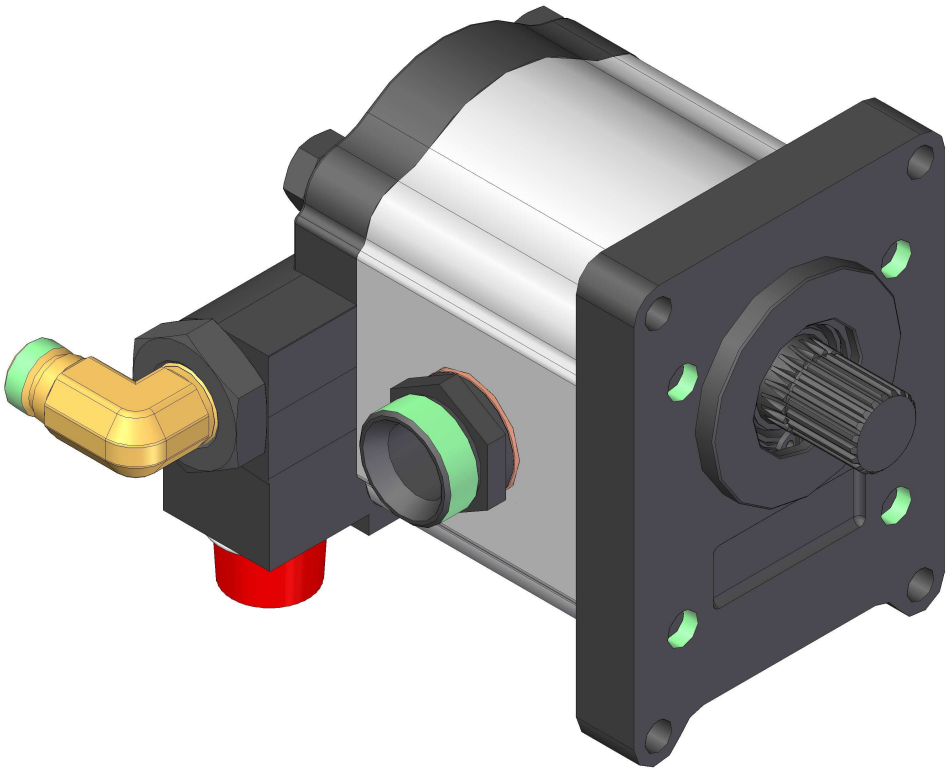
BASIC DESCRIPTION

UD line gear-hydrogenerators as well as UMD line motors are – as regards their structure and the geometric volume range – based on the well-proven line UC (UN). The flange and cover of this hydrogenerators are made of grey case iron; the body is made of an aluminum alloy shaped cross-section bar. The hydrogenerators are connected by means of four M12 through-bolts made of high-strength steel. They are equipped with a hydraulic pressure axial play compensation, which is executed by means of a shape sealing directly in the bearing faces. Compared to the previous design of UC (UN), the UD line hydrogenerators have better parameters of noise, maximum pressure and flow efficiency within the entire speed range, whereas the favorable price has been maintained. The UD line disposes of a wide size range of geometric volumes Vg = 5 to 40 cm^3/rev while achieving nominal working pressures of up to 30 MPa. The pumps have been produced in one-way as well as multiple versions.

UD gear pumps can be equipped with flow control and a safety valve.

For special purposes, a reinforced version (UDD) or a short version (UDK) pumps are available.



PARAMETER TABLE

Nominal Size Parameters		Symb.	Unit	UD-8,0	UD-10,0	UD-12,5	UD-16,0	UD-20,0	UD-25,0	UD-28,0	UD-31
Nominal displacement		V_g	[cm^3]	8	10	12,5	16	20	25	28	31
Rotation speed	nominal	n_n	[min^{-1}]	1500							
	min.	n_{min}	[min^{-1}]	600	450	450	450	450	450	450	450
	max.	n_{max}	[min^{-1}]	3200	3200	3200	3200	3200	3200	3000	2800
Pressure at the inlet port	max.	p_{1min}	[bar]	0,50							
	min.	p_{1max}	[bar]	-0,30							
Pressure at the outlet port	max. continuous pressure	p_{2n}	[bar]	250	250	250	250	230	200	200	160
	max. pressure	p_{2max}	[bar]	300	300	300	290	270	250	230	200
	peak pressure	p_3	[bar]	310	310	310	300	280	260	240	210
Nominal flow rate (min.) at n_n and p_{2n}		Q_n	[$dm^3.min^{-1}$]	10,70	13,60	16,40	22,00	28,00	35,10	39,10	44,40
Maximum flow rate at n_{max} and p_{2max}		Q_{max}	[$dm^3.min^{-1}$]	25,12	31,74	38,33	51,58	64,79	80,66	84,29	89,09
Nominal input power (max.) at n_n and p_{2n}		P_n	[kW]	5,83	7,37	8,90	11,97	13,83	14,98	16,69	15,12
Max. input power at n_{max} and p_{2max}		P_{max}	[kW]	15,42	19,49	23,54	30,64	35,93	41,53	40,07	37,06
Weight		m	[kg]	5,15	5,30	5,40	5,55	5,70	5,85	6,00	6,20

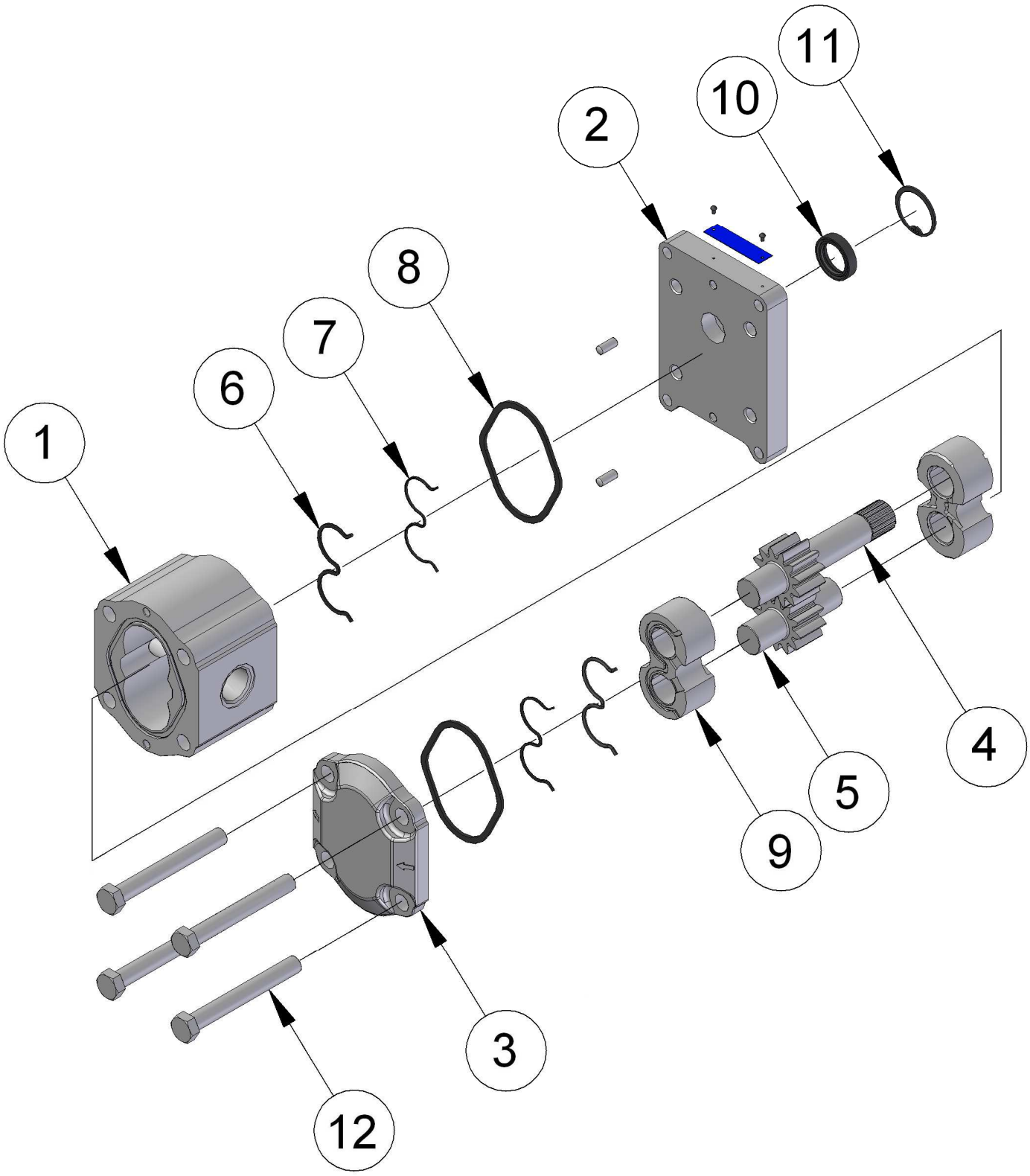
SUPPLEMENTAL TABLE

Nominal Size Parameters		Symb.	Unit	UD-5	UD-39	UDD-39					
Nominal displacement		V_g	[cm^3]	5	39	39					
Rotation speed	nominal	n_n	[min^{-1}]	1500	1200	1200					
	min.	n_{min}	[min^{-1}]	600	400	400					
	max.	n_{max}	[min^{-1}]	3200	1800	1800					
Pressure at the inlet port	max.	p_{1min}	[bar]	0,50							
	min.	p_{1max}	[bar]	-0,30							
Pressure at the outlet port	max. continuous pressure	p_{2n}	[bar]	250	120	160					
	max. pressure	p_{2max}	[bar]	300	160	170					
	peak pressure	p_3	[bar]	310	170	180					
Nominal flow rate (min.) at n_n and p_{2n}		Q_n	[$dm^3.min^{-1}$]	6,60	44,20	43,50					
Maximum flow rate at n_{max} and p_{2max}		Q_{max}	[$dm^3.min^{-1}$]	15,84	71,40	70,70					
Nominal input power (max.) at n_n and p_{2n}		P_n	[kW]	3,68	14,14	17,68					
Max. input power at n_{max} and p_{2max}		P_{max}	[kW]	9,73	24,04	24,77					
Weight		m	[kg]	5,00	6,55	7,20					

