency		
hydromechanical		0,95
volumetric		0,95
Weight (without fluid)	kg	38

FORMULAS

Flow

$$Q = \frac{V_g \cdot n}{1000 \cdot \eta_v} \text{ [l/min]}$$

Torque

$$T = \frac{1.59 \cdot V_p \cdot \Delta p \cdot \eta_{mh}}{10} = \frac{V_g \cdot \Delta p \cdot \eta_{mh}}{2 \cdot \pi} \text{ [N·m]}$$

Power

$$P = \frac{T \cdot n}{9549} = \frac{2 \cdot \pi \cdot T \cdot n}{60000} = \frac{Q \cdot \Delta p \cdot \eta_t}{600} \text{ [kW]}$$

V_g – displacement [cm^3]

Δp – pressure drop [bar]

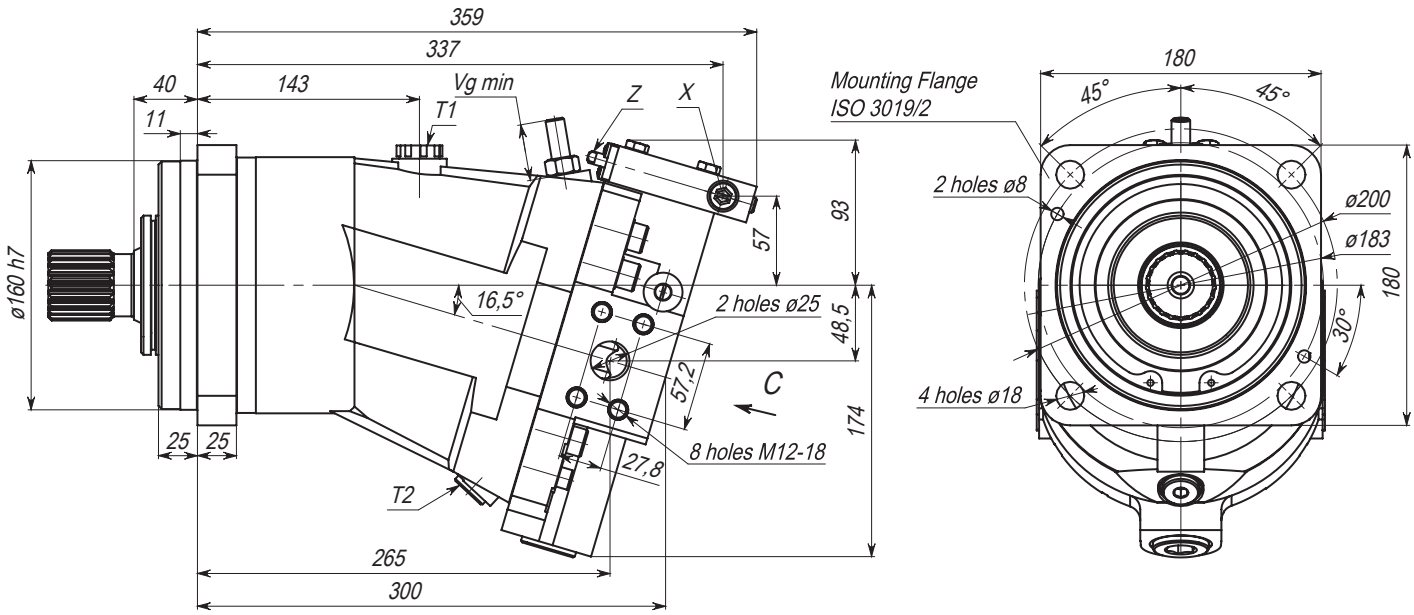
n – speed [min^{-1}]

η_v – volumetric efficiency

η_{hm} – hydromechanical efficiency

η_t – overall efficiency

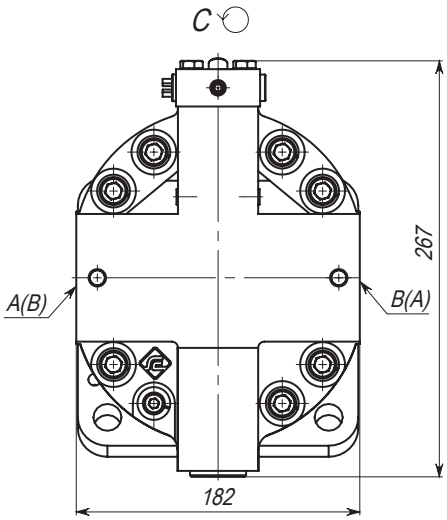
MBV10 MOTORS DIMENSIONS, SIZE 112 CM³



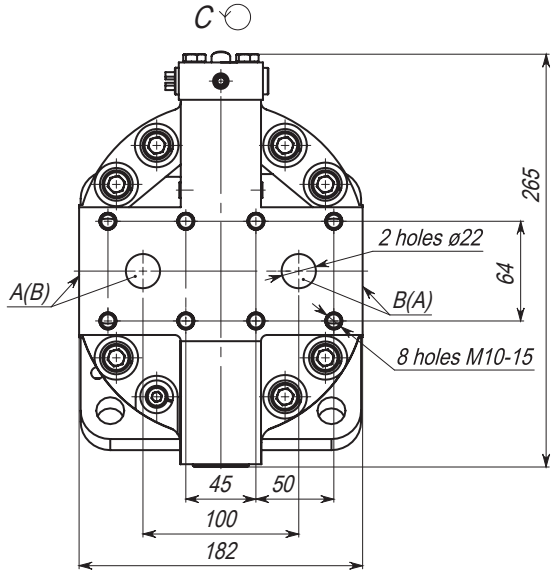
T1, T2 - drain line M18x1,5-12 DIN 3852;
Z - P_{pc} setting screw
X - pilot line M12x1,5-74 DIN 3852

WORKING PORTS OPTION

0 | two flanged ports on the sides



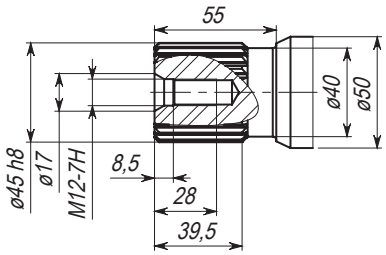
2 | four flanged ports, two on the sides, two on the rear



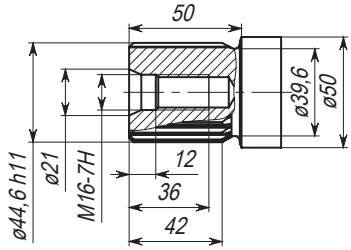
A; B - working lines

DRIVE SHAFTS

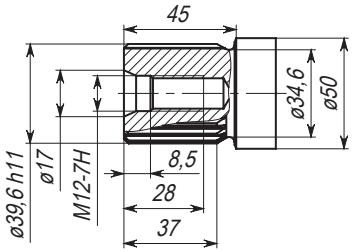
0 | Splined shaft 45xh8x2x9g
GOST 6033-80, z21



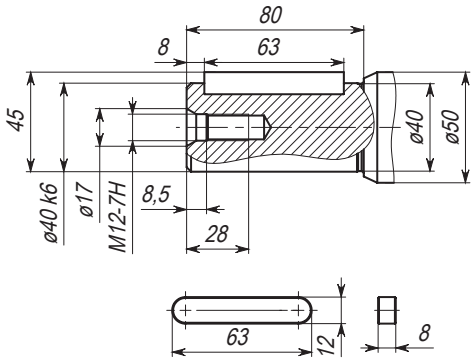
7 | Splined shaft 45x2x30x21x9g
DIN 5480, z21



