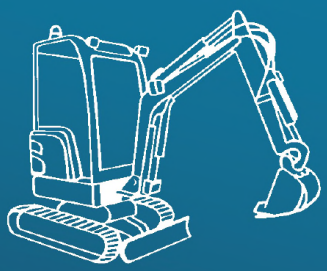
jihostroj
AERO TECHNOLOGY & HYDRAULICS



GEAR MOTORS
TM3

Displacement	from 4 to 31 ccm
Pressure	up to 270 bar
Speed	from 500 to 4000 RPM

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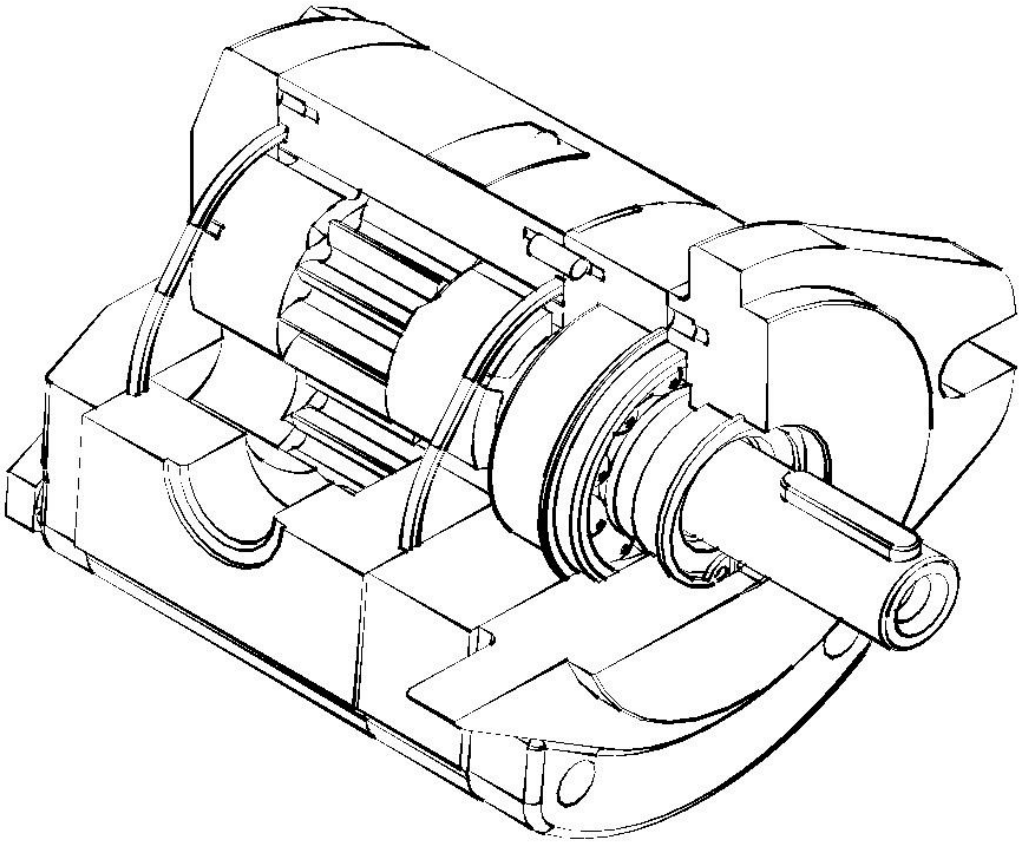
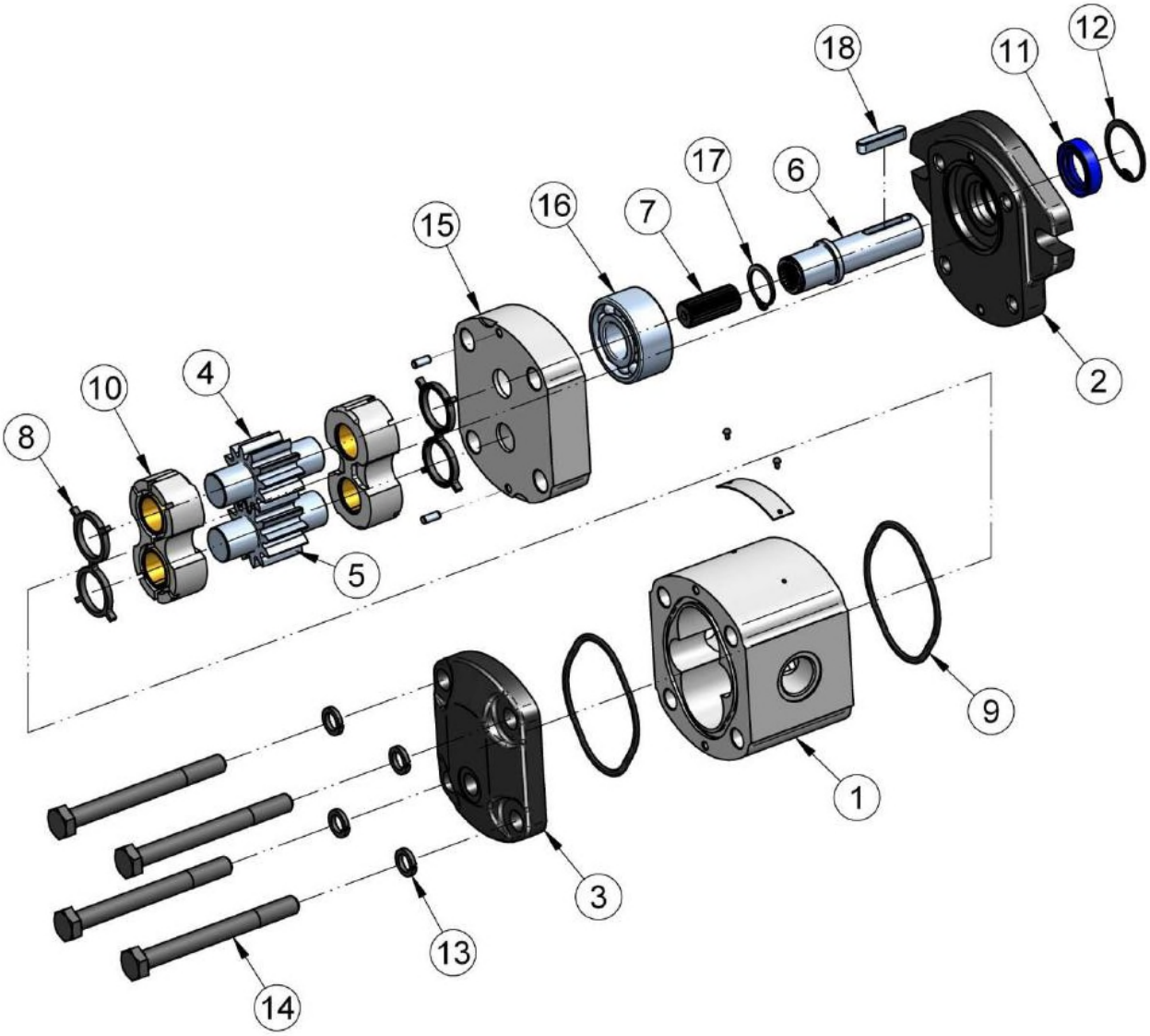


DESCRIPTION

Gear motors are used for transformation of liquid pressure head in mechanical energy. TM3 series motors with external teeth are due to their simple construction, compact dimensions and a wide range of types applicable in modern hydraulic systems, handling equipment as well as mobile hydraulic systems. Flange types used as well as the form of working liquid inlet and outlet comply with all worldwide standards. The PM23 series covers the range of displacements from 9 to 31 cm^3/rev.

The basic version consists of several parts. The body is made of a heavy duty aluminium alloy, engine cover and flange of grey iron or eventually aluminium alloy, and gear wheels of heavy duty steel. Axle pins with a high surface duality are imbedded in sliding sleeves, continuously lubricated and cooled by a stream of working liquid. The axial pump balancing is performed using sliding aluminium alloy bearing sleeves in which a shape sealing of balancing surface is located in grooves. TM3 series motors can be delivered in one-way design as clockwise or anti-clockwise rotating engines; they are also available in reversible version.

BASIC PARTS OF MOTOR



1. Body
2. Flange
3. Cover
4. Driving gear
5. Driven gear
6. Driving shaft
7. Clutch
8. Balancing sealing
9. Peripheral sealing
10. Bearing sleeves
11. Shaft seal
12. Safety ring
13. Spring washers
14. Bolts
15. Body connection
16. Bearing
17. Safety ring
18. Key

PARAMETER TABLE

One direction motors

Nominal Size Parameters		Sym	Unit	TM3 4	TM3 6	TM3 8	TM3 12	TM3 16	TM3 20	TM3 25	TM3 31
Actual displacement		V_g	[cm^3]	4.03	6.02	8.05	12.08	16.10	20.12	25.16	31.21
Rotation speed	nominal	n_n	[min^{-1}]	1500							
	minimum	n_{min}	[min^{-1}]	500							
	maximum	n_{max}	[min^{-1}]	4000	4000	3600	3600	3200	3200	2800	2200
Pressure at outlet	minimum	p_{1min}	[bar]	0.50							
	maximum	p_{1max}	[bar]	-0.30							
Pressure at inlet	max. continuous	p_{2n}	[bar]	270	270	270	250	250	200	180	150
	maximum	p_{2max}	[bar]	290	290	290	270	270	240	200	170
	peak	p_3	[bar]	310	310	310	290	290	260	220	190
Nominal flow rate (min.) at n_n and p_{2n}		Q_n	[$dm^3.min^{-1}$]	7.06	10.59	13.64	20.45	26.67	33.33	41.67	51.67
Maximum flow rate at n_{max} and p_{2max}		Q_{max}	[$dm^3.min^{-1}$]	17.02	25.53	30.64	45.96	54.47	68.09	74.47	72.55
Nominal input power (max.) at n_n and p_{2n}		P_n	[kW]	2.19	3.28	4.47	6.21	8.46	8.46	9.52	9.83
Maximum input power at n_{max} and p_{2max}		P_{max}	[kW]	6.82	10.23	12.28	17.15	20.32	22.58	20.58	17.04
Nominal Torque at n_n a $p2_n$		M	[Nm]	15.47	23.20	30.94	42.97	57.30	57.30	64.46	66.61
Weight		m	[kg]	2.60	2.65	2.75	2.95	3.10	3.35	3.50	3.80

Reversible motors

Nominal Size Parameters		Sym	Unit	TM3 4	TM3 6	TM3 8	TM3 12	TM3 16	TM3 20	TM3 25	TM3 31
Actual displacement		V_g	[cm^3]	4.03	6.02	8.05	12.08	16.10	20.12	25.16	31.21
Rotation speed	nominal	n_n	[min^{-1}]	1500							
	minimum	n_{min}	[min^{-1}]	500							
	maximum	n_{max}	[min^{-1}]	4000	4000	3600	3600	3200	3200	2800	2200
Pressure at outlet	minimum	p_{1min}	[bar]	210	210	210	210	200	160	140	100
	maximum	p_{1max}	[bar]	-0.30							
Pressure at inlet	max. continuous	p_{2n}	[bar]	270	270	270	250	250	200	180	150
	maximum	p_{2max}	[bar]	290	290	290	270	270	240	200	170
	peak	p_3	[bar]	310	310	310	290	290	260	220	190
Nominal flow rate (min.) at n_n and p_{2n}		Q_n	[$dm^3.min^{-1}$]	7.06	10.59	13.64	20.45	26.67	33.33	41.67	51.67
Maximum flow rate at n_{max} and p_{2max}		Q_{max}	[$dm^3.min^{-1}$]	17.02	25.53	30.64	45.96	54.47	68.09	74.47	72.55
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Weight		m	[kg]	2.60	2.65	2.75	2.95	3.10	3.35	3.50	3.80

FORMULAS USED FOR CALCULATION

Flow rate

$$Q = \frac{V_g \cdot n}{1000 \cdot \eta_v} \quad [dm^3min^{-1}]$$

V_g	[cm^3]	pump displacement
n	[min^{-1}]	rotation speed
η_v	[-]	volumetric efficiency

Displacement

$$V_g = \frac{Q \cdot 1000 \cdot \eta_V}{n} \quad [cm^3]$$

Torque

$$M_k = \frac{V_g \cdot p \cdot \eta_m}{20 \cdot \pi} \quad [Nm]$$

p	[bar]	required pressure at outlet
η_m	[-]	mechanical efficiency

Input power

$$P = \frac{V_g \cdot n \cdot p \cdot \eta_t}{600 \cdot 1000} \quad [kW]$$

η_t	[-]	total efficiency

PUMP EFFICIENCIES

Volumetric efficiency η_v

It determines the amount of flow losses. Its value is η_v = 0.92 ÷ 0.98 (depending on rotation speed, viscosity of working liquid and outlet pressure). It can be expressed as follows:

$$\eta_v = \frac{Q_{theor}}{Q_{act.}} \quad [-]$$

$Q_{act.}$	[dm^3min^{-1}]	actual flow rate
Q_{theor}	[dm^3min^{-1}]	theoretical flow rate

Mechanical efficiency η_m

It determines mechanical losses. Its value is about η_m = 0.85. It can be expressed as follows:

$$\eta_m = \frac{M_{act.}}{M_{theor}} \quad [-]$$

$M_{act.}$	[Nm]	actual torque
M_{theor}	[Nm]	theoretical torque

Total efficiency η_t

It is defined as product of η_v and η_m and determines the difference between theoretical and actual required input power:

$$\eta_t = \eta_v \cdot \eta_m = \frac{P_{act.}}{P_{theor}} \quad [-]$$

$P_{act.}$	[kW]	actual input power
P_{theor}	[kW]	theoretical input power

WORKING LIQUID

- Mineral oils for hydraulic drives
- Hydraulic liquids based on plant oils suitable for hydraulic drives