BASIC FLOW CONTROL SETTINGS

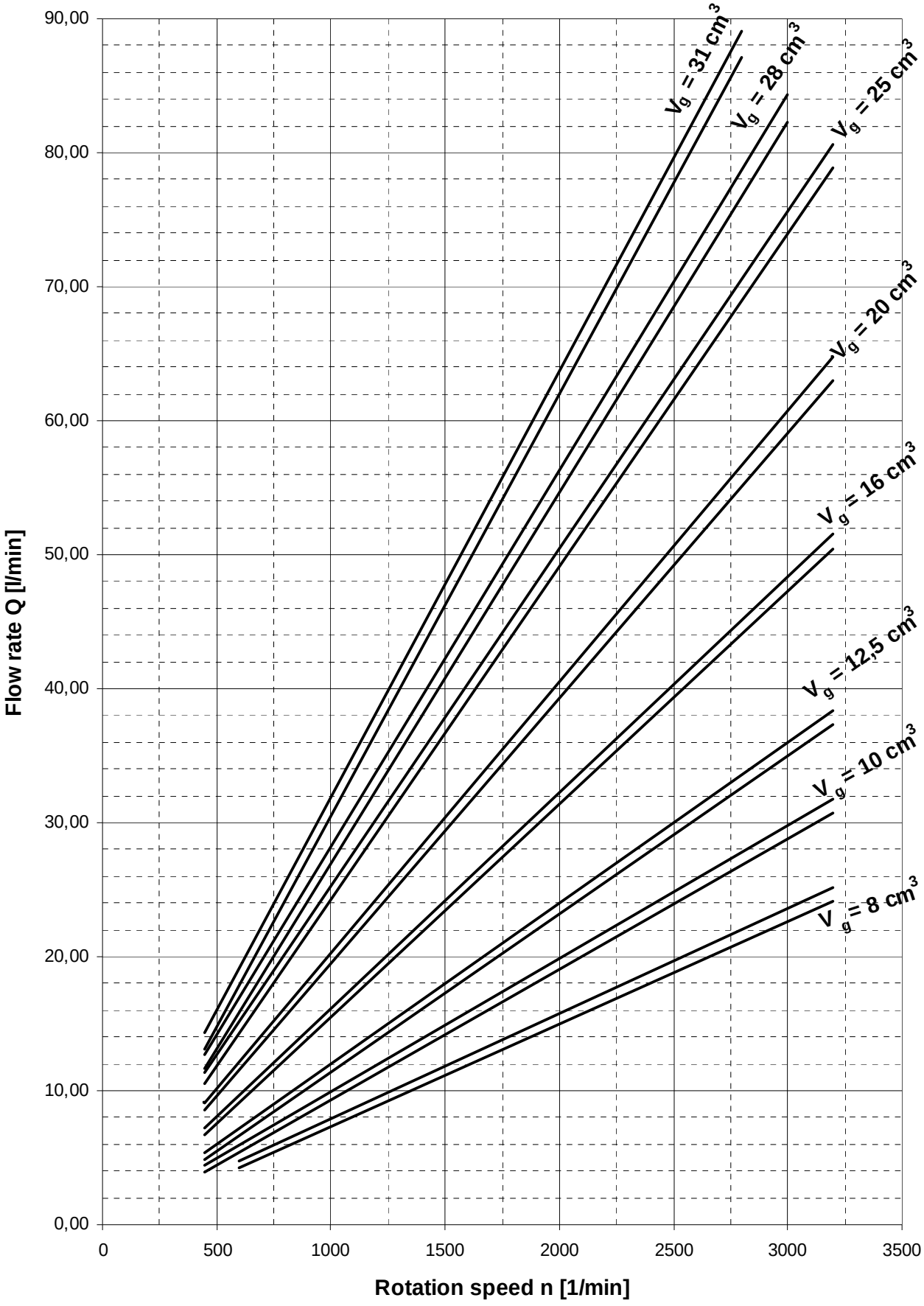
Maximum flow:
13 $dm^3.min^{-1}$
17 $dm^3.min^{-1}$
20 $dm^3.min^{-1}$
30 $dm^3.min^{-1}$

BASIC PARTS



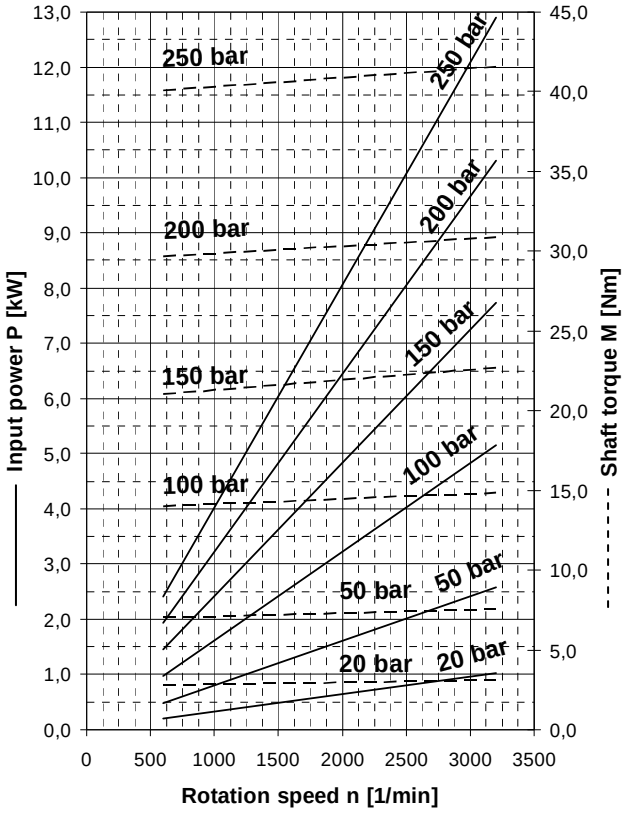
1. Body
2. Flange
3. Cover
4. Driving gear
5. Driven gear
6. Thrust pressure seal
7. Sealing protective plate
8. Peripheral sealing
9. Bearing
10. Shaft seal
11. Safety ring
12. Connection bolts

FLOW RATE AND INPUT POWER CURVES

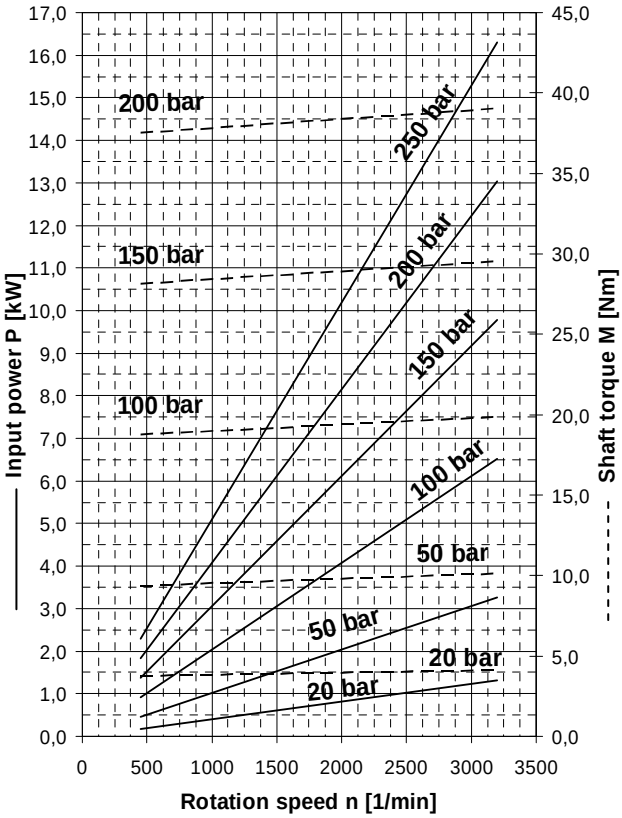


The curves above are valid for the ISO Vg 46 oil at temperature t = 45℃.

