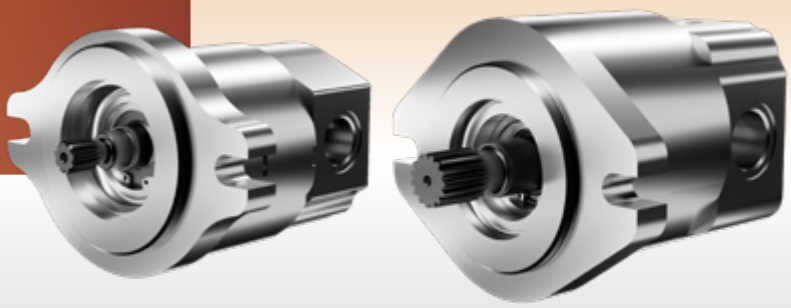
# EIMQ2
# EIMQ3

## Internal gear hydraulic motors



## 4-quadrant technology for maximum efficiency

eckerle.com

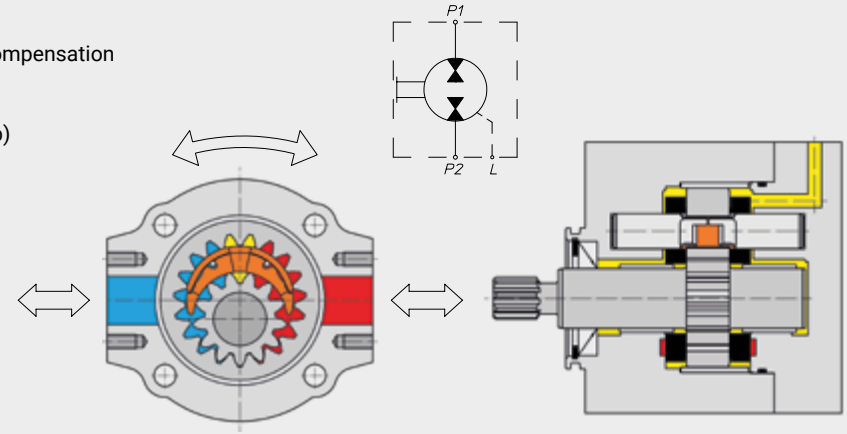
eckerle
HYDRAULIC DIVISION

# Internal gear hydraulic motors Typ EIMQ2 with constant displacement volume



## Features

- Internal gear hydraulic motor with axial and radial gap compensation
- 4-quadrant capability
- Simultaneous operation in 2 quadrants (motor and pump)
- Radial compensation with segments
- Application: Industrial & mobile hydraulics
- Low noise
- Long service life
- Low pulsation (pressure pulsation ~2%)
- Pressure-holding operation possible at low speeds




## Technical data

| Rated size [NG] | 005 | 006 | 008 | 011 | 013 |
|---|---|---|---|---|---|
| Spec. volume Vth [cm3/rev]*** | 5,4 | 6,4 | 7,8 | 10,8 | 13,3 |
| Continuous operating pressure [bar]** | 300 | | | | |
| Peak pressure [bar]**** | 330 | | | | |
| Nominal speed [min⁻¹] | 250 - 2.800<br>250 - 3.300 (motor) | | | 250 - 2.500<br>250 - 3.000 (motor) | |
| Max. speed [min⁻¹] | 4.800<br>6.000 (motor) | | | 4.500<br>6.000 (motor) | |
| Operating viscosity [mm²/s] | 10 – 300 | | | | |
| Starting viscosity [mm²/s] | 2.000 | | | | |
| Operating medium***** | HL – HLP DIN 51 524 part 1/2 | | | | |
| Operating temperature [°C] | -20 to +100 | | | | |
| Max. medium temperature [°C] | 100 | | | | |
| Min. medium temperature [°C] | -20 | | | | |
| Max. ambient temperature [°C] | 80 | | | | |
| Min. ambient temperature [°C] | -20 | | | | |
| Max. system pressure [bar] | 10 bar absolute<br>(pressure peaks up to 12 bar) | | | | |
| Min. system pressure [bar] | 0,8 bar absolute (start 0,6) | | | | |
| Degree of filtration | Class 20/18/15 due to ISO 4406 | | | | |
| Life expectancy | At least 5x $10^6$ cycles against continuous operating pressure<br>At least 10x $10^6$ cycles against 0.9 * continuous operating pressure | | | | |
| Efficiency η vol [%] | 91 | 92 | 93 | 94 | 94 |
| Efficiency η hm [%] | 86 | 87 | 88 | 91 | 90 |
| Pump noise level* (measured in anechoic chamber) [dB(A)] | 55 | 55 | 56 | 57 | 58 |

n = 1.450 min⁻¹ Δ p = 250 bar T = 50 °C Medium: HLP 46

* Measured in the sound measurement chamber, Eckerle Hydraulic Division; microphone distance: 1.0 m axial
** For permissible pressures at speeds from 400 to 1,800 rpm. Please inquire for higher speeds.
*** Due to manufacturing tolerances, slight deviations in the flow rate may occur.
**** Pressure-resistant against 100,000 switch-on peaks, maximum pressure change rates of 15,000 bar/s
***** Brugger value min. 30N/mm² recommended 50N/mm² for servo applications.

The internal gear hydraulic motors do not have corrosion protection. The limit values must not be applied cumulatively. Please feel free to inquire if you have any questions.

# Internal gear hydraulic motors Typ EIMQ3 with constant displacement volume



## Description

Eckerle internal gear hydraulic motors are gap-compensated and offer excellent controllability across the entire operating range thanks to their high efficiency and low viscosity and temperature dependence.

Due to their symmetrical design, the motors of the EIMQ type can operate in both directions of rotation as a pump or as a motor. In addition, the inlet side can also be pressurized in pump mode. This results in very high potentials for energy savings.

## Applications

- Bending machines
- Construction machinery
- Elevators
- Landing gear controls
- Industrial trucks
- Plastic injection machines
- Steering systems
- Presses
- Fan drives

## Technical data

| Rated size [NG] | 016 | 020 | 025 |
|---|---|---|---|
| Spec. volume Vth [cm3/rev]*** | 15,8 | 20,0 | 24,5 |
| Continuous operating pressure [bar]** | 300 | | |
| Peak pressure [bar]**** | 330 | | |
| Nominal speed [min⁻¹] | 250 - 2.800<br>250 - 3.300 (motor) | 250 - 2.500<br>250 - 3.000 (motor) | |
| Max. speed [min⁻¹] | 4.800<br>6.000 (motor) | 4.500<br>6.000 (motor) | |
| Operating viscosity [mm²/s] | 10 – 300 | | |
| Starting viscosity [mm²/s] | 2.000 | | |
| Operating medium***** | HL – HLP DIN 51 524 part 1/2 | | |
| Operating temperature [°C] | -20 to +100 | | |
| Max. medium temperature [°C] | 100 | | |
| Min. medium temperature [°C] | -20 | | |
| Max. ambient temperature [°C] | 80 | | |
| Min. ambient temperature [°C] | -20 | | |
| Max. system pressure [bar] | 10 bar absolute<br>(pressure peaks up to 12 bar) | | |
| Min. system pressure [bar] | 0,8 bar absolute (start 0,6) | | |
| Degree of filtration | Class 20/18/15 due to ISO 4406 | | |
| Life expectancy | At least 5x $10^6$ cycles against continuous operating pressure<br>At least 10x $10^6$ cycles against 0.9 * continuous operating pressure | | |
| Efficiency η vol [%] | 94 | 95 | 95 |
| Efficiency η hm [%] | 89 | 90 | 90 |
| Pump noise level* (measured in anechoic chamber) [dB(A)] | 59 | 60 | 61 |