Liquid temperature

t = -20 ÷ +80 [°C] when used with FKM (Viton) seal up to 120 [°C]

Cinematic viscosity

Recommended (during continuous operation): $\nu = 20 \div 80 \cdot 10^{-6}$ [$m^2 \cdot s^{-1}$]

Maximum (cold starting, at viscosity >1000, operating pressure <10 bar is permissible, speed <1500·min^{-1}): $\nu = 1200 \cdot 10^{-6}$ [$m^2 \cdot s^{-1}$]

Minimum (operating mode at $10 \cdot 10^{-6}$ up to $20 \cdot 10^{-6}$ should be consulted with manufacturer): $\nu = 10 \cdot 10^{-6}$ [$m^2 \cdot s^{-1}$]

Filtration coefficient β_α

β_{25} 75 ≥ (for pressure $p_2 < 200$ bar)
β_{10} 75 ≥ (for pressure $p_2 > 200$ bar)

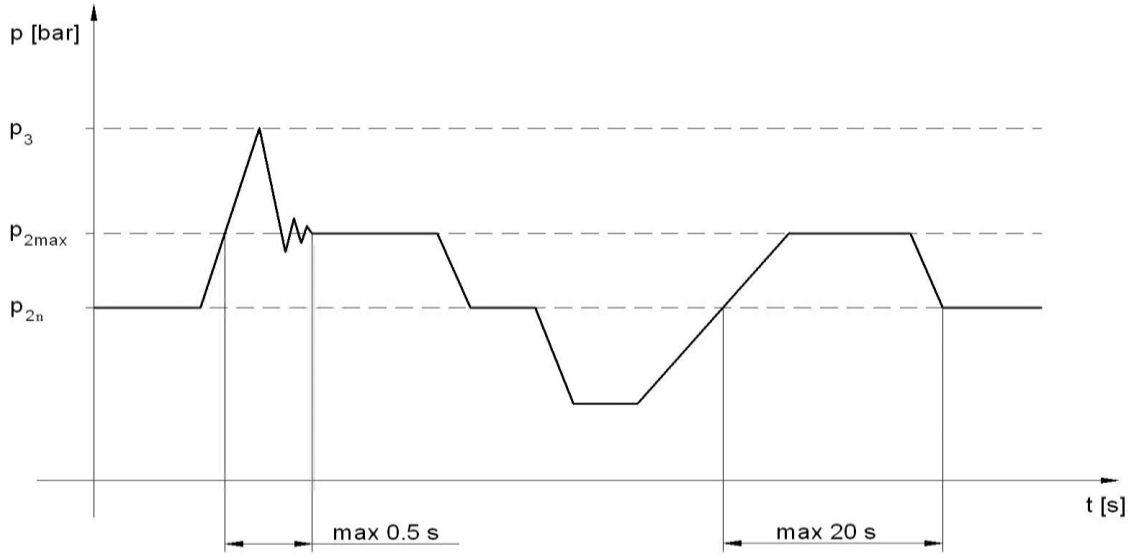
Liquid contamination class according to ISO 4406

21/18/15 (for pressure $p_2 < 200$ bar)
20/17/14 (for pressure $p_2 > 200$ bar)

Liquid contamination class according to NAS 1638

10 (for pressure $p_2 < 200$ bar)
8 (for pressure $p_2 > 200$ bar)

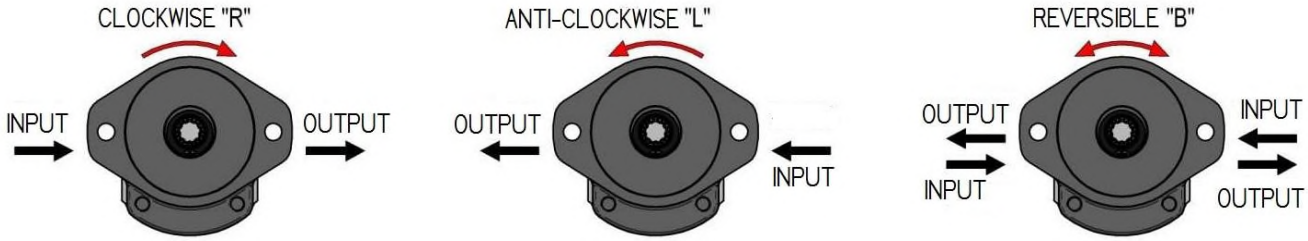
PRESSURE LOAD



p_{2n}	**max. contin. pressure**	max. working pressure, at which the pump can be operated without time limitation.
p_{2max}	**max. pressure**	maximum pressure permissible for a short time, max. 20s.
p_3	**peak pressure**	short-time pressure (fractions of a second) arising in case of a sudden change of the operating mode; any excess of this pressure during operation is impermissible.

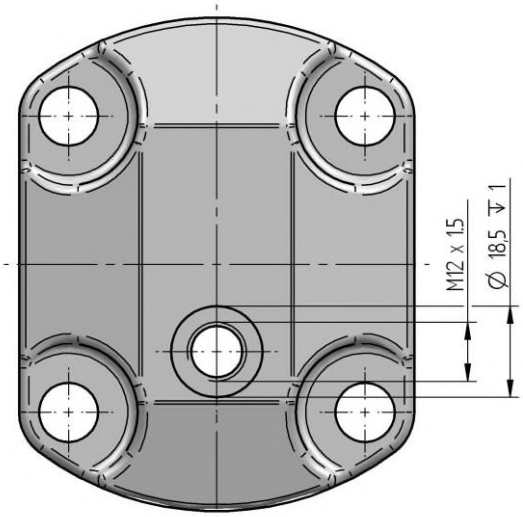
DIRECTION OF ROTATION

Determine direction of rotation by looking at the drive shaft. The motor can only be used in the specified direction of rotation

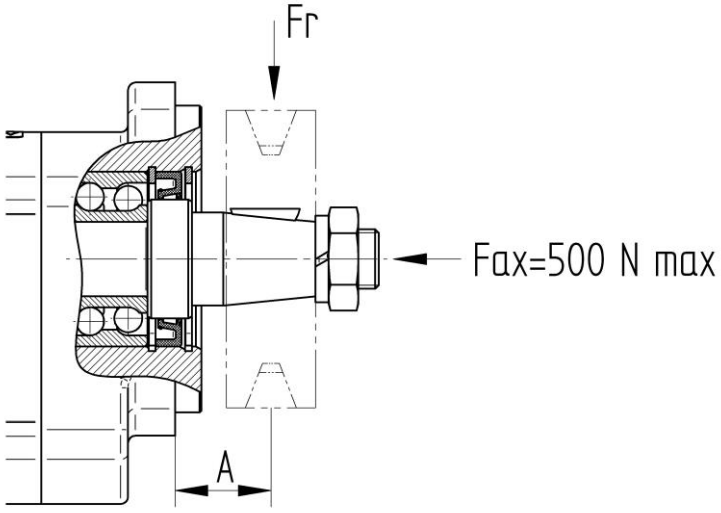


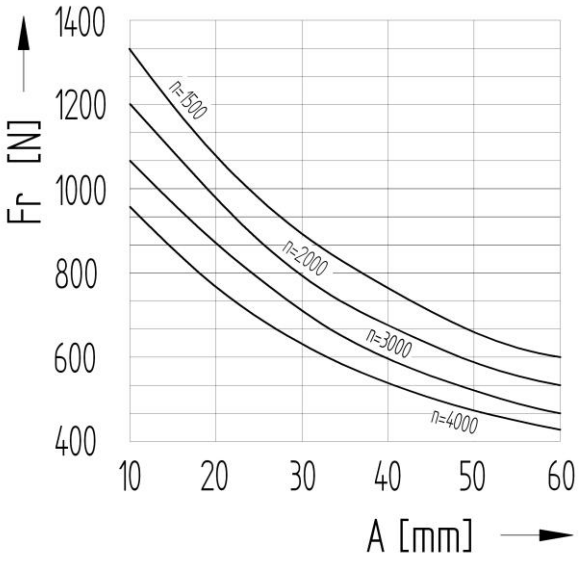
REVERSIBLE DESIGN

The motors with the possibility of bidirectional rotation have a different internal arrangement requiring drainage. Two types are used - internal and external. The internal drainage is always interconnected with the outlet by means of valves. The external drainage is solved by an orifice located in the cover opposite the driven gear.