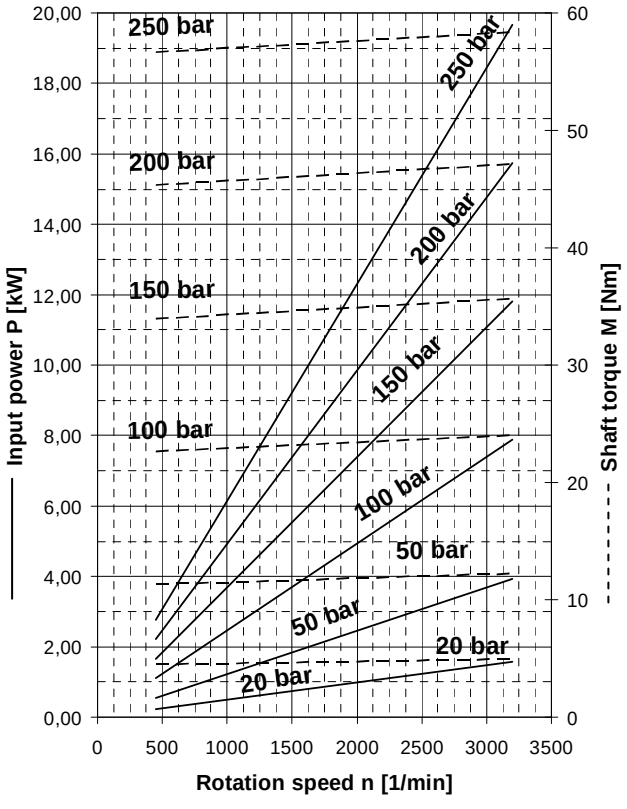
8 cm³



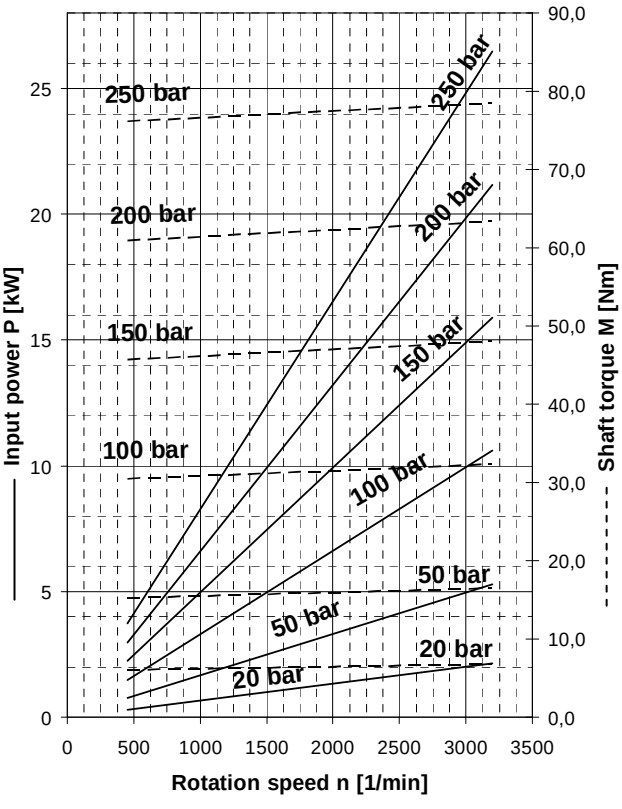
10 cm³



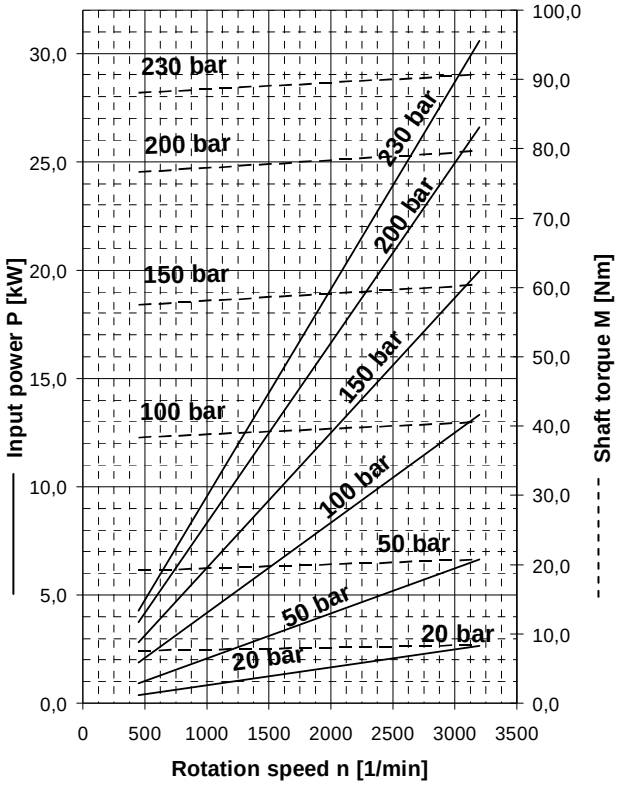
12,5 cm³



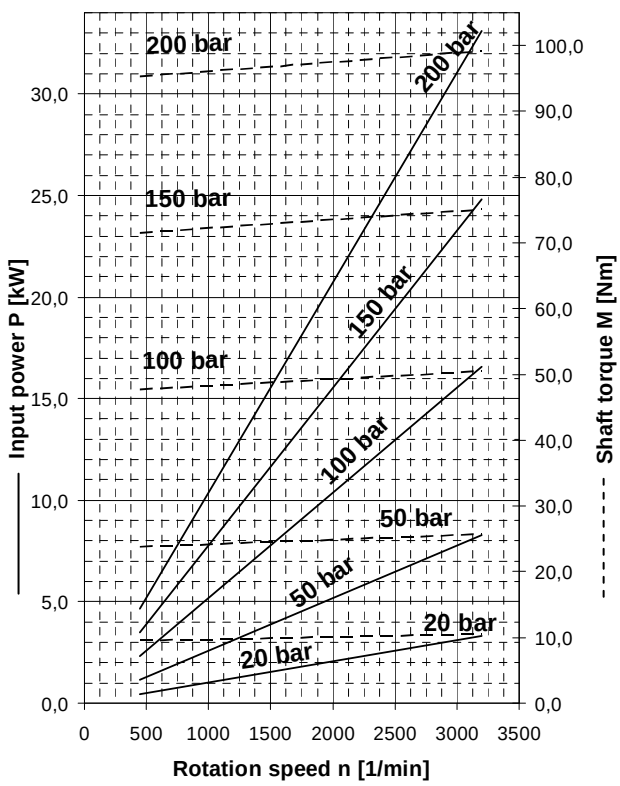
16 cm³



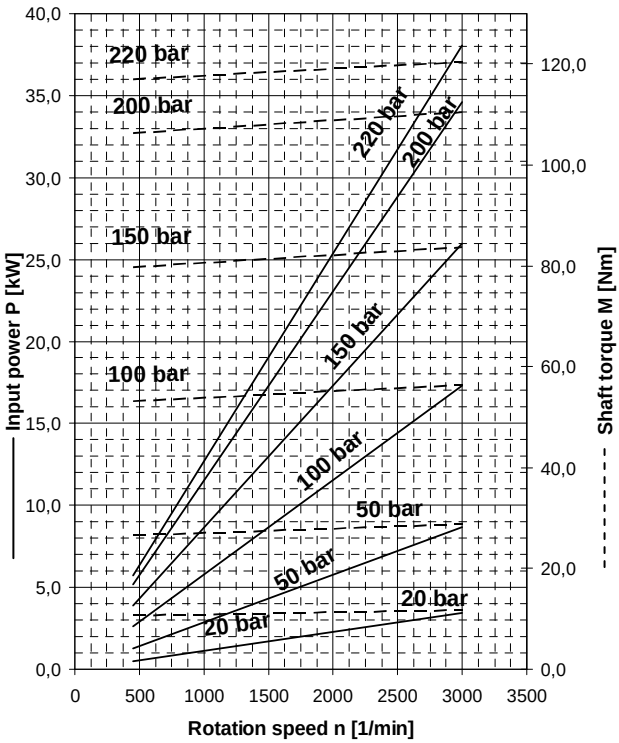
20 cm³



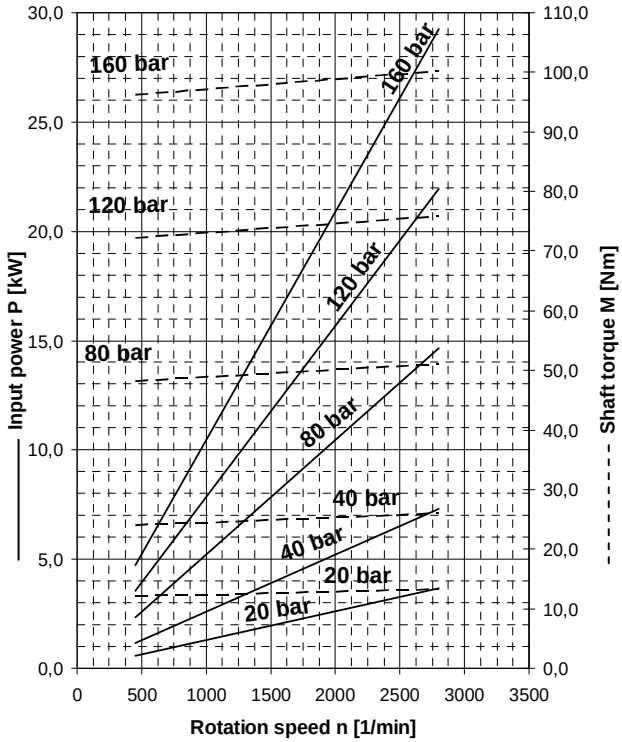
25 cm³



28 cm³



31 cm³



CALCULATION FORMULAS

Flow rate

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

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

Displacement

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

Shaft torque

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

p	[bar]	required pressure at the outlet port
η_v	[-]	mechanic efficiency

Input power

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

η_t	[-]	total efficiency

PUMP EFFICIENCY

Volumetric efficiency η_v

Volumetric efficiency determines the amount of flow losses. Its value varies: $\eta_v = 0,92 \div 0,98$ (depending on the speed and the pressure at the pressure port). Volumetric efficiency can be expressed as follows:

$$\eta_v = \frac{Q_{skut}}{Q_{teor}} \quad [-]$$

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

Mechanical efficiency η_m

Mechanical efficiency determines the hydraulic-mechanical losses. Its value varies at about $\eta_m = 0,85$.
Mechanical efficiency can be expressed as follows:

$$\eta_m = \frac{M_{teor}}{M_{skut}} \quad [-]$$

M_{skut}	[N.m]	actual shaft torque
M_{teor}	[N.m]	theoretical shaft torque

Total efficiency η_t

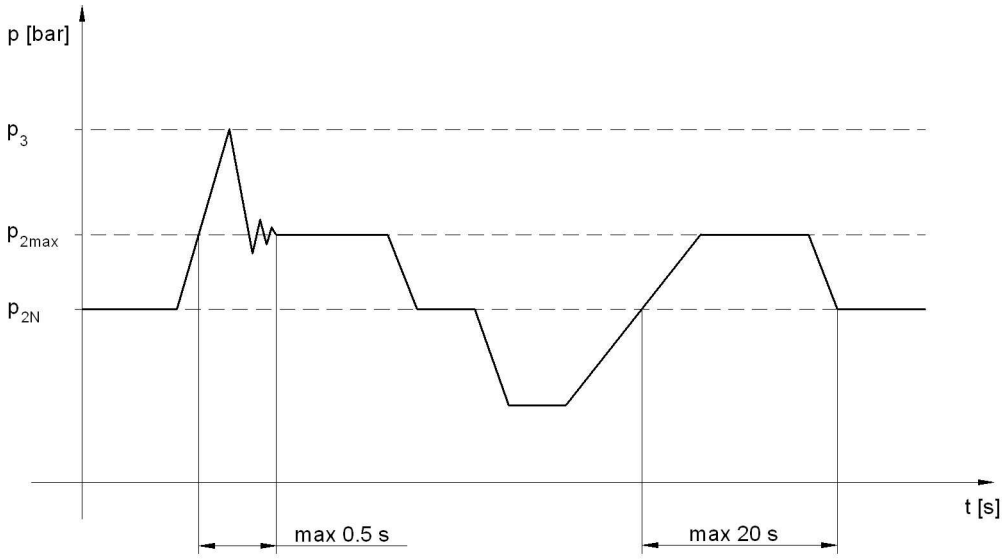
Total efficiency is defined as the arithmetic product of η_v and η_m and expresses the difference between the theoretical and the required actual input power:

$$\eta_t = \eta_V \cdot \pi_m = \frac{P_{teor}}{P_{skut}} \quad [-]$$

P_{skut}	[kW]	actual input power
P_{teor}	[kW]	theoretical input power

PRESSURE LOAD

p_{2N}	**max. continuous pressure**	maximum working pressure at which the pump can be operated without time-limitation
p_{2max}	**maximum pressure**	maximum short-term (max. 20s) allowable pressure
p_3	**peak pressure**	short-term pressure (split second) arising in case of a sudden change of the operating mode; any excess of this pressure during operation is inadmissible.



WORKING LIQUID

- Mineral oils for hydraulic drives
- Hydraulic liquids based on vegetable oils, suitable for hydrostatic drives

Liquid temperature

t = -20 ÷ +80 [℃] when used with a FKM seal (Viton) up to 1 20 [℃]

Cinematic viscosity

during continuous operation:	$\nu = 20 \div 80$ [$mm^2 . s^{-1}$]
max.:	$\nu = 1200$ [$mm^2 . s^{-1}$]
min.:	$\nu = 10$ [$mm^2 . s^{-1}$]

Filtration coefficient β_α