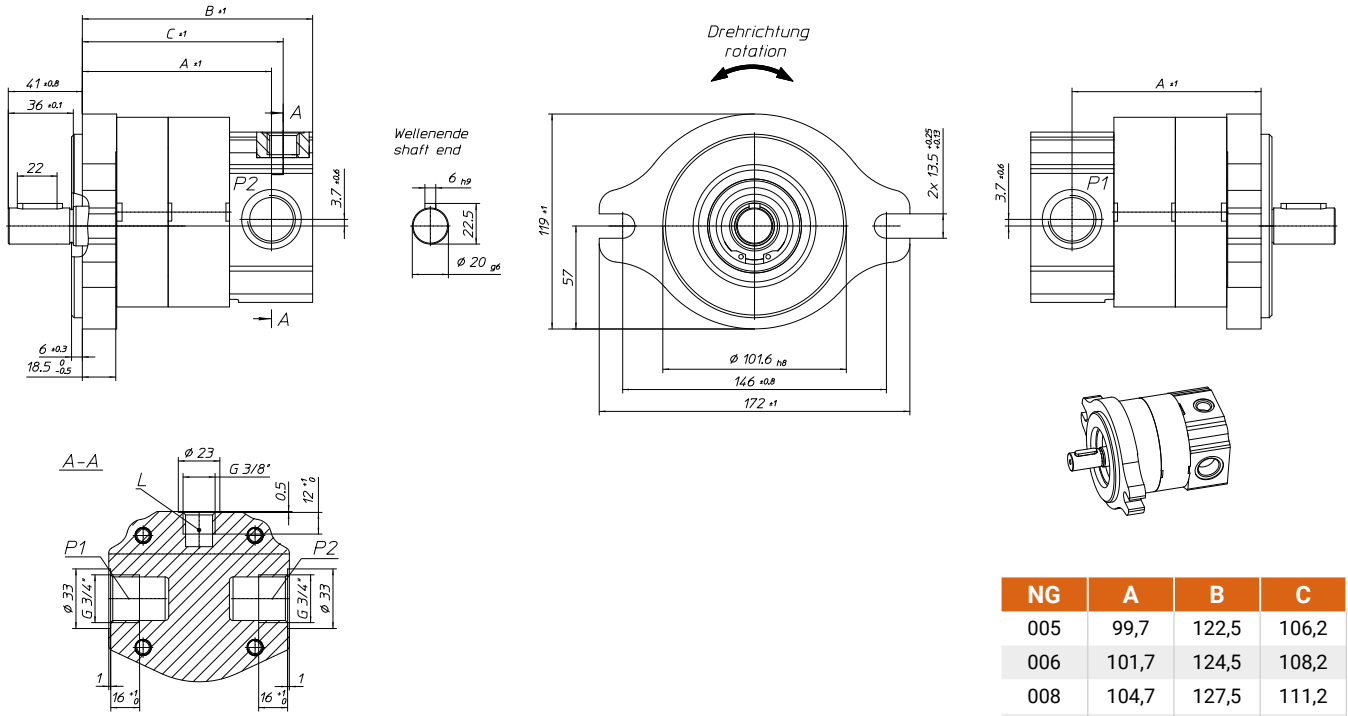
n = 1.450 $min^{-1}$ Δ p = 250 bar T = 50 °C Medium: HLP 46

* Measured in the sound measurement chamber, Eckerle Hydraulic Division; microphone distance: 1.0 m axial
** For permissible pressures at speeds from 400 to 1,800 rpm. Please inquire for higher speeds.
*** Due to manufacturing tolerances, slight deviations in the flow rate may occur.
**** Pressure-resistant against 100,000 switch-on peaks, maximum pressure change rates of 15,000 bar/s
***** Brugger value min. 30N/mm² recommended 50N/mm² for servo applications.

The internal gear hydraulic motors do not have corrosion protection. The limit values must not be applied cumulatively. Please feel free to inquire if you have any questions.

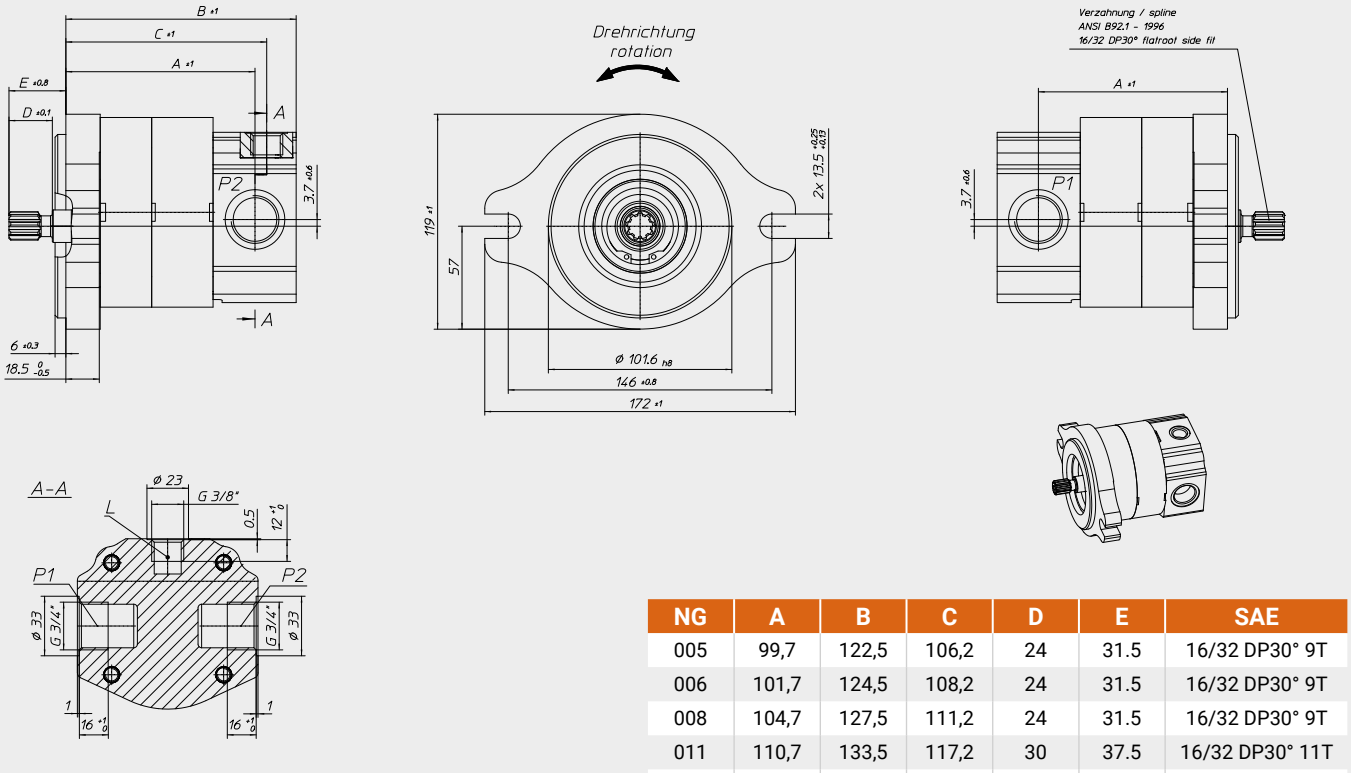
# Dimensions

## Order example: EIMQ2-xxxXA21-1




| NG | A | B | C |
|---|---|---|---|
| 005 | 99,7 | 122,5 | 106,2 |
| 006 | 101,7 | 124,5 | 108,2 |
| 008 | 104,7 | 127,5 | 111,2 |
| 011 | 110,7 | 133,5 | 117,2 |
| 013 | 115,7 | 138,5 | 122,2 |

