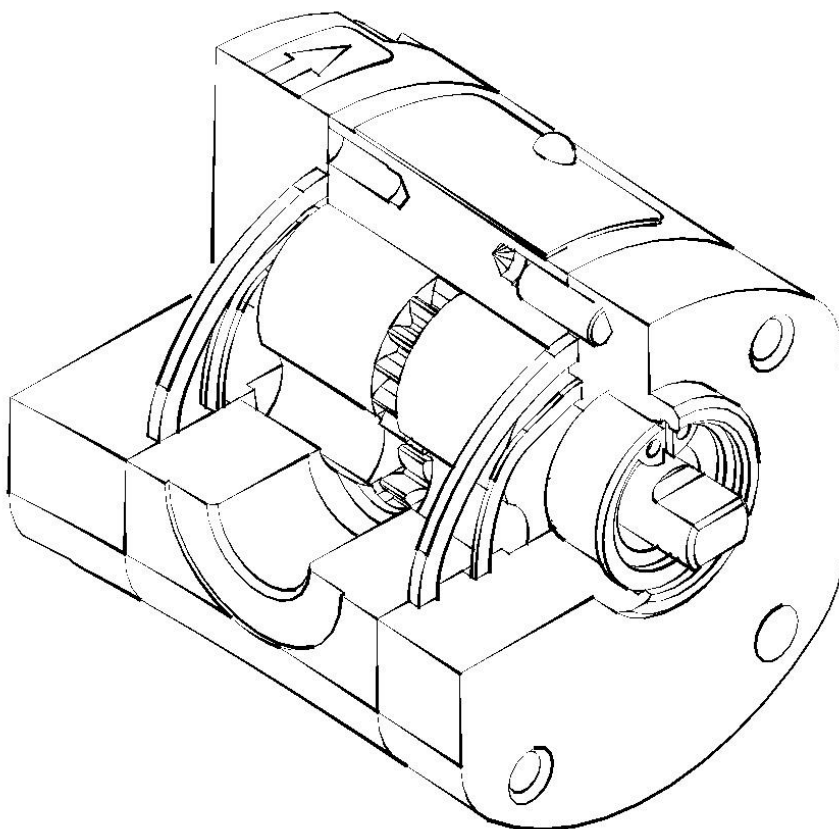


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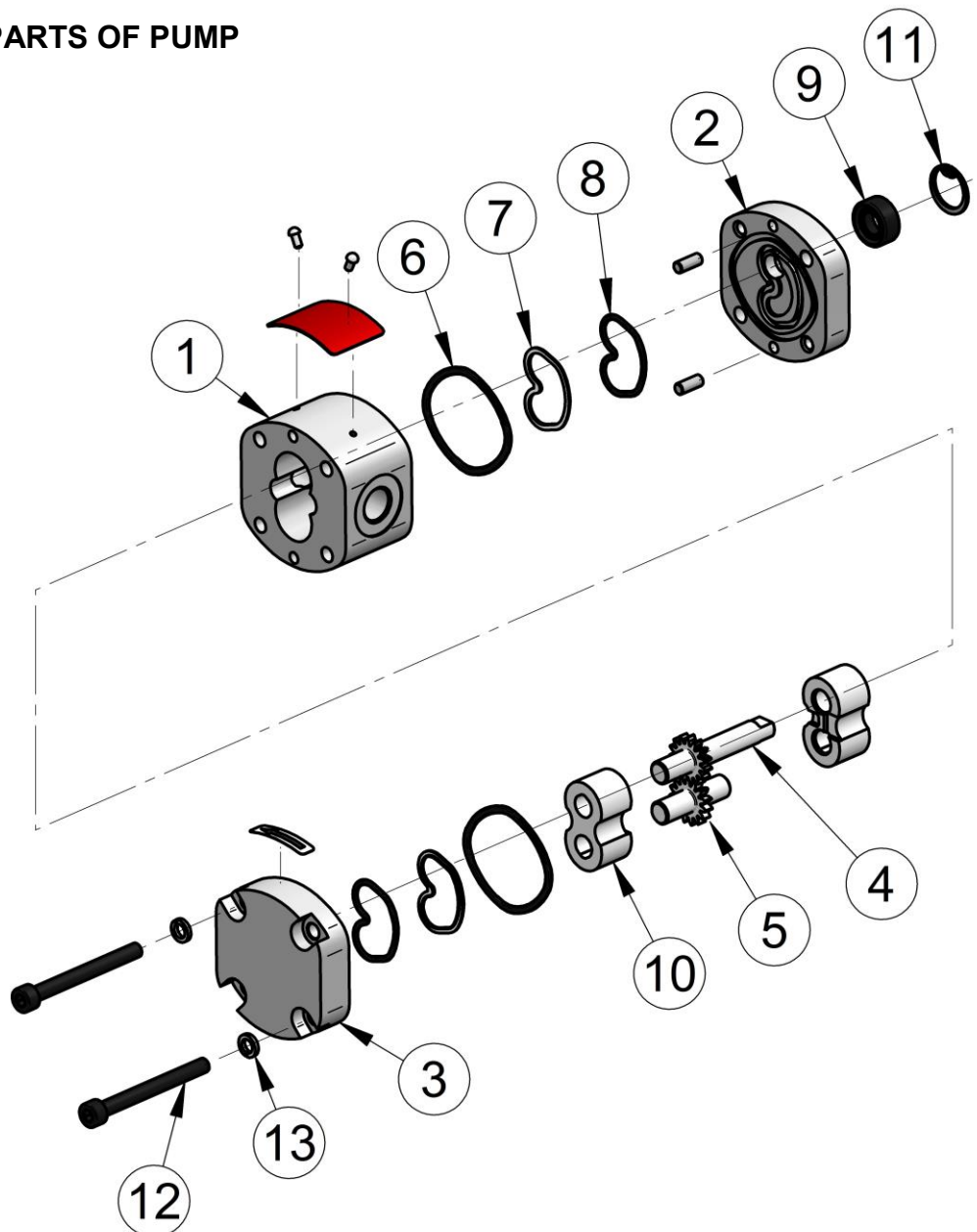
## DESCRIPTION

Pumps and motors of 0.5 series are designed for use in hydraulic systems with very low performance (up to 2.3 kW). They are produced in unidirectional and bi-directional design.

A wide range of shafts, flanges, inlets and outlets working liquid allows their use in hydraulic circuits stationary and mobile machines and devices of smaller dimensions. The used types of connections and flanges conform to world standards.

The 0.5series have a wide spectrum of usable rotational speed from 800 to 8000 min<sup>-1</sup>, enabling connection to high-speed motors. Pumps and motors have a very favourable efficiency and noise throughout the rev range and pressure.

## BASIC PARTS OF PUMP



1. Body
2. Flange
3. Cover
4. Driving gear
5. Driven gear
6. Peripheral sealing
7. Sealing protective plate

8. Balancing sealing
9. Shaft seal
10. Bearing sleeves
11. Safety ring
12. Connection bolts
13. Spring washers

## PARAMETER TABLE

| Nominal Size Parameters                                          |                 | Sym.              | Unit                                  | 0.18  | 0.25  | 0.32  | 0.36  | 0.40  | 0.50  | 0.63  | 0.70  |
|------------------------------------------------------------------|-----------------|-------------------|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Actual displacement                                              |                 | V <sub>g</sub>    | [cm <sup>3</sup> ]                    | 0.175 | 0.256 | 0.327 | 0.361 | 0.408 | 0.501 | 0.630 | 0.711 |
| Rotation speed                                                   | nominal         | n <sub>n</sub>    | [min <sup>-1</sup> ]                  | 1500  |       |       |       |       |       |       |       |
|                                                                  | minimum         | n <sub>min</sub>  | [min <sup>-1</sup> ]                  | 1000  |       |       |       |       |       |       |       |
|                                                                  | maximum         | n <sub>max</sub>  | [min <sup>-1</sup> ]                  | 8000  | 7000  |       |       |       | 6000  |       |       |
| Pressure at inlet *                                              | minimum         | p <sub>1min</sub> | [bar]                                 | -0.3  |       |       |       |       |       |       |       |
|                                                                  | maximum         | p <sub>1max</sub> | [bar]                                 | 0.5   |       |       |       |       |       |       |       |
| Pressure at outlet<br>**                                         | max. continuous | p <sub>2n</sub>   | [bar]                                 | 200   | 230   |       |       |       |       | 220   |       |
|                                                                  | maximum         | p <sub>2max</sub> | [bar]                                 | 250   |       |       |       |       |       | 240   |       |
|                                                                  | peak            | p <sub>3</sub>    | [bar]                                 | 260   |       |       |       |       |       | 250   |       |
| Nominal flow rate (min.) at n <sub>n</sub> and p <sub>2n</sub>   |                 | Q <sub>n</sub>    | [dm <sup>3</sup> .min <sup>-1</sup> ] | 0.19  | 0.30  | 0.40  | 0.44  | 0.50  | 0.65  | 0.85  | 0.95  |
| Maximum flow rate at n <sub>max</sub> and p <sub>2max</sub>      |                 | Q <sub>max</sub>  | [dm <sup>3</sup> .min <sup>-1</sup> ] | 1.39  | 1.77  | 2.27  | 2.50  | 2.83  | 2.98  | 3.74  | 4.22  |
| Nominal input power (max.) at n <sub>n</sub> and p <sub>2n</sub> |                 | P <sub>n</sub>    | [kW]                                  | 0.10  | 0.17  | 0.22  | 0.24  | 0.28  | 0.34  | 0.41  | 0.46  |
| Maximum input power at n <sub>max</sub> and p <sub>2max</sub>    |                 | P <sub>max</sub>  | [kW]                                  | 0.69  | 0.88  | 1.12  | 1.24  | 1.40  | 1.4   | 1.78  | 2.01  |
| Weight                                                           |                 | m                 | [kg]                                  | 0.37  | 0.38  | 0.38  | 0.38  | 0.39  | 0.39  | 0.40  | 0.40  |

| Nominal Size Parameters                          |                 | Sym.       | Unit                                  | 0.80  | 1.00  | 1.25  | 1.50  | 2.00  | 2.50  | 3.20  |
|--------------------------------------------------|-----------------|------------|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|
| Actual displacement                              |                 | $V_g$      | [cm <sup>3</sup> ]                    | 0.804 | 1.001 | 1.258 | 1.514 | 2.004 | 2.505 | 3.192 |
| Rotation speed                                   | nominal         | $n_n$      | [min <sup>-1</sup> ]                  | 1500  |       |       |       |       |       |       |
|                                                  | minimum         | $n_{min}$  | [min <sup>-1</sup> ]                  | 1000  | 800   |       |       | 600   | 500   |       |
|                                                  | maximum         | $n_{max}$  | [min <sup>-1</sup> ]                  | 6000  | 5000  | 4000  | 3000  | 2800  | 2500  | 1800  |
| Pressure at inlet *                              | minimum         | $p_{1min}$ | [bar]                                 | -0.3  |       |       |       |       |       |       |
|                                                  | maximum         | $p_{1max}$ | [bar]                                 | 0.5   |       |       |       |       |       |       |
| Pressure at outlet **                            | max. continuous | $p_{2n}$   | [bar]                                 | 220   | 200   |       | 160   | 120   | 90    | 60    |
|                                                  | maximum         | $p_{2max}$ | [bar]                                 | 240   | 220   |       | 180   | 150   | 100   | 70    |
|                                                  | peak            | $p_3$      | [bar]                                 | 250   | 230   |       | 190   | 160   | 110   | 80    |
| Nominal flow rate (min.) at $n_n$ and $p_{2n}$   |                 | $Q_n$      | [dm <sup>3</sup> .min <sup>-1</sup> ] | 1.05  | 1.35  | 1.70  | 2.00  | 2.70  | 3.40  | 4.45  |
| Maximum flow rate at $n_{max}$ and $p_{2max}$    |                 | $Q_{max}$  | [dm <sup>3</sup> .min <sup>-1</sup> ] | 4.78  | 4.95  | 4.98  | 4.50  | 5.56  | 6.20  | 5.69  |
| Nominal input power (max.) at $n_n$ and $p_{2n}$ |                 | $P_n$      | [kW]                                  | 0.52  | 0.59  | 0.74  | 0.71  | 0.71  | 0.66  | 0.56  |
| Maximum input power at $n_{max}$ and $p_{2max}$  |                 | $P_{max}$  | [kW]                                  | 2.27  | 2.16  | 2.17  | 1.60  | 1.65  | 1.23  | 0.79  |
| Weight                                           |                 | $m$        | [kg]                                  | 0.40  | 0.41  | 0.41  | 0.43  | 0.45  | 0.48  | 0.53  |

\* Inlet pressure in the reversible design can be up to  **$p_1 = p_{2n} - 70$  bar max.** External drainage must be used in case of the reversible design.

\*\* Outlet pressure in the reversible design is **10% lower** than shown in the table (depending on operating conditions - it is necessary to consult with the manufacturer).