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

Contamination class ISO 4406

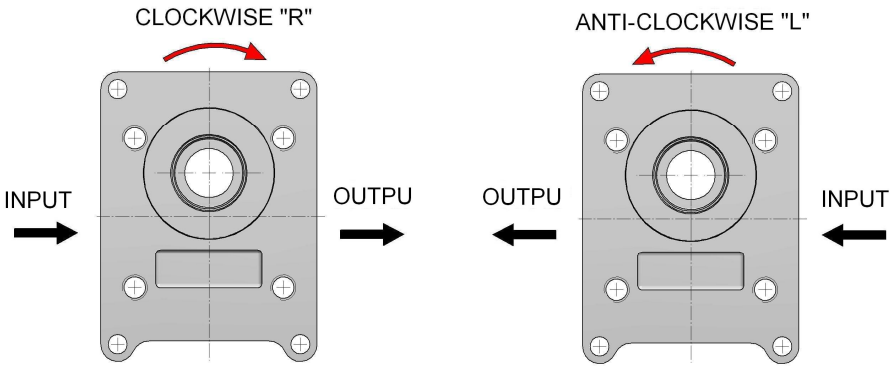
19/16 (for pressure $p_2 < 200$ bar)
17/14 (for pressure $p_2 > 200$ bar)

Contamination class NAS 1638

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

DIRECTION OF ROTATION

When determining the direction of rotation, always look at the drive shaft. The pump is allowed to be operated in the defined direction of rotation only.



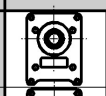
ORDER KEY – SIMPLE VERSION

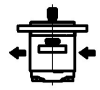
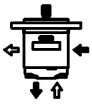
UD - 16 R - R1 D1 - S M09 M07 - V . 0000

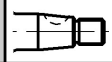
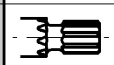
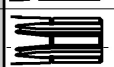
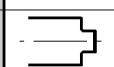
Code	Type
UD	UD Series Gear Pump
UDK	UD Series Gear Pump, short version
UDD	UD Series Gear Pump, reinforced version

Code	Displacement [cm³]
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	Rotation
R	Clockwise rotation
L	Anti-clockwise rotation

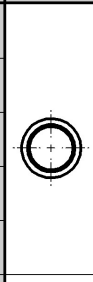
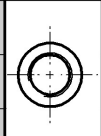
Code	Flange design
R1	 Rectangular flange, centre ring ∅62, spacing 86x120, with O-ring
R2	 Rectangular flange, centre ring ∅62, spacing 86x120
K1	 „UŠATÁ“, centre ring ∅62, 2 aperture, spacing 115, with O-ring
S1	 SAE A, centre ring ∅82,55, 2 aperture, spacing 130
S2	 SAE B, centre ring ∅101,6, 2 aperture, spacing 174
Z	Special design

Code	Location of suction and pressure port
S	 Side (in the body)
R	 Rear (in the cover)
C	 Combination

Code	Drive shaft design
C1	 Taper 1:5
D1	 Grooving 17x1
D2	 Grooving 22x1
D3	 Grooving 5/8“
D4	 Grooving 22x19
D5	 Grooving SAE 7/8“
D6	 Straight-flanked grooving 6x18x22
D7	 Straight-flanked grooving 6x23x28
K1	 Cross coupling
V1	 Cylindric
Z	Special design

Code	Special arrangements
-	No special arrangements
T000	Regulation type T
R000	Regulation type R
S000	Regulation type S
TL12	Regulation T, bleeder
2310	Adjustment for ND
HT36	Regulation T, With front end bearing, bleeder

Code	Sealing material
V	FPN (VITON)
N	NBR

Code	Design of suction and pressure port
M03	 Thread M 14x1,5
M05	Thread M 18x1,5
M06	Thread M 20x1,5
M07	Thread M 22x1,5
M09	Thread M 27x2
G03	 Thread BSP G1/2
G04	Thread BSP G3/4
G05	Thread BSP G1
Z	Special design

Example of an indication of a left-handed UD pump; geometric volume 16 cm^3; rectangular flange with center ring Ø 62 without nut for the O-ring; grooving 22x1; body inlet and outlet with metric threads; standard NBR sealing; no special arrangement: **UD-16L-R2D2-SM07M09-N.0000**