8 | Splined shaft 40x2x30x18x9g
DIN 5480, z18

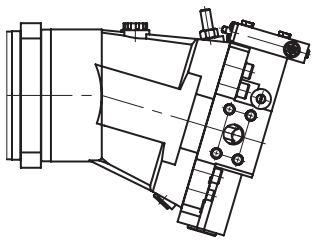


1 | Keyed shaft 12x8x63
GOST 23360

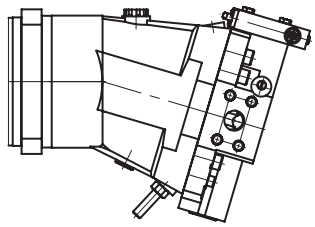


DISPLACEMENT RANGE SETTING

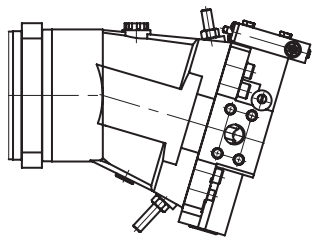
5 | Vg_{min} setting



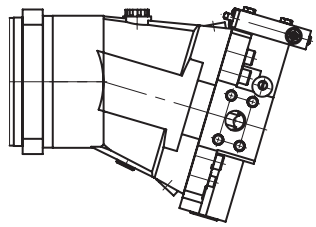
7 | Vg_{max} setting



9 | Vg_{min} and Vg_{max} settings

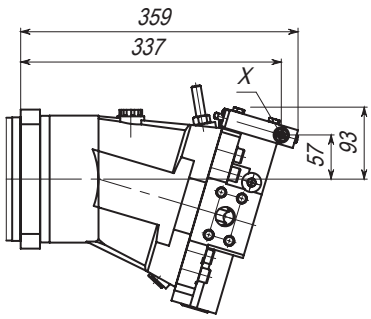


0 | Without settings



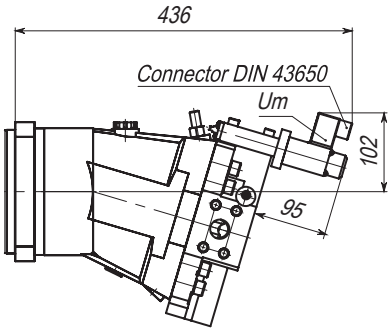
MBV10 MOTORS DIMENSIONS, SIZE 112 CM³

HP5 | motor with proportional hydraulic negative control



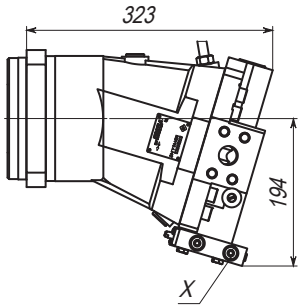
X - pilot line M12x1,5-74 DIN 3852

EZ6 | motor with two-point electric negative control



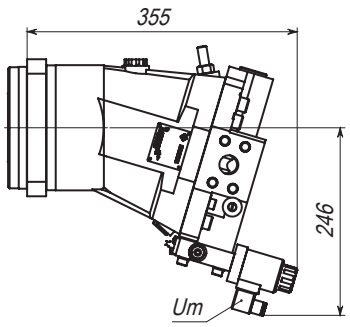
Um - solenoid

HP1 | motor with proportional hydraulic positive control



X - pilot line M12x1,5-74 DIN 3852

EZ3 | motor with two-point electric positive contro



Um - solenoid

CONTROL SYSTEM

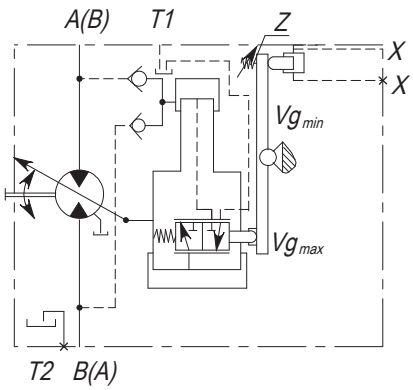
HYDRAULIC PROPORTIONAL NEGATIVE CONTROL

Hydraulic proportional negative control allows to change the displacement stepless from $\mathbf{Vg_{max}}$ to $\mathbf{Vg_{min}}$ proportional to the pilot pressure **Pc** applied to port **X**.
With the maximum tilt angle of the cylinders block to the axis of the shaft and $\mathbf{Pc \le Pc_{min}}$ (**Pc** - pilot pressure, $\mathbf{Pc_{min}}$ - minimum pilot pressure (see chart) motor is in the maximum displacement $\mathbf{Vg_{max}}$, the speed is minimum $\mathbf{n_{min}}$, and torque is maximum $\mathbf{Mt_{max}}$.
With the minimum tilt angle of the cylinders block to the axis of the shaft and $\mathbf{Pc \ge Pc_{max}}$ ($\mathbf{Pc_{max}}$ - maximum pilot pressure) hydraulic motor is in the minimum displacement $\mathbf{Vg_{min}}$, and the speed is maximum $\mathbf{n_{max}}$, and torque is minimum $\mathbf{Mt_{min}}$.

NOTICE:

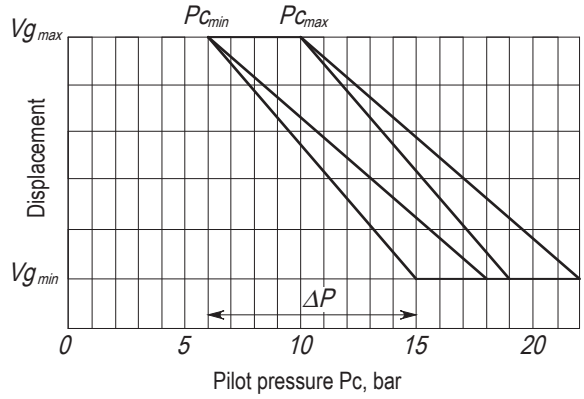
1. Regulation of the hydraulic motor provides by the working pressure in the hydraulic system.
2. A minimum working pressure required for the regulator to operate - 30 bar, and a maximum pilot pressure - 50 bar.
3. Increasing the cast pressure increases Pcmin and causes a parallel changes of the characteristics.
4. A range of Pcmin = 6...10 bar. The default value Pc_{min} = 6...8 bar, and the pilot pressure range ΔPc = 9...12 bar, range of Pc_{max} = 15...20 bar.
By ordering hydraulic motors, specify the required values of the minimum displacement Vg_{min} and the minimum pilot pressure Pc_{min}.

HYDRAULIC CIRCUIT



A, B - working lines
T1, T2 - drain lines
Z - Pc setting screw
X - pilot line

CONTROL CHART



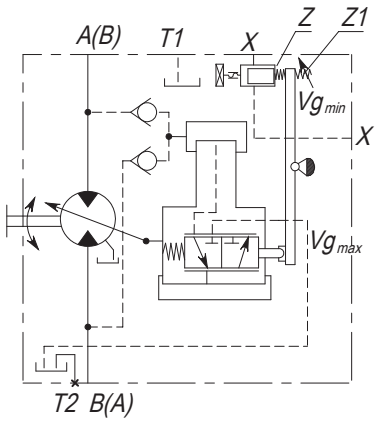
HYDRAULIC PROPORTIONAL POSITIVE CONTROL

Hydraulic proportional negative control allows to change the displacement stepless from $\mathbf{Vg_{min}}$ to $\mathbf{Vg_{max}}$ proportional to the pilot pressure Pc applied to port X.
With the minimum tilt angle of the cylinders block to the axis of the shaft and $\mathbf{Pc \le Pc_{min}}$ (**Pc** - pilot pressure, $\mathbf{Pc_{min}}$ - minimum pilot pressure (see chart) motor is in the minimum displacement $\mathbf{Vg_{min}}$, the speed is maximum $\mathbf{n_{max}}$, and torque is minimum $\mathbf{Mt_{min}}$.
With the maximum tilt angle of the cylinders block to the axis of the shaft and $\mathbf{Pc \ge Pc_{max}}$ ($\mathbf{Pc_{max}}$ - maximum pilot pressure) hydraulic motor is in the maximum displacement $\mathbf{Vg_{max}}$, and the speed is minimum $\mathbf{n_{min}}$, and torque is maximum $\mathbf{Mt_{max}}$.