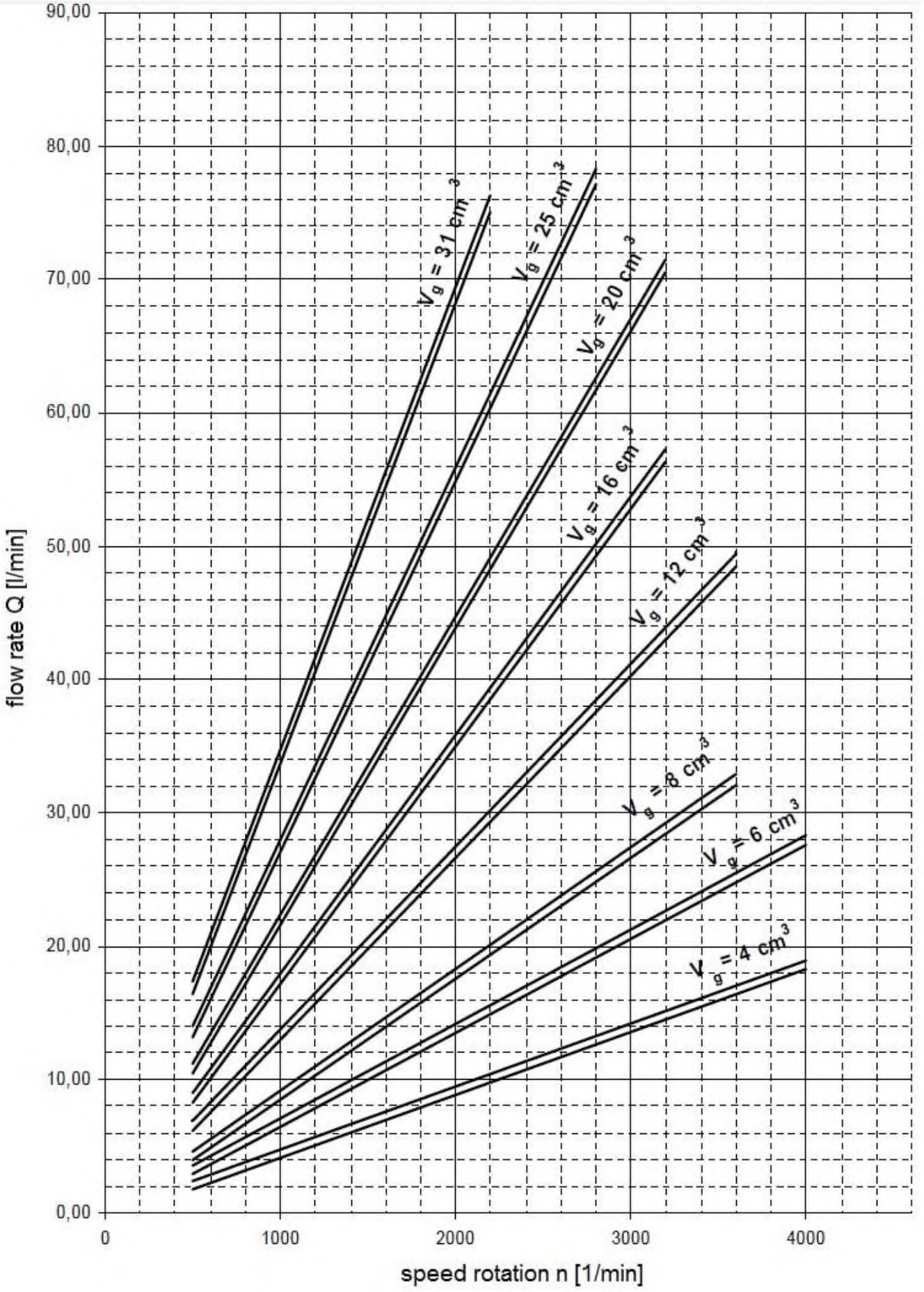
MOTOR WITH A FRONT-END BEARING



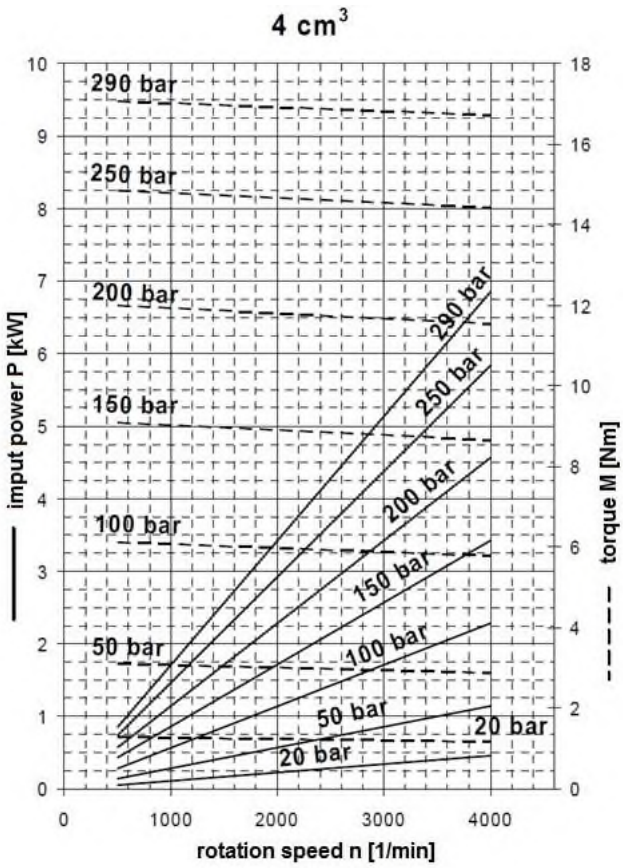


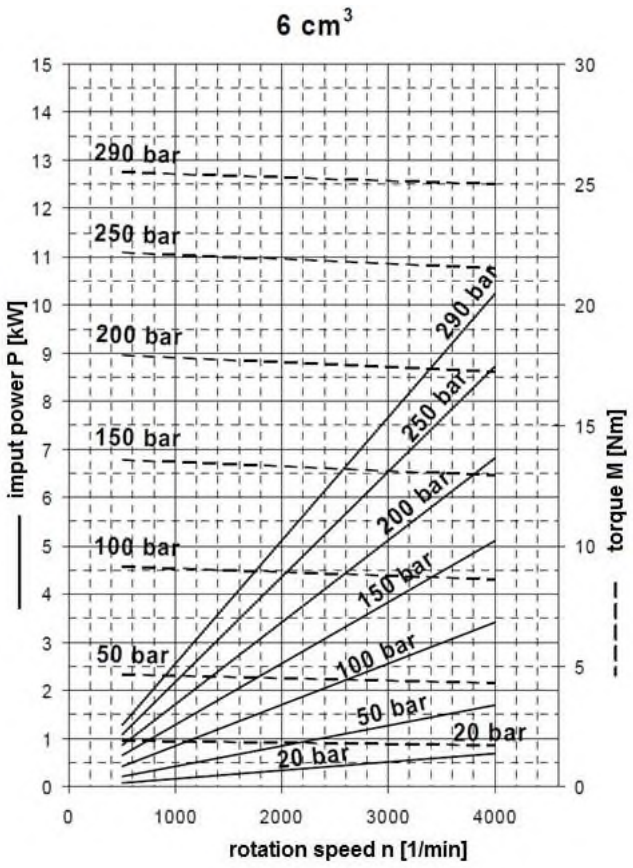
A driven device must not generate an axial or a radial load of the motor shaft, unless this is exclusively permitted for the motor with a front-end bearing.

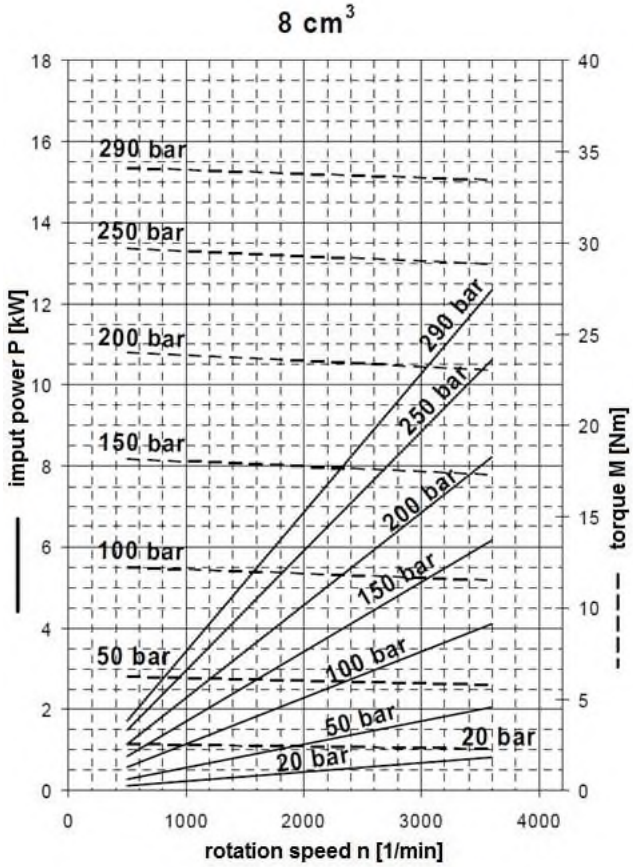
TM3 FLOW RATE AND POWER CURVES

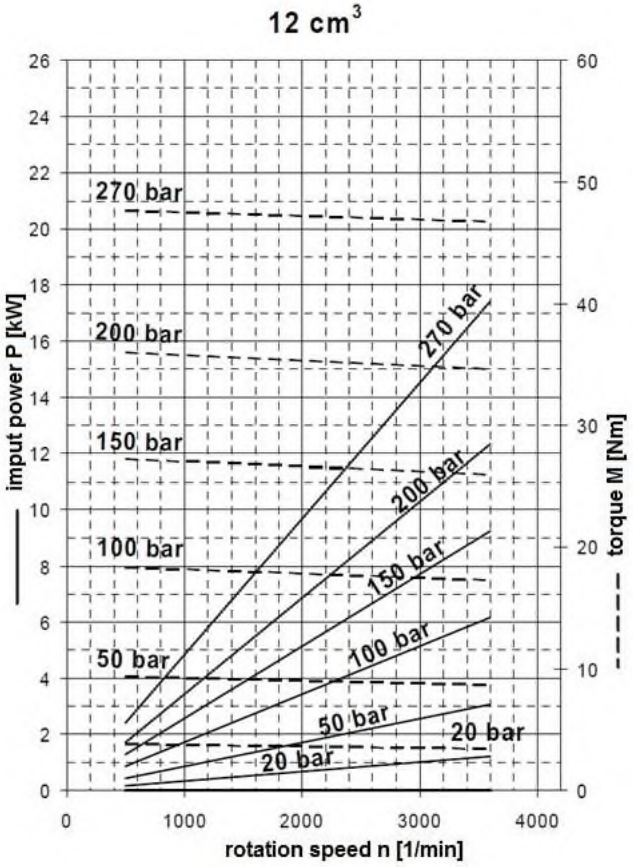


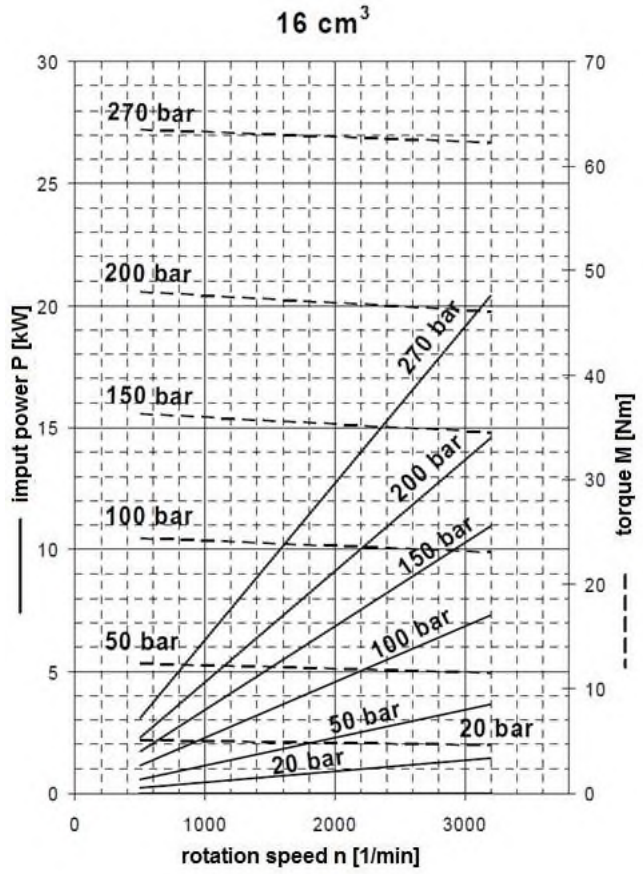
Above curves apply to ISO Vg 46 oil at temperature t = 45°C.

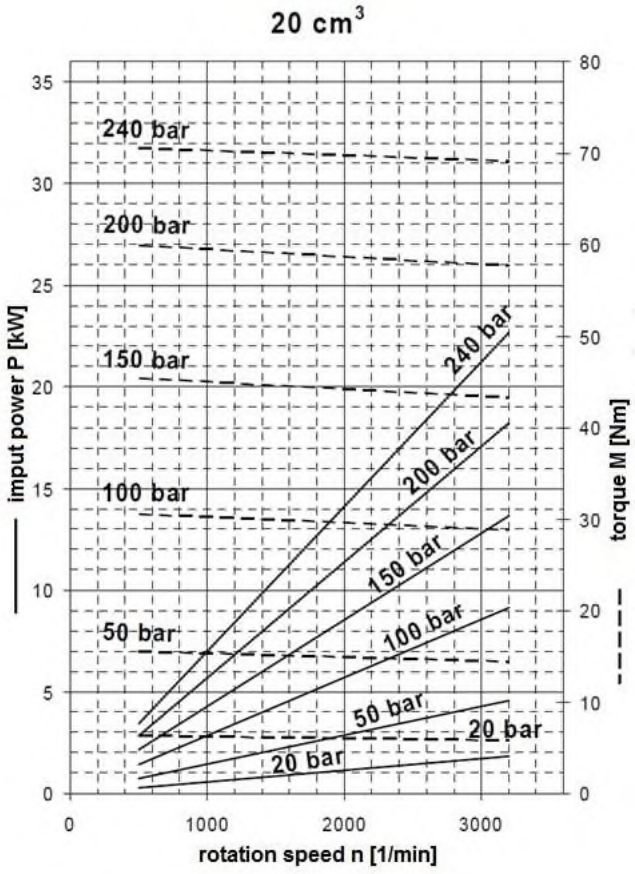

4 cm3
290 bar
250 bar
200 bar
150 bar
100 bar
50 bar
20 bar
imput power P [kW]
torque M [Nm]
rotation speed n [1/min]

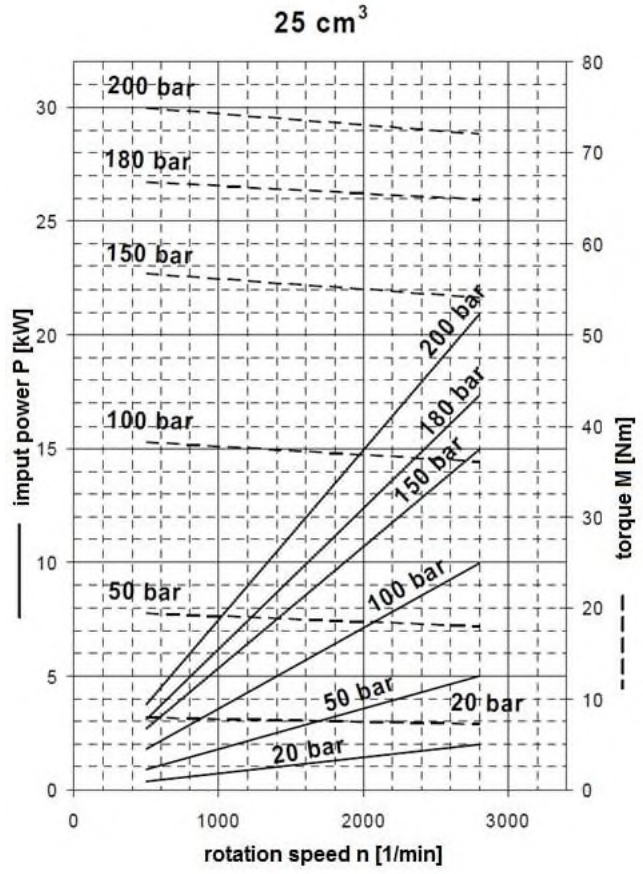

6 cm3
290 bar
250 bar
200 bar
150 bar
100 bar
50 bar
20 bar
imput power P [kW]
torque M [Nm]
rotation speed n [1/min]

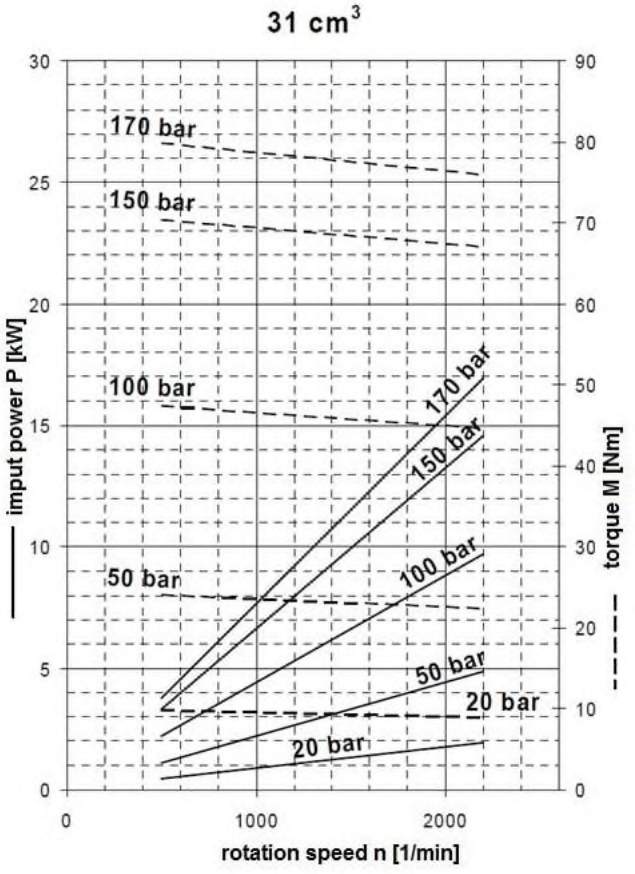

8 cm3
290 bar
250 bar
200 bar
150 bar
100 bar
50 bar
20 bar
imput power P [kW]
torque M [Nm]
rotation speed n [1/min]