## FORMULAS USED FOR CALCULATION

### Flow rate

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

|          |                     |                       |
|----------|---------------------|-----------------------|
| $V_g$    | $[\text{cm}^3]$     | pump displacement     |
| $n$      | $[\text{min}^{-1}]$ | rotation speed        |
| $\eta_v$ | $[-]$               | volumetric efficiency |

### Displacement

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

### Torque

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

|          |                |                             |
|----------|----------------|-----------------------------|
| $p$      | $[\text{bar}]$ | required pressure at outlet |
| $\eta_m$ | $[-]$          | mechanical efficiency       |

### Input power

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

|          |       |                  |
|----------|-------|------------------|
| $\eta_t$ | $[-]$ | total efficiency |
|----------|-------|------------------|

## PUMP EFFICIENCIES

### Volumetric efficiency $\eta_v$

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:

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

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

### Mechanical efficiency $\eta_m$

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

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

|              |               |                    |
|--------------|---------------|--------------------|
| $M_{act.}$   | $[\text{Nm}]$ | actual torque      |
| $M_{theor.}$ | $[\text{Nm}]$ | theoretical torque |

### Total efficiency $\eta_t$

It is defined as product of  $\eta_v$  and  $\eta_m$  and determines difference between theoretical and actual required input power:

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

|              |               |                         |
|--------------|---------------|-------------------------|
| $P_{act.}$   | $[\text{kW}]$ | actual input power      |
| $P_{theor.}$ | $[\text{kW}]$ | 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<sup>2</sup> · s<sup>-1</sup>]

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

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

### Filtration coefficient $\beta_\alpha$

$\beta_{25} 75 \geq$  (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)

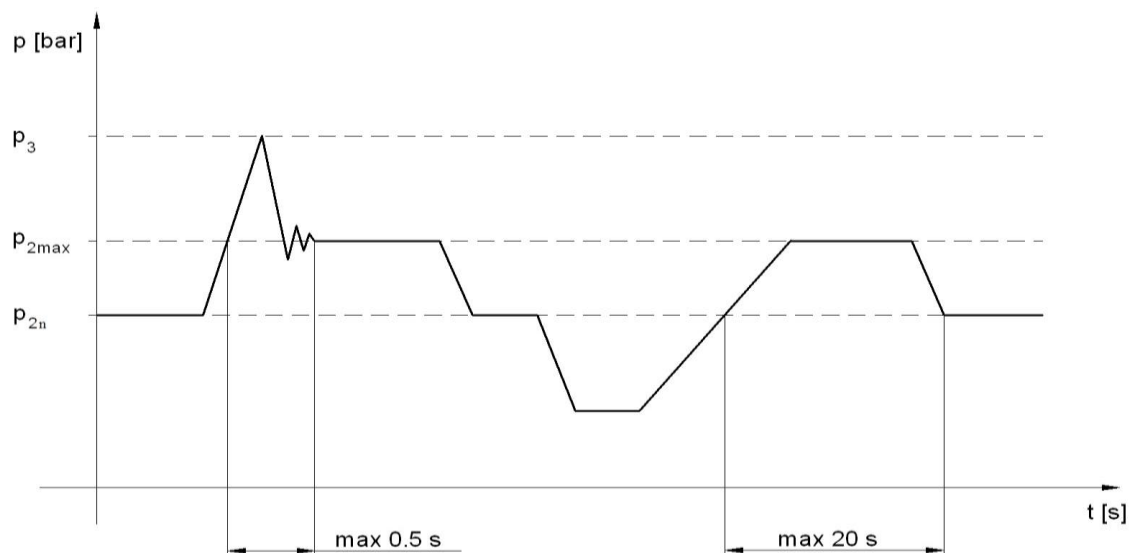
20/17/14 (for pressure  $p_2 > 200$  bar)

### Liquid contamination class according to NAS 1638

10 (for pressure  $p_2 < 200$  bar)

8 (for pressure  $p_2 > 200$  bar)

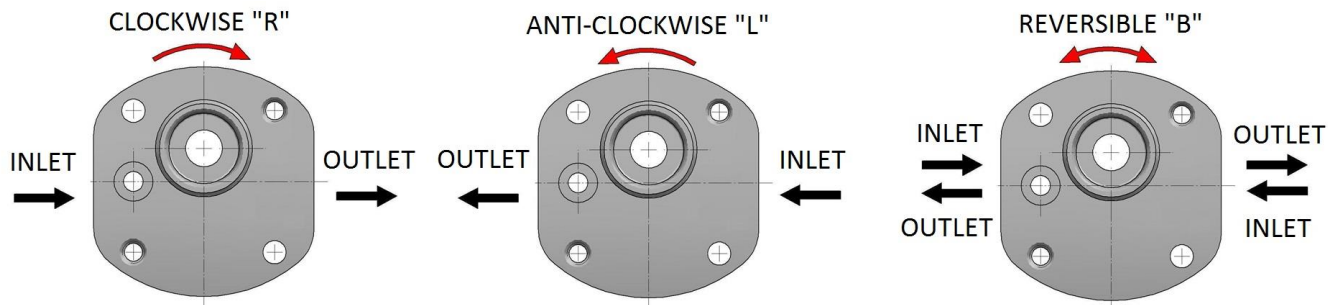
## PRESSURE LOAD



|            |                              |                                                                                                                                                                      |
|------------|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $p_{2n}$   | <b>max. contin. pressure</b> | max. working pressure, at which the pump can be operated without time limitation.                                                                                    |
| $p_{2max}$ | <b>max. pressure</b>         | maximum pressure permissible for a short time, max. 20s.                                                                                                             |
| $p_3$      | <b>peak pressure</b>         | 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. |

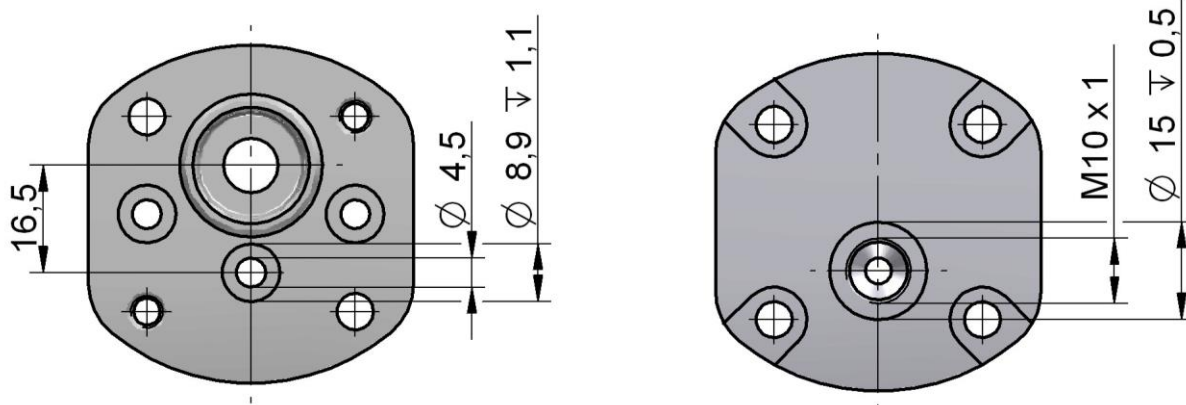
## DIRECTION OF ROTATION

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

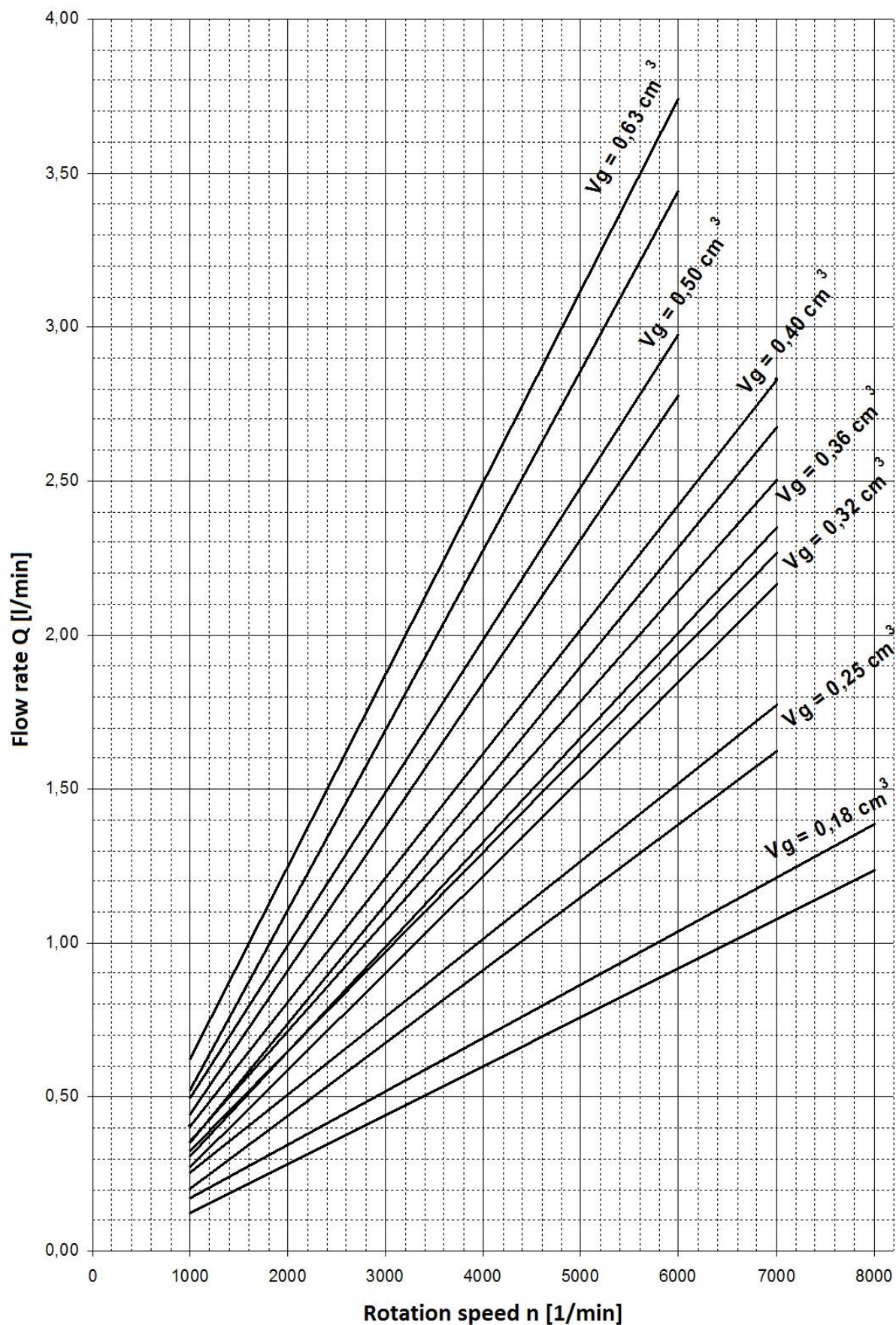


## REVERSIBLE DESIGN

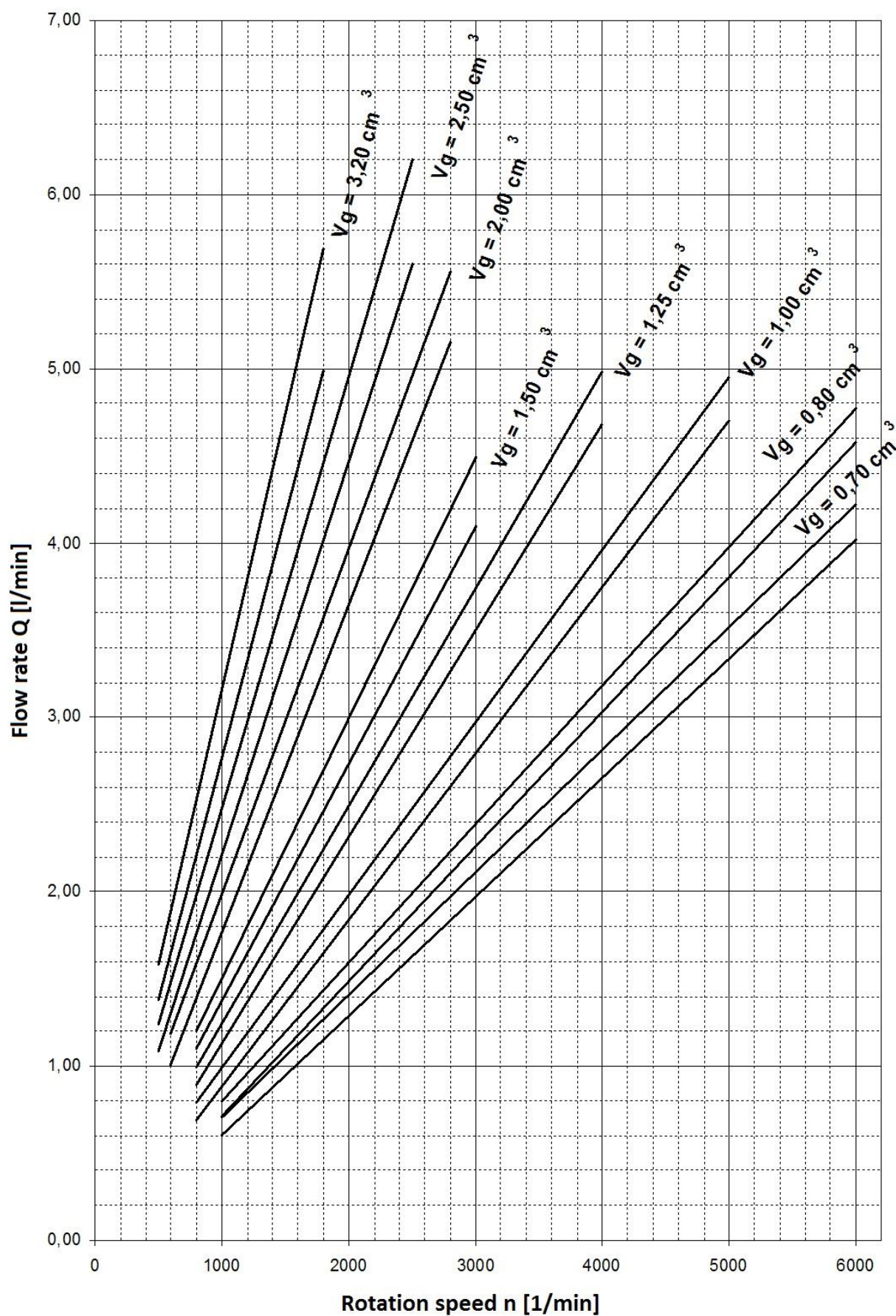
The pumps with the possibility of bidirectional rotation have a different internal arrangement requiring drainage. External drainage is solved by an orifice located in the cover or the flange against the driven gear (see. picture below).