NOTICE:

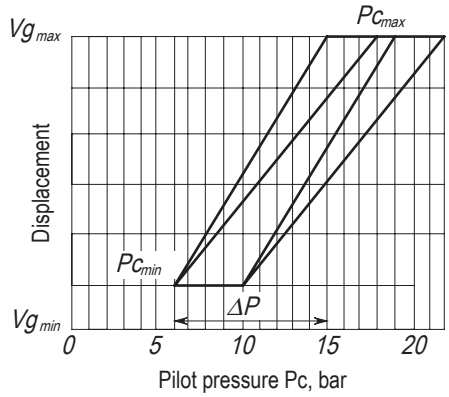
1. Regulation of the hydraulic motor provides by the working pressure in the hydraulic system.
2. A minimum working pressure required for the regulator to operate - 30 bar, and a maximum pilot pressure - 50 bar.
3. Increasing the cast pressure increases Pc_{min} and causes a parallel changes of the characteristics.
4. A range of Pc_{min} = 6...10 bar. The default value Pc_{min} = 6...8 bar, and the pilot pressure range ΔPc = 9...12 bar, range of Pc_{max} = 15...20 bar.
By ordering hydraulic motors, specify the required values of the minimum displacement Vg_{min} and the minimum pilot pressure Pc_{min}.

HYDRAULIC CIRCUIT



A, B - working lines
T1, T2 - drain lines
Z - Pc setting screw
X - pilot line

CONTROL CHART



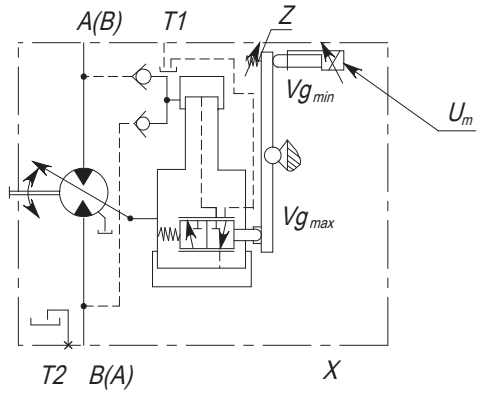
TWO-POINT ELECTRIC CONTROL

The two-point electric control allows the displacement to be set from $\mathbf{Vg_{max}}$ to $\mathbf{Vg_{min}}$ (negative control) or from $\mathbf{Vg_{min}}$ to $\mathbf{Vg_{max}}$ (positive control) by switching the electric current to the solenoid on or off. When the electromagnet is turned off, the displacement changes in the opposite direction.

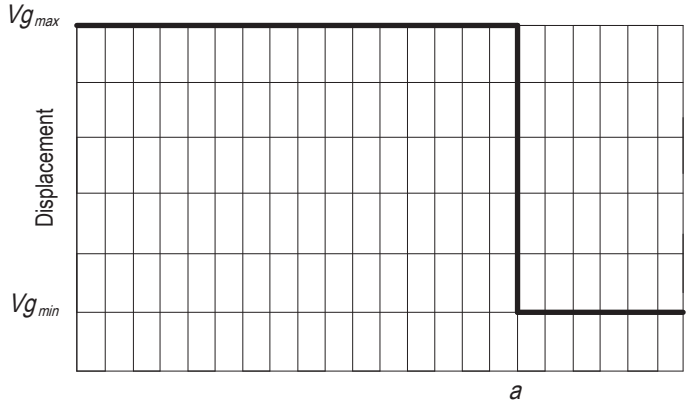
CAUTION:

1. Regulation of the hydraulic motor provides by the working pressure in the hydraulic system.
2. A minimum working pressure required for the regulator to operate - 30 bar.
3. If you need to change the pilot pressure range, consult the manufacturer.
By ordering hydraulic motors, specify the required value of the minimum displacement Vg_{min}.

HYDRAULIC CIRCUIT



CONTROL CHART



Electric control signal

A, B - working lines
T1, T2 - drain lines
Z - Pc setting screw
U_m - pilot current

SOLENOID TECHNICAL DATA

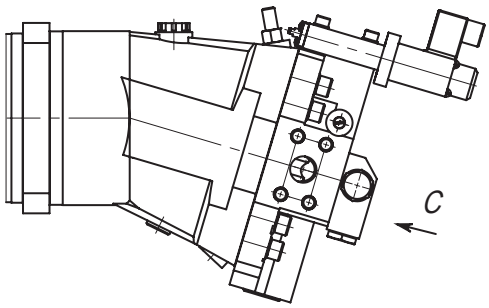
Voltage	24 V
Position Vg_{min}	energized
Position Vg_{max}	de-energized
Pulling force	≥37 N
Stroke of the anchor, nominal	2,8 mm
Nominal resistance (at 20°C)	19,2 Ω
Nominal power	30 W
Duty cycle	100%
Protection class	IP67

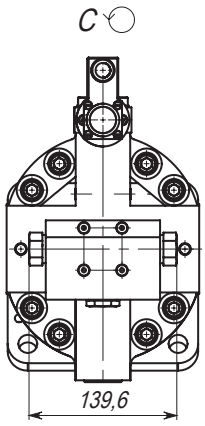
HYDRAULIC AND ELECTRICAL EQUIPMENT

HYDRAULIC MOTORS WITH FLUSHING VALVE

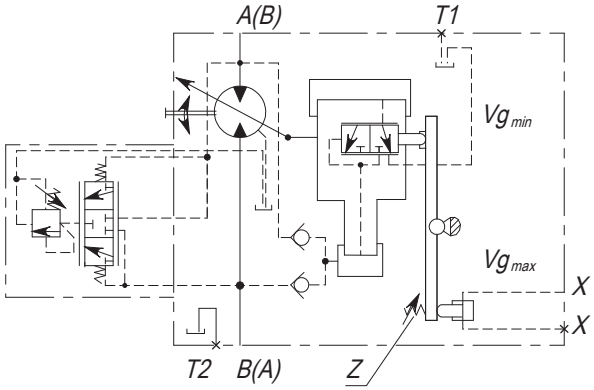
Hydraulic motors can be equipped with a flushing valve which is mounted directly on the motor. Hydraulic motors with flushing valves are used in closed circuits. Flushing valve is designed for:

- remove heat from the hydraulic circuit. The heated hydraulic fluid removed to tank with the leakege through the line T1 (T2) and replaced by a cooled hydraulic fluid, from the charge pump;
- flushing the drainage cavity of the hydraulic motor to cool bearings and parts of the rotor;
- provide minimum charge pressure by setting the purge relief valve in the flushing valve.





