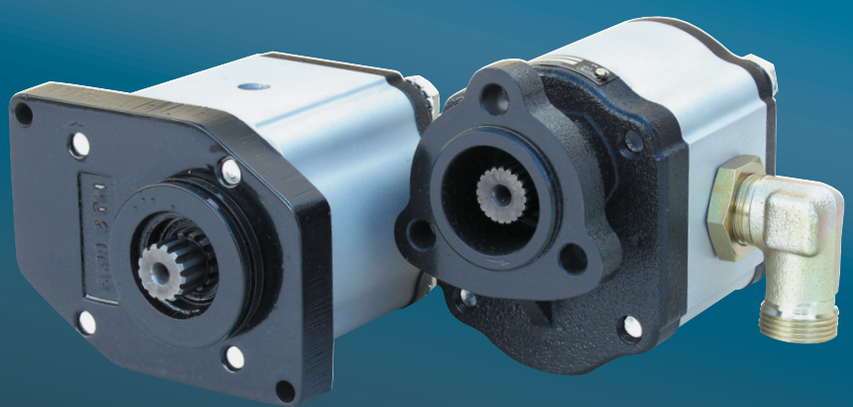
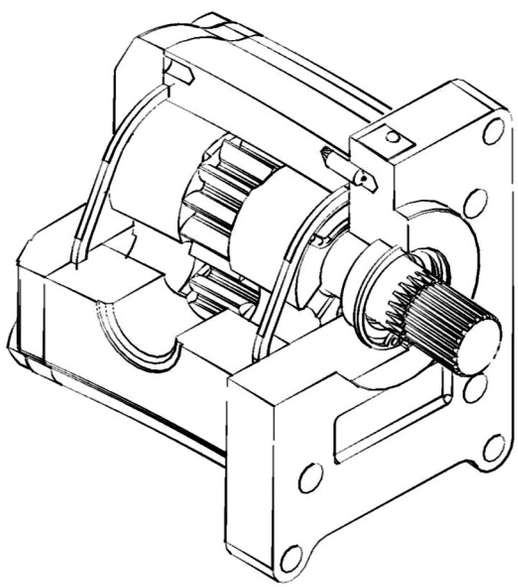
jihostroj
AERO TECHNOLOGY & HYDRAULICS



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

GEAR MOTORS
UMD

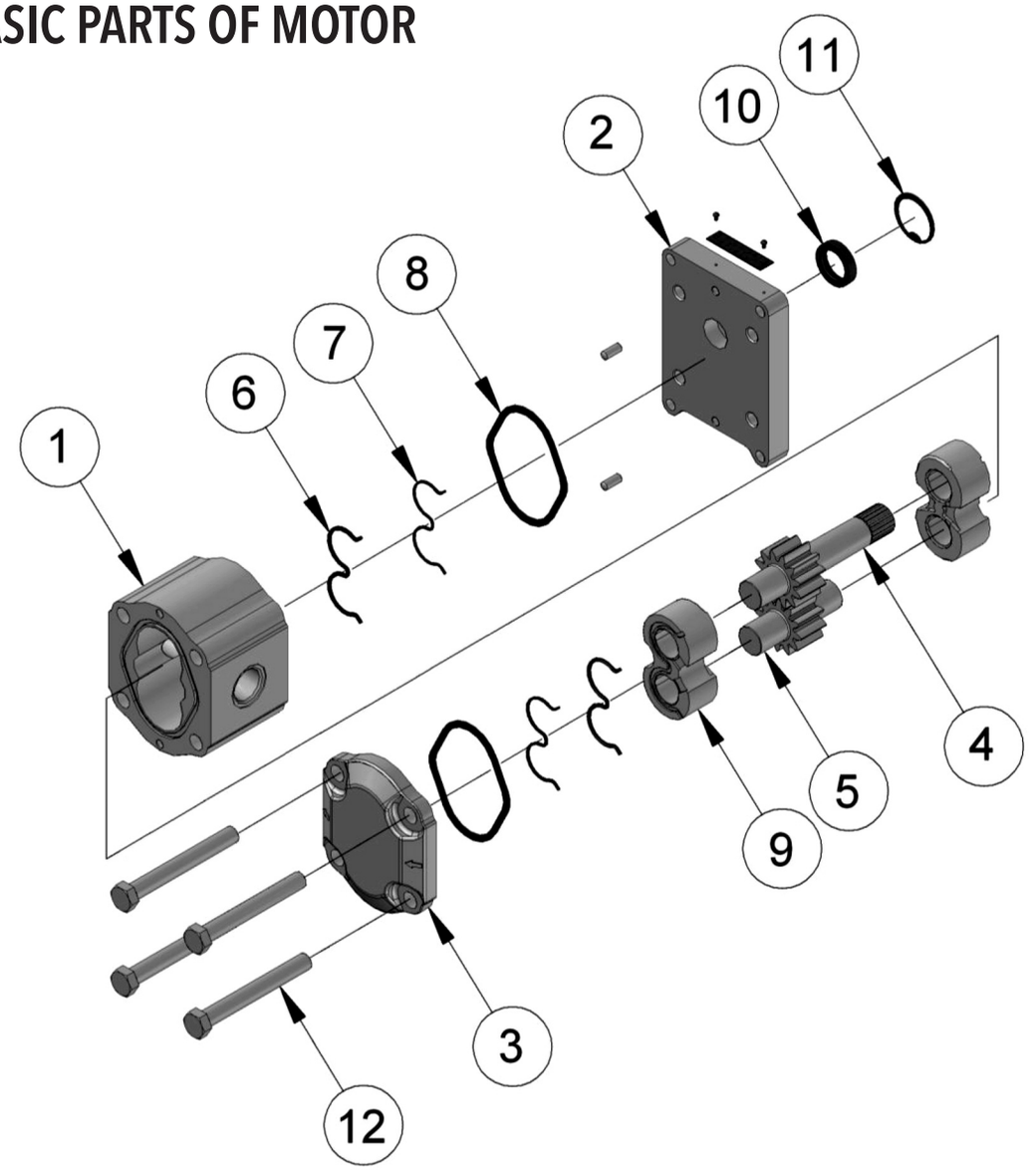
TABLE OF CONTENTS



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)