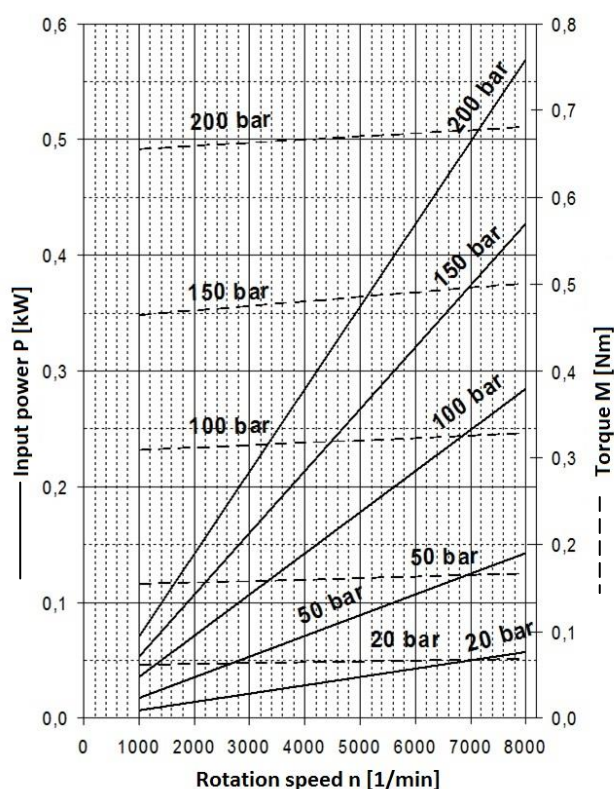
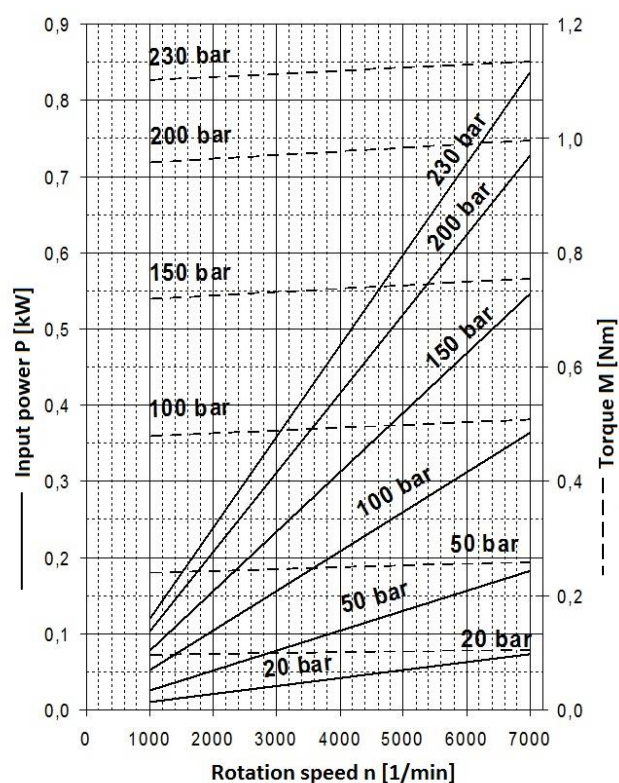
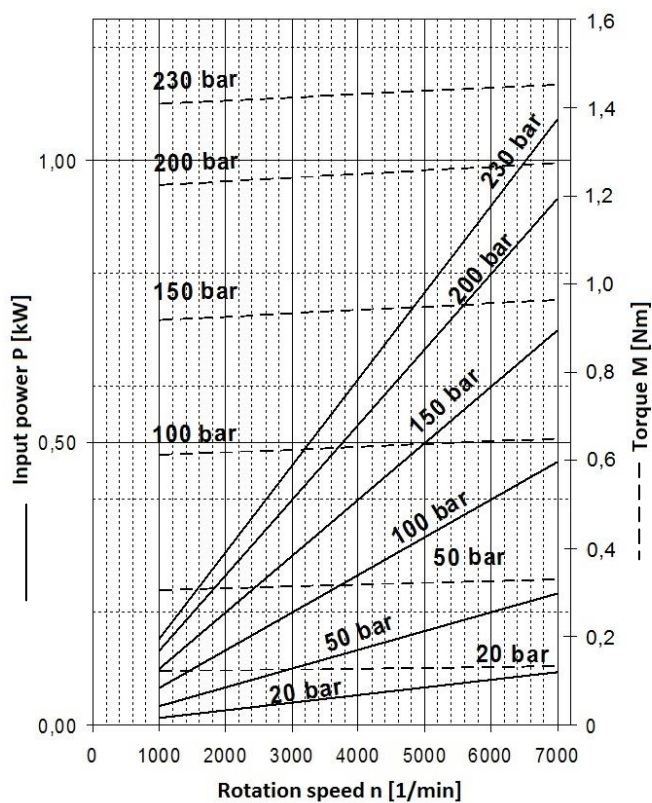
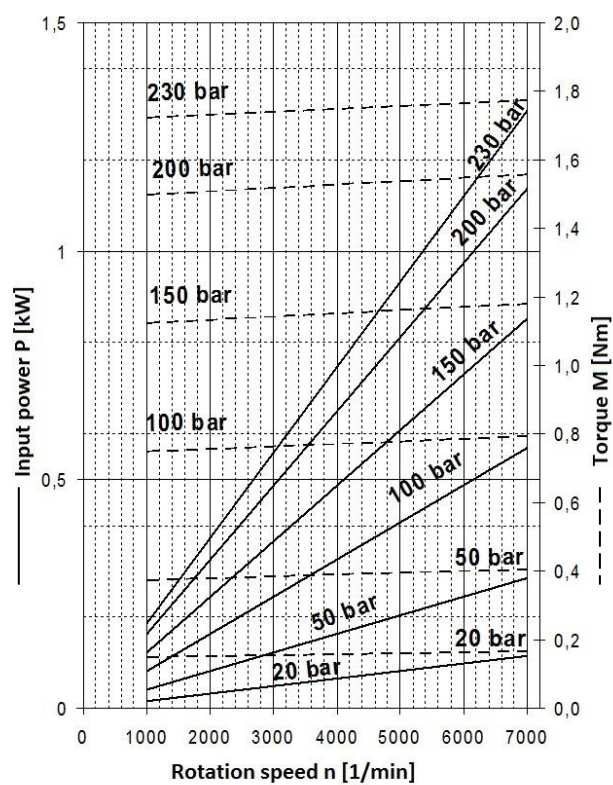
## FLOW RATE AND POWER CURVES

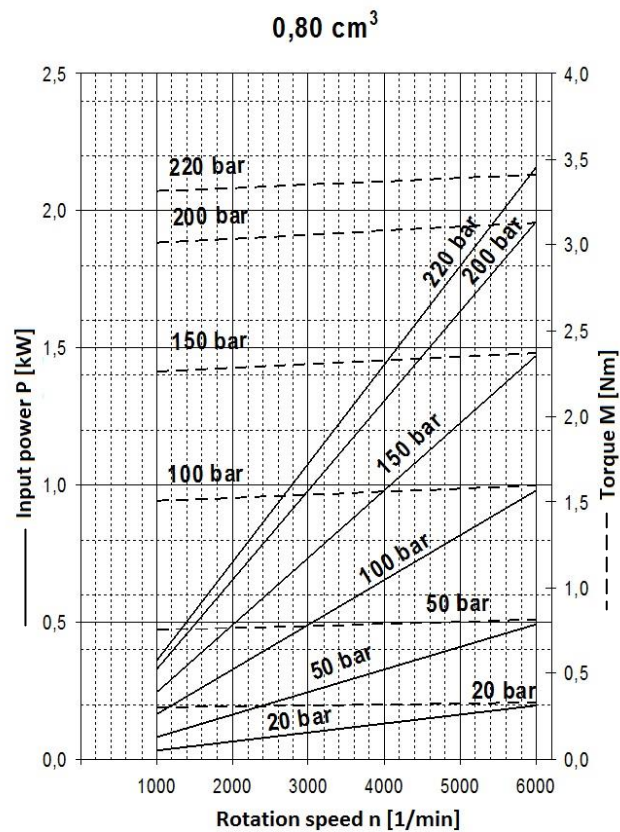
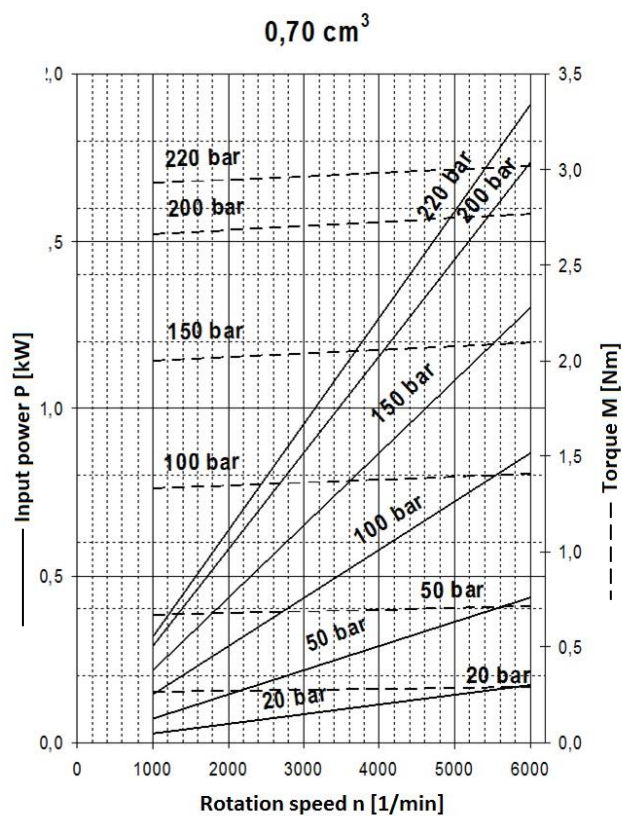
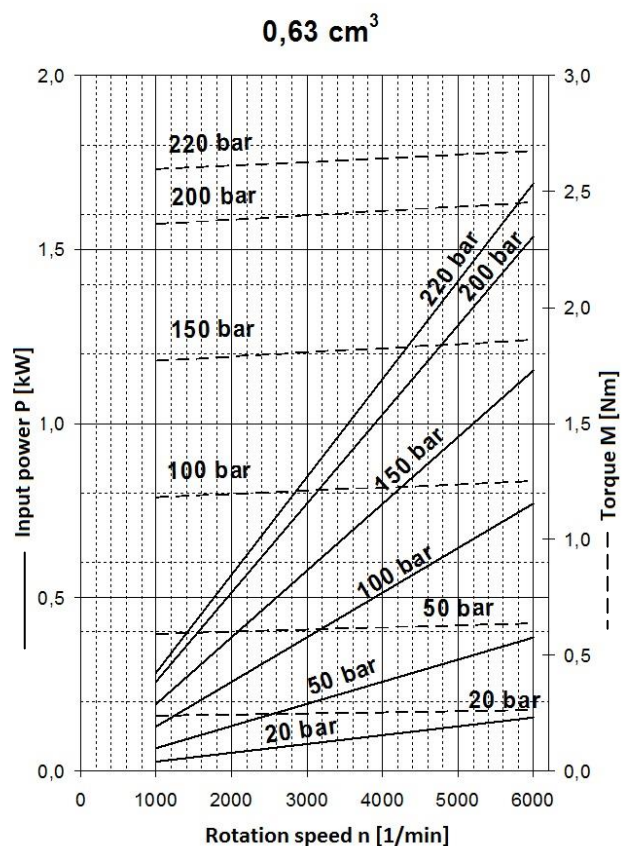
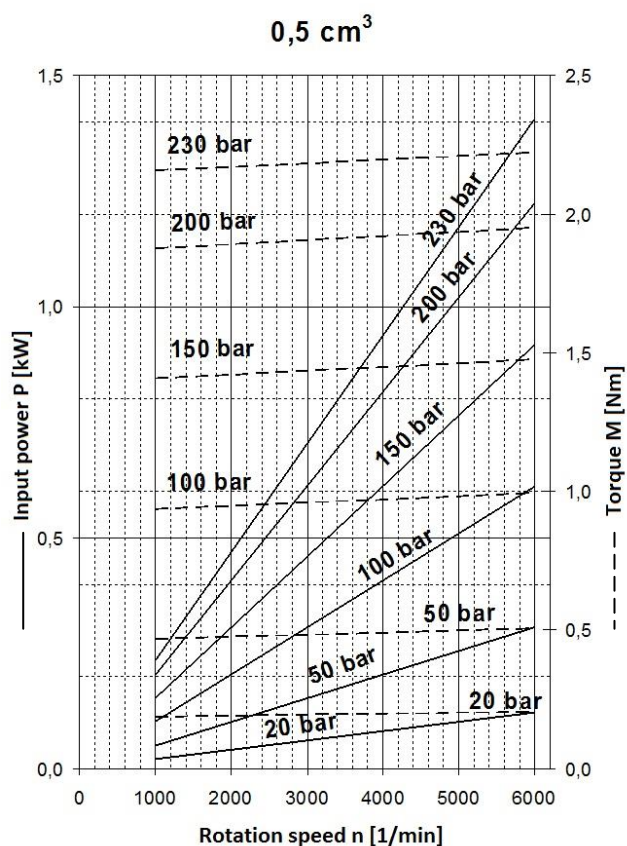