HYDRAULIC CIRCUIT

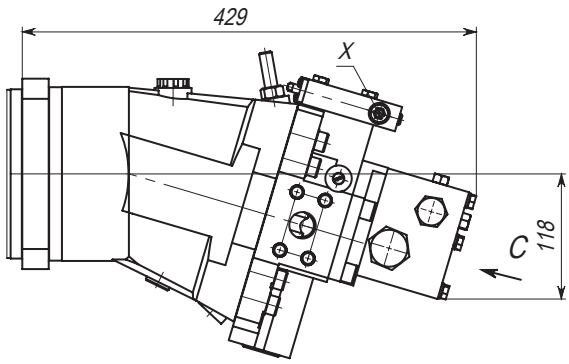


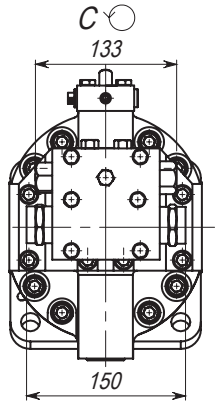
A, B - working lines
T1, T2 - drain lines
Z - Pc setting screw
X - pilot line

HYDRAULIC MOTORS WITH MANIFOLD BLOCK

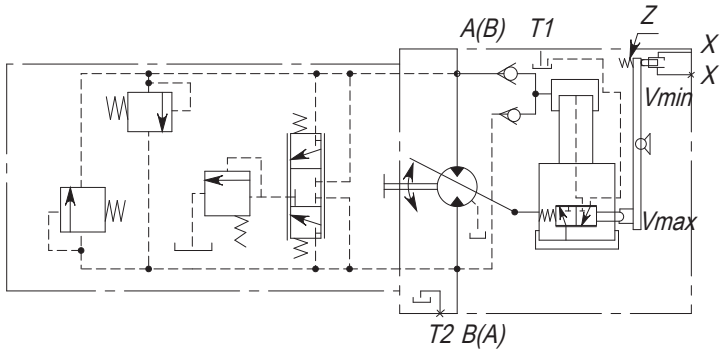
Hydraulic motors can be equipped with a manifold block which is mounted directly on the motor. Hydraulic motors with manifold block are used in closed circuits. Manifold block is designed for:

- overload protection. Pressure relief valves standart setting - 350 bar;
- remove heat from the hydraulic circuit. The heated hydraulic fluid removed to tank with the leakege through the line T1 (T2) and replaced by a cooled hydraulic fluid, from the charge pump;
- flushing the drainage cavity of the hydraulic motor to cool bearings and parts of the rotor;
- provide minimum charge pressure by setting the purge relief valve.





HYDRAULIC CIRCUIT



A, B - working lines
T1, T2 - drain lines
Z - Pc setting screw
X - pilot line

HYDRAULIC MOTORS WITH BUILT-IN SPEED SENSOR

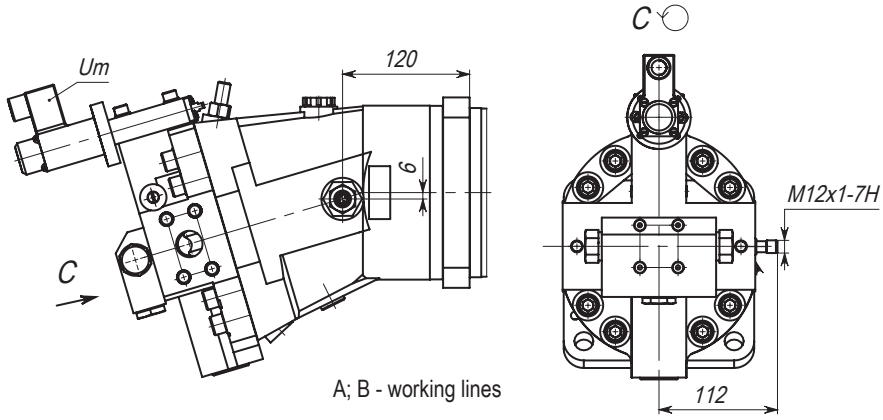
Hydraulic motors can be equipped with an inductive shaft speed sensor. The inductive speed sensor integrated in the housing is designed for non-contact speed measurement of the motor shaft. The operation of the sensor is based on the Hall effect.

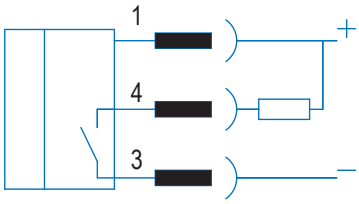
Switching frequency $f = \frac{n \cdot z}{60}$ Гц

где **n** - speed

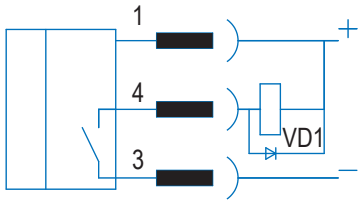
z = 7 - number of pistons

SPEED SENSOR SPECIFICATIONS	
Voltage, Us	10…30 В
Operating current, Iw	≤250 mA DC
Voltage drop Iw	≤2,5 В
Switching frequency, Fmax	850 Гц
Operating temperature range	-25°C…+75°C
Protection class	IP68
Voltage ripple	≤15%