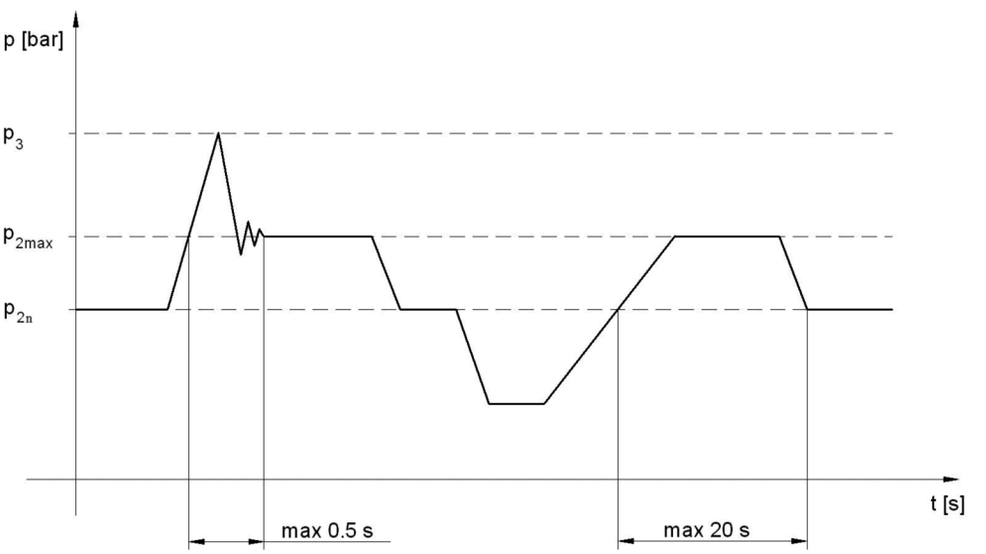
Liquid contamination class according to ISO 4406

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

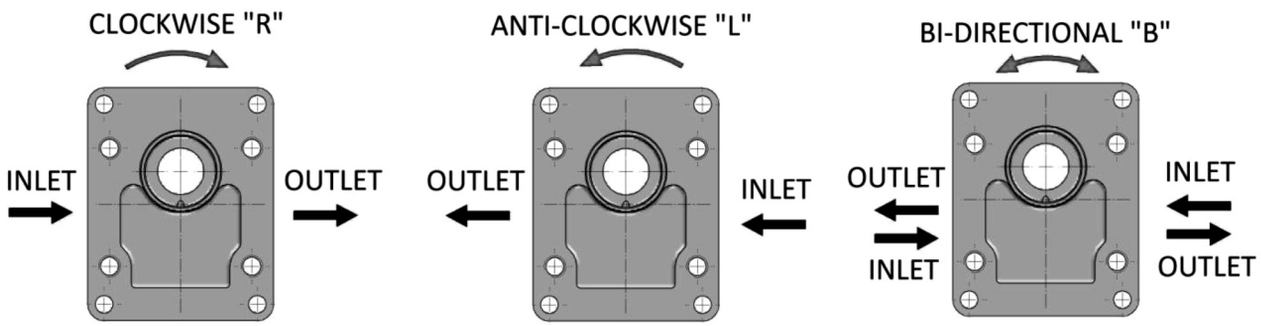
- Driven equipment must not infer axial or radial load motor shaft, if this is not expressly permitted at motor with the front-end bearing.
- All requirement affecting technical parameters and characteristics of the motor are given in the relevant operating instructions, technical specifications and 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.

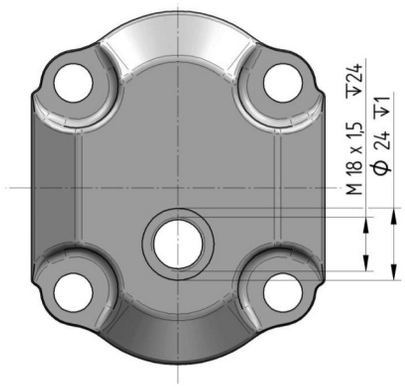
DIRECTION OF ROTATION

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

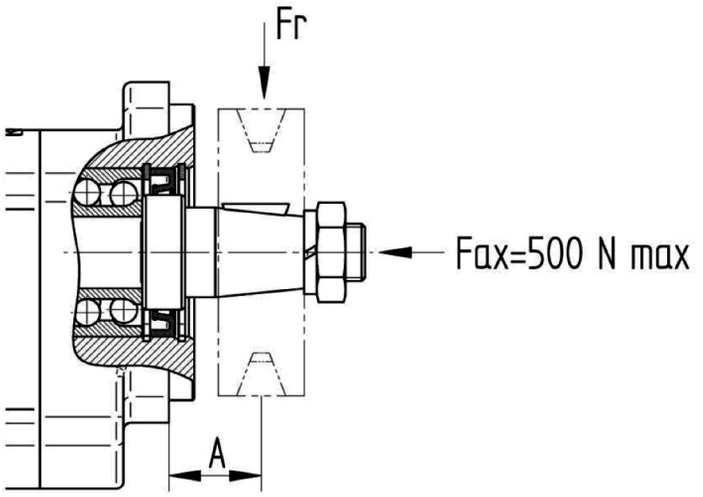


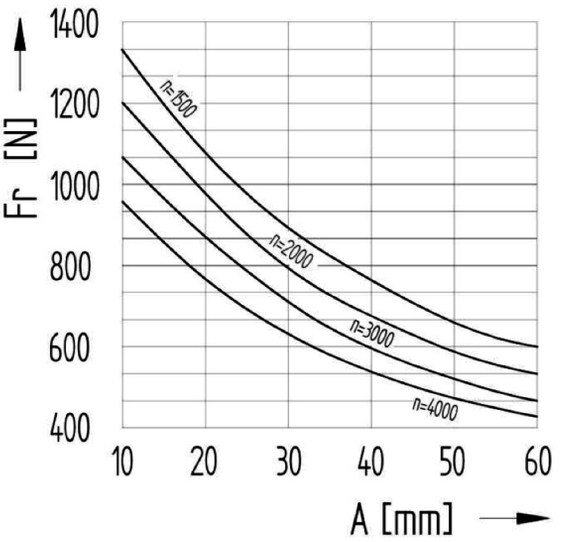
REVERSIBLE DESIGN

- 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.