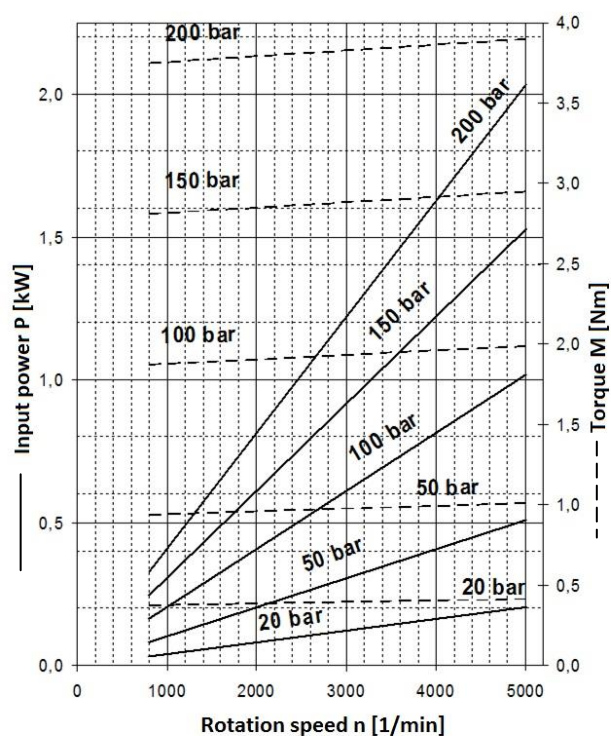
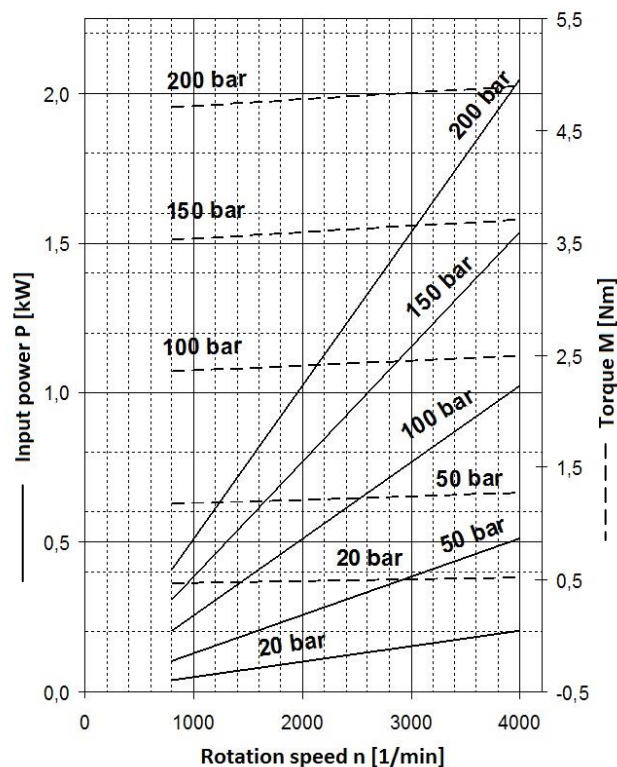
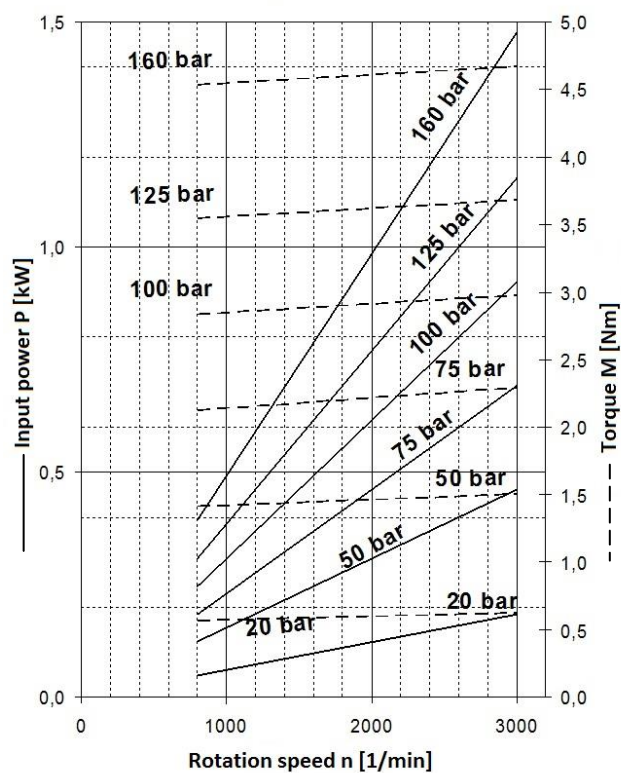
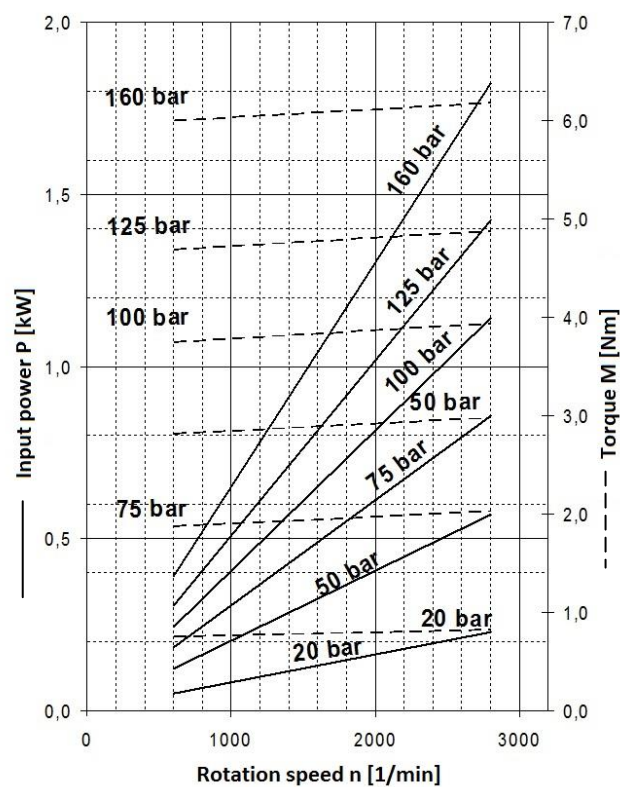
Above curves apply to ISO Vg 46 oil at temperature  $t = 45^\circ\text{C}$ .

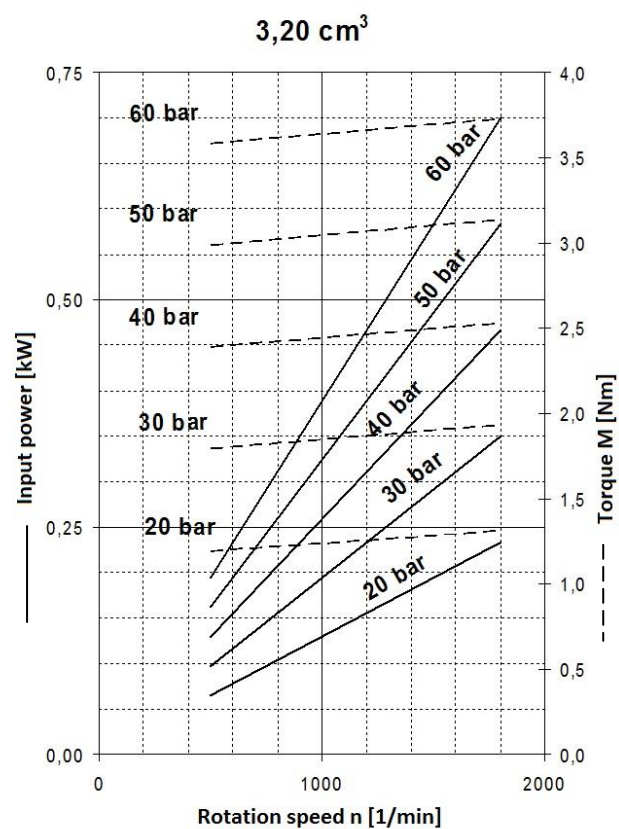
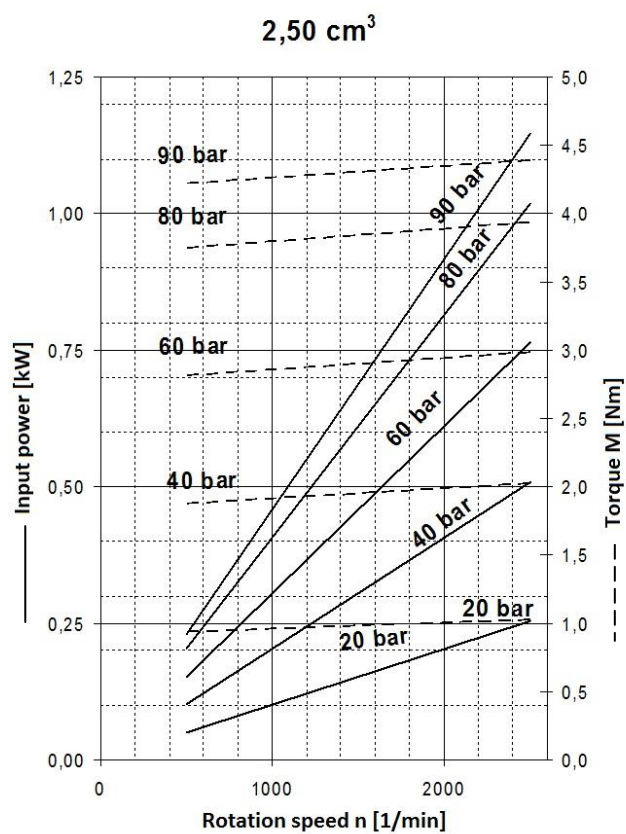


Above curves apply to ISO Vg 46 oil at temperature  $t = 45^\circ\text{C}$ .

**0,18 cm<sup>3</sup>****0,25 cm<sup>3</sup>****0,32 cm<sup>3</sup>****0,4 cm<sup>3</sup>**



**1,00 cm<sup>3</sup>****1,25 cm<sup>3</sup>****1,50 cm<sup>3</sup>****2,00 cm<sup>3</sup>**



## ORDER KEY

|   |   |      |   |   |     |     |   |   |     |     |   |   |   |     |
|---|---|------|---|---|-----|-----|---|---|-----|-----|---|---|---|-----|
| 0 | - | 1,00 | R | - | A01 | C01 | - | S | G01 | G01 | - | N | . | 004 |
|---|---|------|---|---|-----|-----|---|---|-----|-----|---|---|---|-----|

| Code | Displacement<br>[cm³]             |
|------|-----------------------------------|
| 0,18 | 0,175                             |
| 0,25 | 0,256                             |
| 0,32 | 0,327                             |
| 0,36 | 0,361                             |
| 0,40 | 0,408                             |
| 0,50 | 0,501                             |
| 0,63 | 0,630                             |
| 0,70 | 0,711                             |
| 0,80 | 0,804                             |
| 1,00 | 1,001                             |
| 1,25 | 1,258                             |
| 1,50 | 1,514                             |
| 2,00 | 2,004                             |
| 2,50 | 2,505                             |
| 3,20 | 3,192                             |
| XX   | Other displacements<br>on request |

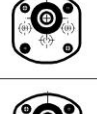
| Code | Rotation                   |
|------|----------------------------|
| R    | Clockwise<br>rotation      |
| L    | Anti-clockwise<br>rotation |
| B    | Bi-directional<br>rotation |

| Code | Type             |
|------|------------------|
| 0.5  | Series Gear Pump |

| Code | Location of suction and<br>pressure port                                                                   |
|------|------------------------------------------------------------------------------------------------------------|
| S    |  Side<br>(in the body)    |
| F    |  Front<br>(in the Flange) |
| A    |  Axial                  |
| C    |  Combination            |
| D    |  Combination            |

| Code | Special arrangements    |
|------|-------------------------|
| -    | No special arrangements |
| 001  | With front end bearing  |
| 004  | Without shaft seal      |
| 005  | drainage in the flange  |

| Code | Sealing material                                                                          |
|------|-------------------------------------------------------------------------------------------|
| N    |  NBR |

| Code | Flange design                                                                                                                                     |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| R01  |  Flange with two bolts M6<br>centre ring Ø 22                  |
| A01  |  Flange with two bolts M5<br>centre ring Ø 22<br>spacing 32x32 |
| A02  |  Flange with two bolts M5<br>centre ring Ø 22<br>spacing 30x32 |
| Z    | Special design                                                                                                                                    |