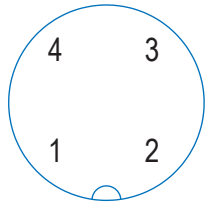




Pic. 1 Wiring diagram for a resistive load

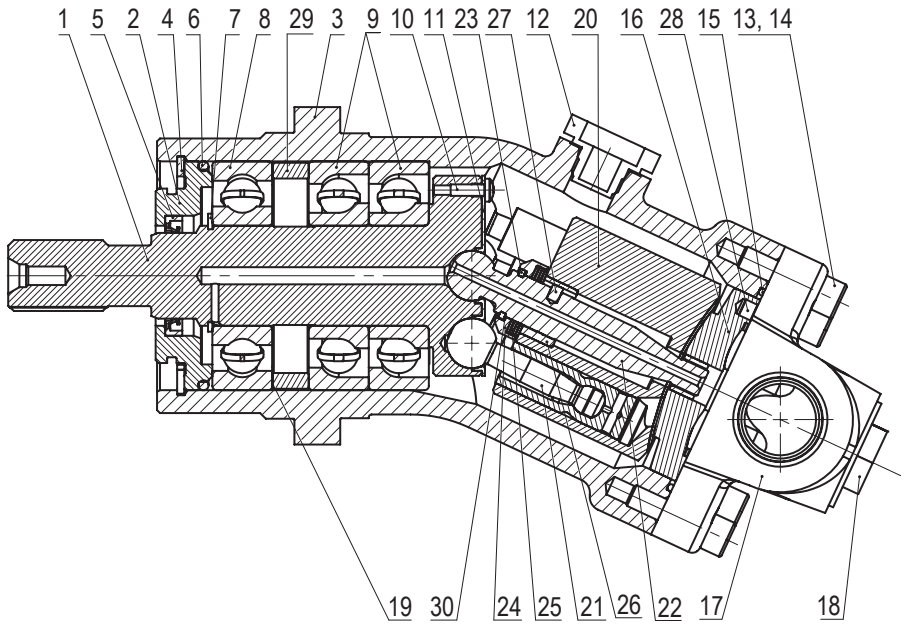


Pic. 2 Wiring diagram for inductive load



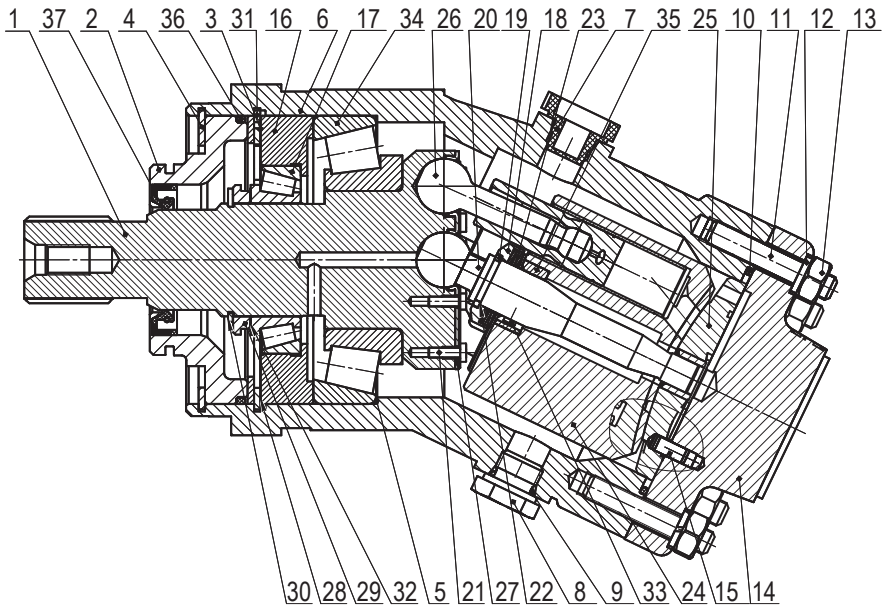
Pic. 3 Pinout of the speed sensor

PBF10 PUMPS AND MBF10 MOTORS LAYOUT, SIZE 28 CM³



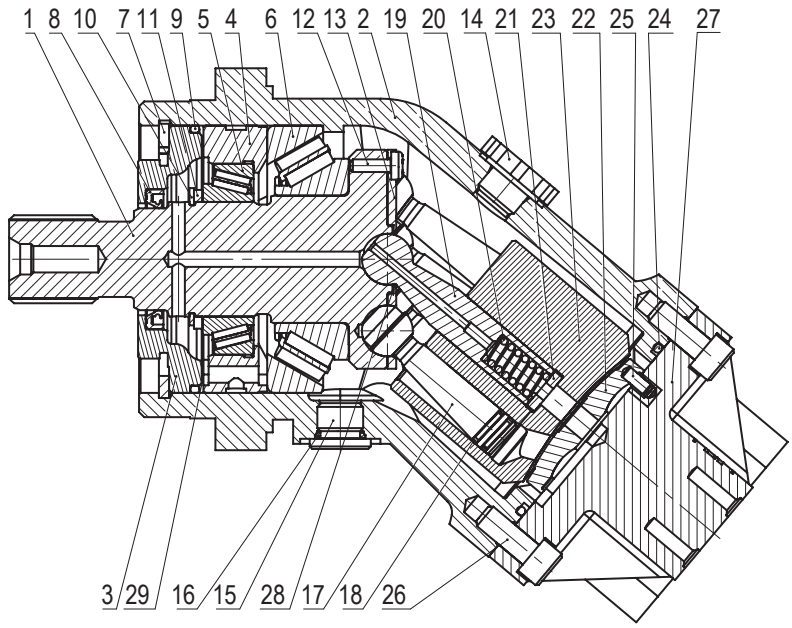
BF10 (28 cm³)			
POSITION	**NAME**	**POSITION**	**NAME**
1	Shaft	**16**	Spreader
2	Radial seal housing	**17**	Rear cover
		18	Plug
3	Body	**19, 30**	Adjusting washer
4, 7	Lock ring		
5	Cuff	**20**	Cylinder block
6, 15	O-ring	**21**	Piston
8, 9	Bearing	**22**	Spike
10	Screw	**23**	Half ring
11	Separator (the pressure plate)	**24**	Bushing
		25	Dish-shaped spring
12	Transport plug	**26**	Cyliner block bushing
13	Screw	**27, 28**	Pin
14	Washer	**29**	Ring

PBF10 PUMPS AND MBF10 MOTORS LAYOUT, SIZE 56, 112 CM³



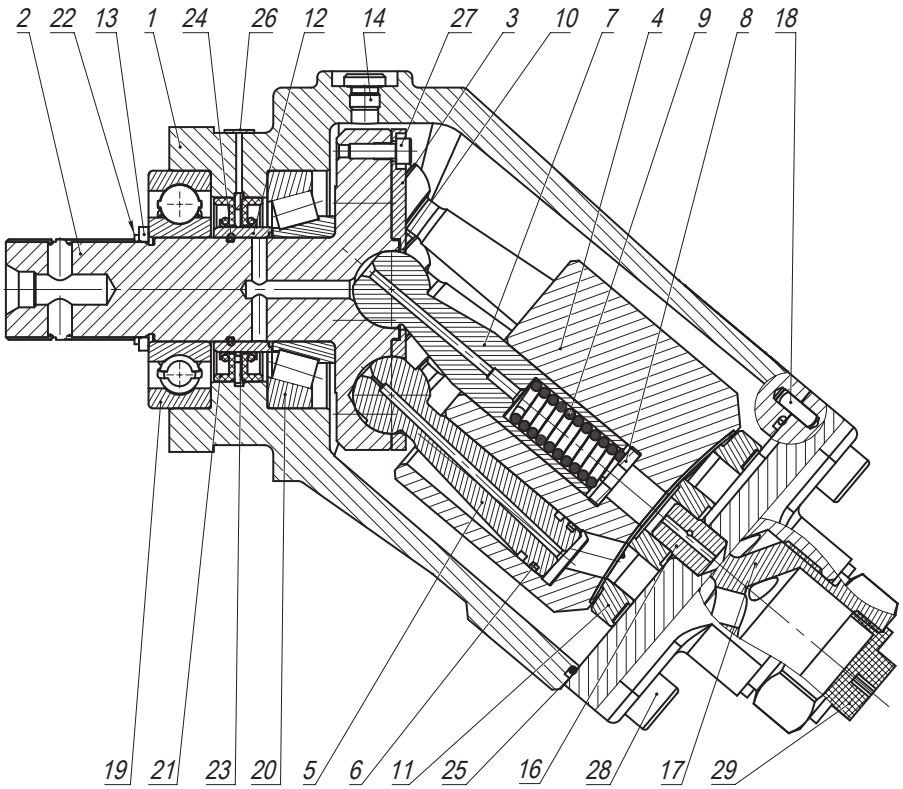
BF10 (56, 112 cm³)			
POSITION	**NAME**	**POSITION**	**NAME**
1	Shaft	**17, 34**	Bearing
2	Radial seal housing	**18**	Bushing
3, 5, 22, 28, 32	Adjusting washer	**19**	Half ring
4, 30, 31, 36	Lock ring	**20**	Spike
6	Body	**21**	Screw
7	Transport plug	**23**	Dish-shaped spring
8	Plug	**24**	Cylinder block
9, 10	O-ring	**25**	Spreader
11	Pin	**26**	Piston
12	Washer		
13	Nut	**27**	Separator
14	Rear cover	**29**	Bushing
15, 33	Pin	**35**	Bushing cylinder block
16	Bearing cup	**37**	Cuff

PBF20 PUMPS AND MBF20 MOTORS LAYOUT, SIZE 56, 80, 107 CM³



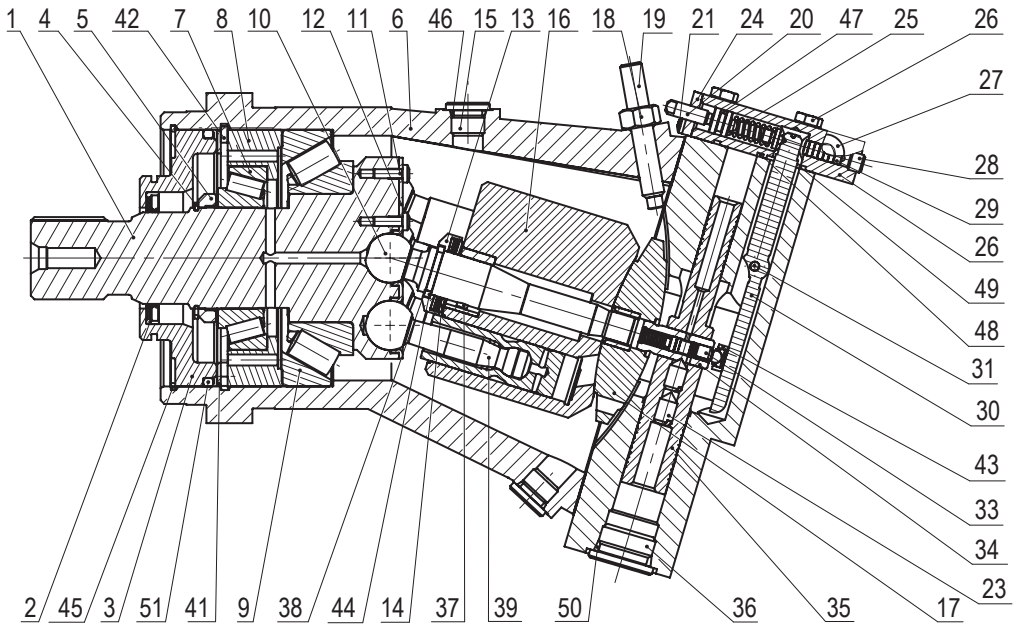
BF20 (56, 80, 107 cm³)			
POSITION	**NAME**	**POSITION**	**NAME**
1	Shaft	**15**	Plug
2	Body	**17**	Piston
3	Radial seal housing	**18**	Compression ring
4	Bearing cup	**19**	Pin
5, 6	Bearing	**20**	Spring
7, 10	Lock ring	**21**	Support washer
8	Cuff	**22**	Spreader
9, 16, 24	O-ring	**23**	Cylinder block
11	Washer	**25**	Pin
12, 26	Screw	**27**	Cover
13	Separator	**28, 29**	Adjusting washer
14	Transport plug		