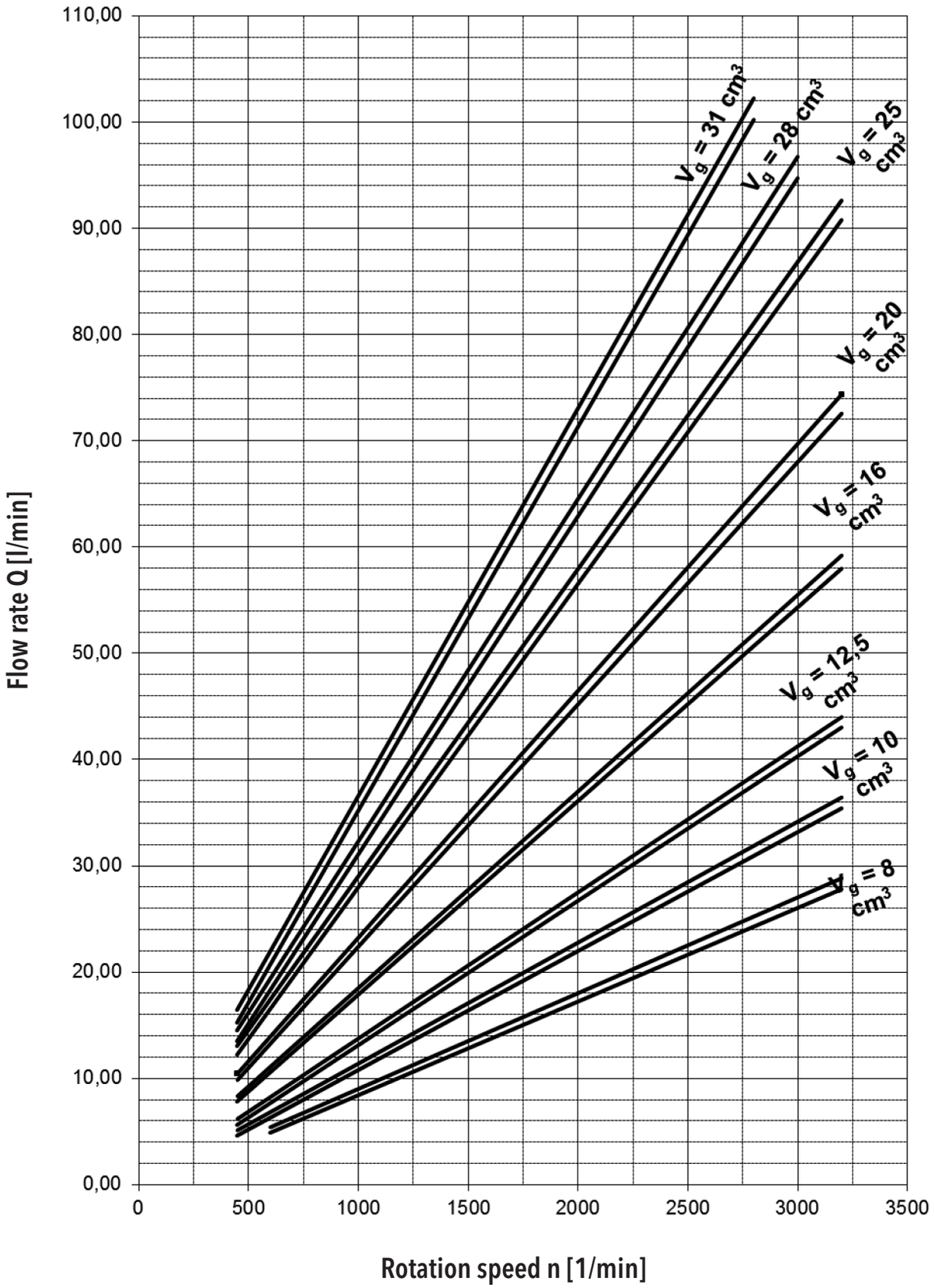
MOTOR WITH FRONT-END BEARING





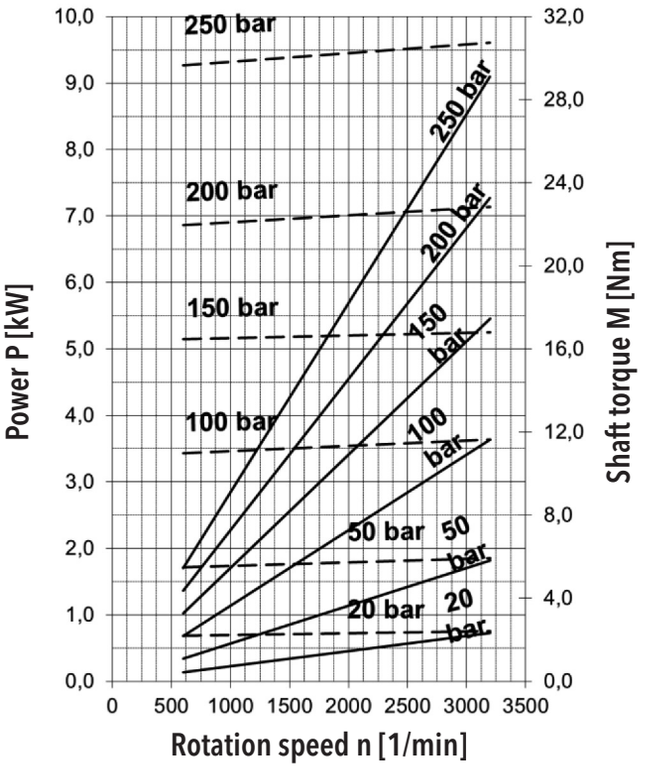
Without front-end bearing must not transfer the driven unit, after connecting to the hydraulic motor, axial or radial load to the drive shaft.

UMD FLOW RATE AND POWER CURVES

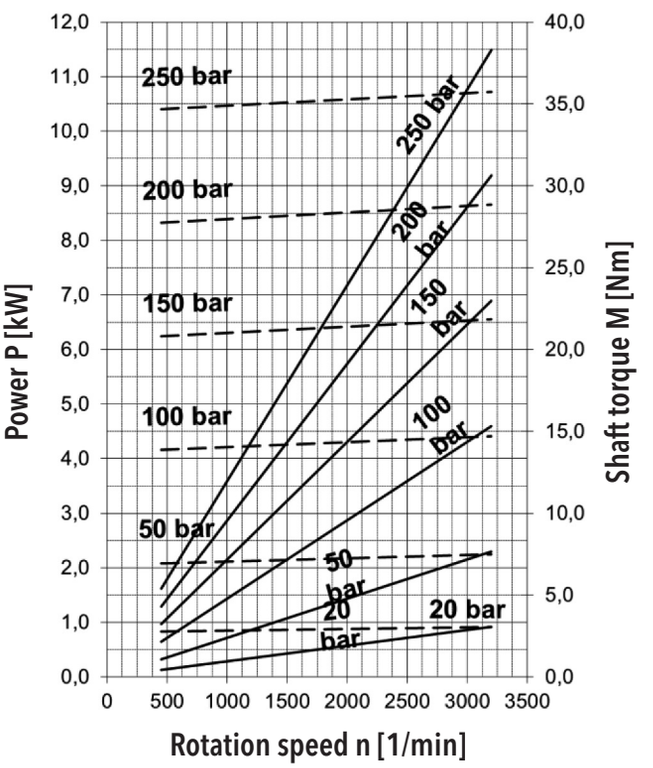


The above characteristics apply to oil ISO V_g 46 at t = 45 °C.