12 cm3
270 bar
200 bar
150 bar
100 bar
50 bar
20 bar
imput power P [kW]
torque M [Nm]
rotation speed n [1/min]


16 cm3
imput power P [kW]
torque M [Nm]
rotation speed n [1/min]
270 bar
200 bar
150 bar
100 bar
50 bar
20 bar


20 cm3
imput power P [kW]
torque M [Nm]
rotation speed n [1/min]
240 bar
200 bar
150 bar
100 bar
50 bar
20 bar


25 cm3
imput power P [kW]
torque M [Nm]
rotation speed n [1/min]
200 bar
180 bar
150 bar
100 bar
50 bar
20 bar


31 cm3
imput power P [kW]
torque M [Nm]
rotation speed n [1/min]
170 bar
150 bar
100 bar
50 bar
20 bar

ORDER KEY

TM3 - 16 R - S02 D04 - S G04 G03 - V . 001

Code	Displacement [cm³]
4	4,03
6	6,02
8	8,05
12	12,08
16	16,10
20	20,12
25	25,16
31	31,21
XX	Other displacements on request

Code	Direction of Rotation
R	Clockwise
L	Anti-clockwise
B	Bi-directional

Code	Type
TM3	TM3 Series Gear Motor

Code	Flange design
F02	Square flange Centre ring Ø 80
R05	Rectangular flange, centre ring Ø 36,5
R06	Rectangular flange, centre ring Ø 80
R07	Rectangular flange, centre ring Ø 60
S02	SAE A
S03	SAE B
A07	Flange with trough-bolts, centre ring Ø 50
A08	Flange with trough-bolts, centre ring Ø 50
A09	Flange with trough-bolts, centre ring Ø 52 with O-ring
A10	Flange with trough-bolts, centre ring Ø 52 with O-ring
Z	Special design

Code	Location of inlets and outlets
S	Side (in the body)
R	Rear (in the cover)
C	Combination
Z	Special design

Code	Drive shaft design
C07	Taper 1:8 Key width 3
C08	Taper 1:8 Key width 3,2
C09	Taper 1:8 Key width 4
C10	Taper 1:5 Key width 3
D04	Spline SAE 9T 16/32 DP
D06	Spline SAE 11T l = 32, 16/32 DP
D07	Spline SAE 11T l = 38, 16/32 DP
D08	Spline CSN 17x1,25
D09	Spline DIN 5482 B17x14
D10	Spline GOST 6033-80
D11	Spline 16x13x3,5
K07	Cross coupling
V09	Cylindric Ø5/8´´, Key 4x4
V11	Cylindric Ø15, Key 4x4
V12	Cylindric Ø3/4´´, Key 4,8x4,8
V13	Cylindric Ø20, Key 6x6
Z	Special design

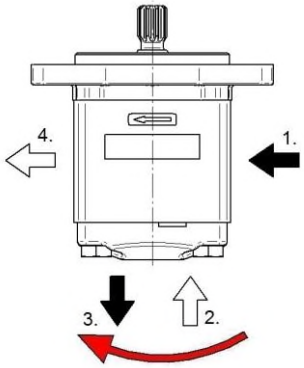
Code	Special arrangements
-	No special arrangements
001	With front-end bearing type 1
002	With front-end bearing type 2
003	Sealed section for multiple version
004	Without shaft seal
005	Inlet in body, outlet in cover
006	Inlet in cover, outlet in body
007	Inlet in body, outlet in flange
008	Inlet in flange, outlet in body
009	Drain M12 x 1,5 in cover
010	With front-end bearing type 3
011	Drain G¼ in cover
012	Internal drain
013	Variseal
014	Shaft seal – double lip

Code	Seal material
N	NBR
V	FKM
H	HNBR

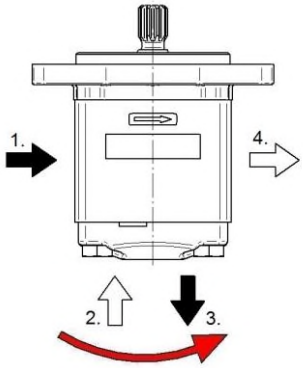
Code	Liquid inlet and outlet connection shape
M05	Thread M18x1,5
M09	Thread M27x2
G03	Thread BSP G1/2
G04	Thread BSP G3/4
G05	Thread BSP G1´´
U04	Thread 7/8–14 UNF-2B
U05	Thread 1–1/16–12 UN-2B
H05	Flanged fitting Ø15 Square 4xM6 Ø35
H06	Flanged fitting Ø20 Square 4xM6 Ø40
H10	Flanged fitting Ø26 Square 4xM8 Ø55
H07	Flanged fitting Ø13,5 Square 4xM6 Ø30
H08	Flanged fitting Ø20 Square 4xM8 Ø40
K01	Flanged fitting Ø13,5 Cross 4xM6 Ø30
K02	Flanged fitting Ø20 Cross 4xM8 Ø40
K07	Flanged fitting Ø14 Cross 4xM8 Ø38
K08	Flanged fitting Ø19 Cross 4xM8 Ø38
Z	Special design

An example of designation for the TM3 clockwise motor with displacement of 16 cm³, SAE A flange; Spline SAE 9T; BSP side inlets in the body and FKM sealing, with front-end bearing **TM3-16R-S02D04-SG04G03-V.001**

Note: In case of combination inlets, with the code "C" is respected following sequence of inlets and outlets:



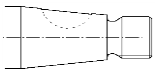
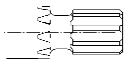
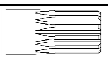
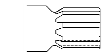
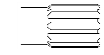
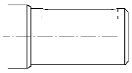
For clockwise and reverse gear motor,
in direction clockwise



For anti-clockwise gear motor,
in direction anti-clockwise

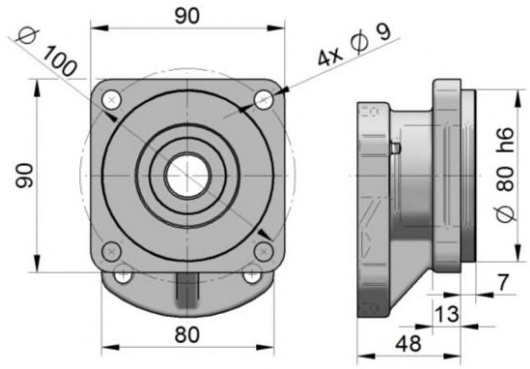
For. ex.: TM3-12R-S02D04-C<u>G03</u><u>G03</u><u>G04</u><u>G04</u>-N
1. 2. 3. 4.

COMBINATIONS OF FLANGES AND SHAFTS

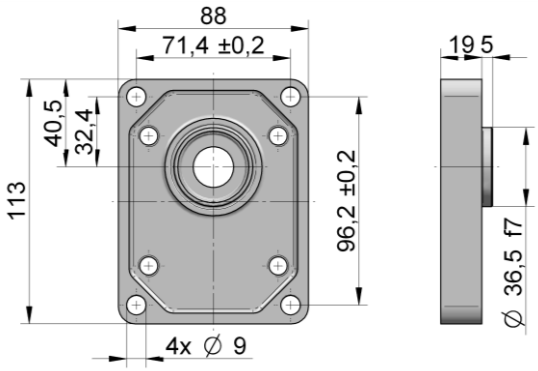
DRIVE SHAFTS		FLANGES DESIGN									
		F02	R05	R06	R07	S02	S03	A07	A08	A09	A10
C07			●								
C08			●								
C09			●								
C10				●				●	●		
D04						●	●				
D06						●	●				
D07						●	●				
D08			●								
D09				●				●	●		
D10		●									
D11					●						
K05										●	●
V09						●	●				
V11			●								
V12						●	●				
V13		●									

FLANGES DESIGN

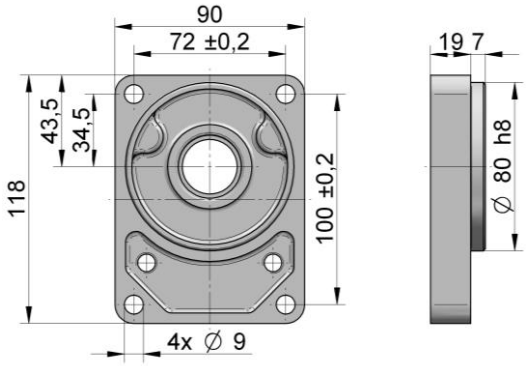
F02:



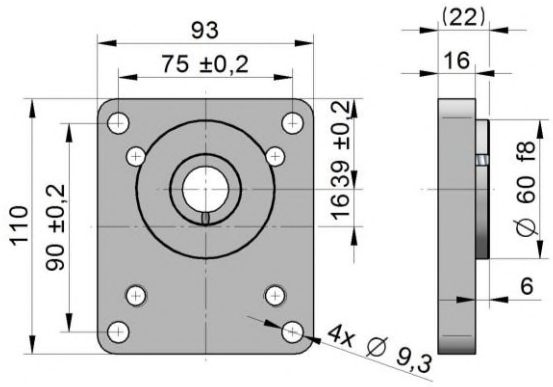
R05:



R06:



R07:



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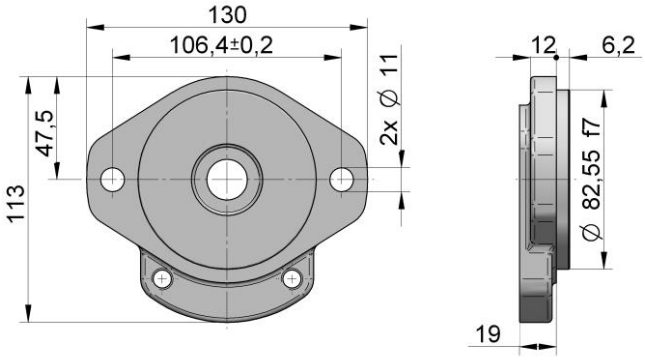

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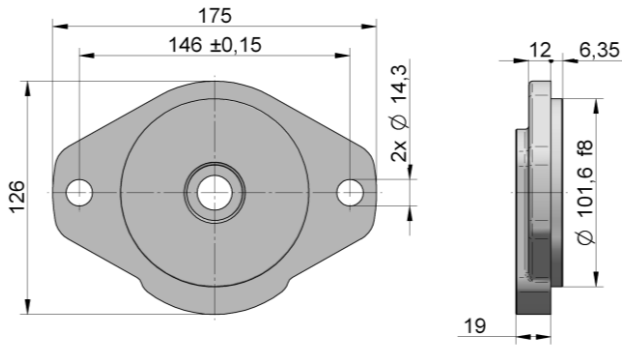
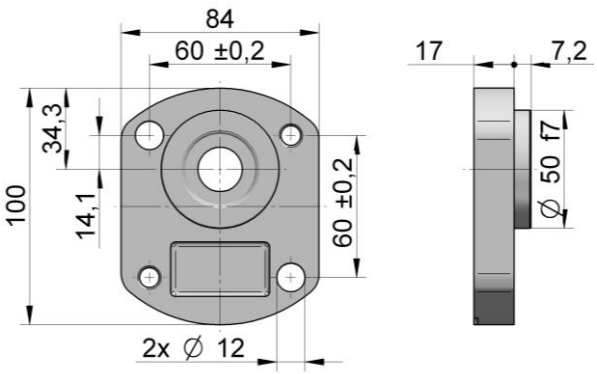
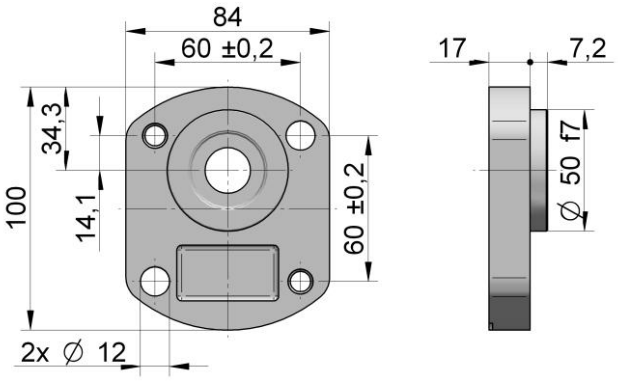


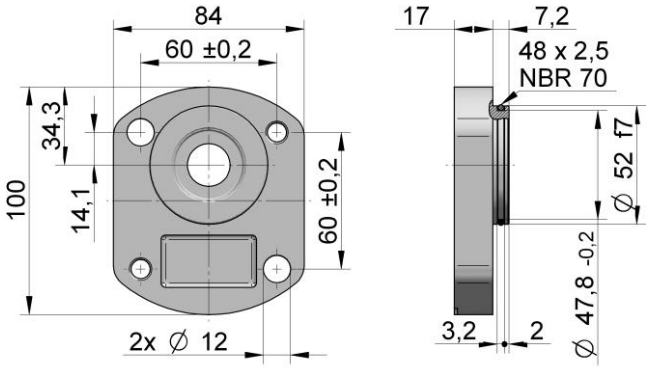
A07:



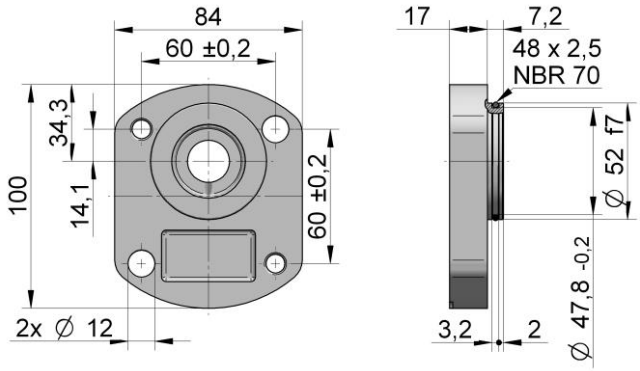
A08:



A09:



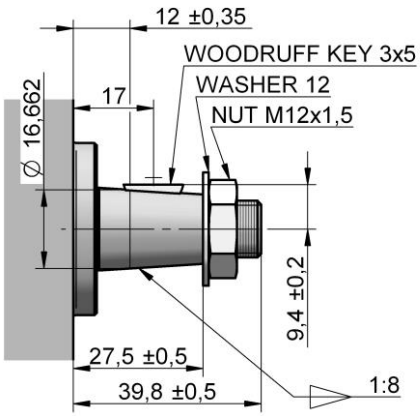
A10:



DRIVE SHAFT

Note: maximum allowed torque on a drive shaft is 100 Nm.