ORDER KEY – MULTIPLE VERSION

UD - 16 / 16 R - R1 D1 - S M09 M07 / M09 M07 - V . 0000

Code	Type
UD	UD Series Gear Pump
UDK	UD Series Gear Pump, short version
UDD	UD Series Gear Pump, reinforced version

Code	Displacement [cm³]
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	Rotation
R	Clockwise rotation
L	Anti-clockwise rotation

Code	Flange design
R1	Rectangular flange, centre ring ∅62, spacing 86x120, with O-ring
R2	Rectangular flange, centre ring ∅62, spacing 86x120
K1	„UŠATÁ“, centre ring ∅62, 2 aperture, spacing 115, with O-ring
S1	SAE A, centre ring ∅82,55, 2 aperture, spacing 130
S2	SAE B, centre ring ∅101,6, 2 aperture, spacing 174
Z	Special design

Code	Location of suction and pressure port
S	Side (in the body)
C	Combination

Code	Drive shaft design
C1	Taper 1:5
D1	Grooving 17x1
D2	Grooving 22x1
D3	Grooving 5/8“
D4	Grooving 22x19
D5	Grooving SAE 7/8“
D6	Straight-flanked grooving 6x18x22
D7	Straight-flanked grooving 6x23x28
K1	Cross coupling
V1	Cylindric
Z	Special design

Code	Special arrangements
-	No special arrangements
T000	Regulation type T
R000	Regulation type R
S000	Regulation type S
TL12	Regulation T, bleeder
2310	Adjustment for ND
HT36	Regulation T, With front end bearing, bleeder

Code	Sealing material
V	FPN (VITON)
N	NBR

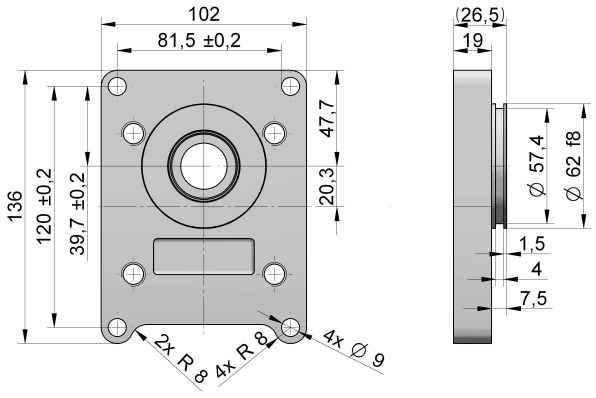
Code	Design of suction and pressure port
M03	Thread M 14x1,5
M05	Thread M 18x1,5
M06	Thread M 20x1,5
M07	Thread M 22x1,5
M09	Thread M 27x2
G03	Thread BSP G1/2
G04	Thread BSP G3/4
G05	Thread BSP G1
Z	Special design

Example of an indication of a left-handed UD pump with two sections; geometric volumes 20 and 16 cm^3, rectangular flange with center ring Ø62 without nut for the O-ring; grooving 22x1; body inlets and outlets with metric threads; standard NBR sealing; no special arrangement: **UD-20/16L-R2D2-SM09M07/M09M07-N.0000**

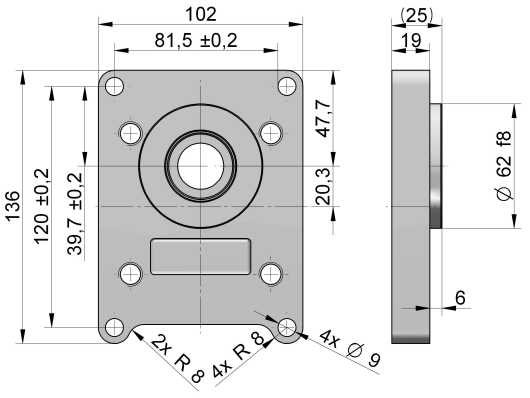
DESIGN OF FLANGES, DRIVE SHAFTS AND INLET PORTS

Flanges

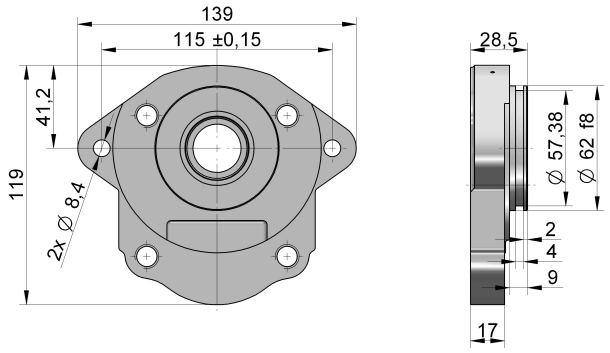
R1:



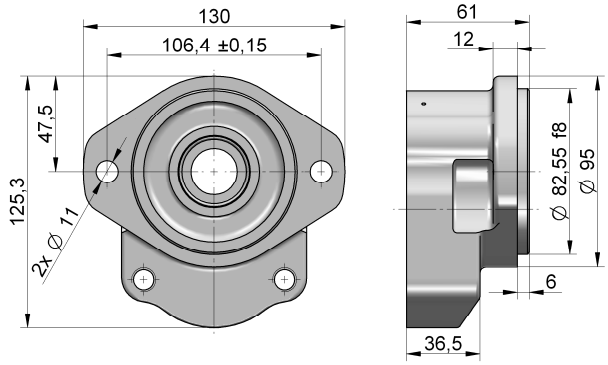
R2:



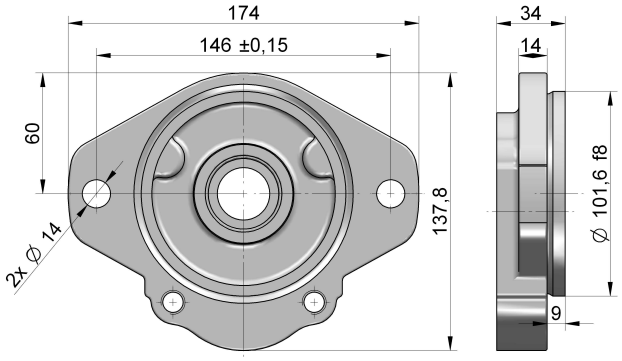
K1:



S1:

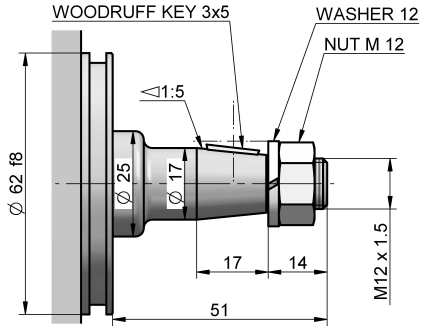


S2:

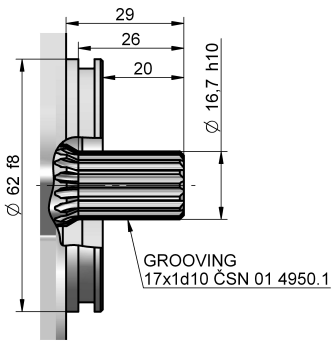


Drive shafts

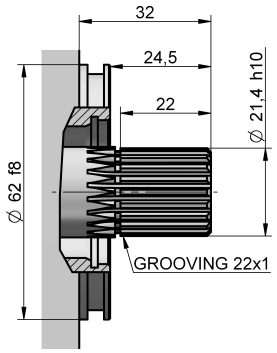
C1:



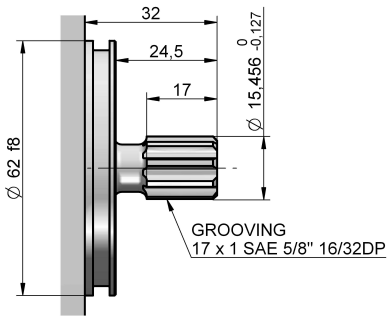
D1:



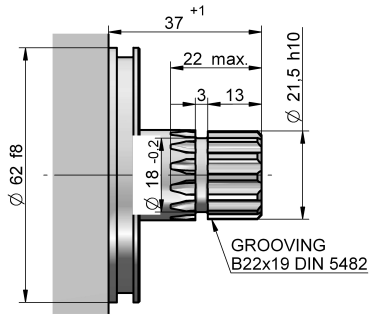
D2:



D3:



D4:



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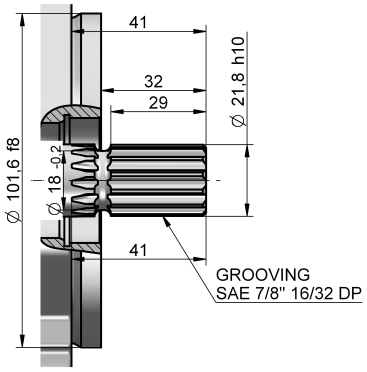