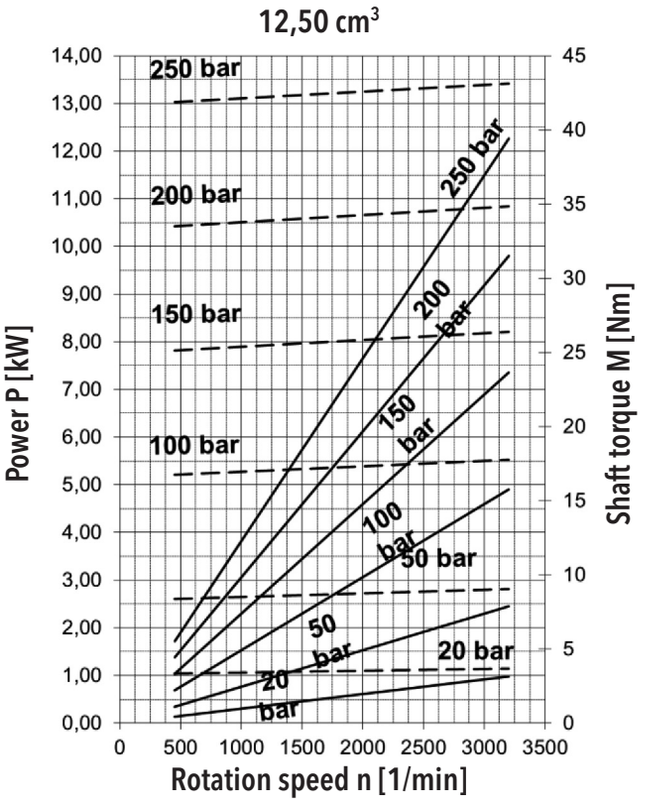
8,00 cm³



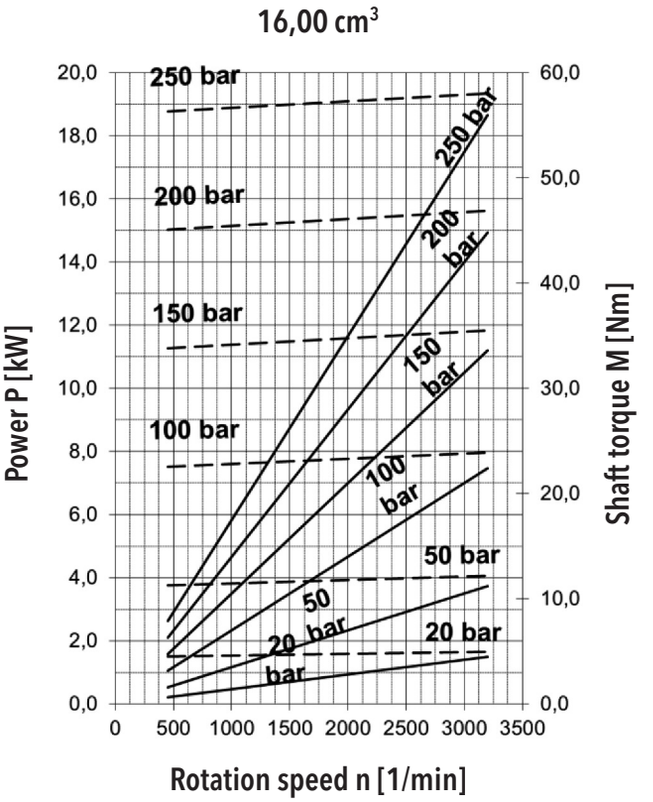
10,00 cm³



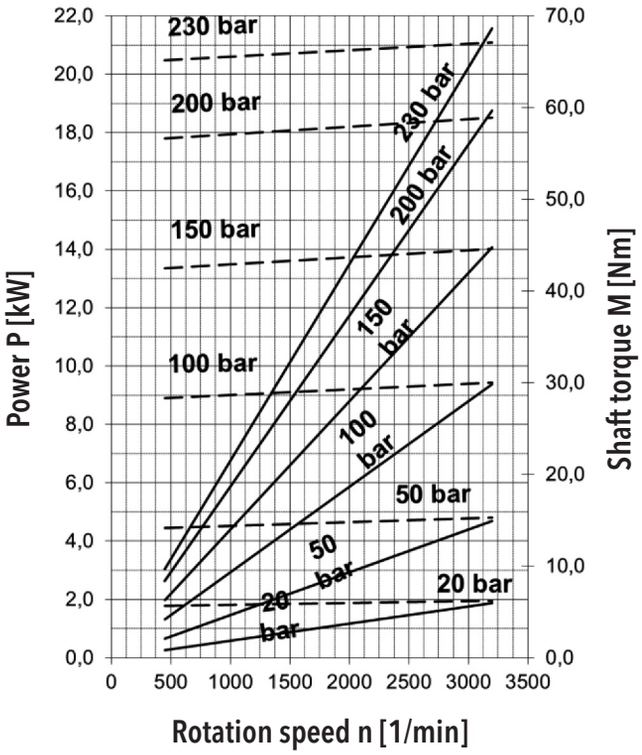
12,50 cm³



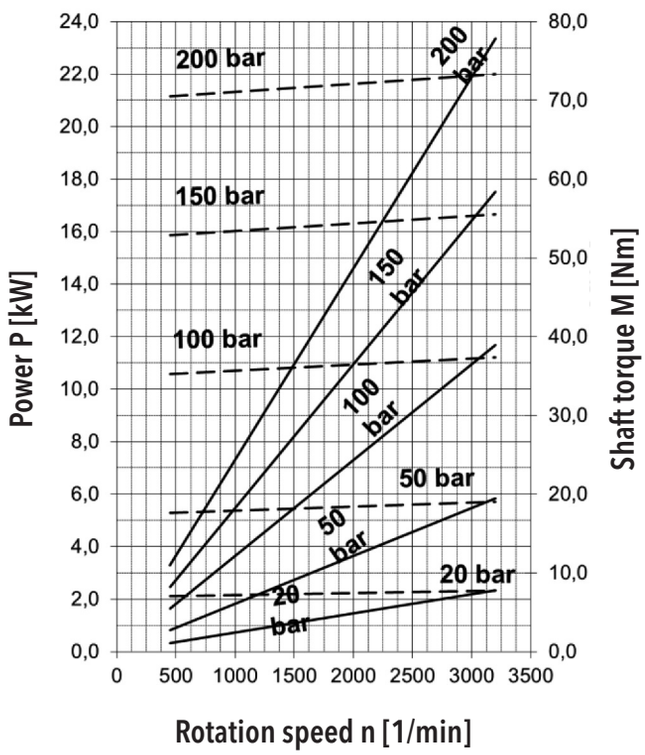
16,00 cm³



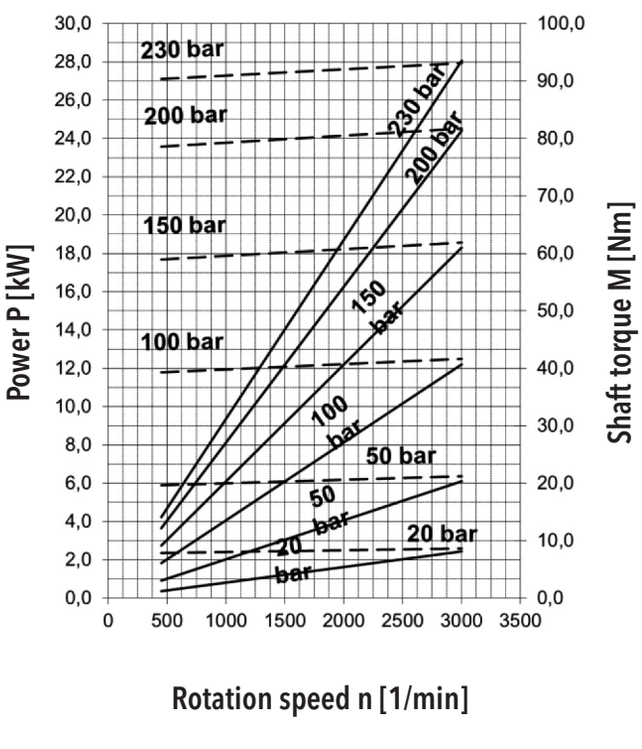
20,00 cm³



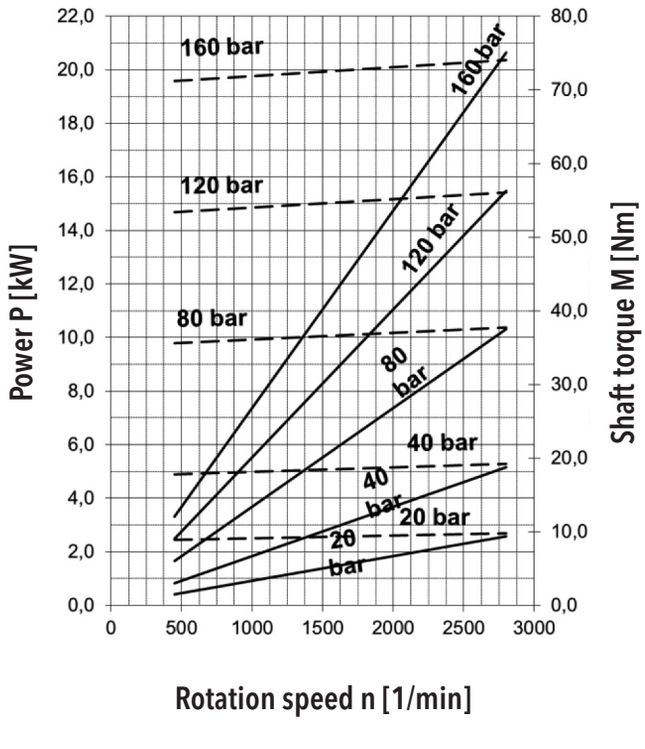
25,00 cm³



28,00 cm³



31,00 cm³



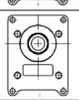
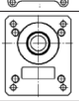
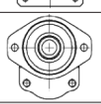
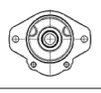
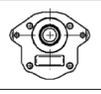
ORDER KEY

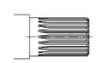
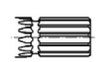
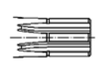
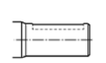
UMD - 16 R - R08 D12 - S M09 M07 - V . 000

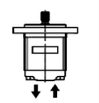
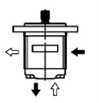
Code	Type
UD	UD Series Gear Motor
UDK	UD Series Gear Motor, shortened version
UDD	UD Series Gear Motor, reinforced version

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

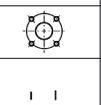
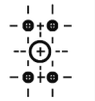
Code	Flange design	
R08		Rectangular flange, centre ring ∅62, spacing 86x120, with O-ring
R09		Rectangular flange, centre ring ∅62, spacing 86x120
R10		Rectangular flange, centre ring ∅63, spacing 76x96
S02		SAE A, centre ring ∅82,55, 2 aperture, spacing 106,4