C07:



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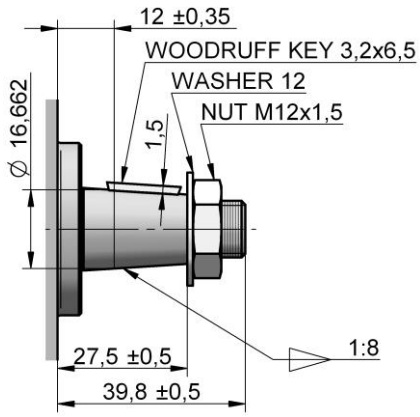
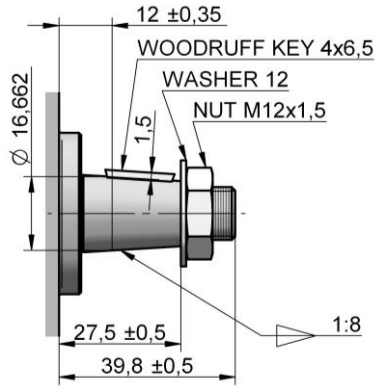


C09:



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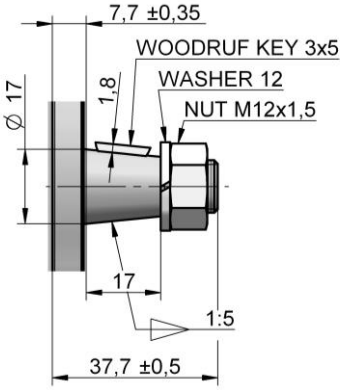
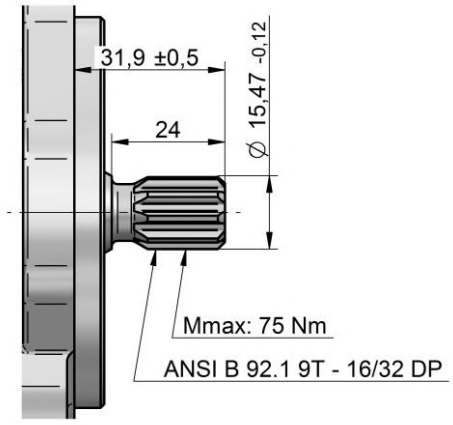
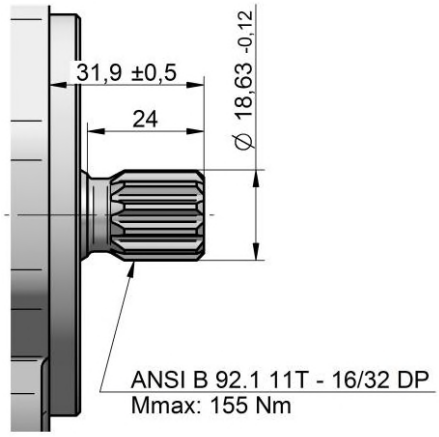


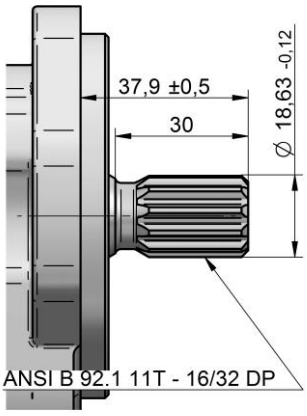
D04:



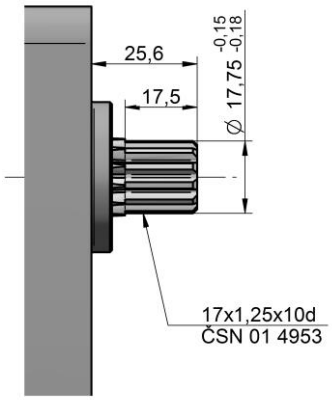
D06:



D07:



D08:



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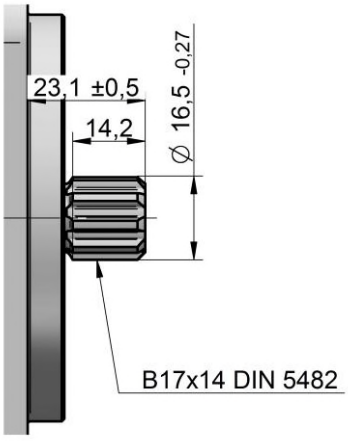

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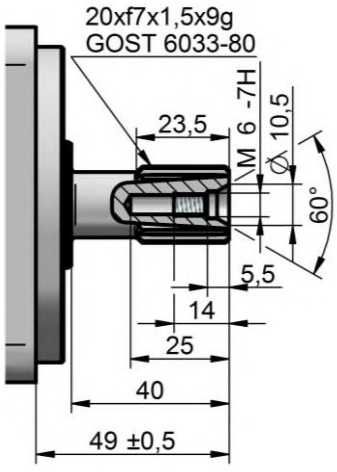
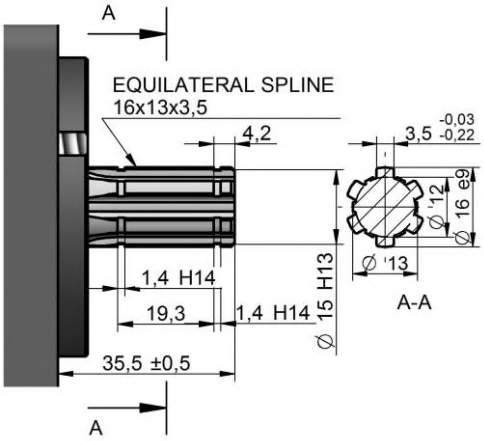
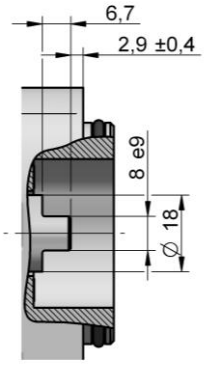


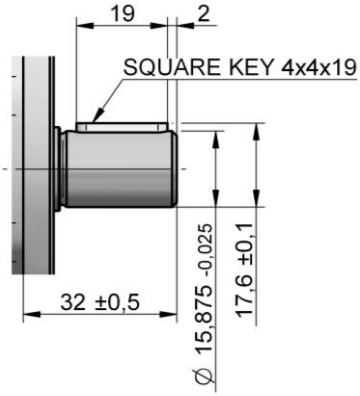
D11:



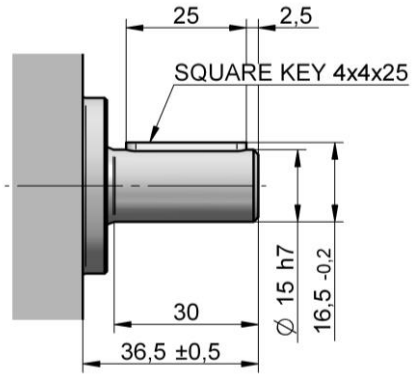
K07



V09:



V11:



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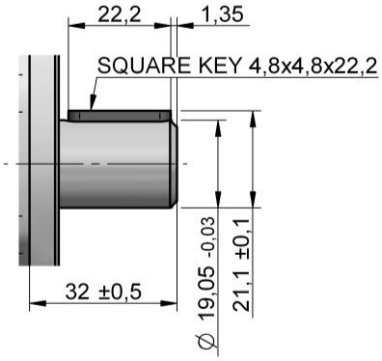
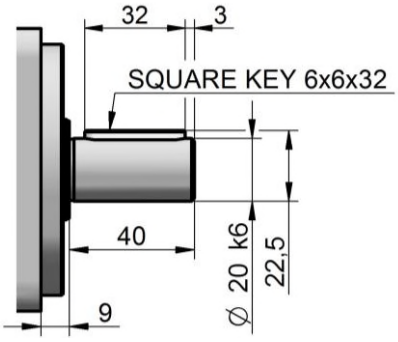
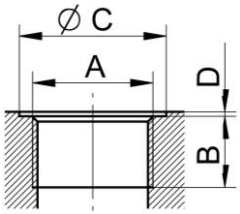


V13:



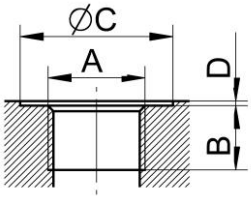
LIQUID INLET AND OUTLET CONNECTION

Metric thread according to ISO 6149



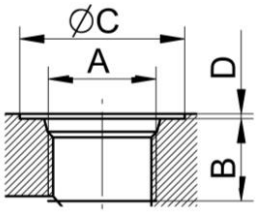
Displacement [cm³]	Inlet					Outlet				
	Code	A	B	C	D	Code	A	B	C	D
all	**M09**	M 27x2	16	33	1	**M05**	M18x1,5	14	24	1

BSPP pipe thread according to ISO 228 - 1



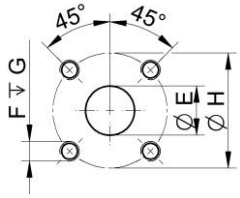
Displacement [cm³]	Inlet					Outlet				
	Code	A	B	C	D	Code	A	B	C	D
to 10	**G03**	G1/2	14	33	1	**G03**	G1/2	14	33	1
10 - 25	**G04**	G3/4	16	39						
above 25	**G05**	G1"	18	45		**G04**	G3/4	16	39	

UNF thread according to SAE



Displacement [cm³]	Inlet					Outlet				
	Code	A	B	C	D	Code	A	B	C	D
to 10	**U04**	7/8-14 UNF-2B	17	34	1	**U04**	7/8-14 UNF-2B	17	34	1
11 - 31	**U05**	1-1/16-12 UNF-2B	19	41						

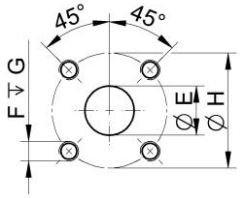
Flanged fittings according to DIN 8901/8902



Displacement [cm³]	Inlet					Outlet				
	Code	E	F	G	H	Code	E	F	G	H
all	**H06**	20	M6	13	40	**H05**	15	M6	13	35
	H10	25	M8	13	55					

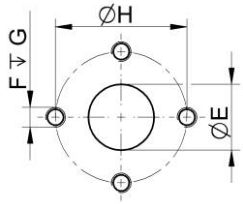
Note: H10H05 – for multiple version with one common inlet

Flanged fittings, - „square“



Displacement [cm³]	Inlet					Outlet				
	Code	E	F	G	H	Code	E	F	G	H
all	**H08**	20	M8	13	40	**H07**	13,5	M6	13	30

Flanged fittings- „cross“

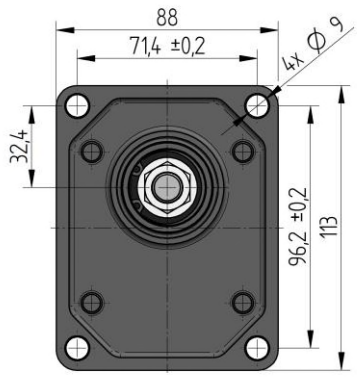


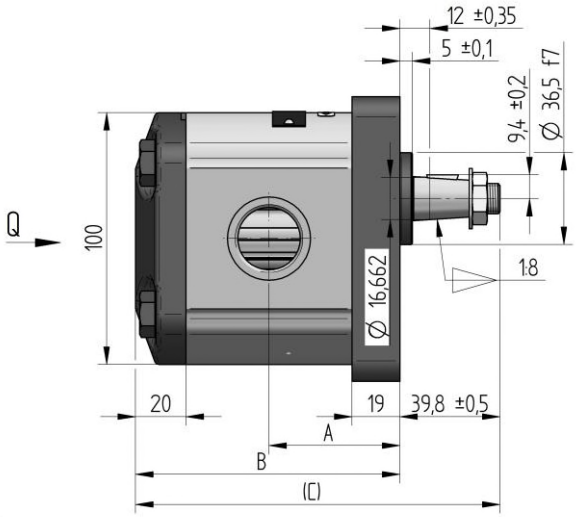
Displacement [cm³]	Inlet					Outlet				
	Code	E	F	G	H	Code	E	F	G	H
all	**K02**	20	M8	13	40	**K01**	13,5	M6	13	30
to 10	**K07**	14			38	**K07**	14	M8		38
above 10	**K08**	19								