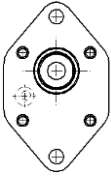
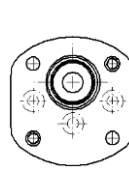
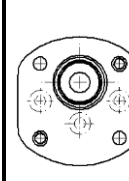
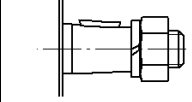
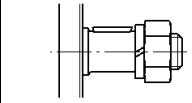
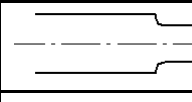
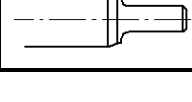
| Code | Drive shaft design                                                                                                  |
|------|---------------------------------------------------------------------------------------------------------------------|
| C01  |  Taper 1:8<br>Woodruff key 2x2,6 |
| V01  |  Cylindric<br>Woodruff key 2x2,6 |
| K01  |  Cross coupling                  |
| K02  |  Cross coupling                  |
| Z    | Special design                                                                                                      |

| Code | Design of suction and pressure port                                                                                |
|------|--------------------------------------------------------------------------------------------------------------------|
| D01  |  Inlet / Outlet in the Flange |
| D02  |  Inlet / Outlet in the Flange |
| P01  |  Inlet / Outlet in the cover  |
| M01  |  Thread M 10x1                |
| G01  |  Thread BSP G 1/4             |
| G02  |  Thread BSP G 3/8             |
| Z    | Special design                                                                                                     |

An example of designation for the 0.5 clockwise pump with displacement 1.00 cm<sup>3</sup>, flange with two bolt about spacing 32x32, taper 1:8 with key 2x26, BSP inlet and outlet in body and without shaft sealing:

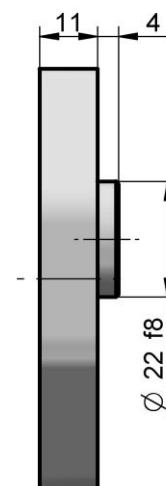
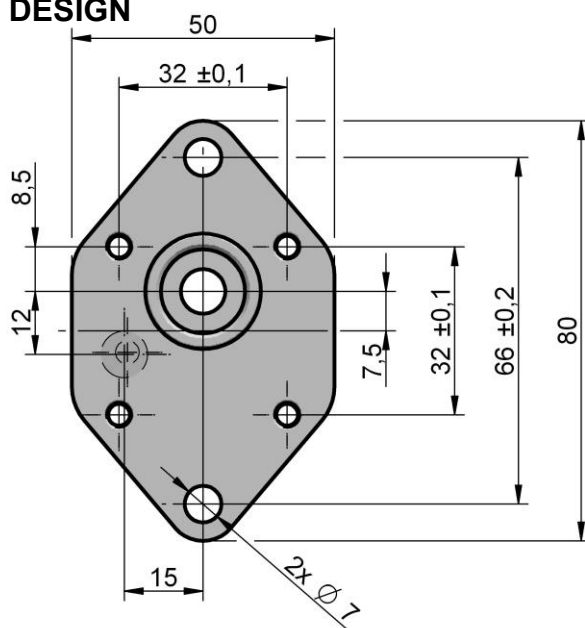
**0.5-1.00R-A01C01-SG01/G01-N . 004**

## COMBINATIONS OF FLANGES AND SHAFTS

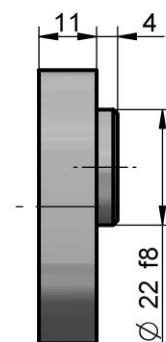
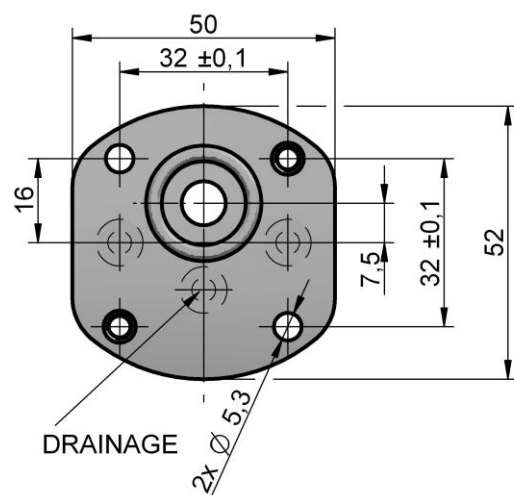
| DRIVE SHAFT |                                                                                   | FLANGE DESIGN                                                                     |                                                                                   |                                                                                     |
|-------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|             |                                                                                   | R01                                                                               | A01                                                                               | A02                                                                                 |
|             |                                                                                   |  |  |  |
| C01         |  |                                                                                   | ●                                                                                 | ●                                                                                   |
| V01         |  | ●                                                                                 | ●                                                                                 | ●                                                                                   |
| K01         |  |                                                                                   | ●                                                                                 | ●                                                                                   |
| K02         |  | ●                                                                                 | ●                                                                                 | ●                                                                                   |

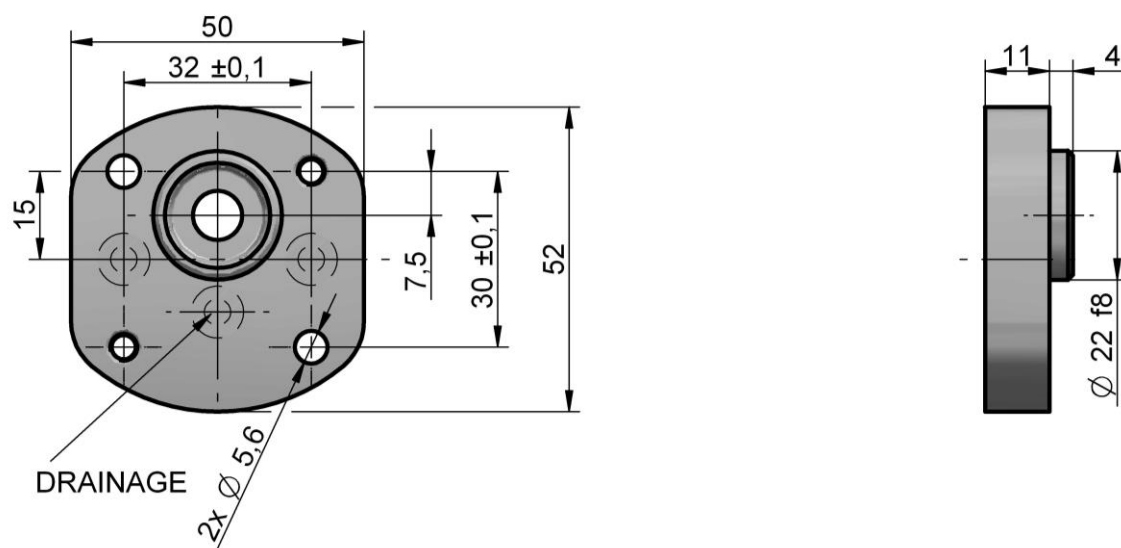
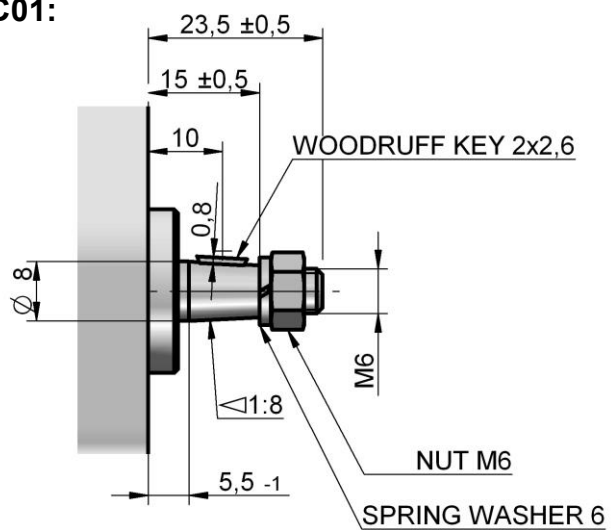
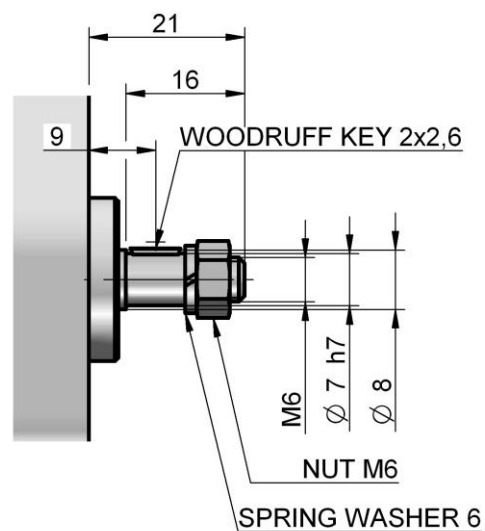
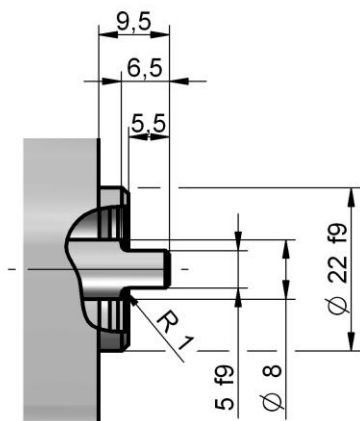
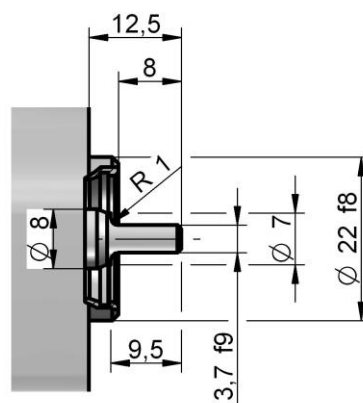
### FLANGE DESIGN

#### R01:



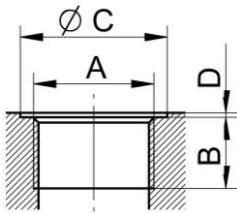
#### A01:



**A02:****DRIVE SHAFTS****C01:****V01:****K01:****K02:**

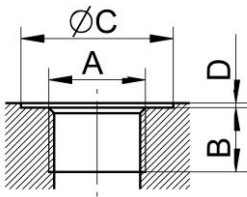
## LIQUID INLET AND OUTLET CONNECTION

Metric thread according to ISO 6149



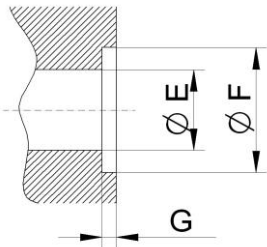
| Displacement<br>[cm <sup>3</sup> ] | Code                  | Inlet  |   |    |   | Code | Outlet |   |    |   |
|------------------------------------|-----------------------|--------|---|----|---|------|--------|---|----|---|
|                                    |                       | A      | B | C  | D |      | A      | B | C  | D |
| 0.18-0.5                           | M01                   | M 10x1 | 8 | 15 | 1 | M01  | M 10x1 | 8 | 15 | 1 |
| 0.5-3.2                            | Other types of inputs |        |   |    |   |      |        |   |    |   |

BSPP pipe thread ISO 228-1



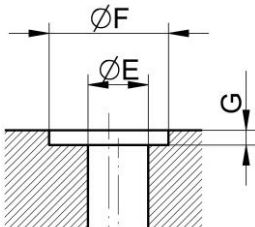
| Displacement<br>[cm <sup>3</sup> ] | Code | Inlet |    |    |   | Code | Outlet |    |    |   |
|------------------------------------|------|-------|----|----|---|------|--------|----|----|---|
|                                    |      | A     | B  | C  | D |      | A      | B  | C  | D |
| all                                | G01  | G 1/4 | 13 | 26 | 1 | G01  | G 1/4  | 13 | 26 | 1 |
|                                    | G02  | G 3/8 |    | 24 |   | G02  | G 3/8  |    | 24 |   |

Inlet / outlet in the flange



| Displacement<br>[cm <sup>3</sup> ] | Code | Inlet |     |     | Code | Outlet |     |     |
|------------------------------------|------|-------|-----|-----|------|--------|-----|-----|
|                                    |      | E     | F   | G   |      | E      | F   | G   |
| all                                | D01  | 4.5   | 8.9 | 1.1 | D01  | 4.5    | 8.9 | 1.1 |
|                                    | D02  |       | 9.5 | 1.3 | D02  |        | 9.5 | 1.3 |