S03		SAE B, centre ring ∅101,6, 2 aperture,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

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

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

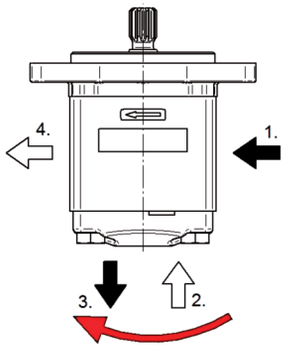
Code	Special arrangements
–	Without special arrangemenst

Code	Sealing material
V	FPN (VITON)
N	NBR

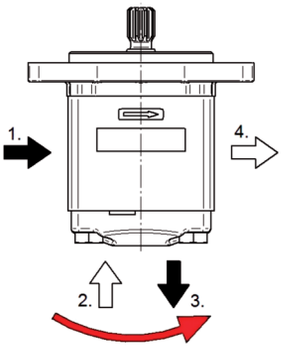
Code	Liquid inlet and outlet connection shape	
M03		Thread M 14x1,5
M05		Thread M 18x1,5
M06		Thread M 20x1,5
M07		Thread M 22x1,5
M09		Thread M 27x2
M12		Thread M 33x2
G03		Thread BSP G1/2
G04		Thread BSP G3/4
G05		Thread BSP G1
G06		Thread BSP G1 1/4
H05		Flange fiting 4xM6/∅35; ∅15
H06		Flange fiting 4xM6/∅40; ∅20
H08		Flange fiting 4xM6/∅30; ∅13,5
H11		Flange fiting 4xM10/∅51; ∅26
K03		Flange fiting 4xM8/∅40; ∅18
E02		Flange fiting 3/4
E03		Flange fiting 1
E04		Flange fiting 1 1/4
Z		Special desing

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:



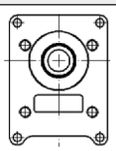
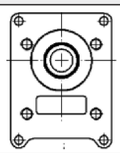
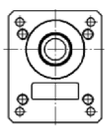
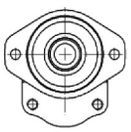
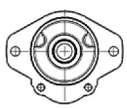
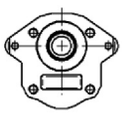
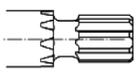
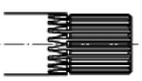
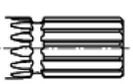
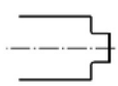
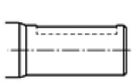
For clockwise and reverse gear motor,
in direction clockwise