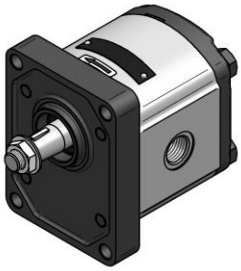
Drains:

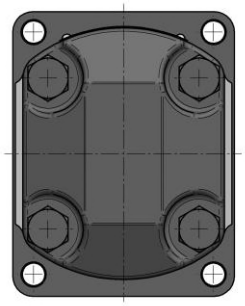
Displacement [cm³]	Code	Outlet			
		A	B	C	D
all	**M02**	M12x1,5	12	20	1
	G01	G1/4	12	45	
	U01	7/16-20 UNF-2B	13	21	
	U02	9/16-18 UNF-2B	14	25	

CATALOGUE SHEETS OF TM3 SERIES BASIC DESIGNS



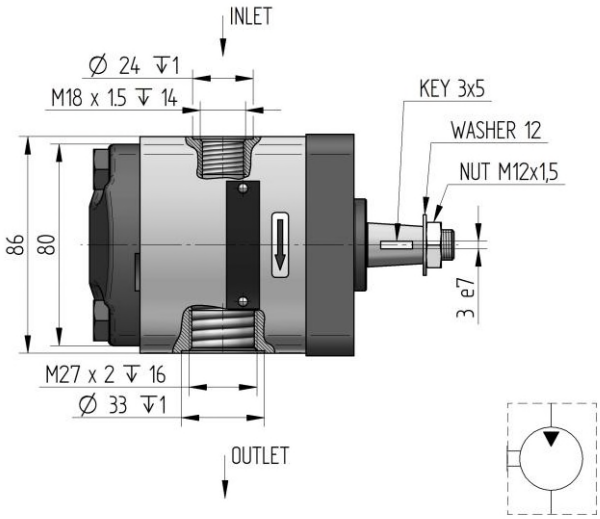




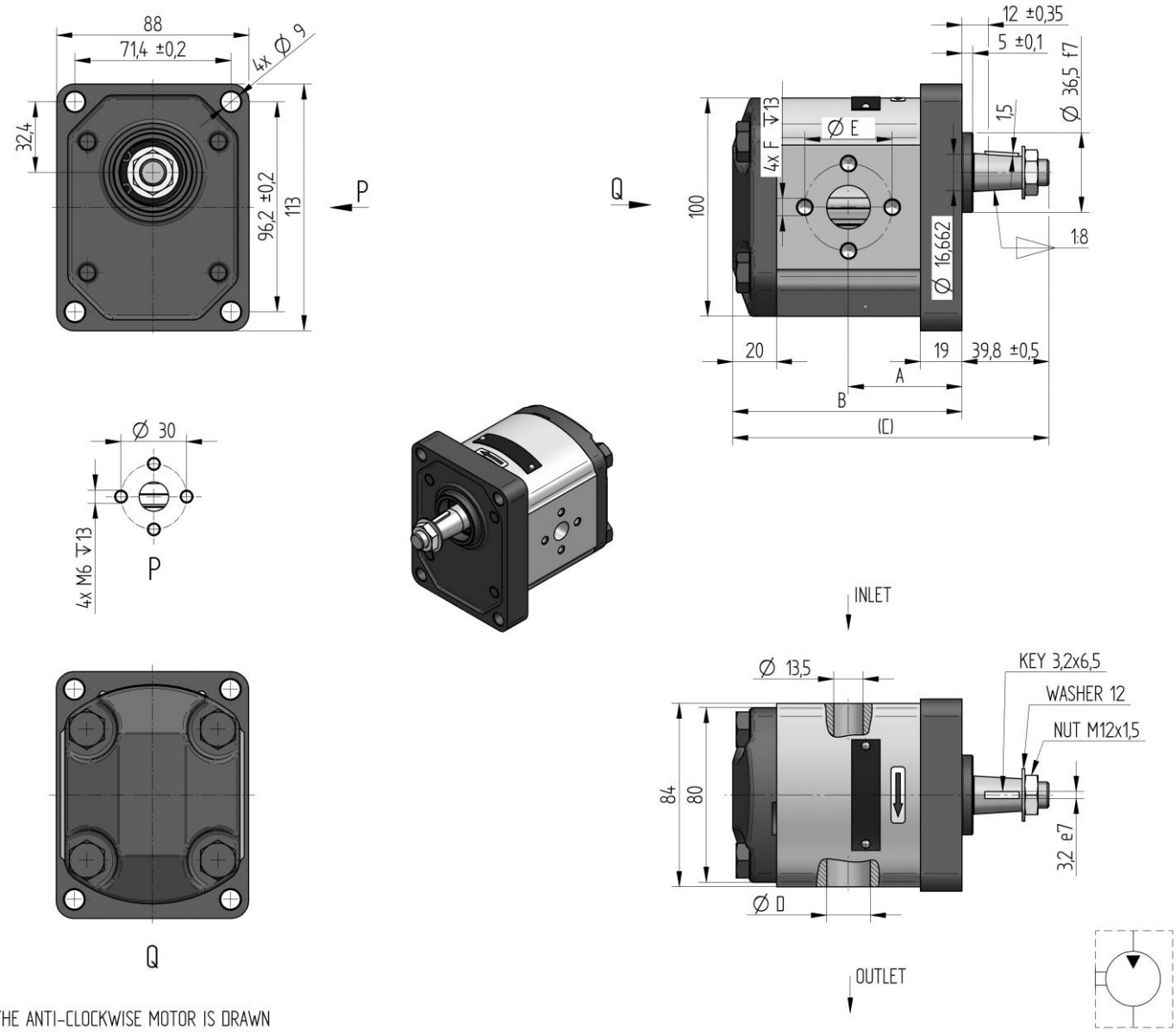


Q

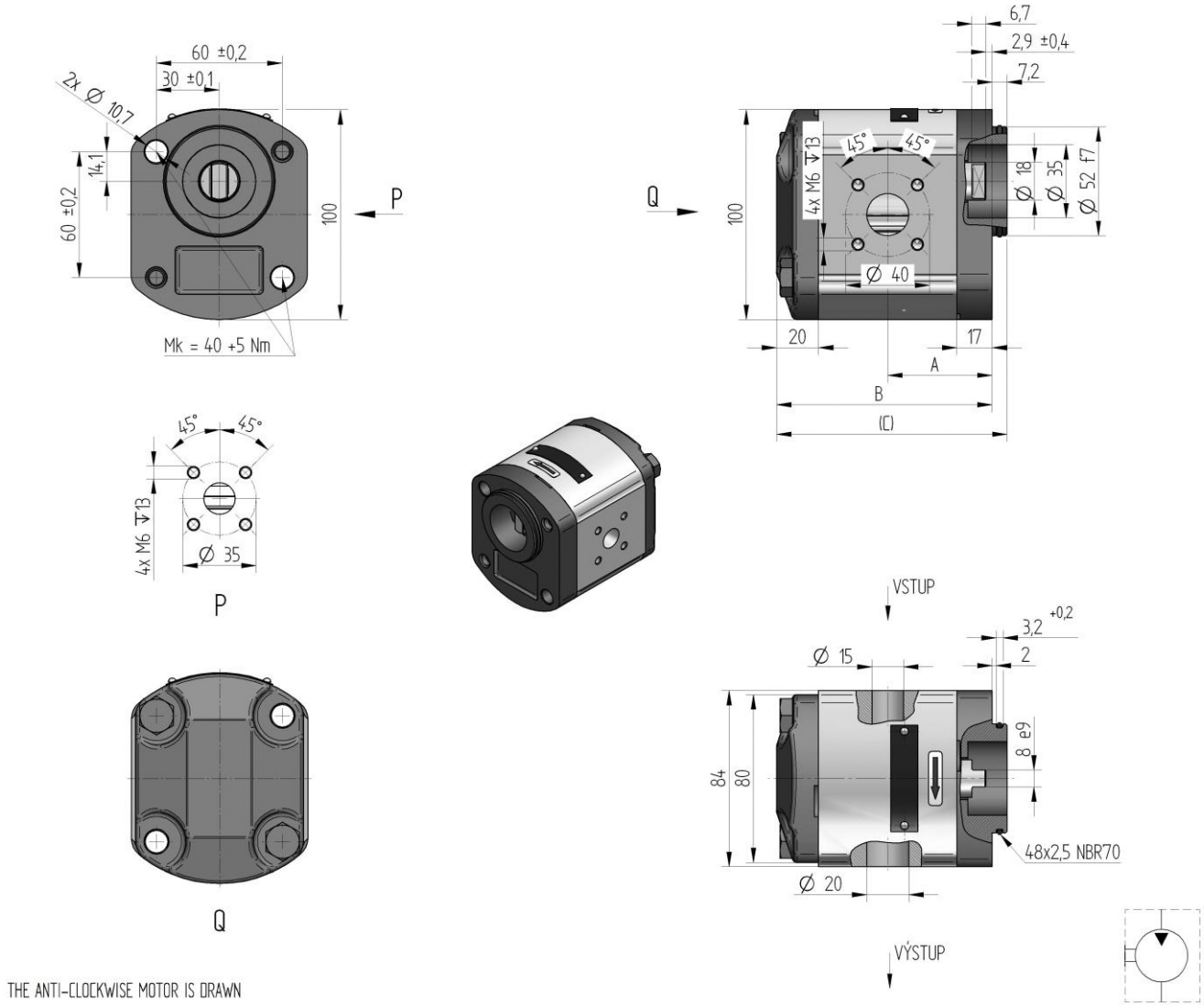
THE ANTI-CLOCKWISE MOTOR IS DRAWN



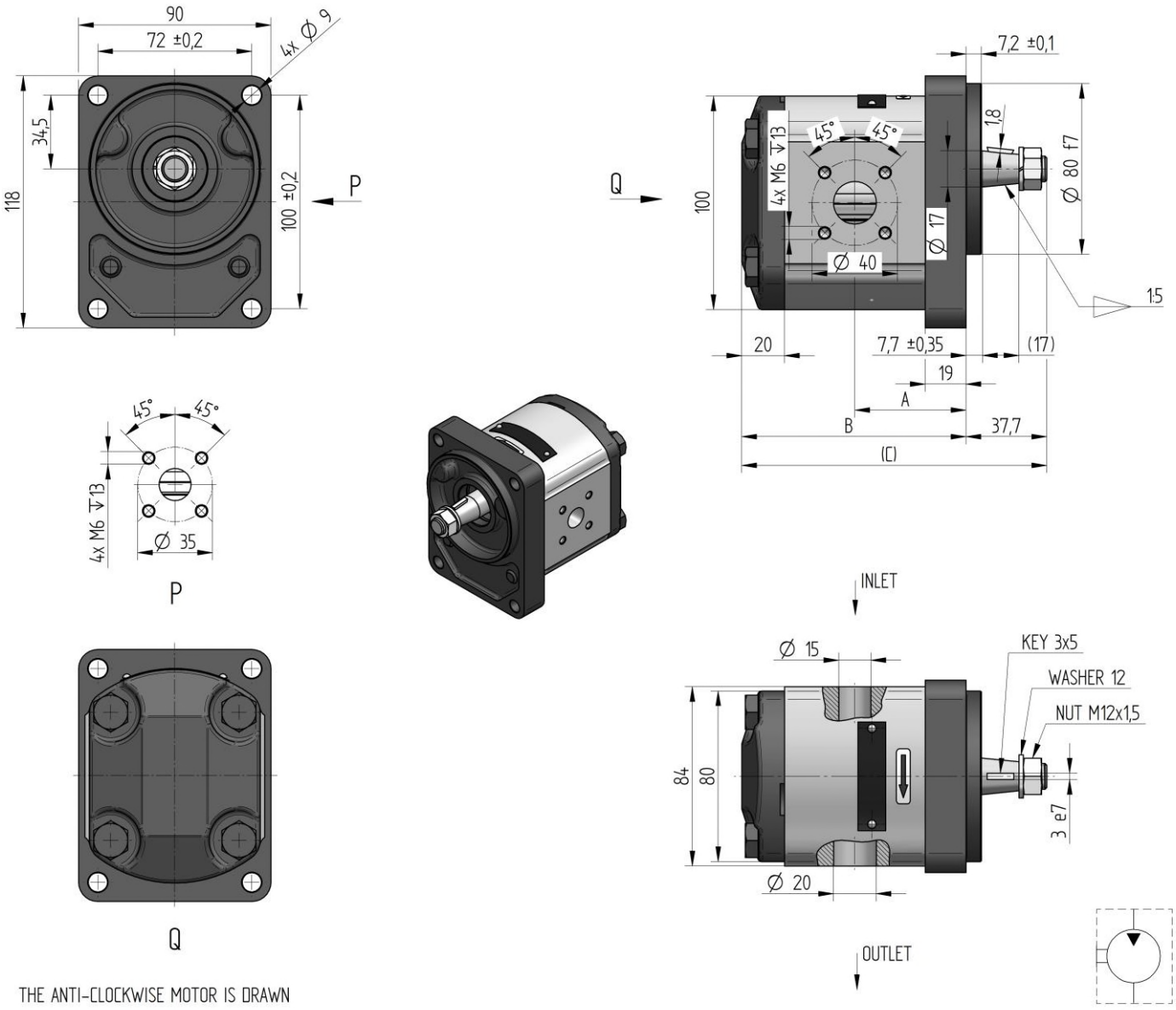
ORDER KEY	PURCH. CODE	DIRECT. OF ROT.	DISPLA-CEMENT [cm³/1]	NOM. PRES. [bar]	MIN SPEED [min⁻¹]	MAX. SPEED [min⁻¹]	A [mm]	B [mm]	C [mm]	DIMENSIONS [mm]		
TM3-31L- R05C07-SM09M05-N		L	31	150	500	2200	63.7	128.5	168.3			
TM3-31R- R05C07-SM09M05-N		R										
TM3-25L- R05C07-SM09M05-N		L	25	200	500	2800	59.0	119.1	158.9			
TM3-25R- R05C07-SM09M05-N		R										
TM3-20L- R05C07-SM09M05-N		L	20	240	500	3200	55.0	111.2	151.0			
TM3-20R- R05C07-SM09M05-N		R										
TM3-16L- R05C07-SM09M05-N		L	16	260	500	3200	51.9	104.9	144.7			
TM3-16R- R05C07-SM09M05-N		R										
TM3-12L- R05C07-SM09M05-N		L	12	260	500	3600	48.8	98.6	138.4			
TM3-12R- R05C07-SM09M05-N		R										
TM3-8L- R05C07-SM09M05-N		L	8	280	500	3600	45.6	92.3	132.1			
TM3-8R- R05C07-SM09M05-N		R										
TM3-6L- R05C07-SM09M05-N		L	6	280	500	4000	44.0	89.2	129.0			
TM3-6R- R05C07-SM09M05-N		R										
TM3-4L- R05C07-SM09M05-N		L	4	280	500	4000	42.5	86.0	125.8			
TM3-4R- R05C07-SM09M05-N		R										