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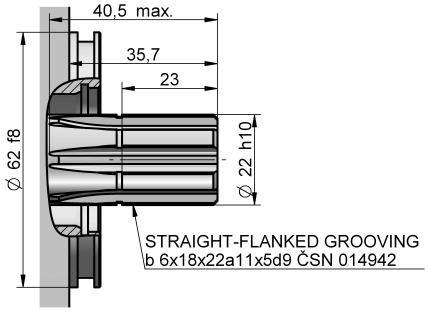
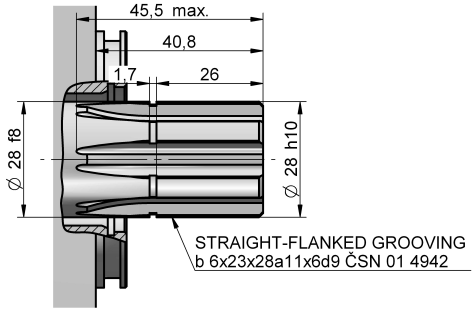
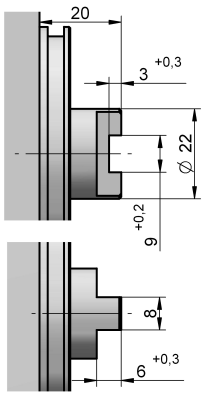


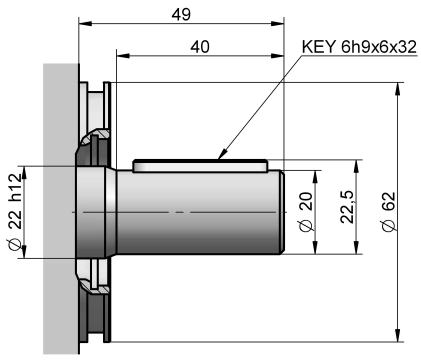
D7:



K1:

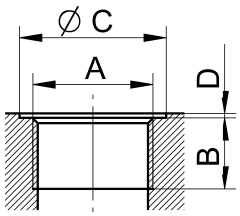


V1:



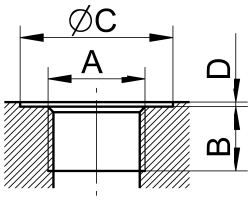
INLET AND OUTLET PORTS

Metric thread ISO 6149

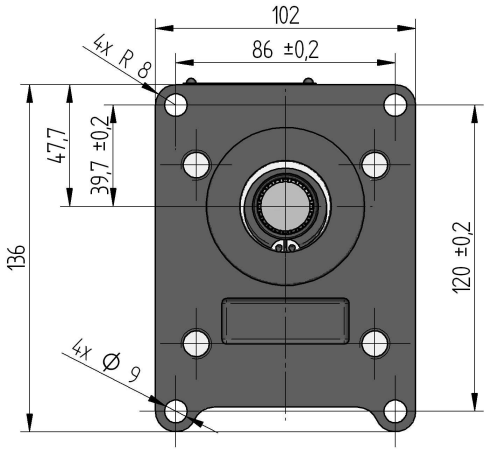


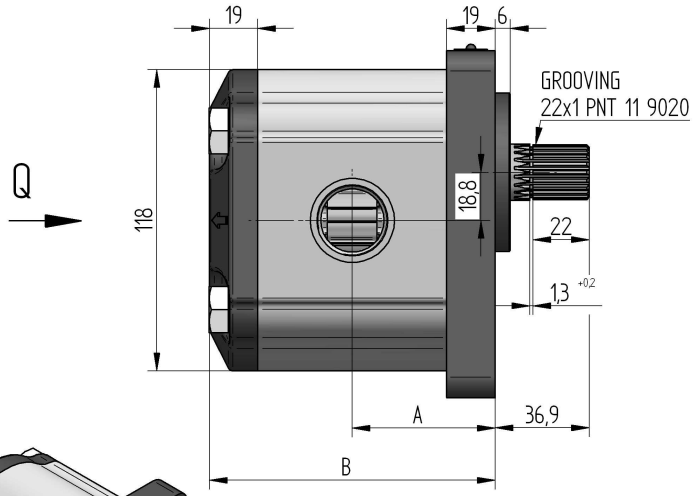
Code	A	B	C	D
M03	M14x1,5	14	20	1
M05	M18x1,5	14	24	1
M06	M20X1,5	14	25	1
M07	M22x1,5	14	28	1
M09	M27x2	16	33	1

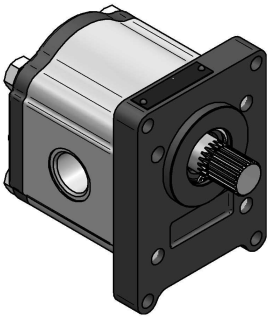
BSP pipe thread ISO 228 - 1

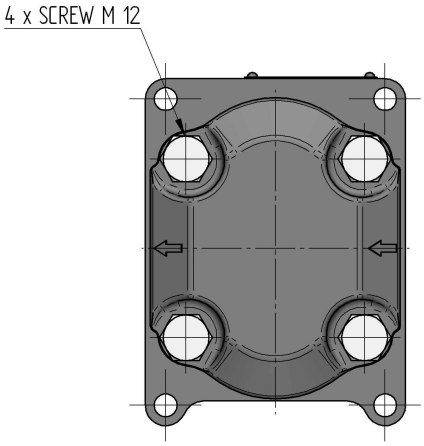


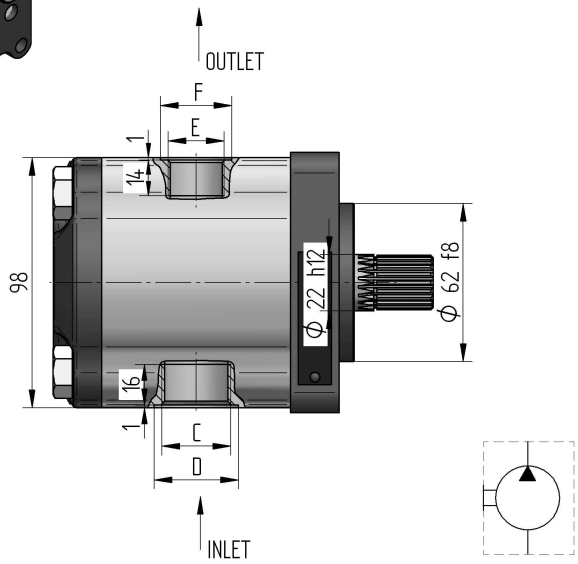
Code	A	B	C	D
G03	G 1/2	14	28	1
G04	G 3/4	17	33	1
G05	G 1	18	45	1