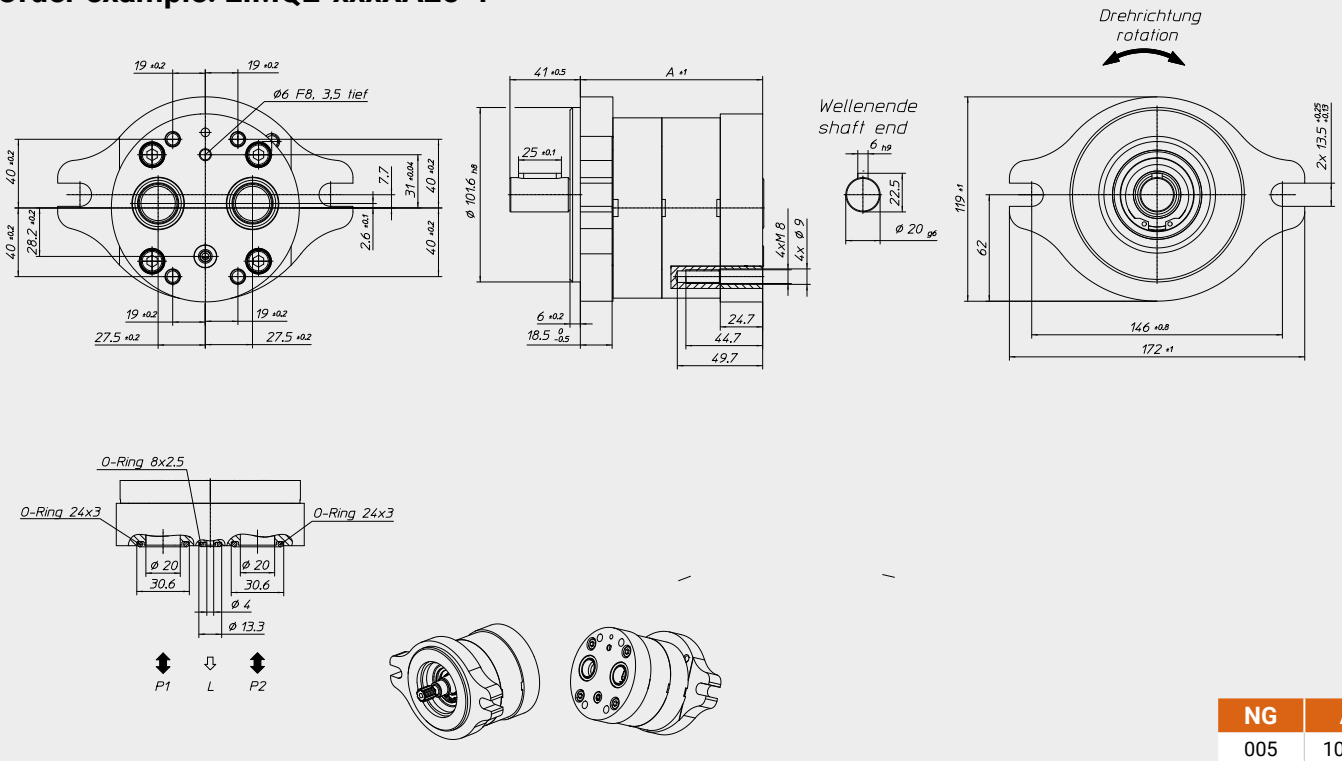
## Order example: EIMQ2-xxxXB21-1




| NG | A | B | C | D | E | SAE |
|---|---|---|---|---|---|---|
| 005 | 99,7 | 122,5 | 106,2 | 24 | 31.5 | 16/32 DP30° 9T |
| 006 | 101,7 | 124,5 | 108,2 | 24 | 31.5 | 16/32 DP30° 9T |
| 008 | 104,7 | 127,5 | 111,2 | 24 | 31.5 | 16/32 DP30° 9T |
| 011 | 110,7 | 133,5 | 117,2 | 30 | 37.5 | 16/32 DP30° 11T |
| 013 | 115,7 | 138,5 | 122,2 | 30 | 37.5 | 16/32 DP30° 11T |

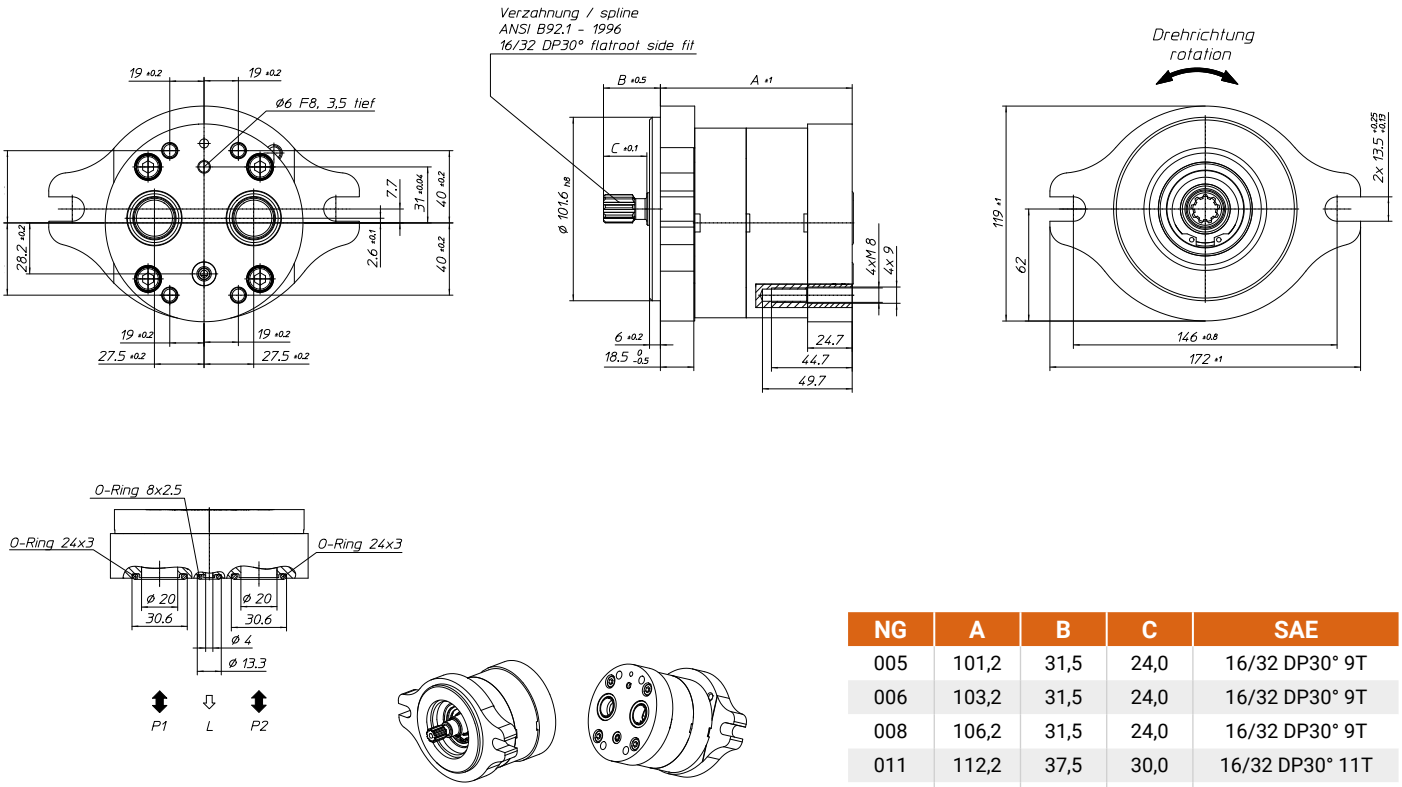
# Dimensions

## Order example: EIMQ2-xxxXA25-1




| NG | A |
|---|---|
| 005 | 101.2 |
| 006 | 103.2 |
| 008 | 106.2 |
| 011 | 112.2 |
| 013 | 117.2 |

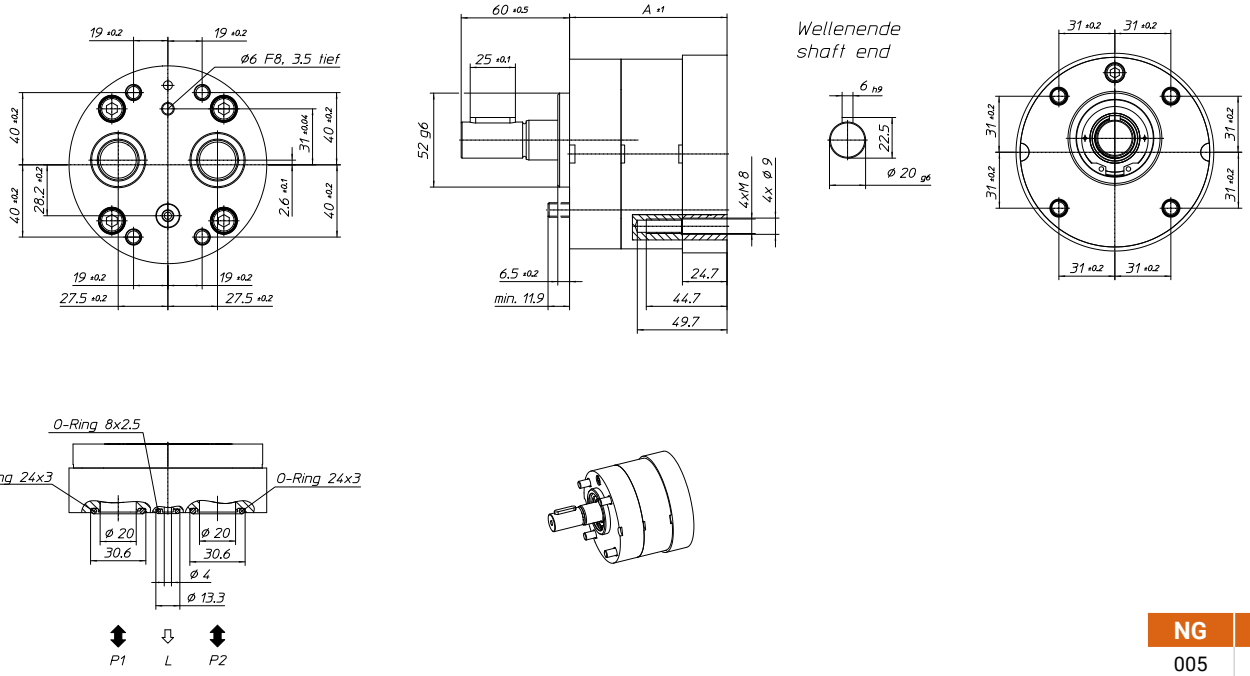
## Order example: EIMQ2-xxxXB25-1x




| NG | A | B | C | SAE |
|---|---|---|---|---|
| 005 | 101,2 | 31,5 | 24,0 | 16/32 DP30° 9T |
| 006 | 103,2 | 31,5 | 24,0 | 16/32 DP30° 9T |
| 008 | 106,2 | 31,5 | 24,0 | 16/32 DP30° 9T |
| 011 | 112,2 | 37,5 | 30,0 | 16/32 DP30° 11T |
| 013 | 117,2 | 37,5 | 30,0 | 16/32 DP30° 11T |