Inlet / outlet in the flange

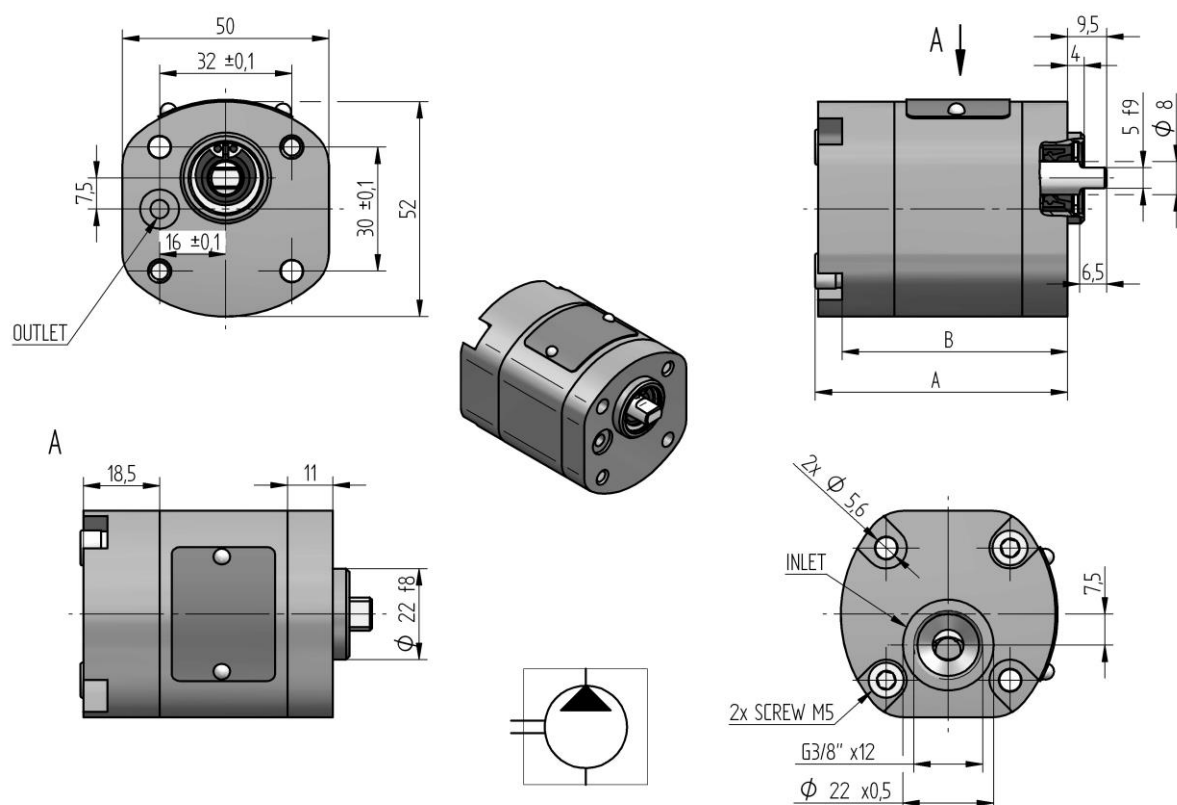


| Displacement<br>[cm <sup>3</sup> ] | Code | Inlet |     |     | Code | Outlet |     |     |
|------------------------------------|------|-------|-----|-----|------|--------|-----|-----|
|                                    |      | E     | F   | G   |      | E      | F   | G   |
| all                                | P01  | 4.5   | 8.9 | 1.1 | P01  | 4.5    | 8.9 | 1.1 |

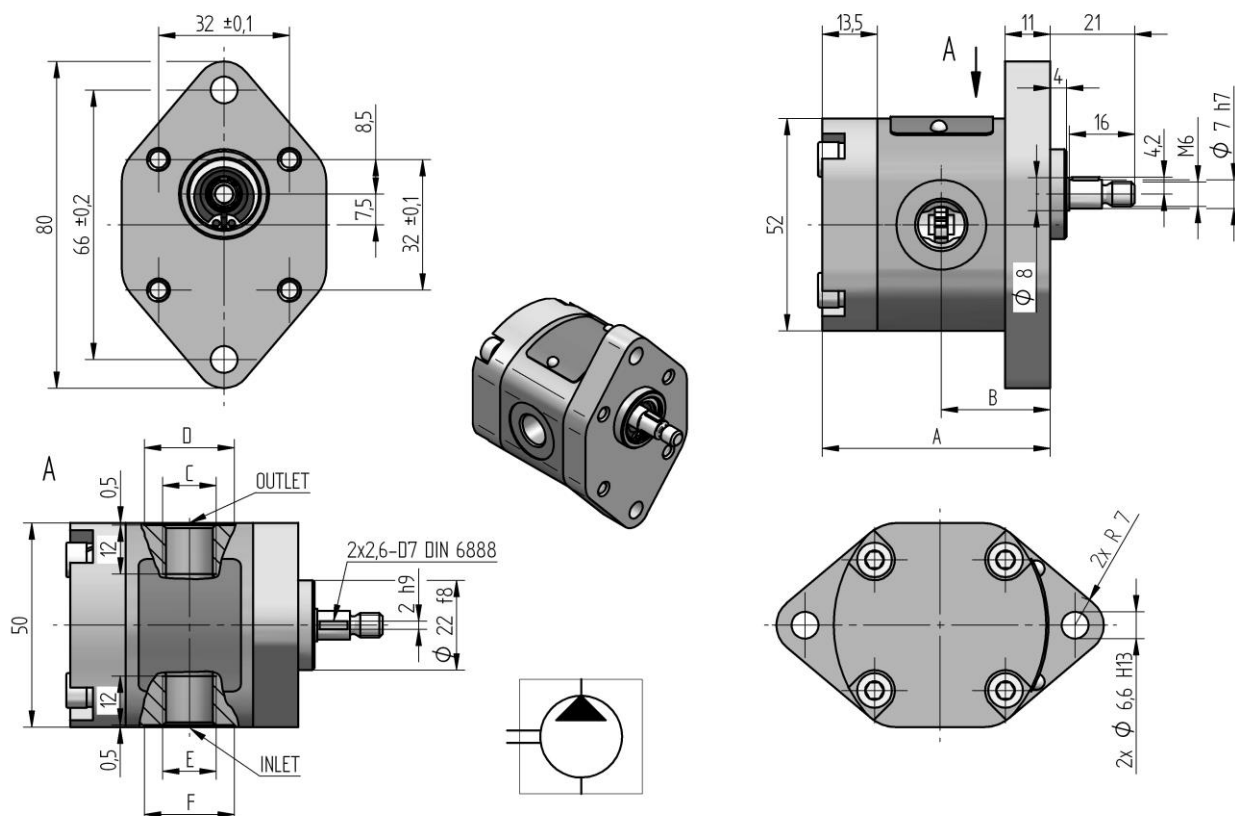
Drain:

| Displacement<br>[cm <sup>3</sup> ] | Code | Outlet |     |     | Code | Outlet |   |    |   |
|------------------------------------|------|--------|-----|-----|------|--------|---|----|---|
|                                    |      | E      | F   | G   |      | A      | B | C  | D |
| all                                | D01  | 4,5    | 8,9 | 1,1 | M01  | M10x1  | 8 | 15 | 1 |

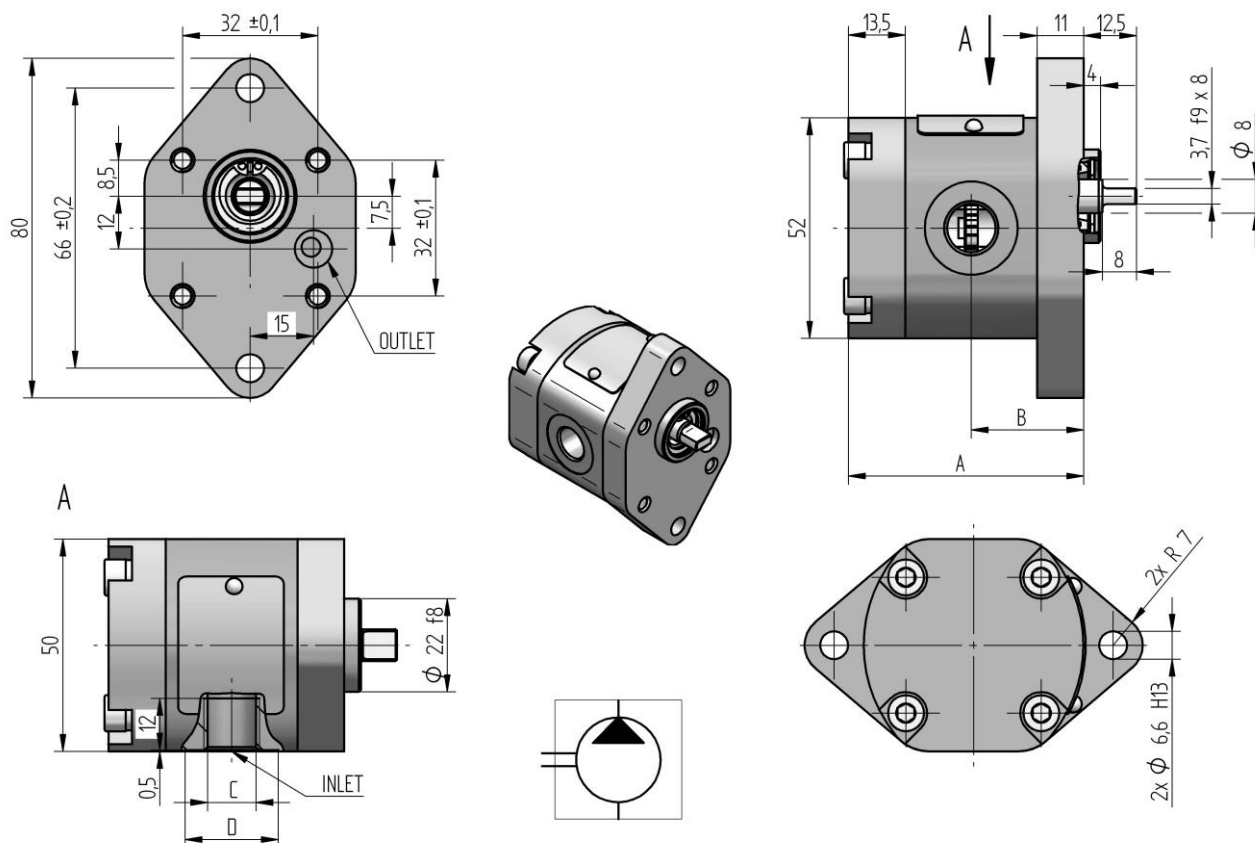
## CATALOGUE SHETS OF 0.5 SERIES BASIC DESIGNS