PBF20T AND PBF20TH PUMPS LAYOUT, SIZE 56, 63, 80, 107 CM³



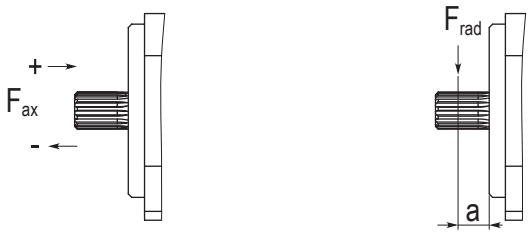
PBF20T (TH) (56, 63, 80, 107 cm³)			
POSITION	**NAME**	**POSITION**	**NAME**
1	Body	**14**	Plug
2	Shaft	**15**	Cover
3	Separator	**16**	Pin-orifice
4	Cylinder block	**17**	Pump adapter
5	Piston	**18**	Pin
6	Compression ring	**19, 20**	Bearing
7	Pin	**21**	Cuff
8	Cylindrical pin	**22, 23**	Lock ring
9	Spring		
10, 13	Adjusting washer	**24, 25**	O-ring
11	Spreader	**26**	Plate
12	Bushing	**27, 28**	Screw
		29	Transport plug

MBV10 MOTORS LAYOUT, SIZE 112 CM³



MBV10 (112 cm³)			
POSITION	**NAME**	**POSITION**	**NAME**
1	Drive shaft	**24**	Bracket
2	Cuff	**25**	Spring
3	Radial seal body	**26**	Body of controller
4, 45	Lock ring	**27**	Plug
5	Bushing	**28**	Cap
6	Body	**29**	Slide valve
7, 9	Bearing	**30**	Lever
8	Bearing cup	**31**	Axis
10	Spike	**32**	Bearing heel
11, 21, 22, 23	Screw	**33**	Spool with the fifth
12	Separator	**34**	Pin
13	Bushing	**35**	Piston
14	Belleville spring	**37**	Pin
15, 36	Transport plug	**38**	Semicircle
16	Cylinder block	**39**	Piston
17	Spreader	**40, 41, 42, 43, 44**	Adjusting washer
18	Nut		
19, 20	Adjusting screw	**46, 47, 48, 49, 50, 51**	Seal ring
21, 22, 23	Screw		

LOAD AND DURABILITY (FOR BF10, BF20, BV10 SERIES PUMPS AND MOTORS)



PERMISSIBLE AXIAL AND RADIAL FORCES ON THE DRIVE SHAFT						
Pumps / motors series	BF10, BV10			BF20		
Displacement, cm^3	28	56	112	56	80	107
A distance to force F from the shaft collar, a, mm	20	25	27,5	18	20	20
Maximum radial force F_{rad}, N	2748	8962	13610	9200	11500	13600
Maximum axial force (during standby, no pressure in hydraulic system), $-F_{ax}$, N	0					
Maximum axial force (during standby, no pressure in hydraulic system), $+F_{ax}$, N	315	500	900	800	1000	1250
Permissible axial force (per bar operating pressure), $\pm F_{ax}$, N/bar	4,6	7,5	11,3	8,7	10,6	12,9

NOTE

The direction of the maximum permissible axial force must be consider:
at $-F_{ax}$ - bearing durability is reduced;
at $+F_{ax}$ - bearing durability is increased.

The choice of the optimal direction of the radial force Frad allows to reduce the load on the bearings and achieve an optimal lifetime. Optimal installation angle φ_{opt} for gear (fig. 1) and V-belt (fig. 2) transmission should match to the values in the table.

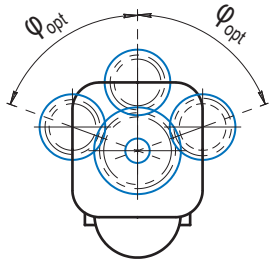


Fig. 1

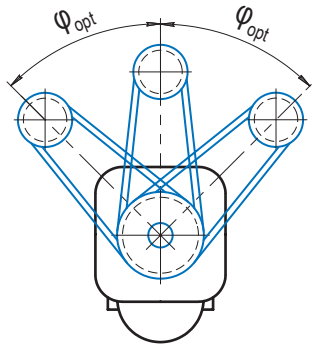
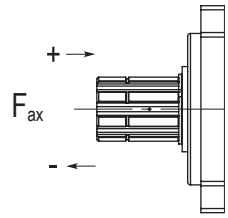


Fig. 2

SERIES	V-BELT	GEAR
BF10	70°	45°
BF20	45°	70°

LOAD AND DURABILITY (FOR PBF20T AND PBF20TH SERIES PUMPS)



PERMISSIBLE AXIAL AND RADIAL FORCES ON THE DRIVE SHAFT

CHARACTERISTICS		56	63	80	107
A distance to force F from the shaft collar, a, mm		21,5			
Maximum axial force (during standby, no pressure in hydraulic system), F_{ax}	N	0			
Permissible axial force (per bar operating pressure), F_{ax}	$+F_{ax}$, N/bar	50	53	60	71
	$-F_{ax}$, N/bar	0			

NOTE

The direction of the maximum permissible axial force must be consider:
at $-F_{ax}$ - bearing durability is reduced;
at $+F_{ax}$ - bearing durability is increased.

HYDRAULIC FLUID

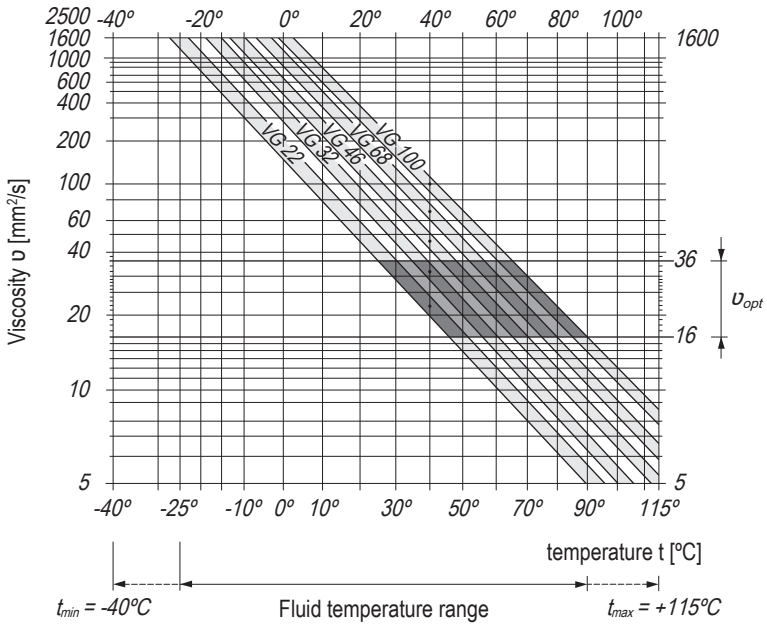
All parameters and characteristics of hydraulic units suggest that hydraulic system uses high quality hydraulic fluids and additives. They should have a number of properties: anticorrosive, antioxidant, anti-foam, and others. These fluids are high-quality turbine oils, API CD SAE J183 engine oil, automatic transmission fluids (ATF) and some specialty fluids.
Never mix different fluids.

