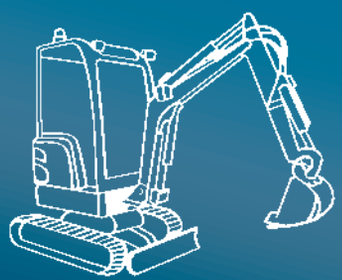
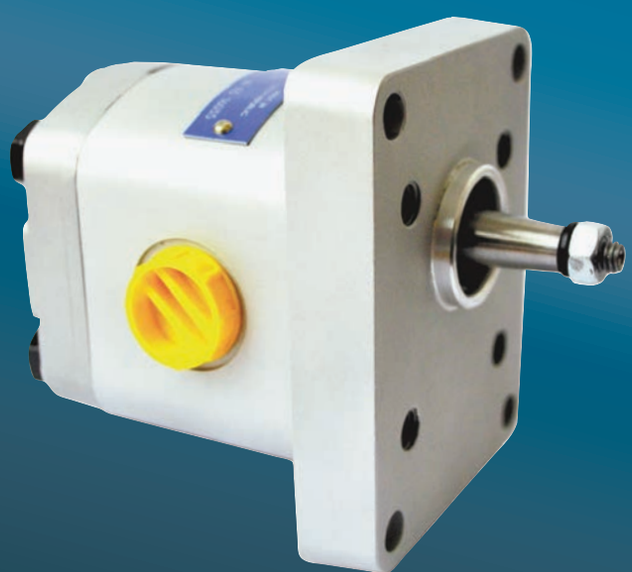
jihostroj
AERO TECHNOLOGY & HYDRAULICS

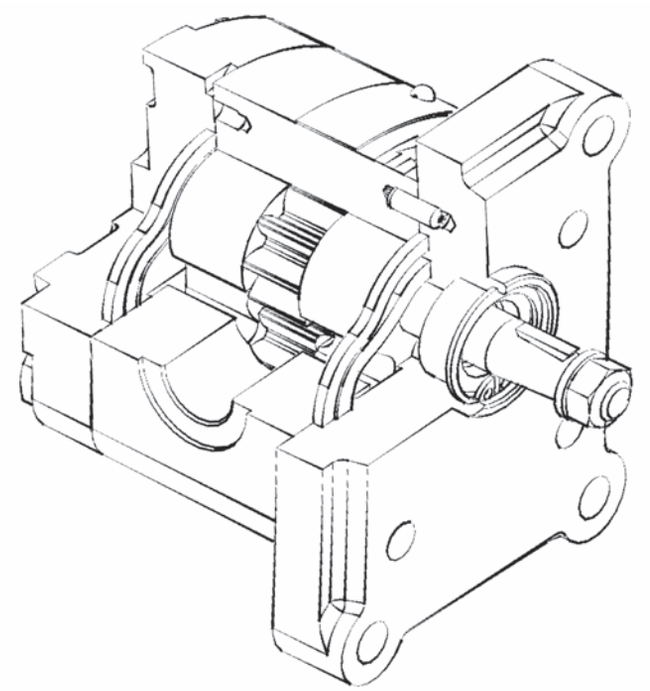




Displacement from 0.8 to 11.8 ccm
Pressure up to 280 bar
Speed from 500 to 5000 RPM

GEAR MOTORS
PM23

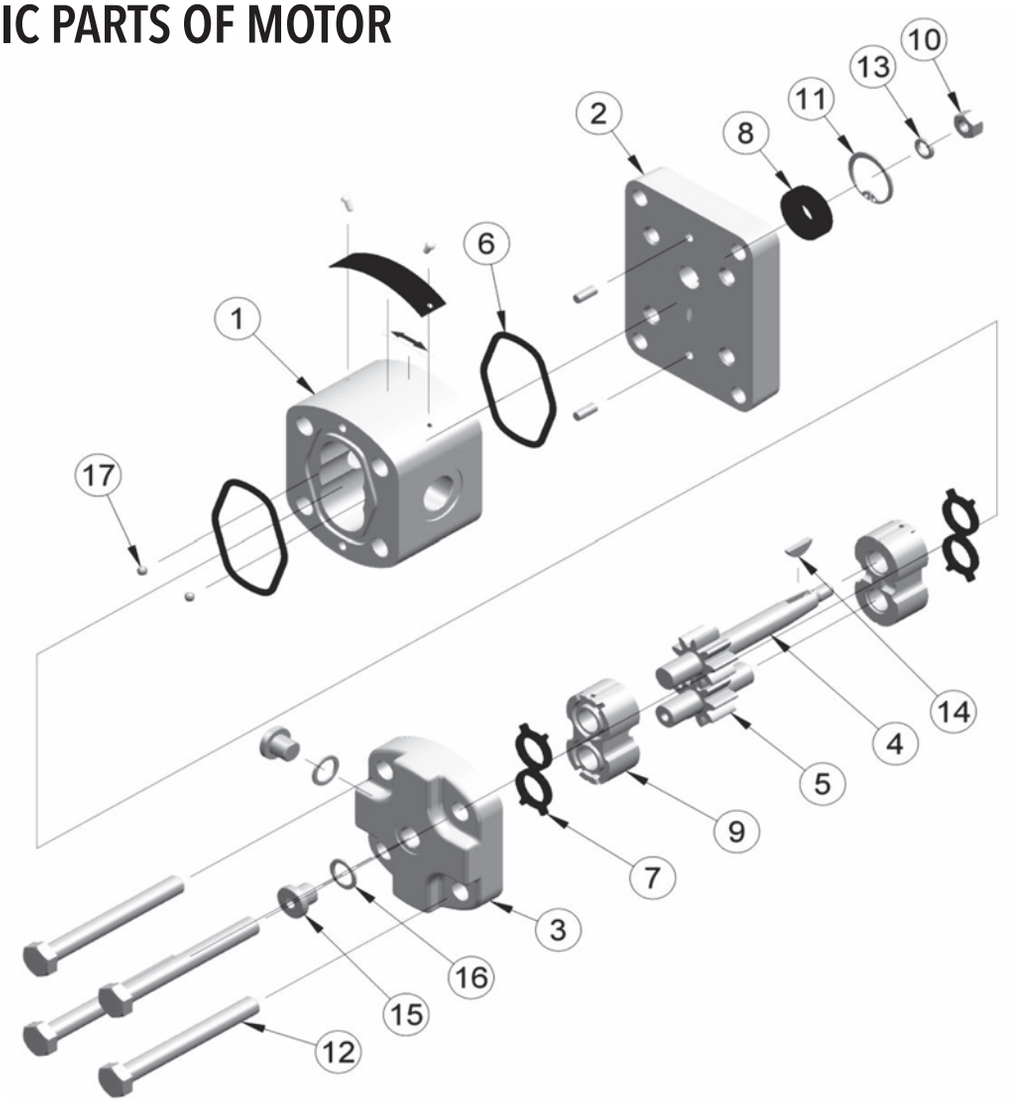
TABLE OF CONTENTS



DESCRIPTION

- Gear motors are used for transformation of liquid pressure head in mechanical energy. PM23 series motors are designed for advanced hydraulic systems with lower capacity (approximately up to 8 kW) with high operational reliability and long service life. They have been produced in both one-way and reversible version with internal or external drainage. A wide variety of designs with diverse drives, connecting flanges, fluid inlets and outlets enable the motors to be used in hydraulic systems of both fixed and mobile machines and equipment. Types of connections and flanges as well as the other connecting dimensions correspond to all worldwide standards.
- The motors are made of high-quality aluminium alloys with steel gear-wheels and they are equipped with hydraulic axial play compensation of new generation ensuring stable performance and torsion moment within the entire range of speeds and temperatures. As for their dimensions, PM23 motors are fully interchangeable with PM and PM2 motors.

BASIC PARTS OF MOTOR



1. Body
2. Flange
3. Cover
4. Driving gear
5. Driven gear
6. Peripheral sealing
7. Balancing sealing
8. Shaft seal
9. Bearing sleeves
10. Nut
11. Safety ring
12. Bolts
13. Spring washer
14. Woodruff key
15. Plug
16. Seal ring AL
17. Steel marble

PARAMETER TABLE

One direction motors

Nominal Size Parameters		Sym.	Unit	PM23 0.80	PM23 1.20	PM23 1.60	PM23 2.10	PM23 2.50	PM23 3.30	PM23 3.60
Actual displacement		V_g	[cm^3]	0.85	1.25	1.68	2.08	2.51	3.32	3.61
Rotation speed	nominal	n_n	[min^{-1}]	1500	1500	1500	1500	1500	1500	1500
	maximum	n_{max}	[min^{-1}]	5000	5000	4500	4500	4000	4000	4000
	minimum	n_{min}	[min^{-1}]	800	800	600	600	500	500	500
Pressure at outlet	maximum	p_{1max}	[bar]	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	minimum	p_{1min}	[bar]	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Pressure at inlet	max. continuous	p_{2n}	[bar]	280	280	280	280	280	280	260
	maximum	p_{2max}	[bar]	300	300	300	300	300	300	280
	peak	p_3	[bar]	310	310	310	310	310	310	290
Nominal input flow rate (max.) at n_n and p_{2n}		Q_n	[$dm^3.min^{-1}$]	1.41	2.12	2.73	3.58	4.17	5.50	6.00
Maximum input flow rate at n_{max} and p_{2max}		Q_{max}	[$dm^3.min^{-1}$]	4.26	6.38	7.66	10.05	10.64	14.04	15.32
Nominal output power (min.) at n_n and p_{2n}		P_n	[kW]	0.30	0.53	0.71	0.95	1.23	1.63	1.64
Maximum output power at n_{max} a p_{2max}		P_{max}	[kW]	1.06	1.88	2.27	3.04	3.51	4.65	4.72
Nominal Torque at n_n and p_{2n}		M	[Nm]	3.21	4.81	6.42	8.42	10.03	13.24	13.41
Weight		m	[kg]	0.82	0.84	0.85	0.87	0.89	0.92	0.93

One direction motors

Nominal Size Parameters		Sym.	Unit	PM23 4.40	PM23 4.80	PM23 5.80	PM23 6.20	PM23 7.90	PM23 11.80
Actual displacement		V_g	[cm^3]	4.39	4.79	5.80	6.21	7.89	11.79
Rotation speed	nominal	n_n	[min^{-1}]	1500	1500	1500	1500	1500	1500
	maximum	n_{max}	[min^{-1}]	4000	3800	3800	3500	3000	1800
	minimum	n_{min}	[min^{-1}]	500	500	500	500	500	500
Pressure at outlet	maximum	p_{1max}	[bar]	0.5	0.5	0.5	0.5	0.5	0.5
	minimum	p_{1min}	[bar]	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Pressure at inlet	max. continuous	p_{2n}	[bar]	250	230	200	180	160	100
	maximum	p_{2max}	[bar]	270	250	220	200	180	150
	peak	p_3	[bar]	280	260	230	210	190	160
Nominal input flow rate (max.) at n_n and p_{2n}		Q_n	[$dm^3.min^{-1}$]	7.33	8.00	9.67	10.33	13.17	19.67
Maximum input flow rate at n_{max} and p_{2max}		Q_{max}	[$dm^3.min^{-1}$]	18.72	19.40	23.45	23.09	25.21	22.60
Nominal output power (min.) at n_n and p_{2n}		P_n	[kW]	1.92	1.93	2.03	1.96	2.21	2.06
Maximum output power at n_{max} a p_{2max}		P_{max}	[kW]	5.53	5.31	5.66	5.07	4.97	3.71
Nominal Torque at n_n and p_{2n}		M	[Nm]	15.76	15.81	16.62	15.99	18.11	16.90
Weight		m	[kg]	0.96	0.98	1.02	1.04	1.10	1.25

One direction motors

Nominal Size Parameters		Sym.	Unit	PM23 1.00	PM23 2.30	PM23 2.65	PM23 6.40	PM23 7.00	PM23 10.00
Actual displacement		V_g	[cm^3]	1.02	2.30	2.67	6.42	7.00	10.00
Rotation speed	nominal	n_n	[min^{-1}]	1500	1500	1500	1500	1500	1500
	maximum	n_{max}	[min^{-1}]	5000	4500	4500	3500	3000	1800
	minimum	n_{min}	[min^{-1}]	800	500	500	500	500	500
Pressure at outlet	maximum	p_{1max}	[bar]	0.5	0.5	0.5	0.5	0.5	0.5
	minimum	p_{1min}	[bar]	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Pressure at inlet	max. continuous	p_{2n}	[bar]	280	280	280	180	170	100
	maximum	p_{2max}	[bar]	300	300	300	200	190	150
	peak	p_3	[bar]	310	310	310	210	200	160
Nominal input flow rate (max.) at n_n and p_{2n}		Q_n	[$dm^3.min^{-1}$]	1.76	4.06	4.52	10.67	11.67	16.67
Maximum input flow rate at n_{max} and p_{2max}		Q_{max}	[$dm^3.min^{-1}$]	5.32	11.01	12.69	23.83	22.34	19.15
Nominal output power (min.) at n_n and p_{2n}		P_n	[kW]	0.36	1.05	1.31	2.02	2.08	1.75
Maximum output power at n_{max} a p_{2max}		P_{max}	[kW]	1.28	3.36	4.21	5.24	4.66	3.15
Nominal Torque at n_n and p_{2n}		M	[Nm]	4.01	9.22	10.63	16.50	17.05	14.32
Weight		m	[kg]	0.83	0.88	0.90	1.05	1.08	1.20

Reversible motors

Nominal Size Parameters		Sym.	Unit	PM23 0.80	PM23 1.20	PM23 1.60	PM23 2.10	PM23 2.50	PM23 3.30	PM23 3.60
Actual displacement		V_g	[cm^3]	0.85	1.25	1.68	2.08	2.51	3.32	3.61
Rotation speed	nominal	n_n	[min^{-1}]	1500	1500	1500	1500	1500	1500	1500
	maximum	n_{max}	[min^{-1}]	5000	5000	4500	4500	4000	4000	4000
	minimum	n_{min}	[min^{-1}]	800	800	600	600	500	500	500
Pressure at outlet	maximum	p_{1max}	[bar]	210	210	210	210	210	210	190
	minimum	p_{1min}	[bar]	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Pressure at inlet	max. continuous	p_{2n}	[bar]	280	280	280	280	280	280	260
	maximum	p_{2max}	[bar]	300	300	300	300	300	300	280
	peak	p_3	[bar]	310	310	310	310	310	310	290
Nominal input flow rate (max.) at n_n and p_{2n}		Q_n	[$dm^3.min^{-1}$]	1.41	2.12	2.73	3.58	4.17	5.50	6.00
Maximum input flow rate at n_{max} and p_{2max}		Q_{max}	[$dm^3.min^{-1}$]	4.26	6.38	7.66	10.05	10.64	14.04	15.32
Nominal output power (min.) at n_n and p_{2n}		P_n	[kW]	0.30	0.53	0.71	0.95	1.23	1.63	1.64
Maximum output power at n_{max} a p_{2max}		P_{max}	[kW]	1.06	1.88	2.27	3.04	3.51	4.65	4.72
Nominal Torque at n_n and p_{2n}		M	[Nm]	3.21	4.81	6.42	8.42	10.03	13.24	13.41
Weight		m	[kg]	0.82	0.84	0.85	0.87	0.89	0.92	0.93

External drainage must be used in case of the reversible design.

Reversible motors

Nominal Size Parameters		Sym.	Unit	PM23 4.40	PM23 4.80	PM23 5.80	PM23 6.20	PM23 7.90	PM23 11.80
Actual displacement		V_g	[cm^3]	4.39	4.79	5.80	6.21	7.89	11.79
Rotation speed	nominal	n_n	[min^{-1}]	1500	1500	1500	1500	1500	1500
	maximum	n_{max}	[min^{-1}]	4000	3800	3800	3500	3000	1800
	minimum	n_{min}	[min^{-1}]	500	500	500	500	500	500
Pressure at outlet	maximum	p_{1max}	[bar]	180	160	130	110	90	30
	minimum	p_{1min}	[bar]	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Pressure at inlet	max. continuous	p_{2n}	[bar]	250	230	200	180	160	100
	maximum	p_{2max}	[bar]	270	250	220	200	180	150
	peak	p_3	[bar]	280	260	230	210	190	160
Nominal input flow rate (max.) at n_n and p_{2n}		Q_n	[$dm^3.min^{-1}$]	7.33	8.00	9.67	10.33	13.17	19.67
Maximum input flow rate at n_{max} and p_{2max}		Q_{max}	[$dm^3.min^{-1}$]	18.72	19.40	23.45	23.09	25.21	22.60
Nominal output power (min.) at n_n and p_{2n}		P_n	[kW]	1.92	1.93	2.03	1.96	2.21	2.06
Maximum output power at n_{max} a p_{2max}		P_{max}	[kW]	5.53	5.31	5.66	5.07	4.97	3.71
Nominal Torque at n_n and p_{2n}		M	[Nm]	15.76	15.81	16.62	15.99	18.11	16.90
Weight		m	[kg]	0.96	0.98	1.02	1.04	1.10	1.25

Reversible motors

Nominal Size Parameters		Sym.	Unit	PM23 1.00	PM23 2.30	PM23 2.65	PM23 6.40	PM23 7.00	PM23 10.00
Actual displacement		V_g	[cm^3]	1.02	2.30	2.67	6.42	7.00	10.00
Rotation speed	nominal	n_n	[min^{-1}]	1500	1500	1500	1500	1500	1500
	maximum	n_{max}	[min^{-1}]	5000	4500	4500	3500	3000	1800
	minimum	n_{min}	[min^{-1}]	800	500	500	500	500	500
Pressure at outlet	maximum	p_{1max}	[bar]	210	210	210	110	100	30
	minimum	p_{1min}	[bar]	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Pressure at inlet	max. continuous	p_{2n}	[bar]	280	280	280	180	170	100
	maximum	p_{2max}	[bar]	300	300	300	200	190	150
	peak	p_3	[bar]	310	310	310	210	200	160
Nominal input flow rate (max.) at n_n and p_{2n}		Q_n	[$dm^3.min^{-1}$]	1.76	4.06	4.52	10.67	11.67	16.67
Maximum input flow rate at n_{max} and p_{2max}		Q_{max}	[$dm^3.min^{-1}$]	5.32	11.01	12.69	23.83	22.34	19.15
Nominal output power (min.) at n_n and p_{2n}		P_n	[kW]	0.36	1.05	1.31	2.02	2.08	1.75
Maximum output power at n_{max} a p_{2max}		P_{max}	[kW]	1.28	3.36	4.21	5.24	4.66	3.15
Nominal Torque at n_n and p_{2n}		M	[Nm]	4.01	9.22	10.63	16.50	17.05	14.32
Weight		m	[kg]	0.83	0.88	0.90	1.05	1.08	1.20

FORMULAS USED FOR CALCULATION

Flow rate
Q

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

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

Displacement
V_g

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

Torque
M_k

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

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

Input power
P

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

η_t [–] total efficiency

PUMP EFFICIENCIES

Volumetric efficiency
η_v

It determines the amount of flow losses. Its value is $\eta_v = 0{,}92 \div 0{,}98$ (depending on rotation speed, viscosity of working liquid and outlet pressure). It can be expressed as follows:

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

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

Mechanical efficiency
η_m

It determines mechanical losses. Its value is about $\eta_m = 0{,}85$.
It can be expressed as follows:

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

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

Total efficiency
η_t

t is defined as product of η_n and η_m
and determines difference between theoretical and actual required input power:

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

$P_{act.}$ [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 $20 \cdot 10^{-6}$ should be consulted with manufacturer): $\nu = 10 \cdot 10^{-6}\ [m^2 \cdot s^{-1}]$

Filtration coefficient β_α

$\beta_{25}\ 75 \geq$ (for pressure $p_2 < 200$ bar)
$\beta_{10}\ 75 \geq$ (for pressure $p_2 > 200$ bar)

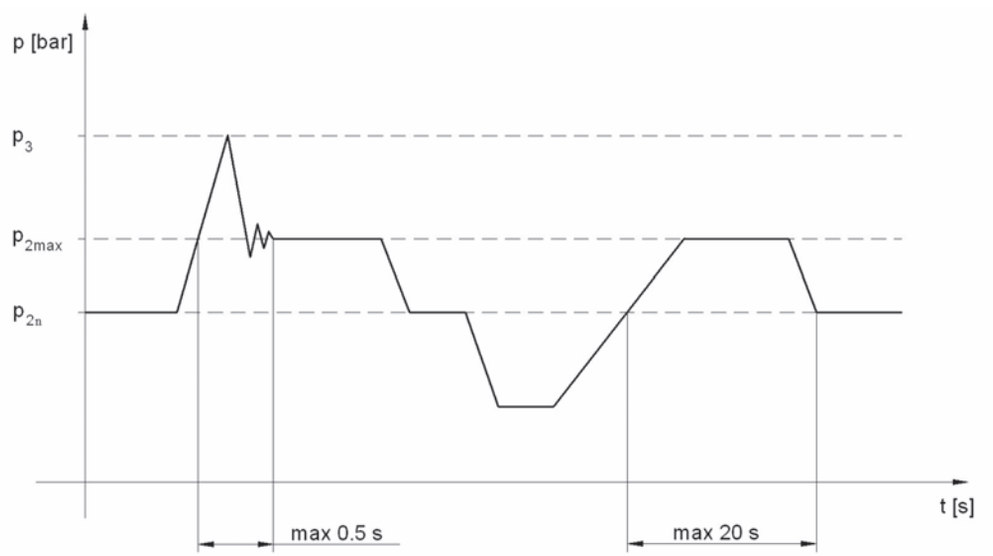
Liquid contamination class according to ISO 4406

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



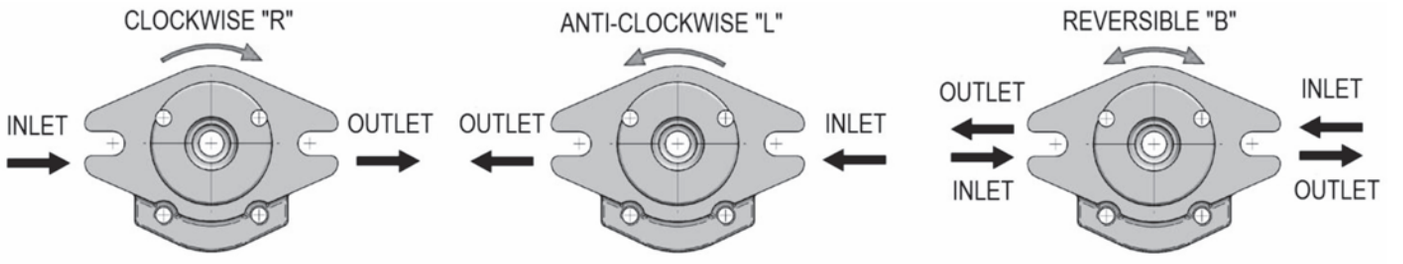
p_{2n}	**max. contin. pressure**	Max. working pressure, at which the pump can be operated without time limitation.
p_{2max}	**max. pressure**	Maximum pressure permissible for a short time, max. 20s.
p_3	**peak pressure**	Short-time pressure (fractions of a second) arising in case of a sudden change of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

OTHER REQUIREMENTS

- All the matters affecting technical parameters and properties of the motor are given in respective operating manuals, technical specifications and test specifications of the manufacturer.

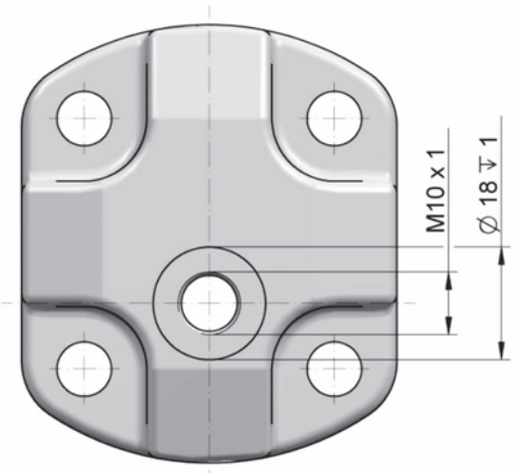
DIRECTION OF ROTATION

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

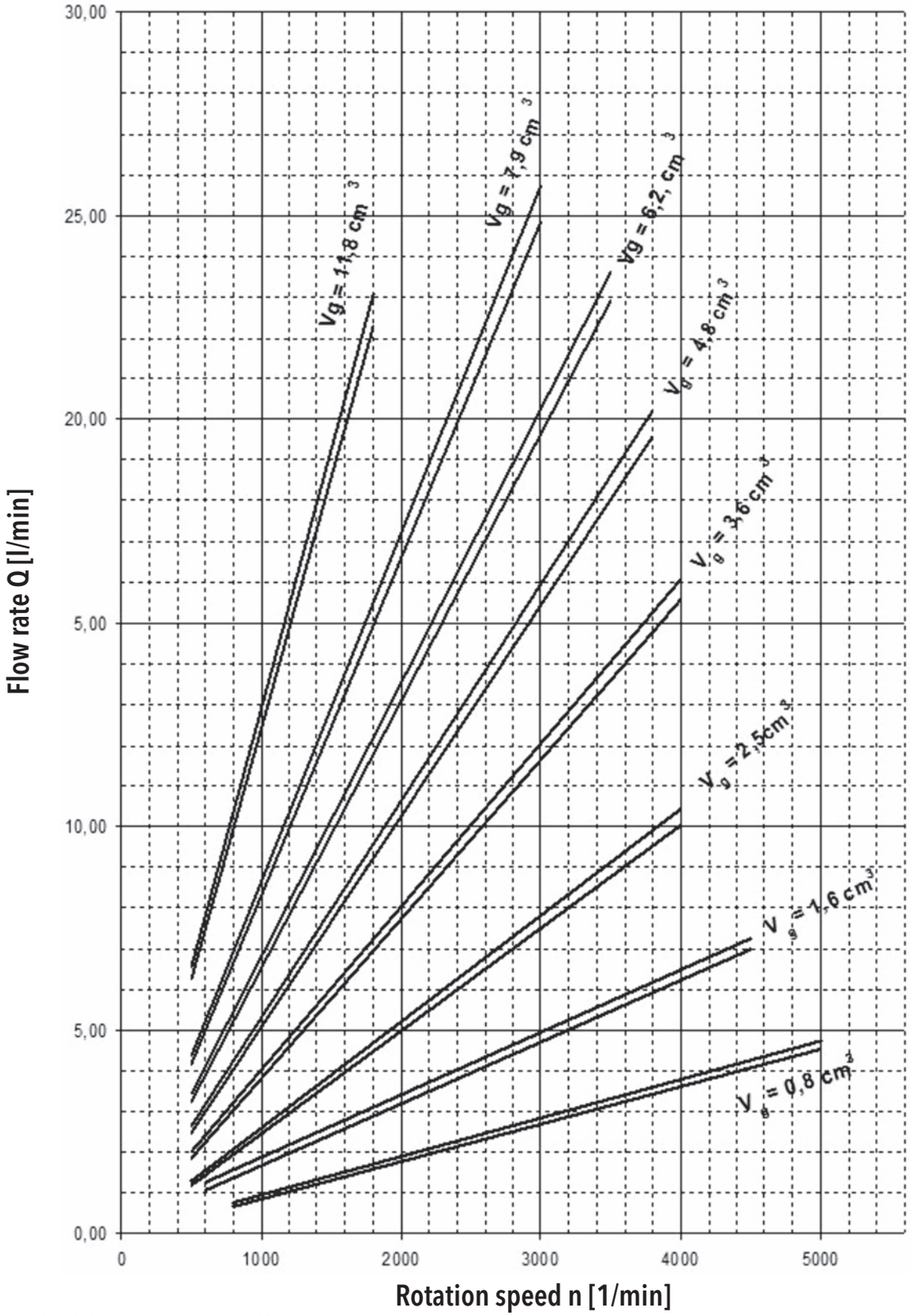


REVERSIBLE DESIGN

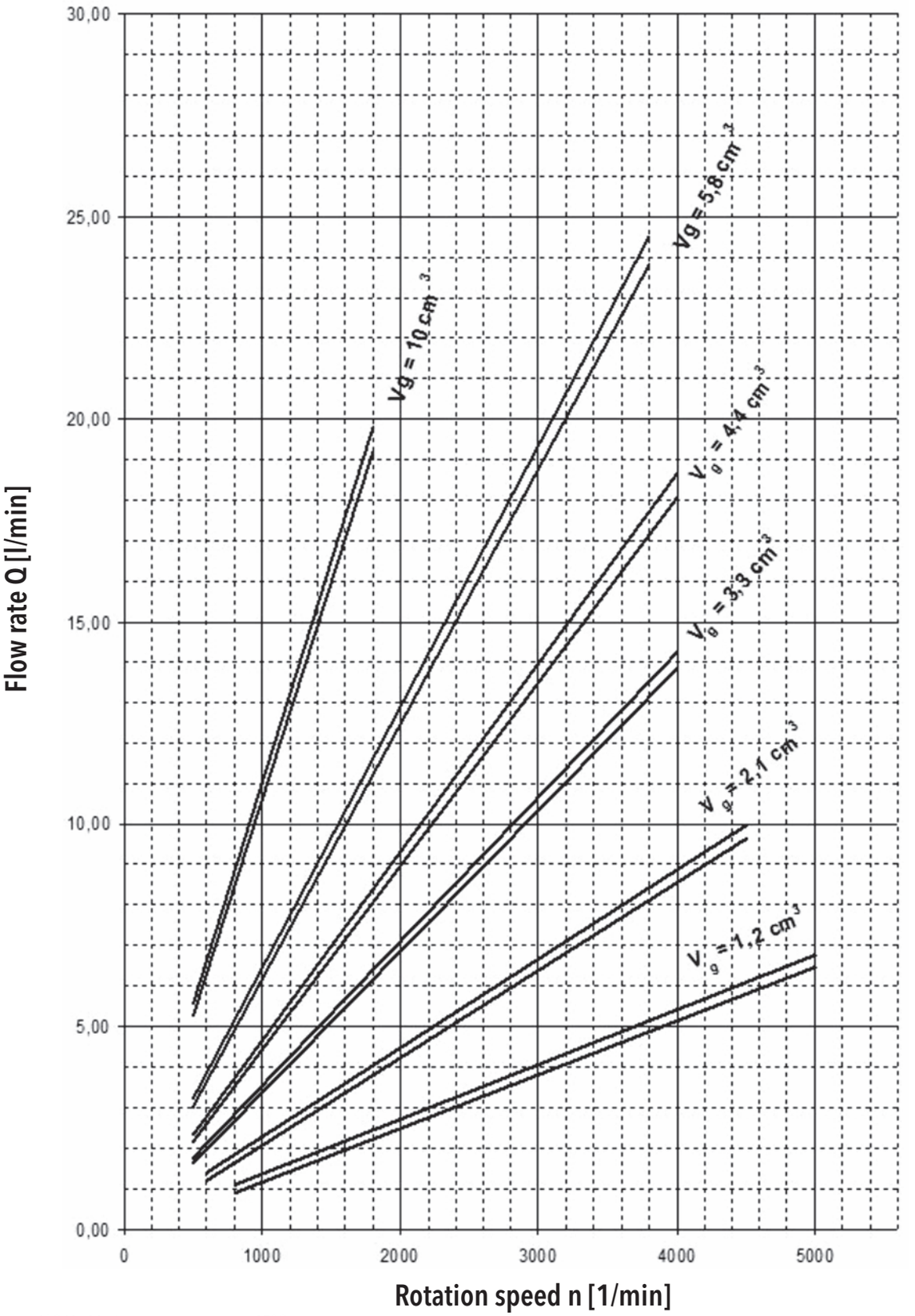
- The motors with the possibility of bidirectional rotation have a different internal arrangement requiring drainage. Two types are used - internal and external. The internal drainage is always interconnected with the outlet by means of valves. The external drainage is solved by an orifice located in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



PM23 FLOW RATE AND POWER CURVES

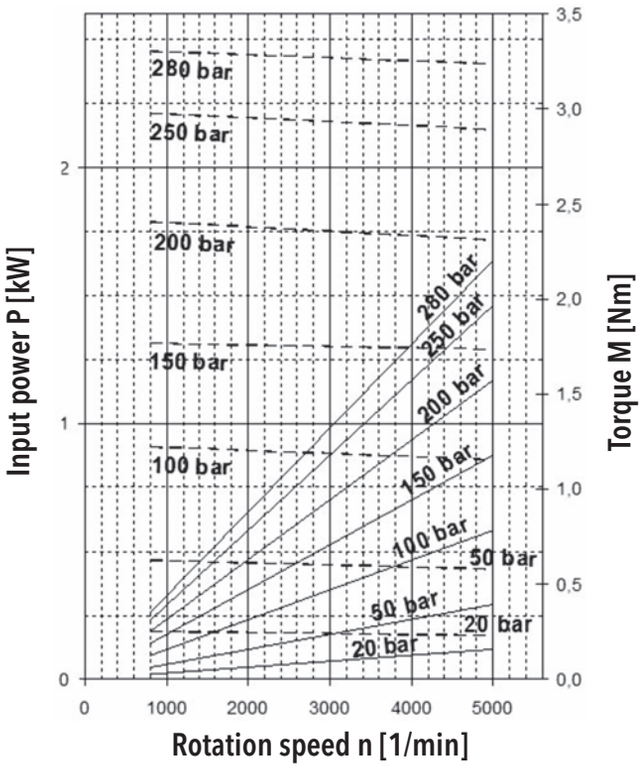


Above curves apply to ISO V_g 46 oil at temperature t = 45°C.

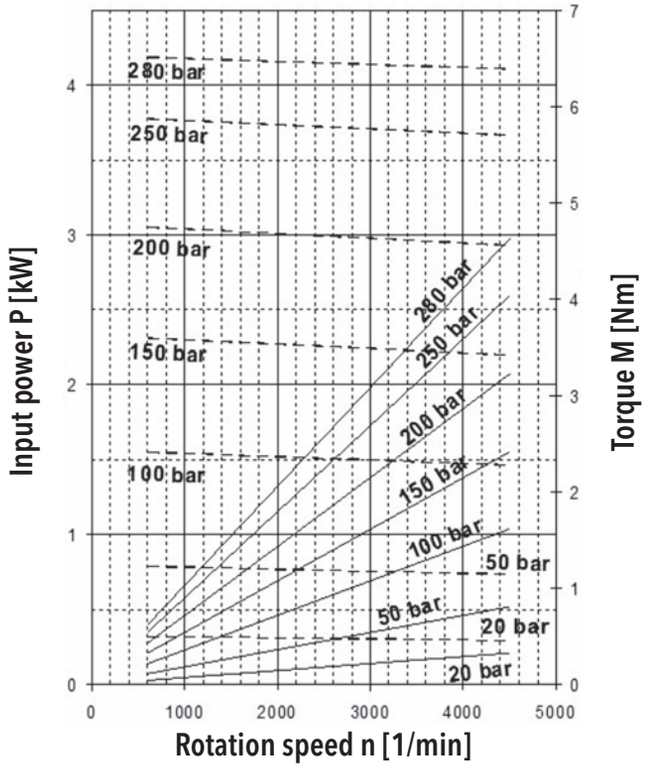


Above curves apply to ISO V_g 46 oil at temperature t = 45°C.

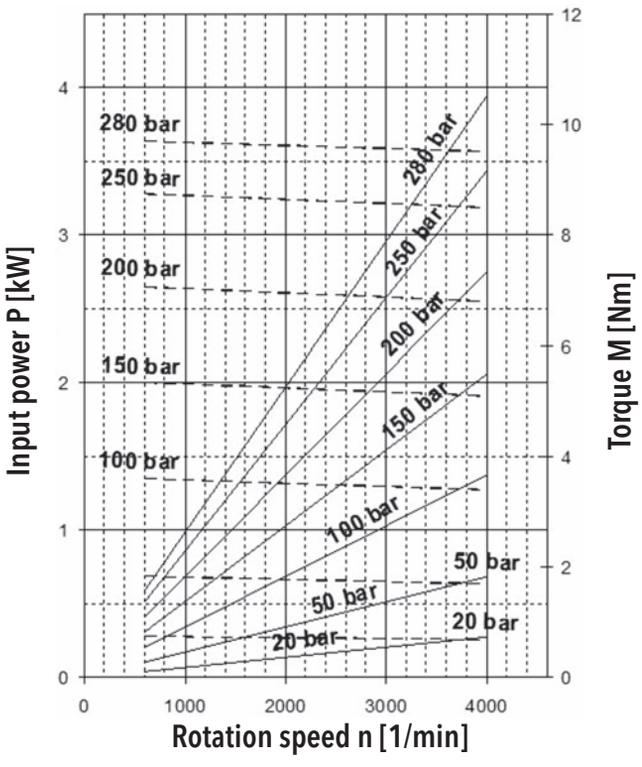
0,80 cm³



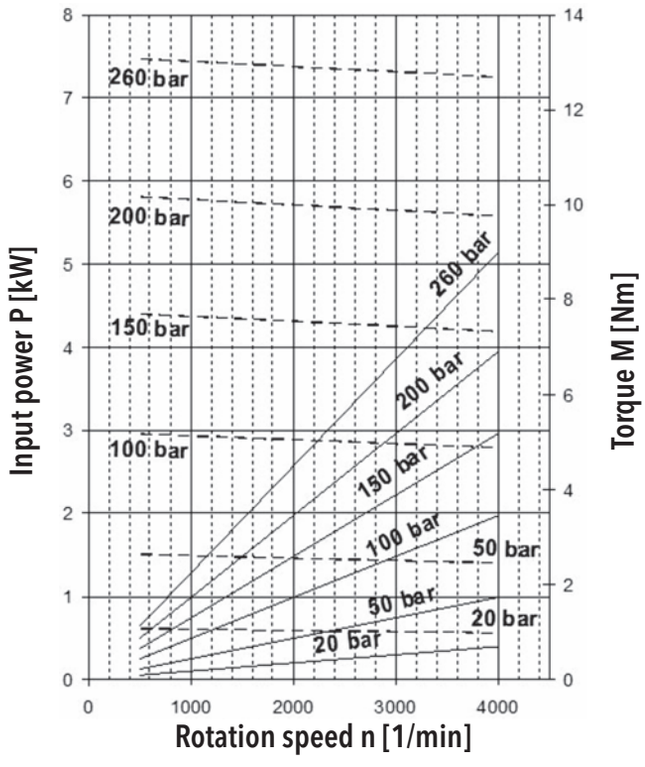
1,60 cm³



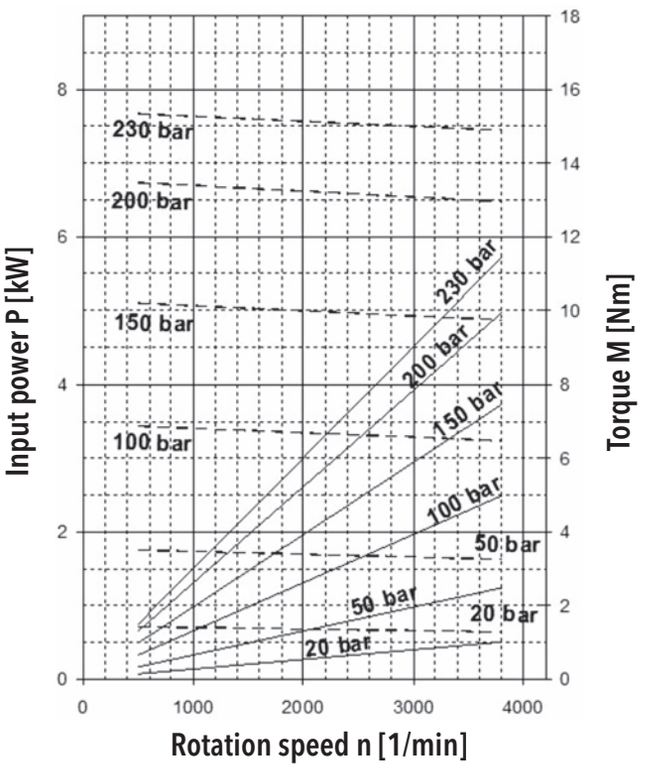
2,50 cm³



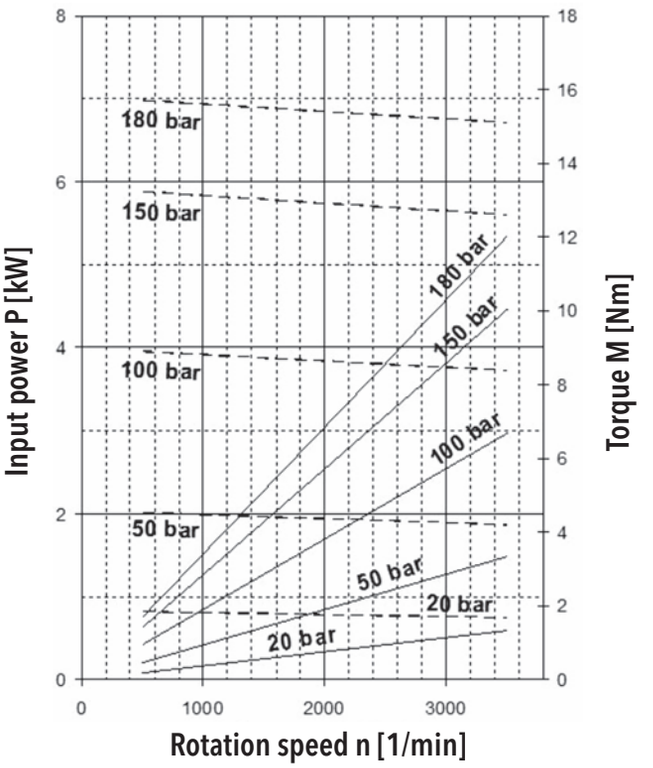
3,60 cm³



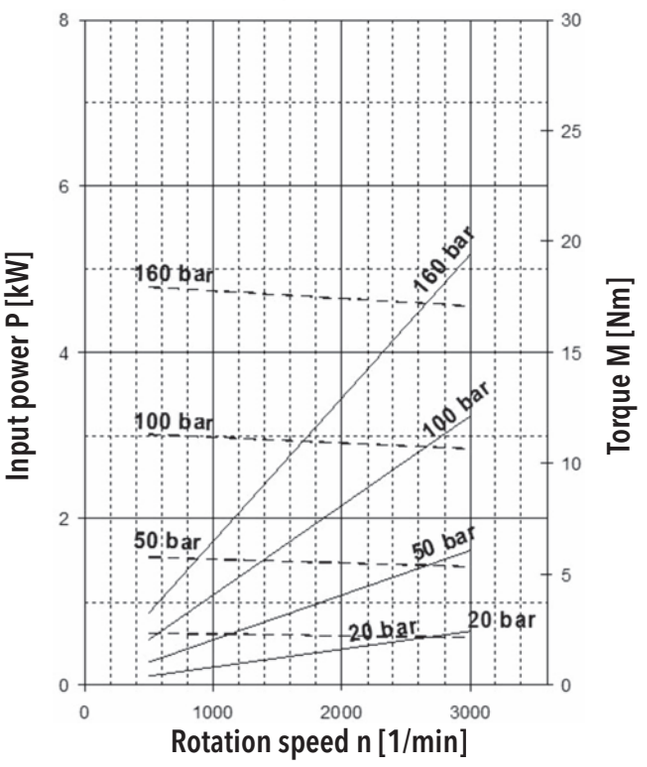
4,80 cm³



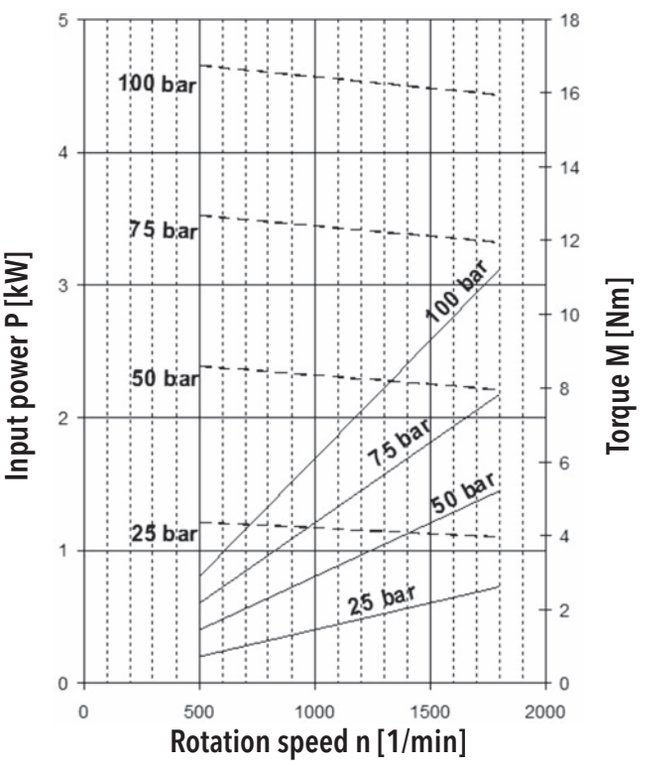
6,20 cm³



7,90 cm³



11,80 cm³



ORDER KEY

PM23 - 3,3 R - S01 D01 - S G02 G01 - V . 004

Code	Type
PM23	PM23 series motor

Code	Displacement [cm³]
0,8	0,855
1,0	1,016
1,2	1,257
1,6	1,686
2,1	2,086
2,3	2,301
2,5	2,514
2,65	2,674
3,3	3,316
3,6	3,611
4,4	4,386
4,8	4,787
5,8	5,804
6,2	6,205
6,4	6,419
7,0	7,007
7,9	7,890
10,0	10,003
11,8	11,795
XX	Other displacement on request

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

Code	Flange design
R02	Rectangular flange, centre ring Ø 25,4 Spacing screw 52,4x71,9
S01	SAE A - A
A03	Flange with through bolts centre ring Ø 32 with O-ring (deep center ring 7)
A04	Flange with through bolts centre ring Ø 32 s O-ring (deep center ring 8)
A05	Flange with through bolts centre ring Ø 32 s O-ring (narrow desing)
A06	Flange with through bolts centre ring Ø 32 (narrow desing)
Z	Special design

Code	Location of inlets and outlets
S	Side (in body)
R	Axial (in cover)
F	Axial (in flange)
A	Axial (inlet in cover, outlet in flange)
C	Combination (inlet in body outlet in flange)
D	Combination (inlet in cover outlet in body)

Code	Drive shaft design
C02	Traper 1:8 Key 2,5x3,7
C03	Traper 1:8 Key 2,4x5 Ø13
C04	Traper 1:5 Key 2x2,6-D7
K03	Cross coupling
K04	Cross coupling
V02	Cylindric Key 3h9x3x22
V03	Cylindric Key 3,2x3,2x19,4
V04	Cylindric Key 3m6x14
V05	Cylindric Key 3h9x3x10
D01	Involute spline
Z	Special design

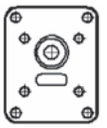
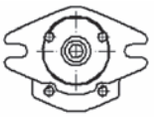
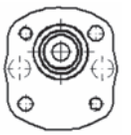
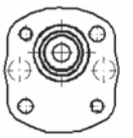
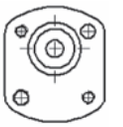
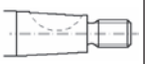
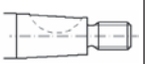
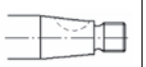
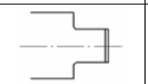
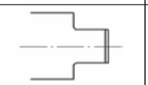
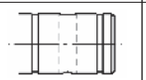
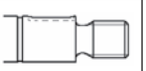
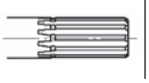
Code	Special arrangements
-	No special arrangements
001	With front end bearing
002	With relief valve
004	Without shaft seal

Code	Sealing material
N	NBR
V	FKM (VITON)
C	CR (CHLOROPREN)

Code	Liquid inlet and outlet connection shape
M02	Thread M12x1,5
M03	Thread M14x1,5
M05	Thread M18x1,5
M06	Thread M20x1,5
M07	Thread M22x1,5
G01	Thread BSP G1/4
G02	Thread BSP G3/8
G03	Thread BSP G1/2
U02	Thread 9/16–18 UNF-2B
U03	Thread 3/4–16 UNF-2B
U04	Thread 7/8–14 UNF-2B
H01	Flanged fitting Ø 8 Square 4xM5 Ø26
H02	Flanged fitting Ø 10 Square 4xM5 Ø26
H03	Flanged fitting Ø 8 Square 4xM6 Ø30
H04	Flanged fitting Ø12 Square 4xM6 Ø30
P01	Inlet / outlet in flange
Z	Special design

An example of designation for the PM23 clockwise motor with displacement of 4.4 cm³, SAE A-A flange; involute spline; BSP side inlets in the body and FKM sealing, with front-end bearing: **P23-3.3R-S01D01-SG02G01-V.001**

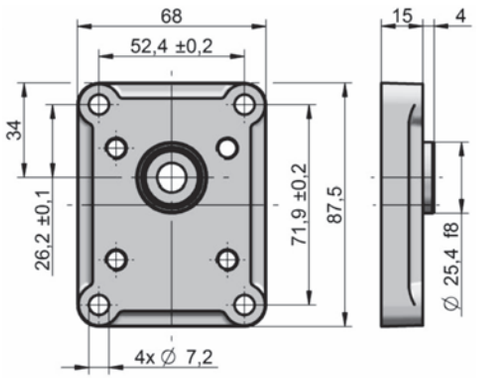
COMBINATIONS OF FLANGES AND SHAFTS

			FLANGE DESIGN					
			R02	S01	A03	A04	A05	A06
								
DRIVE SHAFT	C02		●		●			
	C03		●		●	●		
	C04		●		●			
	K03				●		●	
	K04		○			●	●	●
	V02		○	●				
	V03			●				
	V04				●			
	V05		●					
	D01				●			

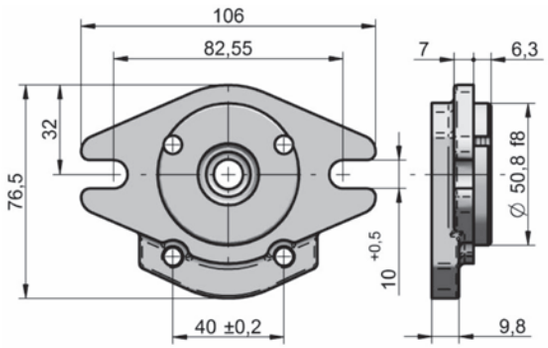
● – SUGGESTED ○ – POSSIBLE

FLANGES DESIGN

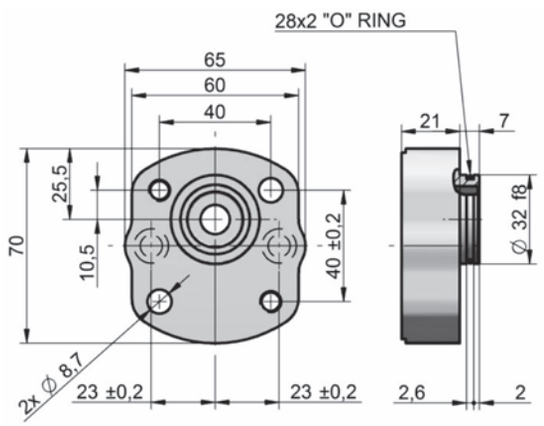
R02:



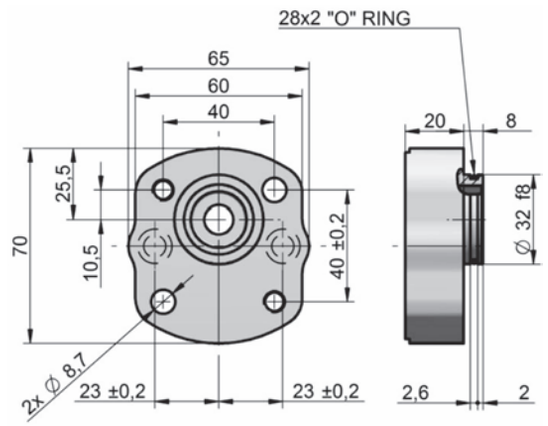
S01:



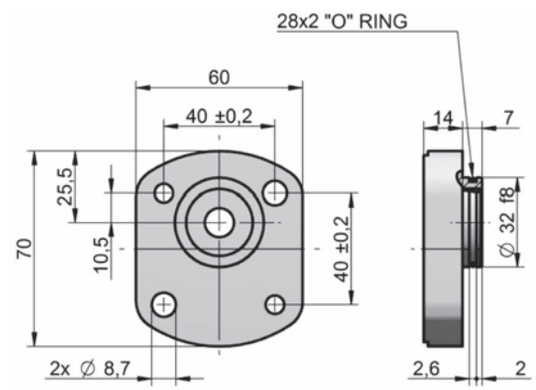
A03:



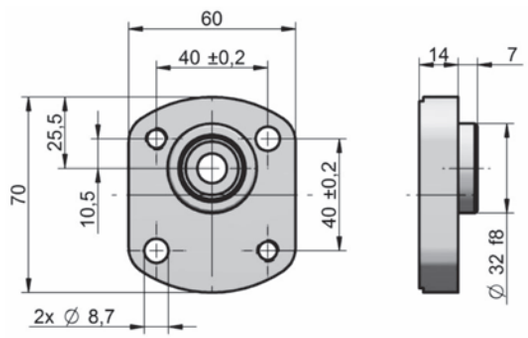
A04:



A05:

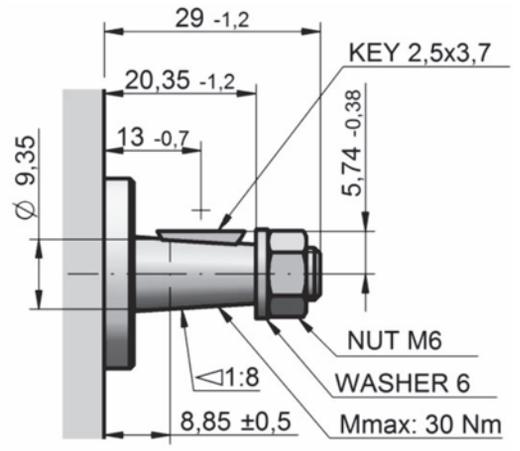


A06:

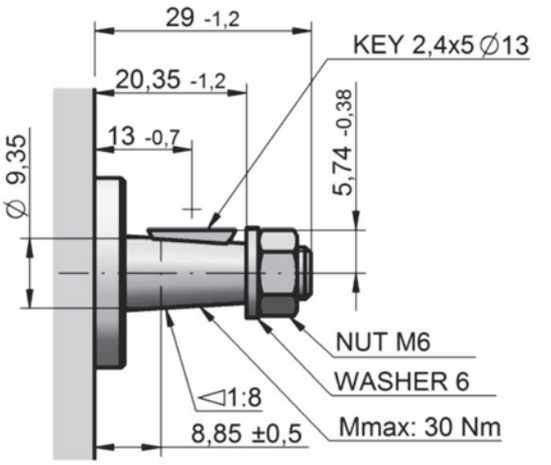


DRIVE SHAFTS

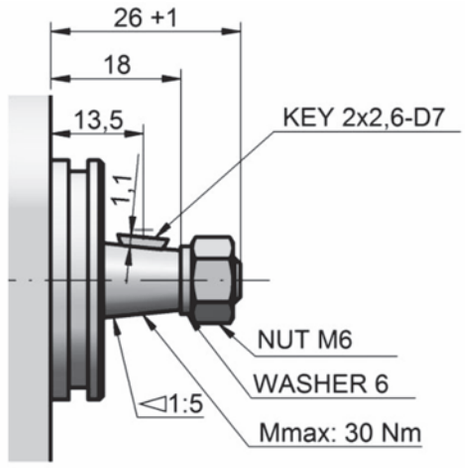
C02:



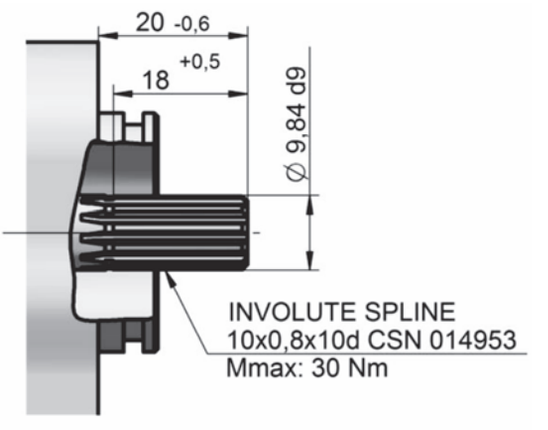
C03:



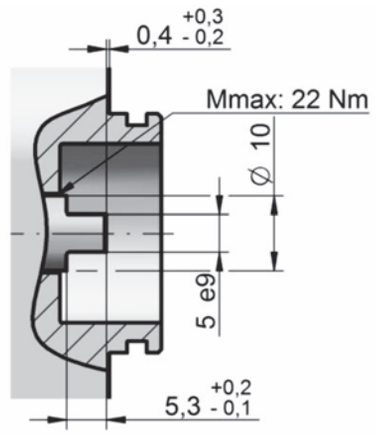
C04:



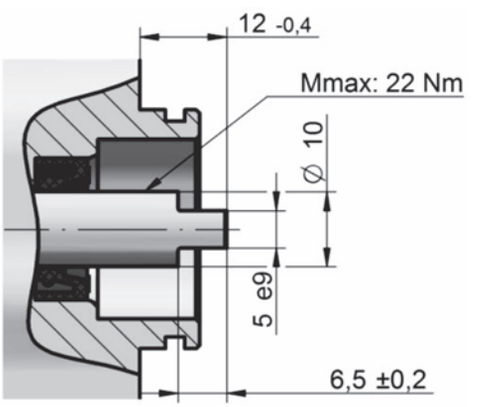
D01:



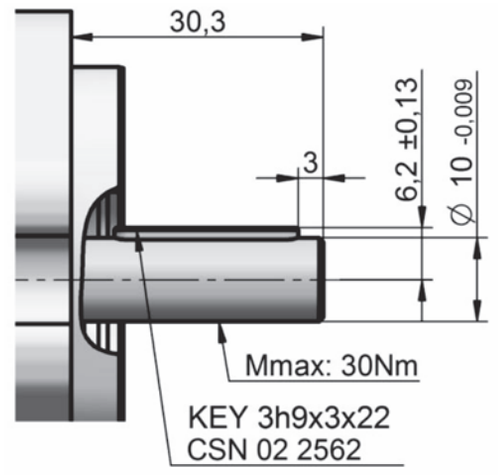
K03:



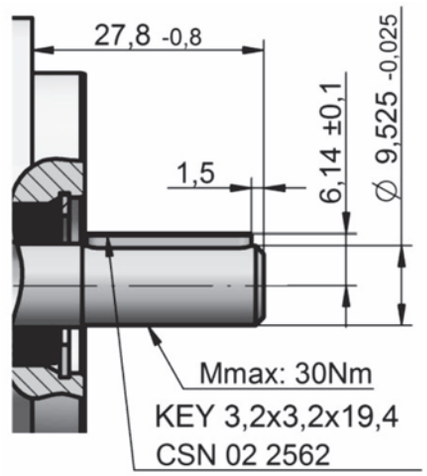
K04:



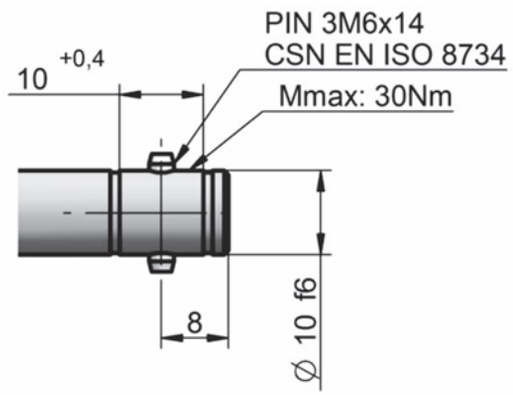
V02:



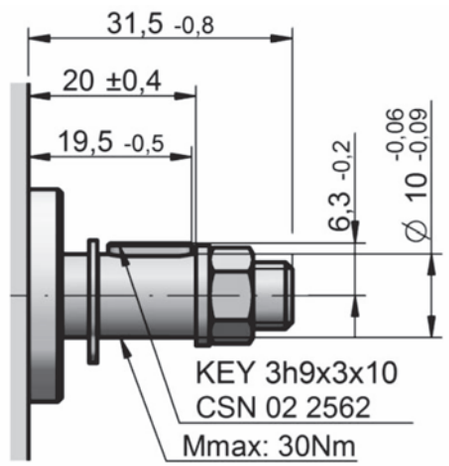
V03:



V04:

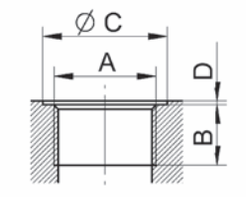


V05:



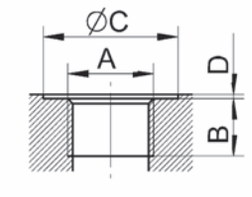
LIQUID INLET AND OUTLET CONNECTION

Metric thread according to ISO 6149



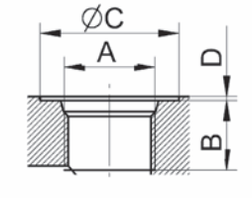
Displacement [cm³]	Code	Inlet				Code	Outlet			
		A	B	C	D		A	B	C	D
all	M03	M 14x1.5	13	26	1	M02	M 12x1.5	12	20	1
0.8 - 3.3	M03	M 14x1.5	13	26	1	M03	M 14x1.5	13	26	1
all	M04	M 16x1.5	14	22	1	M04	M 16x1.5	14	22	1
all	M05	M 18x1.5	13	30	1	M05	M 18x1.5	13	30	1
all	M06	M 20x1.5	14	26	1	M02 – M05				
3.3 - 11.8	M07	M 22x1.5	13	35	1	M02 – M05				

BSPP pipe thread according to ISO 228-1



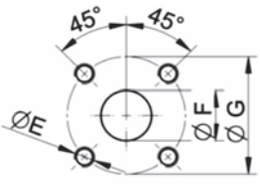
Displacement [cm³]	kód	Inlet				kód	Outlet			
		A	B	C	D		A	B	C	D
all	G02	G 3/8"	13	24	1	G01	G 1/4"	13	26	1
all	G02	G 3/8"	13	24	1	G02	G 3/8"	13	24	1
all	G03	G 1/2"	13	34	1	G03	G 1/2"	13	34	1

UNF thread according to SAE



Displacement [cm³]	kód	Inlet				kód	Outlet			
		A	B	C	D		A	B	C	D
all	U03	3/4–16 UNF	13	24.6	1	U02	9/16–18 UNF	13	24.6	1
all	U04	7/8–14 UNF	16	34.0	1	U03	3/4–16 UNF	13	30.0	1

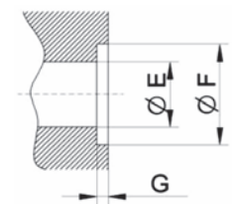
Flanged fittings according to DIN 8901/8902



Displacement [cm³]	kód	Inlet			kód	Outlet		
		A	B	C		A	B	C
all	H01	M5, depth 12	8	26	H01	M5, depth 12	8	26
all	H02	M5, depth 12	10	26	H02	M5, depth 12	10	26
all	H03	M6, depth 12	8	30	H03	M6, depth 12	8	30
all	H04	M6, depth 12	12	30	H04	M6, depth 12	12	30

NOTE: All inlets and outlets can be combination

Inlet / Outlet in flange

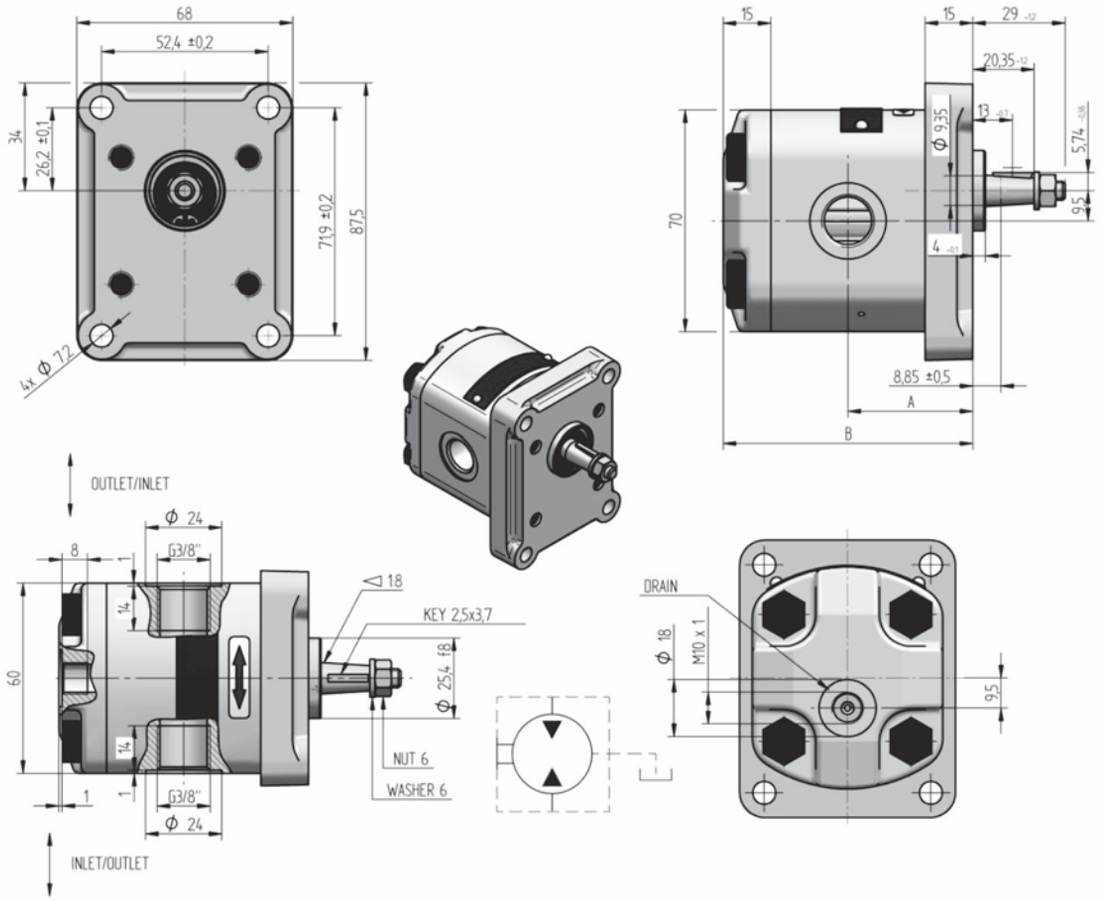


Code	Outlet		
	E	F	G
P01	8	12.4	1.4

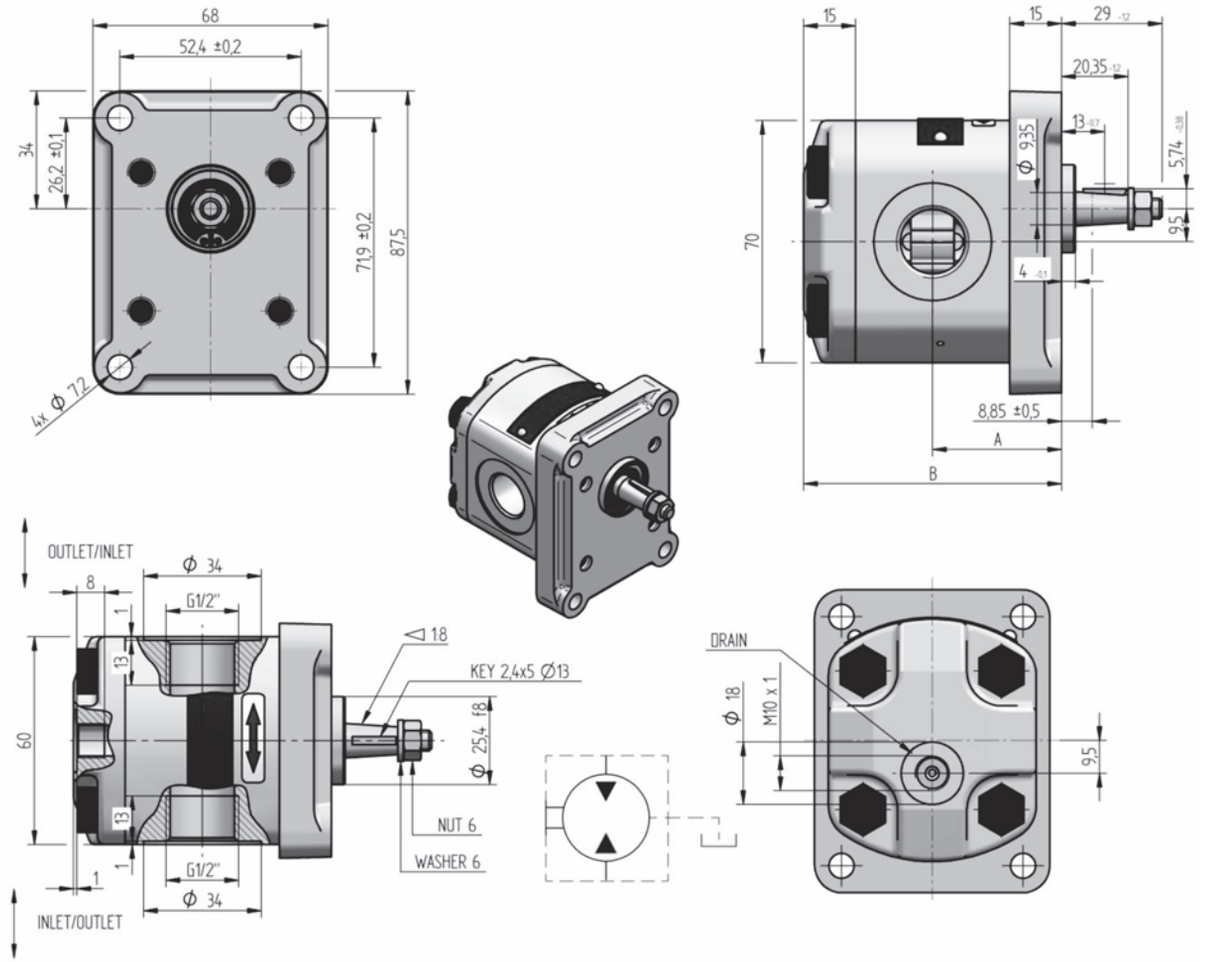
Drains

Displacement [cm³]	Code	Outlet			
		A	B	C	D
all	M01	M 10 x 1	8	15	1

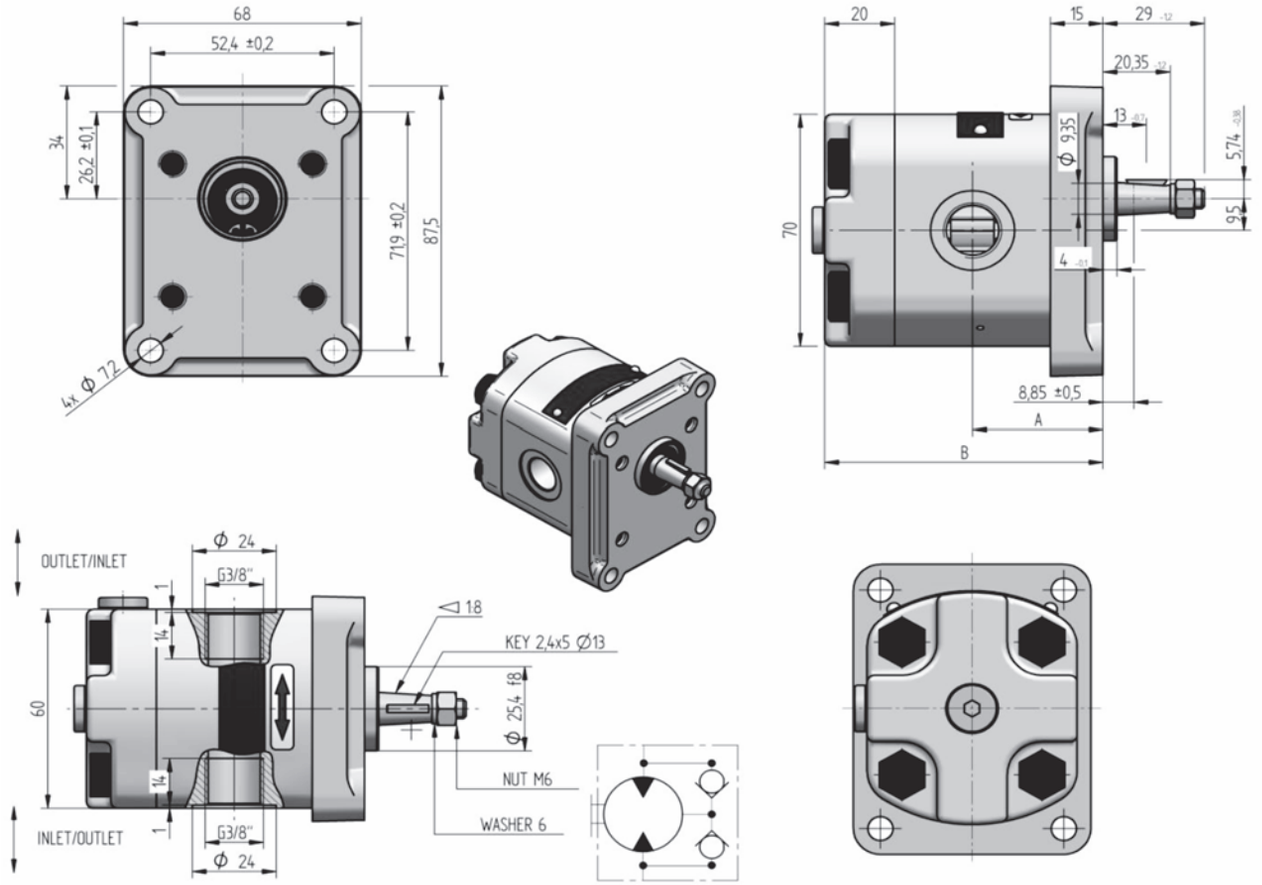
CATALOGUE SHETS OF PM23 SERIES BASIC DESIGNS



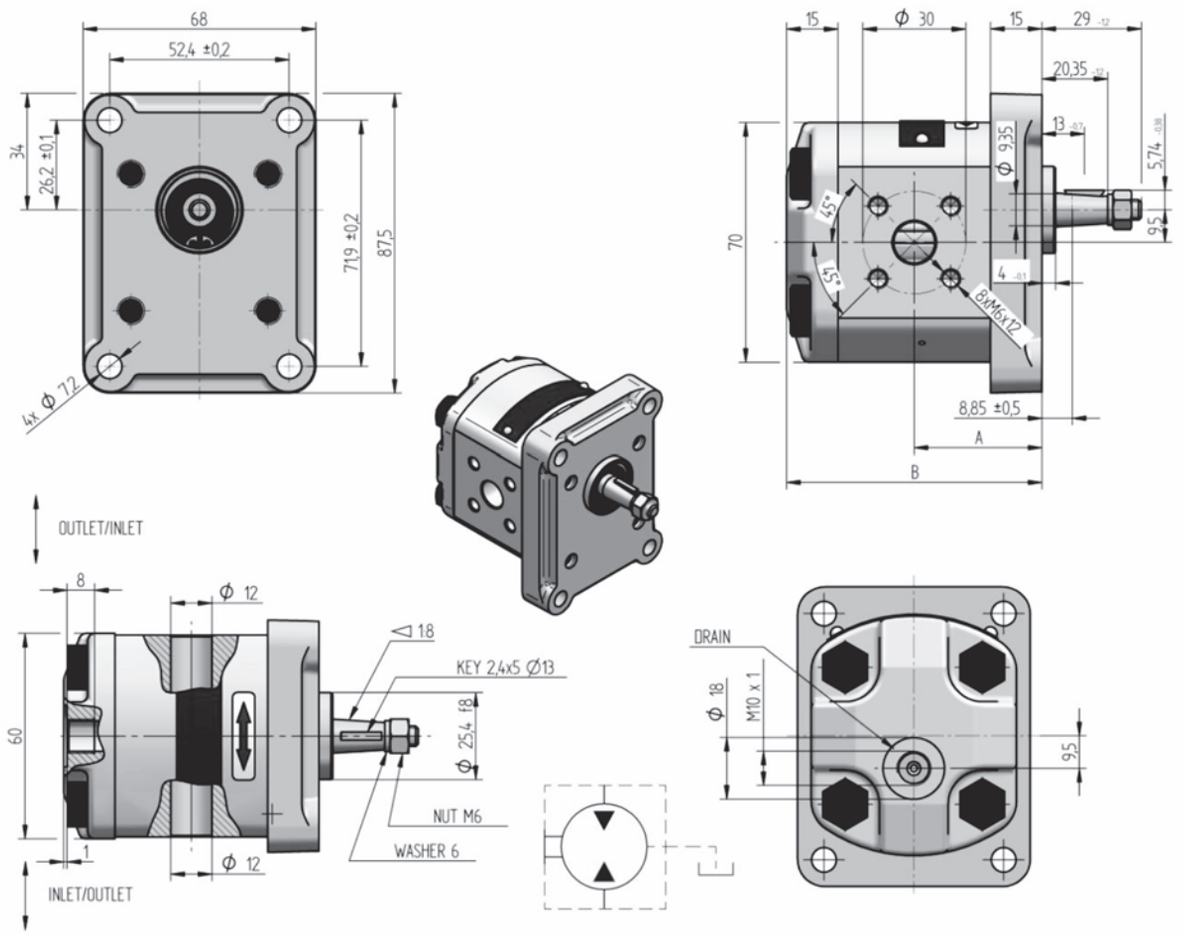
Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	dimension B [mm]
PM23-7.9B-R02C03-SG02G02-N		B	7.9	160	500	3 000	45.8	91.6
PM23-6.2B-R02C03-SG02G02-N		B	6.2	180	500	3 500	42.6	85.3
PM23-5.8B-R02C03-SG02G02-N		B	5.8	200	500	3 800	41.9	83.8
PM23-4.8B-R02C03-SG02G02-N		B	4.8	230	500	3 800	40.0	80.0
PM23-4.4B-R02C03-SG02G02-N	187 9401	B	4.4	250	500	4 000	39.2	78.5
PM23-3.6B-R02C03-SG02G02-N		B	3.6	260	500	4 000	37.8	75.6
PM23-3.3B-R02C03-SG02G02-N		B	3.3	280	500	4 000	37.2	74.5
PM23-2.5B-R02C03-SG02G02-N		B	2.5	280	500	4 000	35.7	71.5
PM23-2.1B-R02C03-SG02G02-N		B	2.1	280	600	4 500	34.9	69.9
PM23-1.6B-R02C03-SG02G02-N		B	1.6	280	600	4 500	34.1	68.3
PM23-1.2B-R02C03-SG02G02-N		B	1.2	280	800	5 000	33.4	66.8
PM23-0.8B-R02C03-SG02G02-N		B	0.8	280	800	5 000	32.6	65.3



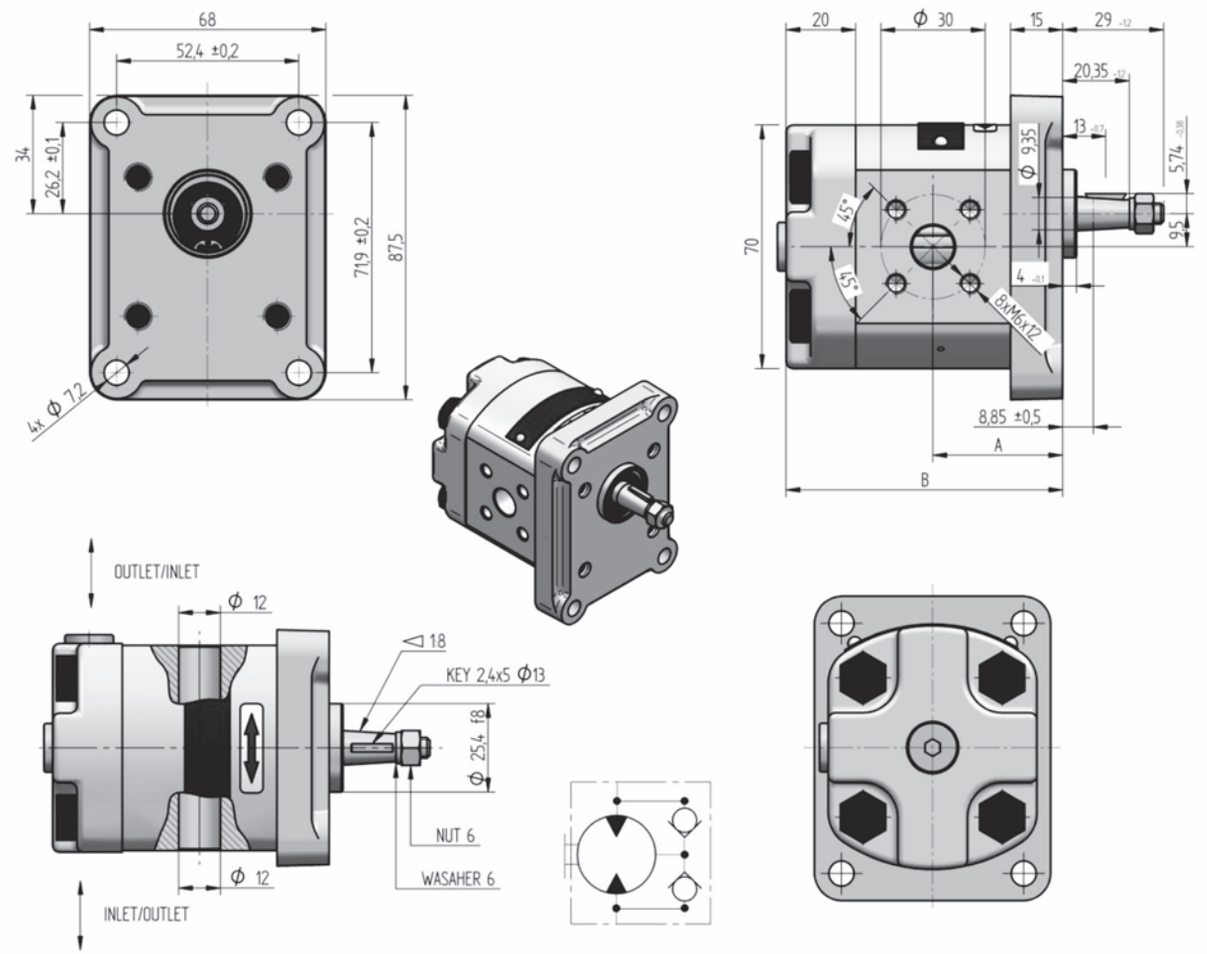
Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	dimension B [mm]
PM23-7.9B-R02C03-SG02G02-N		B	7.9	160	500	3 000	45.8	91.6
PM23-6.2B-R02C03-SG02G02-N		B	6.2	180	500	3 500	42.6	85.3
PM23-5.8B-R02C03-SG02G02-N		B	5.8	200	500	3 800	41.9	83.8
PM23-4.8B-R02C03-SG02G02-N		B	4.8	230	500	3 800	40.0	80.0
PM23-4.4B-R02C03-SG02G02-N		B	4.4	250	500	4 000	39.2	78.5
PM23-3.6B-R02C03-SG02G02-N		B	3.6	260	500	4 000	37.8	75.6
PM23-3.3B-R02C03-SG02G02-N	187 9402	B	3.3	280	500	4 000	37.2	74.5
PM23-2.5B-R02C03-SG02G02-N		B	2.5	280	500	4 000	35.7	71.5
PM23-2.1B-R02C03-SG02G02-N		B	2.1	280	600	4 500	34.9	69.9
PM23-1.6B-R02C03-SG02G02-N		B	1.6	280	600	4 500	34.1	68.3
PM23-1.2B-R02C03-SG02G02-N		B	1.2	280	800	5 000	33.4	66.8
PM23-0.8B-R02C03-SG02G02-N		B	0.8	280	800	5 000	32.6	65.3



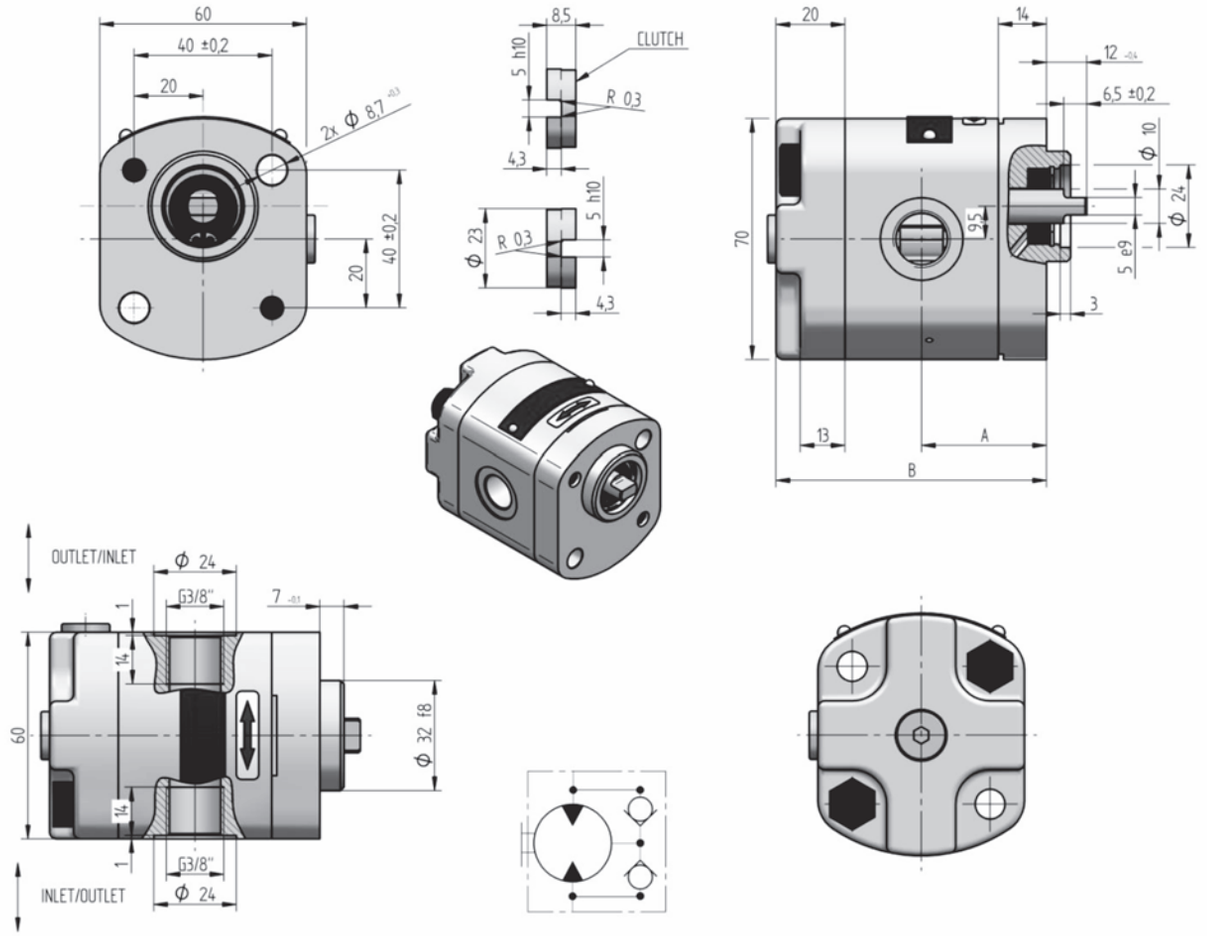
Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	dimension B [mm]
PM23-7.9B-R02C03-SG02G02-N.009		B	7.9	160	500	3 000	45.8	96.6
PM23-6.2B-R02C03-SG02G02-N.009		B	6.2	180	500	3 500	42.6	90.3
PM23-5.8B-R02C03-SG02G02-N.009		B	5.8	200	500	3 800	41.9	88.8
PM23-4.8B-R02C03-SG02G02-N.009		B	4.8	230	500	3 800	40.0	85.0
PM23-4.4B-R02C03-SG02G02-N.009		B	4.4	250	500	4 000	39.2	83.5
PM23-3.6B-R02C03-SG02G02-N.009		B	3.6	260	500	4 000	37.8	80.6
PM23-3.3B-R02C03-SG02G02-N.009		B	3.3	280	500	4 000	37.2	79.5
PM23-2.5B-R02C03-SG02G02-N.009		B	2.5	280	500	4 000	35.7	76.5
PM23-2.1B-R02C03-SG02G02-N.009		B	2.1	280	600	4 500	34.9	74.9
PM23-1.6B-R02C03-SG02G02-N.009		B	1.6	280	600	4 500	34.1	73.3
PM23-1.2B-R02C03-SG02G02-N.009		B	1.2	280	800	5 000	33.4	71.8
PM23-0.8B-R02C03-SG02G02-N.009		B	0.8	280	800	5 000	32.6	70.3



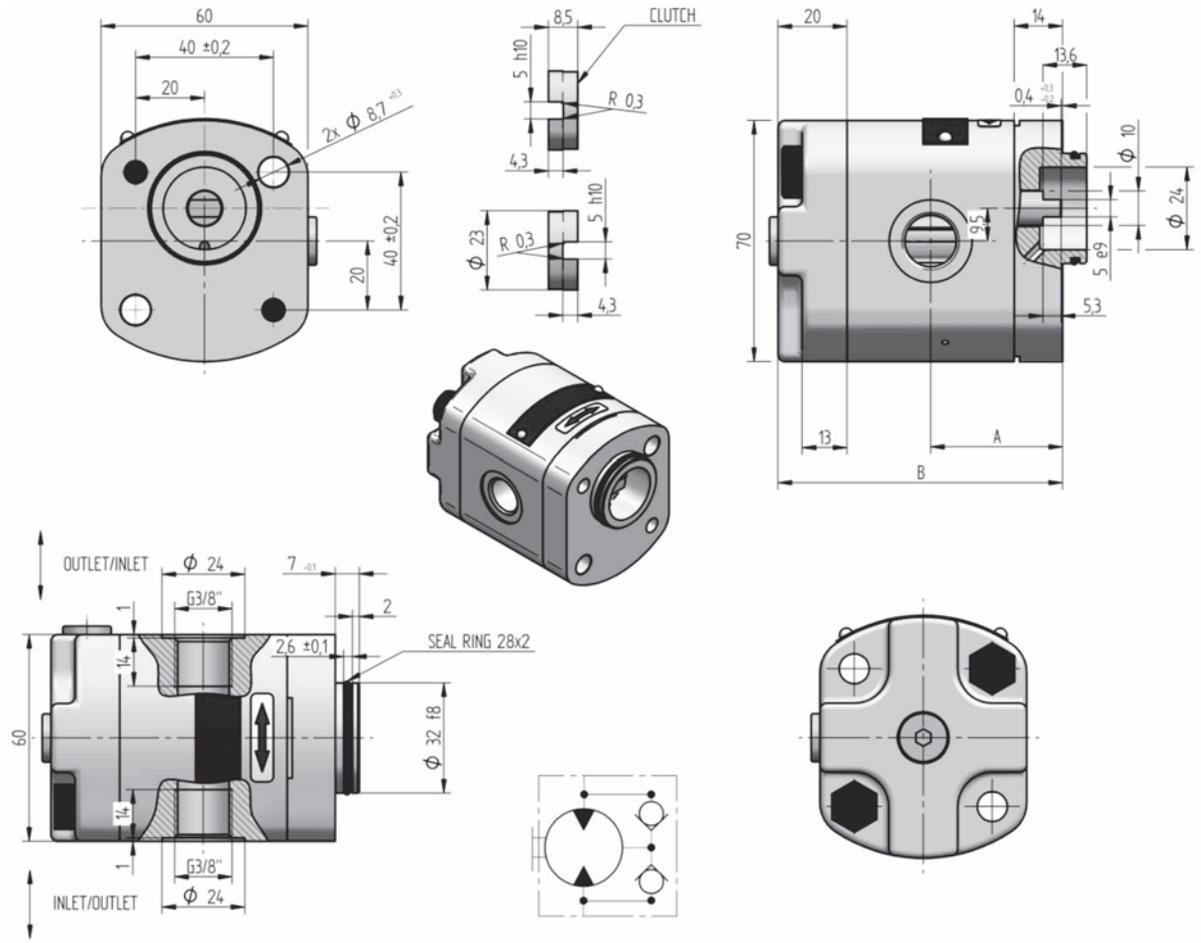
Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	dimension B [mm]
PM23-7.9B-R02C03-SH04H04-N		B	7.9	160	500	3 000	45.8	91.6
PM23-6.2B-R02C03-SH04H04-N		B	6.2	180	500	3 500	42.6	85.3
PM23-5.8B-R02C03-SH04H04-N		B	5.8	200	500	3 800	41.9	83.8
PM23-4.8B-R02C03-SH04H04-N		B	4.8	230	500	3 800	40.0	80.0
PM23-4.4B-R02C03-SH04H04-N		B	4.4	250	500	4 000	39.2	78.5
PM23-3.6B-R02C03-SH04H04-N		B	3.6	260	500	4 000	37.8	75.6
PM23-3.3B-R02C03-SH04H04-N		B	3.3	280	500	4 000	37.2	74.5
PM23-2.5B-R02C03-SH04H04-N		B	2.5	280	500	4 000	35.7	71.5
PM23-2.1B-R02C03-SH04H04-N		B	2.1	280	600	4 500	34.9	69.9
PM23-1.6B-R02C03-SH04H04-N		B	1.6	280	600	4 500	34.1	68.3
PM23-1.2B-R02C03-SH04H04-N		B	1.2	280	800	5 000	33.4	66.8
PM23-0.8B-R02C03-SH04H04-N		B	0.8	280	800	5 000	32.6	65.3



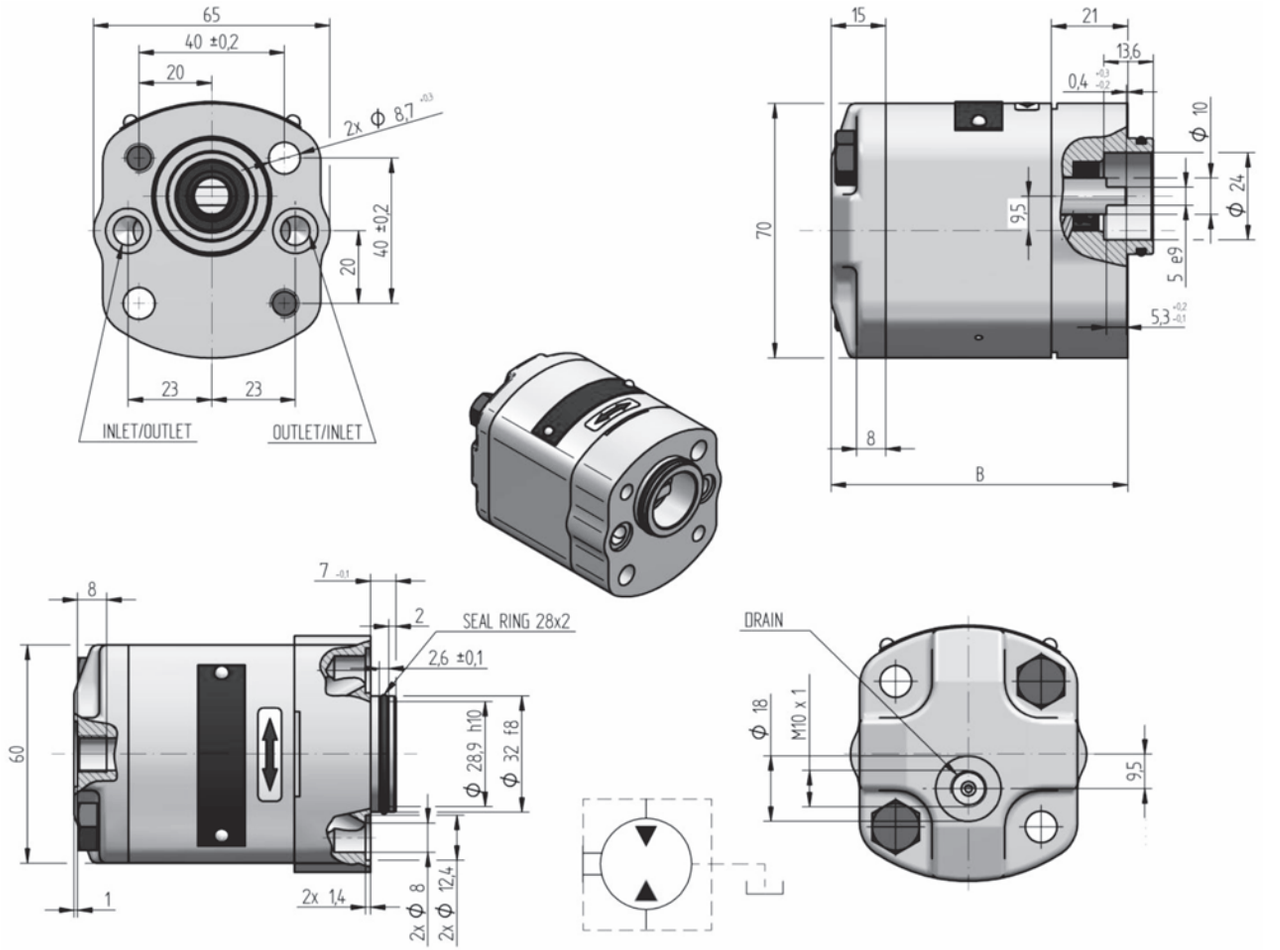
Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	dimension B [mm]
PM23-7.9B- R02C03-SH04H04-N.009		B	7.9	160	500	3 000	45.8	96.6
PM23-6.2B- R02C03-SH04H04-N.009		B	6.2	180	500	3 500	42.6	90.3
PM23-5.8B- R02C03-SH04H04-N.009		B	5.8	200	500	3 800	41.9	88.8
PM23-4.8B- R02C03-SH04H04-N.009		B	4.8	230	500	3 800	40.0	85.0
PM23-4.4B- R02C03-SH04H04-N.009		B	4.4	250	500	4 000	39.2	83.5
PM23-3.6B- R02C03-SH04H04-N.009		B	3.6	260	500	4 000	37.8	80.6
PM23-3.3B- R02C03-SH04H04-N.009		B	3.3	280	500	4 000	37.2	79.5
PM23-2.5B- R02C03-SH04H04-N.009		B	2.5	280	500	4 000	35.7	76.5
PM23-2.1B- R02C03-SH04H04-N.009		B	2.1	280	600	4 500	34.9	74.9
PM23-1.6B- R02C03-SH04H04-N.009		B	1.6	280	600	4 500	34.1	73.3
PM23-1.2B- R02C03-SH04H04-N.009		B	1.2	280	800	5 000	33.4	71.8
PM23-0.8B- R02C03-SH04H04-N.009		B	0.8	280	800	5 000	32.6	70.3



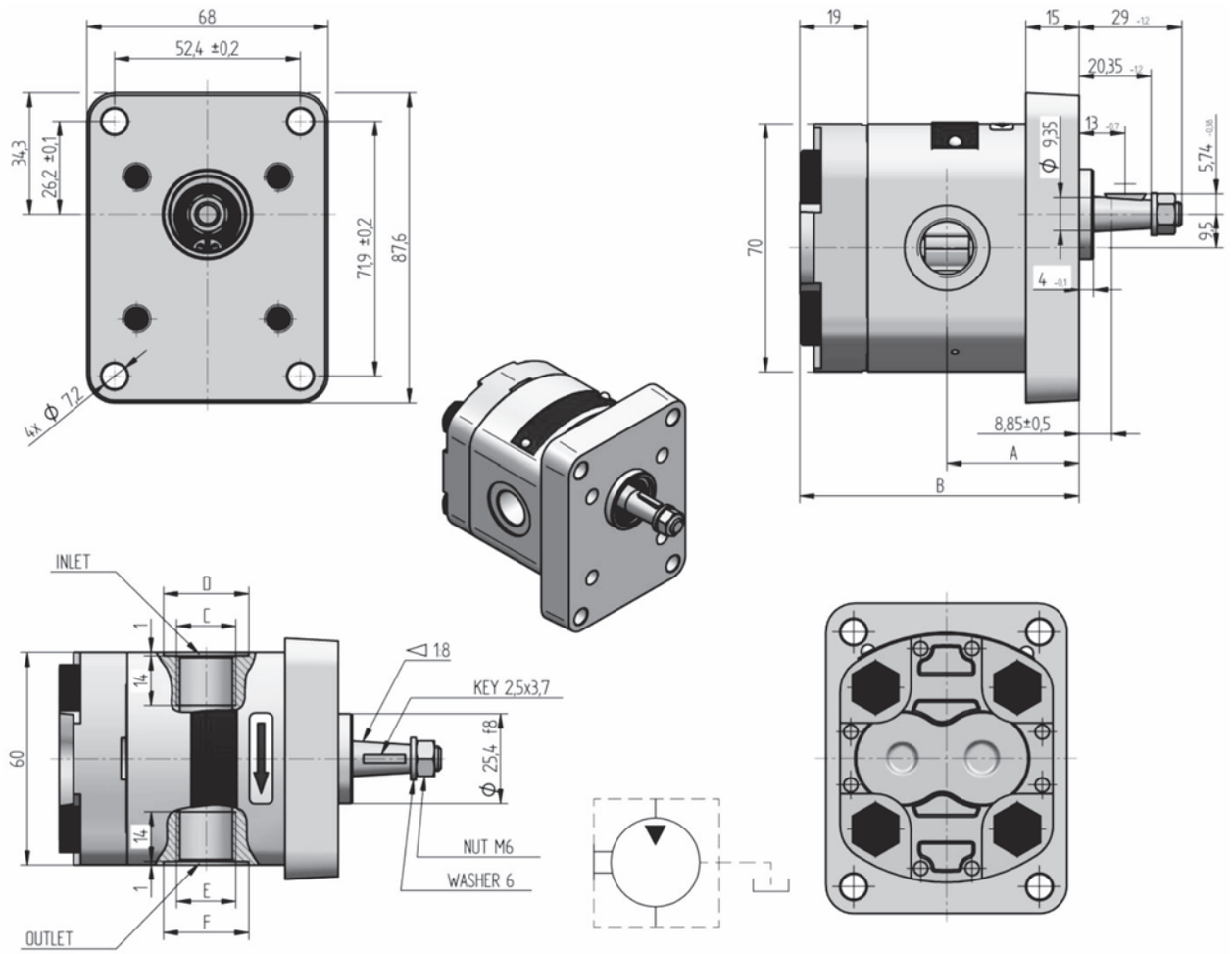
Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	dimension B [mm]
PM23-7.9B-A06K04-SG02G02-N.009		B	7.9	160	500	3 000	44.8	95.6
PM23-6.2B-A06K04-SG02G02-N.009		B	6.2	180	500	3 500	41.6	89.3
PM23-5.8B-A06K04-SG02G02-N.009		B	5.8	200	500	3 800	40.9	87.8
PM23-4.8B-A06K04-SG02G02-N.009		B	4.8	230	500	3 800	39.0	84.0
PM23-4.4B-A06K04-SG02G02-N.009		B	4.4	250	500	4 000	38.2	82.5
PM23-3.6B-A06K04-SG02G02-N.009		B	3.6	260	500	4 000	36.8	79.6
PM23-3.3B-A06K04-SG02G02-N.009		B	3.3	280	500	4 000	36.2	78.5
PM23-2.5B-A06K04-SG02G02-N.009		B	2.5	280	500	4 000	34.7	75.5
PM23-2.1B-A06K04-SG02G02-N.009		B	2.1	280	600	4 500	33.9	73.9
PM23-1.6B-A06K04-SG02G02-N.009		B	1.6	280	600	4 500	33.1	72.3
PM23-1.2B-A06K04-SG02G02-N.009		B	1.2	280	800	5 000	32.4	70.8
PM23-0.8B-A06K04-SG02G02-N.009		B	0.8	280	800	5 000	31.6	69.3



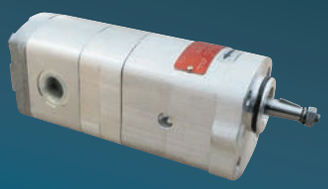
Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	dimension B [mm]
PM23-7.9B-A05K03-SG02G02-N.009		B	7.9	160	500	3 000	44.8	95.6
PM23-6.2B-A05K03-SG02G02-N.009		B	6.2	180	500	3 500	41.6	89.3
PM23-5.8B-A05K03-SG02G02-N.009		B	5.8	200	500	3 800	40.9	87.8
PM23-4.8B-A05K03-SG02G02-N.009		B	4.8	230	500	3 800	39.0	84.0
PM23-4.4B-A05K03-SG02G02-N.009	187 9400	B	4.4	250	500	4 000	38.2	82.5
PM23-3.6B-A05K03-SG02G02-N.009		B	3.6	260	500	4 000	36.8	79.6
PM23-3.3B-A05K03-SG02G02-N.009		B	3.3	280	500	4 000	36.2	78.5
PM23-2.5B-A05K03-SG02G02-N.009		B	2.5	280	500	4 000	34.7	75.5
PM23-2.1B-A05K03-SG02G02-N.009		B	2.1	280	600	4 500	33.9	73.9
PM23-1.6B-A05K03-SG02G02-N.009		B	1.6	280	600	4 500	33.1	72.3
PM23-1.2B-A05K03-SG02G02-N.009		B	1.2	280	800	5 000	32.4	70.8
PM23-0.8B-A05K03-SG02G02-N.009		B	0.8	280	800	5 000	31.6	69.3

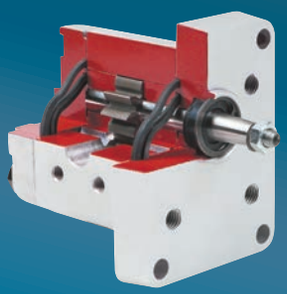


Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension B [mm]
PM23-7.9B-A03K03-FP01P01-N		B	7.9	160	500	3 000	97.6
PM23-6.2B-A03K03-FP01P01-N	187 9893	B	6.2	180	500	3 500	91.3
PM23-5.8B-A03K03-FP01P01-N	187 9892	B	5.8	200	500	3 800	89.8
PM23-4.8B-A03K03-FP01P01-N		B	4.8	230	500	3 800	86.0
PM23-4.4B-A03K03-FP01P01-N	187 9960	B	4.4	250	500	4 000	84.5
PM23-3.6B-A03K03-FP01P01-N		B	3.6	260	500	4 000	81.6
PM23-3.3B-A03K03-FP01P01-N		B	3.3	280	500	4 000	80.5
PM23-2.5B-A03K03-FP01P01-N		B	2.5	280	500	4 000	77.5
PM23-2.1B-A03K03-FP01P01-N		B	2.1	280	600	4 500	75.9
PM23-1.6B-A03K03-FP01P01-N		B	1.6	280	600	4 500	74.3
PM23-1.2B-A03K03-FP01P01-N		B	1.2	280	800	5 000	72.8
PM23-0.8B-A03K03-FP01P01-N		B	0.8	280	800	5 000	71.3



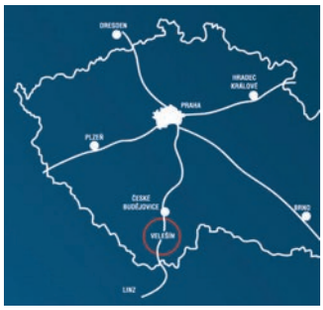
Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	dimension B [mm]
PM23-7.9L-R02C02-SG02G02-N	187 9987	L	7.9	160	500	3 000	45.8	95.6
PM23-6.2L-R02C02-SG02G02-N	187 9804	L	6.2	180	500	3 500	42.6	89.3
PM23-5.8L-R02C02-SG02G02-N	187 9986	L	5.8	200	500	3 800	41.9	87.8
PM23-4.8L-R02C02-SG02G02-N	187 9985	L	4.8	230	500	3 800	40.0	84.0
PM23-4.4L-R02C02-SG02G02-N	187 9954	L	4.4	250	500	4 000	39.2	82.5
PM23-3.6L-R02C02-SG02G02-N	187 9951	L	3.6	260	500	4 000	37.8	79.6
PM23-3.3L-R02C02-SG02G02-N	187 9984	L	3.3	280	500	4 000	37.2	78.5
PM23-2.5L-R02C02-SG02G02-N	187 9950	L	2.5	280	500	4 000	35.7	75.5
PM23-2.1L-R02C02-SG02G02-N	187 9983	L	2.1	280	600	4 500	34.9	73.9
PM23-1.6L-R02C02-SG02G02-N	187 9890	L	1.6	280	600	4 500	34.1	72.3
PM23-1.2L-R02C02-SG02G02-N	187 9903	L	1.2	280	800	5 000	33.4	70.8
PM23-0.8L-R02C02-SG02G02-N	187 9982	L	0.8	280	800	5 000	32.6	69.3