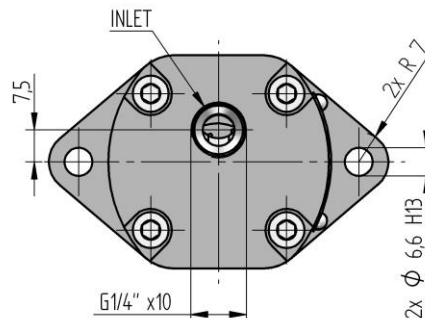
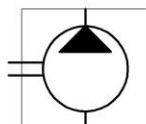
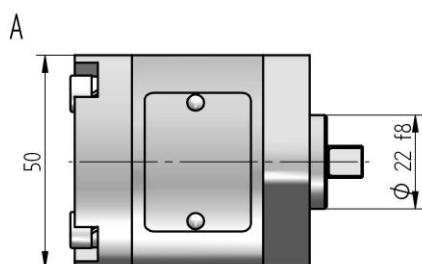
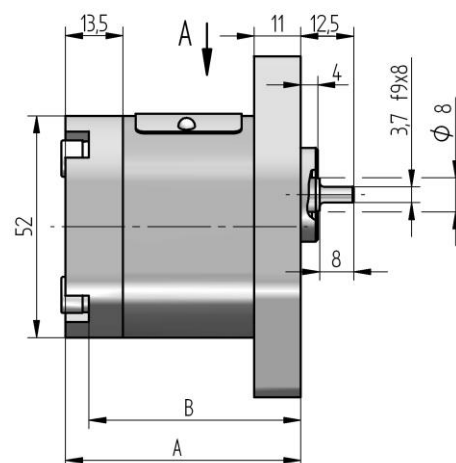
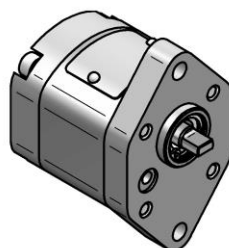
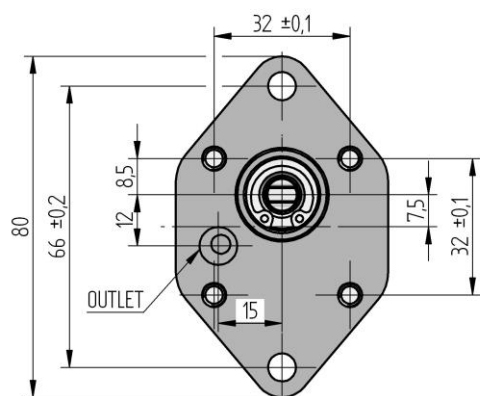
|                            |             |                |                                   |                   |                                 |                                 |      |      |   |   |   |   |
|----------------------------|-------------|----------------|-----------------------------------|-------------------|---------------------------------|---------------------------------|------|------|---|---|---|---|
| 0.5-3.20R-A02K01-AG02D02-N |             | R              | 3.2                               | 60                | 500                             | 1 800                           | 85   | 79.2 |   |   |   |   |
| 0.5-3.20L-A02K01-AG02D02-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-2.50R-A02K01-AG02D02-N |             | R              | 2.5                               | 90                | 500                             | 2 500                           | 79.1 | 73.3 |   |   |   |   |
| 0.5-2.50L-A02K01-AG02D02-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-2.00R-A02K01-AG02D02-N |             | R              | 2                                 | 120               | 600                             | 2 800                           | 74.8 | 69   |   |   |   |   |
| 0.5-2.00L-A02K01-AG02D02-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-1.50R-A02K01-AG02D02-N |             | R              | 1.5                               | 160               | 800                             | 3 000                           | 70.6 | 64.8 |   |   |   |   |
| 0.5-1.50L-A02K01-AG02D02-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-1.25R-A02K01-AG02D02-N |             | R              | 1.25                              | 200               | 800                             | 4 000                           | 68.4 | 62.6 |   |   |   |   |
| 0.5-1.25L-A02K01-AG02D02-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-1.00R-A02K01-AG02D02-N |             | R              | 1                                 | 200               | 800                             | 5 000                           | 66.2 | 60.4 |   |   |   |   |
| 0.5-1.00L-A02K01-AG02D02-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-0.80R-A02K01-AG02D02-N |             | R              | 0.8                               | 220               | 1 000                           | 6 000                           | 64.5 | 58.7 |   |   |   |   |
| 0.5-0.80L-A02K01-AG02D02-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-0.70R-A02K01-AG02D02-N |             | R              | 0.7                               | 220               | 1 000                           | 6 000                           | 63.7 | 57.9 |   |   |   |   |
| 0.5-0.70L-A02K01-AG02D02-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-0.63R-A02K01-AG02D02-N |             | R              | 0.63                              | 220               | 1 000                           | 6 000                           | 63   | 57.2 |   |   |   |   |
| 0.5-0.63L-A02K01-AG02D02-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-0.50R-A02K01-AG02D02-N |             | R              | 0.5                               | 230               | 1 000                           | 6 000                           | 61.9 | 56.1 |   |   |   |   |
| 0.5-0.50L-A02K01-AG02D02-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-0.40R-A02K01-AG02D02-N |             | R              | 0.4                               | 230               | 1 000                           | 7 000                           | 61.1 | 55.3 |   |   |   |   |
| 0.5-0.40L-A02K01-AG02D02-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-0.36R-A02K01-AG02D02-N |             | R              | 0.36                              | 230               | 1 000                           | 7 000                           | 60.7 | 54.9 |   |   |   |   |
| 0.5-0.36L-A02K01-AG02D02-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-0.32R-A02K01-AG02D02-N |             | R              | 0.32                              | 230               | 1 000                           | 7 000                           | 60.4 | 54.6 |   |   |   |   |
| 0.5-0.32L-A02K01-AG02D02-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-0.25R-A02K01-AG02D02-N |             | R              | 0.25                              | 230               | 1 000                           | 7 000                           | 59.8 | 54   |   |   |   |   |
| 0.5-0.25L-A02K01-AG02D02-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-0.18R-A02K01-AG02D02-N |             | R              | 0.18                              | 200               | 1 000                           | 8 000                           | 59.1 | 53.3 |   |   |   |   |
| 0.5-0.18L-A02K01-AG02D02-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| ORDER KEY                  | PURCH. CODE | DIRECT OF ROT. | DISPLACEMENT [cm <sup>3</sup> /1] | NOM. PRESS. [bar] | MIN. SPEED [min <sup>-1</sup> ] | MAX. SPEED [min <sup>-1</sup> ] | A    | B    | C | D | E | F |
| DIMENSION [mm]             |             |                |                                   |                   |                                 |                                 |      |      |   |   |   |   |



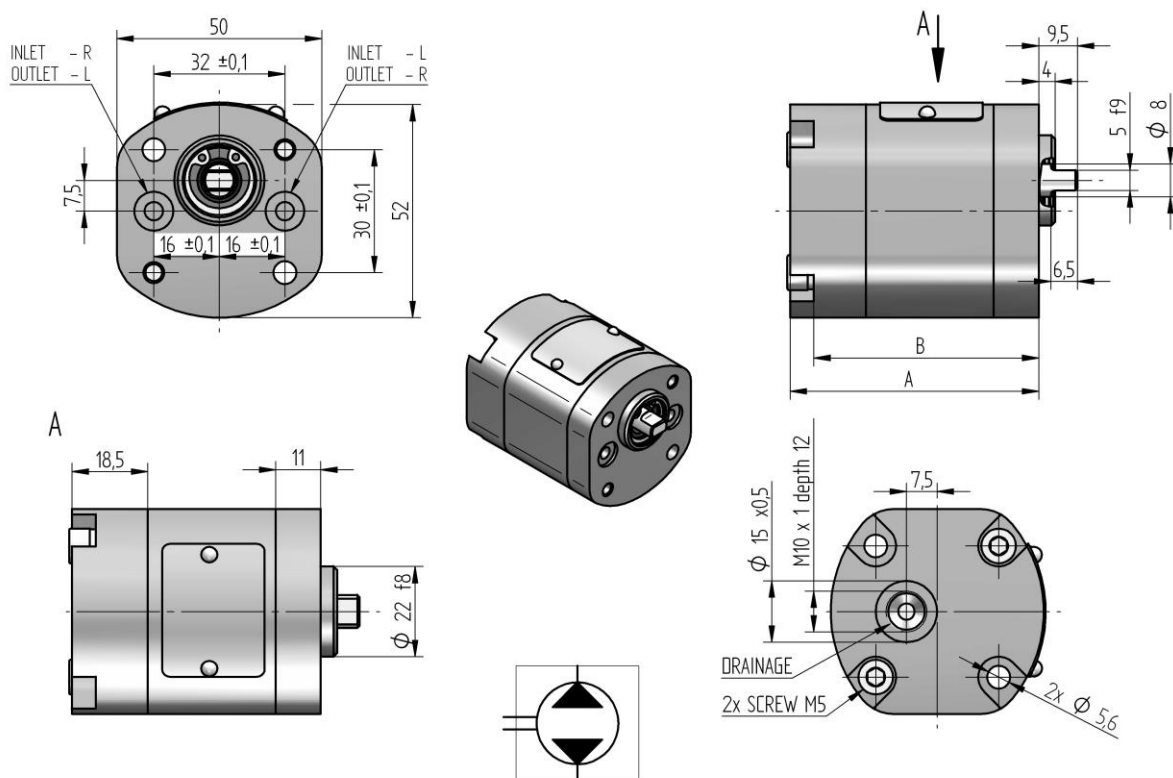
|                             |             |                |                      |                   |                    |                    |      |      |       |      |       |      |
|-----------------------------|-------------|----------------|----------------------|-------------------|--------------------|--------------------|------|------|-------|------|-------|------|
| 0.5-3.20R- R01V01-SG01G01-N |             | R              | 3.2                  | 60                | 500                | 1 800              | 80   | 38.8 | G 1/4 | Ø 22 | G 1/4 | Ø 22 |
| 0.5-3.20L- R01V01-SG01G01-N |             | L              |                      |                   |                    |                    |      |      |       |      |       |      |
| 0.5-2.50R- R01V01-SG01G01-N |             | R              | 2.5                  | 90                | 500                | 2 500              | 74.1 | 35.8 | G 1/4 | Ø 22 | G 1/4 | Ø 22 |
| 0.5-2.50L- R01V01-SG01G01-N |             | L              |                      |                   |                    |                    |      |      |       |      |       |      |
| 0.5-2.00R- R01V01-SG01G01-N |             | R              | 2                    | 120               | 600                | 2 800              | 69.8 | 33.7 | G 1/4 | Ø 22 | G 1/4 | Ø 22 |
| 0.5-2.00L- R01V01-SG01G01-N |             | L              |                      |                   |                    |                    |      |      |       |      |       |      |
| 0.5-1.50R- R01V01-SG01G01-N |             | R              | 1.5                  | 160               | 800                | 3 000              | 65.6 | 31.6 | G 1/4 | Ø 22 | G 1/4 | Ø 22 |
| 0.5-1.50L- R01V01-SG01G01-N |             | L              |                      |                   |                    |                    |      |      |       |      |       |      |
| 0.5-1.25R- R01V01-SG01G01-N |             | R              | 1.25                 | 200               | 800                | 4 000              | 63.4 | 30.5 | G 1/4 | Ø 22 | G 1/4 | Ø 22 |
| 0.5-1.25L- R01V01-SG01G01-N |             | L              |                      |                   |                    |                    |      |      |       |      |       |      |
| 0.5-1.00R- R01V01-SG01G01-N |             | R              | 1                    | 200               | 800                | 5 000              | 61.2 | 29.4 | G 1/4 | Ø 22 | G 1/4 | Ø 22 |
| 0.5-1.00L- R01V01-SG01G01-N |             | L              |                      |                   |                    |                    |      |      |       |      |       |      |
| 0.5-0.80R- R01V01-SG01G01-N |             | R              | 0.8                  | 220               | 1 000              | 6 000              | 59.5 | 28.5 | G 1/4 | Ø 22 | G 1/4 | Ø 22 |
| 0.5-0.80L- R01V01-SG01G01-N |             | L              |                      |                   |                    |                    |      |      |       |      |       |      |
| 0.5-0.70R- R01V01-SG01G01-N |             | R              | 0.7                  | 220               | 1 000              | 6 000              | 58.7 | 28.1 | G 1/4 | Ø 22 | G 1/4 | Ø 22 |
| 0.5-0.70L- R01V01-SG01G01-N |             | L              |                      |                   |                    |                    |      |      |       |      |       |      |
| 0.5-0.63R- R01V01-SG01G01-N |             | R              | 0.63                 | 220               | 1 000              | 6 000              | 58   | 27.8 | G 1/4 | Ø 22 | G 1/4 | Ø 22 |
| 0.5-0.63L- R01V01-SG01G01-N |             | L              |                      |                   |                    |                    |      |      |       |      |       |      |
| 0.5-0.50R- R01V01-SG01G01-N |             | R              | 0.5                  | 230               | 1 000              | 6 000              | 56.9 | 27.2 | G 1/4 | Ø 22 | G 1/4 | Ø 22 |
| 0.5-0.50L- R01V01-SG01G01-N |             | L              |                      |                   |                    |                    |      |      |       |      |       |      |
| 0.5-0.40R- R01V01-SG01G01-N |             | R              | 0.4                  | 230               | 1 000              | 7 000              | 56.1 | 26.8 | G 1/4 | Ø 22 | G 1/4 | Ø 22 |
| 0.5-0.40L- R01V01-SG01G01-N |             | L              |                      |                   |                    |                    |      |      |       |      |       |      |
| 0.5-0.36R- R01V01-SG01G01-N |             | R              | 0.36                 | 230               | 1 000              | 7 000              | 55.7 | 26.6 | G 1/4 | Ø 22 | G 1/4 | Ø 22 |
| 0.5-0.36L- R01V01-SG01G01-N |             | L              |                      |                   |                    |                    |      |      |       |      |       |      |
| 0.5-0.32R- R01V01-SG01G01-N |             | R              | 0.32                 | 230               | 1 000              | 7 000              | 55.4 | 26.5 | G 1/4 | Ø 22 | G 1/4 | Ø 22 |
| 0.5-0.32L- R01V01-SG01G01-N |             | L              |                      |                   |                    |                    |      |      |       |      |       |      |
| 0.5-0.25R- R01V01-SG01G01-N |             | R              | 0.25                 | 230               | 1 000              | 7 000              | 54.8 | 26.2 | G 1/4 | Ø 22 | G 1/4 | Ø 22 |
| 0.5-0.25L- R01V01-SG01G01-N |             | L              |                      |                   |                    |                    |      |      |       |      |       |      |
| 0.5-0.18R- R01V01-SG01G01-N |             | R              | 0.18                 | 200               | 1 000              | 8 000              | 54.1 | 25.8 | G 1/4 | Ø 22 | G 1/4 | Ø 22 |
| 0.5-0.18L- R01V01-SG01G01-N |             | L              |                      |                   |                    |                    |      |      |       |      |       |      |
| ORDER KEY                   | PURCH. CODE | DIRECT OF ROT. | DISPLACEMENT [cm³/1] | NOM. PRESS. [bar] | MIN. SPEED [min⁻¹] | MAX. SPEED [min⁻¹] | A    | B    | C     | D    | E     | F    |
| DIMENSION [mm]              |             |                |                      |                   |                    |                    |      |      |       |      |       |      |