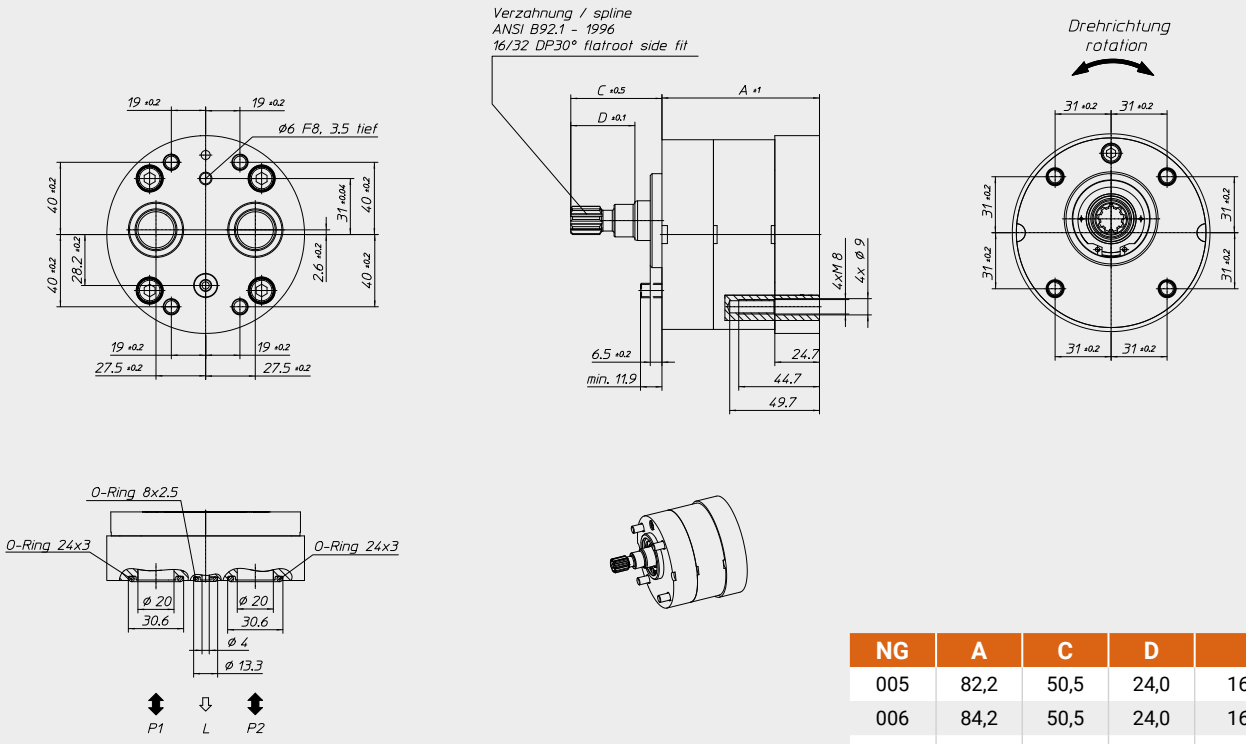
# Dimensions

## Order example: EIMQ2-xxxXA35-1x




| NG | A |
|---|---|
| 005 | 82,2 |
| 006 | 84,2 |
| 008 | 87,2 |
| 011 | 93,2 |
| 013 | 98,2 |

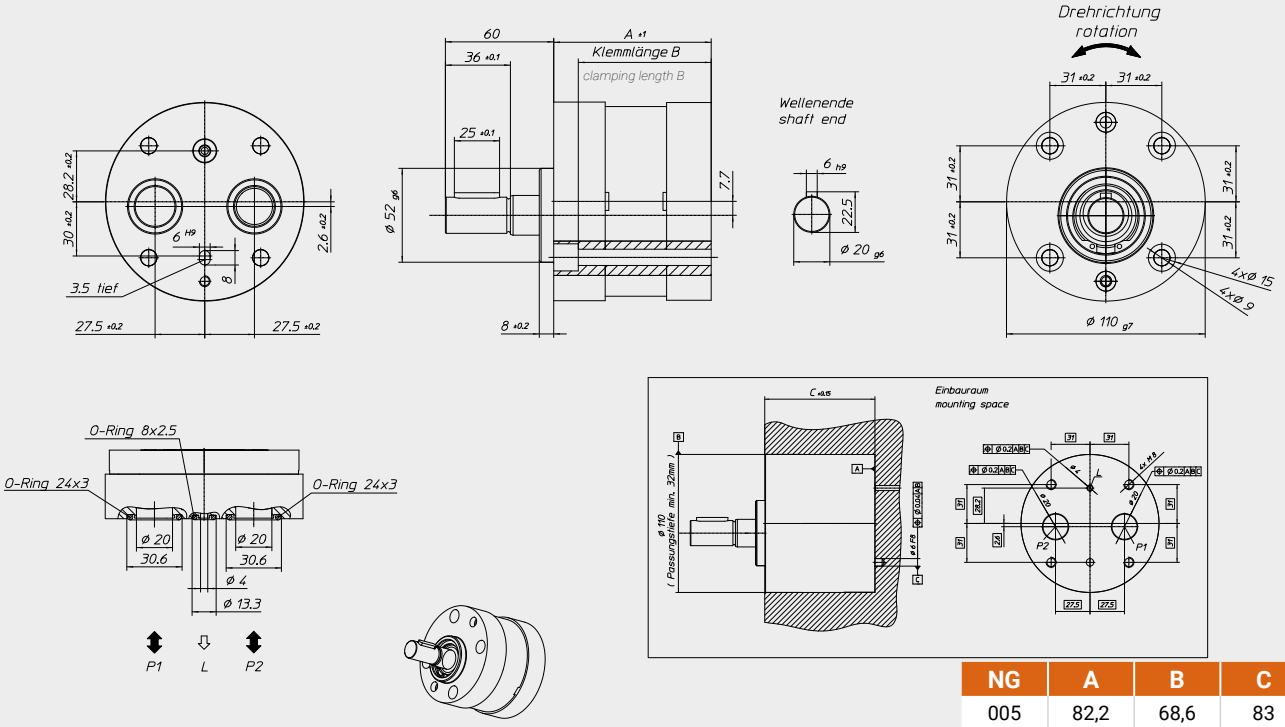
## Order example: EIMQ2-xxxXB35-1




| NG | A | C | D | SAE |
|---|---|---|---|---|
| 005 | 82,2 | 50,5 | 24,0 | 16/32 DP30° 9T |
| 006 | 84,2 | 50,5 | 24,0 | 16/32 DP30° 9T |
| 008 | 87,2 | 50,5 | 24,0 | 16/32 DP30° 9T |
| 011 | 93,2 | 56,5 | 30,0 | 16/32 DP30° 11T |
| 013 | 98,2 | 56,5 | 30,0 | 16/32 DP30° 11T |