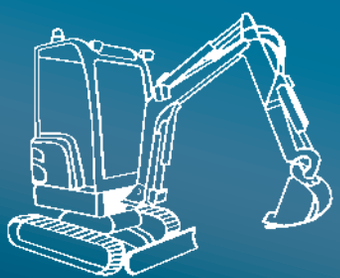


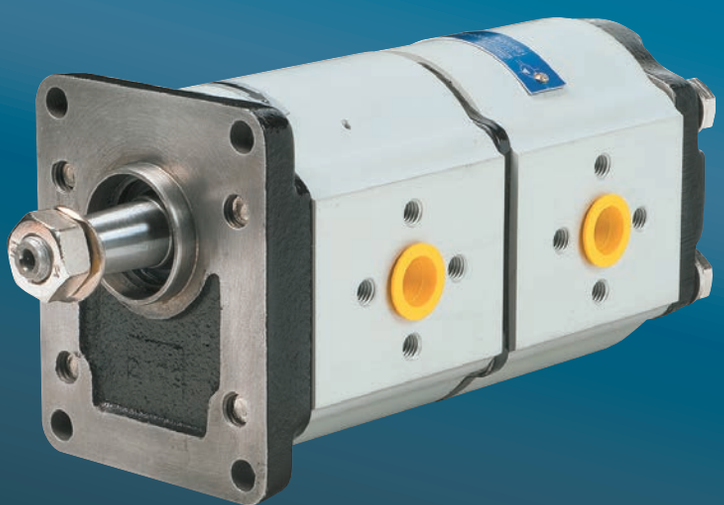
jihostroj
AERO TECHNOLOGY & HYDRAULICS

JIHOSTROJ a.s.
Budějovická 148
CZ 382 32 Velešín
Czech Republic
tel.: +420 380 340 511
fax: +420 380 340 612
e-mail: mailbox@jihostroj.cz
http: //**www.jihostroj.com**
GPS 48°49'51.748" N 14°27'40.770" E



jihostroj
AERO TECHNOLOGY & HYDRAULICS

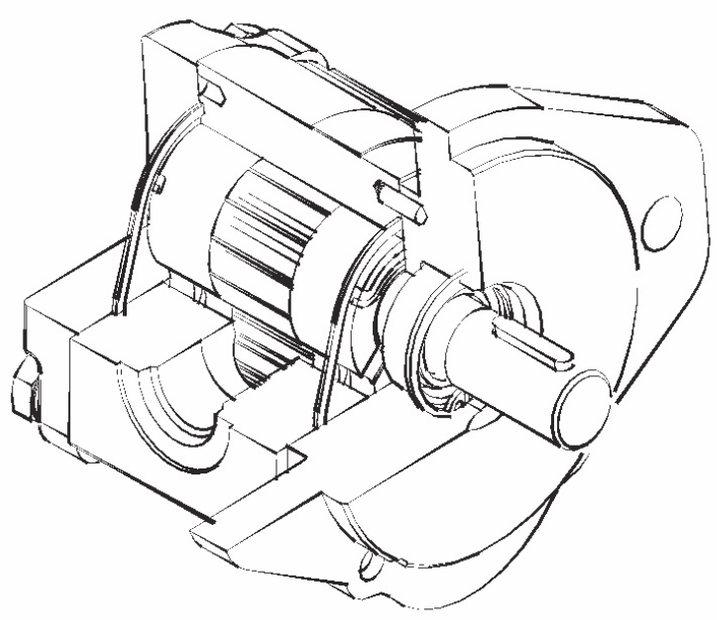




GEAR MOTORS
JM

Displacement from 2 to 15 ccm
Pressure up to 280 bar
Speed from 500 to 4000 RPM

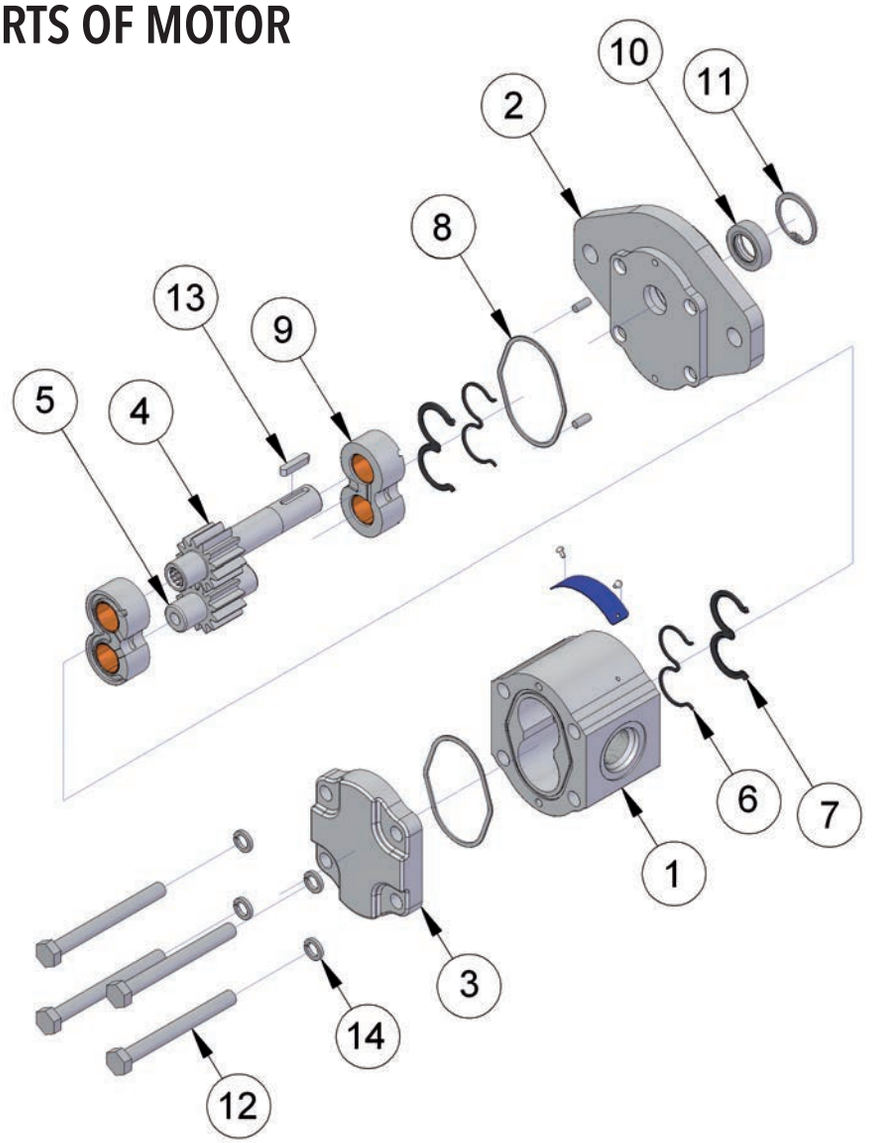
TABLE OF CONTENTS



DESCRIPTION

- Gear motors are used for transformation of liquid pressure head in mechanical energy. The JM line motors are designed for advanced hydraulic systems with lower capacity (approximately up to 10 kW) with high operational reliability and long service life. A wide variety of designs with diverse drives, connecting flanges, fluid inlets and outlets enable the motors to be used in hydraulic systems of both fixed and mobile machines and equipment. The JM series covers the range of displacements from 2 to 15 cm^3/rev.
- The flange types used as well as the form of the working liquid inlets and outlets (located laterally – in the body or axially – in the cover) meet all worldwide standards. The pump body is made of a heavy duty aluminium alloy. The cover and the flange are made of grey iron or 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. JM line 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. Balancing sealing
7. Sealing protective plates
8. Peripheral sealing
9. Bearing sleeves
10. Shaft seal
11. Safety ring
12. Connection bolts
13. Key
14. Spring washers

PARAMETER TABLE

One direction motors

Nominal Size Parameters		Sym.	Unit	JM 2	JM 3	JM 4	JM 5	JM 6	JM 7
Actual displacement		V_g	[cm^3]	2.00	3.01	4.01	5.01	6.02	7.02
Rotation speed	nominal	n_n	[min^{-1}]	1500	1500	1500	1500	1500	1500
	minimum	n_{min}	[min^{-1}]	500	500	500	500	500	500
	maximum	n_{max}	[min^{-1}]	4000	4000	4000	4000	3600	3500
Pressure at outlet	minimum	p_{1min}	[bar]	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
	maximum	p_{1max}	[bar]	210	210	210	210	210	210
Pressure at inlet	max. continuous	p_{2n}	[bar]	280	280	280	280	280	280
	maximum	p_{2max}	[bar]	290	290	290	290	290	290
	peak	p_3	[bar]	300	300	300	300	300	300
Nominal input flow rate (max.) at n_n and p_{2n}		Q_n	[$dm^3.min^{-1}$]	3.54	5.31	6.84	8.55	10.03	11.70
Maximum input flow rate at n_{max} and p_{2max}		Q_{max}	[$dm^3.min^{-1}$]	8.55	12.81	17.08	21.34	23.04	24.64
Nominal output power (min.) at n_n and p_{2n}		P_n	[kW]	1.20	1.80	2.40	3.00	3.60	4.20
Maximum output power at n_{max} a p_{2max}		P_{max}	[kW]	3.28	4.92	6.56	8.20	8.86	9.47
Nominal Torque at n_n and p_{2n}		M	[Nm]	7.61	11.40	15.20	19.00	22.79	26.59
Weight		m	[kg]	1.75	1.80	1.85	1.90	1.95	1.95

Nominal Size Parameters		Sym.	Unit	JM 8	JM 10	JM 11	JM 12	JM 15
Actual displacement		V_g	[cm^3]	8.02	10.03	11.03	12.03	15.01
Rotation speed	nominal	n_n	[min^{-1}]	1500	1500	1500	1500	1500
	minimum	n_{min}	[min^{-1}]	500	500	500	500	500
	maximum	n_{max}	[min^{-1}]	3100	2800	2500	2400	2200
Pressure at outlet	minimum	p_{1min}	[bar]	-0.3	-0.3	-0.3	-0.3	-0.3
	maximum	p_{1max}	[bar]	210	180	165	150	110
Pressure at inlet	max. continuous	p_{2n}	[bar]	280	250	235	220	190
	maximum	p_{2max}	[bar]	290	270	255	240	210
	peak	p_3	[bar]	300	280	265	250	220
Nominal input flow rate (max.) at n_n and p_{2n}		Q_n	[$dm^3.min^{-1}$]	13.37	16.71	18.38	20.05	25.06
Maximum input flow rate at n_{max} and p_{2max}		Q_{max}	[$dm^3.min^{-1}$]	25.60	29.86	28.16	30.71	35.19
Nominal output power (min.) at n_n and p_{2n}		P_n	[kW]	4.80	5.30	5.48	5.60	5.72
Maximum output power at n_{max} a p_{2max}		P_{max}	[kW]	9.94	10.69	9.62	9.87	9.90
Nominal Torque at n_n and p_{2n}		M	[Nm]	30.38	35.06	35.80	36.62	35.06
Weight		m	[kg]	2.00	2.10	2.10	2.20	2.45

Reversible motors

Nominal Size Parameters		Sym.	Unit	JM 2	JM 3	JM 4	JM 5	JM 6	JM 7
Actual displacement		V_g	[cm^3]	2.00	3.01	4.01	5.01	6.02	7.02
Rotation speed	nominal	n_n	[min^{-1}]	1500	1500	1500	1500	1500	1500
	minimum	n_{min}	[min^{-1}]	500	500	500	500	500	500
	maximum	n_{max}	[min^{-1}]	4000	4000	4000	4000	3600	3500
Pressure at outlet	minimum	p_{1min}	[bar]	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
	maximum	p_{1max}	[bar]	180	180	180	180	180	180
Pressure at inlet	max. continuous	p_{2n}	[bar]	250	250	250	250	250	250
	maximum	p_{2max}	[bar]	260	260	260	260	260	260
	peak	p_3	[bar]	270	270	270	270	270	270
Nominal input flow rate (max.) at n_n and p_{2n}		Q_n	[$dm^3.min^{-1}$]	3.54	5.31	6.84	8.55	10.03	11.70
Maximum input flow rate at n_{max} and p_{2max}		Q_{max}	[$dm^3.min^{-1}$]	8.55	12.81	17.08	21.34	23.04	24.64
Nominal output power (min.) at n_n and p_{2n}		P_n	[kW]	1.20	1.80	2.40	3.00	3.60	4.20
Maximum output power at n_{max} a p_{2max}		P_{max}	[kW]	3.28	4.92	6.56	8.20	8.86	9.47
Nominal Torque at n_n and p_{2n}		M	[Nm]	7.61	11.40	15.20	19.00	22.79	26.59
Weight		m	[kg]	1.75	1.80	1.85	1.90	1.95	1.95

Nominal Size Parameters		Sym.	Unit	JM 8	JM 10	JM 11	JM 12	JM 15
Actual displacement		V_g	[cm^3]	8.02	10.03	11.03	12.03	15.01
Rotation speed	nominal	n_n	[min^{-1}]	1500	1500	1500	1500	1500
	minimum	n_{min}	[min^{-1}]	500	500	500	500	500
	maximum	n_{max}	[min^{-1}]	3100	2800	2500	2400	2200
Pressure at outlet	minimum	p_{1min}	[bar]	-0.3	-0.3	-0.3	-0.3	-0.3
	maximum	p_{1max}	[bar]	180	160	145	130	100
Pressure at inlet	max. continuous	p_{2n}	[bar]	250	230	215	200	170
	maximum	p_{2max}	[bar]	260	250	235	220	190
	peak	p_3	[bar]	270	260	245	230	200
Nominal input flow rate (max.) at n_n and p_{2n}		Q_n	[$dm^3.min^{-1}$]	13.37	16.71	18.38	20.05	25.06
Maximum input flow rate at n_{max} and p_{2max}		Q_{max}	[$dm^3.min^{-1}$]	25.60	29.86	28.16	30.71	35.19
Nominal output power (min.) at n_n and p_{2n}		P_n	[kW]	4.80	5.30	5.48	5.60	5.72
Maximum output power at n_{max} a p_{2max}		P_{max}	[kW]	9.94	10.69	9.62	9.87	9.90
Nominal Torque at n_n and p_{2n}		M	[Nm]	30.38	35.06	35.80	36.62	35.06
Weight		m	[kg]	2.00	2.10	2.10	2.20	2.45

External drainage must be used in case of the reversible design.

FORMULAS USED FOR CALCULATION

Flow rate
Q

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

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

Displacement
V_g

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

Torque
M_k

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

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

Input power
P

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

η_t [–] total efficiency

PUMP EFFICIENCIES

Volumetric efficiency
η_v

It determines the amount of flow losses. Its value is $\eta_v = 0{,}92 \div 0{,}98$ (depending on rotation speed, viscosity of working liquid and outlet pressure). It can be expressed as follows:

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

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

Mechanical efficiency
η_m

It determines mechanical losses. Its value is about $\eta_m = 0{,}85$.
It can be expressed as follows:

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

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

Total efficiency
η_t

t is defined as product of η_n and η_m
and determines difference between theoretical and actual required input power:

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

$P_{act.}$ [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 10·10^{-6} up 20·10^{-6} should be consulted with manufacturer): $\nu = 10 \cdot 10^{-6}\ [m^2 \cdot s^{-1}]$

Filtration coefficient β_α

$\beta_{25}\ 75 \geq$ (for pressure $p_2 < 200$ bar)
$\beta_{10}\ 75 \geq$ (for pressure $p_2 > 200$ bar)

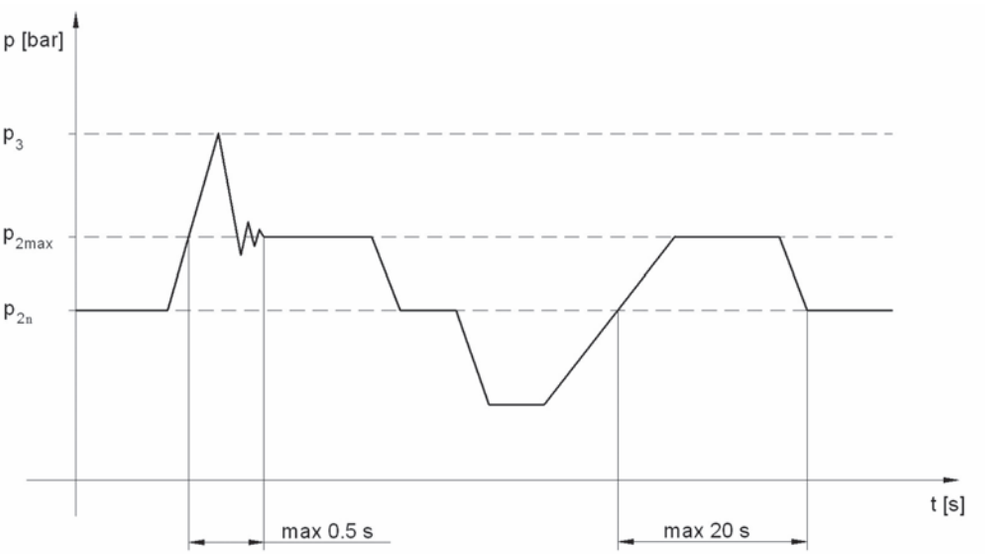
Liquid contamination class according to ISO 4406

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)

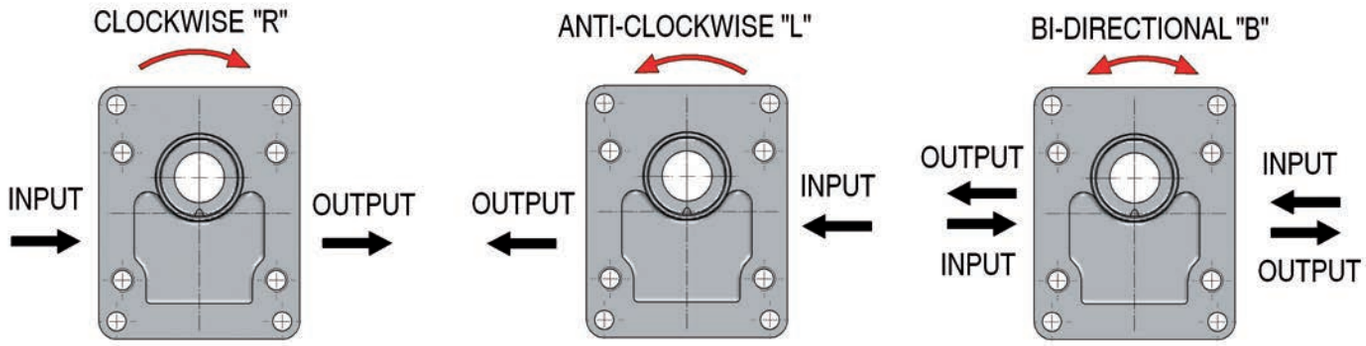
PRESSURE LOAD



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.

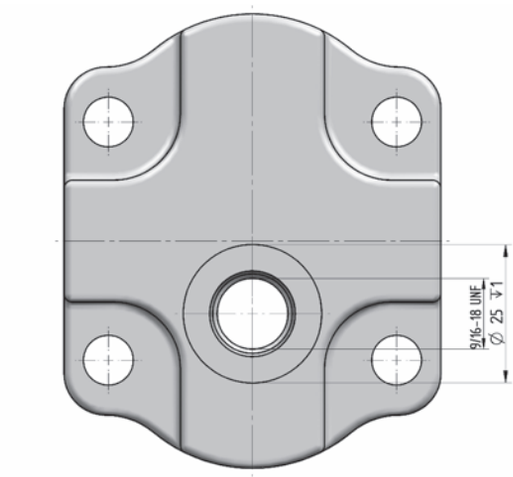
DIRECTION OF ROTATION

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

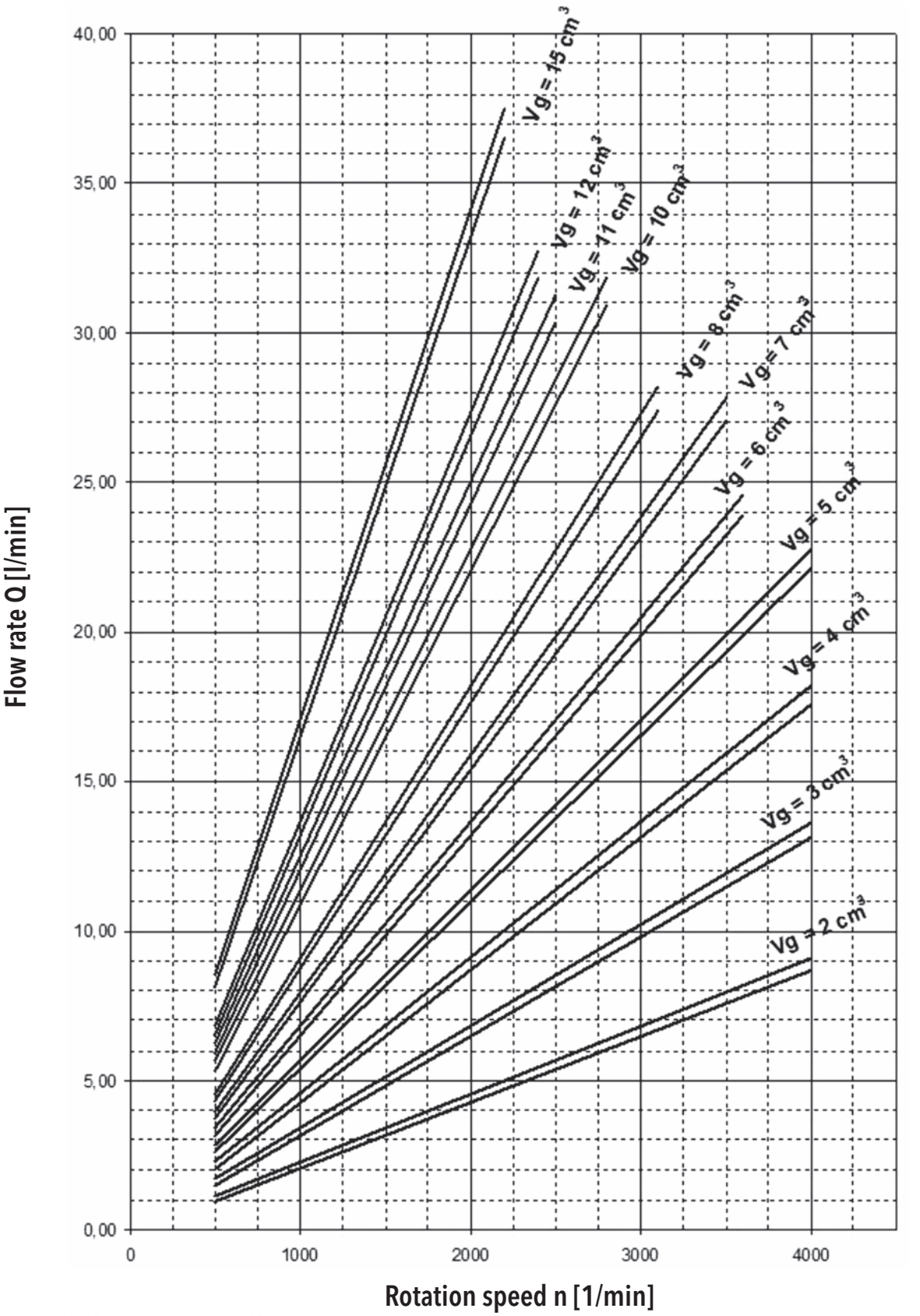


REVERSIBLE DESIGN

- 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.

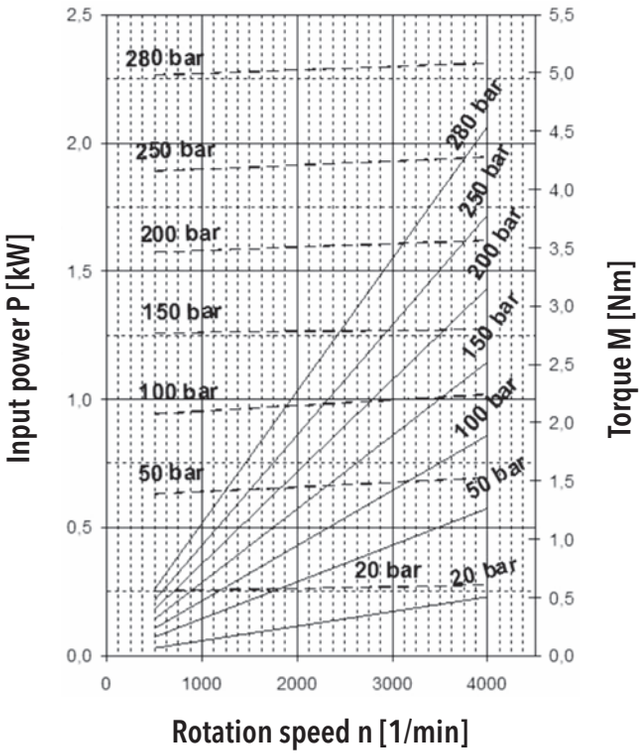


JM FLOW RATE AND POWER CURVES

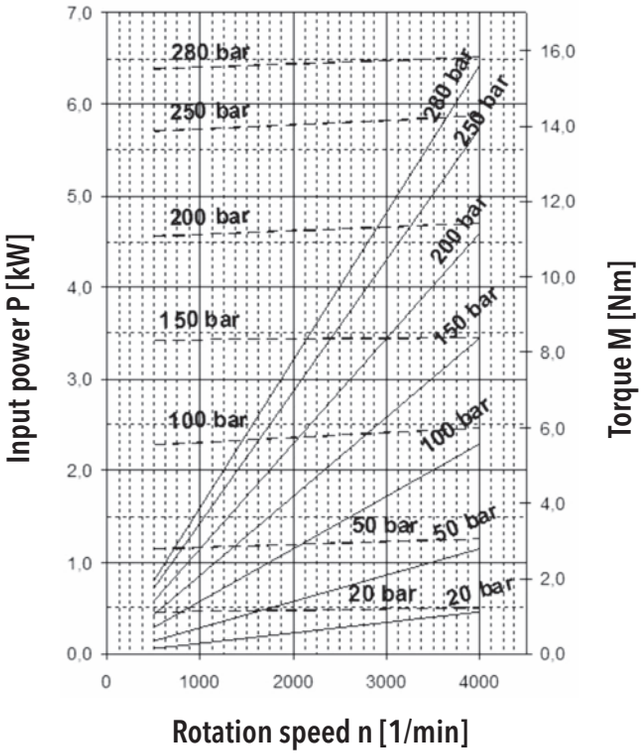


Above curves apply to ISO V_g 46 oil at temperature t = 45°C.

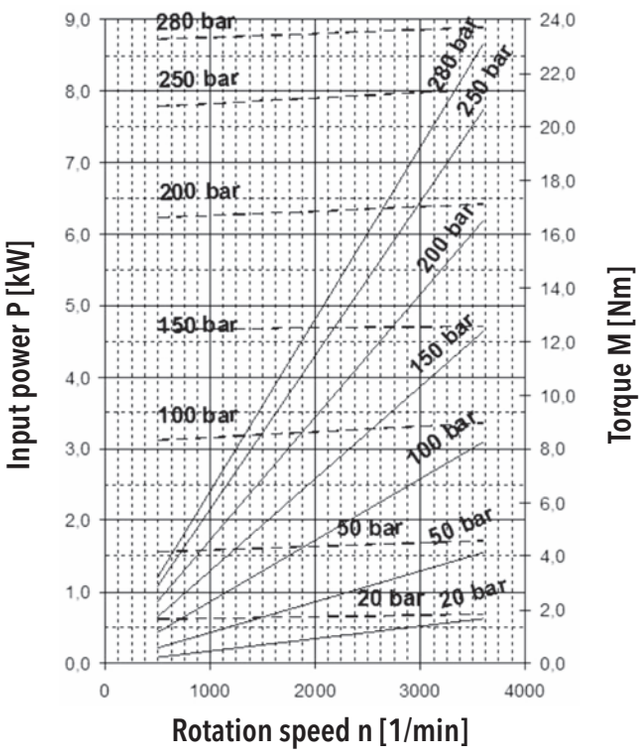
2,00 cm³



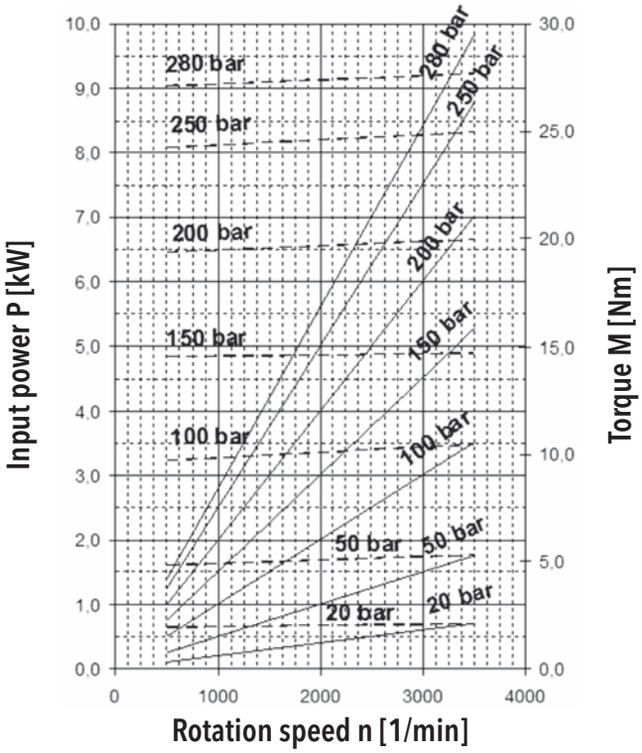
4,00 cm³



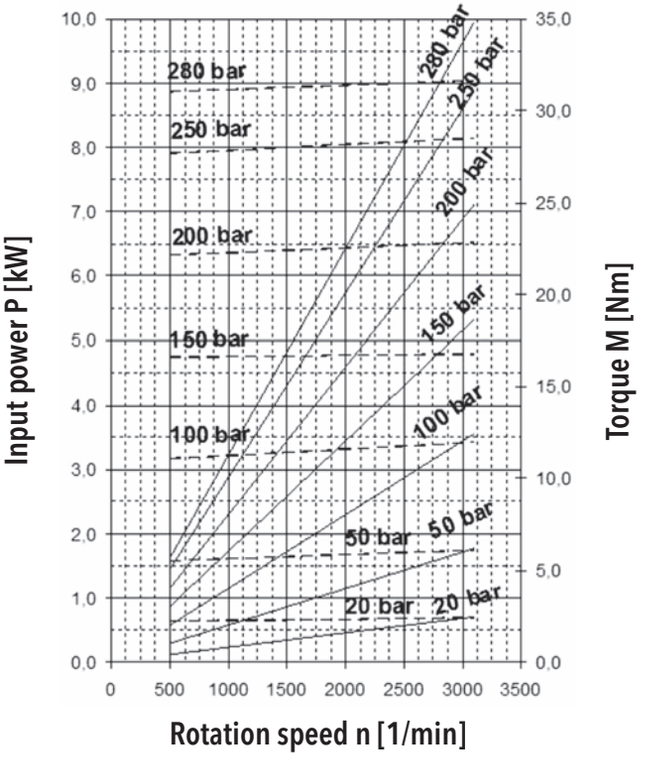
6,00 cm³



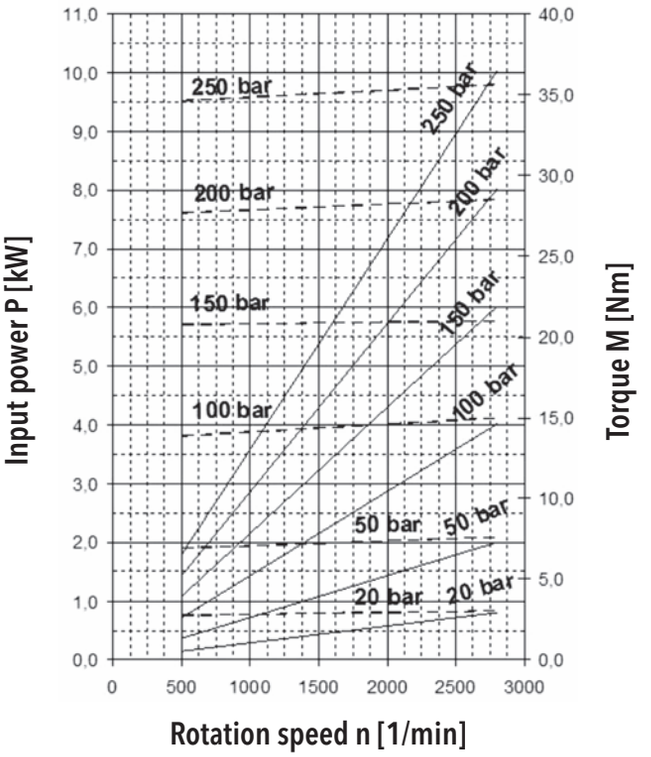
7,00 cm³



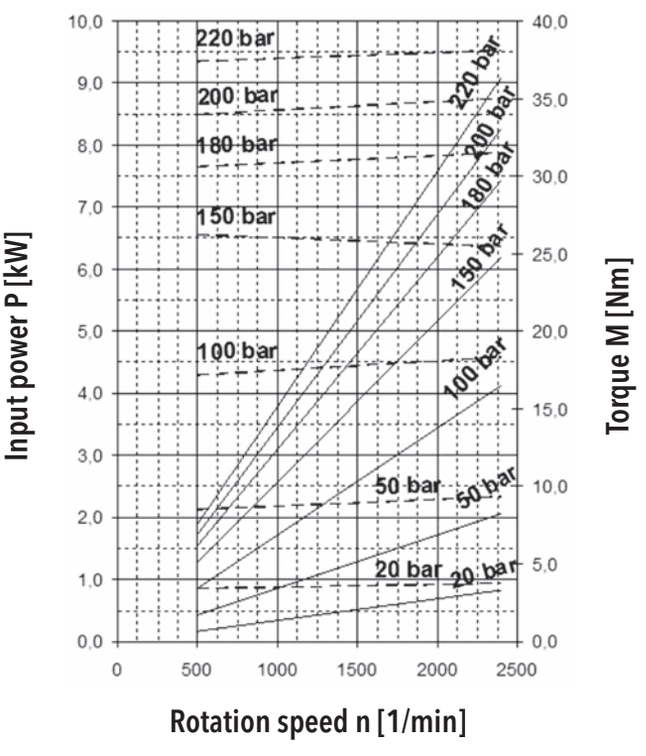
8,00 cm³



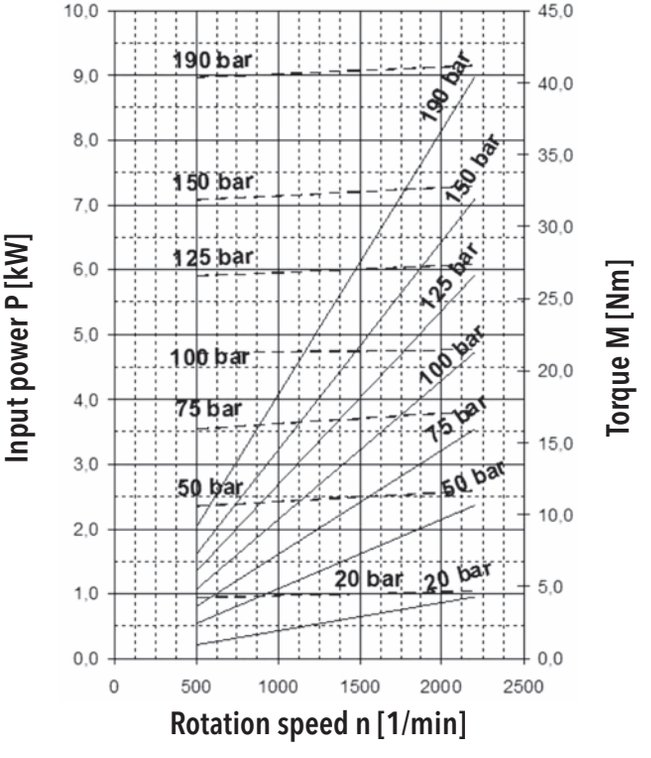
10,00 cm³



12,00 cm³



15,00 cm³



ORDER KEY

J - 12 R - S01 D03 - S G04 G03 - V . 001

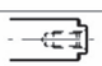
Code	Type
J	J Series Gear Pump
JK	J Series Gear Pump, short version

Code	Displacement [cm³]
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
18	18
XX	Other displacements on request

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

Code	Flange design
R03	 Rectangular flange, centre ring Ø 30
R05	 Rectangular flange, centre ring Ø 36,5
S01	 SAE AA, centre ring Ø 50,8
S02	 SAE A, centre ring Ø 82,5
F01	 ISO, centre ring Ø 45,25
Z	Special design

Code	Location of inlets and outlets
S	 Side (in the body)
R	 Axial (in the cover)
C	 Combination

Code	Drive shaft design
C05	 Cone 1:8 Key width 3
C06	Cone 1:8 Key width 2,4
D02	 Spline 20/40 -30° SAE 9T, l = 9
D03	Spline 20/40 -30° SAE 9T, l = 27
D04	Spline 16/32 -30° SAE 9T, l = 32
D05	Spline 16/32 -30° SAE 8T, l = 32
K05	 Cross coupling 4,37
K06	Cross coupling 5
V06	 Cylindric Ø 12, Key 3, M10, l =31,5
V07	Cylindric Ø 12,7 Key 3,18, l = 27
V08	 Cylindric Ø 12,7 Key 3,18, l = 38,2
V09	Cylindric Ø 15,88 Key 3,97, l = 32
V10	 Cylindric Ø 16 1/4´´-20UNC THD
Z	Special design

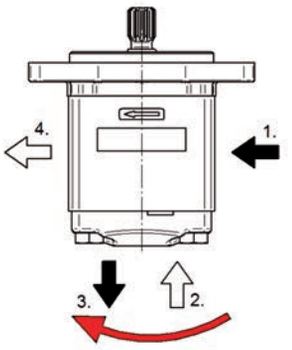
Code	Liquid inlet and outlet connection shape
M03	 Thread M 14x1,5
M05	Thread M 18x1,5
M07	Thread M 22x1,5
G01	 Thread BSP G1/4
G02	Thread BSP G3/8
G03	Thread BSP G1/2
G04	Thread BSP G3/4
U02	 Thread 9/16–18 UNF-2B
U03	Thread 3/4–16 UNF-2B
U04	Thread 7/8–14 UNF-2B
R02	 Thread 3/8-18NPT
R03	Thread 1/2-14NPT
H03	 Fitting Ø 8; Square 4xM6 Ø30
H04	Fitting Ø 12; Square 4xM6 Ø30
H05	Fitting Ø 15; Square 4xM6 Ø35
H06	Fitting Ø 20; Square 4xM6 Ø40
S02	 Fitting Square 4xM8/25,15x25,15
Z	Special design

Code	Special arrangements
-	No special arrangements
001	With front-end bearing
004	Without shaft seal

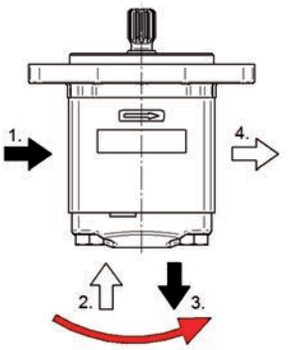
Code	Sealing material
N	NBR
V	FKM (VITON)
H	HNBR

An example of designation for the JM clockwise motor with displacement of 2 cm³, Rectangular flange with centre ring ∅ 50.8, Cylindric ∅12, BSP side inlets, FKM seal and with front-end bearing: **JM-2R-R03V06-SG04G03-V.001**

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



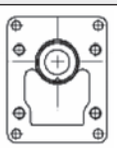
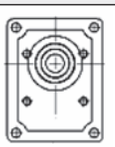
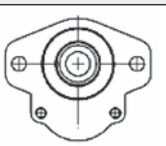
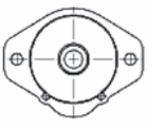
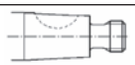
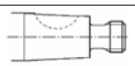
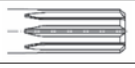
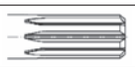
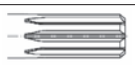
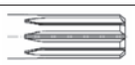
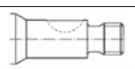
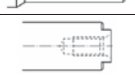
For clockwise and reverse gear motor,
in direction clockwise



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

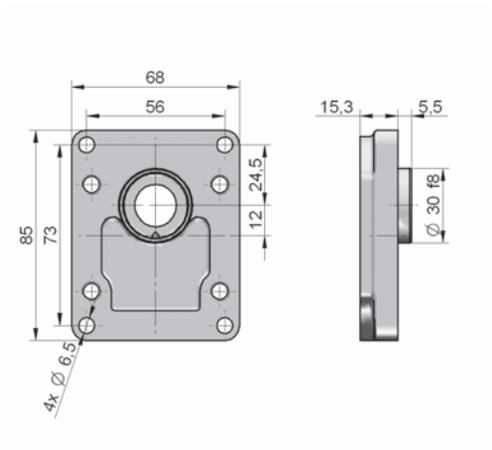
For. ex...: JM-12R-S01D03-C<u>G03</u> <u>G03</u> <u>G04</u> <u>G04</u> -N
1. 2. 3. 4.

COMBINATIONS OF FLANGES AND SHAFTS

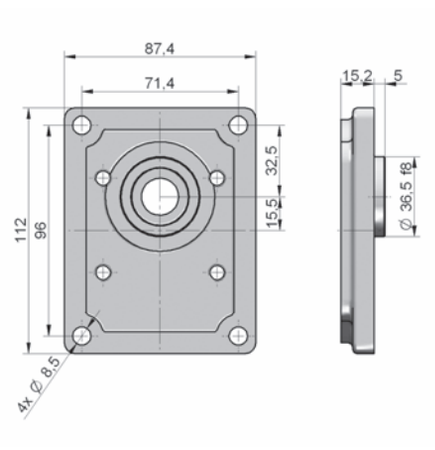
			FLANGE DESIGN				
			R03	R05	S01	S02	F01
							
DRIVE SHAFT	C05		●	●	●		
	C06		●	●		●	
	D02				●		●
	D03				●	●	●
	D04				●	●	
	D05				●	●	
	K05						●
	K06				●		
	V06		●				
	V07				●		
	V08		●		●	●	●
	V09			●		●	●
	V10						●

FLANGES DESIGN

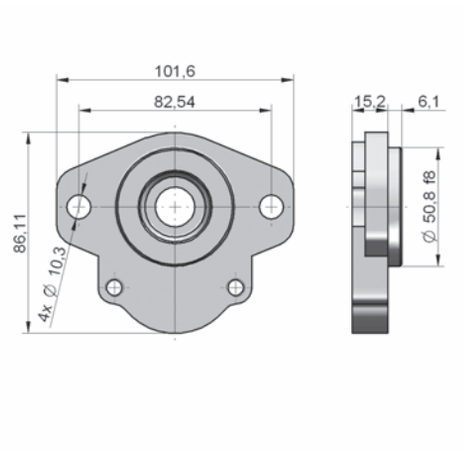
R03:



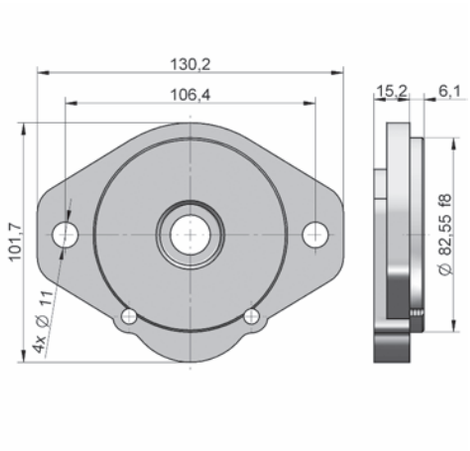
R05:



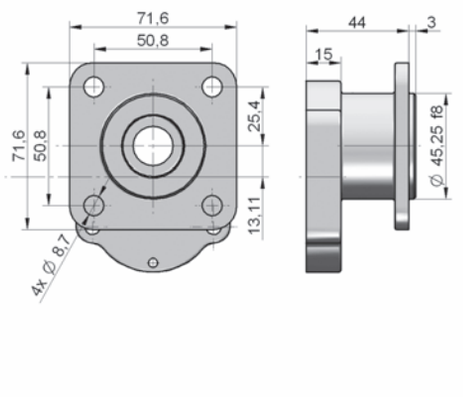
S01:



S02:

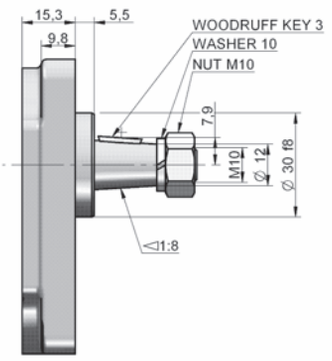


F01:

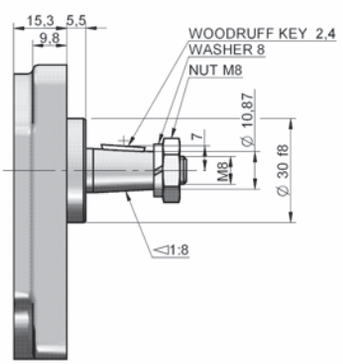


DRIVE SHAFTS

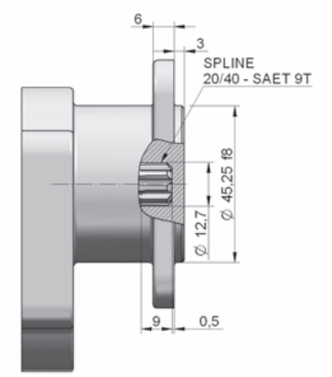
C05:



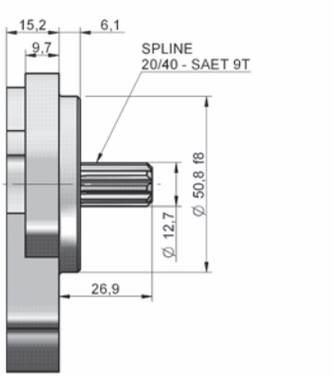
C06:



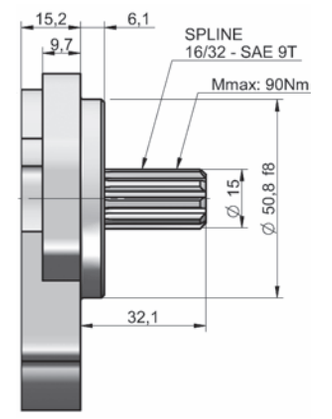
D02:



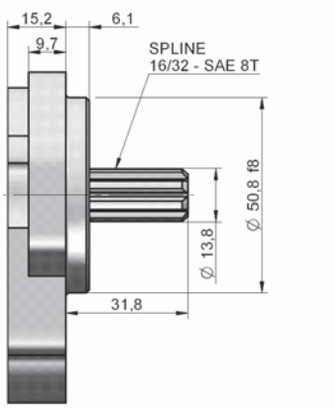
D03:



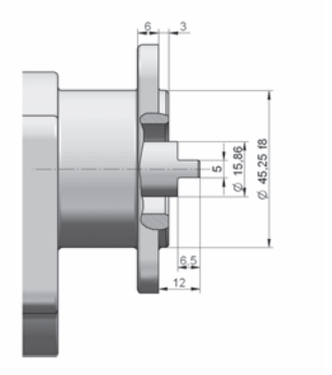
D04:



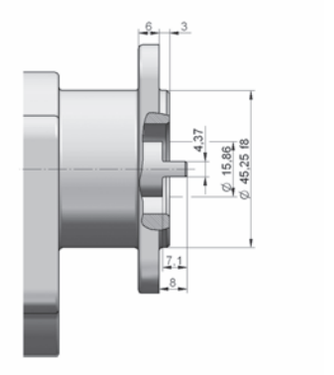
D05:



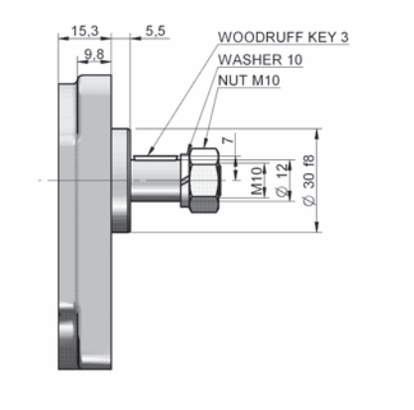
K05:



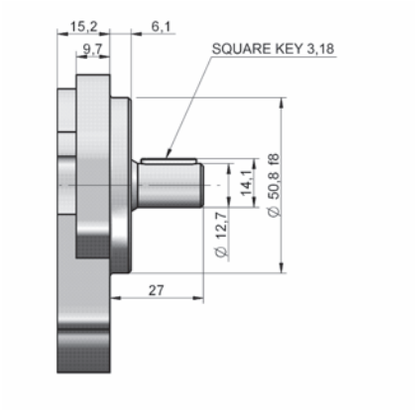
K06:



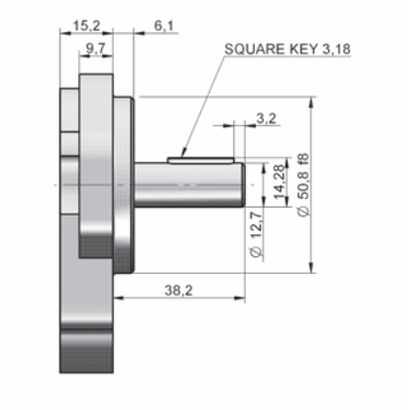
V06:



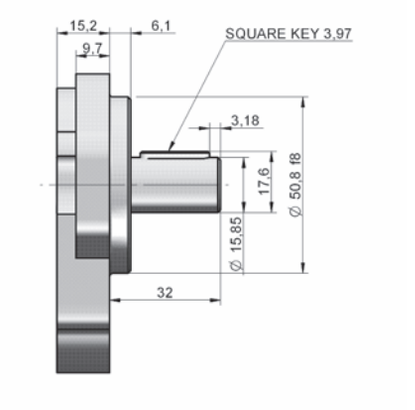
V07:



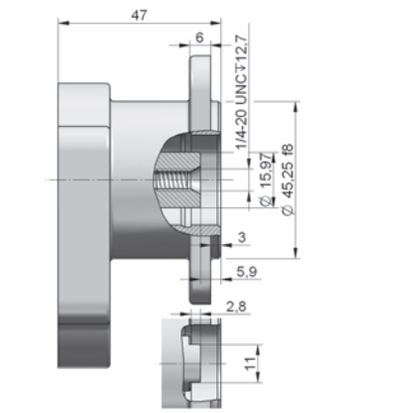
V08:



V09:

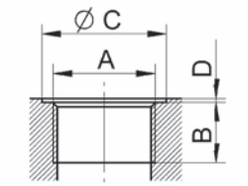


V10:



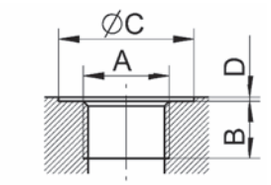
LIQUID INLET AND OUTLET CONNECTION

Metric thread according to ISO 6149



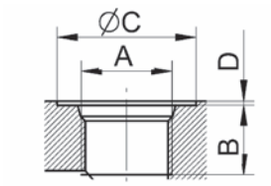
Code	A	B	C	D
M03	M 14 x 1.5	13	22	1
M05	M 18 x 1.5	13	24	1
M07	M 22 x 1.5	14	28	1

BSPP pipe thread according to ISO 228-1



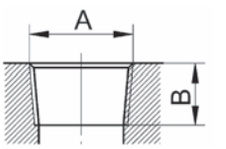
Code	A	B	C	D
G01	G 1/4	12	18	1
G02	G 3/8	13	24	1
G03	G 1/2	14	33	1
G04	G 3/4	16	39	1

UNF thread according to SAE



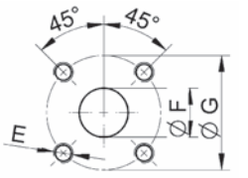
Code	A	B	C	D
U02	9/16 – 18 UNF	13	25	1
U03	3/4 – 16 UNF	15	30	1
U04	7/8 – 14 UNF	17	34	1

Tapered thread NPT



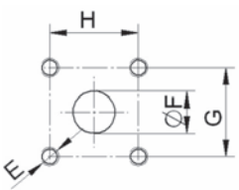
Code	A	B
R02	3/8 – 18 NPF	16.0
R03	1/2 – 14 NPF	20.8