HYDRAULIC FLUID CHOICE

For the correct choice you need to know the working temperature of the fluid in the hydraulic tank (depending on the ambient temperature) and the viscosity of the fluid. The fluid must be selected so that the viscosity be within the allowable range (V_{opt}) at any temperature (t_{min}-t_{max}), (see diagram). It is recommended to select a higher temperature class of the working fluid.

EXAMPLE.
At an ambient temperature of X°C, an operating temperature of 60°C is set. In the optimum working range of (V_{opt}) viscosity, this corresponds to classes VG 46 and VG 68. The right choise is VG 68. The temperature of fluid in the drain channel is always higher than the temperature in the tank. At any point in the hydraulic system fluid temperature should not exceed 90°C.
If it is not possible to comply with temperature conditions, consult for advice.

SELECTION DIAGRAM



HYDRAULIC FLUID FILTRATION

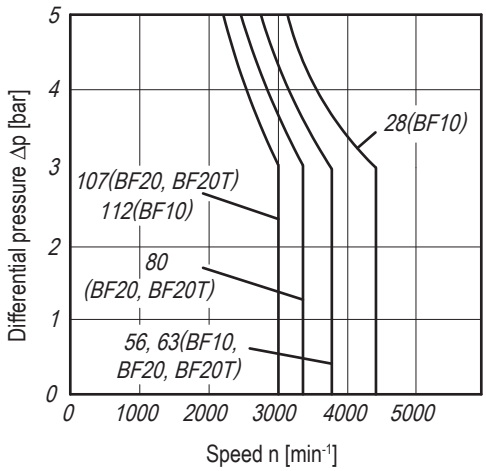
The better filtration provides the higher purity class of the working fluid, which in turn increases the axial piston unit lifetime. To ensure reliable operation of the axial piston unit, it is necessary to determine the working fluid purity according to ISO 4406. At very high temperatures of the working fluid (from 90°C to a maximum of 115°C), a purity class at least 19/17/14 according to ISO 4406 is required. If it is impossible to comply with the purity class, please consult.

VISCOSITY AND TEMPERATURE OF WORKING FLUID

CONDITIONS	VISCOSITY	TEMPERATURE	NOTES
Storage and transportation		$T_{min} \geq -40°C$ $T_{opt} = +5°C…+20°C$	Storage at the factory: Standard - up to 12 months; Long-term - up to 24 months
Cold start	$\upsilon_{max} \leq 1600$ mm²/s	$T \geq -40°C$	$t \leq 3$ min, $n \leq 1000$ min^{-1}, no load $P \leq 50$ bar
Permissible temperature drop		$T \leq 25°C$	The temperature difference between the axial piston pump and the working fluid in the system
Warm-up period	$\upsilon = 1600...400$ mm²/s	$T = -40°C…-25°C$	at $P \leq 0.7 \cdot P_{nom}$, $n \leq 0.5 \cdot n_{nom}$ $t \leq 15$ min
Continuous operating mode	$\upsilon = 400...10$ mm²/s		In case of VG 46 corresponds to a temperature range of + 5°C to + 85°C
		$\Delta T = 12°C$ $T = -25°C…+103°C$	The temperature difference between the cuff, bearing and drainage Temperature in drain line
	$\upsilon_{opt} = 36...16$ mm²/s		Optimal viscosity range in operating mode
Short-term operating	$\upsilon_{min} \geq 7$ mm²/s	$T = +103°C$	$t < 3$ min, $p < 0.3 \cdot P_{nom}$

SHAFT SEAL

The shaft seal service life depends on the shaft speed and drain pressure. The diagram shows the dependence of the shaft speed on the case pressure that acts on the seal from the pump cavity. When the hydraulic unit is operating at the maximum allowable drain pressure, the shaft seal life is reduced. Short-term pressure (t <0,1 sec) up to 10 bar is allowed, but with the increasing the pressure pulsation frequency the shaft seal service life is reduced. The case pressure must be equal to or higher than the ambient pressure.



Maximum case pressure:

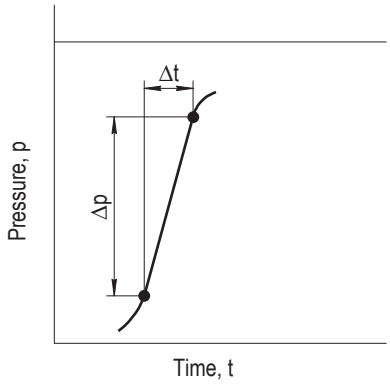
1 bar - for 28 cm^3 series BF10

2,5 bar - 56 cm^3 and 112 cm^3 series BF10, BV10

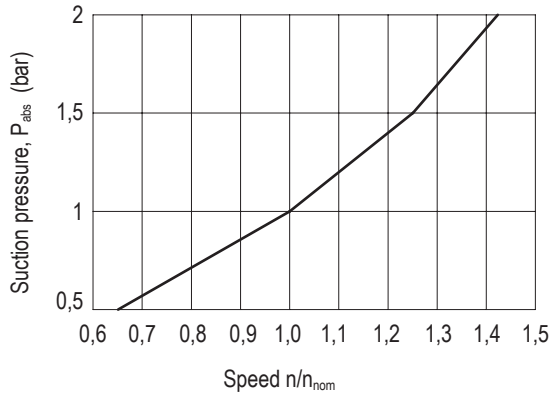
to 3 bar - 56 cm^3, 63 cm^3, 80 cm^3, 107 cm^3 series BF20, BF20T

SUCTION PRESSURE AT INCREASED SPEED

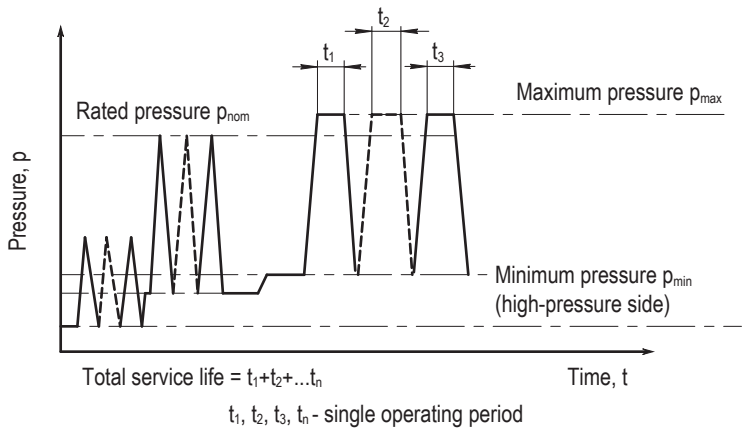
PRESSURE CHANGE RATE



SHAFT ROTATION SPEED TO SUCTION PRESSURE RATE



OPERATING PERIODS OF THE PUMP THROUGHOUT THE ENTIRE SERVICE LIFE



t_1, t_2, t_3, t_n - single operating period

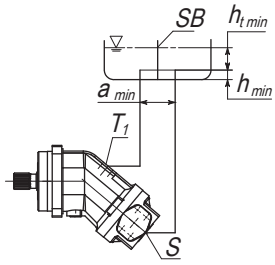
INSTALLATION INSTRUCTIONS

During commissioning and operation, the axial piston unit must be filled with hydraulic fluid and air bled. This must also be observed following a relatively long standstill as the axial piston unit may drain back to the reservoir via the hydraulic lines.
In case of "above reservoir" installation filling and air bleeding must be carried out completely as there is, for example, a danger of dry running.
The drain line to tank (T1, T2) should be located at the highest available level (for the PBF10, PBF20 series).
To achieve lower noise levels, connect all hydraulic lines using flexible hoses and avoid "above reservoir" installation.
In all operating conditions, the drain line must flow into the reservoir below the minimum fluid level. Maximum permissible suction height is 800 mm. The minimum pressure in the suction channel S must also not fall below 0.8 bar to absolute pressure (pabs) during the operation and cold start.