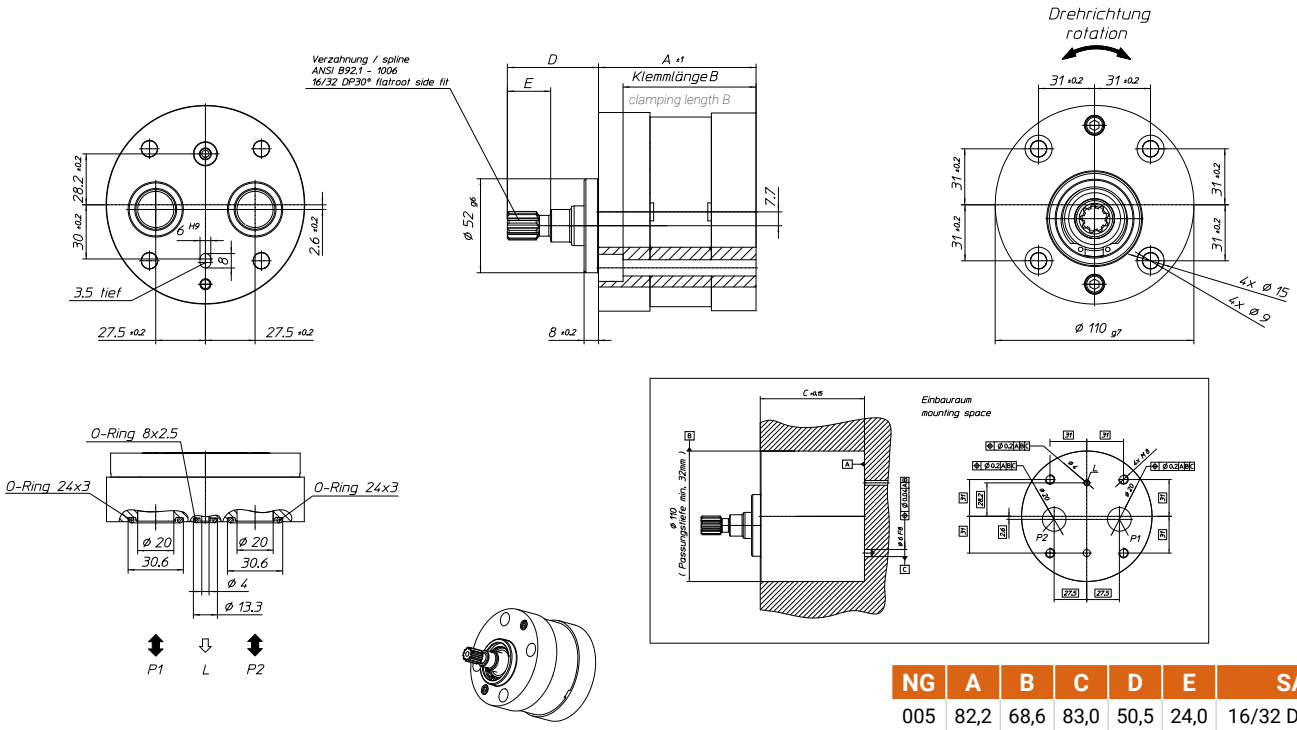
# Dimensions

## Order example: EIMQ2-xxxXA75-1




| NG | A | B | C |
|---|---|---|---|
| 005 | 82,2 | 68,6 | 83 |
| 006 | 84,2 | 70,6 | 85 |
| 008 | 87,2 | 73,6 | 88 |
| 011 | 93,2 | 79,6 | 94 |
| 013 | 98,2 | 84,6 | 99 |

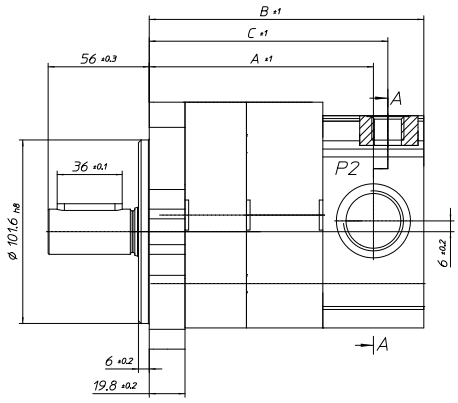
## Order example: EIMQ2-xxxXB75-1x

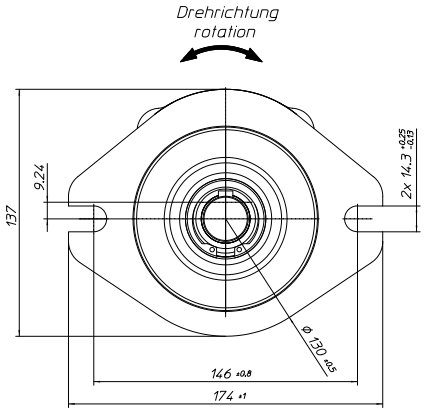


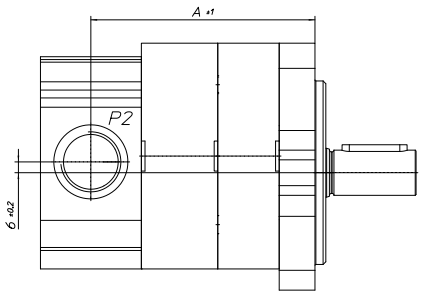

| NG | A | B | C | D | E | SAE |
|---|---|---|---|---|---|---|
| 005 | 82,2 | 68,6 | 83,0 | 50,5 | 24,0 | 16/32 DP30° 9T |
| 006 | 84,2 | 70,6 | 85,0 | 50,5 | 24,0 | 16/32 DP30° 9T |
| 008 | 87,2 | 73,6 | 88,0 | 50,5 | 24,0 | 16/32 DP30° 9T |
| 011 | 93,2 | 79,6 | 94,0 | 56,5 | 30,0 | 16/32 DP30° 11T |
| 013 | 98,2 | 84,6 | 99,0 | 56,5 | 30,0 | 16/32 DP30° 11T |

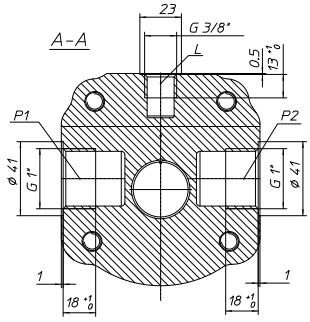
# Dimensions

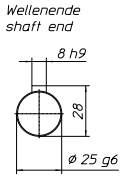
## Order example: EIMQ3-xxxXA21-1

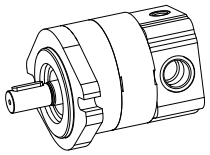


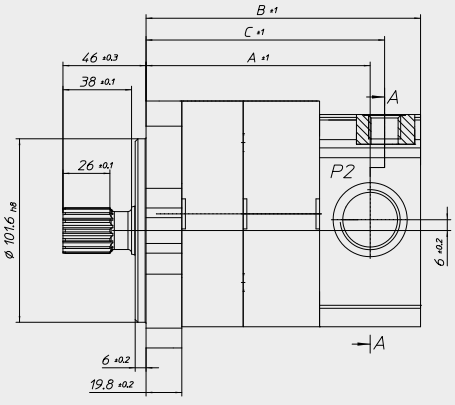



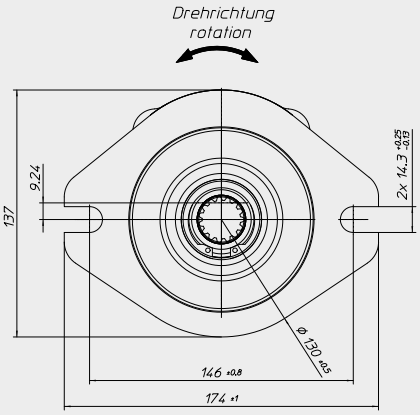



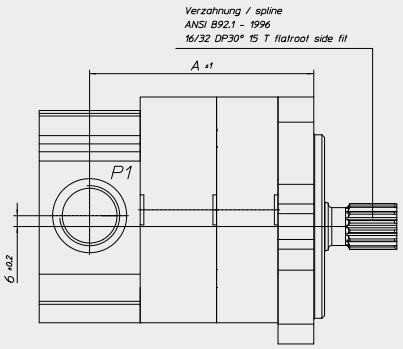



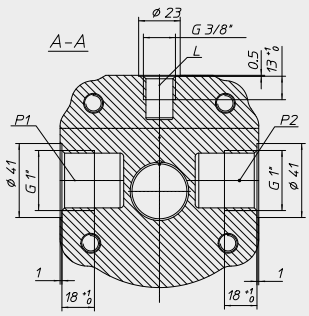
| NG | A | B | C |
|---|---|---|---|
| 016 | 118,6 | 146,5 | 126,6 |
| 020 | 124,1 | 152,0 | 132,1 |
| 025 | 130,6 | 158,5 | 138,6 |