| 0.5-3.20R- R01K02-CG01P01-N |             | R              | 3.2                                  | 60                   | 500                                | 1 800                              | 80   | 38.8 | G 1/4 | Ø 22 |   |   |
|-----------------------------|-------------|----------------|--------------------------------------|----------------------|------------------------------------|------------------------------------|------|------|-------|------|---|---|
| 0.5-3.20L- R01K02-CG01P01-N |             | L              | 3.2                                  | 60                   | 500                                | 1 800                              | 80   | 38.8 | G 1/4 | Ø 22 |   |   |
| 0.5-2.50R- R01K02-CG01P01-N |             | R              | 2.5                                  | 90                   | 500                                | 2 500                              | 74.1 | 35.8 | G 1/4 | Ø 22 |   |   |
| 0.5-2.50L- R01K02-CG01P01-N |             | L              | 2.5                                  | 90                   | 500                                | 2 500                              | 74.1 | 35.8 | G 1/4 | Ø 22 |   |   |
| 0.5-2.00R- R01K02-CG01P01-N |             | R              | 2                                    | 120                  | 600                                | 2 800                              | 69.8 | 33.7 | G 1/4 | Ø 22 |   |   |
| 0.5-2.00L- R01K02-CG01P01-N |             | L              | 2                                    | 120                  | 600                                | 2 800                              | 69.8 | 33.7 | G 1/4 | Ø 22 |   |   |
| 0.5-1.50R- R01K02-CG01P01-N |             | R              | 1.5                                  | 160                  | 800                                | 3 000                              | 65.6 | 31.6 | G 1/4 | Ø 22 |   |   |
| 0.5-1.50L- R01K02-CG01P01-N |             | L              | 1.5                                  | 160                  | 800                                | 3 000                              | 65.6 | 31.6 | G 1/4 | Ø 22 |   |   |
| 0.5-1.25R- R01K02-CG01P01-N |             | R              | 1.25                                 | 200                  | 800                                | 4 000                              | 63.4 | 30.5 | G 1/4 | Ø 22 |   |   |
| 0.5-1.25L- R01K02-CG01P01-N |             | L              | 1.25                                 | 200                  | 800                                | 4 000                              | 63.4 | 30.5 | G 1/4 | Ø 22 |   |   |
| 0.5-1.00R- R01K02-CG01P01-N |             | R              | 1                                    | 200                  | 800                                | 5 000                              | 61.2 | 29.4 | G 1/4 | Ø 22 |   |   |
| 0.5-1.00L- R01K02-CG01P01-N |             | L              | 1                                    | 200                  | 800                                | 5 000                              | 61.2 | 29.4 | G 1/4 | Ø 22 |   |   |
| 0.5-0.80R- R01K02-CG01P01-N |             | R              | 0.8                                  | 220                  | 1 000                              | 6 000                              | 59.5 | 28.5 | G 1/4 | Ø 22 |   |   |
| 0.5-0.80L- R01K02-CG01P01-N |             | L              | 0.8                                  | 220                  | 1 000                              | 6 000                              | 59.5 | 28.5 | G 1/4 | Ø 22 |   |   |
| 0.5-0.70R- R01K02-CG01P01-N |             | R              | 0.7                                  | 220                  | 1 000                              | 6 000                              | 58.7 | 28.1 | G 1/4 | Ø 22 |   |   |
| 0.5-0.70L- R01K02-CG01P01-N |             | L              | 0.7                                  | 220                  | 1 000                              | 6 000                              | 58.7 | 28.1 | G 1/4 | Ø 22 |   |   |
| 0.5-0.63R- R01K02-CG01P01-N |             | R              | 0.63                                 | 220                  | 1 000                              | 6 000                              | 58   | 27.8 | G 1/4 | Ø 22 |   |   |
| 0.5-0.63L- R01K02-CG01P01-N |             | L              | 0.63                                 | 220                  | 1 000                              | 6 000                              | 58   | 27.8 | G 1/4 | Ø 22 |   |   |
| 0.5-0.50R- R01K02-CG01P01-N |             | R              | 0.5                                  | 230                  | 1 000                              | 6 000                              | 56.9 | 27.2 | G 1/4 | Ø 22 |   |   |
| 0.5-0.50L- R01K02-CG01P01-N |             | L              | 0.5                                  | 230                  | 1 000                              | 6 000                              | 56.9 | 27.2 | G 1/4 | Ø 22 |   |   |
| 0.5-0.40R- R01K02-CG01P01-N |             | R              | 0.4                                  | 230                  | 1 000                              | 7 000                              | 56.1 | 26.8 | G 1/4 | Ø 22 |   |   |
| 0.5-0.40L- R01K02-CG01P01-N |             | L              | 0.4                                  | 230                  | 1 000                              | 7 000                              | 56.1 | 26.8 | G 1/4 | Ø 22 |   |   |
| 0.5-0.36R- R01K02-CG01P01-N |             | R              | 0.36                                 | 230                  | 1 000                              | 7 000                              | 55.7 | 26.6 | G 1/4 | Ø 22 |   |   |
| 0.5-0.36L- R01K02-CG01P01-N |             | L              | 0.36                                 | 230                  | 1 000                              | 7 000                              | 55.7 | 26.6 | G 1/4 | Ø 22 |   |   |
| 0.5-0.32R- R01K02-CG01P01-N |             | R              | 0.32                                 | 230                  | 1 000                              | 7 000                              | 55.4 | 26.5 | G 1/4 | Ø 22 |   |   |
| 0.5-0.32L- R01K02-CG01P01-N |             | L              | 0.32                                 | 230                  | 1 000                              | 7 000                              | 55.4 | 26.5 | G 1/4 | Ø 22 |   |   |
| 0.5-0.25R- R01K02-CG01P01-N |             | R              | 0.25                                 | 230                  | 1 000                              | 7 000                              | 54.8 | 26.2 | G 1/4 | Ø 22 |   |   |
| 0.5-0.25L- R01K02-CG01P01-N |             | L              | 0.25                                 | 230                  | 1 000                              | 7 000                              | 54.8 | 26.2 | G 1/4 | Ø 22 |   |   |
| 0.5-0.18R- R01K02-CG01P01-N |             | R              | 0.18                                 | 200                  | 1 000                              | 8 000                              | 54.1 | 25.8 | G 1/4 | Ø 22 |   |   |
| 0.5-0.18L- R01K02-CG01P01-N |             | L              | 0.18                                 | 200                  | 1 000                              | 8 000                              | 54.1 | 25.8 | G 1/4 | Ø 22 |   |   |
| ORDER KEY                   | PURCH. CODE | DIRECT OF ROT. | DISPLACEMENT<br>[cm <sup>3</sup> /1] | NOM. PRESS.<br>[bar] | MIN. SPEED<br>[min <sup>-1</sup> ] | MAX. SPEED<br>[min <sup>-1</sup> ] | A    | B    | C     | D    | E | F |
| DIMENSION<br>[mm]           |             |                |                                      |                      |                                    |                                    |      |      |       |      |   |   |



|                             |             |                |                                   |                   |                                 |                                 |      |      |   |   |   |   |
|-----------------------------|-------------|----------------|-----------------------------------|-------------------|---------------------------------|---------------------------------|------|------|---|---|---|---|
| 0.5-3.20R- R01K02-AG01P01-N |             | R              | 3.2                               | 60                | 500                             | 1 800                           | 80   | 74.5 |   |   |   |   |
| 0.5-3.20L- R01K02-AG01P01-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-2.50R- R01K02-AG01P01-N |             | R              | 2.5                               | 90                | 500                             | 2 500                           | 74.1 | 68.6 |   |   |   |   |
| 0.5-2.50L- R01K02-AG01P01-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-2.00R- R01K02-AG01P01-N |             | R              | 2                                 | 120               | 600                             | 2 800                           | 69.8 | 64.3 |   |   |   |   |
| 0.5-2.00L- R01K02-AG01P01-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-1.50R- R01K02-AG01P01-N |             | R              | 1.5                               | 160               | 800                             | 3 000                           | 65.6 | 60.1 |   |   |   |   |
| 0.5-1.50L- R01K02-AG01P01-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-1.25R- R01K02-AG01P01-N |             | R              | 1.25                              | 200               | 800                             | 4 000                           | 63.4 | 57.9 |   |   |   |   |
| 0.5-1.25L- R01K02-AG01P01-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-1.00R- R01K02-AG01P01-N |             | R              | 1                                 | 200               | 800                             | 5 000                           | 61.2 | 55.7 |   |   |   |   |
| 0.5-1.00L- R01K02-AG01P01-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-0.80R- R01K02-AG01P01-N |             | R              | 0.8                               | 220               | 1 000                           | 6 000                           | 59.5 | 54   |   |   |   |   |
| 0.5-0.80L- R01K02-AG01P01-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-0.70R- R01K02-AG01P01-N |             | R              | 0.7                               | 220               | 1 000                           | 6 000                           | 58.7 | 53.2 |   |   |   |   |
| 0.5-0.70L- R01K02-AG01P01-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-0.63R- R01K02-AG01P01-N |             | R              | 0.63                              | 220               | 1 000                           | 6 000                           | 58   | 52.5 |   |   |   |   |
| 0.5-0.63L- R01K02-AG01P01-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-0.50R- R01K02-AG01P01-N |             | R              | 0.5                               | 230               | 1 000                           | 6 000                           | 56.9 | 51.4 |   |   |   |   |
| 0.5-0.50L- R01K02-AG01P01-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-0.40R- R01K02-AG01P01-N |             | R              | 0.4                               | 230               | 1 000                           | 7 000                           | 56.1 | 50.6 |   |   |   |   |
| 0.5-0.40L- R01K02-AG01P01-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-0.36R- R01K02-AG01P01-N |             | R              | 0.36                              | 230               | 1 000                           | 7 000                           | 55.7 | 50.2 |   |   |   |   |
| 0.5-0.36L- R01K02-AG01P01-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-0.32R- R01K02-AG01P01-N |             | R              | 0.32                              | 230               | 1 000                           | 7 000                           | 55.4 | 49.9 |   |   |   |   |
| 0.5-0.32L- R01K02-AG01P01-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-0.25R- R01K02-AG01P01-N |             | R              | 0.25                              | 230               | 1 000                           | 7 000                           | 54.8 | 49.3 |   |   |   |   |
| 0.5-0.25L- R01K02-AG01P01-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| 0.5-0.18R- R01K02-AG01P01-N |             | R              | 0.18                              | 200               | 1 000                           | 8 000                           | 54.1 | 48.6 |   |   |   |   |
| 0.5-0.18L- R01K02-AG01P01-N |             | L              |                                   |                   |                                 |                                 |      |      |   |   |   |   |
| ORDER KEY                   | PURCH. CODE | DIRECT OF ROT. | DISPLACEMENT [cm <sup>3</sup> /l] | NOM. PRESS. [bar] | MIN. SPEED [min <sup>-1</sup> ] | MAX. SPEED [min <sup>-1</sup> ] | A    | B    | C | D | E | F |
| DIMENSION [mm]              |             |                |                                   |                   |                                 |                                 |      |      |   |   |   |   |



| 0.5-3.20B-A02K01-FD02D02-N |             | B              | 3.2                                  | 60                   | 500                                | 1 800                              | 85   | 79.2 |   |   |   |   |
|----------------------------|-------------|----------------|--------------------------------------|----------------------|------------------------------------|------------------------------------|------|------|---|---|---|---|
| 0.5-2.50B-A02K01-FD02D02-N |             | B              | 2.5                                  | 90                   | 500                                | 2 500                              | 79.1 | 73.3 |   |   |   |   |
| 0.5-2.00B-A02K01-FD02D02-N |             | B              | 2                                    | 120                  | 600                                | 2 800                              | 74.8 | 69   |   |   |   |   |
| 0.5-1.50B-A02K01-FD02D02-N |             | B              | 1.5                                  | 160                  | 800                                | 3 000                              | 70.6 | 64.8 |   |   |   |   |
| 0.5-1.25B-A02K01-FD02D02-N |             | B              | 1.25                                 | 200                  | 800                                | 4 000                              | 68.4 | 62.6 |   |   |   |   |
| 0.5-1.00B-A02K01-FD02D02-N |             | B              | 1                                    | 200                  | 800                                | 5 000                              | 66.2 | 60.4 |   |   |   |   |
| 0.5-0.80B-A02K01-FD02D02-N |             | B              | 0.8                                  | 220                  | 1 000                              | 6 000                              | 64.5 | 58.7 |   |   |   |   |
| 0.5-0.70B-A02K01-FD02D02-N |             | B              | 0.7                                  | 220                  | 1 000                              | 6 000                              | 63.7 | 57.9 |   |   |   |   |
| 0.5-0.63B-A02K01-FD02D02-N |             | B              | 0.63                                 | 220                  | 1 000                              | 6 000                              | 63   | 57.2 |   |   |   |   |
| 0.5-0.50B-A02K01-FD02D02-N |             | B              | 0.5                                  | 230                  | 1 000                              | 6 000                              | 61.9 | 56.1 |   |   |   |   |
| 0.5-0.40B-A02K01-FD02D02-N |             | B              | 0.4                                  | 230                  | 1 000                              | 7 000                              | 61.1 | 55.3 |   |   |   |   |
| 0.5-0.36B-A02K01-FD02D02-N |             | B              | 0.36                                 | 230                  | 1 000                              | 7 000                              | 60.7 | 54.9 |   |   |   |   |
| 0.5-0.32B-A02K01-FD02D02-N |             | B              | 0.32                                 | 230                  | 1 000                              | 7 000                              | 60.4 | 54.6 |   |   |   |   |
| 0.5-0.25B-A02K01-FD02D02-N |             | B              | 0.25                                 | 230                  | 1 000                              | 7 000                              | 59.8 | 54   |   |   |   |   |
| 0.5-0.18B-A02K01-FD02D02-N |             | B              | 0.18                                 | 200                  | 1 000                              | 8 000                              | 59.1 | 53.3 |   |   |   |   |
| ORDER KEY                  | PURCH. CODE | DIRECT OF ROT. | DISPLACEMENT<br>[cm <sup>3</sup> /1] | NOM. PRESS.<br>[bar] | MIN. SPEED<br>[min <sup>-1</sup> ] | MAX. SPEED<br>[min <sup>-1</sup> ] | A    | B    | C | D | E | F |
| DIMENSION<br>[mm]          |             |                |                                      |                      |                                    |                                    |      |      |   |   |   |   |

[illegible]