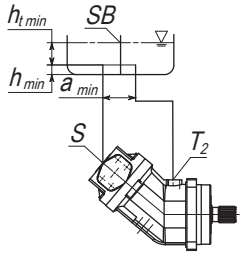
INSTALLATION POSITION FOR PUMPS PBF10, PBF20

Below-reservoir installation

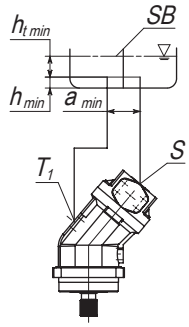
Below-reservoir installation means that the axial piston unit is installed outside of the reservoir below the minimum fluid level. **Installation in positions 1 and 2 is recommended.**



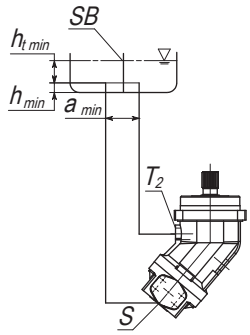
Pos. 1



Pos. 2



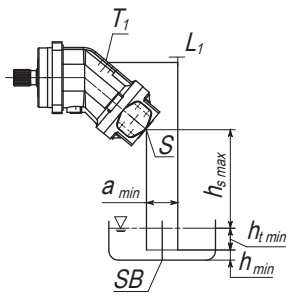
Pos. 3



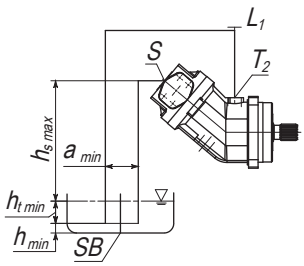
Pos. 4

Above-reservoir installation

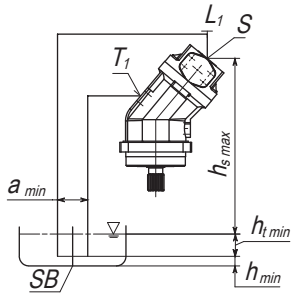
Above-reservoir installation means, that the axial piston unit isinstalled above the minimum fluid level.
Recommendation for installation position 8 (drive shaft upward): a check valve in the drain line (cracking pressure 0.5 bar) can prevent draining of the pump housing.



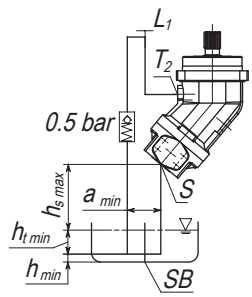
Pos. 5



Pos. 6



Pos. 7



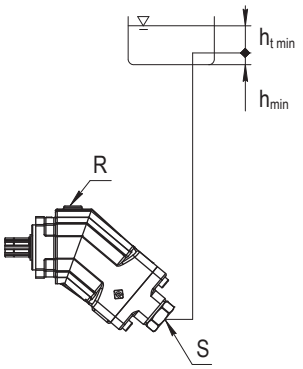
Pos. 8

S Suction line
T_1, T_2 Drain line
SB Damping wall (panel)
$h_{t\,min}$ Minimum required loading depth 200 mm
h_{min} The minimum required distance to the bottom of the tank 100 mm
L_1 Filling / air bleed
$h_{S\,max}$ Maximum permissible suction height (800 mm)
a_{min} When selecting a tank, it is necessary to ensure a sufficient distance between the suction line and the drain line. This will prevent the absorption of heated fluid back into the suction line.

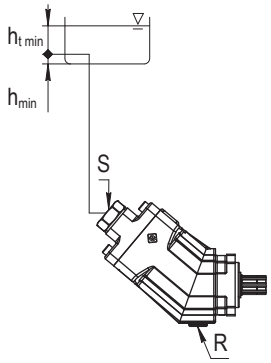
INSTALLATION POSITION FOR PUMPS PBF20T(TH)

Below-reservoir installation (pos. 1 and 2)

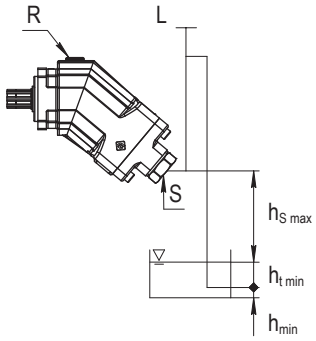
Below-reservoir installation means that the axial piston unit is installed outside of the reservoir below the minimum fluid level. **Installation in positions 1 and 2 is recommended.**



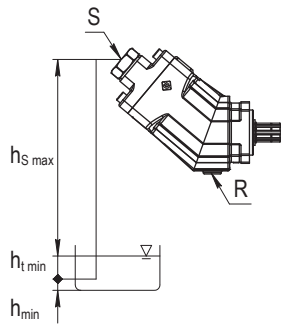
Pos. 1



Pos. 2



Pos. 3



Pos. 4

INSTALLATION POSITIONS	AIR BLEED	FILLING
Pos. 1	R	S
Pos. 2	-	S

Above-reservoir installation (pos. 3 and 4)

Above-reservoir installation means, that the axial piston unit isinstalled above the minimum fluid level.

INSTALLATION POSITIONS	AIR BLEED	FILLING
Pos. 3	R	L
Pos. 4	S	S

S Suction line

R Air bleed

L Filling

$\mathbf{h_{t\,min}}$ Minimum required loading depth 200 mm

$\mathbf{h_{min}}$ The minimum required distance to the bottom of the tank 100 mm

$\mathbf{h_{S\,max}}$ Maximum permissible suction height (800 mm)

HYDRAULIC TANKS REQUIREMENTS

1. Design of the tank should facilitate cooling of the working fluid, prevent access of air to the working fluid and foaming it, eliminates theingress of contaminants from the environment and sucking sediment from the bottom of the tank to the hydraulic system.
2. The tank must be equipped with a level indicator, and if necessary, equipped with an automatic device that regulates the level of working fluid or signal when the predetermined level.
3. The tank must have a filler neck with a filter and a sealed cap with restraint. The design and installation of the filter should prevent damage during operation. The capacity of the filler neck with a filter must ensure filling the tank within the time stipulated by the technical documentation for specific types of hydraulic tanks.
4. It is desirable that the design of the hydraulic tank provide for a closed filling, in which the working fluid enters the tank through a pipeline hermetically connected to the tank from the filling station.
5. There shoulb be an air bleeder at the top of the tank (for tanks design for operation in ambient pressure) with an air filter with a filter fineness corresponding to the required purity of the working fluid in the system.
The bandwidth of the bleeder should ensure the pressure drop in the tank at the maximum rate of change of the working fluid level does not exceed the value set in the documentation for specific hydraulic tanks. The leakage of the working fluid through the bleeder should be excluded during operation.
6. The design of the tank should ensure its convenient cleaning. Drains must be located in such places that the working fluid can be drained from the tank.
7. The surface of the tank must be protected against corrosion, resistant to the working fluid, causing no pollution.

OK Sp. z o.o.
95-050, Konstantynów Ł., Krótka 6
Phone: +48 427126607
e-mail: zapytania@dzwigi.net.pl
www.dzwigi.net.pl

HS-AB-04/042025