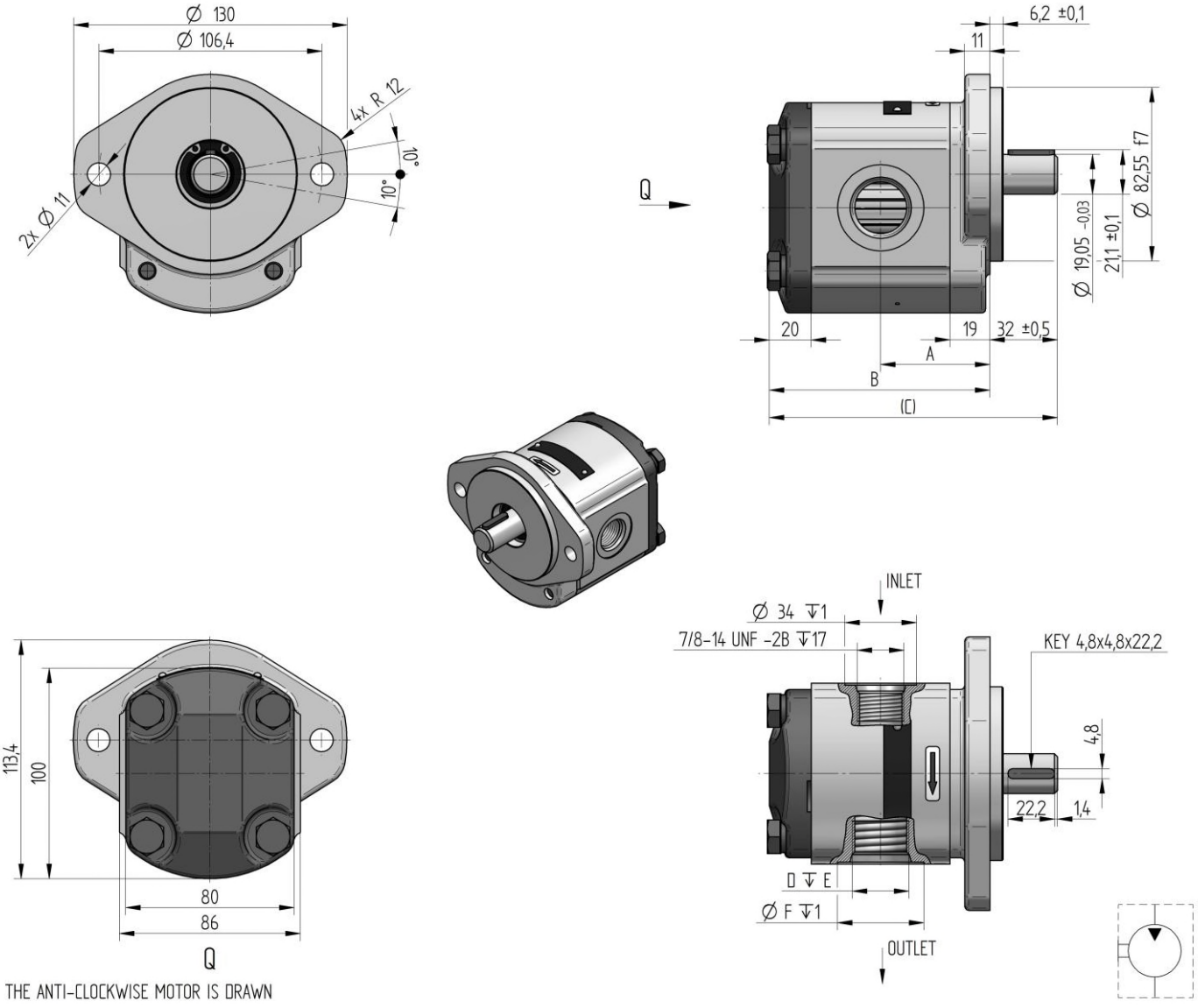
ORDER KEY	PURCH. CODE	DIRECT. OF ROT.	DISPLA-CEMENT [cm³/1]	NOM. PRES. [bar]	SPEED MIN [min⁻¹]	SPEED MAX. [min⁻¹]	DIMENSIONS A [mm]	B	C	D	E		
TM3-31L- R05C08-SK02K01-N		L	31	150	2200	63.7	128.5	168.3	Ø20	Ø40	M8		
TM3-31R- R05C08-SK02K01-N		R											
TM3-25L- R05C08-SK02K01-N		L	25	200	2800	59.0	119.1	158.9	Ø20	Ø40	M8		
TM3-25R- R05C08-SK02K01-N		R											
TM3-20L- R05C08-SK02K01-N		L	20	240	3200	55.0	111.2	151.0	Ø20	Ø40	M8		
TM3-20R- R05C08-SK02K01-N		R											
TM3-16L- R05C08-SK02K01-N		L	16	260	3200	51.9	104.9	144.7	Ø20	Ø40	M8		
TM3-16R- R05C08-SK02K01-N		R											
TM3-12L- R05C08-SK02K01-N		L	12	260	3600	48.8	98.6	138.4	Ø20	Ø40	M8		
TM3-12R- R05C08-SK02K01-N		R											
TM3-8L- R05C08-SK01K01-N		L	8	280	3600	45.6	92.3	132.1	Ø13.5	Ø30	M6		
TM3-8R- R05C08-SK01K01-N		R											
TM3-6L- R05C08-SK01K01-N		L	6	280	4000	44.0	89.2	129.0	Ø13.5	Ø30	M6		
TM3-6R- R05C08-SK01K01-N		R											
TM3-4L- R05C08-SK01K01-N		L	4	280	4000	42.5	86.0	125.8	Ø13.5	Ø30	M6		
TM3-4R- R05C08-SK01K01-N		R											



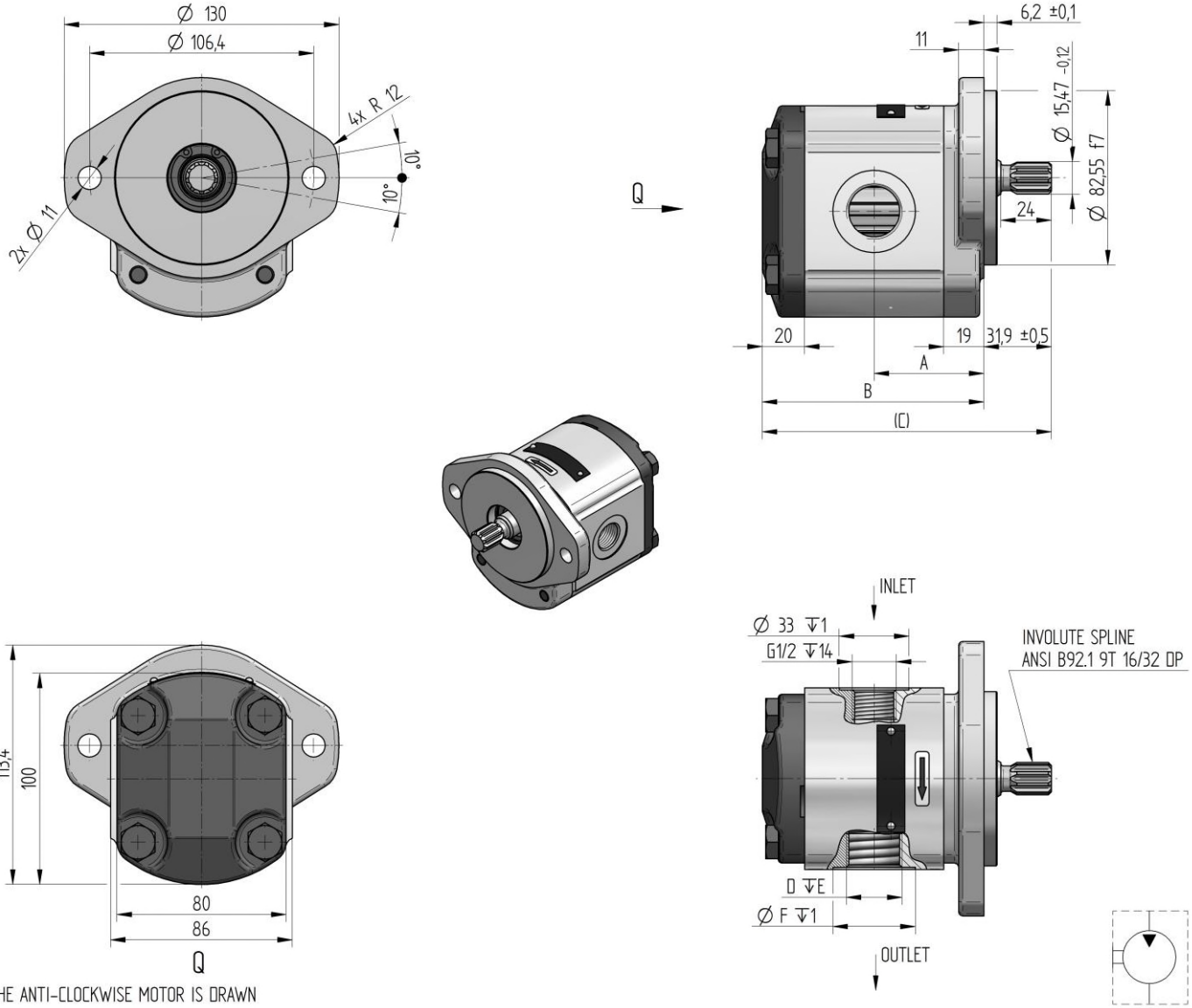
ORDER KEY	PURCH. CODE	DIRECT. OF ROT.	DISPLA-CEMENT [cm³/1]	NOM. PRES. [bar]	MIN SPEED [min⁻¹]	MAX. SPEED [min⁻¹]	A	B	C				
							DIMENSIONS [mm]						
TM3-31L- A09K07-SH06H05-N.004		L	31	150	500	2200	61.7	126.5	133.7				
TM3-31R- A09K07-SH06H05-N.004		R											
TM3-25L- A09K07-SH06H05-N.004		L	25	200	500	2800	57.0	117.1	124.3				
TM3-25R- A09K07-SH06H05-N.004		R											
TM3-20L- A09K07-SH06H05-N.004		L	20	240	500	3200	53.0	109.2	116.4				
TM3-20R- A09K07-SH06H05-N.004		R											
TM3-16L- A09K07-SH06H05-N.004		L	16	260	500	3200	49.9	102.9	110.1				
TM3-16R- A09K07-SH06H05-N.004		R											
TM3-12L- A09K07-SH06H05-N.004		L	12	260	500	3600	46.8	96.6	103.8				
TM3-12R- A09K07-SH06H05-N.004		R											
TM3-8L- A09K07-SH06H05-N.004		L	8	280	500	3600	43.6	90.3	97.5				
TM3-8R- A09K07-SH06H05-N.004		R											
TM3-6L- A09K07-SH06H05-N.004		L	6	280	500	4000	42.0	87.2	94.4				
TM3-6R- A09K07-SH06H05-N.004		R											
TM3-4L- A09K07-SH06H05-N.004		L	4	280	500	4000	40.5	84.0	91.2				
TM3-4R- A09K07-SH06H05-N.004		R											