Flanged fittings according to DIN 8901/8902



Code	A	B	C
H03	M6	8	30
H04	M6	12	30
H05	M6	15	35
H06	M6	20	40

Flanged fittings ISO

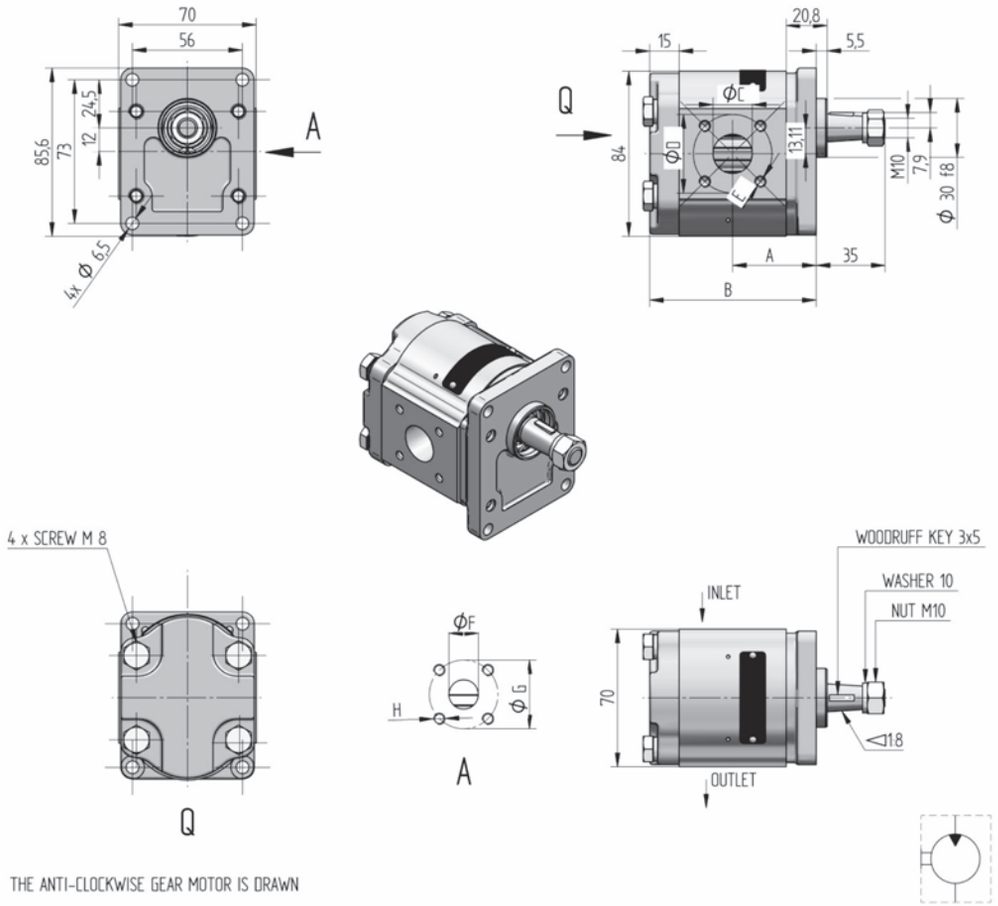


Code	E	F	G	H
S02	1/4 UNC	14.2	25.15	25.15
S03	M8	14.2	25.15	25.15

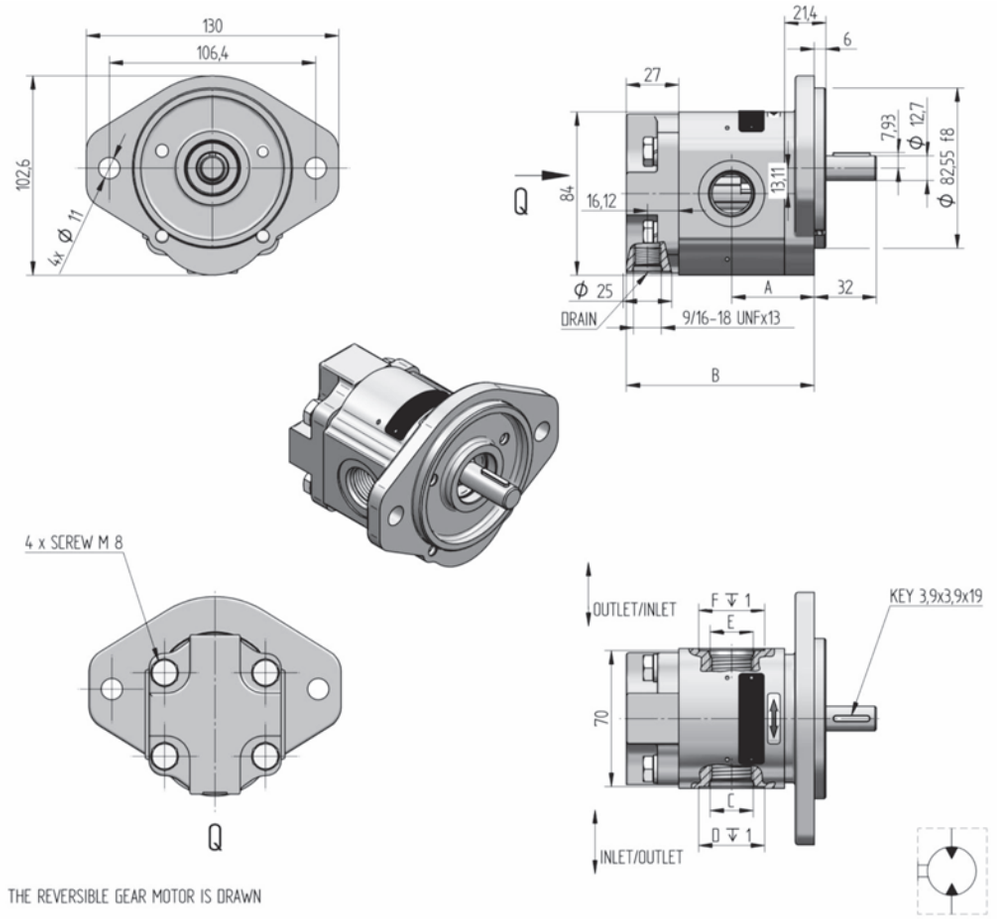
Drains

Code	A	B	C	D
U01	7/16-20 UNF 2B	13	21	1
G01	G 1/4	12	18	1

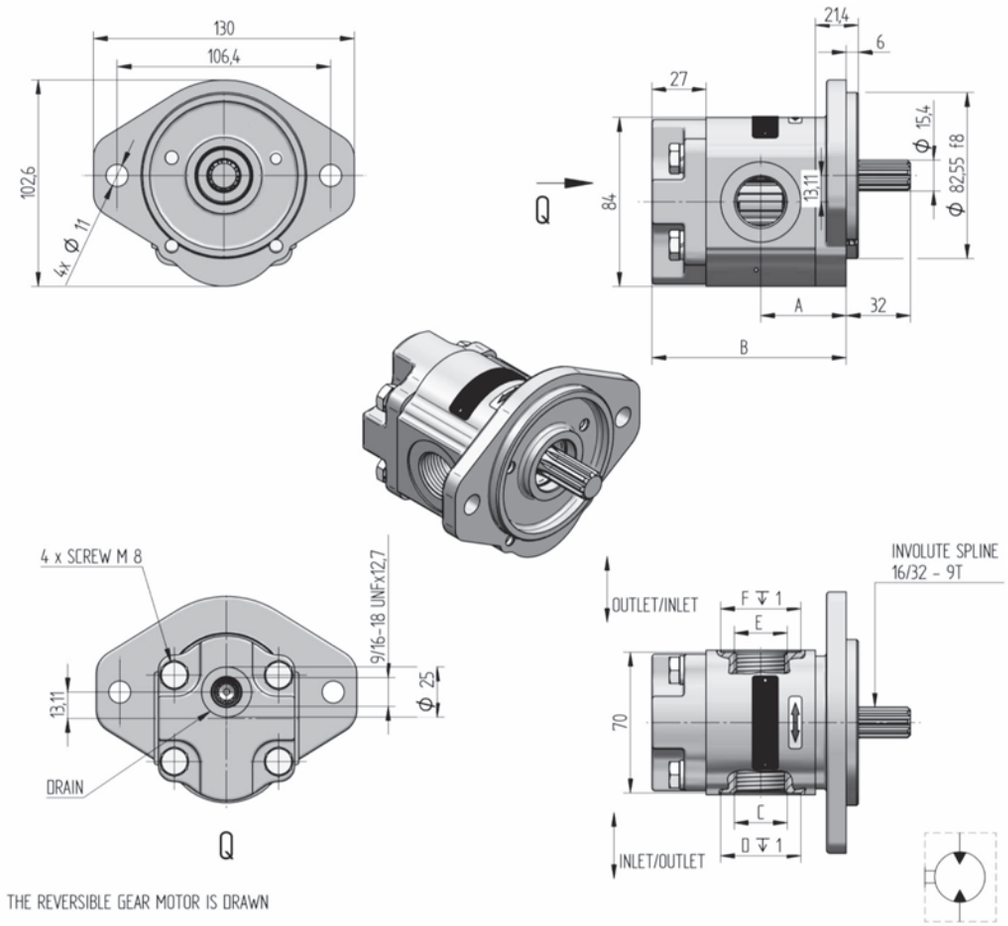
CATALOGUE SHETS OF JM SERIES BASIC DESIGNS



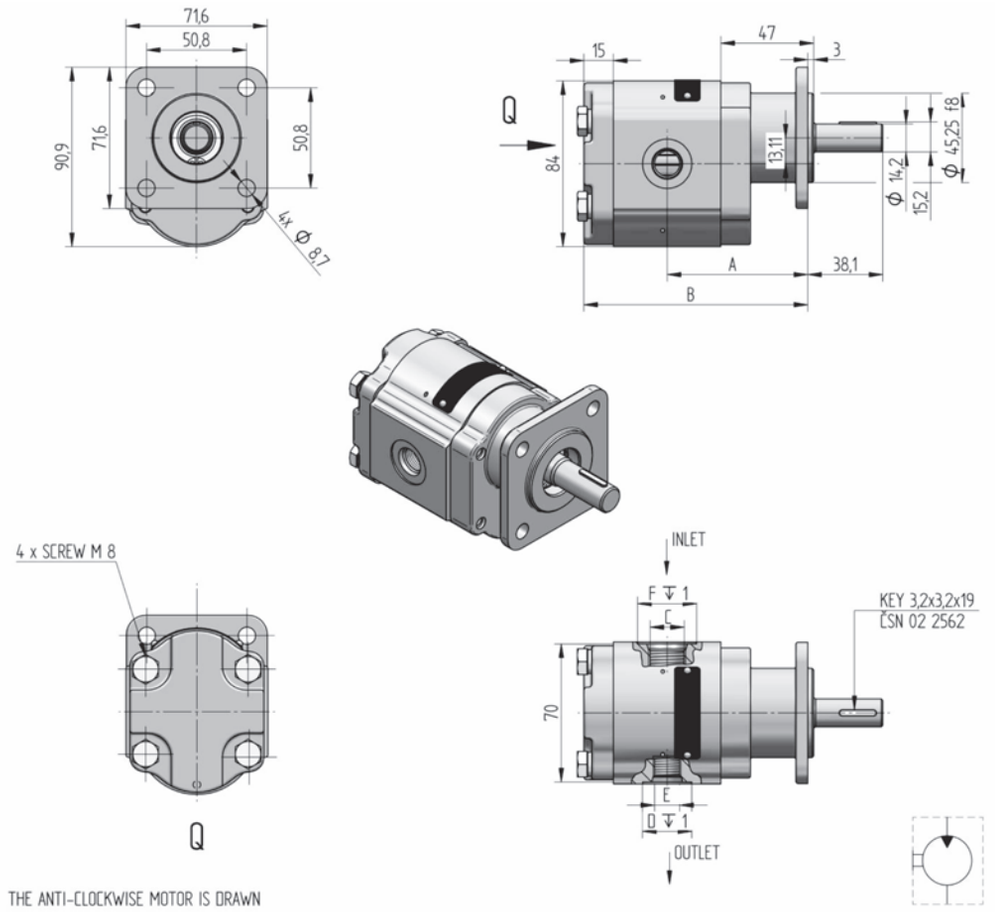
Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]
JM-15R-R03C05-S H06H05-N		R	15	190	500	2200	51.86	103.42	20	40	M6x13	15	35	M6x13
JM-15L- R03C05-S H06H05-N		L												
JM-12R- R03C05-S H06H05-N		R	12	220	500	2400	47.88	95.46	20	40	M6x13	15	35	M6x13
JM-12L- R03C05-S H06H05-N		L												
JM-11R- R03C05-S H06H05-N		R	11	235	500	2500	46.55	92.80	20	40	M6x13	15	35	M6x13
JM-11L- R03C05-S H06H05-N		L												
JM-10R- R03C05-S H06H05-N		R	10	250	500	2800	45.21	90.12	20	40	M6x13	15	35	M6x13
JM-10L- R03C05-S H06H05-N		L												
JM-8R- R03C05-S H06H05-N		R	8	280	500	3100	42.54	84.79	20	40	M6x13	15	35	M6x13
JM-8L- R03C05-S H06H05-N		L												
JM-7R- R03C05-S H06H05-N		R	7	280	500	3500	41.21	82.12	20	40	M6x13	15	35	M6x13
JM-7L- R03C05-S H06H05-N		L												
JM-6R- R03C05-S H06H05-N		R	6	280	500	3600	39.87	79.44	20	40	M6x13	15	35	M6x13
JM-6L- R03C05-S H06H05-N		L												
JM-5R- R03C05-S H06H05-N		R	5	280	500	4000	38.54	76.78	20	40	M6x13	15	35	M6x13
JM-5L- R03C05-S H06H05-N		L												
JM-4R- R03C05-S H06H05-N		R	4	280	500	4000	37.20	74.11	20	40	M6x13	15	35	M6x13
JM-4L- R03C05-S H06H05-N		L												
JM-3R- R03C05-S H06H05-N		R	3	280	500	4000	35.87	71.44	20	40	M6x13	15	35	M6x13
JM-3L- R03C05-S H06H05-N		L												
JM-2R- R03C05-S H06H05-N		R	2	280	500	4000	34.53	68.76	20	40	M6x13	15	35	M6x13
JM-2L- R03C05-S H06H05-N		L												



Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]
JM-15B- S02V08-SU04U04-N		B	15	190	500	2200	80,56	132,12	7/8-14UNFx17	∅ 34	7/8-14UNFx17	∅ 30
JM-12B- S02V08-SU04U04-N		B	12	220	500	2400	76,58	124,16	7/8-14UNFx17	∅ 34	7/8-14UNFx17	∅ 30
JM-11B- S02V08-SU04U04-N		B	11	235	500	2500	75,25	121,50	7/8-14UNFx17	∅ 34	7/8-14UNFx17	∅ 30
JM-10B- S02V08-SU04U04-N		B	10	250	500	2800	73,91	118,82	7/8-14UNFx17	∅ 34	7/8-14UNFx17	∅ 30
JM-8B- S02V08-SU04U04-N		B	8	280	500	3100	71,24	113,49	7/8-14UNFx17	∅ 34	7/8-14UNFx17	∅ 30
JM-7B- S02V08-SU04U04-N		B	7	280	500	3500	69,91	110,82	7/8-14UNFx17	∅ 34	7/8-14UNFx17	∅ 30
JM-6B- S02V08-SU04U04-N		B	6	280	500	3600	68,57	108,14	7/8-14UNFx17	∅ 34	7/8-14UNFx17	∅ 30
JM-5B- S02V08-SU04U04-N		B	5	280	500	4000	67,24	105,48	7/8-14UNFx17	∅ 34	7/8-14UNFx17	∅ 30
JM-4B- S02V08-SU04U04-N		B	4	280	500	4000	65,90	102,81	7/8-14UNFx17	∅ 34	7/8-14UNFx17	∅ 30
JM-3B- S02V08-SU04U04-N		B	3	280	500	4000	64,57	100,14	7/8-14UNFx17	∅ 34	7/8-14UNFx17	∅ 30
JM-2B- S02V08-SU04U04-N		B	2	280	500	4000	63,23	97,46	7/8-14UNFx17	∅ 34	7/8-14UNFx17	∅ 30



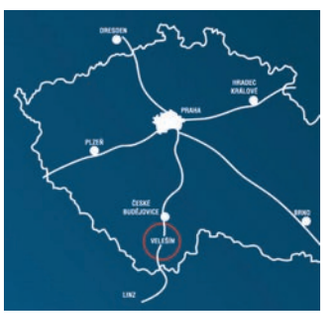
Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]
JM-15B- S02D04-S G04G04-N		B	15	190	500	2200	80,56	132,12	G 3/4 x 16	∅ 39	G 3/4 x 16	∅ 39
JM-12B- S02D04-S G04G04-N		B	12	220	500	2400	76,58	124,16	G 3/4 x 16	∅ 39	G 3/4 x 16	∅ 39
JM-11B- S02D04-S G04G04-N		B	11	235	500	2500	75,25	121,50	G 3/4 x 16	∅ 39	G 3/4 x 16	∅ 39
JM-10B- S02D04-S G04G04-N		B	10	250	500	2800	73,91	118,82	G 3/4 x 16	∅ 39	G 3/4 x 16	∅ 39
JM-8B- S02D04-S G04G04-N		B	8	280	500	3100	71,24	113,49	G 3/4 x 16	∅ 39	G 3/4 x 16	∅ 39
JM-7B- S02D04-S G04G04-N		B	7	280	500	3500	69,91	110,82	G 3/4 x 16	∅ 39	G 3/4 x 16	∅ 39
JM-6B- S02D04-S G04G04-N		B	6	280	500	3600	68,57	108,14	G 3/4 x 16	∅ 39	G 3/4 x 16	∅ 39
JM-5B- S02D04-S G04G04-N		B	5	280	500	4000	67,24	105,48	G 3/4 x 16	∅ 39	G 3/4 x 16	∅ 39
JM-4B- S02D04-S G04G04-N		B	4	280	500	4000	65,90	102,81	G 3/4 x 16	∅ 39	G 3/4 x 16	∅ 39
JM-3B- S02D04-S G04G04-N		B	3	280	500	4000	64,57	100,14	G 3/4 x 16	∅ 39	G 3/4 x 16	∅ 39
JM-2B- S02D04-S G04G04-N		B	2	280	500	4000	63,23	97,46	G 3/4 x 16	∅ 39	G 3/4 x 16	∅ 39



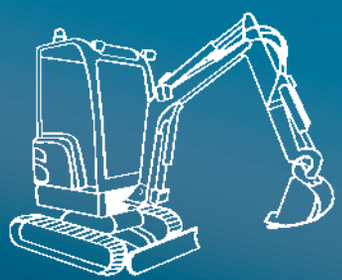
Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]
JM-15R- F01V08-S U03U02-N		R	15	190	500	2200	80.56	132.12	3/4-16UNFx15	∅ 30	9/16-18UNFx13	∅ 25
JM-15L- F01V08-S U03U02-N		L										
JM-12R- F01V08-S U03U02-N		R	12	220	500	2400	76.58	124.16	3/4-16UNFx15	∅ 30	9/16-18UNFx13	∅ 25
JM-12L- F01V08-S U03U02-N		L										
JM-11R- F01V08-S U03U02-N		R	11	235	500	2500	75.25	121.50	3/4-16UNFx15	∅ 30	9/16-18UNFx13	∅ 25
JM-11L- F01V08-S U03U02-N		L										
JM-10R- F01V08-S U03U02-N		R	10	250	500	2800	73.91	118.82	3/4-16UNFx15	∅ 30	9/16-18UNFx13	∅ 25
JM-10L- F01V08-S U03U02-N		L										
JM-8R- F01V08-S U03U02-N		R	8	280	500	3100	71.24	113.49	3/4-16UNFx15	∅ 30	9/16-18UNFx13	∅ 25
JM-8L- F01V08-S U03U02-N		L										
JM-7R- F01V08-S U03U02-N		R	7	280	500	3500	69.91	110.82	3/4-16UNFx15	∅ 30	9/16-18UNFx13	∅ 25
JM-7L- F01V08-S U03U02-N		L										
JM-6R- F01V08-S U03U02-N		R	6	280	500	3600	68.57	108.14	3/4-16UNFx15	∅ 30	9/16-18UNFx13	∅ 25
JM-6L- F01V08-S U03U02-N		L										
JM-5R- F01V08-S U03U02-N		R	5	280	500	4000	67.24	105.48	3/4-16UNFx15	∅ 30	9/16-18UNFx13	∅ 25
JM-5L- F01V08-S U03U02-N		L										
JM-4R- F01V08-S U03U02-N		R	4	280	500	4000	65.90	102.81	3/4-16UNFx15	∅ 30	9/16-18UNFx13	∅ 25
JM-4L- F01V08-S U03U02-N		L										
JM-3R- F01V08-S U03U02-N		R	3	280	500	4000	64.57	100.14	3/4-16UNFx15	∅ 30	9/16-18UNFx13	∅ 25
JM-3L- F01V08-S U03U02-N		L										
JM-2R- F01V08-S U03U02-N		R	2	280	500	4000	63.23	97.46	3/4-16UNFx15	∅ 30	9/16-18UNFx13	∅ 25
JM-2L- F01V08-S U03U02-N		L										

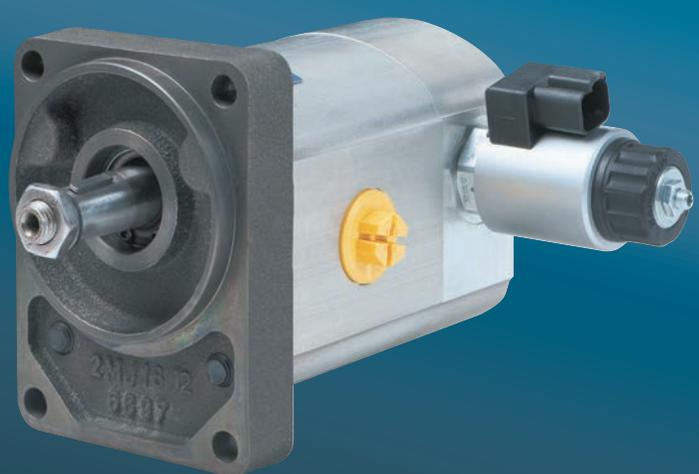
jihostroj
AERO TECHNOLOGY & HYDRAULICS

JIHOSTROJ a.s.
Budějovická 148
CZ 382 32 Velešín
Czech Republic
tel.: +420 380 340 511
fax: +420 380 340 612
e-mail: mailbox@jihostroj.cz
http: //**www.jihostroj.com**
GPS 48°49'51.748" N 14°27'40.770" E



jihostroj
AERO TECHNOLOGY & HYDRAULICS

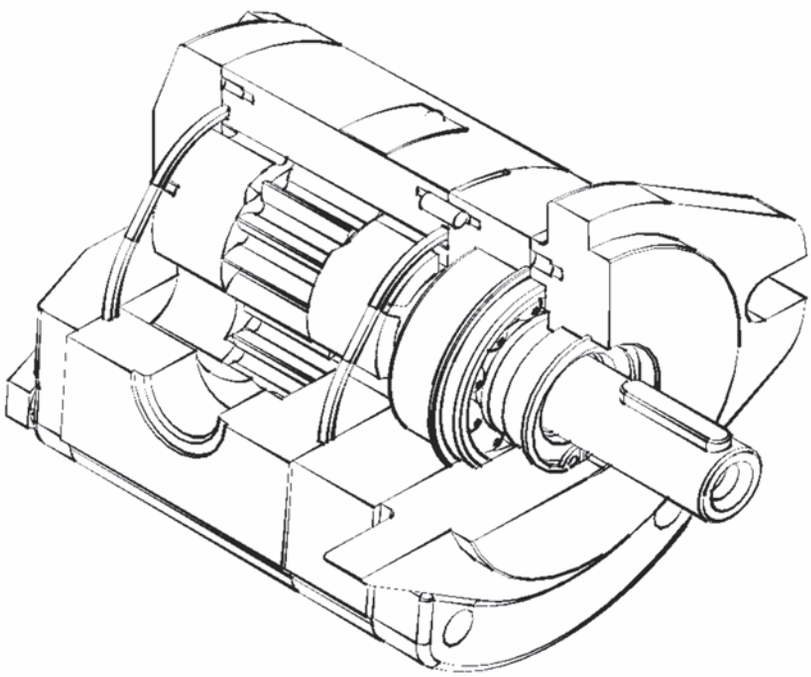




Displacement from 4 to 31 ccm
Pressure up to 270 bar
Speed from 500 to 4000 RPM

GEAR MOTORS
TM3

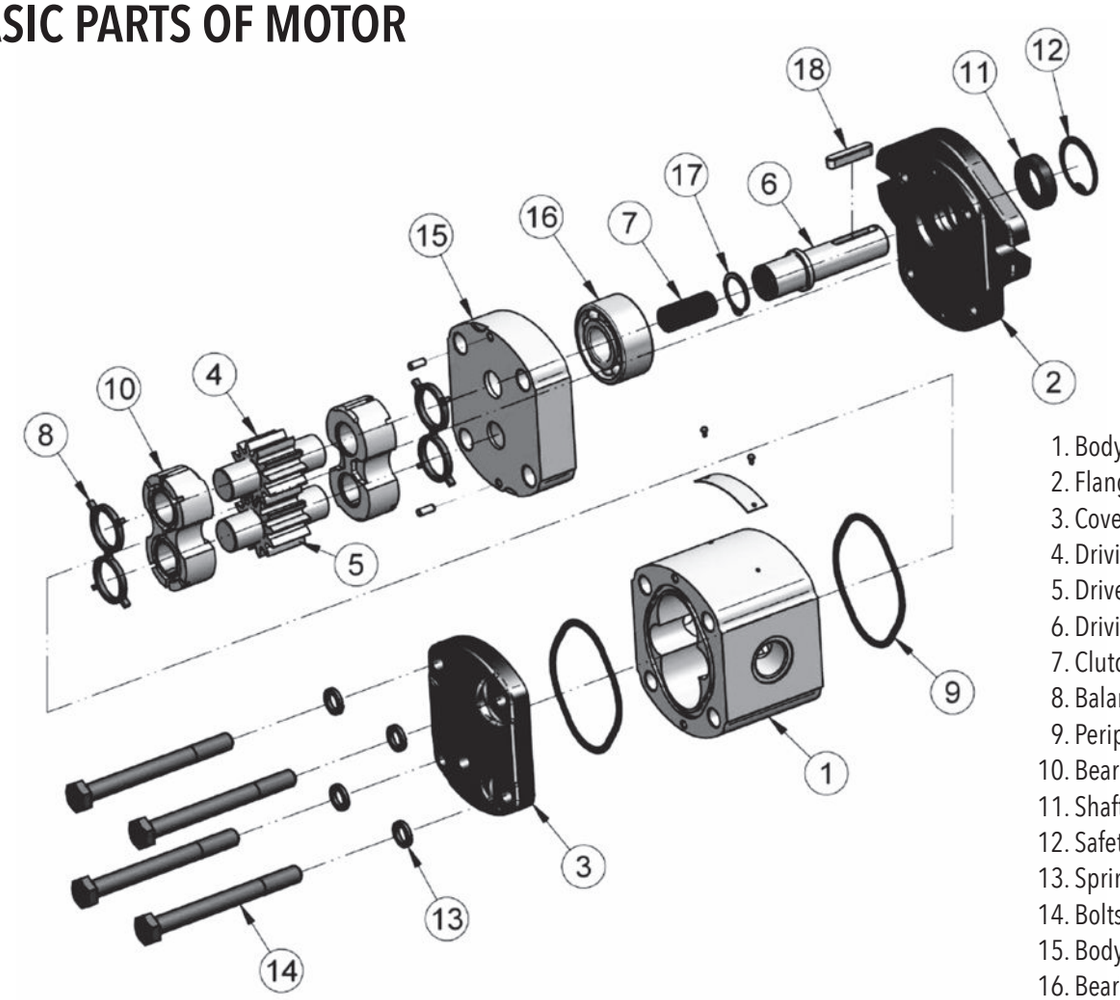
TABLE OF CONTENTS



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 TM3 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	1500	1500	1500	1500	1500	1500	1500
	minimum	n_{min}	[min^{-1}]	500	500	500	500	500	500	500	500
	maximum	n_{max}	[min^{-1}]	4000	4000	3600	3600	3200	3200	2800	2200
Pressure at outlet	minimum	p_{1min}	[bar]	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
	maximum	p_{1max}	[bar]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
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 input flow rate (max.) 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 input 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 output power (min.) 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 output power at n_{max} a 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 and p_{2n}		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	1500	1500	1500	1500	1500	1500	1500
	minimum	n_{min}	[min^{-1}]	500	500	500	500	500	500	500	500
	maximum	n_{max}	[min^{-1}]	4000	4000	3600	3600	3200	3200	2800	2200
Pressure at outlet	minimum	p_{1min}	[bar]	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
	maximum	p_{1max}	[bar]	210	210	210	210	200	160	140	100
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 input flow rate (max.) 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 input 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 output power (min.) 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 output power at n_{max} a 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 and p_{2n}		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

FORMULAS USED FOR CALCULATION

Flow rate
Q

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

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

Displacement
V_g

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

Torque
M_k

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

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

Input power
P

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

η_t [–] total efficiency

PUMP EFFICIENCIES

Volumetric efficiency
η_v

It determines the amount of flow losses. Its value is $\eta_v = 0{,}92 \div 0{,}98$ (depending on rotation speed, viscosity of working liquid and outlet pressure). It can be expressed as follows:

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

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

Mechanical efficiency
η_m

It determines mechanical losses. Its value is about $\eta_m = 0{,}85$.
It can be expressed as follows:

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

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

Total efficiency
η_t

t is defined as product of η_n and η_m
and determines difference between theoretical and actual required input power:

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

$P_{act.}$ [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 $20 \cdot 10^{-6}$ should be consulted with manufacturer): $\nu = 10 \cdot 10^{-6}\ [m^2 \cdot s^{-1}]$

Filtration coefficient β_α

$\beta_{25}\ 75 \geq$ (for pressure $p_2 < 200$ bar)
$\beta_{10}\ 75 \geq$ (for pressure $p_2 > 200$ bar)

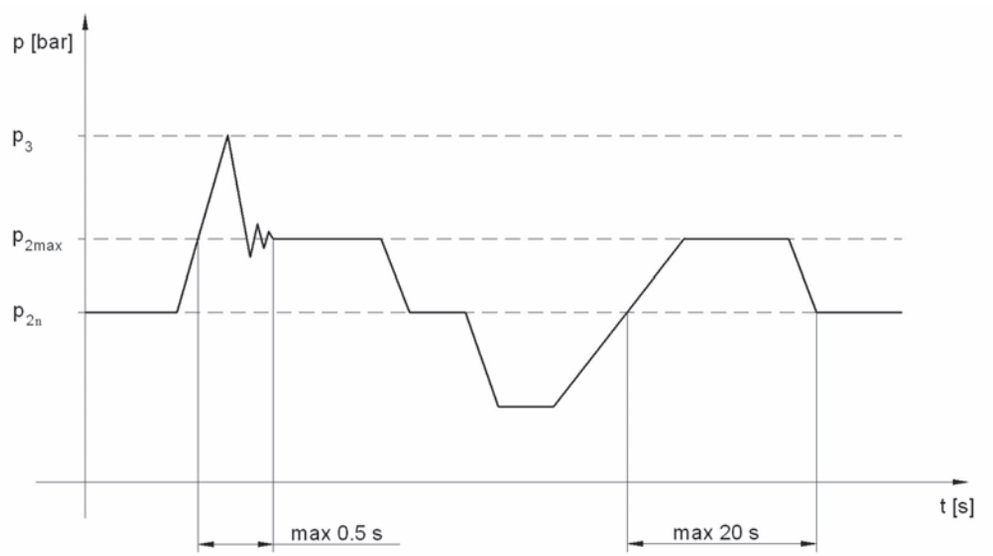
Liquid contamination class according to ISO 4406

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)

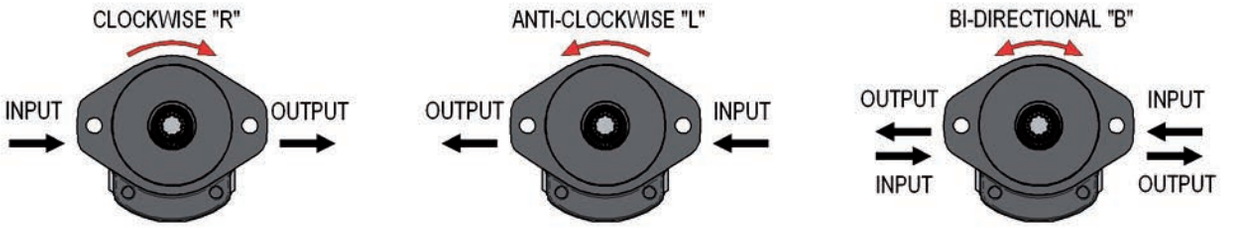
PRESSURE LOAD



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.

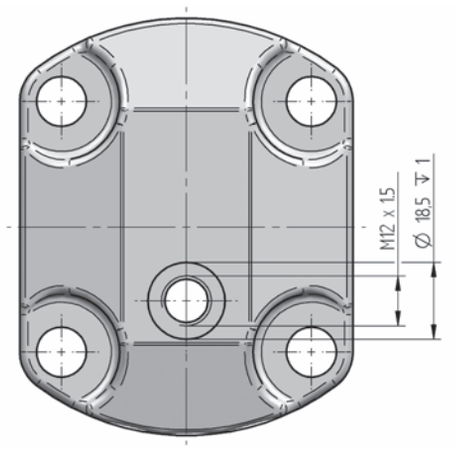
DIRECTION OF ROTATION

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

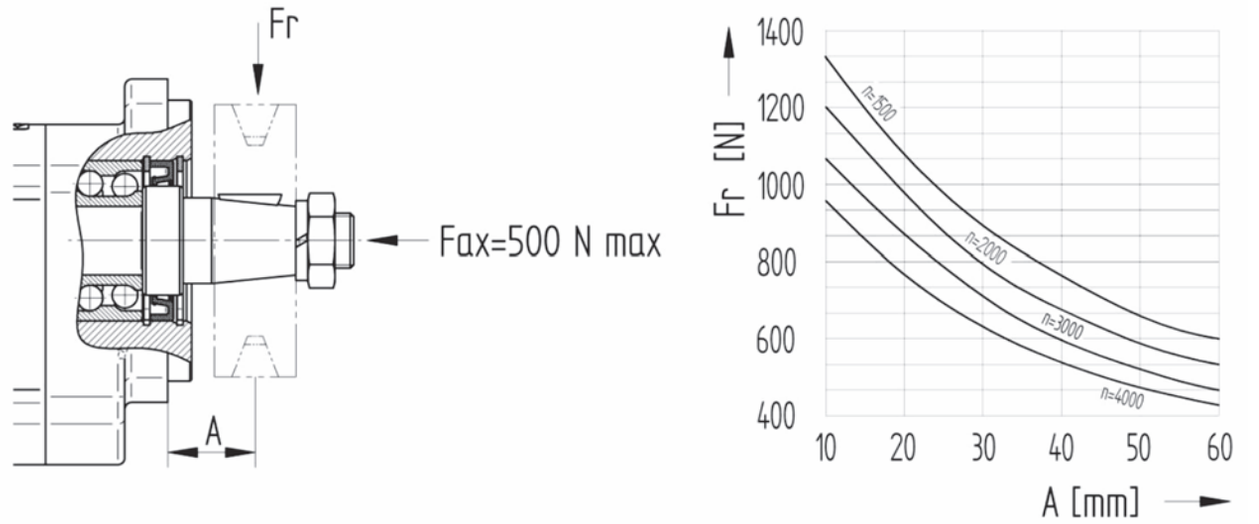


REVERSIBLE DESIGN

- 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.

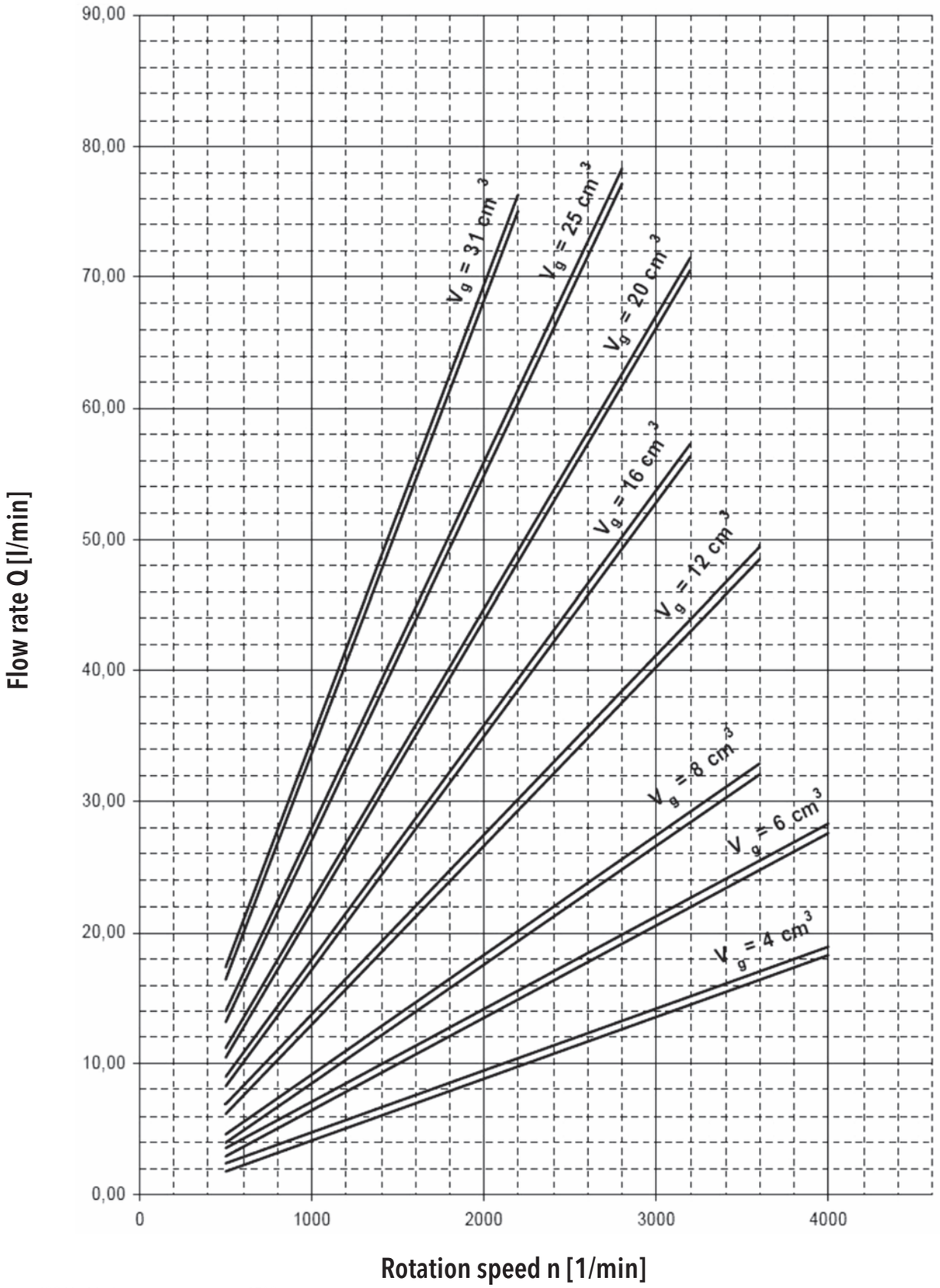


MOTOR WITH A FRONT-END BEARING



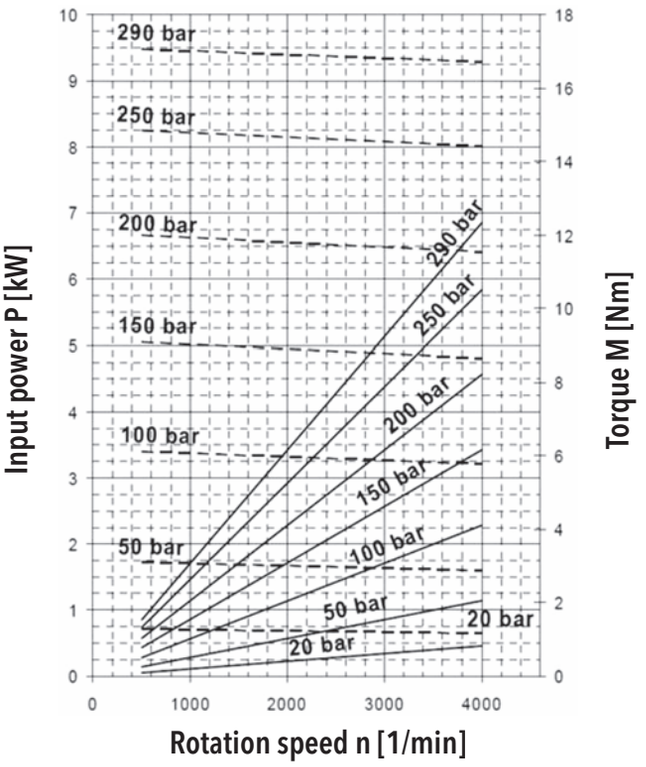
A driven device must not generate an axial or a radial load of the motor shaft, unless this is exclusively permitted for the motor with a front-end bearing.

TM3 FLOW RATE AND POWER CURVES

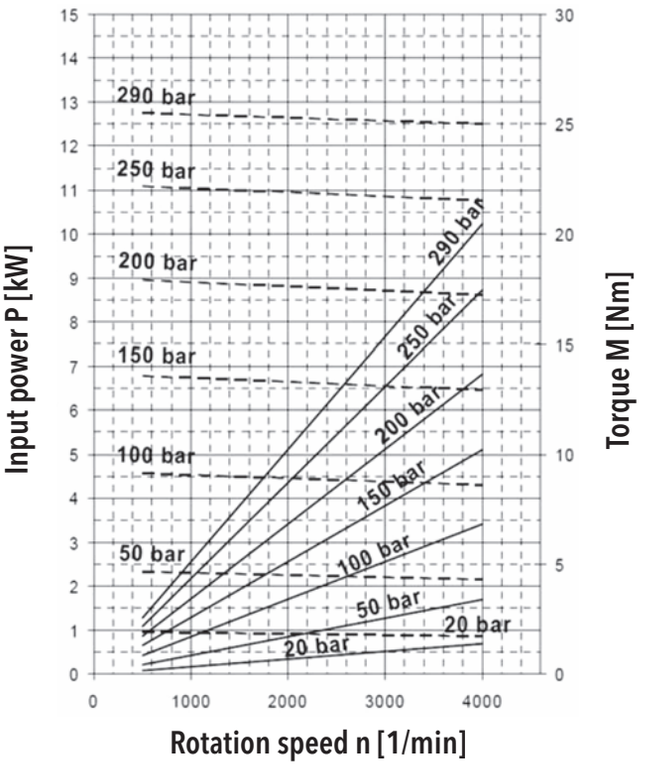


Above curves apply to ISO V_g 46 oil at temperature t = 45°C.

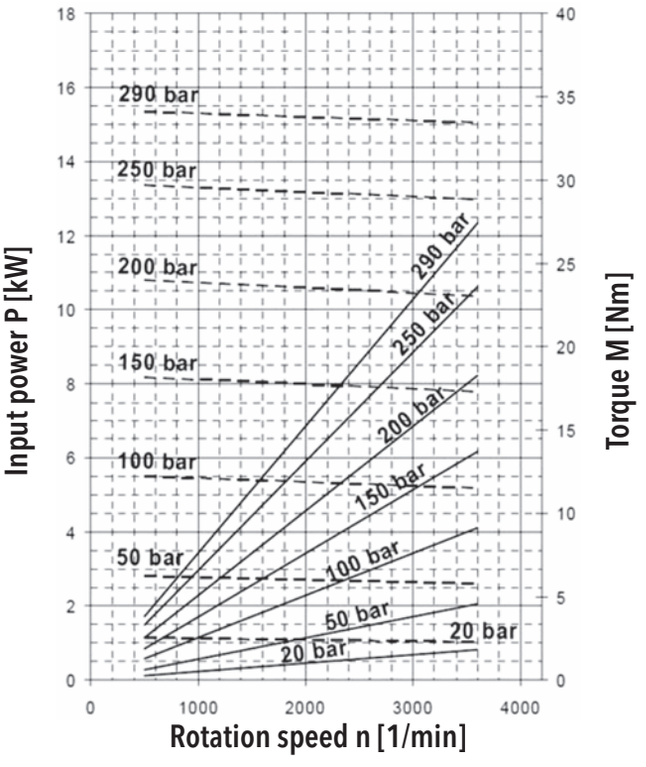
4,00 cm³



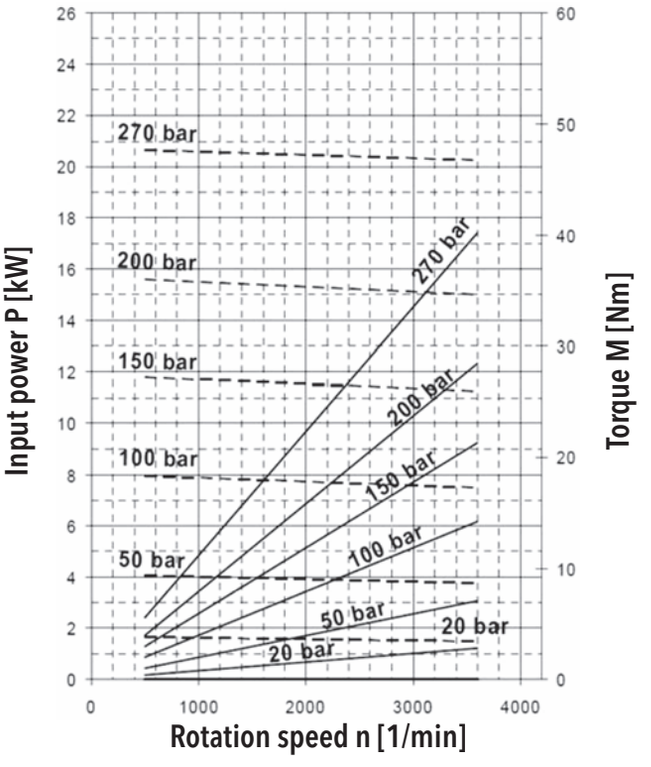
6,00 cm³



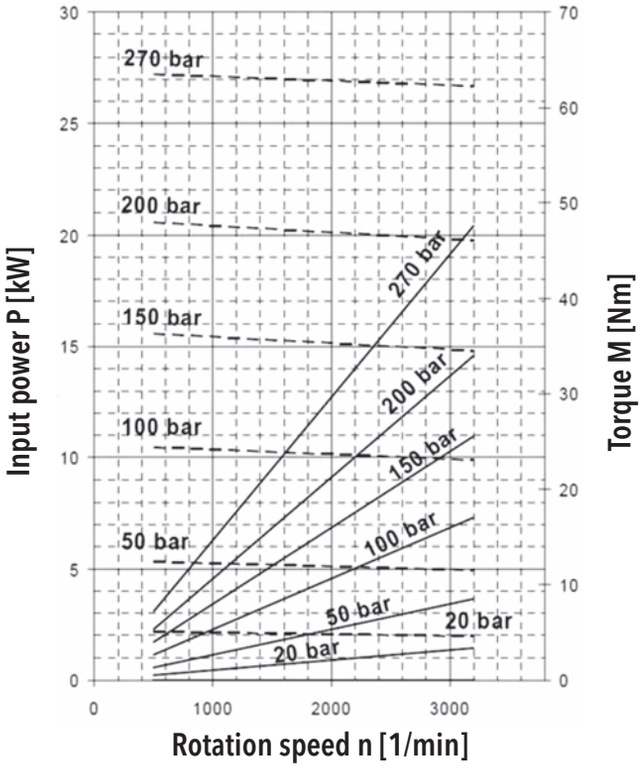
8,00 cm³



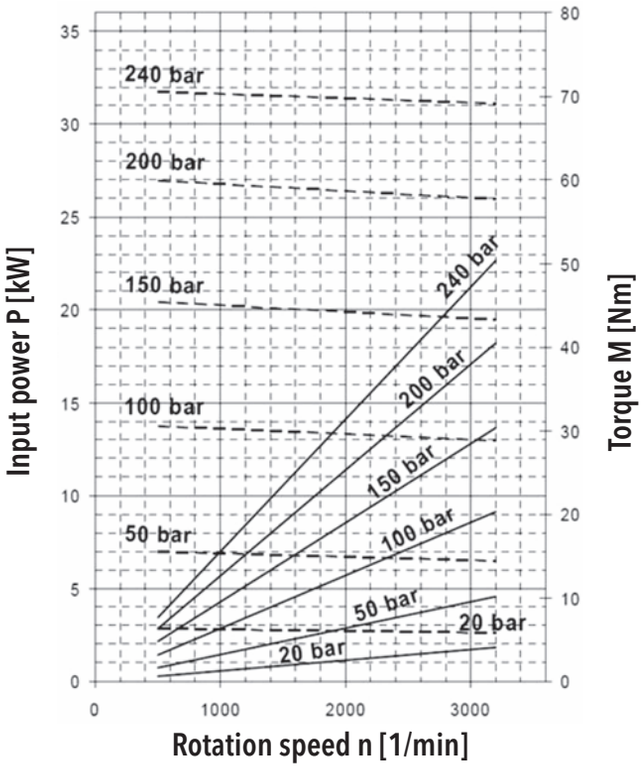
12,00 cm³



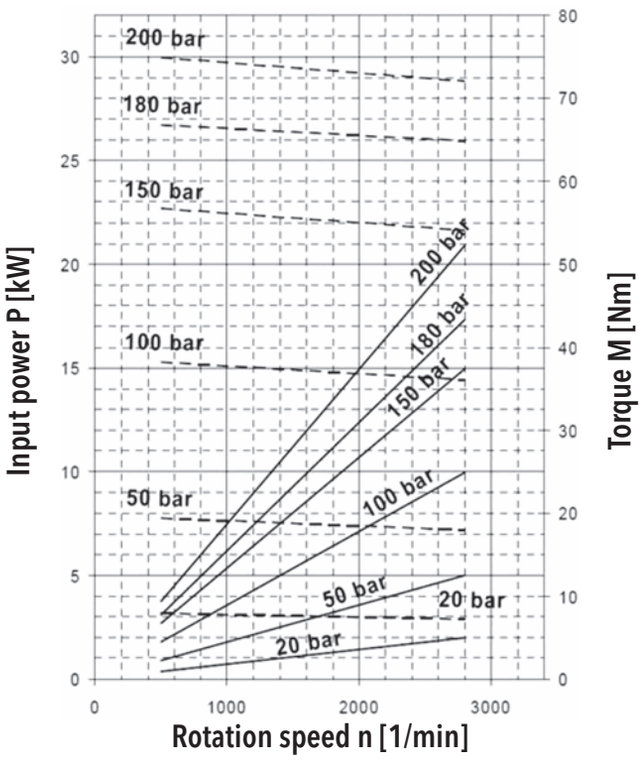
16,00 cm³



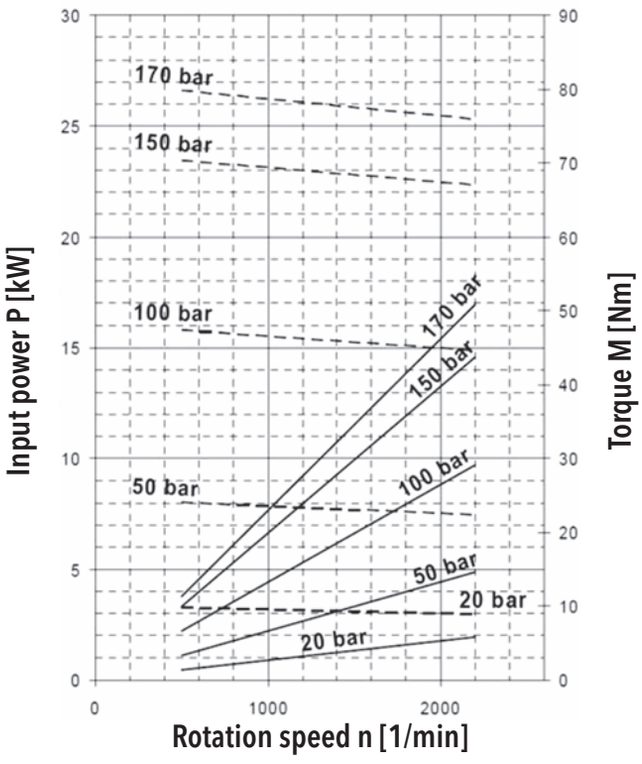
20,00 cm³



25,00 cm³



31,00 cm³



ORDER KEY

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

Code	Type
TM3	TM3 Series Gear Motor

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	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

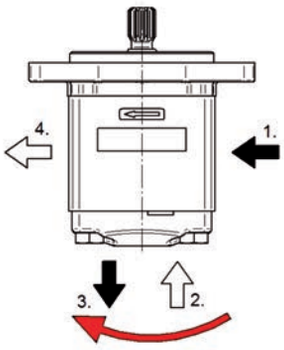
Code	Special arrangements
-	No special arrangements
001	With front-end bearing type 1
002	With front-end bearing type 2
003	Sealed section for multiple version
004	Without shaft seal
005	Inlet in body, outlet in cover
006	Inlet in cover, outlet in body
007	Inlet in body, outlet in flange
008	Inlet in 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

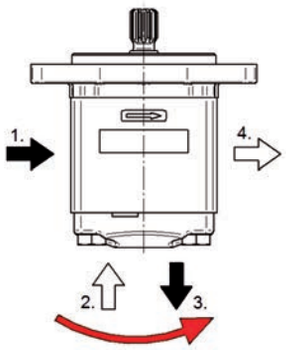
Code	Liquid inlet and outlet connection shape
M05	Thread M18x1,5
M09	Thread M27x2
G03	Thread BSP G1/2
G04	Thread BSP G3/4
G05	Thread BSP G1´´
U04	Thread 7/8–14 UNF-2B
U05	Thread 1–1/16–12 UN-2B
H05	Flanged fitting Ø15 Square 4xM6 Ø35
H06	Flanged fitting Ø20 Square 4xM6 Ø40
H10	Flanged fitting Ø26 Square 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:



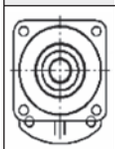
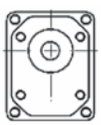
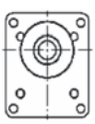
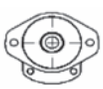
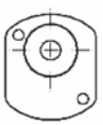
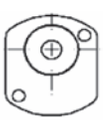
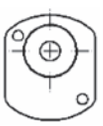
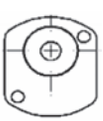
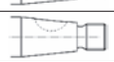
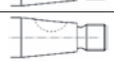
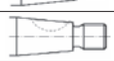
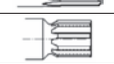
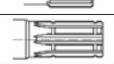
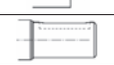
For clockwise and reverse gear motor,
in direction clockwise



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

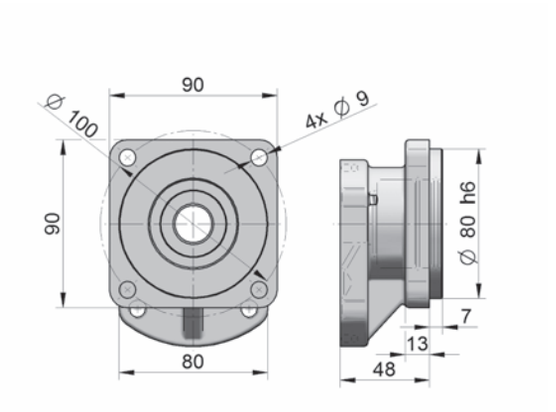
For. ex...: TM3-12R-S02D04-C<u>G03</u> <u>G03</u> <u>G04</u> <u>G04</u> -N
1. 2. 3. 4.