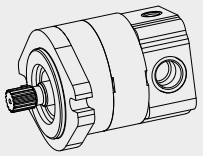
## Order example: EIMQ3-xxxXB21-1



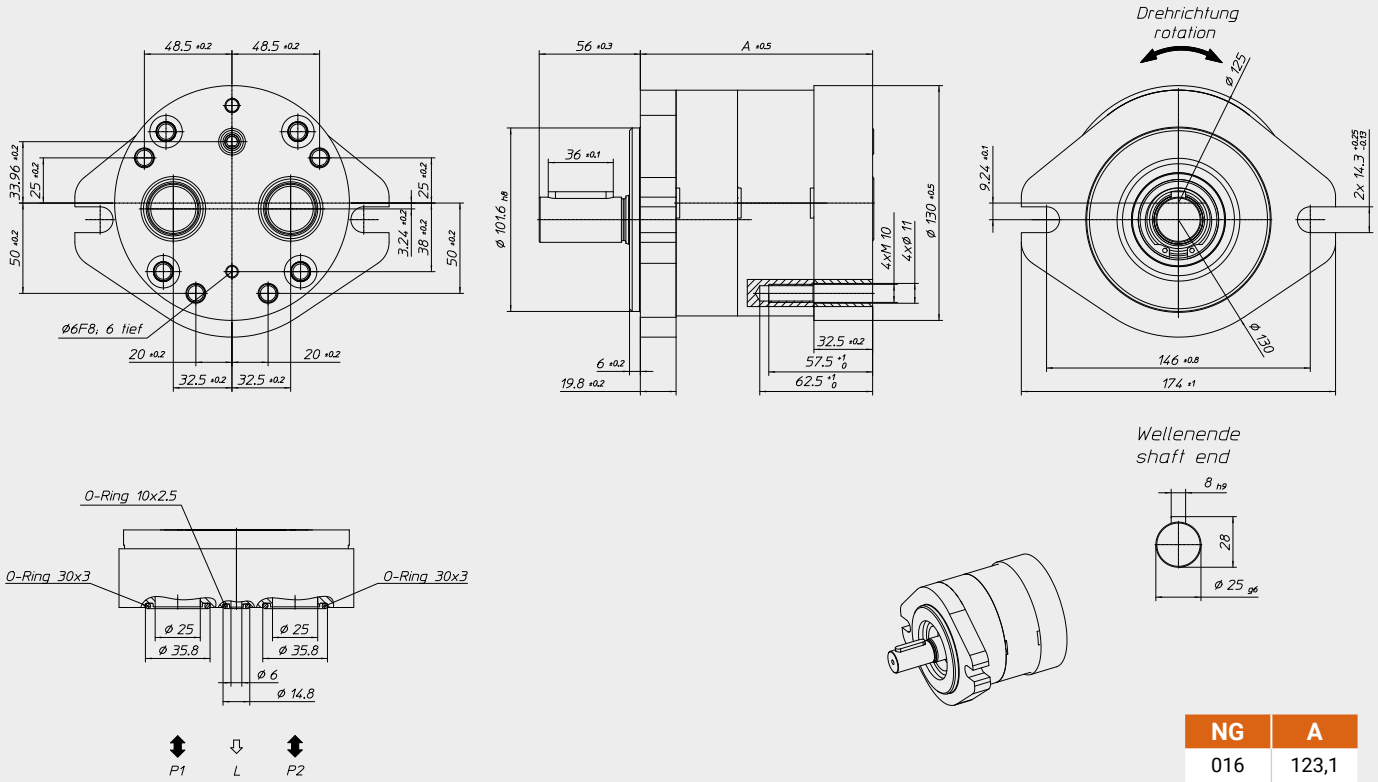



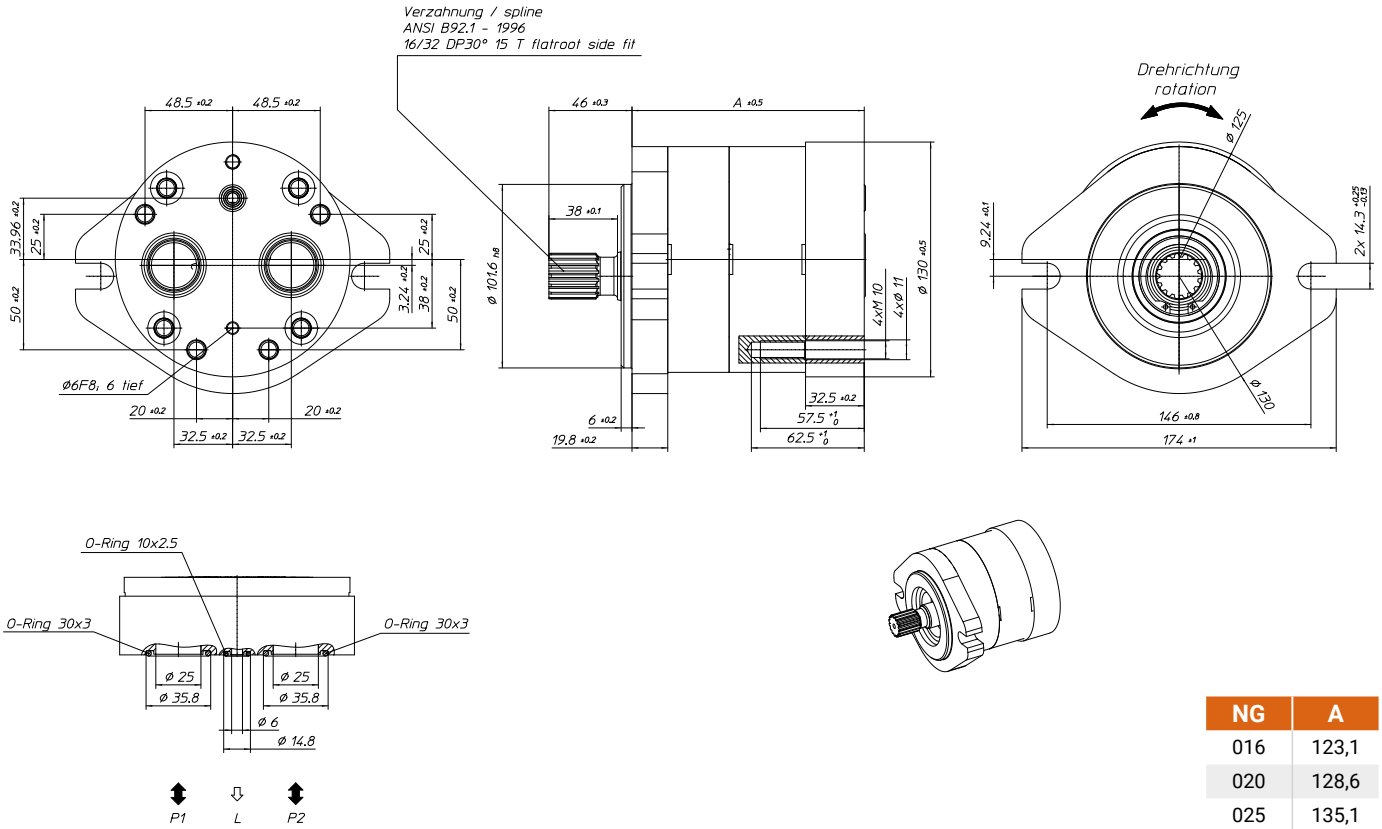
| NG | A | B | C |
|---|---|---|---|
| 016 | 118,6 | 146,5 | 126,6 |
| 020 | 124,1 | 152,0 | 132,1 |
| 025 | 130,6 | 158,5 | 138,6 |