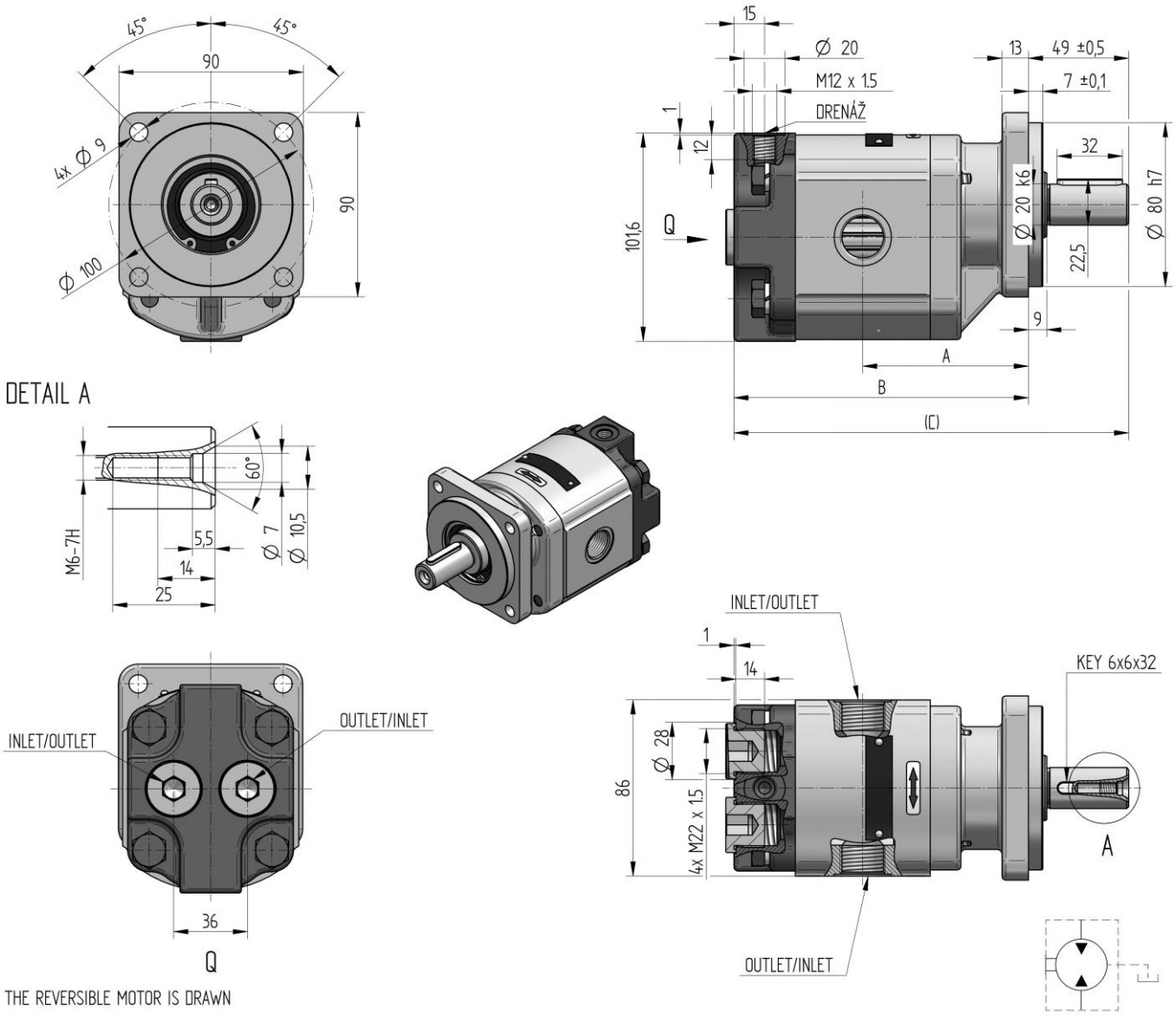
ORDER KEY	PURCH. CODE	DIRECT. OF ROT.	DISPLA-CEMENT [cm³/1]	NOM. PRES. [bar]	SPEED MIN [min⁻¹]	SPEED MAX. [min⁻¹]	DIMENSIONS A [mm]	DIMENSIONS B [mm]	DIMENSIONS C [mm]				
TM3-31L- R06C10-SH06H05-N		L	31	150	500	2200	63.7	128.5	168.3				
TM3-31R- R06C10-SH06H05-N		R											
TM3-25L- R06C10-SH06H05-N		L	25	200	500	2800	59.0	119.1	158.9				
TM3-25R- R06C10-SH06H05-N		R											
TM3-20L- R06C10-SH06H05-N		L	20	240	500	3200	55.0	111.2	151.0				
TM3-20R- R06C10-SH06H05-N		R											
TM3-16L- R06C10-SH06H05-N		L	16	260	500	3200	51.9	104.9	144.7				
TM3-16R- R06C10-SH06H05-N		R											
TM3-12L- R06C10-SH06H05-N		L	12	260	500	3600	48.8	98.6	138.4				
TM3-12R- R06C10-SH06H05-N		R											
TM3-8L- R06C10-SH06H05-N		L	8	280	500	3600	45.6	92.3	132.1				
TM3-8R- R06C10-SH06H05-N		R											
TM3-6L- R06C10-SH06H05-N		L	6	280	500	4000	44.0	89.2	129.0				
TM3-6R- R06C10-SH06H05-N		R											
TM3-4L- R06C10-SH06H05-N		L	4	280	500	4000	42.5	86.0	125.8				
TM3-4R- R06C10-SH06H05-N		R											



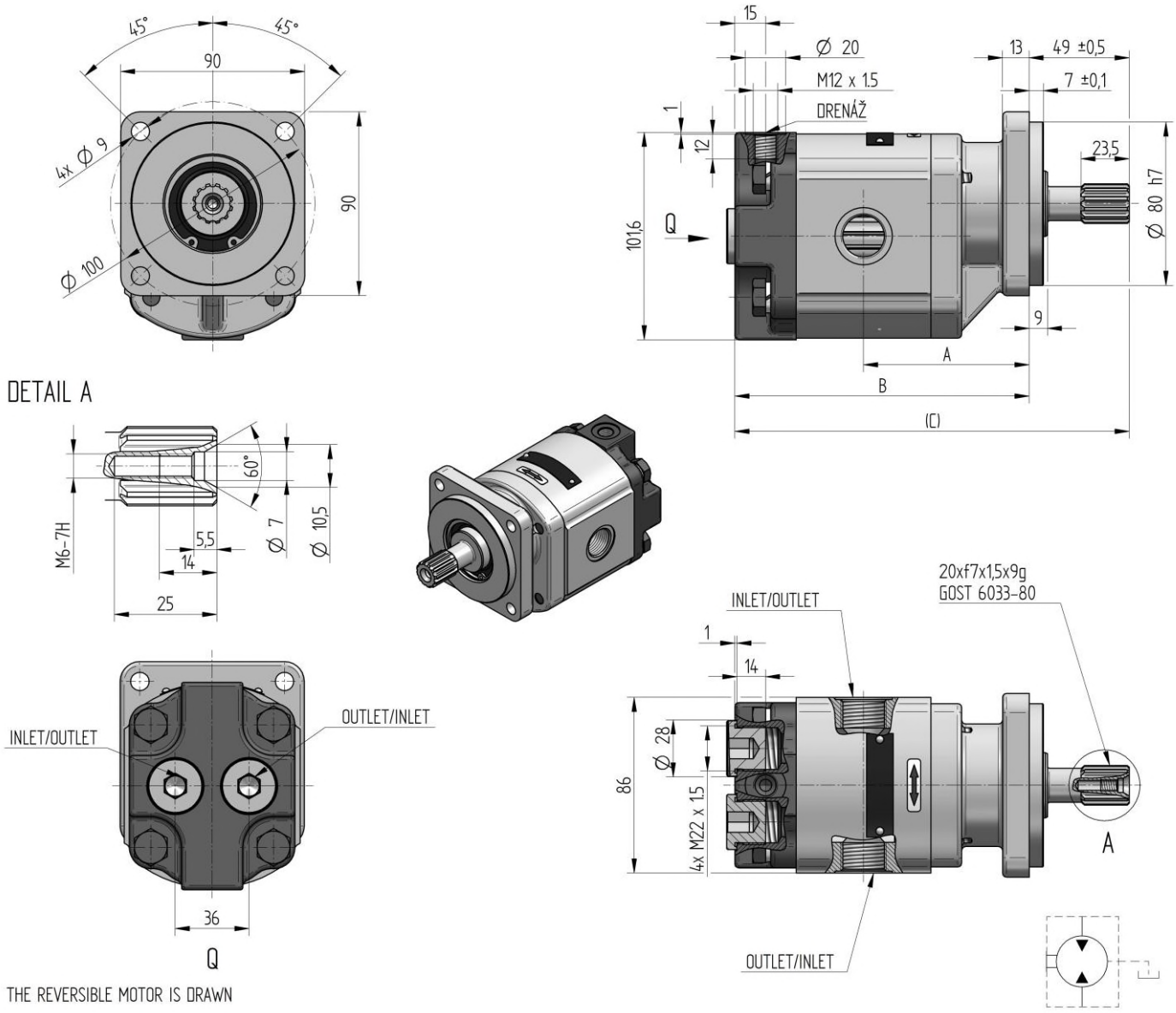
ORDER KEY	PURCH CODE	DIRECT. OF ROT.	DISPLACEMENT [cm³/1]	NOM. PRES. [bar]	MIN SPEED [min⁻¹]	MAX. SPEED [min⁻¹]	A	B	C	D	E	F	
							DIMENSIONS [mm]						
TM3-31L- S02V12-SU05U04-N		L	31	150	500	2200	63.7	128.5	160.5	1-1/16-12 UN-2B	19	41	
TM3-31R- S02V12-SU05U04-N		R											
TM3-25L- S02V12-SU05U04-N		L	25	200	500	2800	59.0	119.1	151.1	1-1/16-12 UN-2B	19	41	
TM3-25R- S02V12-SU05U04-N		R											
TM3-20L- S02V12-SU05U04-N		L	20	240	500	3200	55.0	111.2	143.2	1-1/16-12 UN-2B	19	41	
TM3-20R- S02V12-SU05U04-N		R											
TM3-16L- S02V12-SU05U04-N		L	16	260	500	3200	51.9	104.9	136.9	1-1/16-12 UN-2B	19	41	
TM3-16R- S02V12-SU05U04-N		R											
TM3-12L- S02V12-SU05U04-N		L	12	260	500	3600	48.8	98.6	130.6	1-1/16-12 UN-2B	19	41	
TM3-12R- S02V12-SU05U04-N		R											
TM3-8L- S02V12-SU04U04-N		L	8	280	500	3600	45.6	92.3	124.3	7/8-14 UNF-2B	17	34	
TM3-8R- S02V12-SU04U04-N		R											
TM3-6L- S02V12-SU04U04-N		L	6	280	500	4000	44.0	89.2	121.2	7/8-14 UNF-2B	17	34	
TM3-6R- S02V12-SU04U04-N		R											
TM3-4L- S02V12-SU04U04-N		L	4	280	500	4000	42.5	86.0	118.0	7/8-14 UNF-2B	17	34	
TM3-4R- S02V12-SU04U04-N		R											



ORDER KEY	PURCH. CODE	DIRECT. OF ROT.	DISPLA-CEMENT [cm³/1]	NOM. PRES. [bar]	SPEED MIN. [min⁻¹]	SPEED MAX. [min⁻¹]	DIMENSIONS A [mm]	DIMENSIONS B [mm]	DIMENSIONS C [mm]	DIMENSIONS D [mm]	DIMENSIONS E [mm]	DIMENSIONS F [mm]
TM3-31L- S02D04-SG04G03-N		L	31	150	500	2200	63.7	128.5	160.6	G3/4	16	39
TM3-31R- S02D04-SG04G03-N		R										
TM3-25L- S02D04-SG04G03-N		L	25	200	500	2800	59.0	119.1	151.2	G3/4	16	39
TM3-25R- S02D04-SG04G03-N		R										
TM3-20L- S02D04-SG04G03-N		L	20	240	500	3200	55.0	111.2	143.3	G3/4	16	39
TM3-20R- S02D04-SG04G03-N		R										
TM3-16L- S02D04-SG04G03-N		L	16	260	500	3200	51.9	104.9	137.0	G3/4	16	39
TM3-16R- S02D04-SG04G03-N		R										
TM3-12L- S02D04-SG03G03-N		L	12	260	500	3600	48.8	98.6	130.7	G3/4	16	39
TM3-12R- S02D04-SG04G03-N		R										
TM3-8L- S02D04-SG03G03-N		L	8	280	500	3600	45.6	92.3	124.4	G1/2	14	33
TM3-8R- S02D04-SG03G03-N		R										
TM3-6L- S02D04-SG03G03-N		L	6	280	500	4000	44.0	89.2	121.3	G1/2	14	33
TM3-6R- S02D04-SG03G03-N		R										
TM3-4L- S02D04-SG03G03-N		L	4	280	500	4000	42.5	86.0	118.1	G1/2	14	33
TM3-4R- S02D04-SG03G03-N		R										



		B											
		B											
		B											
		B											
		B											
		B											
TM3-13B-F02D10-CM07M07-N.027	184 9217	B	13	260	300	3500	78.6	139.1	188.1				
		B											
ORDER KEY	PURCH. CODE	DIRECT. OF ROT.	DISPLA-CEMENT [cm³/1]	NOM. PRES. [bar]	MIN. SPEED [min⁻¹]	MAX. SPEED [min⁻¹]	A	B	C	DIMENSIONS [mm]			



		B											
		B											
		B											
		B											
		B											
		B											
TM3-13B-F02V13-CM07M07-N.027	184 9215	B	13	260	300	3500	78.6	139.1	188.1				
		B											
ORDER KEY	PURCH. CODE	DIRECT. OF ROT.	DISPLA-CEMENT [cm³/1]	NOM. PRES. [bar]	MIN. SPEED [min⁻¹]	MAX. SPEED [min⁻¹]	A	B	C	DIMENSIONS [mm]			

NOTES:

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