COMBINATIONS OF FLANGES AND SHAFTS

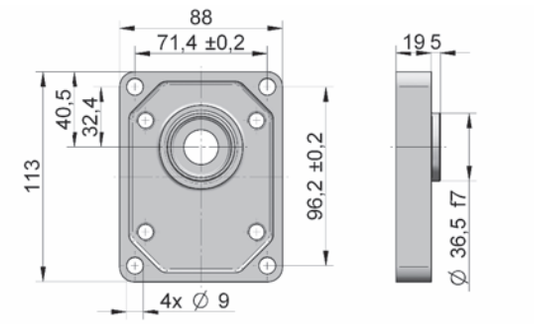
			FLANGE DESIGN									
			F02	R05	R06	R07	S02	S03	A07	A08	A09	A10
												
DRIVE SHAFT	C07			●								
	C08			●								
	C09			●								
	C10				●				●	●		
	D04						●	●				
	D06						●	●				
	D07						●	●				
	D08			●								
	D09				●				●	●		
	D10		●									
	D11					●						
	K05										●	●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

FLANGES DESIGN

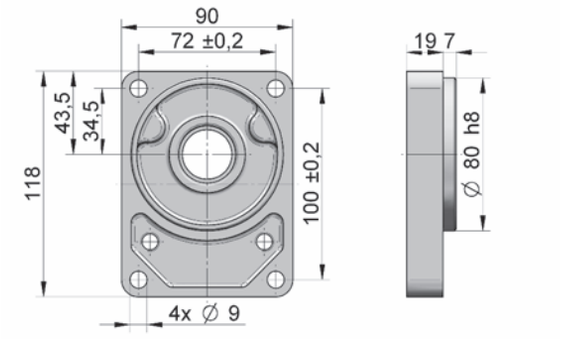
F02:



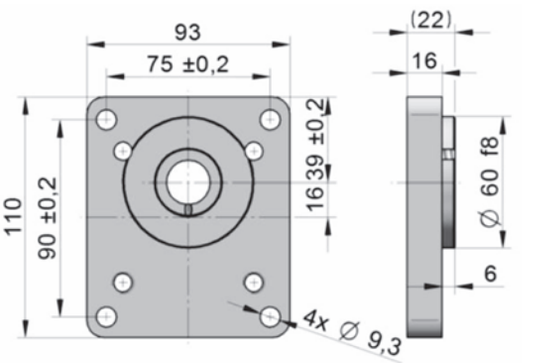
R05:



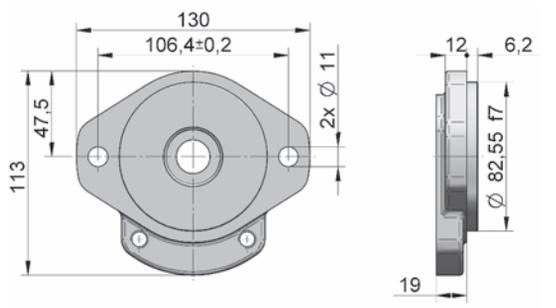
R06:



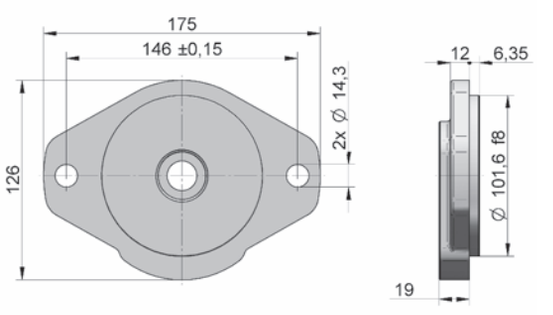
R07:



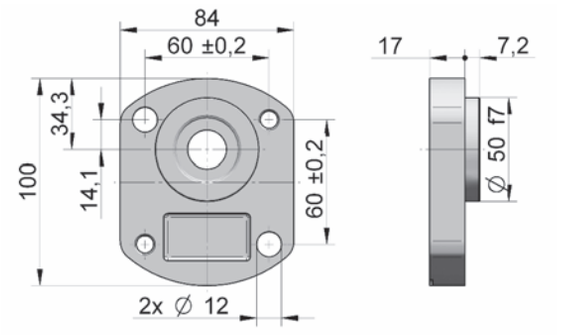
S02:



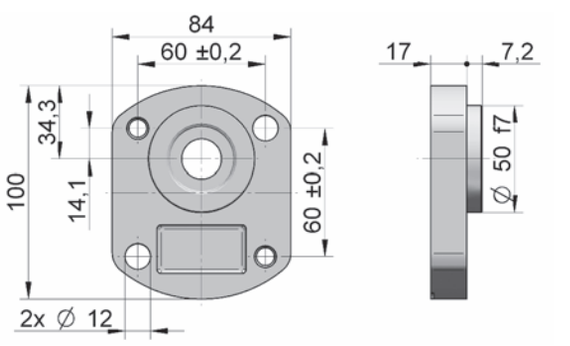
S03:



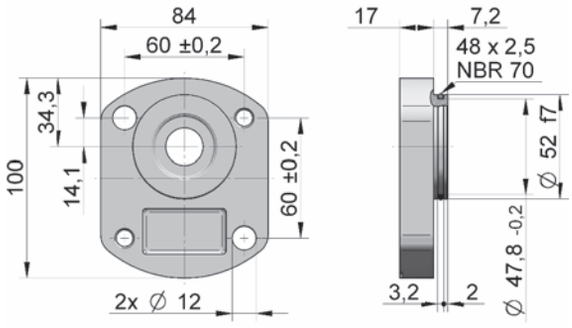
A07:



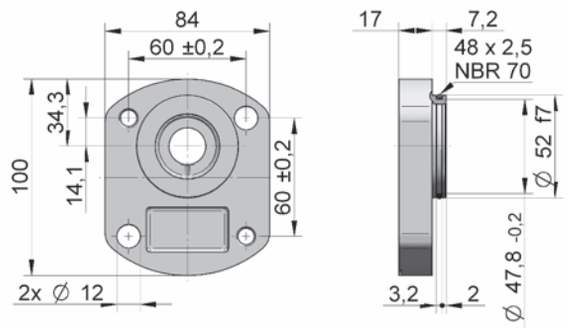
A08:



A09:



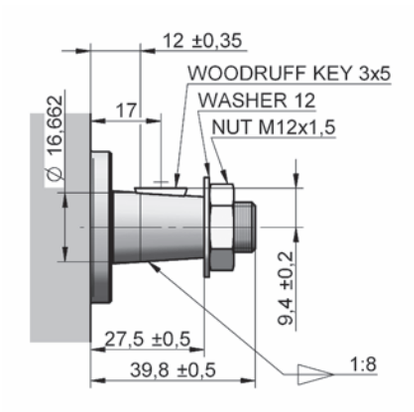
A10:



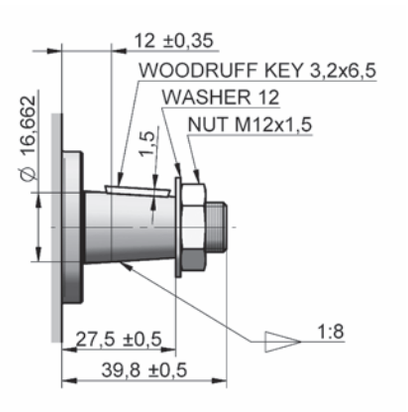
DRIVE SHAFT

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

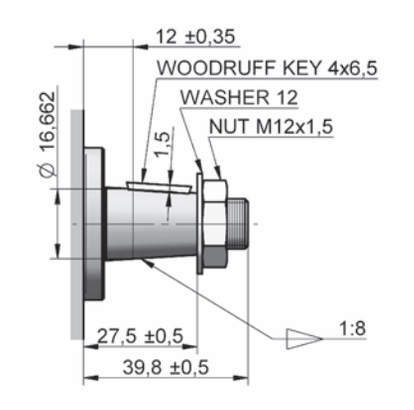
C07:



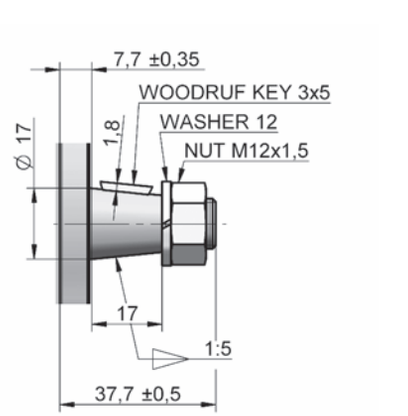
C08:



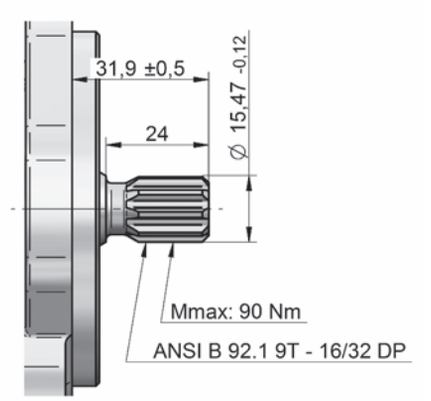
C09:



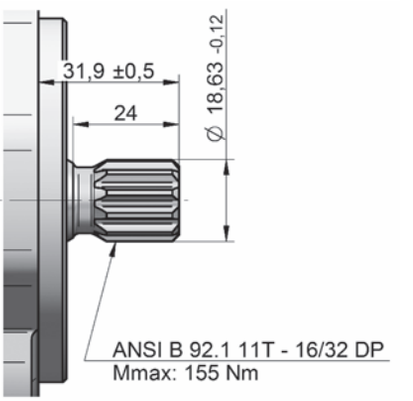
C10:



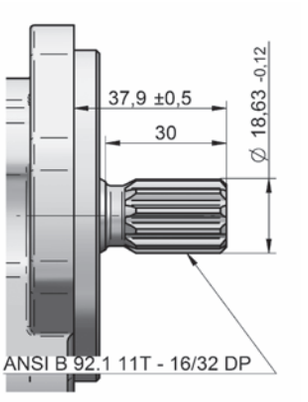
D04:



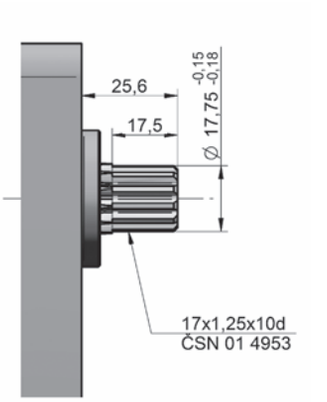
D06:



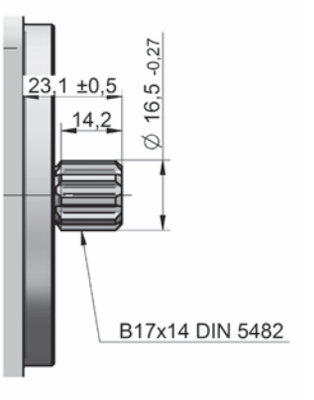
D07:



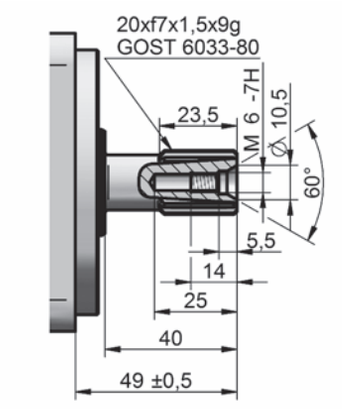
D08:



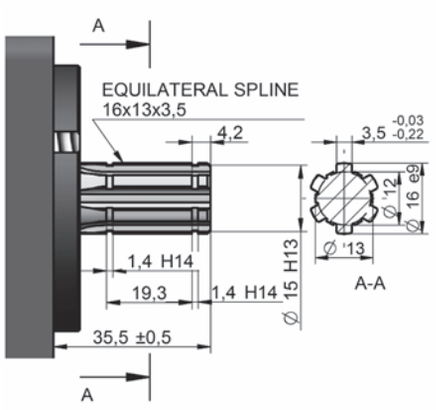
D09:



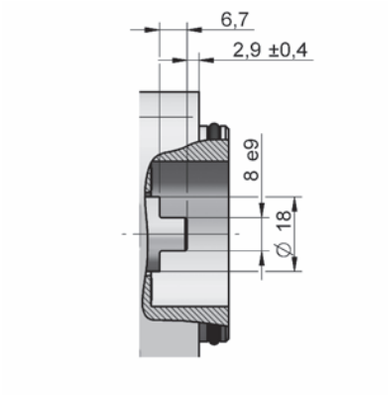
D10:



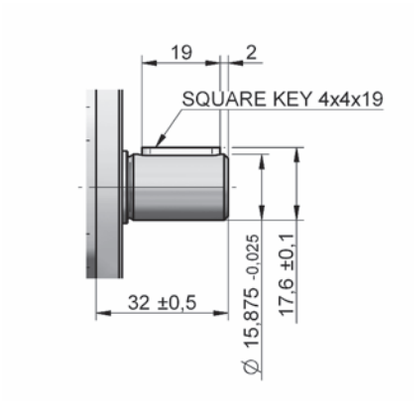
D11:



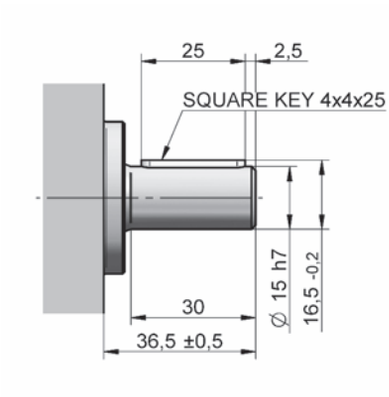
K07:



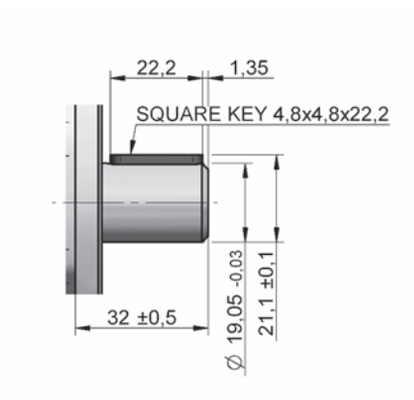
V09:



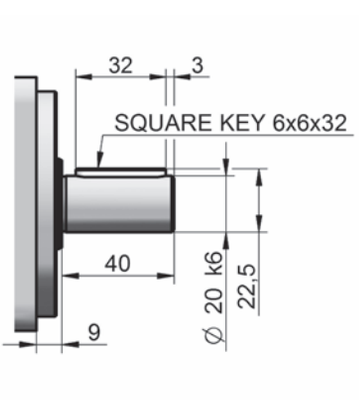
V11:



V12:

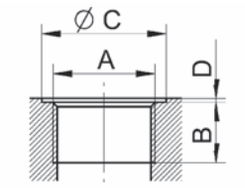


V13:



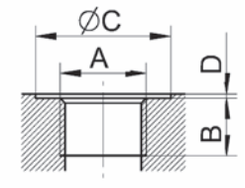
LIQUID INLET AND OUTLET CONNECTION

Metric thread according to ISO 6149



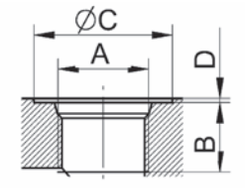
Displacement [cm³]	kód	Inlet				kód	Outlet			
		A	B	C	D		A	B	C	D
all	M09	M 27x2	16	33	1	M05	M 18x1,5	14	24	1

BSPP pipe thread according to ISO 228 - 1



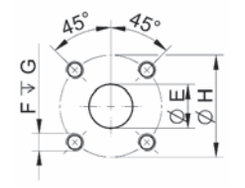
Displacement [cm³]	Code	Inlet				Code	Outlet			
		A	B	C	D		A	B	C	D
to 10	G03	G 1/2"	14	33	1	G03	G 1/2"	14	33	1
10 - 25	G04	G 3/4"	16	39	1	G03	G 1/2"	14	33	1
above 25	G05	G 1"	18	45	1	G04	G 3/4"	16	39	1

UNF thread according to SAE



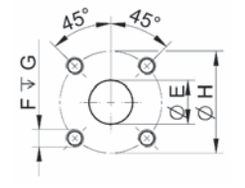
Displacement [cm³]	Code	Inlet				Code	Outlet			
		A	B	C	D		A	B	C	D
to 10	U04	7/8-14 UNF-2B	17	34	1	U04	7/8-14 UNF-2B	17	34	1
11 - 31	U05	1-1/16-12 UNF-2B	19	41	1	U04	7/8-14 UNF-2B	17	34	1

Flanged fittings according to DIN 8901/8902



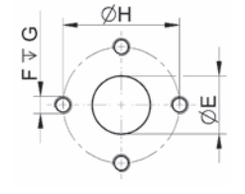
Displacement [cm³]	Code	Inlet				Code	Outlet			
		E	F	G	H		E	F	G	H
all	H06	20	M6	13	40	H05	15	M6	13	35
all	H10	25	M8	13	55	H05	15	M6	13	35

Flanged fittings - „square"



Displacement [cm³]	Code	Inlet				Code	Outlet			
		E	F	G	H		E	F	G	H
all	H08	20	M8	13	40	H07	13.5	M6	13	30

Flanged fittings - „cross"

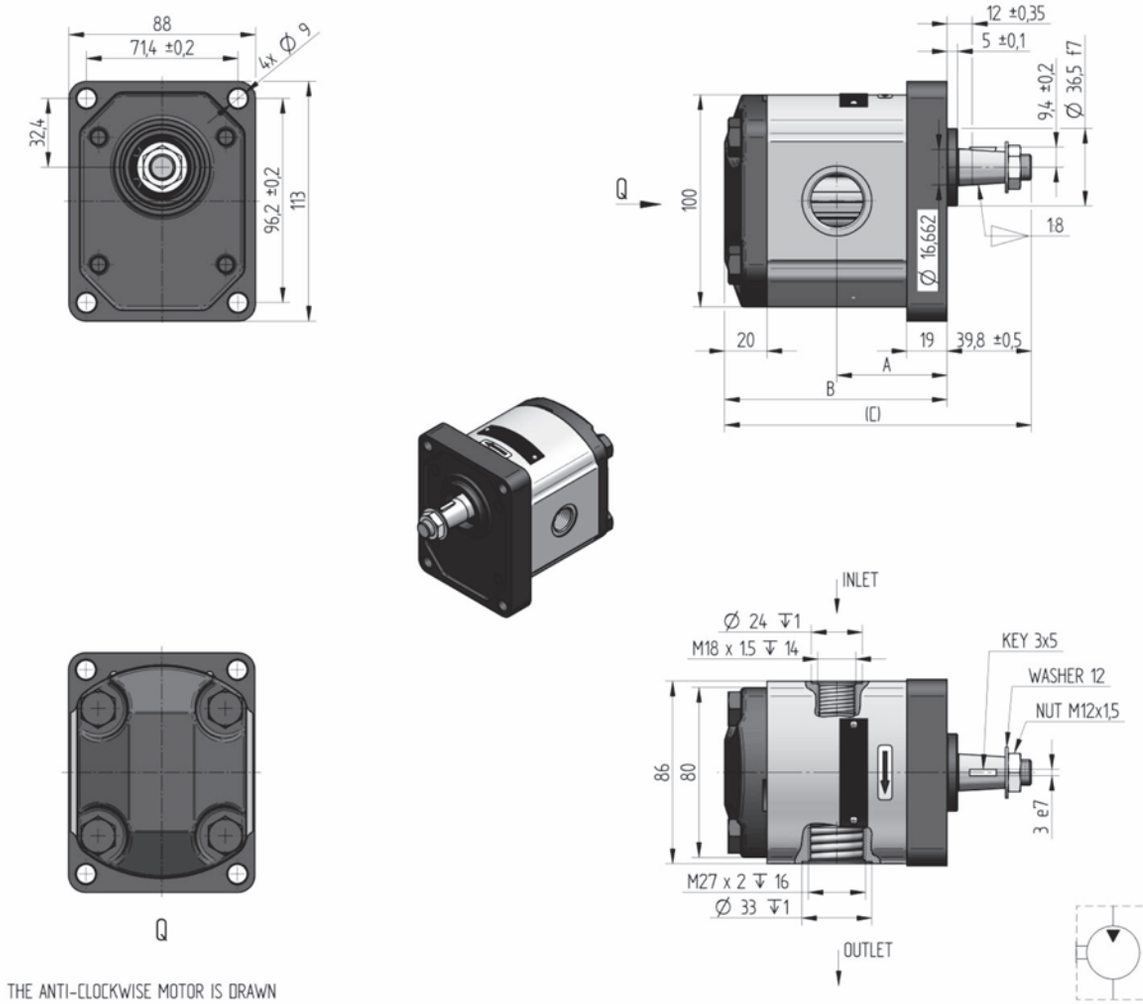


Displacement [cm³]	Code	Inlet				Code	Outlet			
		E	F	G	H		E	F	G	H
all	K02	20	M8	13	40	K01	13.5	M6	13	30
to 10	K07	14	M8	13	38	K07	14.0	M8	13	38
above 10	K08	19	M8	13	38	K07	14.0	M8	13	38

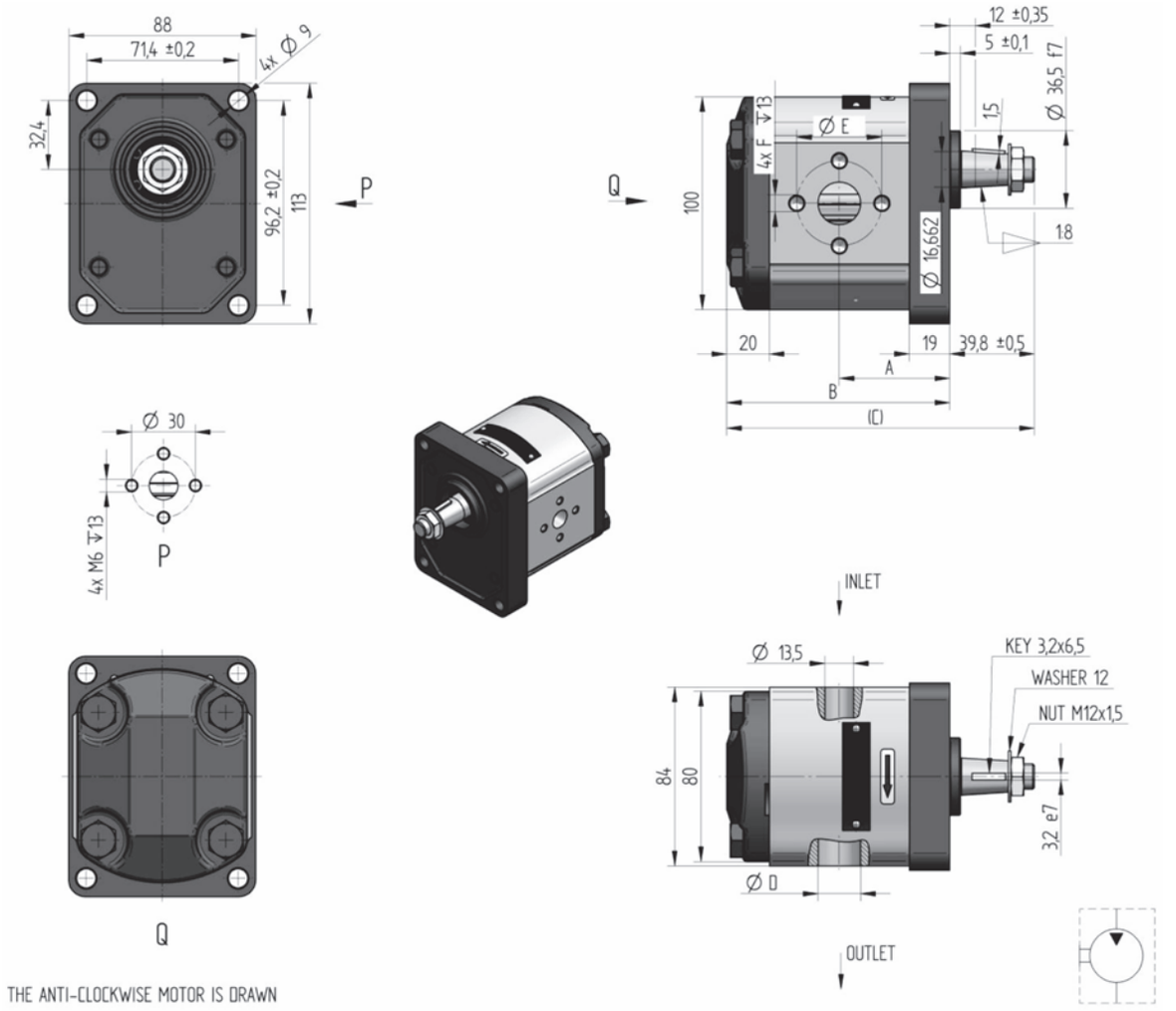
Drain

Displacement [cm³]	Code	Outlet			
		A	B	C	D
all	M02	M 12x1,5	12	20	1
	G01	G 1/4	12	45	1
	U01	7/16-20 UNF-2B	13	21	1
	U02	9/16-18 UNF-2B	14	25	1

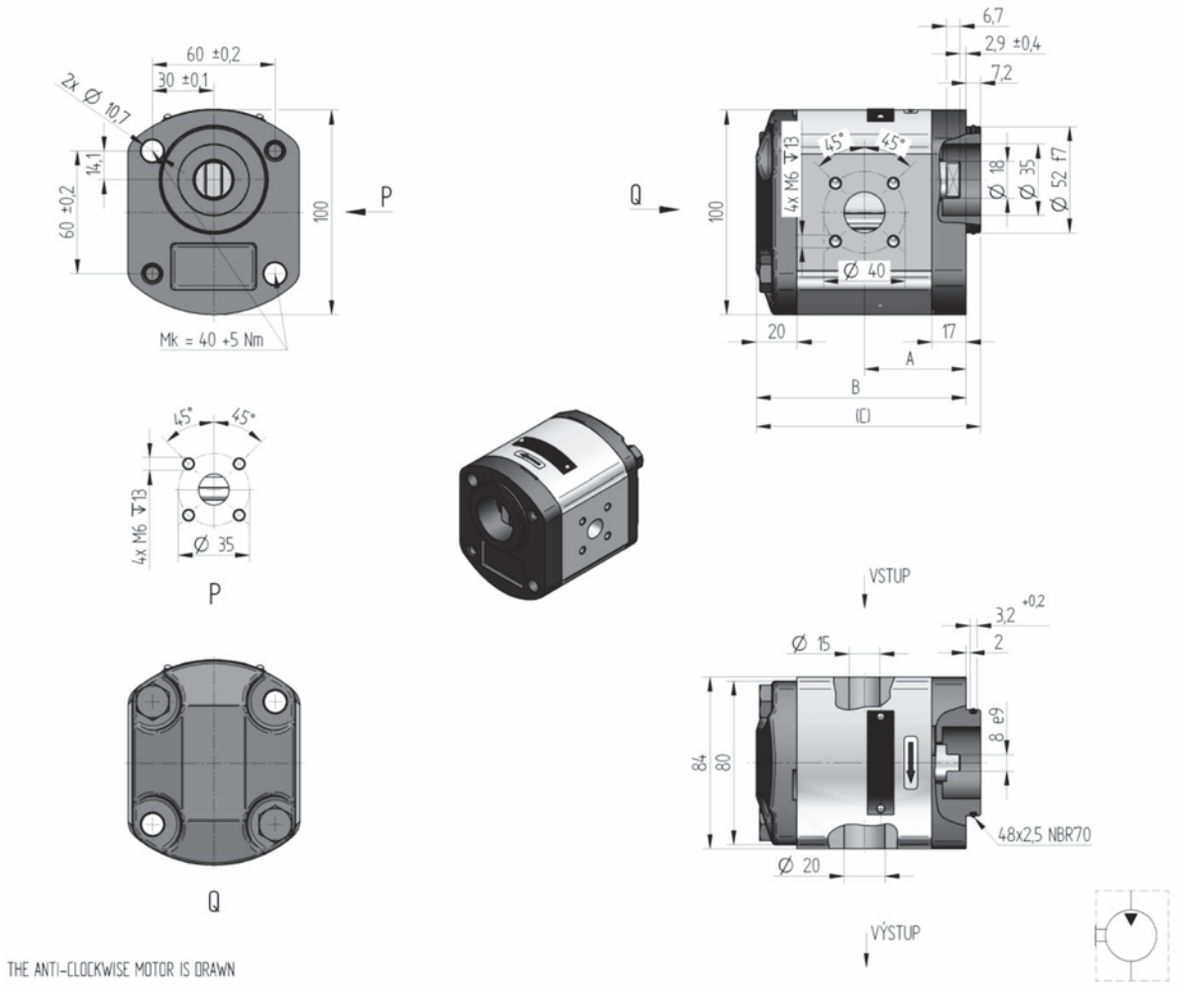
CATALOGUE SHETS OF TM3 SERIES BASIC DESIGNS



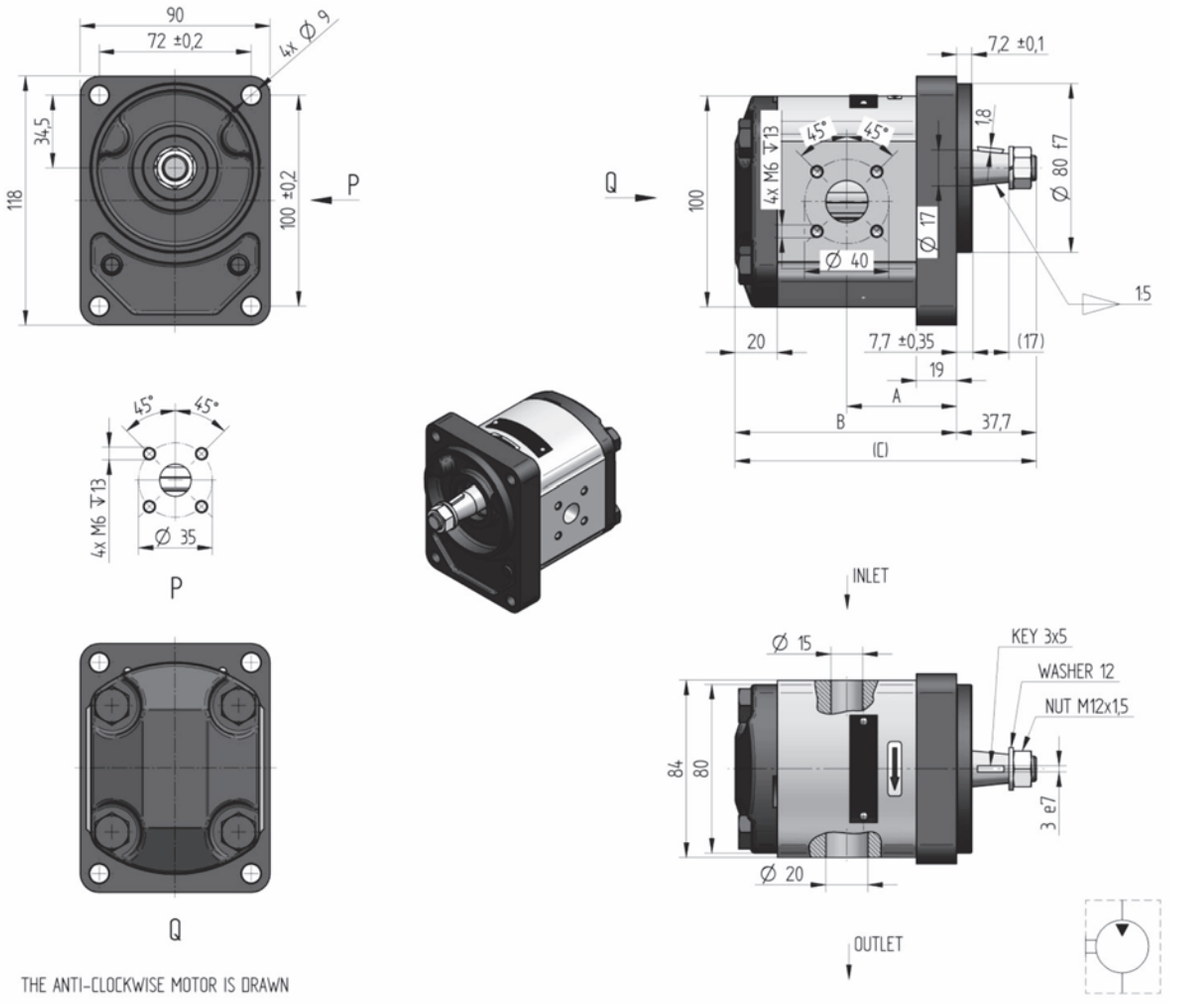
Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	dimension B [mm]	dimension C [mm]
TM3-31L- R05C07-SM09M05-N		L	31	150	500	2 200	63.7	128.5	168.3
TM3-31R- R05C07-SM09M05-N		R							
TM3-25L- R05C07-SM09M05-N		L	25	200	500	2 800	59.0	119.1	158.9
TM3-25R- R05C07-SM09M05-N		R							
TM3-20L- R05C07-SM09M05-N		L	20	240	500	3 200	55.0	111.2	151.0
TM3-20R- R05C07-SM09M05-N		R							
TM3-16L- R05C07-SM09M05-N		L	16	260	500	3 200	51.9	104.9	144.7
TM3-16R- R05C07-SM09M05-N		R							
TM3-12L- R05C07-SM09M05-N		L	12	260	500	3 600	48.8	98.6	138.4
TM3-12R- R05C07-SM09M05-N		R							
TM3-8L- R05C07-SM09M05-N		L	8	280	500	3 600	45.6	92.3	132.1
TM3-8R- R05C07-SM09M05-N		R							
TM3-6L- R05C07-SM09M05-N		L	6	280	500	4 000	44.0	89.2	129.0
TM3-6R- R05C07-SM09M05-N		R							
TM3-4L- R05C07-SM09M05-N		L	4	280	500	4 000	42.5	86.0	125.8
TM3-4R- R05C07-SM09M05-N		R							



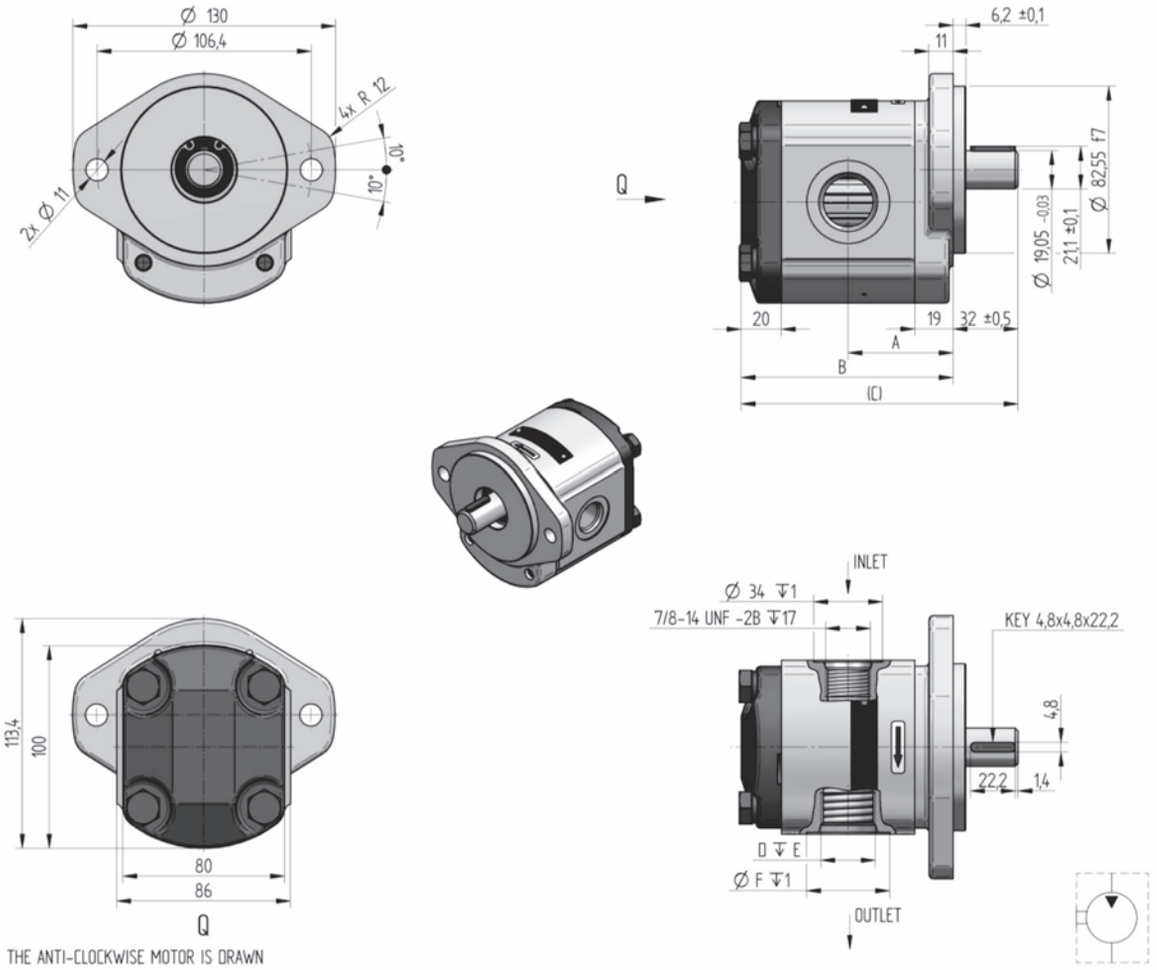
Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]
TM3-31L- R05C08-SK02K01-N		L	31	150	500	2 200	63.7	128.5	168.3	∅ 20	∅ 40	M8
TM3-31R- R05C08-SK02K01-N		R										
TM3-25L- R05C08-SK02K01-N		L	25	200	500	2 800	59.0	119.1	158.9	∅ 20	∅ 40	M8
TM3-25R- R05C08-SK02K01-N		R										
TM3-20L- R05C08-SK02K01-N		L	20	240	500	3 200	55.0	111.2	151.0	∅ 20	∅ 40	M8
TM3-20R- R05C08-SK02K01-N		R										
TM3-16L- R05C08-SK02K01-N		L	16	260	500	3 200	51.9	104.9	144.7	∅ 20	∅ 40	M8
TM3-16R- R05C08-SK02K01-N		R										
TM3-12L- R05C08-SK02K01-N		L	12	260	500	3 600	48.8	98.6	138.4	∅ 20	∅ 40	M8
TM3-12R- R05C08-SK02K01-N		R										
TM3-8L- R05C08-SK01K01-N		L	8	280	500	3 600	45.6	92.3	132.1	∅ 13.5	∅ 30	M6
TM3-8R- R05C08-SK01K01-N		R										
TM3-6L- R05C08-SK01K01-N		L	6	280	500	4 000	44.0	89.2	129.0	∅ 13.5	∅ 30	M6
TM3-6R- R05C08-SK01K01-N		R										
TM3-4L- R05C08-SK01K01-N		L	4	280	500	4 000	42.5	86.0	125.8	∅ 13.5	∅ 30	M6
TM3-4R- R05C08-SK01K01-N		R										



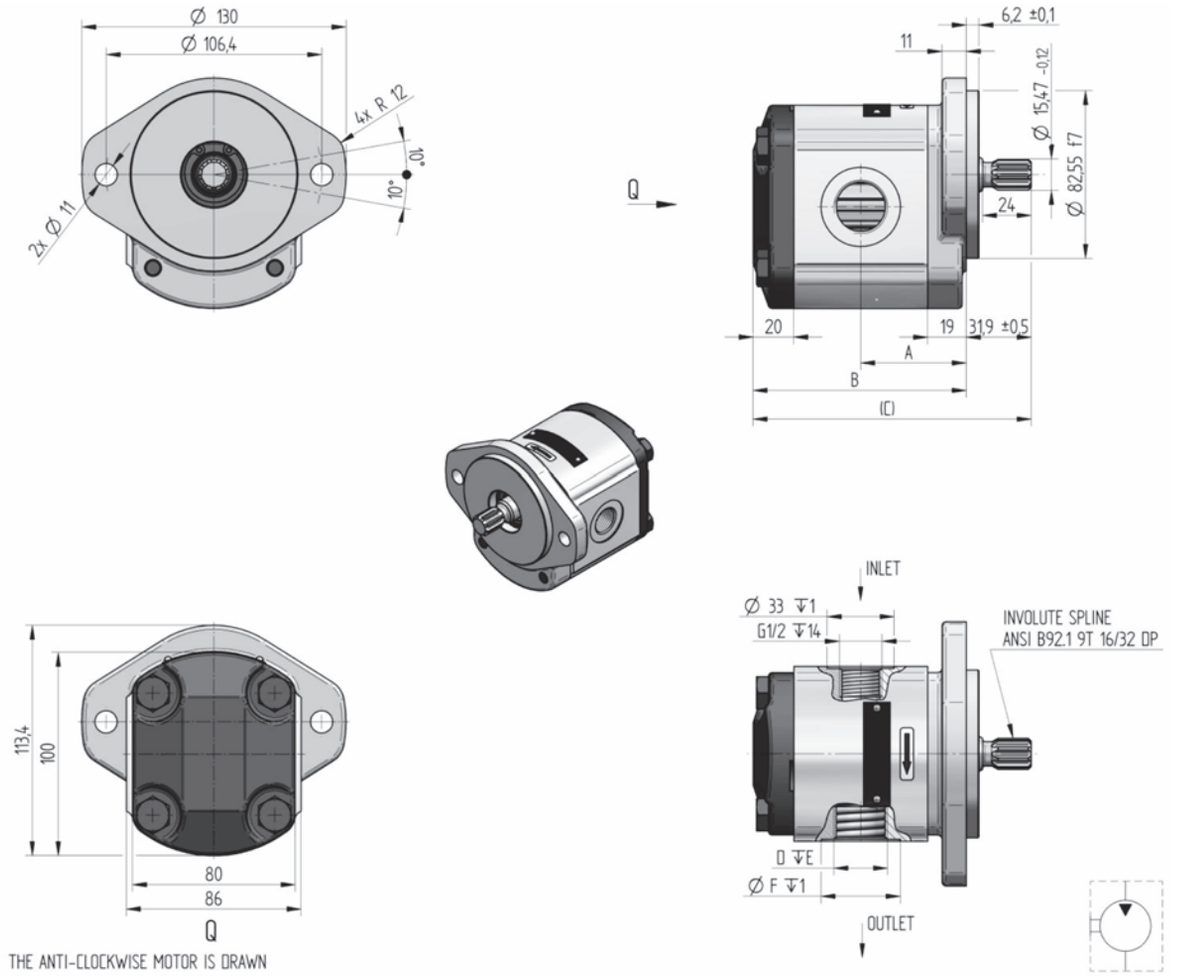
Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	dimension B [mm]	dimension C [mm]
TM3-31L-A09K07-SH06H05-N.004		L	31	150	500	2 200	61.7	126.5	133.7
TM3-31R-A09K07-SH06H05-N.004		R							
TM3-25L-A09K07-SH06H05-N.004		L	25	200	500	2 800	57.0	117.1	124.3
TM3-25R-A09K07-SH06H05-N.004		R							
TM3-20L-A09K07-SH06H05-N.004		L	20	240	500	3 200	53.0	109.2	116.4
TM3-20R-A09K07-SH06H05-N.004		R							
TM3-16L-A09K07-SH06H05-N.004		L	16	260	500	3 200	49.9	102.9	110.1
TM3-16R-A09K07-SH06H05-N.004		R							
TM3-12L-A09K07-SH06H05-N.004		L	12	260	500	3 600	46.8	96.6	103.8
TM3-12R-A09K07-SH06H05-N.004		R							
TM3-8L-A09K07-SH06H05-N.004		L	8	280	500	3 600	43.6	90.3	97.5
TM3-8R-A09K07-SH06H05-N.004		R							
TM3-6L-A09K07-SH06H05-N.004		L	6	280	500	4 000	42.0	87.2	94.4
TM3-6R-A09K07-SH06H05-N.004		R							
TM3-4L-A09K07-SH06H05-N.004		L	4	280	500	4 000	40.5	84.0	91.2
TM3-4R-A09K07-SH06H05-N.004		R							



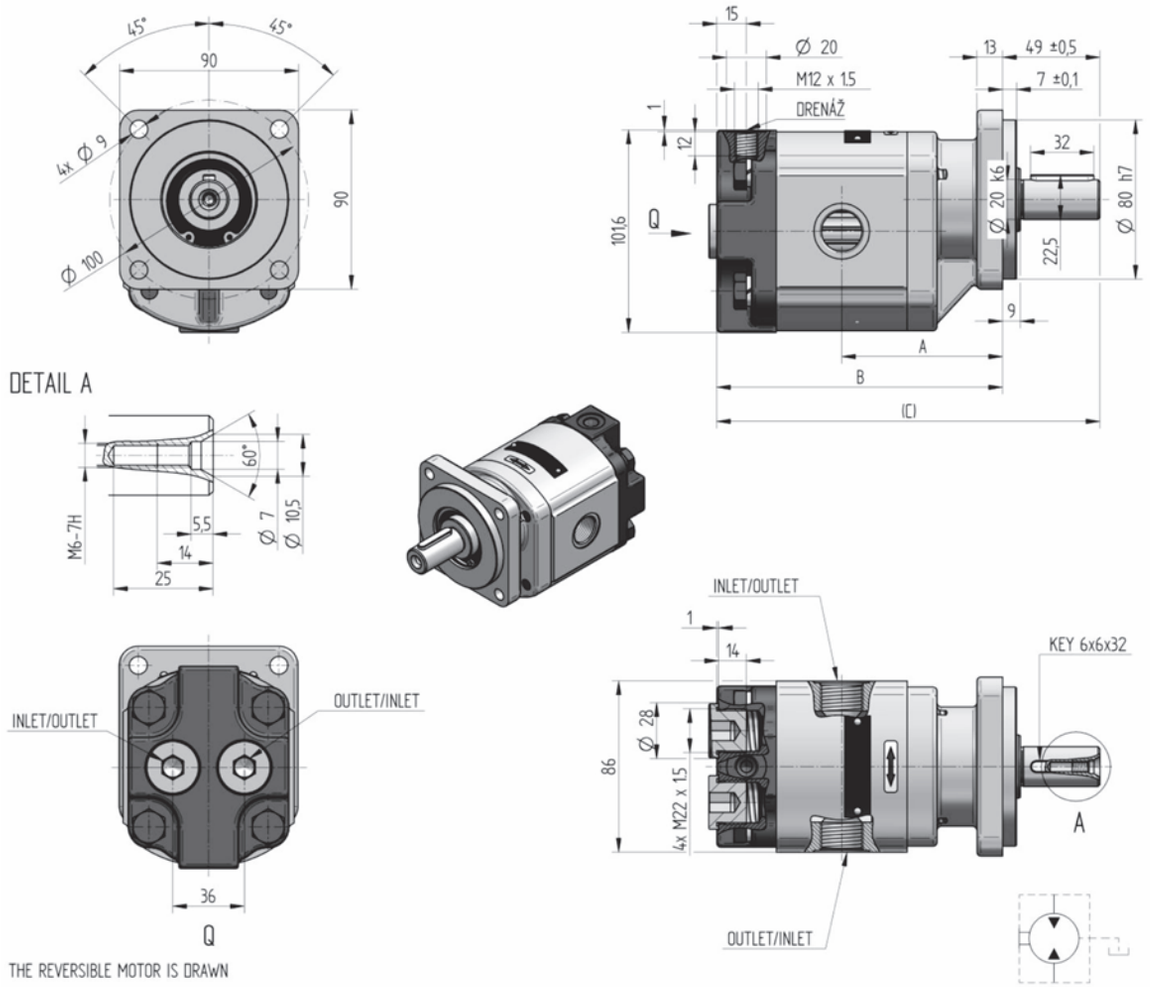
Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	dimension B [mm]	dimension C [mm]
TM3-31L-R06C10-SH06H05-N		L	31	150	500	2 200	63.7	128.5	168.3
TM3-31R-R06C10-SH06H05-N		R							
TM3-25L-R06C10-SH06H05-N		L	25	200	500	2 800	59.0	119.1	158.9
TM3-25R-R06C10-SH06H05-N		R							
TM3-20L-R06C10-SH06H05-N		L	20	240	500	3 200	55.0	111.2	151.0
TM3-20R-R06C10-SH06H05-N		R							
TM3-16L-R06C10-SH06H05-N		L	16	260	500	3 200	51.9	104.9	144.7
TM3-16R-R06C10-SH06H05-N		R							
TM3-12L-R06C10-SH06H05-N		L	12	260	500	3 600	48.8	98.6	138.4
TM3-12R-R06C10-SH06H05-N		R							
TM3-8L-R06C10-SH06H05-N		L	8	280	500	3 600	45.6	92.3	132.1
TM3-8R-R06C10-SH06H05-N		R							
TM3-6L-R06C10-SH06H05-N		L	6	280	500	4 000	44.0	89.2	129.0
TM3-6R-R06C10-SH06H05-N		R							
TM3-4L-R06C10-SH06H05-N		L	4	280	500	4 000	42.5	86.0	125.8
TM3-4R-R06C10-SH06H05-N		R							



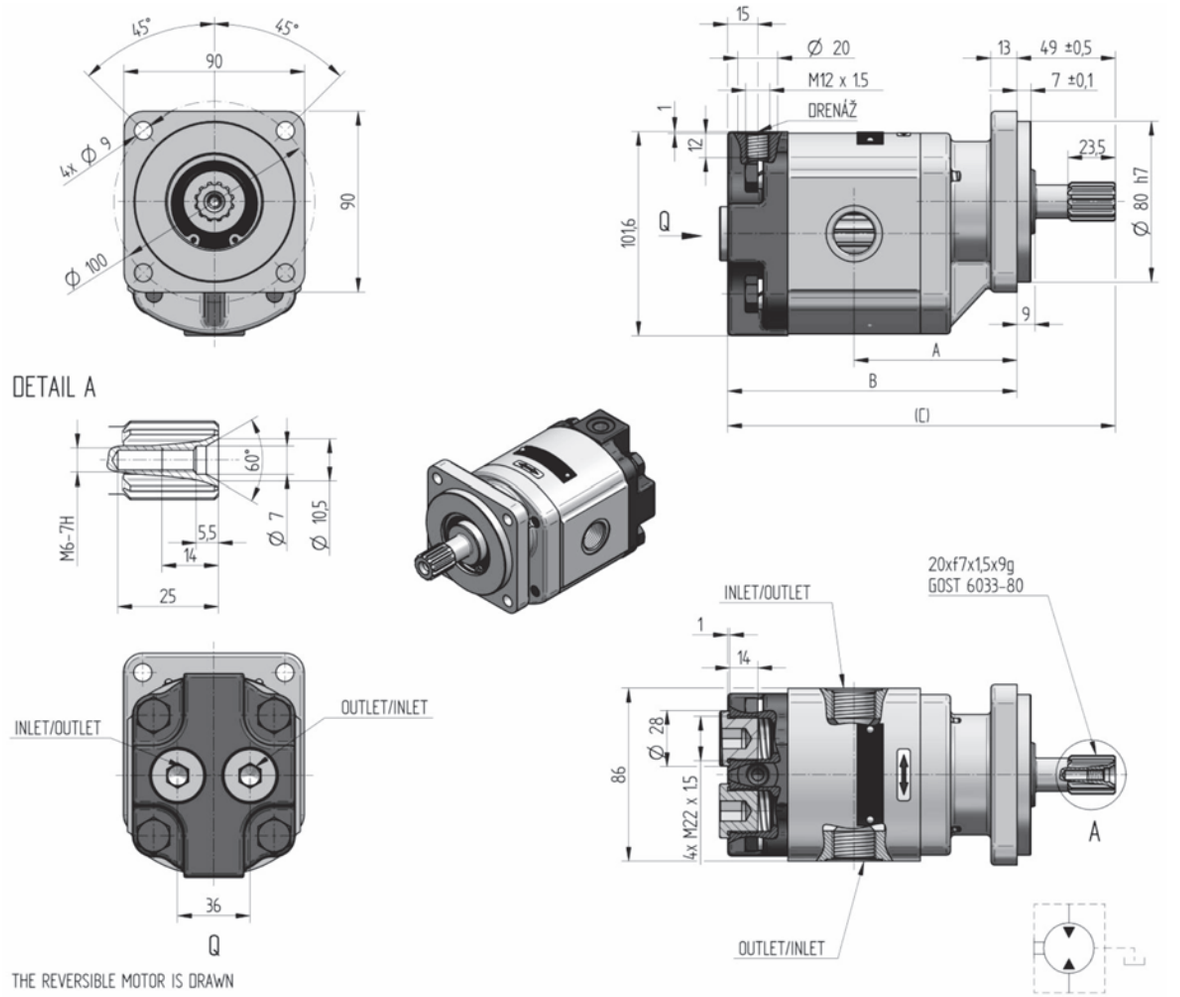
Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]
TM3-31L- S02V12-SU05U04-N		L	31	150	500	2 200	63.7	128.5	160.5	1-1/16-12 UN-2B	19	41
TM3-31R- S02V12-SU05U04-N		R										
TM3-25L- S02V12-SU05U04-N		L	25	200	500	2 800	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	3 200	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	3 200	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	3 600	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	3 600	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	4 000	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	4 000	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. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]
TM3-31L- S02D04-SG04G03-N		L	31	150	500	2 200	63.7	128.5	160.6	G 3/4	16	39
TM3-31R- S02D04-SG04G03-N		R										
TM3-25L- S02D04-SG04G03-N		L	25	200	500	2 800	59.0	119.1	151.2	G 3/4	16	39
TM3-25R- S02D04-SG04G03-N		R										
TM3-20L- S02D04-SG04G03-N		L	20	240	500	3 200	55.0	111.2	143.3	G 3/4	16	39
TM3-20R- S02D04-SG04G03-N		R										
TM3-16L- S02D04-SG04G03-N		L	16	260	500	3 200	51.9	104.9	137.0	G 3/4	16	39
TM3-16R- S02D04-SG04G03-N		R										
TM3-12L- S02D04-SG04G03-N		L	12	260	500	3 600	48.8	98.6	130.7	G 3/4	16	39
TM3-12R- S02D04-SG04G03-N		R										
TM3-8L- S02D04-SG03G03-N		L	8	280	500	3 600	45.6	92.3	124.4	G 1/2	14	33
TM3-8R- S02D04-SG03G03-N		R										
TM3-6L- S02D04-SG03G03-N		L	6	280	500	4 000	44.0	89.2	121.3	G 1/2	14	33
TM3-6R- S02D04-SG03G03-N		R										
TM3-4L- S02D04-SG03G03-N		L	4	280	500	4 000	42.5	86.0	118.1	G 1/2	14	33
TM3-4R- S02D04-SG03G03-N		R										



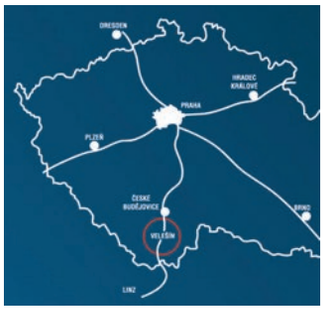
Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	B [mm]	C [mm]
TM3-13B-F02D10-CM07M07-N.027	184 9217	B	13	260	300	3500	78.6	139.1	188.1



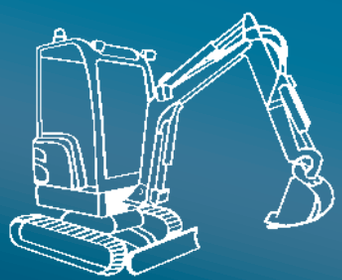
Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	B [mm]	C [mm]
TM3-13B-F02V13-CM07M07-N.027	184 9215	B	13	260	300	3500	78.6	139.1	188.1

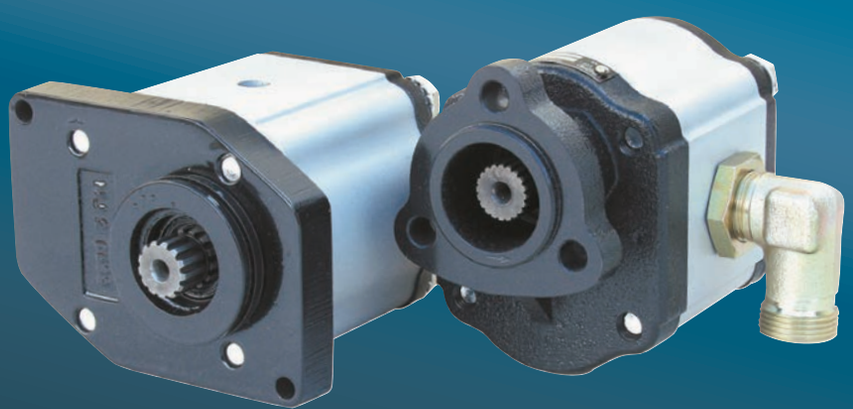
jihostroj
AERO TECHNOLOGY & HYDRAULICS

JIHOSTROJ a.s.
Budějovická 148
CZ 382 32 Velešín
Czech Republic
tel.: +420 380 340 511
fax: +420 380 340 612
e-mail: mailbox@jihostroj.cz
http: //**www.jihostroj.com**
GPS 48°49'51.748" N 14°27'40.770" E



jihostroj
AERO TECHNOLOGY & HYDRAULICS

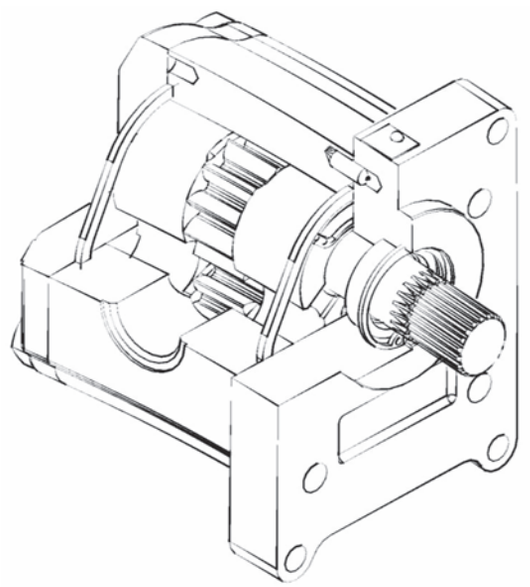




Displacement from 5 to 39 ccm
Pressure up to 250 bar
Speed from 400 to 3200 RPM

GEAR MOTORS
UMD

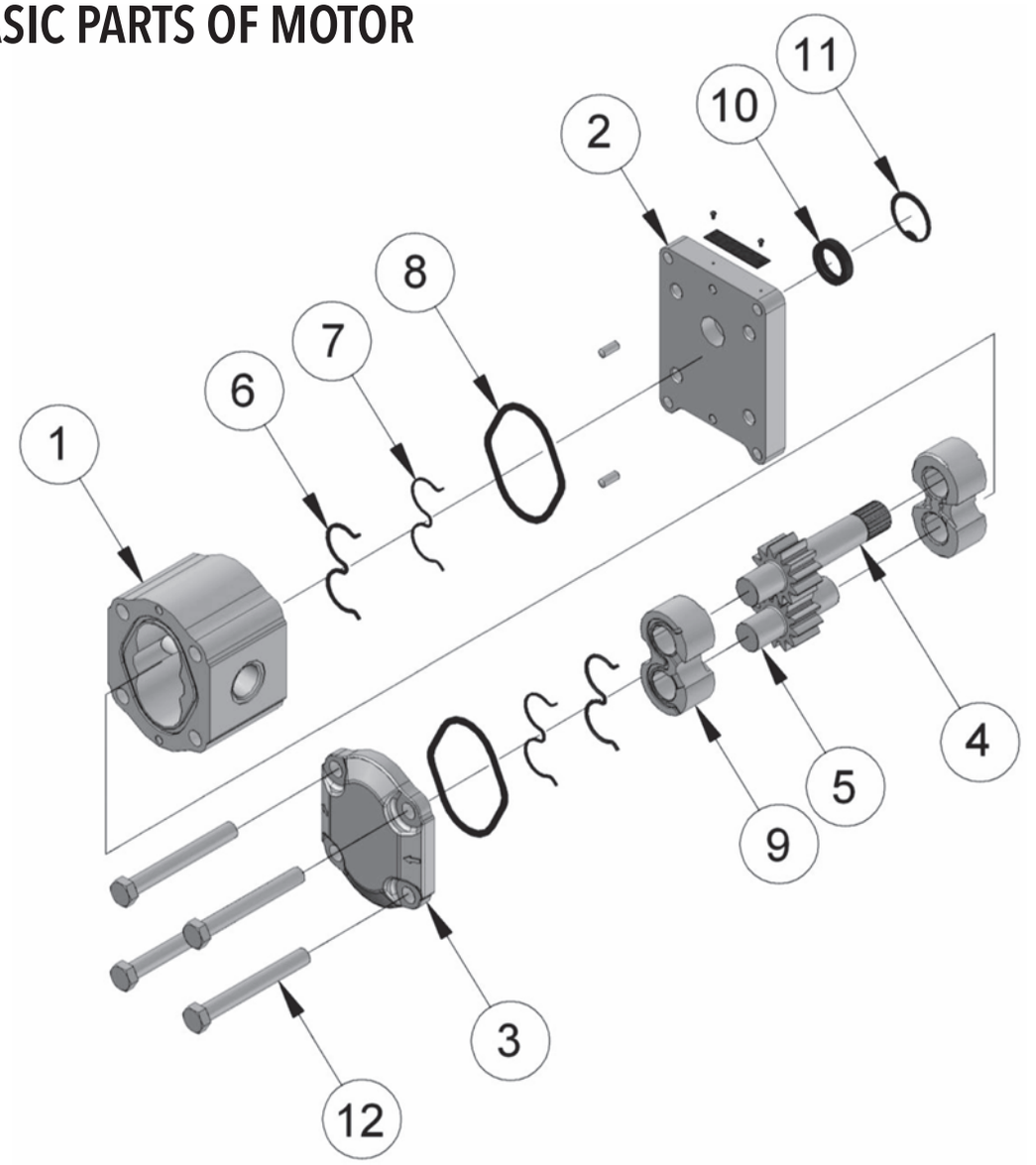
TABLE OF CONTENTS



DESCRIPTION

- Gear motors of UMD series are used for transformation of liquid pressure head in mechanical energy. Cover and flange are manufactured of grey iron. The body is designed from of shaped profile bars from aluminium alloy. They meet all world standards, as well as execution input and output of the working fluid (the location on the side – in the body or axially – in the cover). Motors are connected with four through-bolts from M12 high strength steel. They are equipped with a hydraulic pressure compensation axial-clearance which is executed by means of a balancing sealing directly in the bearing sleeves. UMD motors are manufactured in a unidirectional design as clockwise or anticlockwise motor can be reversible in the embodiment.