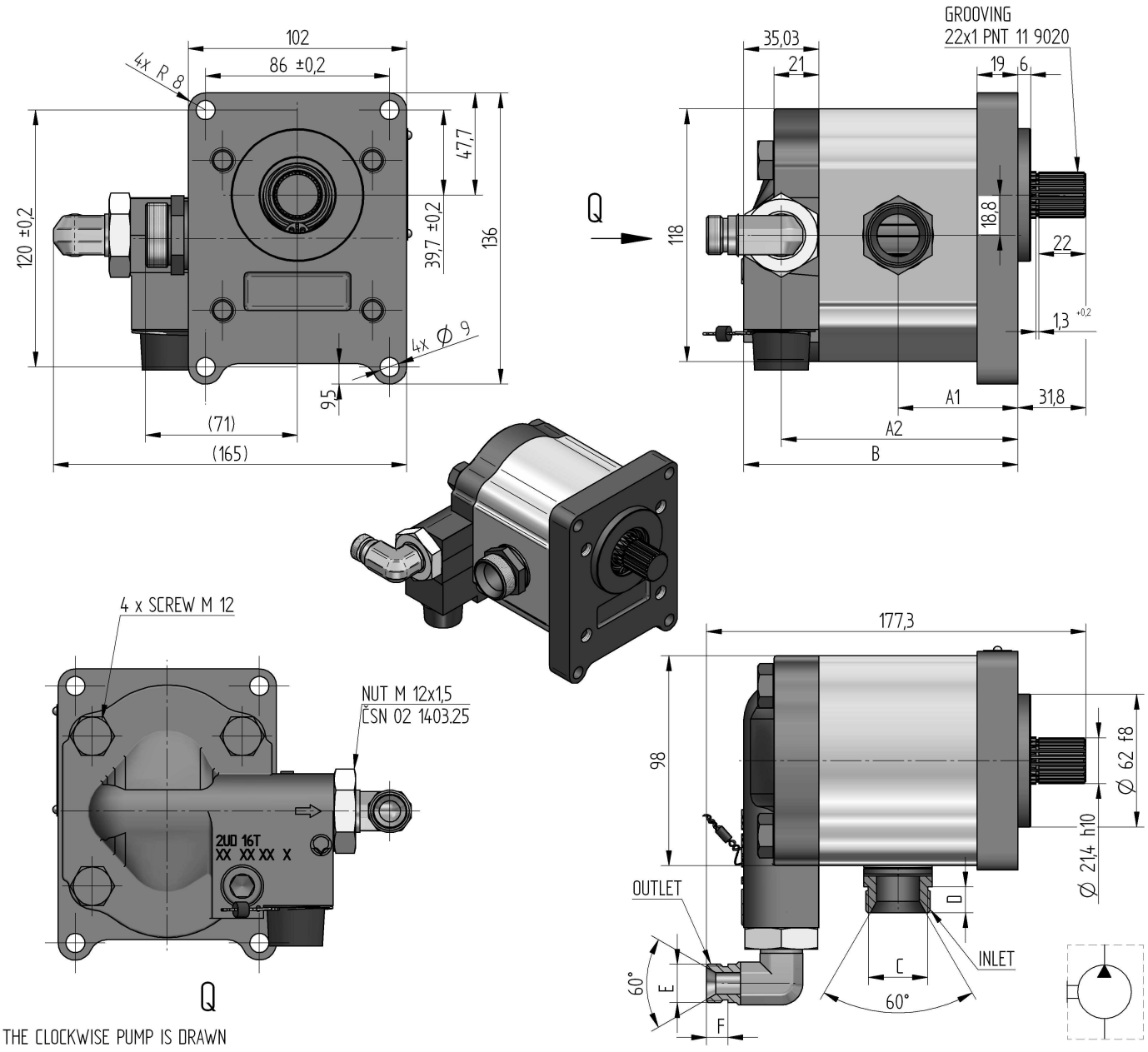




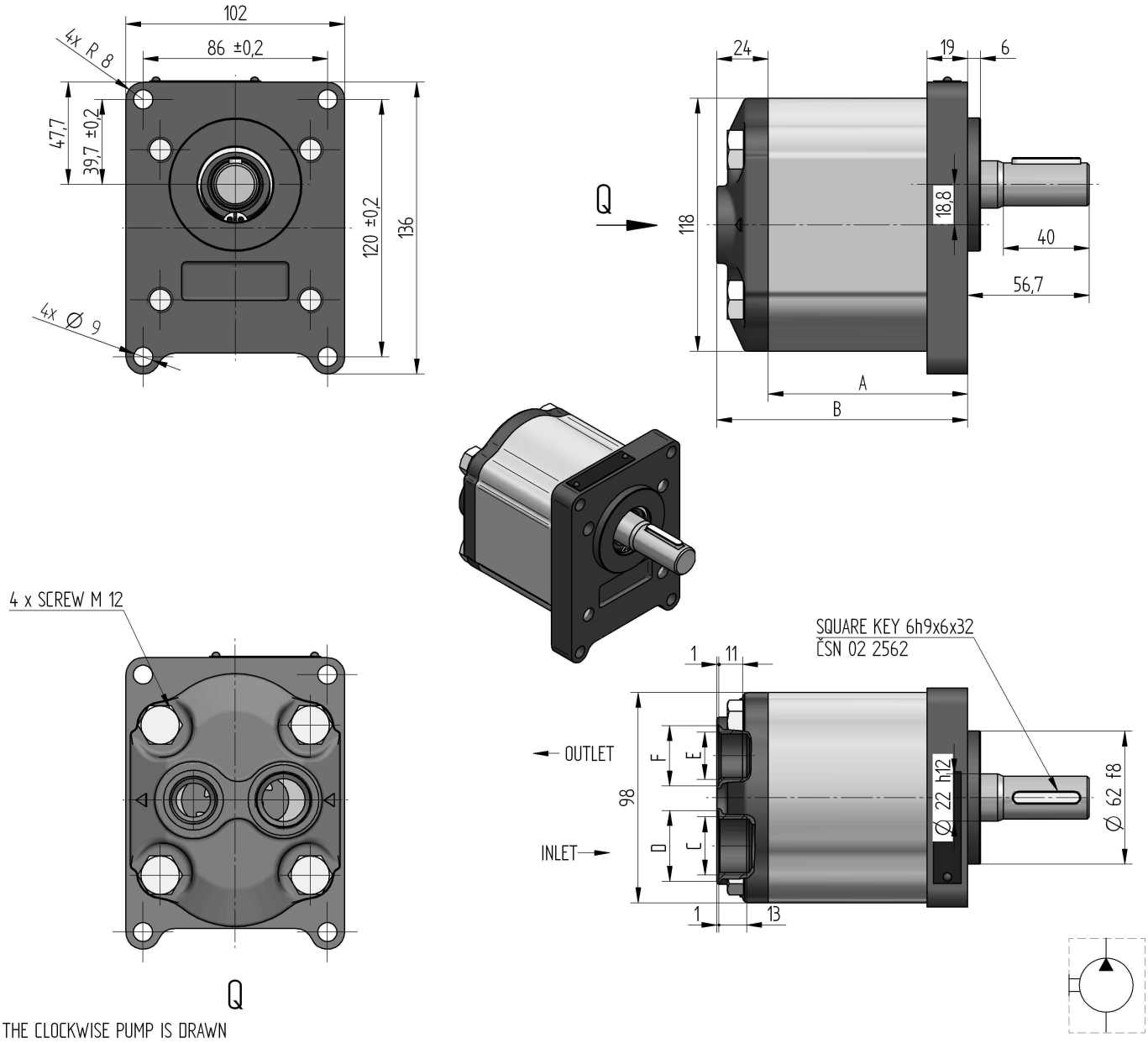


THE CLOCKWISE PUMP IS DRAWN

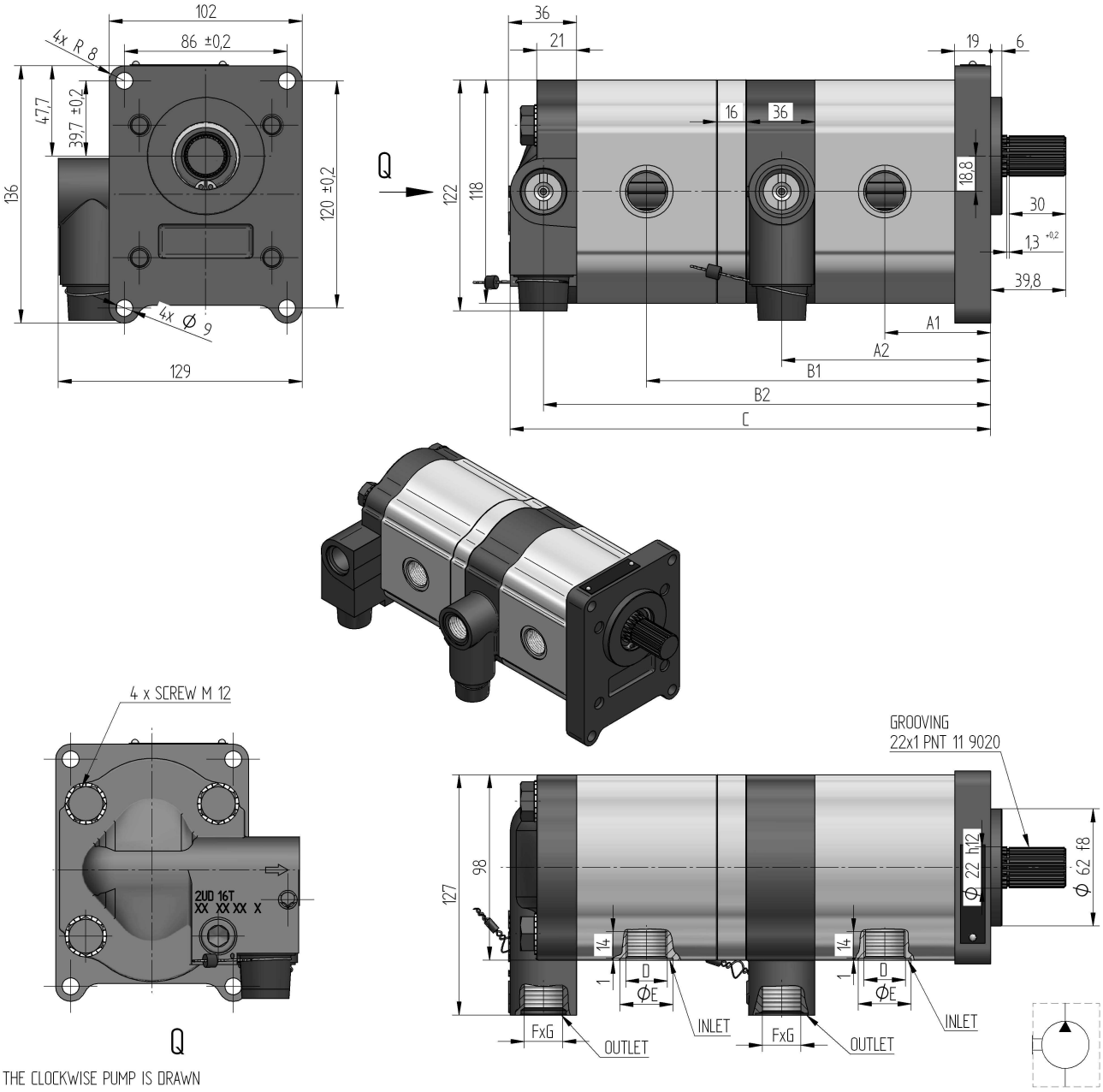
ORDER KEY	PURCH. CODE	DIRECT. OF ROT.	DISPLA-CEMENT [cm³/1]	CONT. PRESS. [bar]	SPEED MIN. [min⁻¹]	SPEED MAX. [min⁻¹]	DIMENSION A [mm]	B	C	D	E	F	
UD-31R-R1D2-SM07M09-N.0000	183 9476	R	31	200	450	2800	65,50	131,0	M27x2	Ø 33	M22x1,5	Ø 28	
UD-31L-R1D2-SM07M09-N.0000	183 9047	L											
UD-28R-R1D2-SM07M09-N.0000		R	28	230	450	3000	63,25	126,5	M27x2	Ø 33	M22x1,5	Ø 28	
UD-28L-R1D2-SM07M09-N.0000		L											
UD-25R-R1D2-SM07M09-N.0000	183 9475	R	25	250	450	3200	61,50	123,0	M27x2	Ø 33	M22x1,5	Ø 28	
UD-25L-R1D2-SM07M09-N.0000	183 9046	L											
UD-20R-R1D2-SM07M09-N.0000	183 9412	R	20	270	450	3200	58,50	117,0	M27x2	Ø 33	M22x1,5	Ø 28	
UD-20L-R1D2-SM07M09-N.0000	183 9413	L											
UD-16R-R1D2-SM07M09-N.0000	183 9406	R	16	290	450	3200	56,00	112,0	M27x2	Ø 33	M22x1,5	Ø 28	
UD-16L-R1D2-SM07M09-N.0000	183 9407	L											
UD-12,5R-R1D2-SM07M09-N.0000		R	12,5	300	450	3200	53,50	107,0	M27x2	Ø 33	M22x1,5	Ø 28	
UD-12,5L-R1D2-SM07M09-N.0000		L											
UD-10R-R1D2-SM07M09-N.0000	183 9400	R	10	300	450	3200	52,25	104,5	M27x2	Ø 33	M22x1,5	Ø 28	
UD-10L-R1D2-SM07M09-N.0000	183 9401	L											
UD-8R-R1D2-SM07M09-N.0000		R	8	300	600	3200	51,00	102,0	M27x2	Ø 33	M22x1,5	Ø 28	
UD-8L-R1D2-SM07M09-N.0000		L											