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

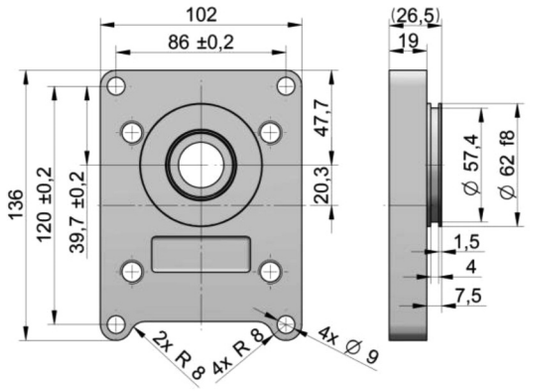
For. ex...: UMD-16R-S02D04-C<u>G03</u> <u>G03</u> <u>G04</u> <u>G04</u> -N
1. 2. 3. 4.

COMBINATIONS OF FLANGES AND SHAFTS

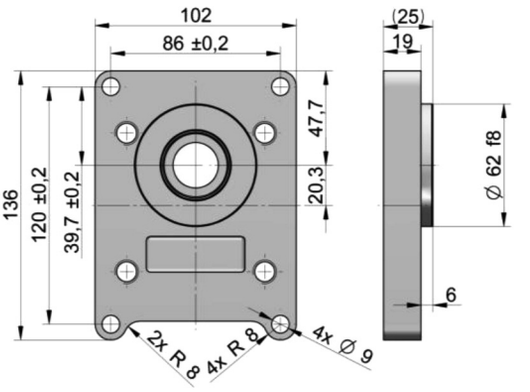
			FLANGE DESIGN					
			R08	R09	R10	S02	S03	K01
								
DRIVE SHAFT	D04					●		
	D12		●	●				
	D13						●	●
	D24				●			
	K08		●	●				
	V13		●	●				

FLANGES DESIGN

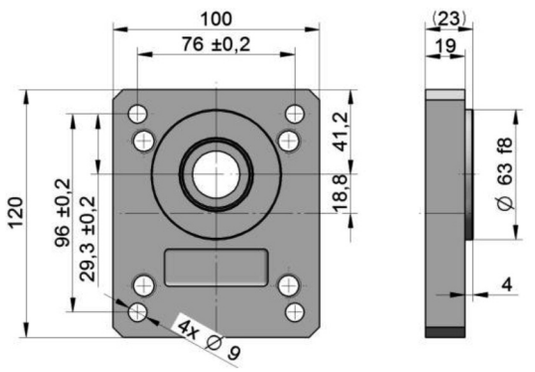
R08:



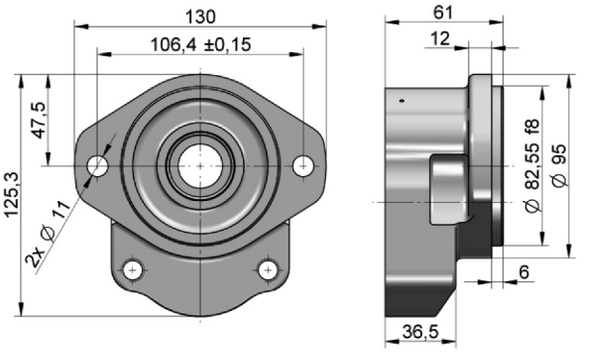
R09:



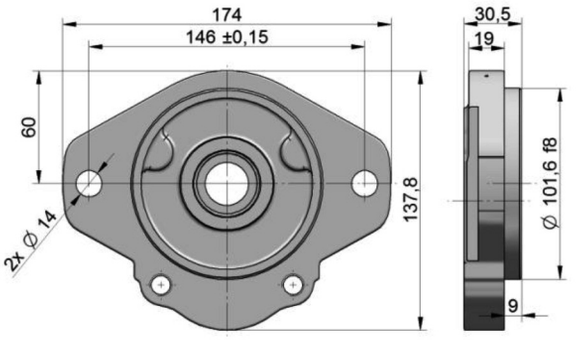
R10:



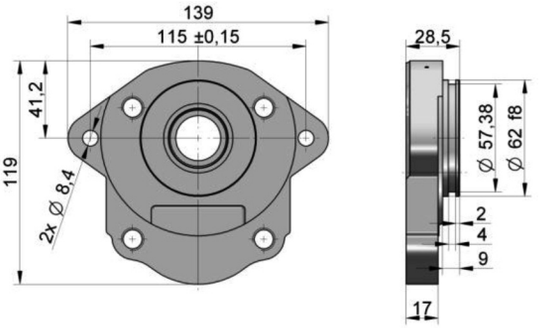
S02:



S03:

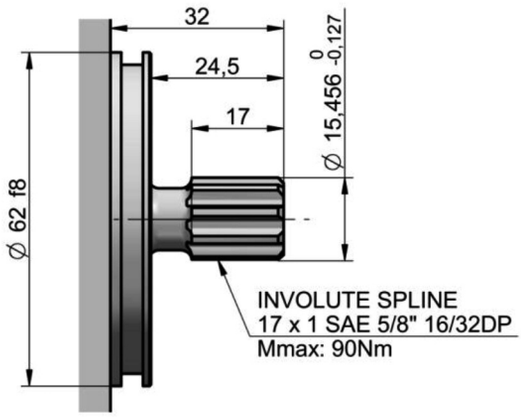


K01:

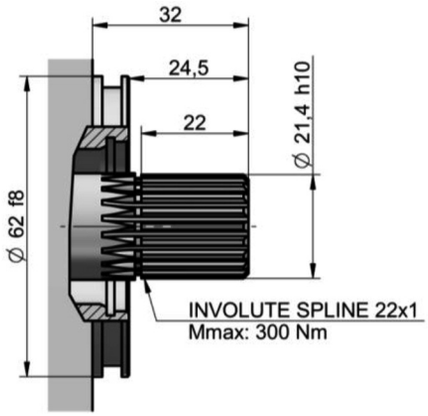


DRIVE SHAFTS

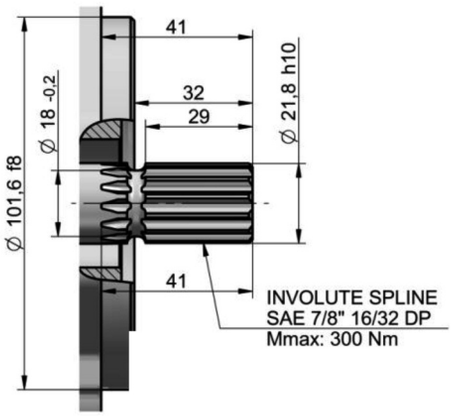
D04:



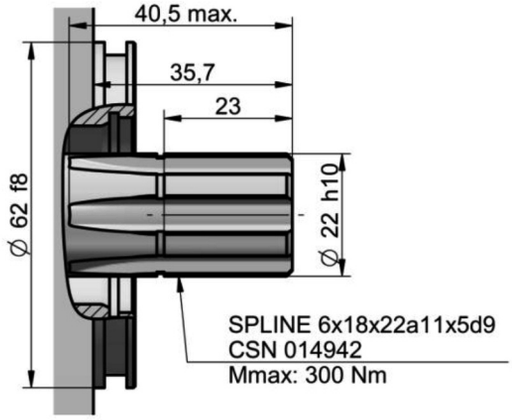
D12:



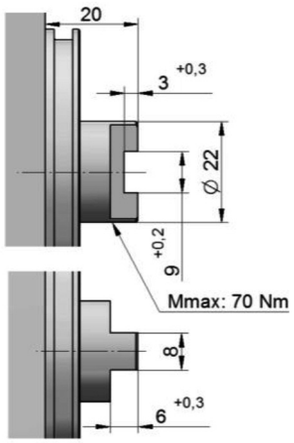
D13:



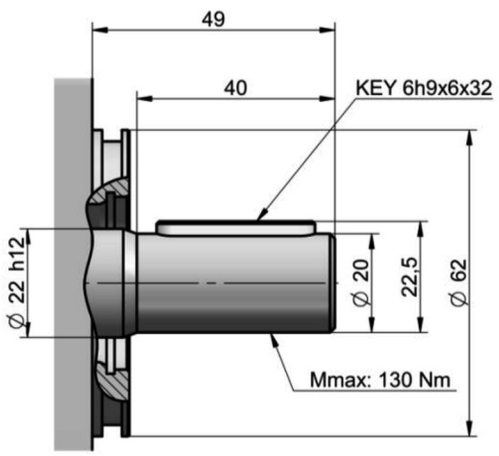
D24:



K08:

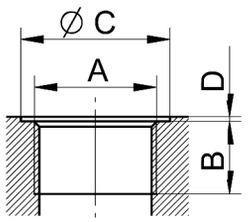


V13:



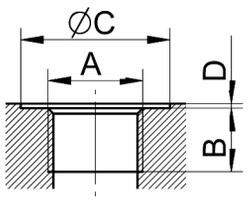
LIQUID INLET AND OUTLET CONNECTION

Metric thread according to ISO 6149



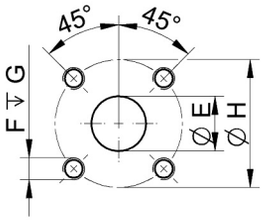
Code	A	B	C	D
M03	M 14 x 1.5	13	22	1
M05	M 18 x 1.5	14	24	1
M06	M 20 x 1.5	14	26	1
M07	M 22 x 1.5	14	28	1
M09	M 27 x 2.0	16	33	1
M12	M 33 x 2.0	18	40	1

BSPP pipe thread according to ISO 228-1



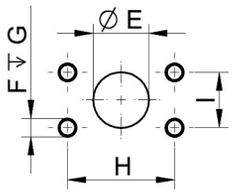
Code	A	B	C	D
G03	G 1/2"	14	33	1
G04	G 3/4"	16	39	1
G05	G 1"	18	45	1
G06	G 1 1/4"	18	57	1

Flanged fittings according to DIN 8901/8902



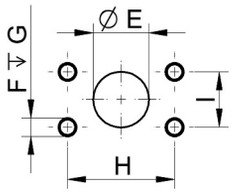
Code	E	F	G	H
H05	15.0	M6	13	35
H06	20.0	M6	13	40
H07	13.5	M6	13	30
H11	26.0	M10	16	51

Flanged fittings – „cross"