BASIC PARTS OF MOTOR



1. Body
2. Flange
3. Cover
4. Driving gear
5. Driven gear
6. Balancing sealing
7. Sealing protective plate
8. Peripheral sealing
9. Bearing sleeves
10. Shaft seal
11. Safety ring
12. Connection bolts

PARAMETER TABLE

One direction motors

Nominal Size Parameters		Sym.	Unit	UMD 5	UMD 8	UMD 10	UMD 12,5	UMD 16
Actual displacement		V_g	[cm^3]	5.01	7.93	10.02	12.10	16.28
Rotation speed	nominal	n_n	[min^{-1}]	1500	1500	1500	1500	1500
	minimum	n_{min}	[min^{-1}]	600	600	450	450	450
	maximum	n_{max}	[min^{-1}]	3200	3200	3200	3200	3200
Pressure at outlet	minimum	p_{1min}	[bar]	-0.3	-0.3	-0.3	-0.3	-0.3
	maximum	p_{1max}	[bar]	0.5	0.5	0.5	0.5	0.5
Pressure at inlet	max. continuous	p_{2n}	[bar]	250	250	250	250	250
	maximum	p_{2max}	[bar]	300	300	300	300	290
	peak	p_3	[bar]	310	310	310	310	300
Nominal input flow rate (max.) at n_n and p_{2n}		Q_n	[$dm^3.min^{-1}$]	8.8	14.1	17.0	21.3	26.7
Maximum input flow rate at n_{max} and p_{2max}		Q_{max}	[$dm^3.min^{-1}$]	17.0	27.2	34.0	42.6	54.5
Nominal output power (min.) at n_n and p_{2n}		P_n	[kW]	2.5	4.1	5.2	6.5	8.5
Maximum output power at n_{max} a p_{2max}		P_{max}	[kW]	7.1	11.3	14.1	14.6	21.8
Nominal Torque at n_n and p_{2n}		M	[Nm]	17.9	28.6	35.8	44.8	57.3
Weight		m	[kg]	5.00	5.15	5.30	5.40	5.55

Nominal Size Parameters		Sym.	Unit	UMD 20	UMD 25	UMD 28	UMD 31	UMD 39
Actual displacement		V_g	[cm^3]	20.45	25.46	28.38	32.14	40.07
Rotation speed	nominal	n_n	[min^{-1}]	1500	1500	1500	1500	1200
	minimum	n_{min}	[min^{-1}]	450	450	450	450	400
	maximum	n_{max}	[min^{-1}]	3200	3200	3000	2800	1800
Pressure at outlet	minimum	p_{1min}	[bar]	-0.3	-0.3	-0.3	-0.3	-0.3
	maximum	p_{1max}	[bar]	0.5	0.5	0.5	0.5	0.5
Pressure at inlet	max. continuous	p_{2n}	[bar]	230	200	200	160	120
	maximum	p_{2max}	[bar]	270	250	230	200	160
	peak	p_3	[bar]	280	260	240	210	170
Nominal input flow rate (max.) at n_n and p_{2n}		Q_n	[$dm^3.min^{-1}$]	33.3	41.7	46.7	51.7	65.0
Maximum input flow rate at n_{max} and p_{2max}		Q_{max}	[$dm^3.min^{-1}$]	68.1	85.1	89.4	92.3	74.7
Nominal output power (min.) at n_n and p_{2n}		P_n	[kW]	9.7	10.6	11.8	10.5	9.9
Maximum output power at n_{max} a p_{2max}		P_{max}	[kW]	25.4	2.4	28.4	25.5	16.5
Nominal Torque at n_n and p_{2n}		M	[Nm]	65.9	71.6	80.2	71.0	67.0
Weight		m	[kg]	5.70	5.85	6.00	6.20	6.55

Reversible motors

Nominal Size Parameters		Sym.	Unit	UMD 5	UMD 8	UMD 10	UMD 12,5	UMD 16
Actual displacement		V_g	[cm^3]	5.01	7.93	10.02	12.10	16.28
Rotation speed	nominal	n_n	[min^{-1}]	1500	1500	1500	1500	1500
	minimum	n_{min}	[min^{-1}]	600	600	450	450	450
	maximum	n_{max}	[min^{-1}]	3200	3200	3200	3200	3200
Pressure at outlet	minimum	p_{1min}	[bar]	-0.3	-0.3	-0.3	-0.3	-0.3
	maximum	p_{1max}	[bar]	160	160	160	160	160
Pressure at inlet	max. continuous	p_{2n}	[bar]	230	230	230	230	230
	maximum	p_{2max}	[bar]	280	280	280	280	270
	peak	p_3	[bar]	290	290	290	290	280
Nominal input flow rate (max.) at n_n and p_{2n}		Q_n	[$dm^3.min^{-1}$]	8.8	14.1	17.0	21.3	26.7
Maximum input flow rate at n_{max} and p_{2max}		Q_{max}	[$dm^3.min^{-1}$]	17.0	27.2	34.0	42.6	54.5
Nominal output power (min.) at n_n and p_{2n}		P_n	[kW]	2.5	4.1	5.2	6.5	8.5
Maximum output power at n_{max} a p_{2max}		P_{max}	[kW]	7.1	11.3	14.1	14.6	21.8
Nominal Torque at n_n and p_{2n}		M	[Nm]	17.9	28.6	35.8	44.8	57.3
Weight		m	[kg]	5.00	5.15	5.30	5.40	5.55

Nominal Size Parameters		Sym.	Unit	UMD 20	UMD 25	UMD 28	UMD 31	UMD 39
Actual displacement		V_g	[cm^3]	20.45	25.46	28.38	32.14	40.07
Rotation speed	nominal	n_n	[min^{-1}]	1500	1500	1500	1500	1200
	minimum	n_{min}	[min^{-1}]	450	450	450	450	400
	maximum	n_{max}	[min^{-1}]	3200	3200	3000	2800	1800
Pressure at outlet	minimum	p_{1min}	[bar]	-0.3	-0.3	-0.3	-0.3	-0.3
	maximum	p_{1max}	[bar]	140	110	110	70	40
Pressure at inlet	max. continuous	p_{2n}	[bar]	210	180	180	140	110
	maximum	p_{2max}	[bar]	250	230	210	180	150
	peak	p_3	[bar]	260	240	220	190	160
Nominal input flow rate (max.) at n_n and p_{2n}		Q_n	[$dm^3.min^{-1}$]	33.3	41.7	46.7	51.7	65.0
Maximum input flow rate at n_{max} and p_{2max}		Q_{max}	[$dm^3.min^{-1}$]	68.1	85.1	89.4	92.3	74.7
Nominal output power (min.) at n_n and p_{2n}		P_n	[kW]	9.7	10.6	11.8	10.5	9.9
Maximum output power at n_{max} a p_{2max}		P_{max}	[kW]	25.4	2.4	28.4	25.5	16.5
Nominal Torque at n_n and p_{2n}		M	[Nm]	65.9	71.6	80.2	71.0	67.0
Weight		m	[kg]	5.70	5.85	6.00	6.20	6.55

External drainage must be used in case of the reversible design.

FORMULAS USED FOR CALCULATION

Flow rate
Q

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

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

Displacement
V_g

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

Torque
M_k

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

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

Input power
P

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

η_t [–] total efficiency

MOTOR EFFICIENCIES

Volumetric efficiency
η_v

It determines the amount of flow losses. Its value is $\eta_v = 0{,}92 \div 0{,}98$ (depending on rotation speed, viscosity of working liquid and outlet pressure). It can be expressed as follows:

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

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

Mechanical efficiency
η_m

It determines mechanical losses. Its value is about $\eta_m = 0{,}85$.
It can be expressed as follows:

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

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

Total efficiency
η_t

t is defined as product of η_n and η_m
and determines difference between theoretical and actual required input power:

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

$P_{act.}$ [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

- $t = -20 \div +80$ [°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 $20 \cdot 10^{-6}$ 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)

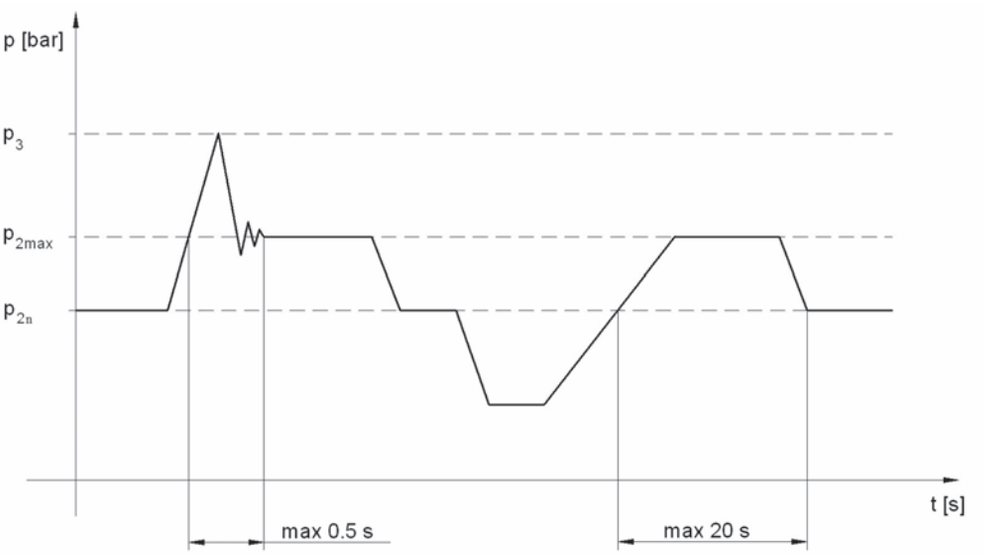
Liquid contamination class according to ISO 4406

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.

OTHER REQUIREMENTS

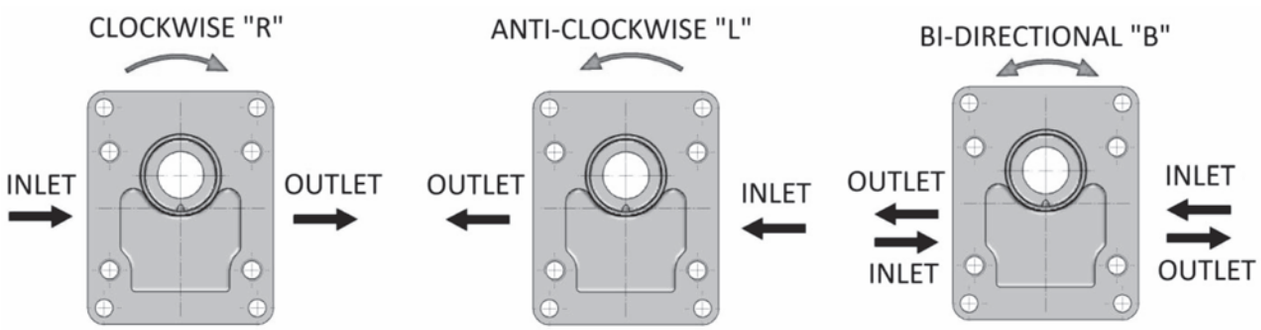
- Driven equipment must not infer axial or radial load motor shaft, if this is not expressly permitted at motor with the front-end bearing.
- All requirement affecting technical parameters and characteristics of the motor are given in the relevant operating instructions, technical specifications and test regulations of the manufacturer.
- For special purposes, is possible use reinforced version (UMDD) or a shortened version (UMDK).
- UDD motors are a reinforced version, which is longer about 10 mm. Motor has increased the pressure from displacement >16 cm^3/rev. Positions of inlets and outlets is shifted about 5 mm on body and 10 mm on cover opposite standard version.
- UDK motors are a shortened about 20 mm. Position of inlets and outlets is shifted about 10 mm on body and 20 mm on cover opposite standard version.

SHAFT SEAL

- For increased demands of pressure on the output hydraulic motor, especially at large distances from the outlet of tank, is possible use a reinforced shaft seal as special arrangements.

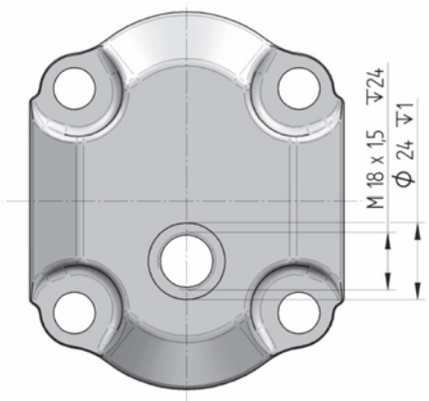
DIRECTION OF ROTATION

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

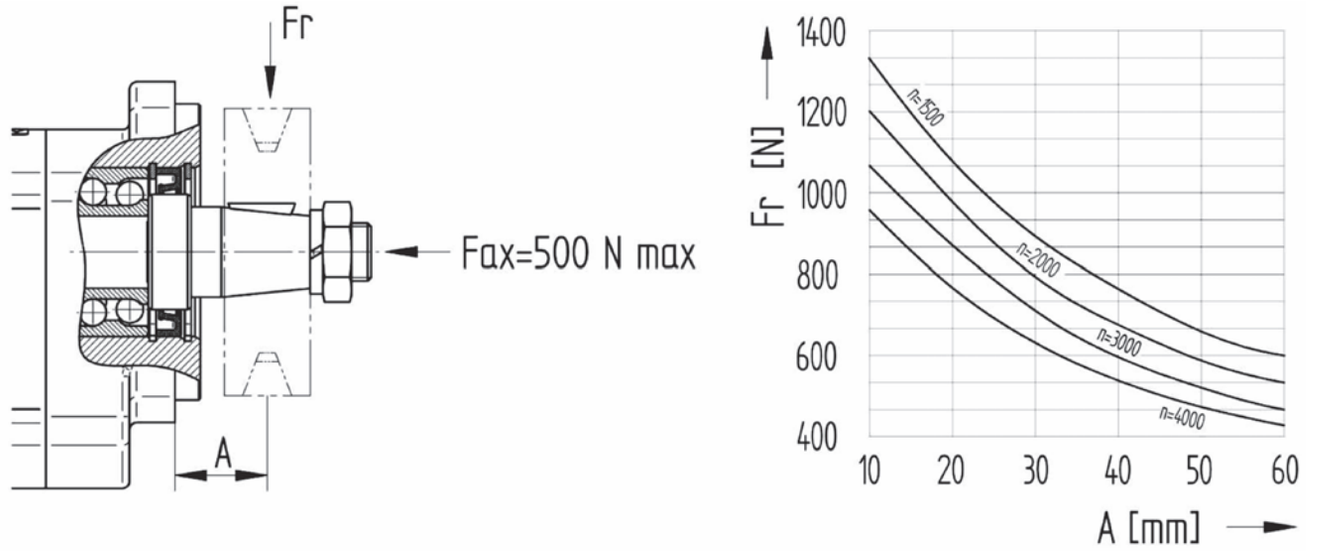


REVERSIBLE DESIGN

- Motors with the possibility of bidirectional rotation have a different internal arrangements requiring drainage. Two types of drain are used – internal and external. Internal drainage is always by means of valves connected to output, which do not affect on the outer design. External drainage is solved by hole, which is located in the cover against the driven gear (see figure below). Max. pressure in the drainage of the serial version (standard shaft seal) is 0.5 bar.

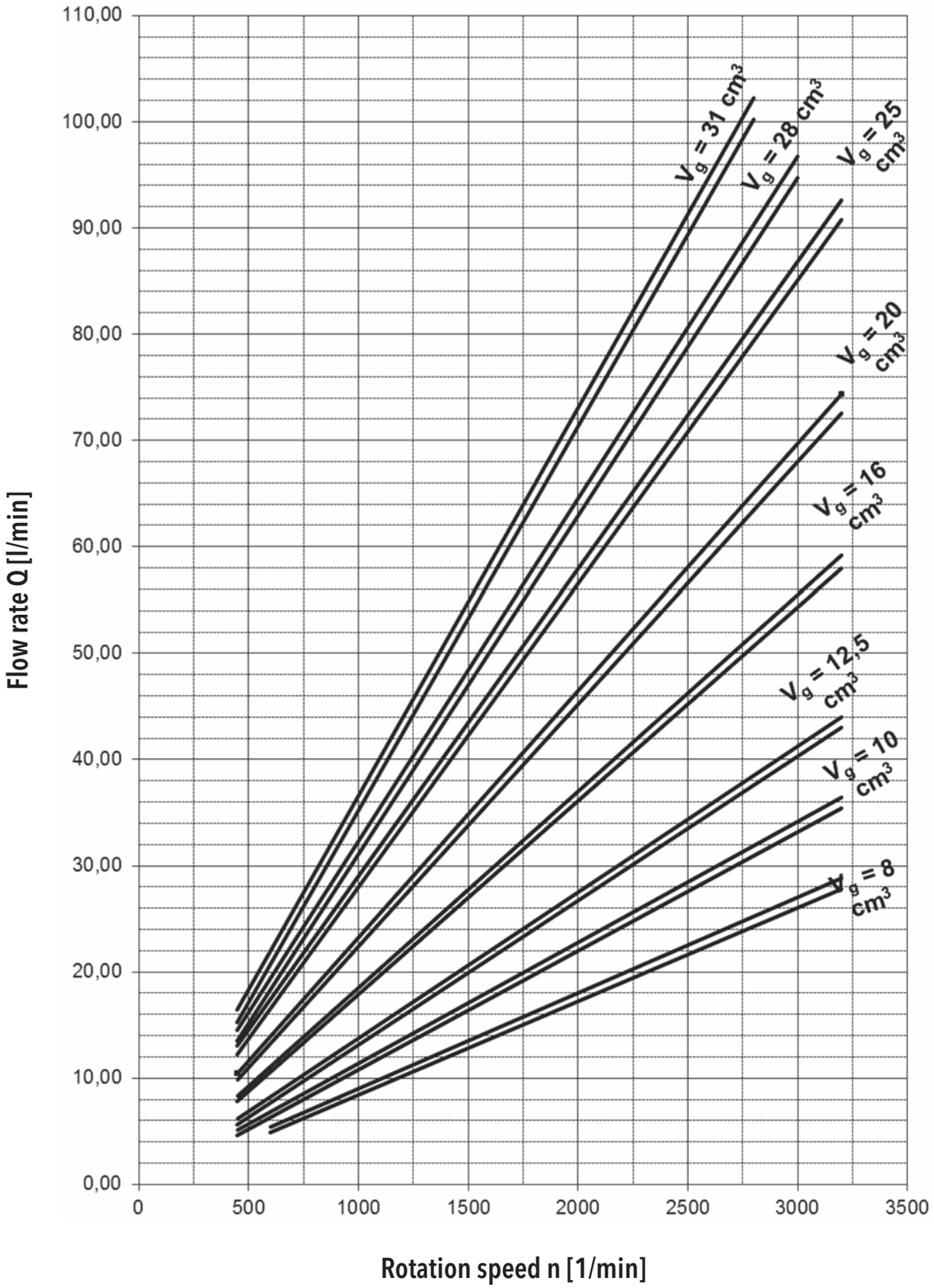


MOTOR WITH FRONT-END BEARING



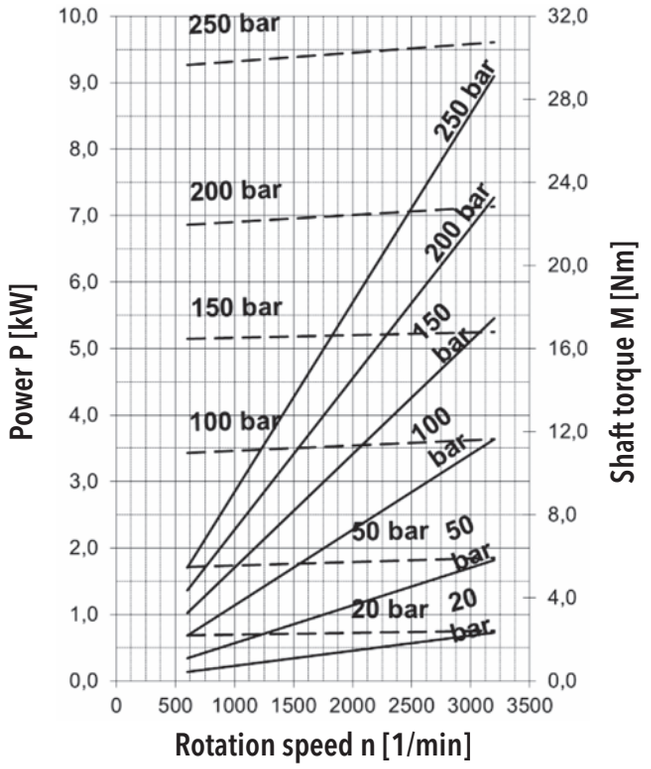
Without front-end bearing must not transfer the driven unit, after connecting to the hydraulic motor, axial or radial load to the drive shaft.

UMD FLOW RATE AND POWER CURVES

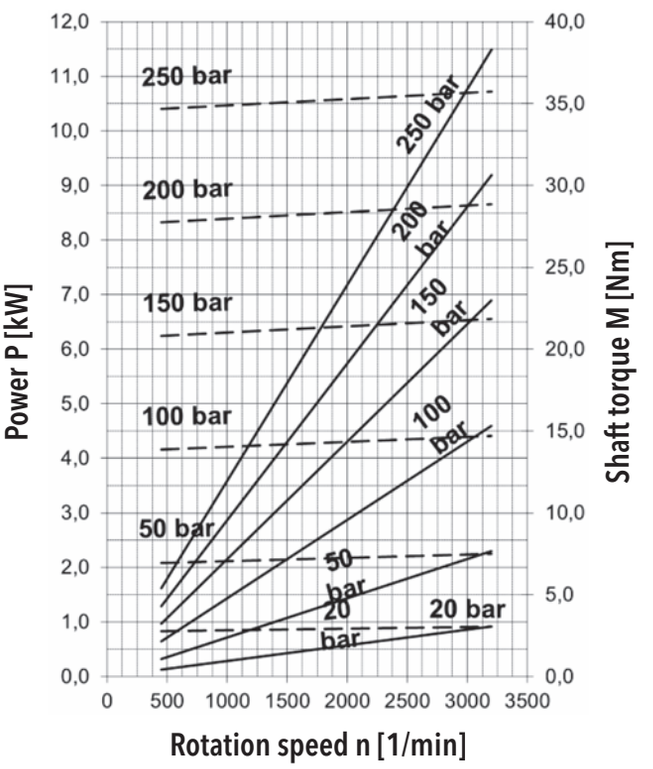


The above characteristics apply to oil ISO V_g 46 at t = 45 °C.

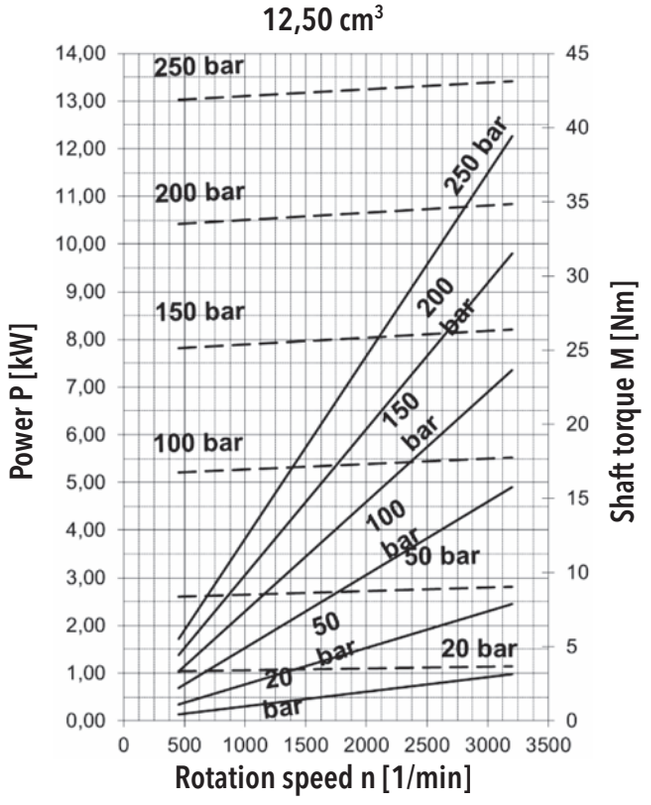
8,00 cm³



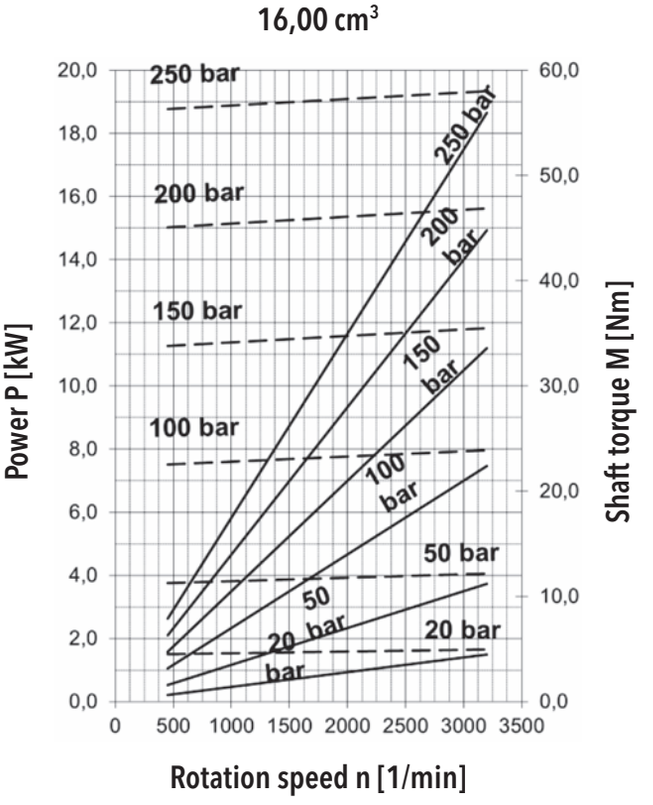
10,00 cm³



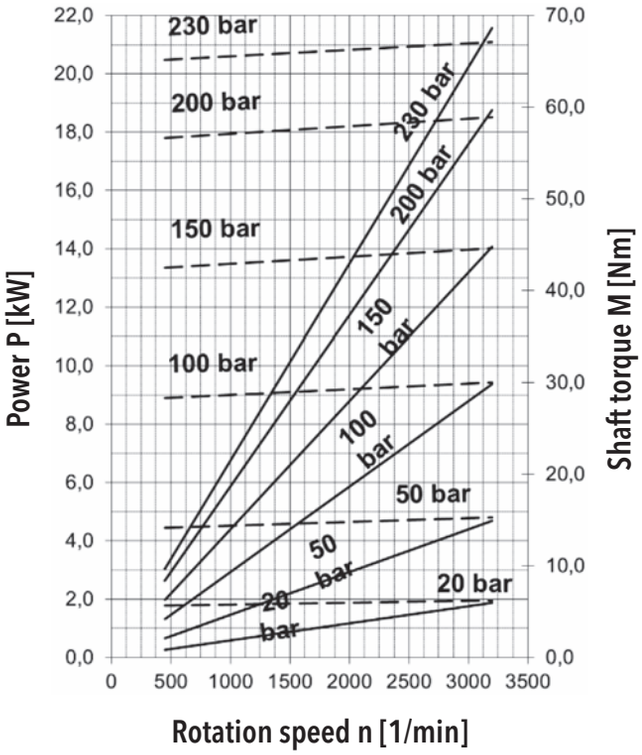
12,50 cm³



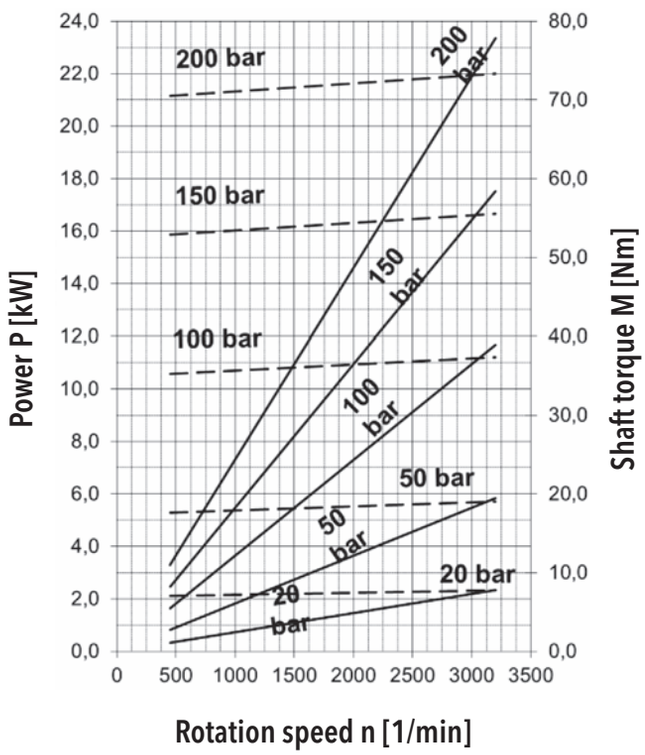
16,00 cm³



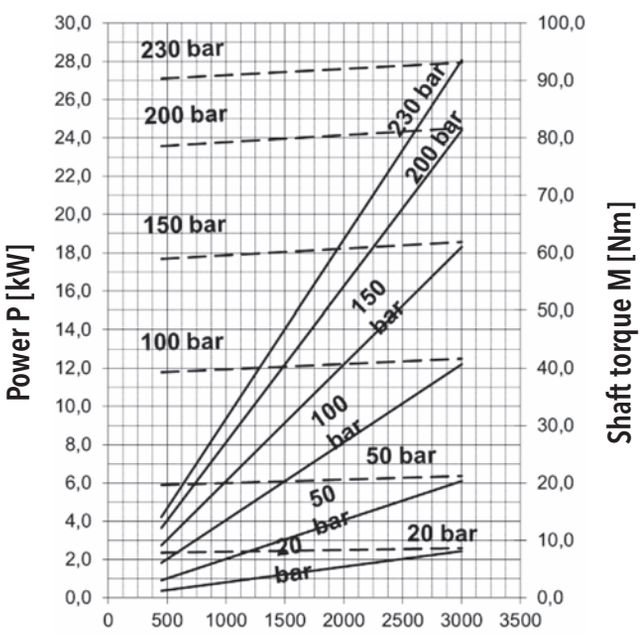
20,00 cm³



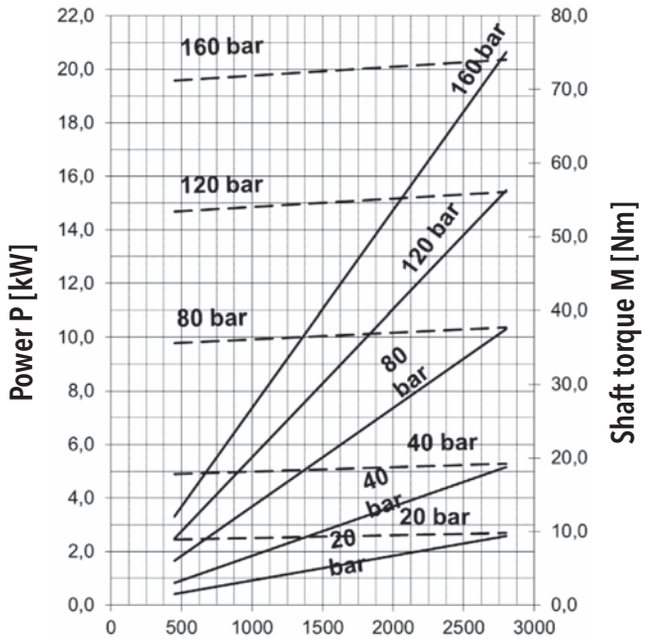
25,00 cm³



28,00 cm³



31,00 cm³



ORDER KEY

UMD - 16 R - R08 D12 - S M09 M07 - V . 000

Code	Displacement [cm³]
5,0	5,01
8,0	7,93
10,0	10,02
12,5	12,10
16,0	16,28
20,0	20,45
25,0	25,46
28,0	28,38
31,0	32,14
39,0	40,07
XX	Other displacements on request

Code	Direction of rotation
R	Clockwise rotation
L	Anti-clockwise rotation
B	Reversible rotation

Code	Type
UD	UD Series Gear Motor
UDK	UD Series Gear Motor, shortened version
UDD	UD Series Gear Motor, reinforced version

Code	Flange design
R08	Rectangular flange, centre ring ∅62, spacing 86x120, with O-ring
R09	Rectangular flange, centre ring ∅62, spacing 86x120
R10	Rectangular flange, centre ring ∅63, spacing 76x96
S02	SAE A, centre ring ∅82,55, 2 aperture, spacing 106,4
S03	SAE B, centre ring ∅101,6, 2 aperture, spacing 146
K01	Centre ring ∅62, 2 bolts, spacing 115
Z	Special design

Code	Location of inlets and outlets
S	Side (in the body)
R	Axial (in the cover)
C	Combination

Code	Drive shaft design
D04	Spline 5/8"
D12	Spline 22x1
D13	Spline SAE 7/8"
D24	Spline 6x18x22
K08	Cross coupling
V13	Cylindric
Z	Special design

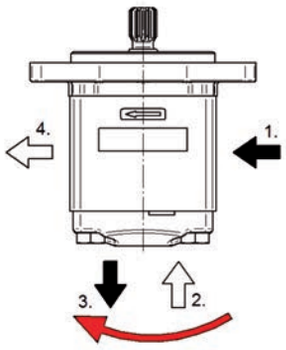
Code	Liquid inlet and outlet connection shape
M03	Thread M 14x1,5
M05	Thread M 18x1,5
M06	Thread M 20x1,5
M07	Thread M 22x1,5
M09	Thread M 27x2
M12	Thread M 33x2
G03	Thread BSP G1/2
G04	Thread BSP G3/4
G05	Thread BSP G1
G06	Thread BSP G1 1/4
H05	Flange fitting 4xM6/∅35; ∅15
H06	Flange fitting 4xM6/∅40; ∅20
H08	Flange fitting 4xM6/∅30; ∅13.5
H11	Flange fitting 4xM10/∅51; ∅26
K03	Flange fitting 4xM8/∅40; ∅18
E02	Flange fitting 3/4
E03	Flange fitting 1
E04	Flange fitting 1 1/4
Z	Special design

Code	Special arrangements
-	Without special arrangements

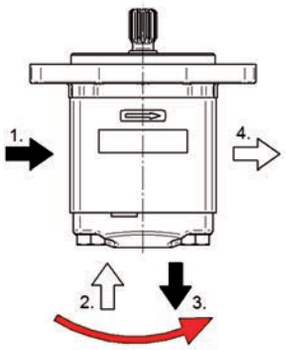
Code	Sealing material
V	FPN (VITON)
N	NBR

An example of designation for the UMD anti-clockwise motor with displacement of 16 cm³, Rectangular flange, center ring ∅62, spacing 86x120, without O-ring, Involute spline 22x1, inlet and outlet in body with metric thread and standard NBR sealing without special arrangements: **UMD-16L-R09D12-SM09M07-N.0000**

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



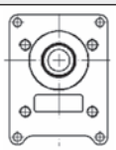
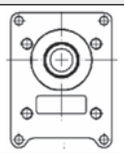
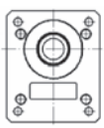
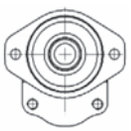
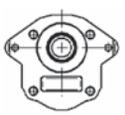
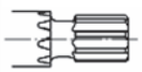
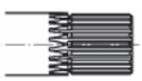
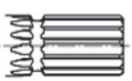
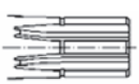
For clockwise and reverse gear motor,
in direction clockwise



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

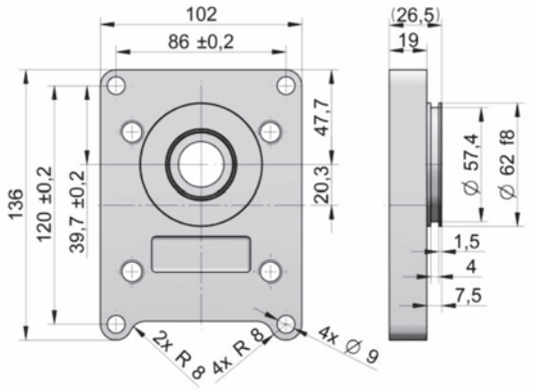
For. ex...: UMD-16R-S02D04-C<u>G03</u> <u>G03</u> <u>G04</u> <u>G04</u> -N
1. 2. 3. 4.

COMBINATIONS OF FLANGES AND SHAFTS

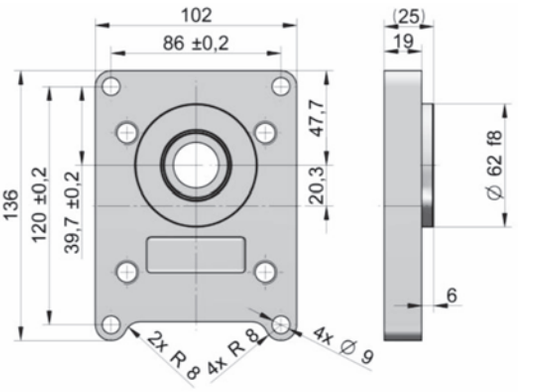
			FLANGE DESIGN					
			R08	R09	R10	S02	S03	K01
								
DRIVE SHAFT	D04					●		
	D12		●	●				
	D13						●	●
	D24				●			
	K08		●	●				
	V13		●	●				

FLANGES DESIGN

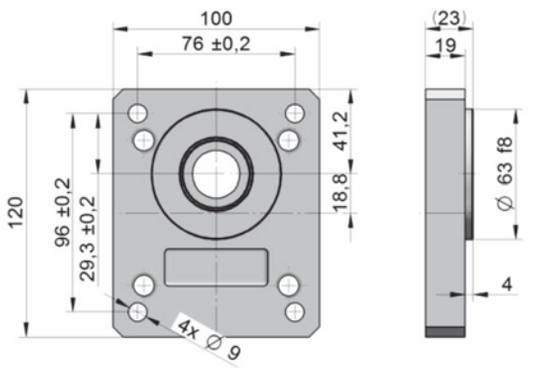
R08:



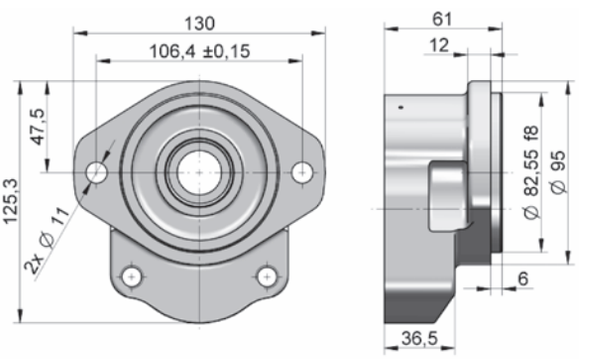
R09:



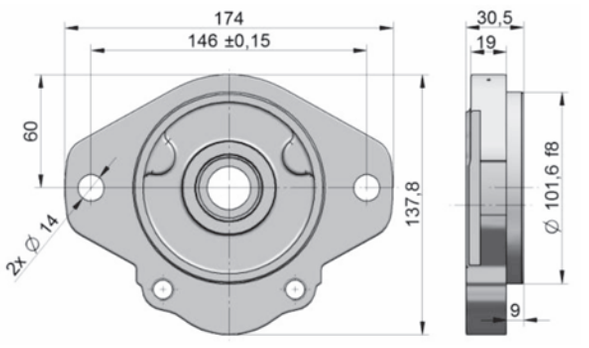
R10:



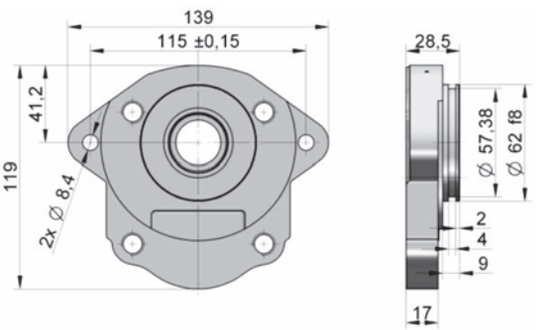
S02:



S03:

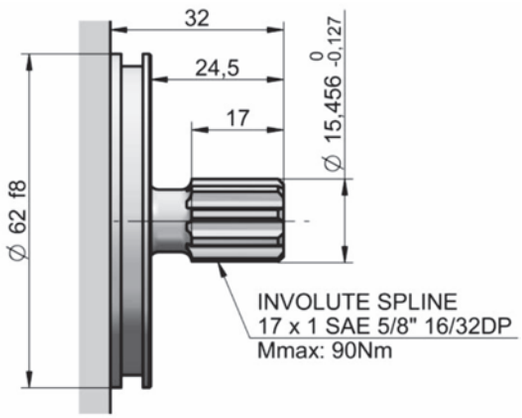


K01:

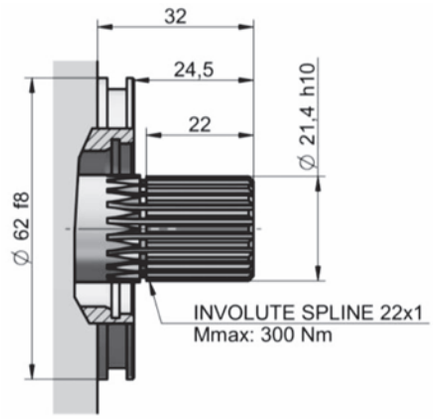


DRIVE SHAFTS

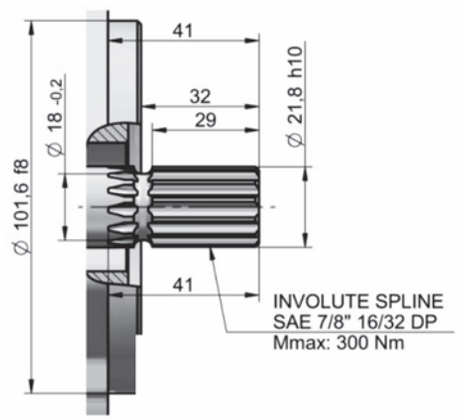
D04:



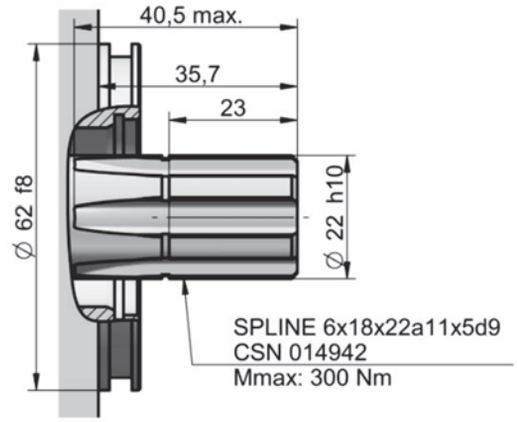
D12:



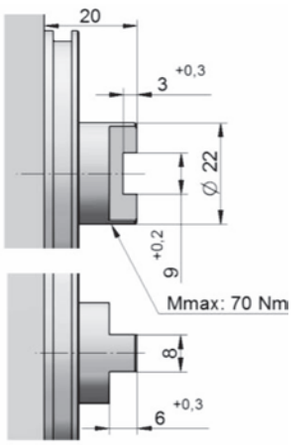
D13:



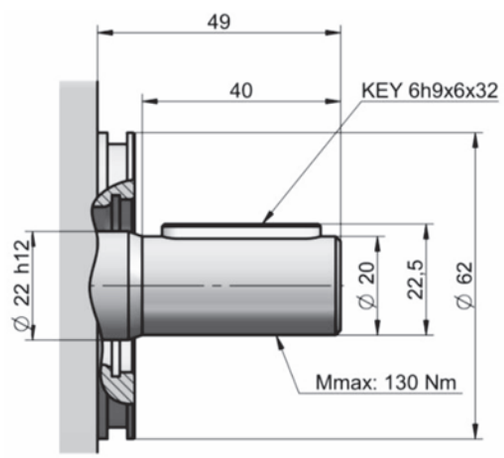
D24:



K08:

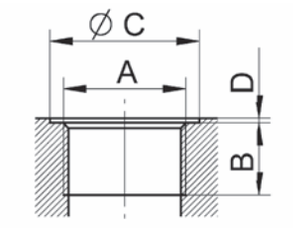


V13:



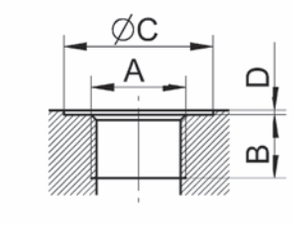
LIQUID INLET AND OUTLET CONNECTION

Metric thread according to ISO 6149



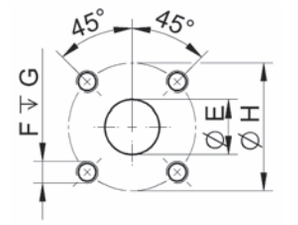
Code	A	B	C	D
M03	M 14 x 1.5	13	22	1
M05	M 18 x 1.5	14	24	1
M06	M 20 x 1.5	14	26	1
M07	M 22 x 1.5	14	28	1
M09	M 27 x 2.0	16	33	1
M12	M 33 x 2.0	18	40	1

BSPP pipe thread according to ISO 228-1



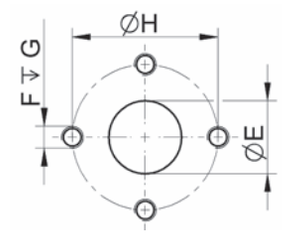
Code	A	B	C	D
G03	G 1/2"	14	33	1
G04	G 3/4"	16	39	1
G05	G 1"	18	45	1
G06	G 1 1/4"	18	57	1

Flanged fittings according to DIN 8901/8902



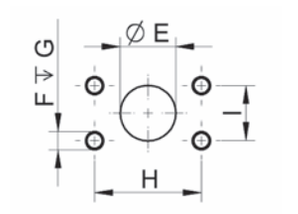
Code	E	F	G	H
H05	15.0	M6	13	35
H06	20.0	M6	13	40
H07	13.5	M6	13	30
H11	26.0	M10	16	51

Flanged fittings – „cross"