ORDER KEY	PURCH. CODE	DIRECT. OF ROT.	DISPLA-CEMENT [cm³/1]	CONT. PRESS. [bar]	MIN. SPEED [min⁻¹]	MAX. SPEED [min⁻¹]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]
UD-31R-R2D2-SZZ-V.T64V		R	31	200	450	2800	65,50	129,5	147,0	M30x2	Ø 14	M18x1,5	Ø 10
UD-31L-R2D2-SZZ-V.T64V		L											
UD-28R-R2D2-SZZ-V.T64V		R	28	230	450	3000	63,25	125,0	142,5	M30x2	Ø 14	M18x1,5	Ø 10
UD-28L-R2D2-SZZ-V.T64V		L											
UD-25R-R2D2-SZZ-V.T64V	183 9637	R	25	250	450	3200	61,50	121,5	139,0	M30x2	Ø 14	M18x1,5	Ø 10
UD-25L-R2D2-SZZ-V.T64V		L											
UD-20R-R2D2-SZZ-V.T64V	183 9742	R	20	270	450	3200	58,50	115,5	133,0	M30x2	Ø 14	M18x1,5	Ø 10
UD-20L-R2D2-SZZ-V.T64V		L											
UD-16R-R2D2-SZZ-V.T64V	183 9633	R	16	290	450	3200	56,00	110,5	128,0	M30x2	Ø 14	M18x1,5	Ø 10
UD-16L-R2D2-SZZ-V.T64V		L											
UD-12,5R-R2D2-SZZ-V.T64V		R	12,5	300	450	3200	53,50	1055	123,0	M30x2	Ø 14	M18x1,5	Ø 10
UD-12,5L-R2D2-SZZ-V.T64V		L											
UD-10R-R2D2-SZZ-V.T64V		R	10	300	450	3200	52,25	103,0	120,5	M30x2	Ø 14	M18x1,5	Ø 10
UD-10L-R2D2-SZZ-V.T64V		L											
UD-8R-R2D2-SZZ-V.T64V		R	8	300	600	3200	51,00	100,5	118,0	M30x2	Ø 14	M18x1,5	Ø 10
UD-8L-R2D2-SZZ-V.T64V		L											



ORDER KEY	PURCH. CODE	DIRECT. OF ROT.	DISPLACEMENT [cm³/1]	CONT. PRESS. [bar]	SPEED MIN. [min⁻¹]	SPEED MAX. [min⁻¹]	A	B	C	D	E	F	
							DIMENSION [mm]						
UD-31R-R2V1-RM09M07-N.A050		R	31	200	450	2800	112,0	136,0	M27x2	Ø 33	M22x1,5	Ø 28	
UD-31L-R2V1-R M09M07-N.AL05		L											
UD-28R-R2V1-RM09M07-N.A050		R	28	230	450	3000	107,5	131,5	M27x2	Ø 33	M22x1,5	Ø 28	
UD-28L-R2V1-RM09M07-N.A050		L											
UD-25R-R2V1-RM09M07-N.A050		R	25	250	450	3200	104,0	128,0	M27x2	Ø 33	M22x1,5	Ø 28	
UD-25L-R2V1-RM09M07-N.A050		L											
UD-20R-R2V1-RM09M07-N.A050		R	20	270	450	3200	98,0	122,0	M27x2	Ø 33	M22x1,5	Ø 28	
UD-20L-R2V1-RM09M07-N.A050		L											
UD-16R-R2V1-RM09M07-N.A050		R	16	290	450	3200	93,0	117,0	M27x2	Ø 33	M22x1,5	Ø 28	
UD-16L-R2V1-RM09M07-N.A050		L											
UD-12,5R-R2V1-RM09M07-N.A050		R	12,5	300	450	3200	88,0	112,0	M27x2	Ø 33	M22x1,5	Ø 28	
UD-12,5L-R2V1-RM09M07-N.A050		L											
UD-10R-R2V1-RM09M07-N.A050	183 9404	R	10	300	450	3200	85,5	109,5	M27x2	Ø 33	M22x1,5	Ø 28	
UD-10L-R2V1-RM09M07-N.A050		L											
UD-8R-R2V1-RM09M07-N.A050		R	8	300	600	3200	83,0	107,0	M27x2	Ø 33	M22x1,5	Ø 28	
UD-8L-R2V1-RM09M07-N.A050		L											



THE CLOCKWISE PUMP IS DRAWN

ORDER KEY	PURCH. CODE	DIRECT. OF ROT.	DISPLA-CEMENT [cm³/1]	CONT. PRESS. [bar]	MIN. SPEED [min⁻¹]	MAX. SPEED [min⁻¹]	A1 [mm]	A2 [mm]	B1 [mm]	B2 [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]
UD-31/31R-R2D2-SM07M07/ M07M07-N.T450		R	31	200	450	2800	65,50	129,5	210,50	274,5	293,0	M22x1,5	28	M22x1,5	28
UD-31/31L-R2D2-SM07M07/ M07M07-N.T450		L													
UD-28/28R-R2D2-SM07M07/ M07M07-N.T450		R	28	230	450	3000	63,25	125,0	203,75	265,5	284,0	M22x1,5	28	M22x1,5	28
UD-28/28L-R2D2-SM07M07/ M07M07-N.T450		L													
UD-25/25R-R2D2-SM07M07/ M07M07-N.T450		R	25	250	450	3200	61,50	121,5	198,50	258,5	277,0	M22x1,5	28	M22x1,5	28
UD-25/25L-R2D2-SM07M07/ M07M07-N.T450		L													
UD-20/20R-R2D2-SM07M07/ M07M07-N.T450		R	20	270	450	3200	58,50	115,5	189,50	246,5	265,0	M22x1,5	28	M22x1,5	28
UD-20/20L-R2D2-SM07M07/ M07M07-N.T450		L													
UD-16/16R-R2D2-SM07M07/ M07M07-N.T450	183 9645	R	16	290	450	3200	56,00	110,5	182,00	236,5	255,0	M22x1,5	28	M22x1,5	28
UD-16/16L-R2D2-SM07M07/ M07M07-N.T450		L													
UD-12,5/12,5R-R2D2-SM07M07/ M07M07-N.T450		R	12,5	300	450	3200	53,50	1055	174,50	226,5	245,0	M22x1,5	28	M22x1,5	28
UD-12,5/12,5L-R2D2-SM07M07/ M07M07-N.T450		L													
UD-10/10R-R2D2-SM07M07/ M07M07-N.T450		R	10	300	450	3200	52,25	103,0	170,75	221,5	240,0	M22x1,5	28	M22x1,5	28
UD-10/10L-R2D2-SM07M07/ M07M07-N.T450		L													
UD-8/8R-R2D2-SM07M07/ M07M07-N.T450		R	8	300	600	3200	51,00	100,5	167,00	216,5	265,0	M22x1,5	28	M22x1,5	28
UD-8/8L-R2D2-SM07M07/ M07M07-N.T450		L													