Code	E	F	G	H
K03	18	M8	16	40

Flanged fittings according to SAE, metric thread

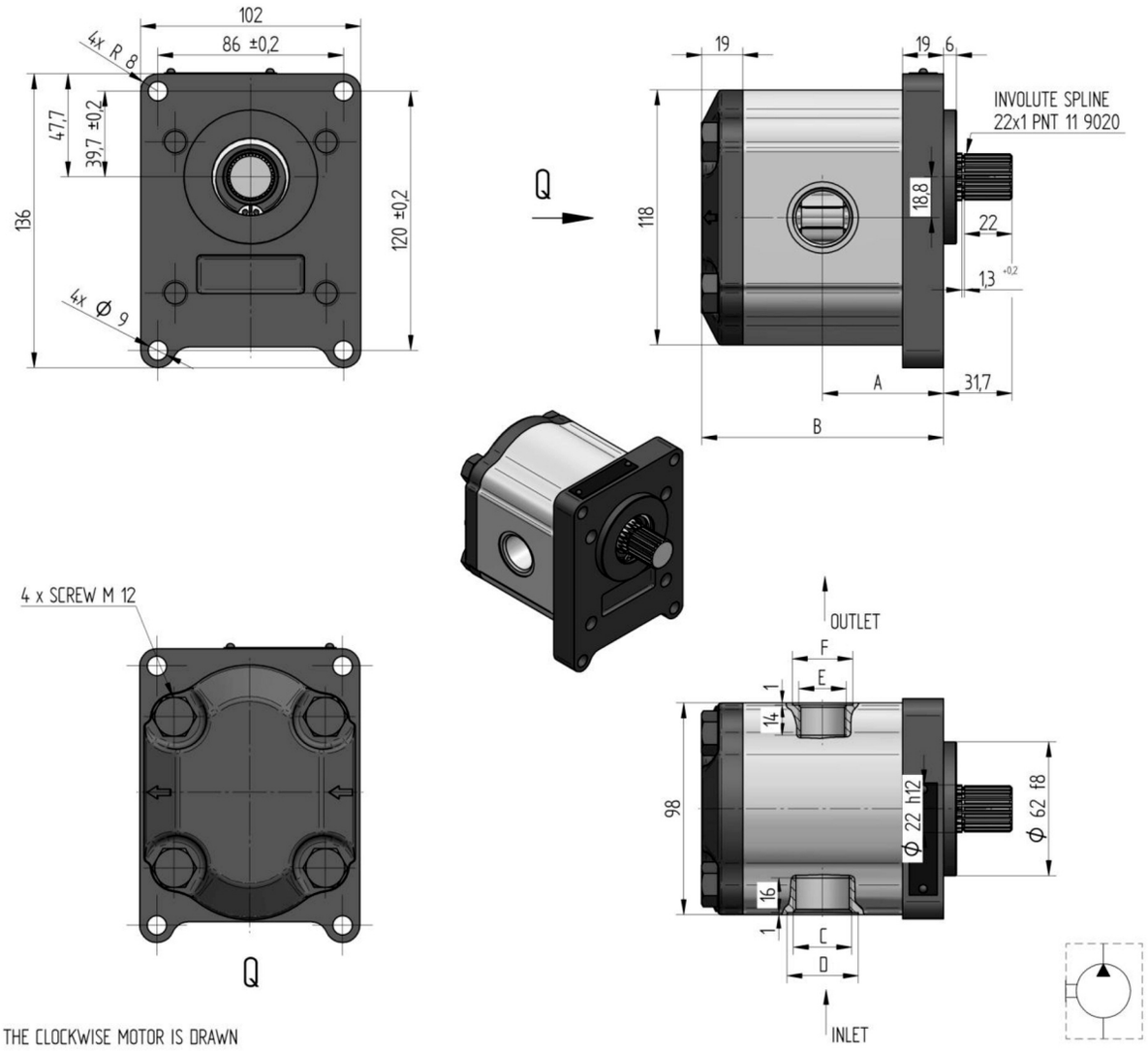


Code	E	F	G	H	I
E02	19.0	M10	18	47.6	22.2
E03	25.4	M10	18	52.4	26.2
E04	30.5	M10	18	58.7	30.2

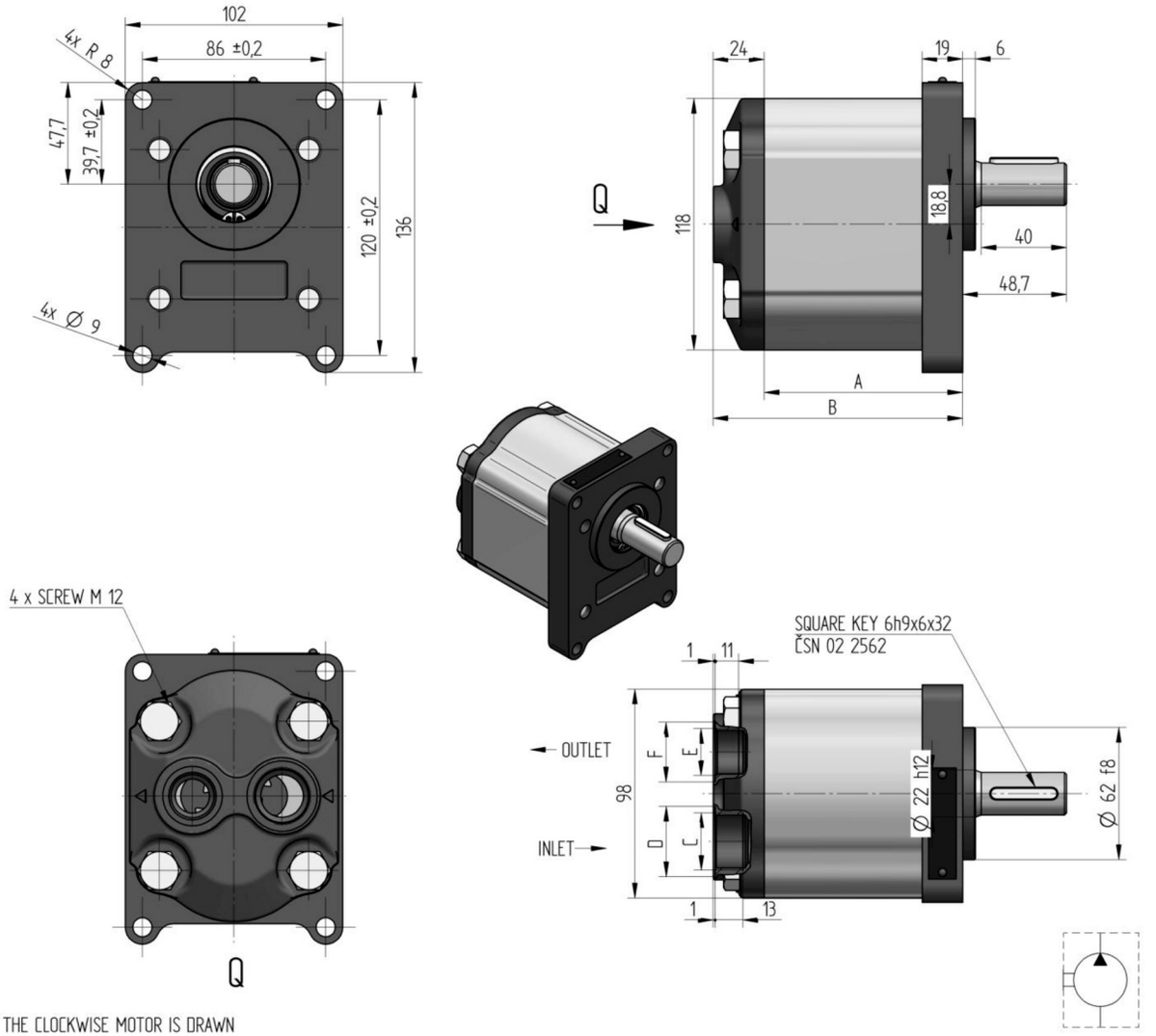
Drains

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

CATALOGUE SHETS OF UMD SERIES BASIC DESIGNS

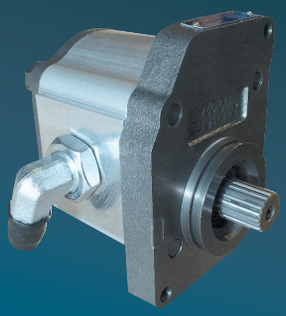


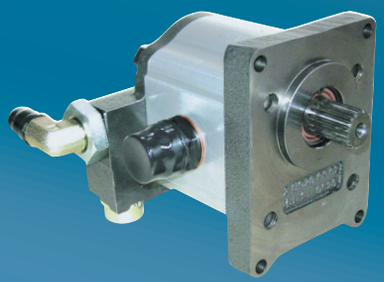
Order key	purch. code	direct. of rot.	displa-cement [cm³/1]	nom. press. [bar]	speed MIN. [min⁻¹]	speed MAX. [min⁻¹]	dimension A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]
UMD-31L-R08D12-SM09M07-N	183 9476	L	31	200	450	2800	65.50	131.0	M27x2	Ø 33	M22x1.5	Ø 28
UMD-31R-R08D12-SM09M07-N	183 9047	R										
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										



THE CLOCKWISE MOTOR IS DRAWN

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