Code	E	F	G	H
K03	18	M8	16	40

Flanged fittings according to SAE, metric thread

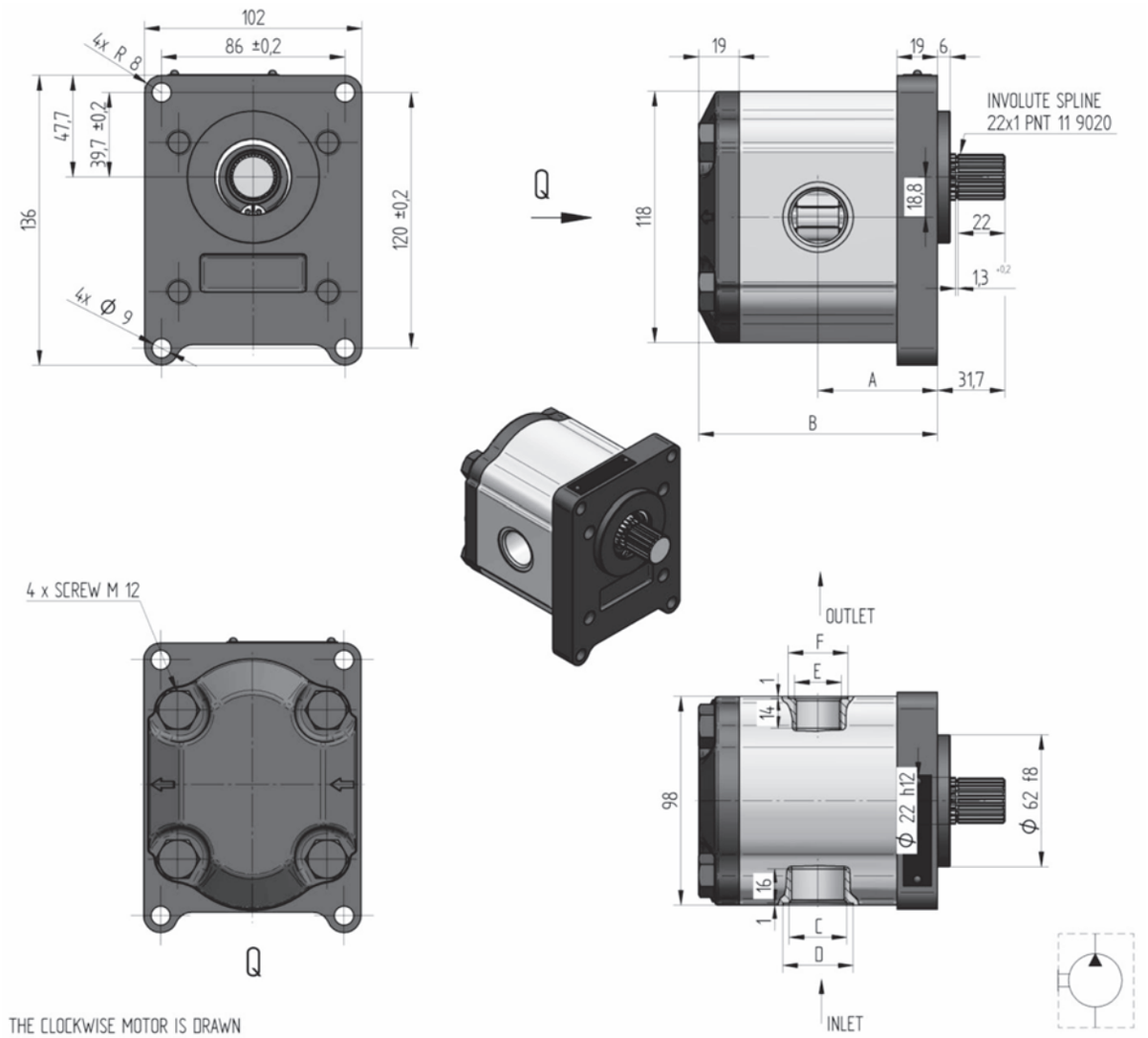


Code	E	F	G	H	I
E02	19.0	M10	18	47.6	22.2
E03	25.4	M10	18	52.4	26.2
E04	30.5	M10	18	58.7	30.2

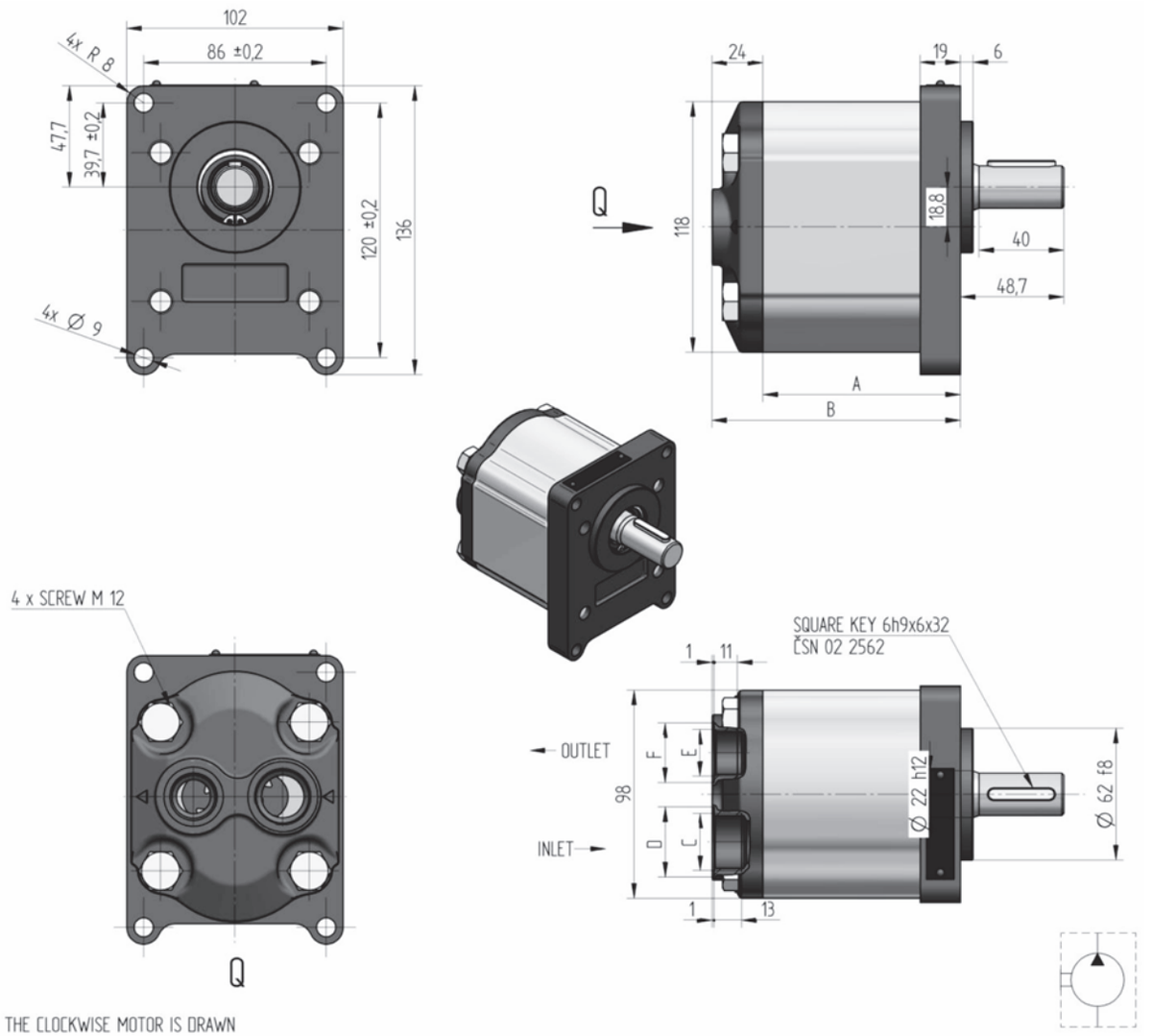
Drains

Code	A	B	C	D
M05	M18x1.5	14	24	1

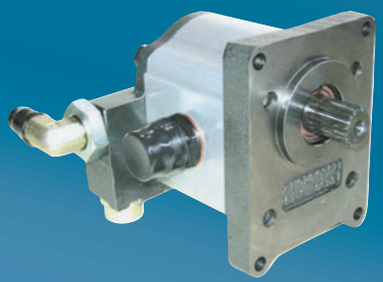
CATALOGUE SHETS OF UMD SERIES BASIC DESIGNS



Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]
UMD-31L-R08D12-SM09M07-N	183 9476	L	31	200	450	2800	65.50	131.0	M27x2	Ø 33	M22x1.5	Ø 28
UMD-31R-R08D12-SM09M07-N	183 9047	R										
UMD-28L-R08D12-SM09M07-N		L	28	230	450	3000	63.25	126.5	M27x2	Ø 33	M22x1.5	Ø 28
UMD-28R-R08D12-SM09M07-N		R										
UMD-25L-R08D12-SM09M07-N	183 9475	L	25	250	450	3200	61.50	123.0	M27x2	Ø 33	M22x1.5	Ø 28
UMD-25R-R08D12-SM09M07-N	183 9046	R										
UMD-20L-R08D12-SM09M07-N	183 9412	L	20	270	450	3200	58.50	117.0	M27x2	Ø 33	M22x1.5	Ø 28
UMD-20R-R08D12-SM09M07-N	183 9413	R										
UMD-16L-R08D12-SM09M07-N	183 9406	L	16	290	450	3200	56.00	112.0	M27x2	Ø 33	M22x1.5	Ø 28
UMD-16R-R08D12-SM09M07-N	183 9407	R										
UMD-12.5L-R08D12-SM09M07-N		L	12.5	300	450	3200	53.50	107.0	M27x2	Ø 33	M22x1.5	Ø 28
UMD-12.5R-R08D12-SM09M07-N		R										
UMD-10L-R08D12-SM09M07-N	183 9400	L	10	300	450	3200	52.25	104.5	M27x2	Ø 33	M22x1.5	Ø 28
UMD-10R-R08D12-SM09M07-N	183 9401	R										
UMD-8L-R08D12-SM09M07-N		L	8	300	600	3200	51.00	102.0	M27x2	Ø 33	M22x1.5	Ø 28
UMD-8R-R08D12-SM09M07-N		R										

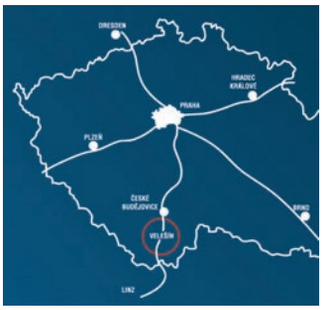


Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]
UMD-31L-R09V13-RM09M07-N		L	31	200	450	2800	112.0	136.0	M27x2	Ø 33	M22x1.5	Ø 28
UMD-31R-R09V13-RM09M07-N		R										
UMD-28L-R09V13-RM09M07-N		L	28	230	450	3000	107.5	131.5	M27x2	Ø 33	M22x1.5	Ø 28
UMD-28R-R09V13-RM09M07-N		R										
UMD-25L-R09V13-RM09M07-N		L	25	250	450	3200	104.0	128.0	M27x2	Ø 33	M22x1.5	Ø 28
UMD-25R-R09V13-RM09M07-N		R										
UMD-20L-R09V13-RM09M07-N		L	20	270	450	3200	98.0	122.0	M27x2	Ø 33	M22x1.5	Ø 28
UMD-20R-R09V13-RM09M07-N		R										
UMD-16L-R09V13-RM09M07-N		L	16	290	450	3200	93.0	117.0	M27x2	Ø 33	M22x1.5	Ø 28
UMD-16R-R09V13-RM09M07-N		R										
UMD-12.5L-R09V13-RM09M07-N		L	12.5	300	450	3200	88.0	112.0	M27x2	Ø 33	M22x1.5	Ø 28
UMD-12.5R-R09V13-RM09M07-N		R										
UMD-10L-R09V13-RM09M07-N	183 9404	L	10	300	450	3200	85.5	109.5	M27x2	Ø 33	M22x1.5	Ø 28
UMD-10R-R09V13-RM09M07-N		R										
UMD-8L-R09V13-RM09M07-N		L	8	300	600	3200	83.0	107.0	M27x2	Ø 33	M22x1.5	Ø 28
UMD-8R-R09V13-RM09M07-N		R										

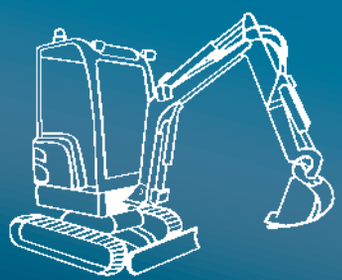


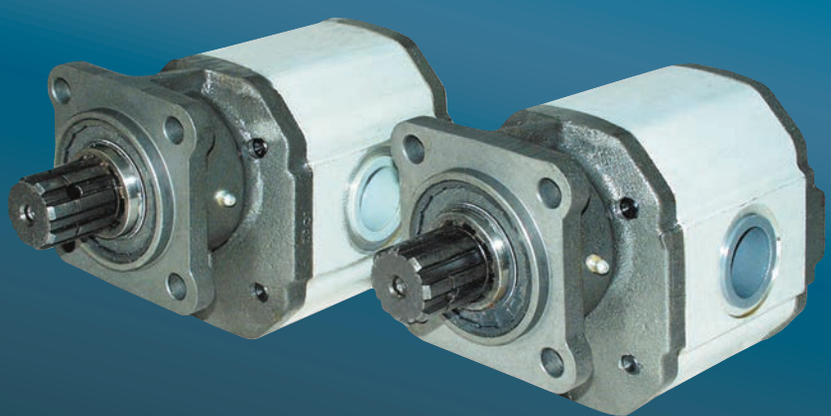
jihostroj
AERO TECHNOLOGY & HYDRAULICS

JIHOSTROJ a.s.
Budějovická 148
CZ 382 32 Velešín
Czech Republic
tel.: +420 380 340 511
fax: +420 380 340 612
e-mail: mailbox@jihostroj.cz
http: //**www.jihostroj.com**
GPS 48°49'51.748" N 14°27'40.770" E



jihostroj
AERO TECHNOLOGY & HYDRAULICS

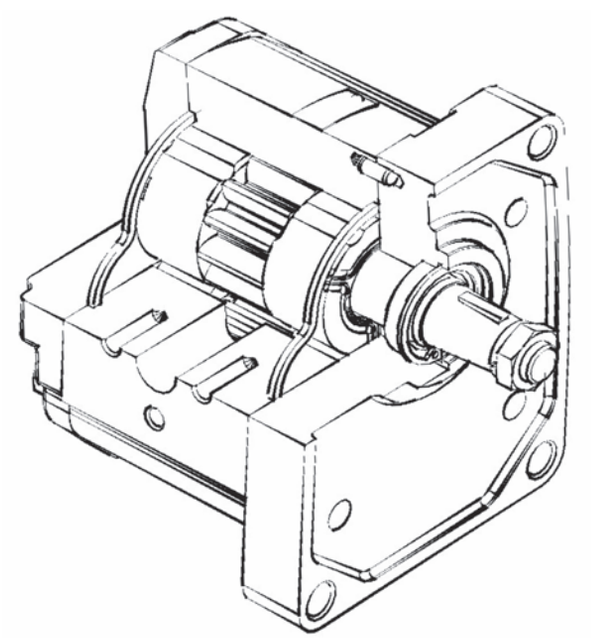




Displacement from 10 to 100 ccm
Pressure up to 290 bar
Speed from 400 to 3200 RPM

GEAR MOTORS
QM2

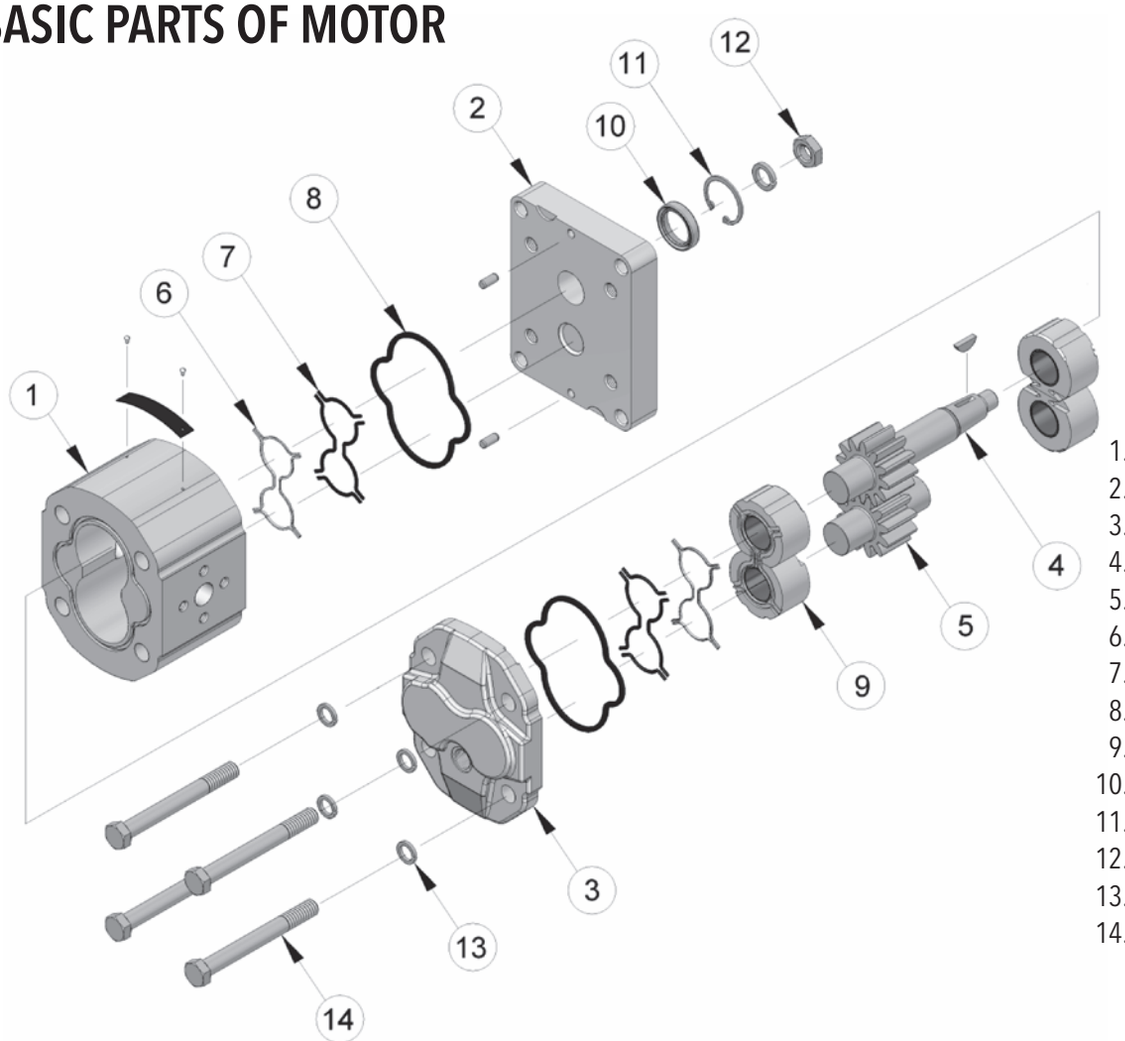
TABLE OF CONTENTS



DESCRIPTION

- Gear motors are used for transformation of liquid pressure head in mechanical energy. QM2 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 QM2 series covers the range of displacements from 10 to 100 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. QM2 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. Sealing protective plate
7. Balancing sealing
8. Peripheral sealing
9. Bearing sleeves
10. Shaft seal
11. Safety ring
12. Nut
13. Spring washer
14. Bolts

PARAMETER TABLE

One direction motors

Nominal Size Parameters		Sym.	Unit	QM2 10.0	QM2 13.5	QM2 17.0	QM2 22.5	QM2 27.0	QM2 34.0
Actual displacement		V_g	[cm^3]	10.14	13.76	17.39	22.46	27.53	34.05
Rotation speed	nominal	n_n	[min^{-1}]	1500	1500	1500	1500	1500	1500
	minimum	n_{min}	[min^{-1}]	600	600	500	500	500	500
	maximum	n_{max}	[min^{-1}]	3200	3200	3200	3200	3200	3000
Pressure at outlet	minimum	p_{1min}	[bar]	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
	maximum	p_{1max}	[bar]	0.5	0.5	0.5	0.5	0.5	0.5
Pressure at inlet	max. continuous	p_{2n}	[bar]	270	290	290	290	290	290
	maximum	p_{2max}	[bar]	290	310	310	310	310	310
	peak	p_3	[bar]	300	320	320	320	320	320
Nominal input flow rate (max.) at n_n and p_{2n}		Q_n	[$dm^3.min^{-1}$]	17.7	24.0	30.3	39.2	45.9	56.8
Maximum input flow rate at n_{max} and p_{2max}		Q_{max}	[$dm^3.min^{-1}$]	37.7	51.2	63.2	81.7	97.9	113.5
Nominal output power (min.) at n_n and p_{2n}		P_n	[kW]	5.8	8.5	10.7	13.8	17.0	21.0
Maximum output power at n_{max} a p_{2max}		P_{max}	[kW]	13.3	19.3	24.4	31.6	38.7	44.9
Nominal Torque at n_n and p_{2n}		M	[Nm]	37.0	54.0	68.2	88.1	108.0	133.6
Weight		m	[kg]	7.9	8.0	8.1	8.2	8.4	8.6

Nominal Size Parameters		Sym.	Unit	QM2 43.0	QM2 51.0	QM2 61.0	QM2 71.0	QM2 82.0	QM2 100.0
Actual displacement		V_g	[cm^3]	43.47	51.44	61.59	71.01	81.87	99.98
Rotation speed	nominal	n_n	[min^{-1}]	1500	1500	1500	1500	1500	1500
	minimum	n_{min}	[min^{-1}]	400	400	400	400	400	400
	maximum	n_{max}	[min^{-1}]	2800	2600	2400	2200	2000	1800
Pressure at outlet	minimum	p_{1min}	[bar]	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
	maximum	p_{1max}	[bar]	0.5	0.5	0.5	0.5	0.5	0.5
Pressure at inlet	max. continuous	p_{2n}	[bar]	280	270	250	230	200	180
	maximum	p_{2max}	[bar]	300	290	270	250	220	200
	peak	p_3	[bar]	310	300	280	260	230	210
Nominal input flow rate (max.) at n_n and p_{2n}		Q_n	[$dm^3.min^{-1}$]	72.5	85.7	102.7	118.4	136.5	166.6
Maximum input flow rate at n_{max} and p_{2max}		Q_{max}	[$dm^3.min^{-1}$]	135.2	148.6	164.2	173.6	181.9	200.0
Nominal output power (min.) at n_n and p_{2n}		P_n	[kW]	25.9	29.5	32.7	34.7	34.8	38.2
Maximum output power at n_{max} a p_{2max}		P_{max}	[kW]	51.7	54.9	56.5	55.3	51.0	51.0
Nominal Torque at n_n and p_{2n}		M	[Nm]	164.7	187.9	208.3	220.9	221.5	243.5
Weight		m	[kg]	9.0	9.2	9.5	9.8	10.1	11.2

Reversible motors

Nominal Size Parameters		Sym.	Unit	QM2 10.0	QM2 13.5	QM2 17.0	QM2 22.5	QM2 27.0	QM2 34.0
Actual displacement		V_g	[cm^3]	10.14	13.76	17.39	22.46	27.53	34.05
Rotation speed	nominal	n_n	[min^{-1}]	1500	1500	1500	1500	1500	1500
	minimum	n_{min}	[min^{-1}]	600	600	500	500	500	500
	maximum	n_{max}	[min^{-1}]	3200	3200	3200	3200	3200	3000
Pressure at outlet	minimum	p_{1min}	[bar]	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
	maximum	p_{1max}	[bar]	170	190	190	190	190	190
Pressure at inlet	max. continuous	p_{2n}	[bar]	240	260	260	260	260	260
	maximum	p_{2max}	[bar]	260	280	280	280	280	280
	peak	p_3	[bar]	270	290	290	290	290	290
Nominal input flow rate (max.) at n_n and p_{2n}		Q_n	[$dm^3.min^{-1}$]	17.7	24.0	30.3	39.2	45.9	56.8
Maximum input flow rate at n_{max} and p_{2max}		Q_{max}	[$dm^3.min^{-1}$]	37.7	51.2	63.2	81.7	97.9	113.5
Nominal output power (min.) at n_n and p_{2n}		P_n	[kW]	5.8	8.5	10.7	13.8	17.0	21.0
Maximum output power at n_{max} a p_{2max}		P_{max}	[kW]	13.3	19.3	24.4	31.6	38.7	44.9
Nominal Torque at n_n and p_{2n}		M	[Nm]	37.0	54.0	68.2	88.1	108.0	133.6
Weight		m	[kg]	7.9	8.0	8.1	8.2	8.4	8.6

Nominal Size Parameters		Sym.	Unit	QM2 43.0	QM2 51.0	QM2 61.0	QM2 71.0	QM2 82.0	QM2 100.0
Actual displacement		V_g	[cm^3]	43.47	51.44	61.59	71.01	81.87	99.98
Rotation speed	nominal	n_n	[min^{-1}]	1500	1500	1500	1500	1500	1500
	minimum	n_{min}	[min^{-1}]	400	400	400	400	400	400
	maximum	n_{max}	[min^{-1}]	2800	2600	2400	2200	2000	1800
Pressure at outlet	minimum	p_{1min}	[bar]	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
	maximum	p_{1max}	[bar]	180	170	160	140	110	90
Pressure at inlet	max. continuous	p_{2n}	[bar]	250	240	230	210	180	160
	maximum	p_{2max}	[bar]	270	260	250	230	200	180
	peak	p_3	[bar]	280	270	260	240	210	190
Nominal input flow rate (max.) at n_n and p_{2n}		Q_n	[$dm^3.min^{-1}$]	72.5	85.7	102.7	118.4	136.5	166.6
Maximum input flow rate at n_{max} and p_{2max}		Q_{max}	[$dm^3.min^{-1}$]	135.2	148.6	164.2	173.6	181.9	200.0
Nominal output power (min.) at n_n and p_{2n}		P_n	[kW]	25.9	29.5	32.7	34.7	34.8	38.2
Maximum output power at n_{max} a p_{2max}		P_{max}	[kW]	51.7	54.9	56.5	55.3	51.0	51.0
Nominal Torque at n_n and p_{2n}		M	[Nm]	164.7	187.9	208.3	220.9	221.5	243.5
Weight		m	[kg]	9.0	9.2	9.5	9.8	10.1	11.2

External drainage must be used in case of the reversible design.

FORMULAS USED FOR CALCULATION

Flow rate
Q

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

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

Displacement
V_g

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

Torque
M_k

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

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

Input power
P

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

η_t [–] total efficiency

PUMP EFFICIENCIES

Volumetric efficiency
η_v

It determines the amount of flow losses. Its value is $\eta_v = 0{,}92 \div 0{,}98$ (depending on rotation speed, viscosity of working liquid and outlet pressure). It can be expressed as follows:

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

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

Mechanical efficiency
η_m

It determines mechanical losses. Its value is about $\eta_m = 0{,}85$.
It can be expressed as follows:

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

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

Total efficiency
η_t

t is defined as product of η_n and η_m
and determines difference between theoretical and actual required input power:

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

$P_{act.}$ [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

- $t = -20 \div +80$ [°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 $20 \cdot 10^{-6}$ should be consulted with manufacturer): $\nu = 10 \cdot 10^{-6}$ [$m^2 \cdot s^{-1}$]

Filtration coefficient β_α

$\beta_{25}\ 75 \geq$ (for pressure $p_2 < 200$ bar)
$\beta_{10}\ 75 \geq$ (for pressure $p_2 > 200$ bar)

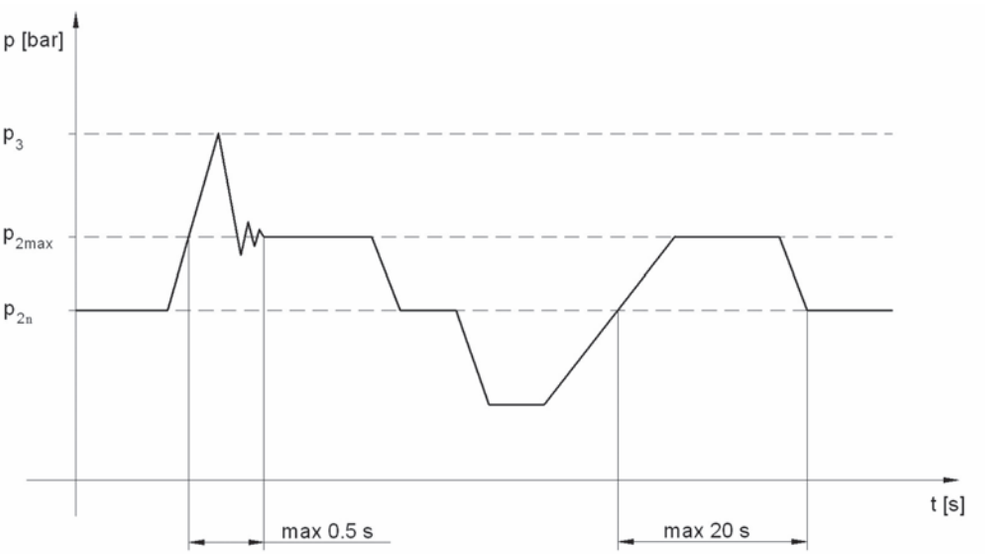
Liquid contamination class according to ISO 4406

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



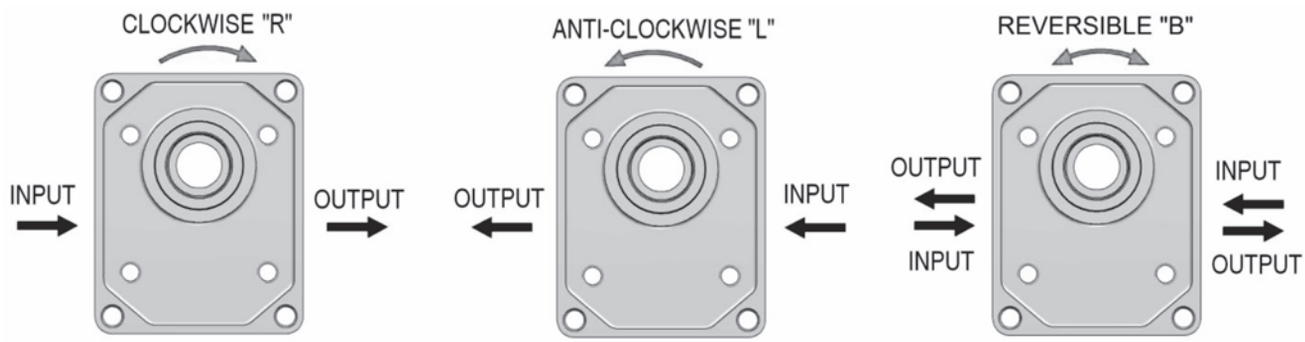
p_{2n}	**max. contin. pressure**	Max. working pressure, at which the pump can be operated without time limitation.
p_{2max}	**max. pressure**	Maximum pressure permissible for a short time, max. 20s.
p_3	**peak pressure**	Short-time pressure (fractions of a second) arising in case of a sudden change of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

OTHER REQUIREMENTS

- 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.
- All the matters affecting technical parameters and properties of the motor are given in respective operating manuals, technical specifications and test specifications of the manufacturer.

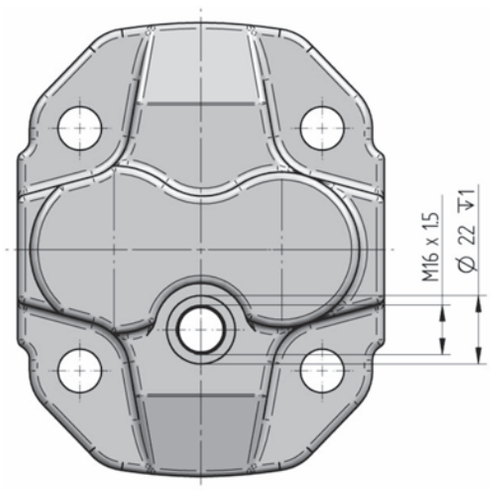
DIRECTION OF ROTATION

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

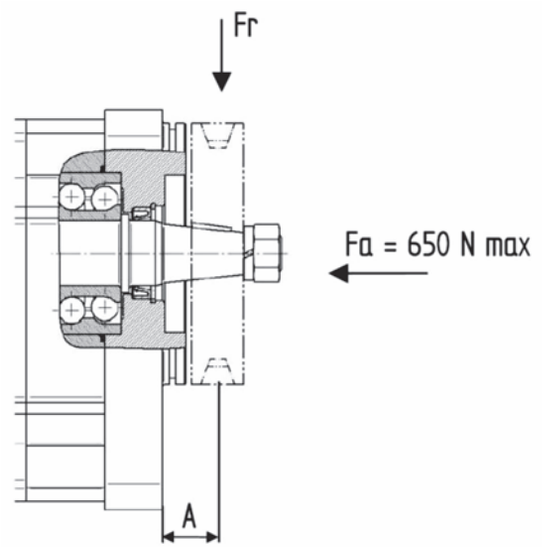


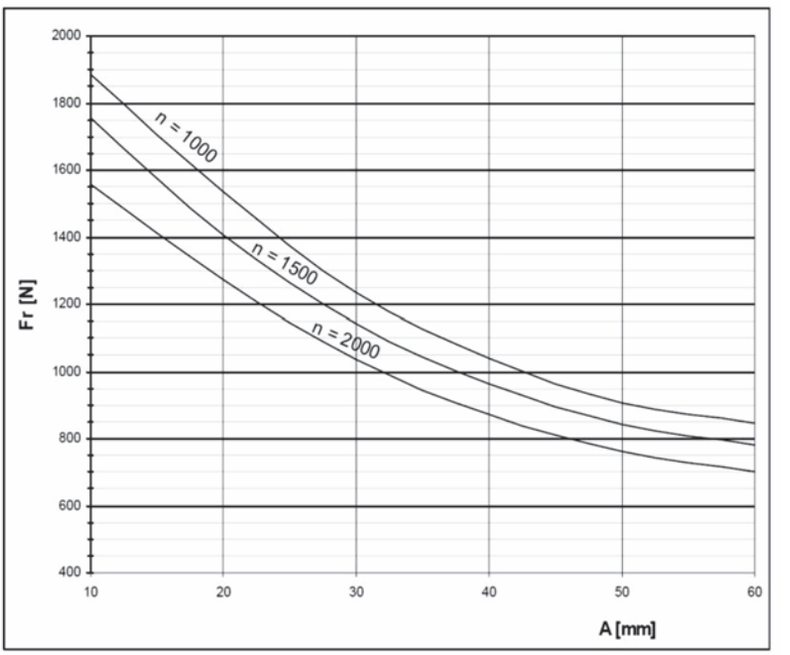
REVERSIBLE DESIGN

- 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.



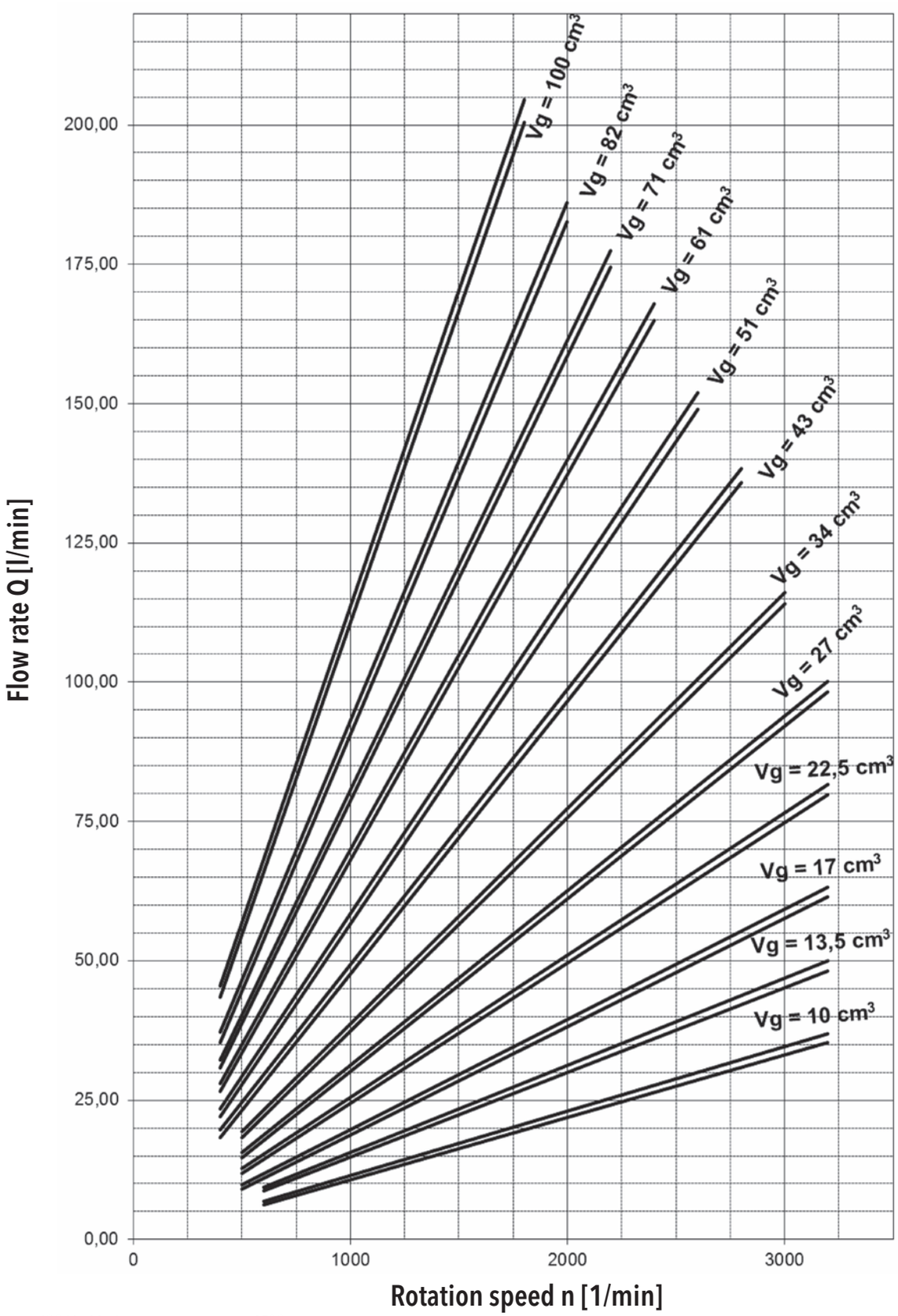
MOTOR WITH FRONT-END BEARING





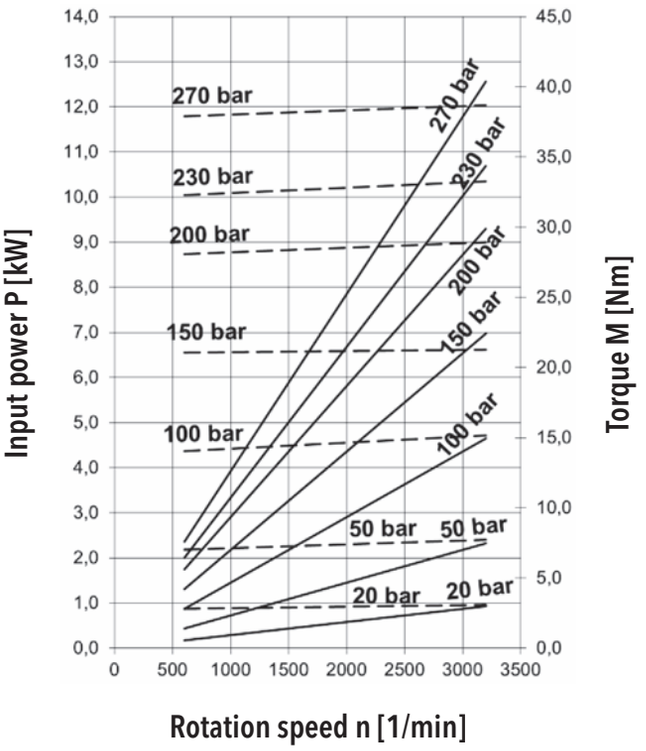
A driven device must not generate an axial or a radial load of the motor shaft, unless this is exclusively permitted for the motor with a front-end bearing.

QM2 FLOW RATE AND POWER CURVES

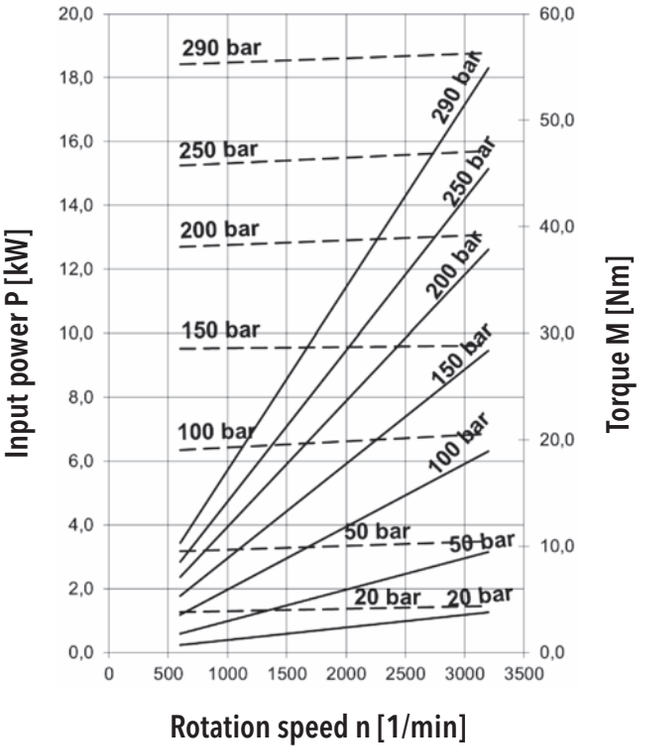


Above curves apply to ISO V_g 46 oil at temperature t = 45°C.

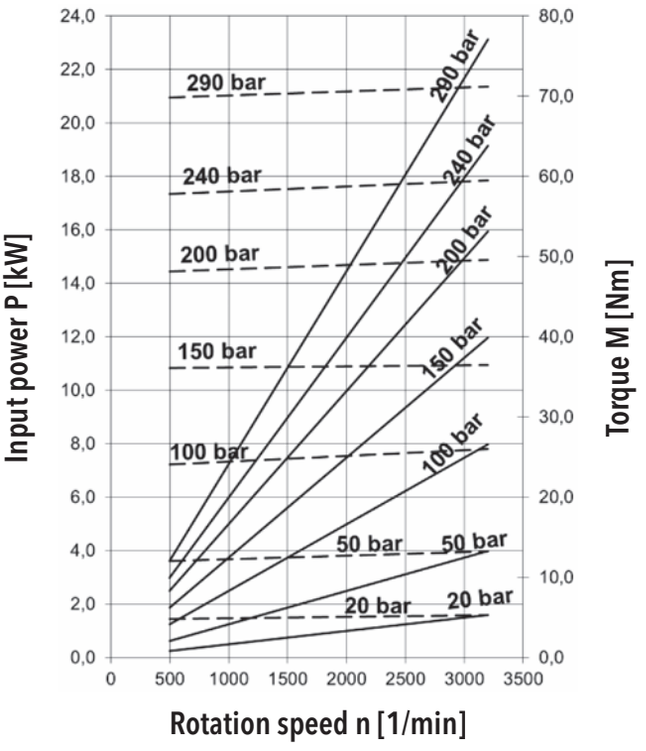
10,00 cm³



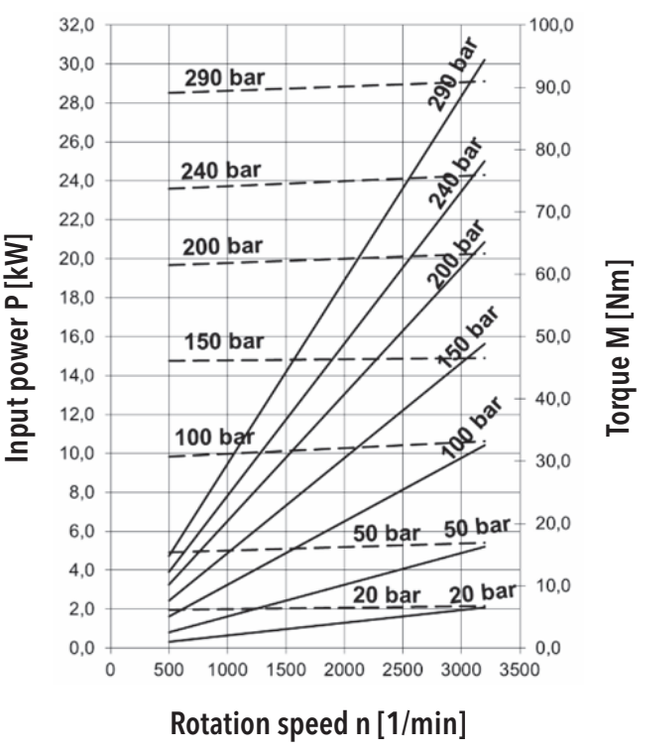
13,50 cm³



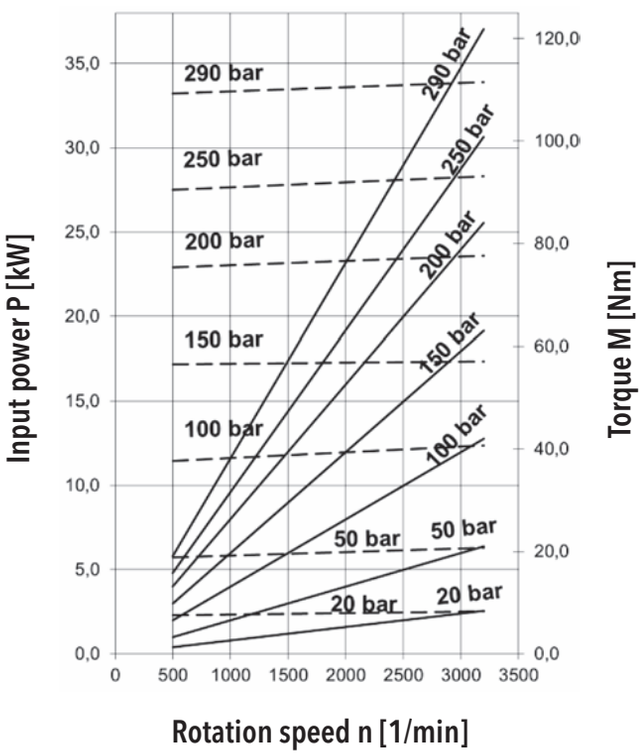
17,00 cm³



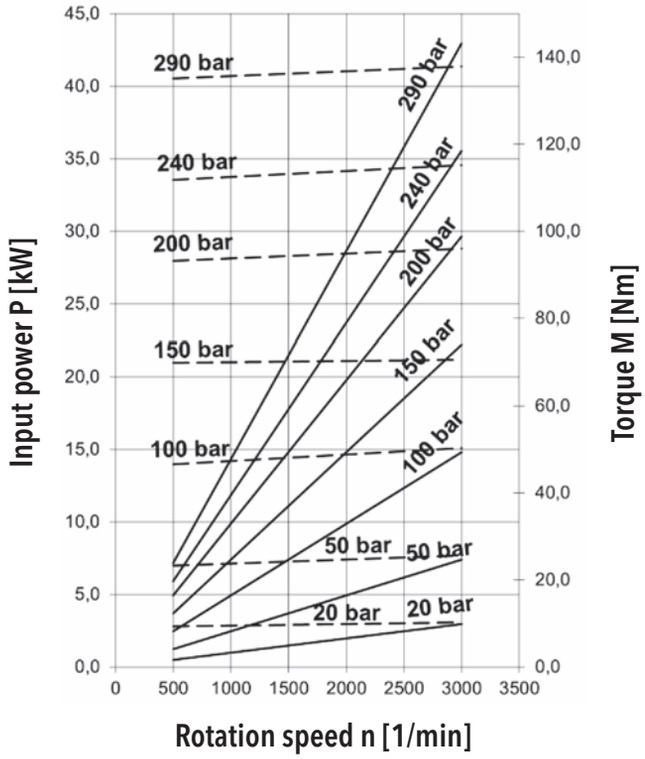
22,50 cm³



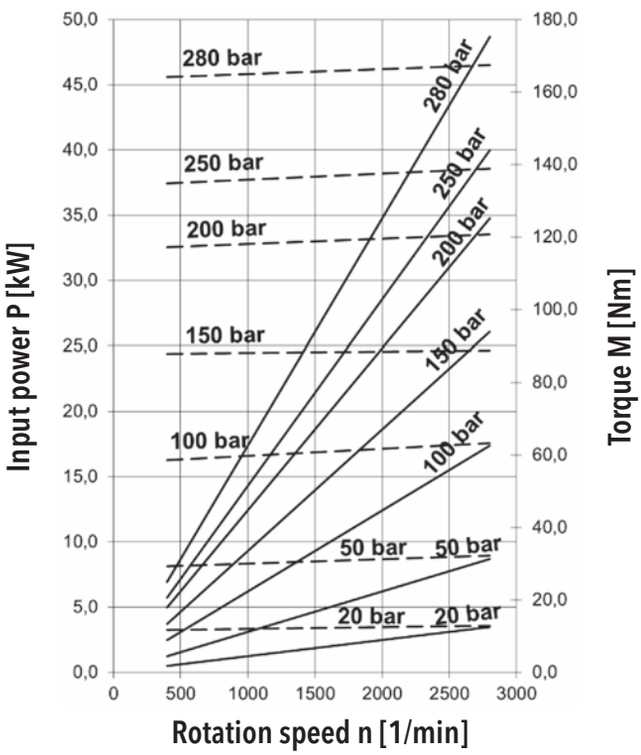
27,00 cm³



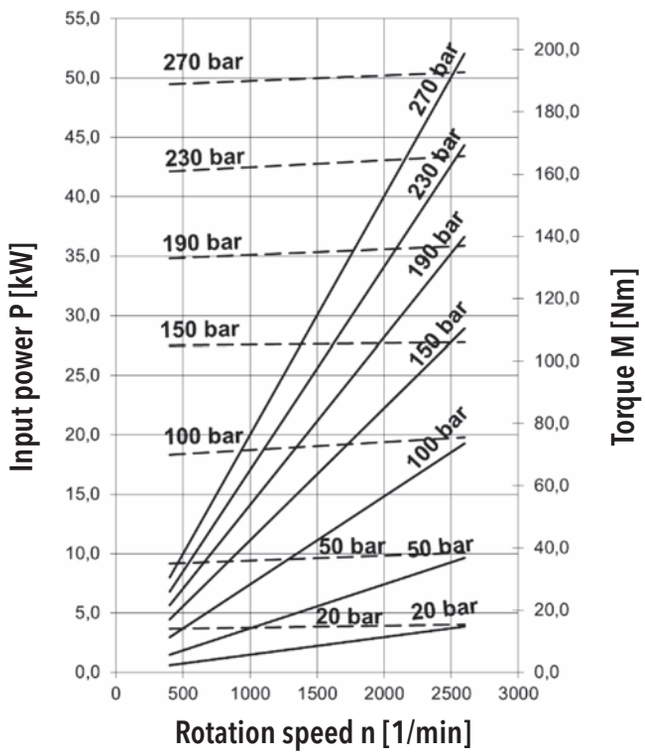
34,00 cm³



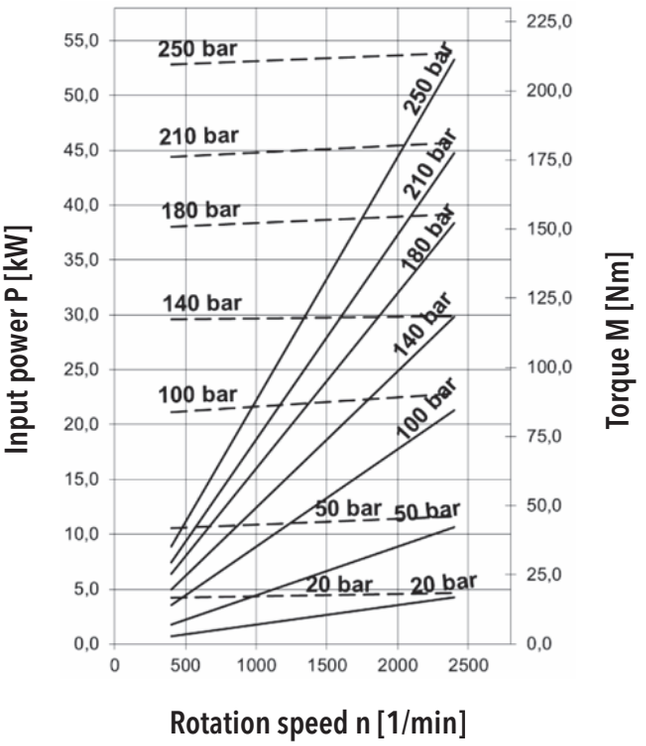
43,00 cm³



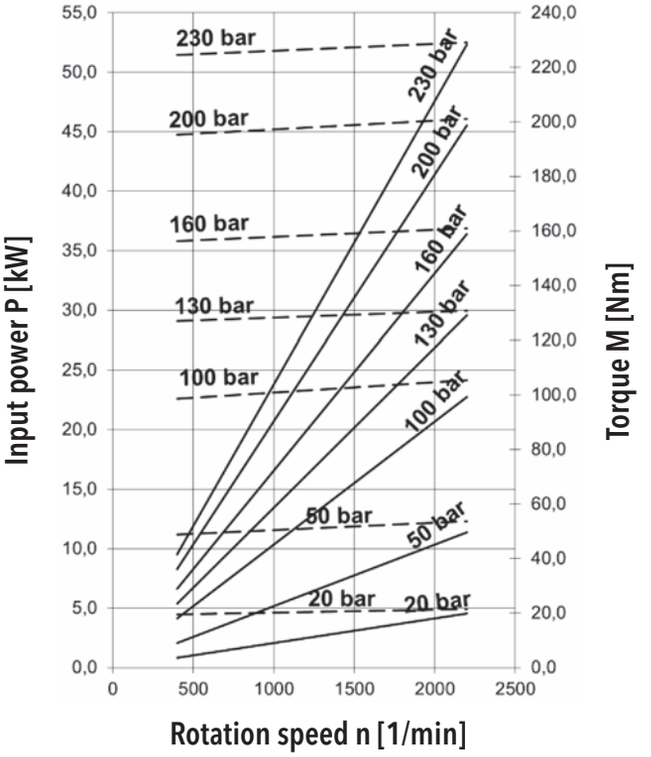
51,00 cm³



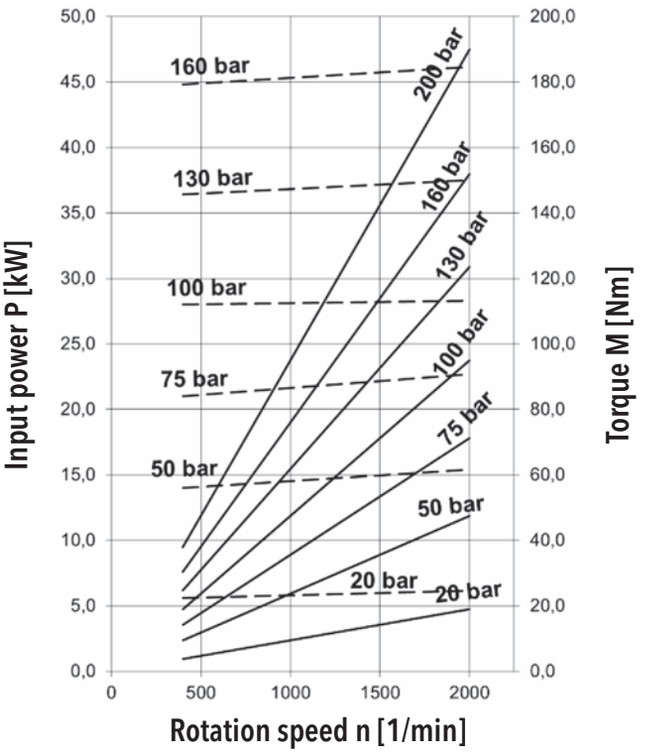
61,00 cm³



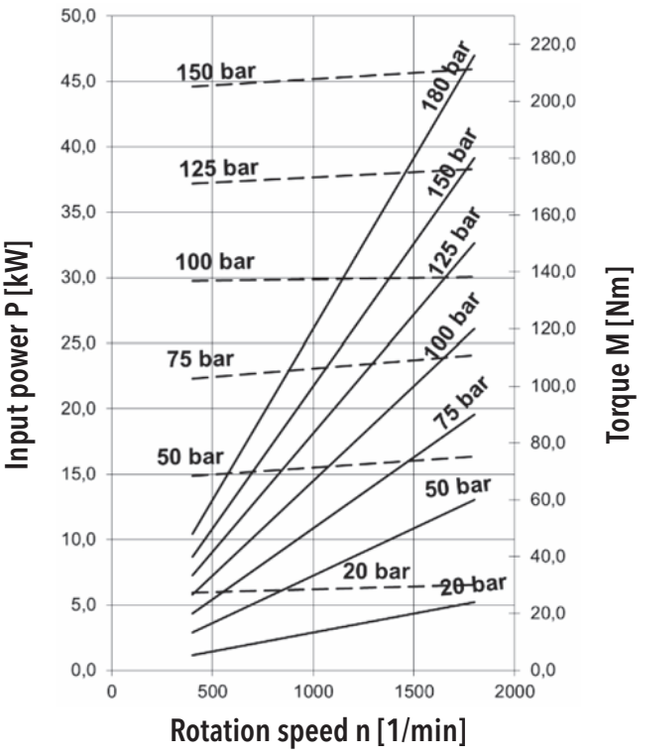
71,00 cm³



82,00 cm³



100,00 cm³



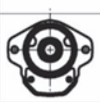
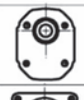
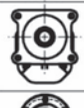
ORDER KEY

QM2 - 51 R - R11 C11 - S G05 G04 - N . 001

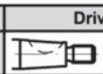
Code	Displacement [cm³]
10	10,14
13,5	13,76
17	17,39
22,5	22,46
27	27,53
34	34,05
43	43,47
51	51,44
61	61,59
71	71,01
82	81,87
100	99,98
XX	Other displacements on request

Code	Rotation
R	Clockwise rotation
L	Anti-clockwise rotation
B	Bi-directional rotation

Code	Type
QM2	QM2 Series Gear Motor

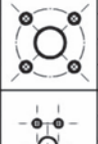
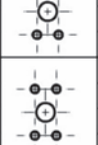
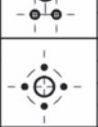
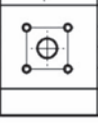
Code	Flange design	
R11		Rectangular flange, centre ring ∅ 50,8 spacing 98,5 x 128
R22		Rectangular flange UN II
R13		Rectangular flange, centre ring ∅105 spacing 102,5 x 145
S03		SAE B – 2 aperture
S05		SAE B – 4 aperture
I01		ISO, centre ring ∅ 80 front end bearing
I02		ISO, centre ring ∅ 80
U01		UNI
A11		trough - bolts
A12		trough - bolts
B01		Flange 4 aperture centre ring ∅ 90 spacing 110 x 86
K02		Circular flange, centre ring ∅85, 6 bolts, ∅105
Z		Special design

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

Code	Drive shaft design	
C11		Cone 1:8
C12		Cone 1:5
D13		Spline SAE 13T
D15		Spline SAE 15T
D16		Spline 25x1,5 ČSN 014950
D17		Spline UNI 221
D18		Equilateral spline DIN 5462 A8x32x36x6
D19		Equilateral spline 6 grooves, ∅ 20
D22		Involute spline ZV 25x1,5x16
K09		Cross coupling
V14		Cylindric SAE ∅22,225
V15		Cylindric ∅20h7
V16		Cylindric ∅25
Z		Special design

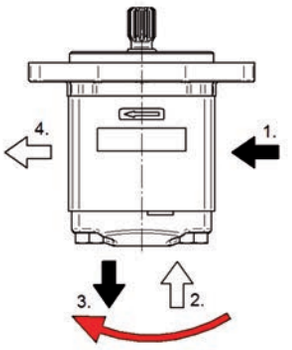
Code	Special arrangements
-	No special arrangements
001	Double lip shaft seal
004	Without shaft seal
006	Axial inlet, radial outlet
007	Rotated out of flange throat
008	With front-end bearing light design
013	Internal drain
014	Axial drain M18x1,5
015	Axial drain M16x1,5
050	Built-in relief valve
061	Radial inlet, radial+axial outlet

Code	Seal material
N	NBR
V	FKM (VITON)
H	HNBR

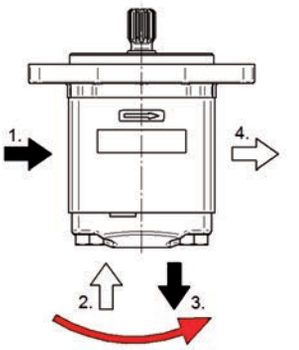
Code	Liquid inlet and outlet connection shape	
M08		Thread M 27x1,5
M09		Thread M 27x2
M11		Thread M 33x1,5
M12		Thread M 33x2
M15		Thread M 48x2
G03		Thread BSP G1/2
G04		Thread BSP G3/4
G05		Thread BSP G1"
G06		Thread BSP G1 1/4
U04		Thread 7/8 – 14 UNF
U05		Thread 1-1/16 - 12 UN
U07		Thread 1-5/16 - 12 UN
U08		Thread 1-5/8 - 12 UN
H08		Flanged fitting 4xM8/∅40
H09		Flanged fitting 4xM8/∅55 ; ∅18
H10		Flanged fitting 4xM8/∅55 ; ∅25
H11		Flanged fitting 4xM10/∅51
A02		Flanged fitting SAE 3/4
A03		Flanged fitting SAE 1
A04		Flanged fitting SAE 1 1/4
A05		Flanged fitting SAE 1 1/2
E02		Flanged fitting 3/4
E03		Flanged fitting 1
E04		Flanged fitting 1 1/4
E05		Flanged fitting 1 1/2
K03		Flanged fitting 4xM8/∅40; ∅18
K04		Flanged fitting 4xM10/∅51; ∅26
K05		Flanged fitting 4xM8/∅55; ∅18
K06		Flanged fitting 4xM8/∅55; ∅25
S08		Flanged fitting 4xM10/22x54
S09		Flanged fitting 4xM10/22x54
S10		Flanged fitting 4xM8/22x46
S11		Flanged fitting 4xM8/22x46
Z		Special design

An example of designation for the QM2 clockwise motor with displacement of 51 cm³. Rectangular flange centre ring ∅ 50.8mm, Shaft with traper 1:8, BSP side inlets in the body and standard NBR sealing, and with two-edges shaft seal: **QM2-51R-R11C11-SG04G05-N.001**

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



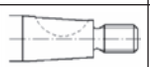
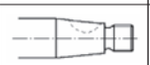
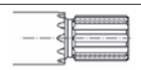
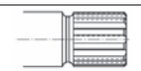
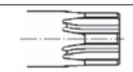
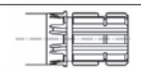
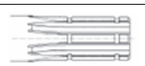
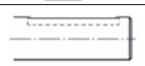
For clockwise and reverse gear motor,
in direction clockwise



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

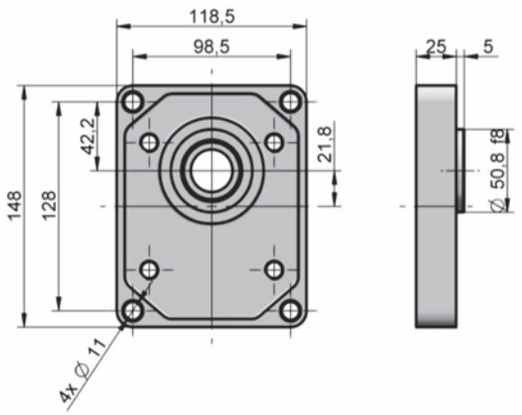
For. ex...: QM2-43B-R11C11-C<u>G04</u> <u>G04</u> <u>G05</u> <u>G05</u> -N
1. 2. 3. 4.

COMBINATIONS OF FLANGES AND SHAFTS

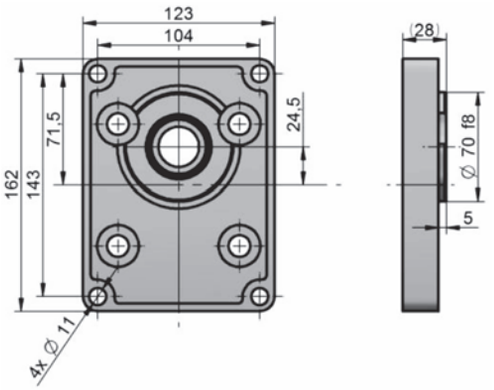
			FLANGE DESIGN									
			R11	R12	R13	S03	S05	I01 / I02	U01	A11	A12	B01	K02
DRIVE SHAFT	C11		●					●					
	C12				●								
	D13					●	●						
	D15					●	●						
	D17								●			●	
	D18							●					
	D19			●									●
	D22											●	
	K09									●	●		
	V14					●	●						
	V15		●										
	V16		●	●									

FLANGES DESIGN

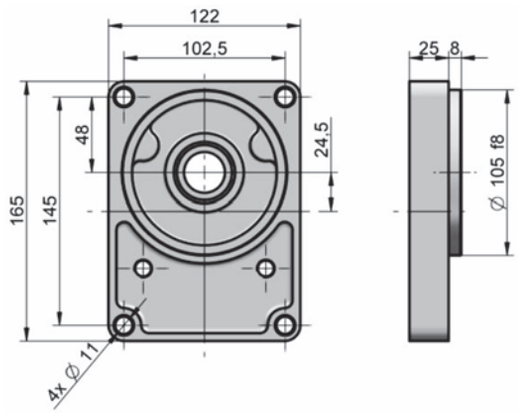
R11:



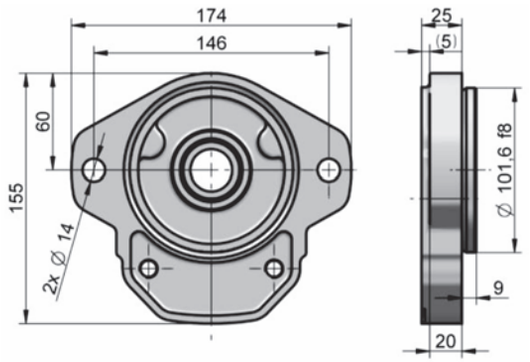
R12:



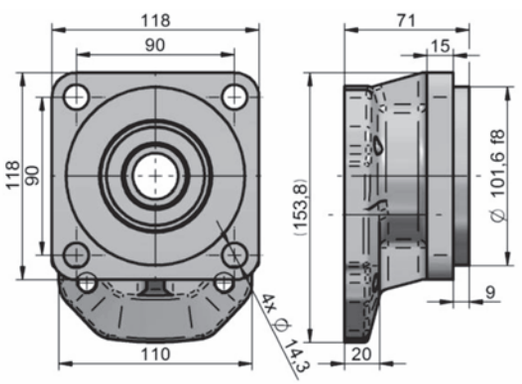
R13:



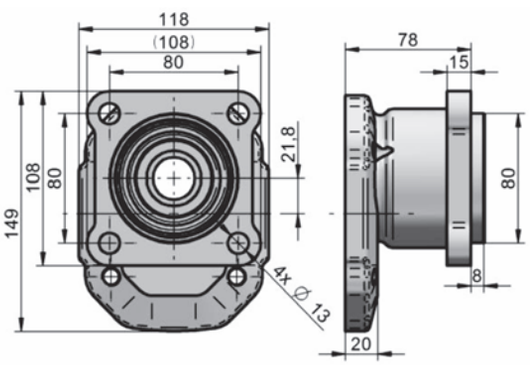
S03:



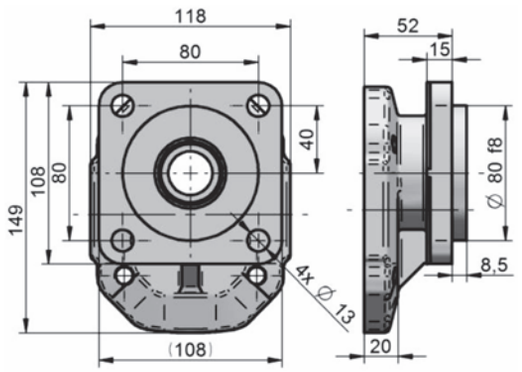
S05:



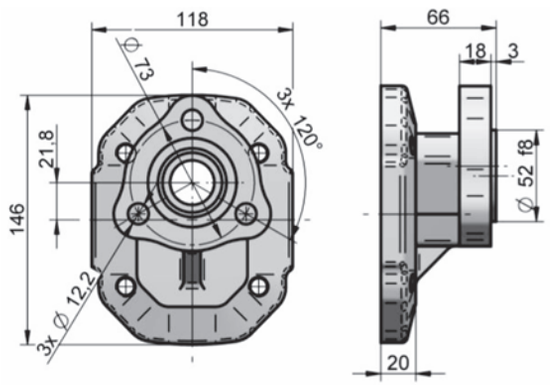
I01:



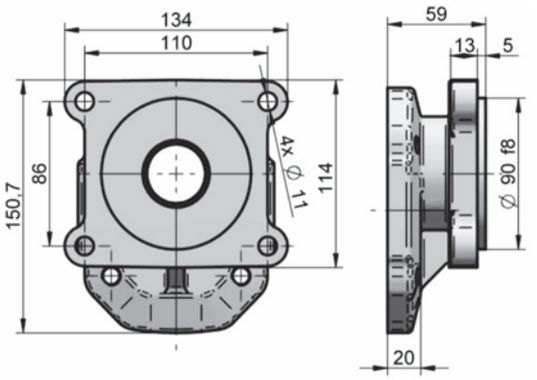
I02:



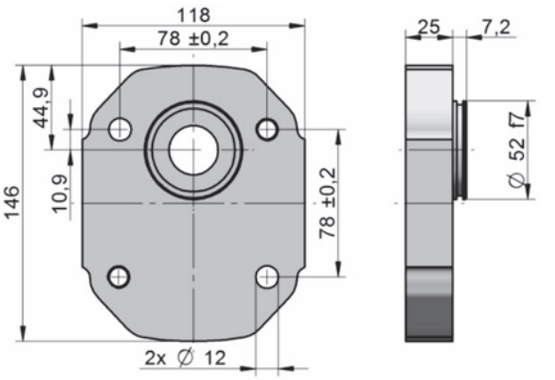
U01:



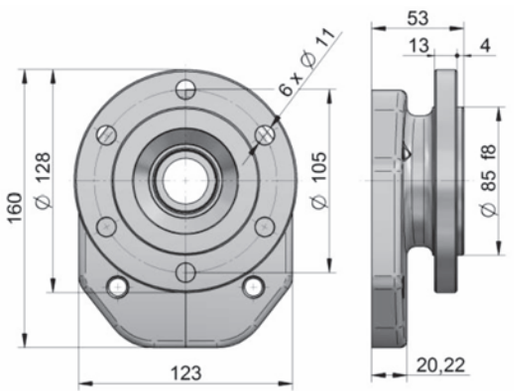
B01:



A11:

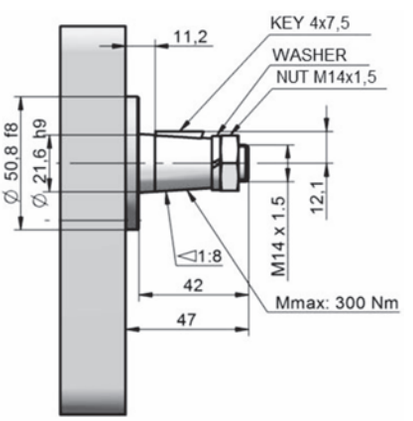


K02:

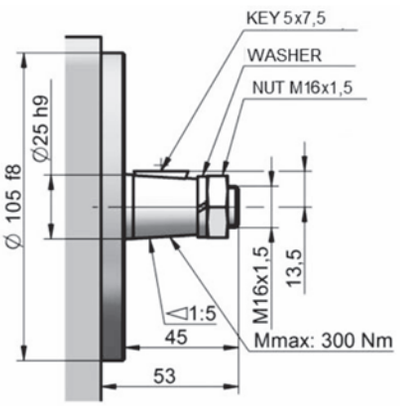


DRIVE SHAFTS

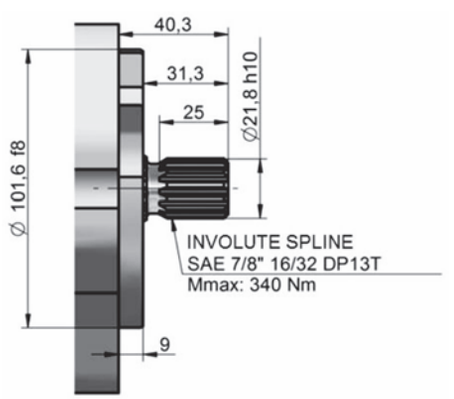
C11:



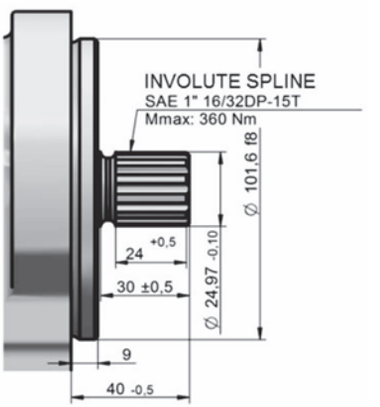
C12:



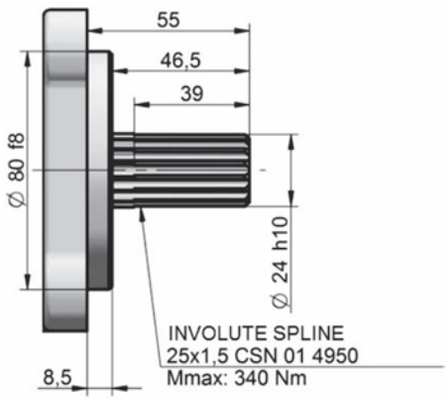
D13:



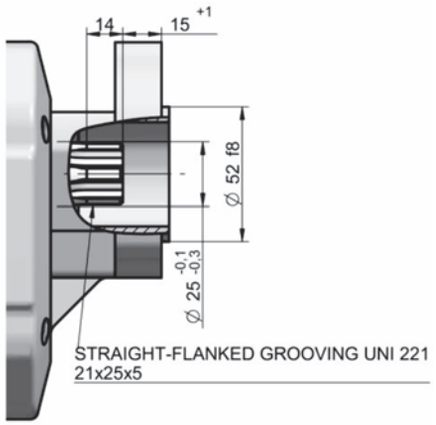
D15:



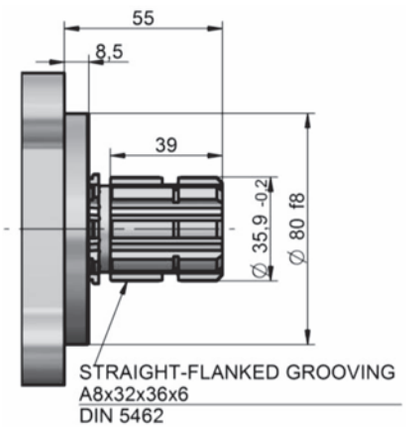
D16:



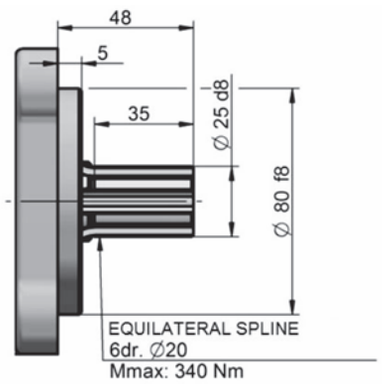
D17:



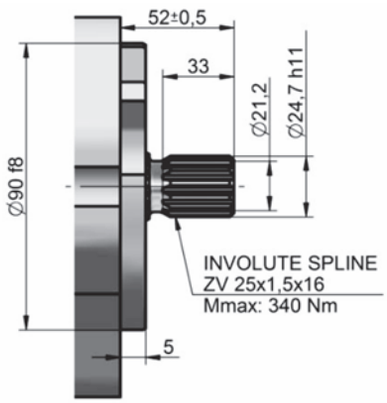
D18:



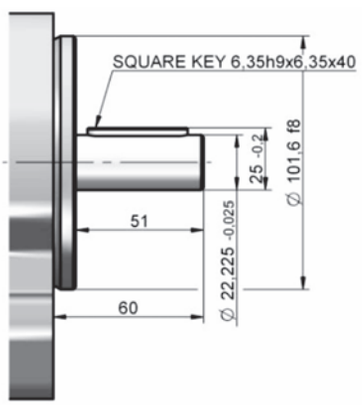
D19:



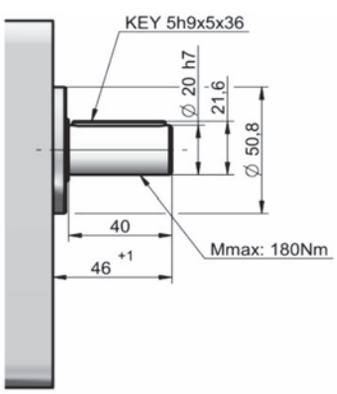
D22:



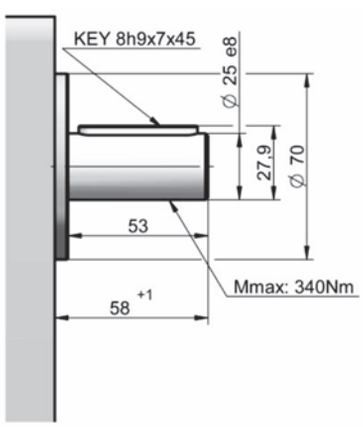
V14:



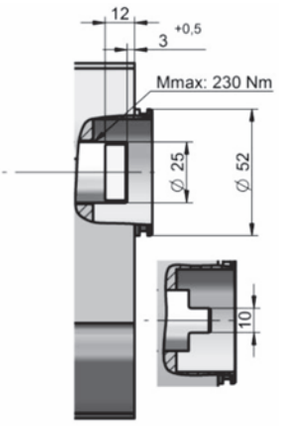
V15:



V16:

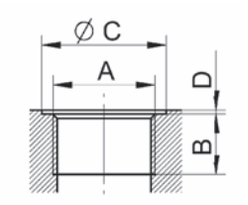


K09:



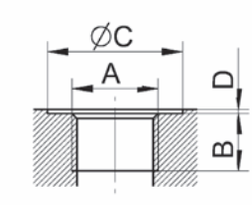
COMBINATIONS OF LIQUID INLETS AND OUTLETS

Metric thread according to ISO 6149



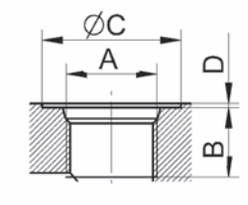
Displacement [cm³]	Code	Inlet				Code	Outlet			
		A	B	C	D		A	B	C	D
to 51 including	M12	M 33x2	18,0	40,0	1,0	M09	M 27x2	16,0	33,0	1,0
above 51	M15	M 48x2	18,0	56,0	1,0	M12	M 33x2	18,0	40,0	1,0
drain	M04	M 16x1,5	14,0	22,0	1,0					
drain	M05	M 18x1,5	14,0	24,0	1,0					

BSPP pipe thread according to ISO 228-1



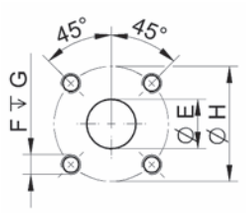
Displacement [cm³]	Code	Inlet				Code	Outlet			
		A	B	C	D		A	B	C	D
to 17 including	G03	G 1/2	14,0	33,0	1,0	G03	G 1/2	14,0	33,0	1,0
17-34 including	G04	G 3/4	16,0	39,0	1,0	G04	G 3/4	16,0	39,0	1,0
34-51 including	G05	G 1	18,0	45,0	1,0	G04	G 3/4	16,0	39,0	1,0
above 51	G06	G 1 1/4	18,0	57,0	1,0	G05	G 1	18,0	45,0	1,0

UNF thread according to SAE



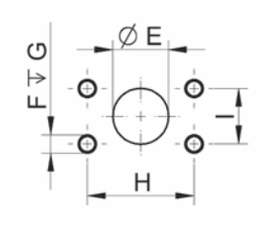
Displacement [cm³]	Code	Inlet				Code	Outlet			
		A	B	C	D		A	B	C	D
to 17 including	U05	1-1/16-12UNF	19,0	41,0	1,0	U04	7/8-14UNF	17,0	34,0	1,0
17-27 including	U07	1-5/16-12UNF	23,0	49,0	1,0	U05	1-1/16-12UNF	19,0	41,0	1,0
27-39 including	U07	1-5/16-12UNF	23,0	49,0	1,0	U07	1-5/16-12UNF	23,0	49,0	1,0
above 39	U08	1-5/8-12UN 2B	23,0	58,0	1,0	U07	1-5/16-12UNF	23,0	49,0	1,0

Flanged fittings according to DIN 8901/8902



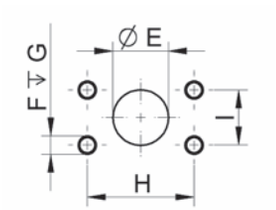
Displacement [cm³]	Code	Inlet				Code	Outlet			
		E	F	G	H		E	F	G	H
all	H11	26,0	M 10	16,0	51,0	H08	18,0	M 8	16,0	40,0
	H10	25,0	M 8	16,0	55,0	H09	18,0	M 8	16,0	55,0

Flanged fittings according to SAE, metric thread



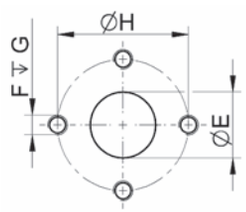
Displacement [cm³]	Code	Inlet					Code	Outlet				
		E	F	G	H	I		E	F	G	H	I
to 61 including	E03	25,4	M 10	22,0	52,4	26,2	E02	19,0	M 10	22,0	47,6	22,2
above 61	E04	30,5	M 10	22,0	58,7	30,2	E03	25,4	M 10	22,0	52,4	26,2
above 61	E05	39,3	M 12	27,0	69,8	35,7	E04	30,5	M 10	22,0	58,7	30,2

Flanged fittings according to SAE, UNC thread



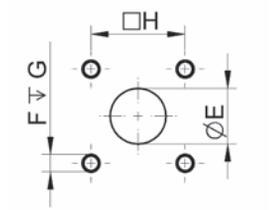
Displacement [cm³]	Code	Inlet					Code	Outlet				
		E	F	G	H	I		E	F	G	H	I
to 61 including	A03	25,4	3/8-16-UMC	22,0	52,4	26,2	A02	19,0	3/8-16-UMC	22,0	47,6	22,2
above 61	A04	30,5	7/16-14-UMC	29,0	58,7	30,2	A03	25,4	3/8-16-UMC	22,0	52,4	26,2
above 61	A05	39,3	1/2-13-UMC	27,0	69,8	35,7	A04	30,5	7/16-14-UMC	29,0	58,7	30,2

Flanged fittings – „cross"



Displacement [cm³]	Code	Inlet				Code	Outlet			
		E	F	G	H		E	F	G	H
all	K04	26,0	M 10	16,0	51,0	K03	18,0	M 8	16,0	40,0
	K06	25,0	M 8	16,0	55,0	K05	18,0	M 8	16,0	55,0

Flanged fittings – „square"

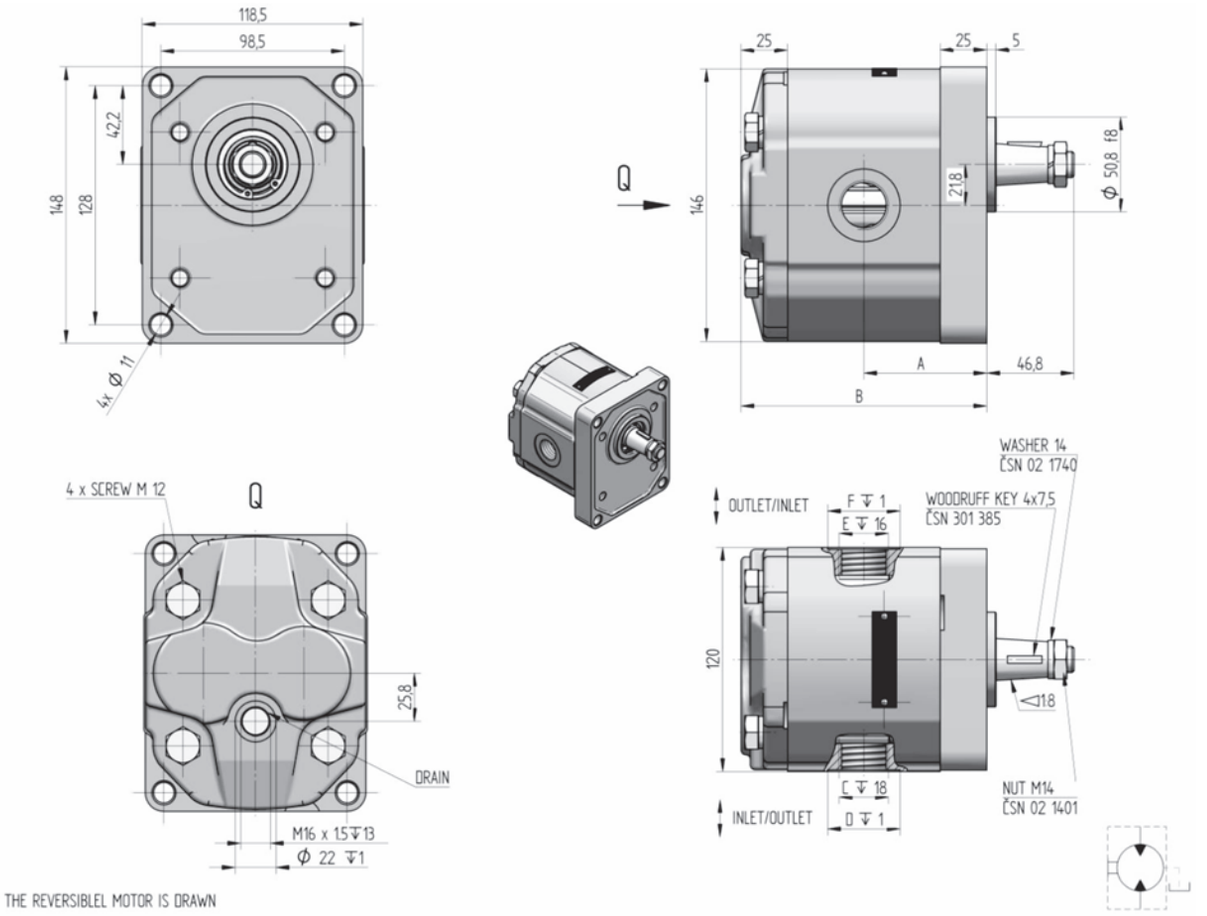


Displacement [cm³]	Code	Inlet				Code	Outlet			
		E	F	G	H		E	F	G	H
to 43 including	S11	23,0	M 8	22,0	46,0	S10	16,0	M 8	22,0	46,0
above 43	S09	27,0	M 10	22,0	54,0	S08	19,0	M 10	22,0	54,0

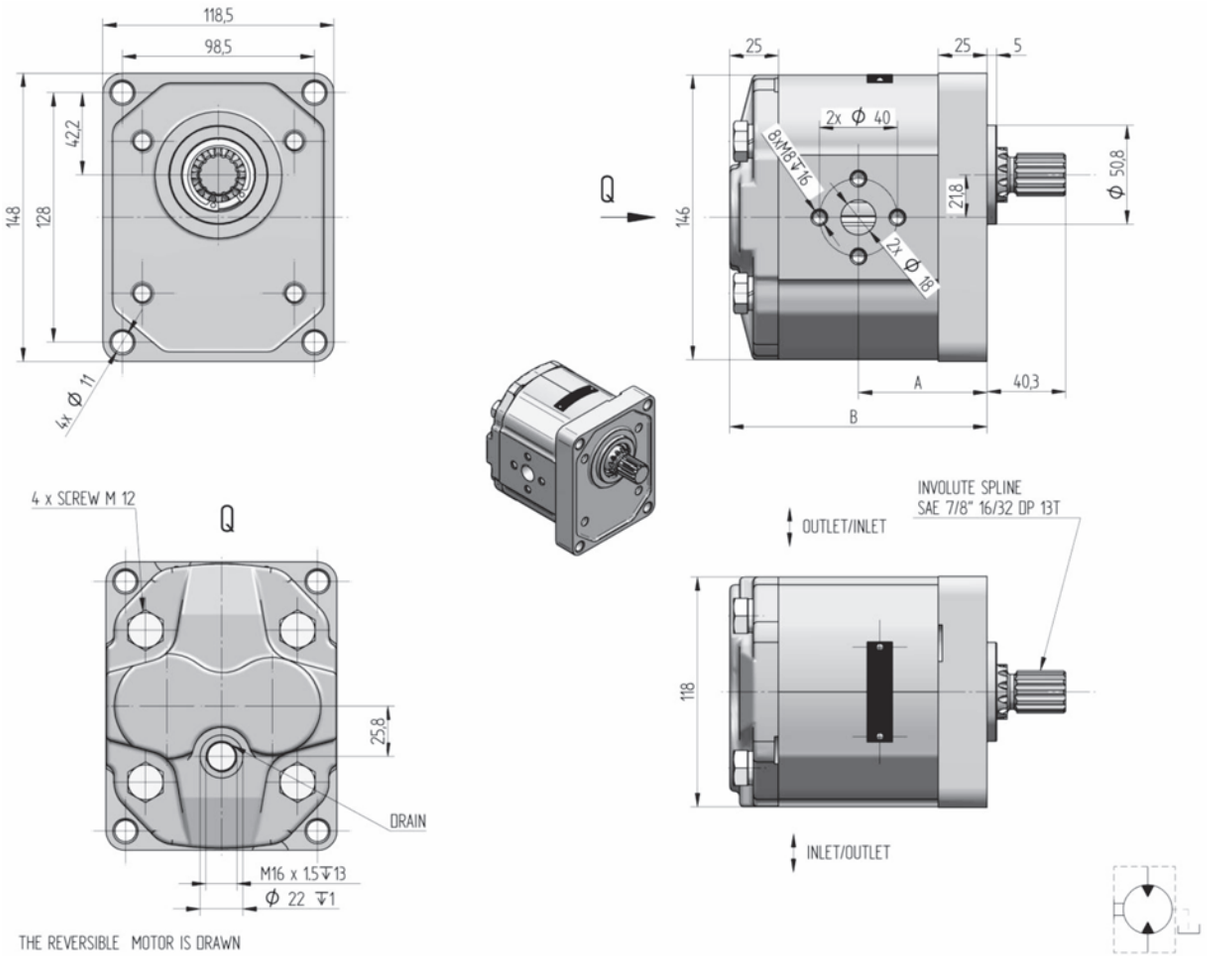
Drain

Displacement [cm³]	Code	Outlet			
		A	B	C	D
all	M04	M 16x1,5	14,0	22,0	1,0
	M05	M 18x1,5	14,0	24,0	1,0

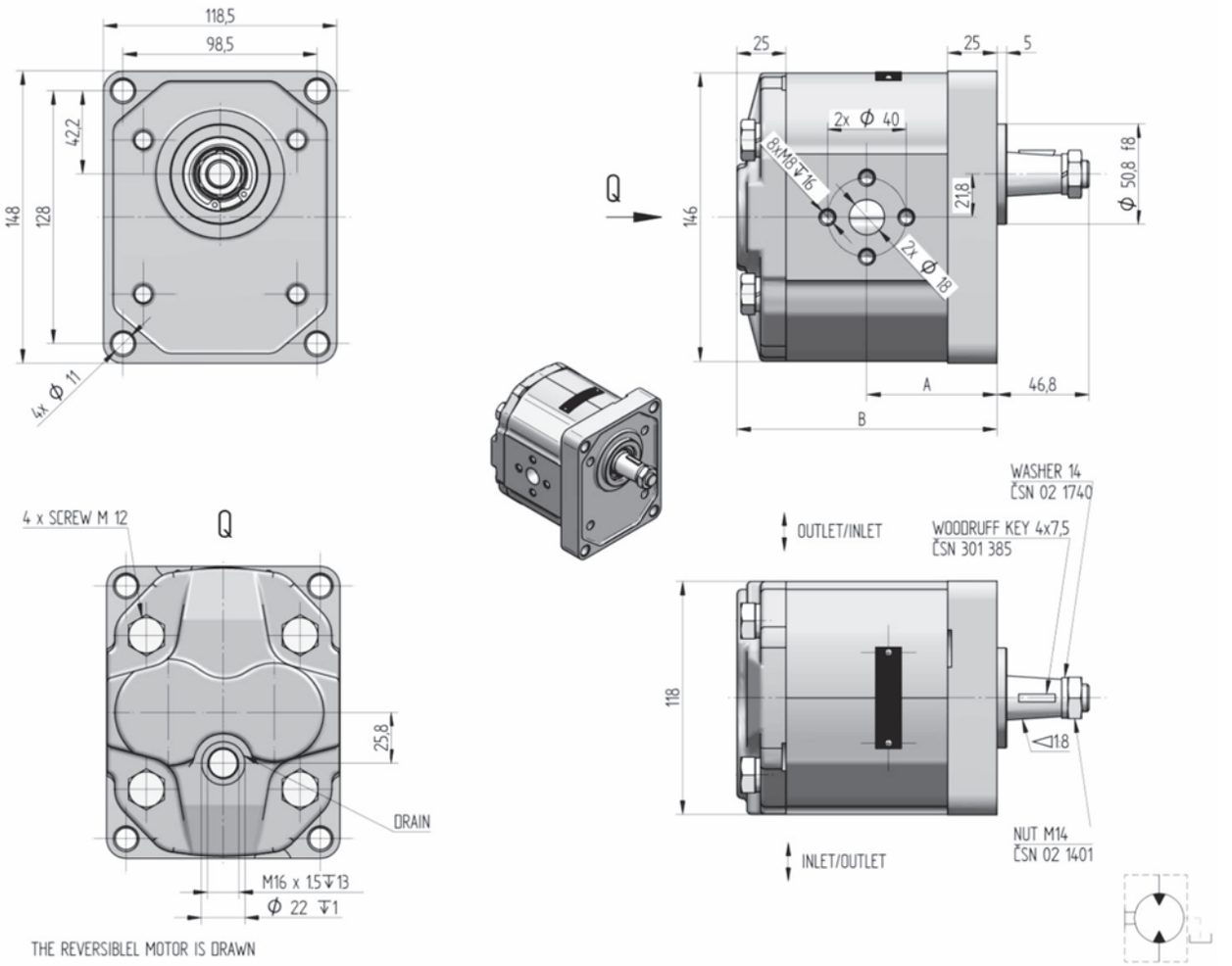
CATALOGUE SHETS OF QM2 SERIES BASIC DESIGNS



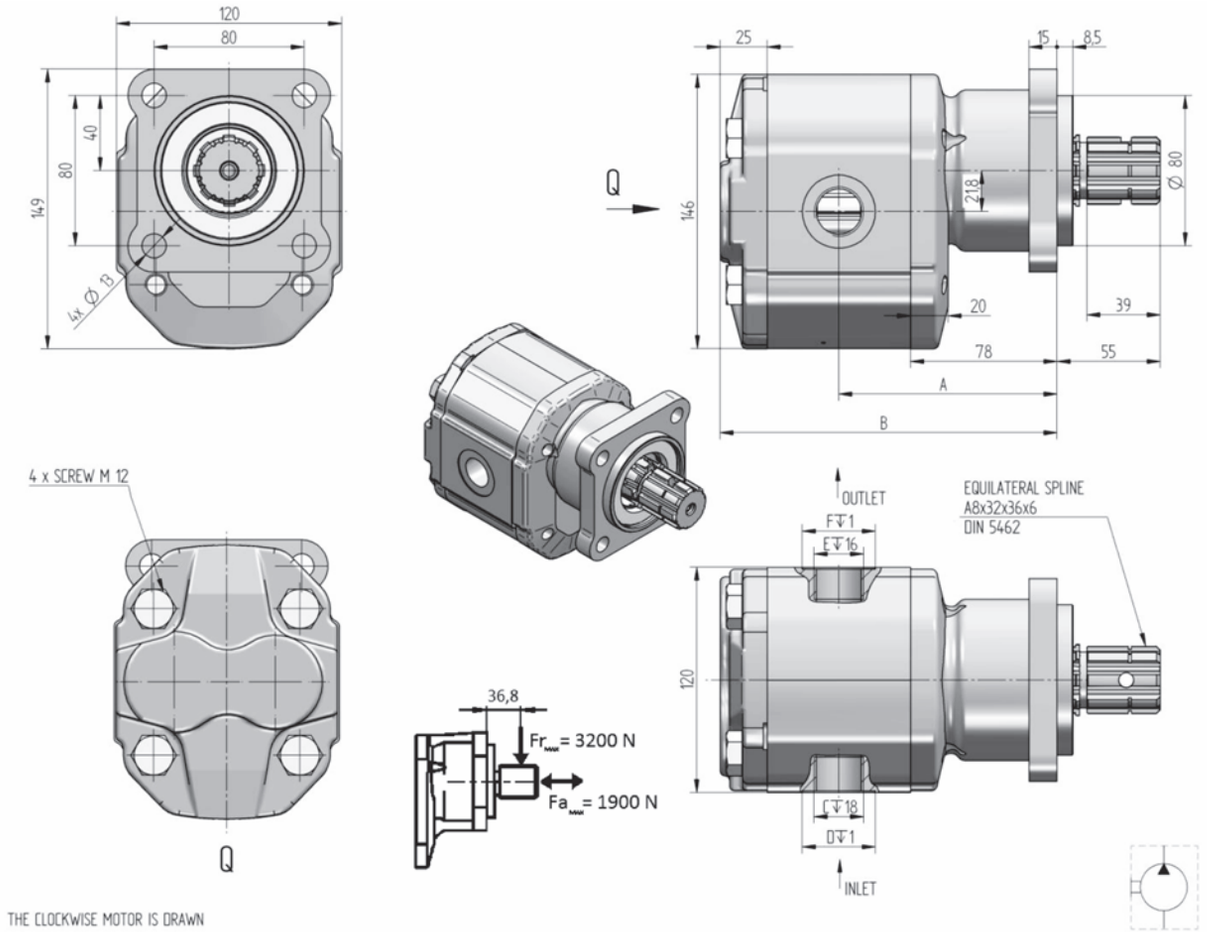
Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]
QM2-82B-R11C11-SG05G05-N		B	82	200	400	2000	80.00	160.0	G 1"	Ø 45	G 1"	Ø 45
QM2-71B-R11C11-SG05G05-N		B	71	230	400	2200	76.25	152.5	G 1"	Ø 45	G 1"	Ø 45
QM2-61B-R11C11-SG05G05-N		B	61	250	400	2400	73.00	146.0	G 1"	Ø 45	G 1"	Ø 45
QM2-51B-R11C11-SG04G04-N		B	51	270	400	2600	69.50	139.0	G 3/4"	Ø 39	G 3/4"	Ø 39
QM2-43B-R11C11-SG04G04-N		B	43	280	400	2800	66.75	133.5	G 3/4"	Ø 39	G 3/4"	Ø 39
QM2-34B-R11C11-SG04G04-N		B	34	290	500	3000	63.50	127.0	G 3/4"	Ø 39	G 3/4"	Ø 39
QM2-27B-R11C11-SG04G04-N		B	27	290	500	3200	61.25	122.5	G 3/4"	Ø 39	G 3/4"	Ø 39
QM2-22.5B-R11C11-SG04G04-N		B	22.5	290	500	3200	59.50	119.0	G 3/4"	Ø 39	G 3/4"	Ø 39
QM2-17B-R11C11-SG03G03-N		B	17	290	500	3200	57.75	115.5	G 1/2"	Ø 33	G 1/2"	Ø 33
QM2-13.5B-R11C11-SG03G03-N		B	13.5	290	600	3200	56.50	113.0	G 1/2"	Ø 33	G 1/2"	Ø 33
QM2-10B-R11C11-SG03G03-N		B	10	270	600	3200	55.25	110.5	G 1/2"	Ø 33	G 1/2"	Ø 33



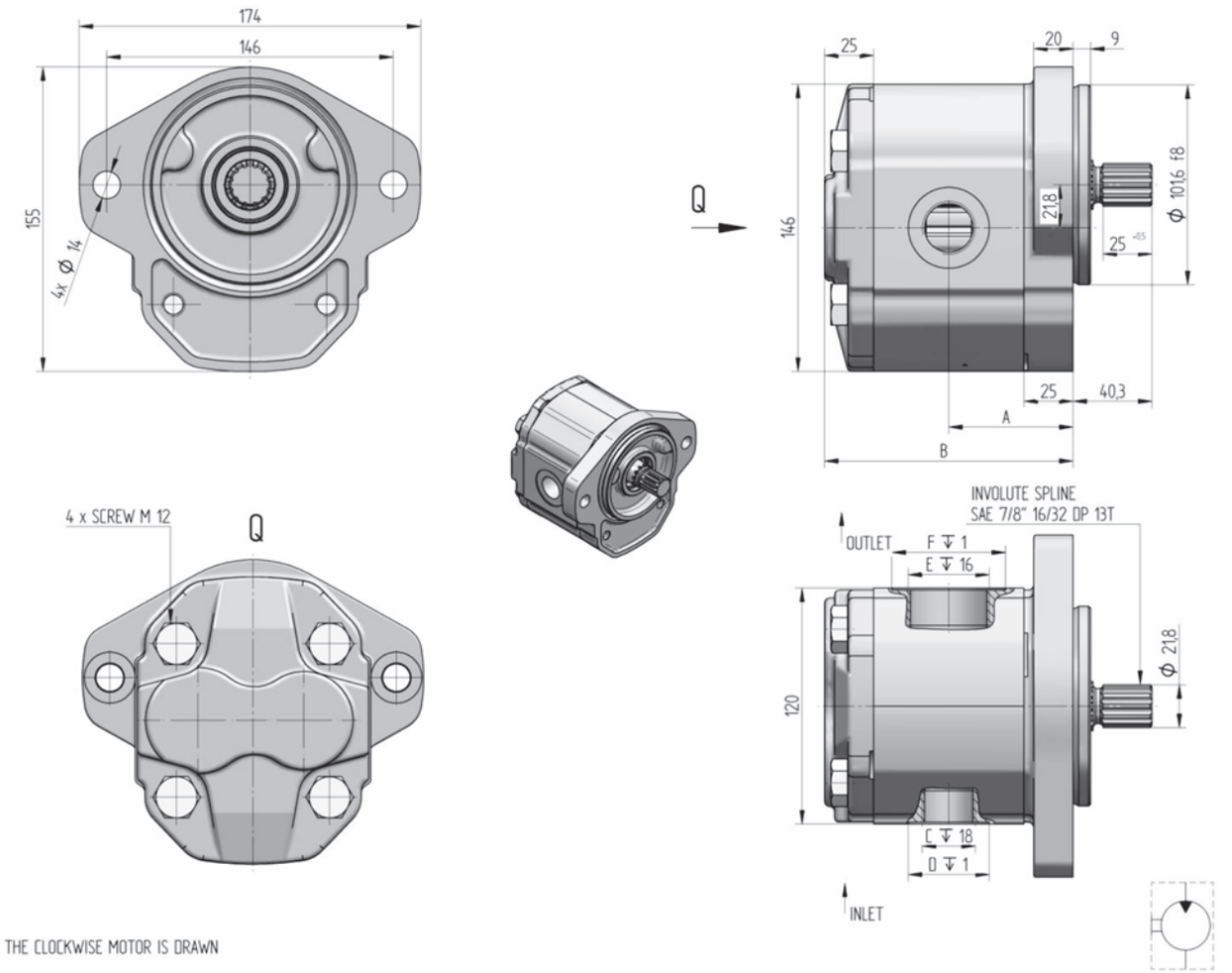
Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	dimension B [mm]
QM2-82B-R11D13-SK03K03-N		B	82	200	400	2000	80.00	160.0
QM2-71B-R11D13-SK03K03-N		B	71	230	400	2200	76.25	152.5
QM2-61B-R11D13-SK03K03-N		B	61	250	400	2400	73.00	146.0
QM2-51B-R11D13-SK03K03-N		B	51	270	400	2600	69.50	139.0
QM2-43B-R11D13-SK03K03-N		B	43	280	400	2800	66.75	133.5
QM2-34B-R11D13-SK03K03-N		B	34	290	500	3000	63.50	127.0
QM2-27B-R11D13-SK03K03-N		B	27	290	500	3200	61.25	122.5
QM2-22.5B-R11D13-SK03K03-N		B	22.5	290	500	3200	59.50	119.0



Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	dimension B [mm]
QM2-82B-R11C11-SK03K03-N		B	82	200	400	2000	80.00	160.0
QM2-71B- R11C11-SK03K03-N		B	71	230	400	2200	76.25	152.5
QM2-61B- R11C11-SK03K03-N		B	61	250	400	2400	73.00	146.0
QM2-51B- R11C11-SK03K03-N		B	51	270	400	2600	69.50	139.0
QM2-43B- R11C11-SK03K03-N		B	43	280	400	2800	66.75	133.5
QM2-34B- R11C11-SK03K03-N		B	34	290	500	3000	63.50	127.0
QM2-27B- R11C11-SK03K03-N		B	27	290	500	3200	61.25	122.5
QM2-17B- R11C11-SK03K03-N		B	17	290	500	3200	57.75	115.5



Order key	purch. code	direct. of rot.	displacement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]
QM2-82R-I01D18-SG05G06-N		R	82	200	400	2000	133.00	213.0	G 1	18	45	G 1-1/4	18	57
QM2-82L-I01D18-SG05G06-N		L												
QM2-71R-I01D18-SG05G06-N		R	71	230	400	2200	129.25	205.5	G 1	18	45	G 1-1/4	18	57
QM2-71L-I01D18-SG05G06-N		L												
QM2-61R-I01D18-SG05G06-N		R	61	250	400	2400	126.00	199.0	G 1	18	45	G 1-1/4	18	57
QM2-61L-I01D18-SG05G06-N		L												
QM2-51R-I01D18-SG04G05-N		R	51	270	400	2600	122.50	192.0	G 3/4	16	39	G 1	18	45
QM2-51L-I01D18-SG04G05-N		L												
QM2-43R-I01D18-SG04G05-N		R	43	280	400	2800	119.75	1186.5	G 3/4	16	39	G 1	18	45
QM2-43L-I01D18-SG04G05-N		L												
QM2-34R-I01D18-SG04G04-N		R	34	290	500	3000	116.50	180.0	G 3/4	16	39	G 1/2	14	33
QM2-34L-I01D18-SG04G04-N		L												
QM2-27R-I01D18-SG04G04-N		R	27	290	500	3200	114.25	175.5	G 3/4	16	39	G 1/2	14	33
QM2-27L-I01D18-SG04G04-N		L												
QM2-22.5R-I01D18-SG04G04-N		R	22.5	290	500	3200	112.50	172.0	G 3/4	16	39	G 1/2	14	33
QM2-22.5L-I01D18-SG04G04-N		L												
QM2-17R-I01D18-SG03G03-N		R	17	290	500	3200	110.75	168.5	G 1/2	14	33	G 1/2	14	33
QM2-17L-I01D18-SG03G03-N		L												
QM2-10R-I01D18-SG03G03-N		R	10	270	600	3200	108.25	163.5	G 1/2	14	33	G 1/2	14	33
QM2-10L-I01D18-SG03G03-N		L												



Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]
QM2-82R-S03D13-SU07U08-N		R	82	200	400	2000	80.00	160.0	1-5/16-12 UN	Ø 49	1-5/8-12 UN	Ø 58
QM2-82L-S03D13-SU07U08-N		L										
QM2-71R-S03D13-SU07U08-N		R	71	230	400	2200	76.25	152.5	1-5/16-12 UN	Ø 49	1-5/8-12 UN	Ø 58
QM2-71L-S03D13-SU07U08-N		L										
QM2-61R-S03D13-SU07U08-N		R	61	250	400	2400	73.00	146.0	1-5/16-12 UN	Ø 49	1-5/8-12 UN	Ø 58
QM2-61L-S03D13-SU07U08-N		L										
QM2-51R-S03D13-SU07U08-N		R	51	270	400	2600	69.50	139.0	1-5/16-12 UN	Ø 49	1-5/8-12 UN	Ø 58
QM2-51L-S03D13-SU07U08-N		L										
QM2-43R-S03D13-SU07U08-N		R	43	280	400	2800	66.75	133.5	1-5/16-12 UN	Ø 49	1-5/8-12 UN	Ø 58
QM2-43L-S03D13-SU07U08-N		L										
QM2-34R-S03D13-SU07U07-N		R	34	290	500	3000	63.50	127.0	1-5/16-12 UN	Ø 49	1-5/16-12 UN	Ø 49
QM2-34L-S03D13-SU07U07-N		L										
QM2-27R-S03D13-SU05U07-N		R	27	290	500	3200	61.25	122.5	1-1/16-12 UN	Ø 41	1-5/16-12 UN	Ø 49
QM2-27L-S03D13-SU05U07-N		L										
QM2-22.5R-S03D13-SU05U07-N		R	22.5	290	500	3200	59.50	119.0	1-1/16-12 UN	Ø 41	1-5/16-12 UN	Ø 49
QM2-22.5L-S03D13-SU05U07-N		L										
QM2-17R-S03D13-SU04U05-N		R	17	290	500	3200	57.75	115.5	7/8-14 UNF	Ø 34	1-1/16-12 UN	Ø 41
QM2-17L-S03D13-SU04U05-N		L										
QM2-13.5R-S03D13-SU04U05-N		R	13.5	290	600	3200	56.50	113.0	7/8-14 UNF	Ø 34	1-1/16-12 UN	Ø 41
QM2-13.5L-S03D13-SU04U05-N		L										
QM2-10R-S03D13-SU04U05-N		R	10	270	600	3200	55.25	110.5	7/8-14 UNF	Ø 34	1-1/16-12 UN	Ø 41
QM2-10L-S03D13-SU04U05-N		L										

jihostroj
AERO TECHNOLOGY & HYDRAULICS

JIHOSTROJ a.s.
Budějovická 148
CZ 382 32 Velešín
Czech Republic
tel.: +420 380 340 511
fax: +420 380 340 612
e-mail: mailbox@jihostroj.cz
http: //**www.jihostroj.com**
GPS 48°49'51.748" N 14°27'40.770" E