## Order example: EIMQ3-xxxXA25-1




| NG | A |
|---|---|
| 016 | 123,1 |
| 020 | 128,6 |
| 025 | 135,1 |

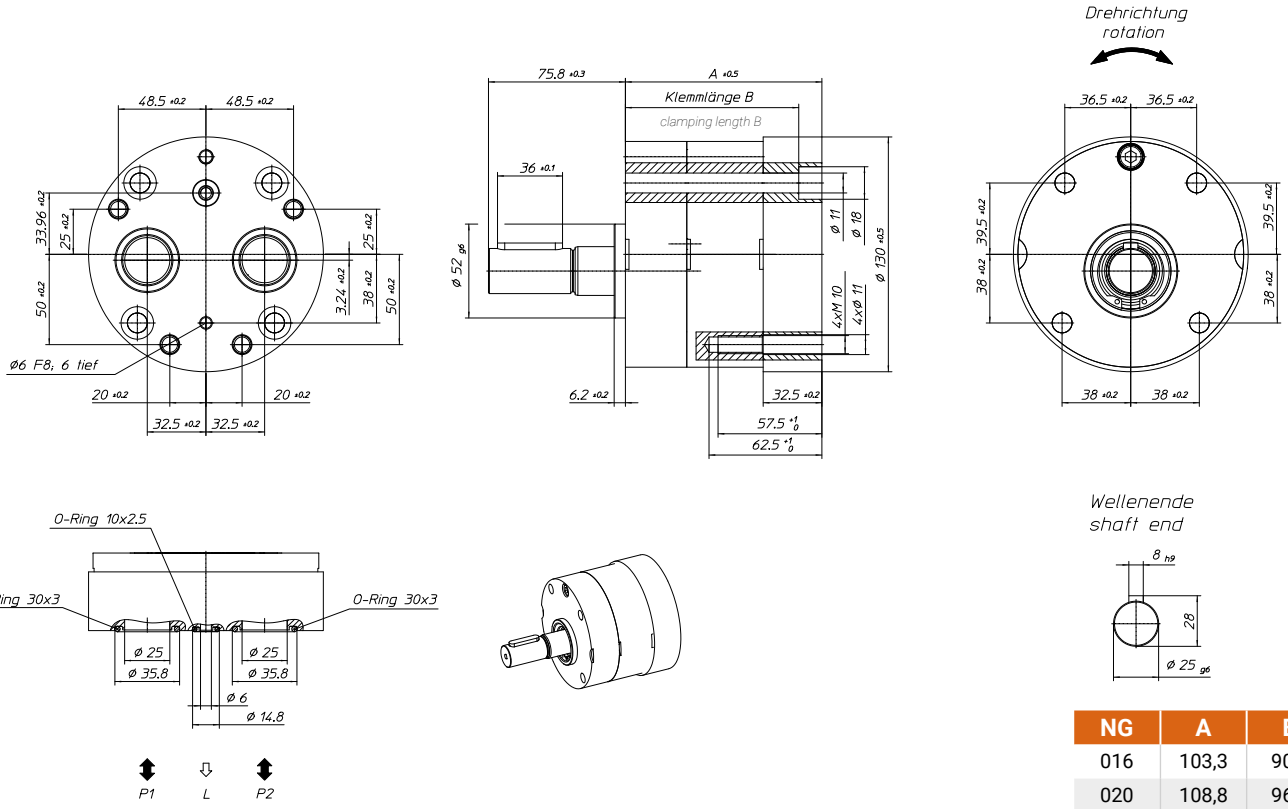
## Order example: EIMQ3-xxxXB25-1x




| NG | A |
|---|---|
| 016 | 123,1 |
| 020 | 128,6 |
| 025 | 135,1 |

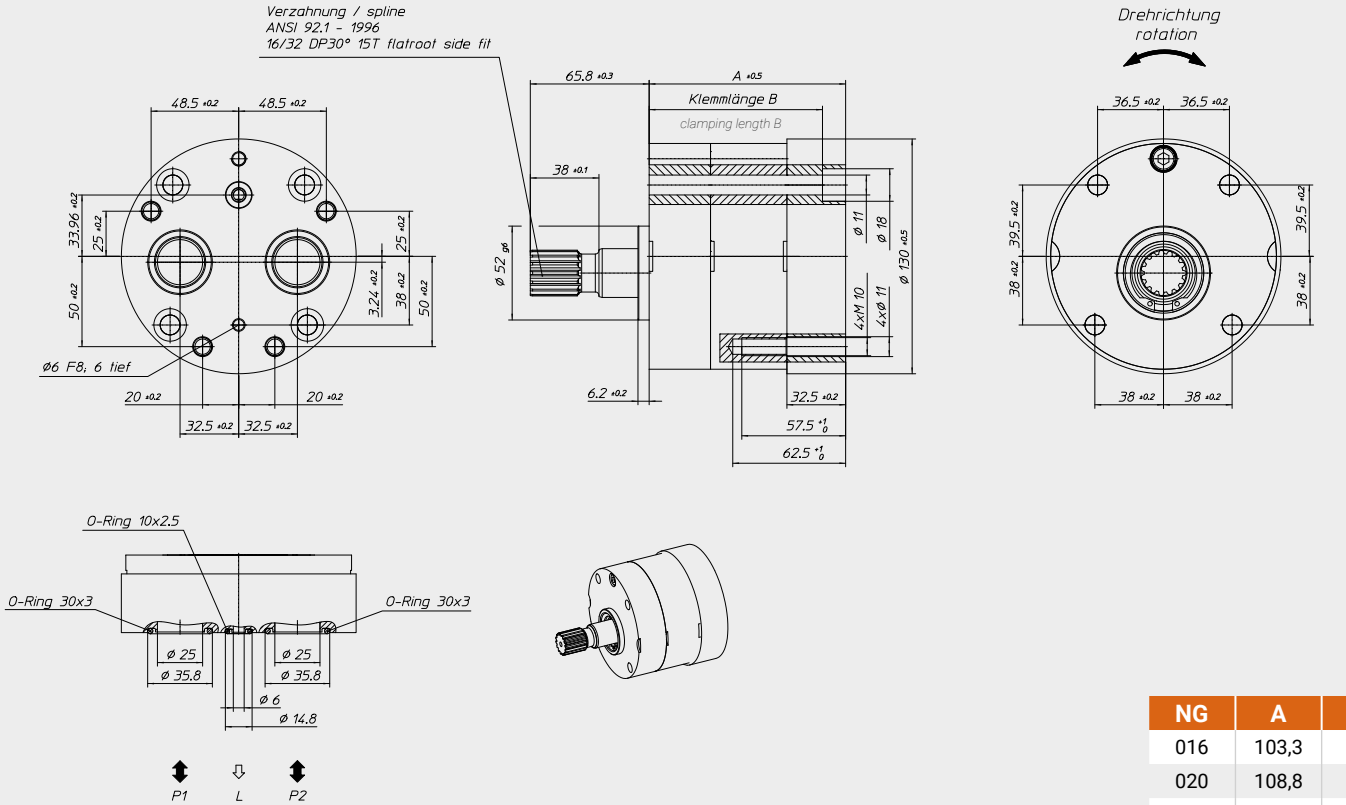
# Dimensions

## Order example: EIMQ3-xxxXA35-1x



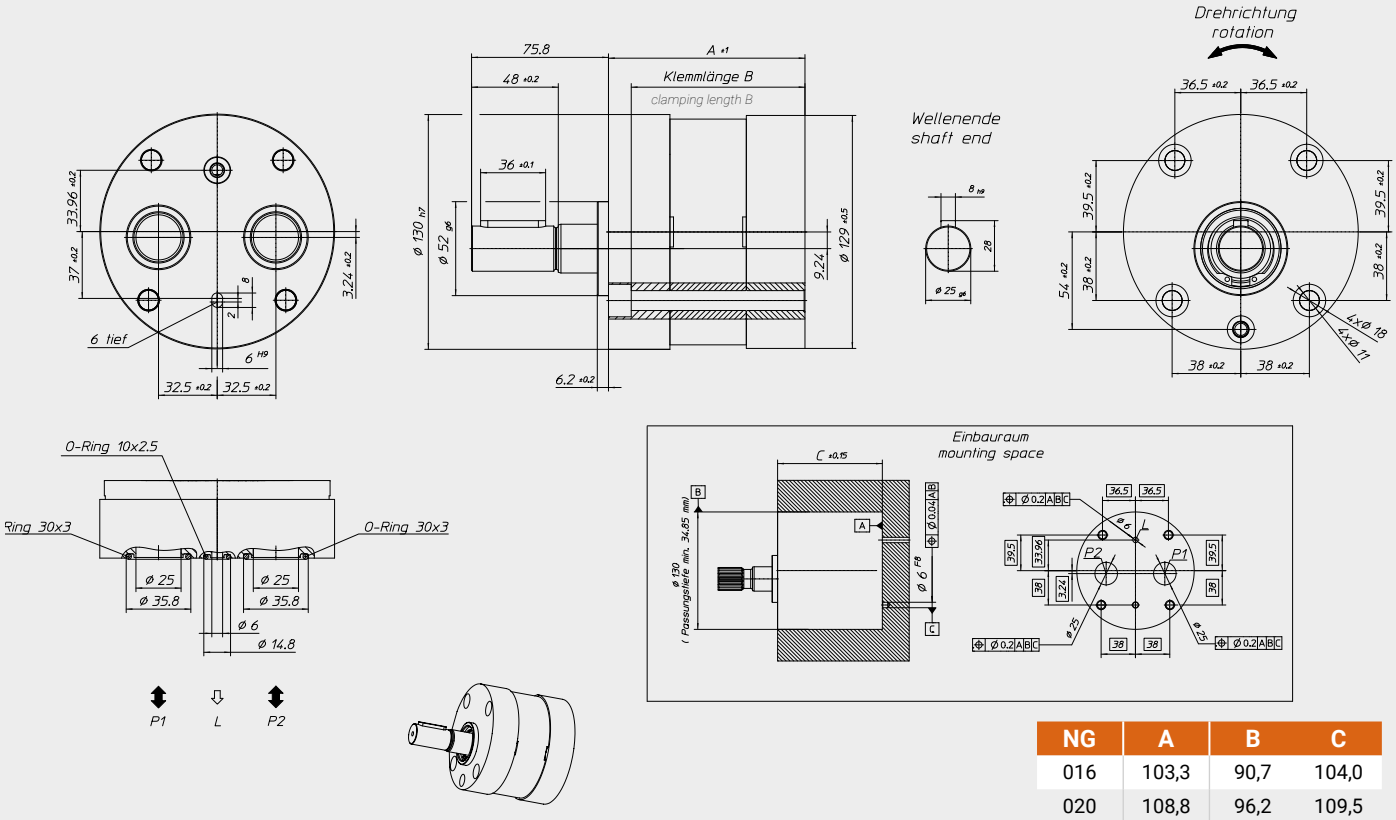

| NG | A | B |
|---|---|---|
| 016 | 103,3 | 90,5 |
| 020 | 108,8 | 96,0 |
| 025 | 115,3 | 102,5 |

## Order example: EIMQ3-xxxXB35-1



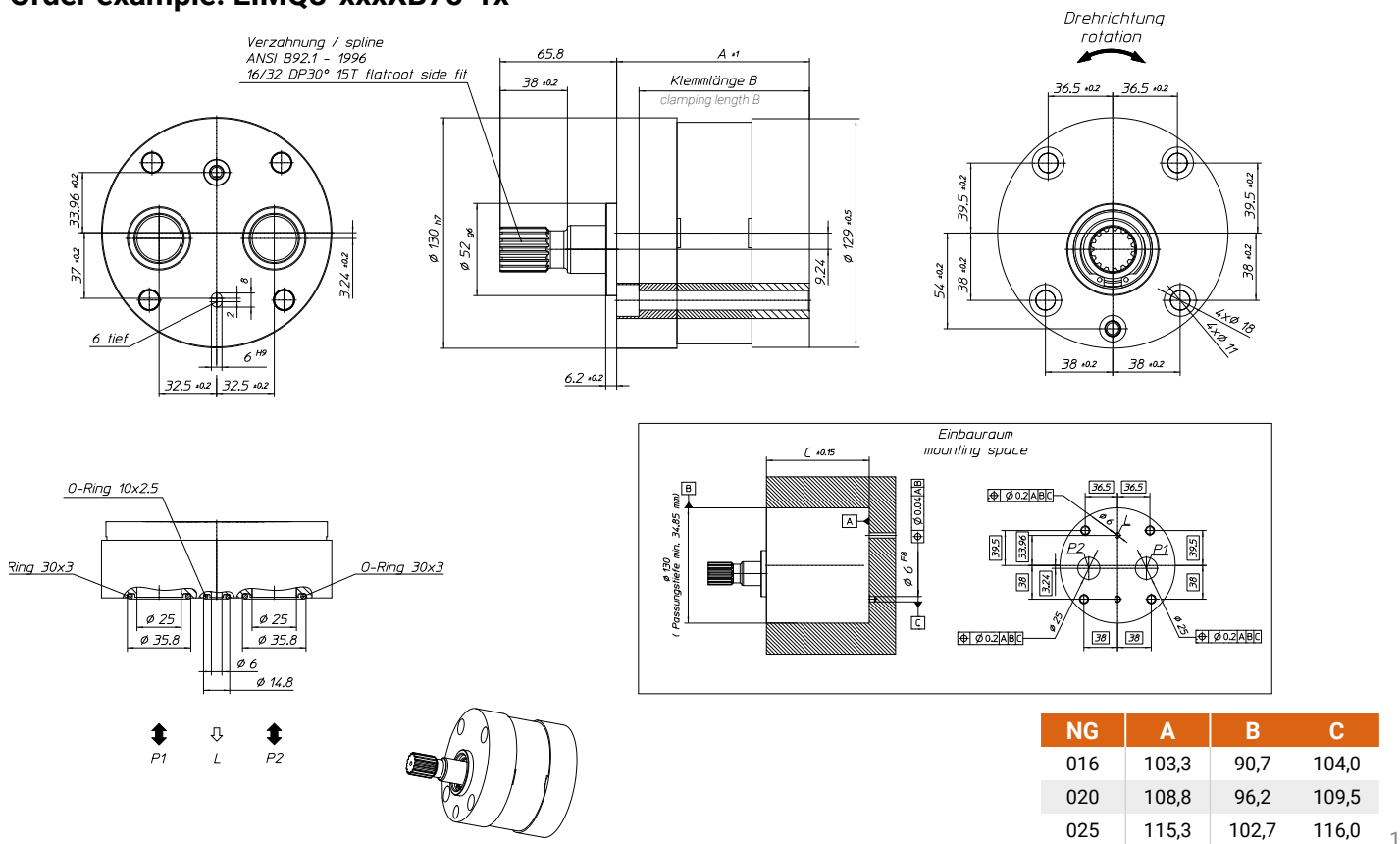

| NG | A | B |
|---|---|---|
| 016 | 103,3 | 90,5 |
| 020 | 108,8 | 96,0 |
| 025 | 115,3 | 102,5 |

## Order example: EIMQ3-xxxXA75-1




| NG | A | B | C |
|---|---|---|---|
| 016 | 103,3 | 90,7 | 104,0 |
| 020 | 108,8 | 96,2 | 109,5 |
| 025 | 115,3 | 102,7 | 116,0 |

## Order example: EIMQ3-xxxXB75-1x

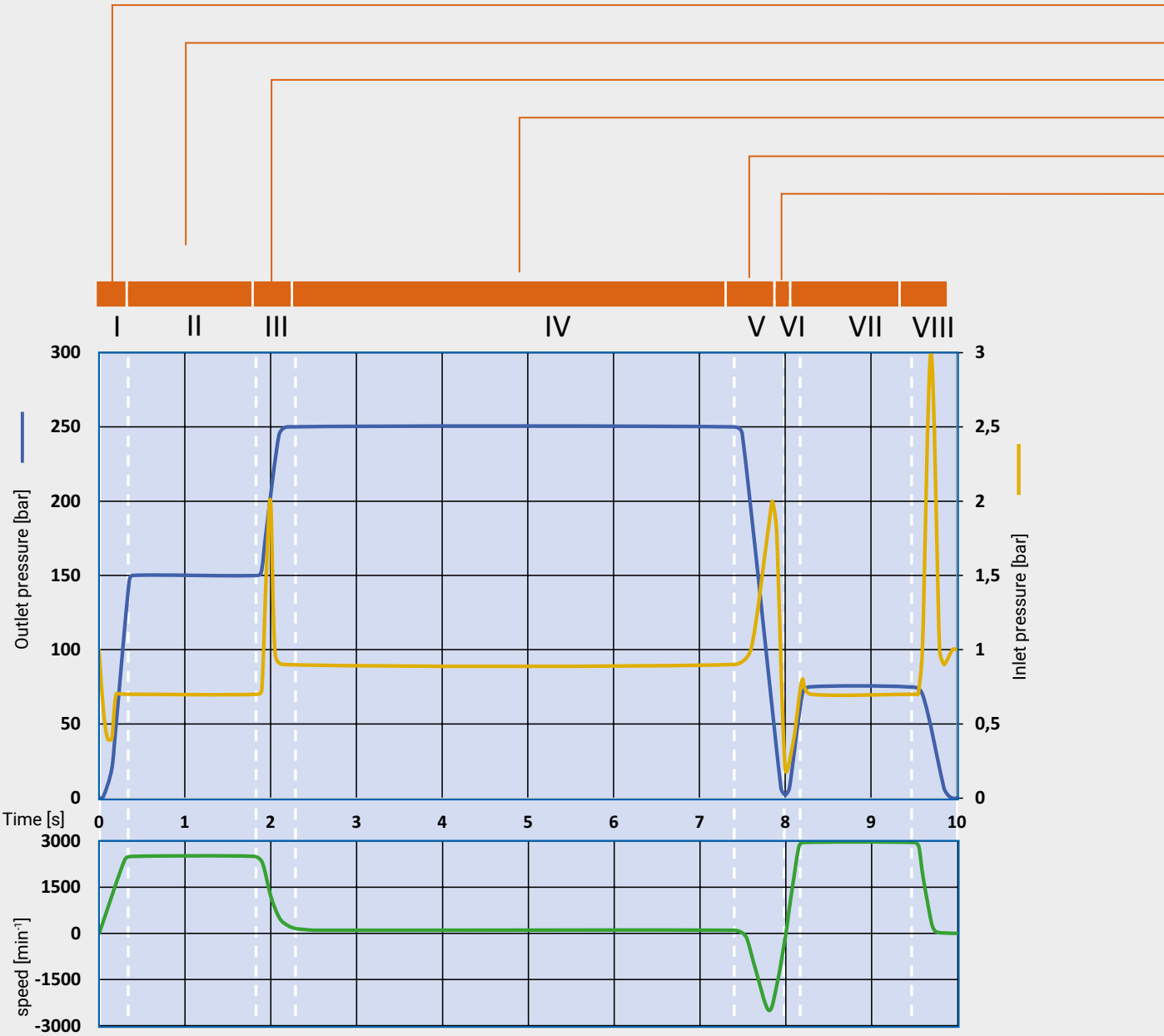



| NG | A | B | C |
|---|---|---|---|
| 016 | 103,3 | 90,7 | 104,0 |
| 020 | 108,8 | 96,2 | 109,5 |
| 025 | 115,3 | 102,7 | 116,0 |

# Variable-speed operation (pump operation)

**Eckerle internal gear hydraulic motors are inherently well-suited for variable speed operation. Even at low viscosities and high temperatures of the working fluid, the motors are capable of operating over a wide speed range with high energy efficiency and high dynamics, thanks to radial and axial gap compensation.**

**However, certain boundary conditions should be observed during variable speed operation. An exemplary cycle is illustrated below for clarification.**



### I. Start:

Eckerle internal gear pumps are able to build up pressure from standstill. This happens smoothly when the pump starts from an unpressurized state. Please talk to Eckerle, if due to the system design the pump is pressurized at standstill.

### II. + VII. Pump operation:

Eckerle internal gear pumps are capable of providing a speed-dependent volumetric flow at any pressure level during pump operation. However, application limits of the respective sizes must be observed.[2)]

### III. + VIII. Deceleration:

With Eckerle internal gear pumps very high decelerations can be achieved. It must be ensured though that line-dependent pressure peaks can develop within the suction side. These should not exceed the maximum permissible inlet pressure.[2) 3)]

### IV. Pressure Holding Operation:

Eckerle internal gear pumps are able to build up high pressures even at very low speeds due to the gap compensation. Hold pressure operation is thus extremely energy-efficient. Pump operation should follow after the hold pressure operation to flush out the pump.

### V. Reverse operation:

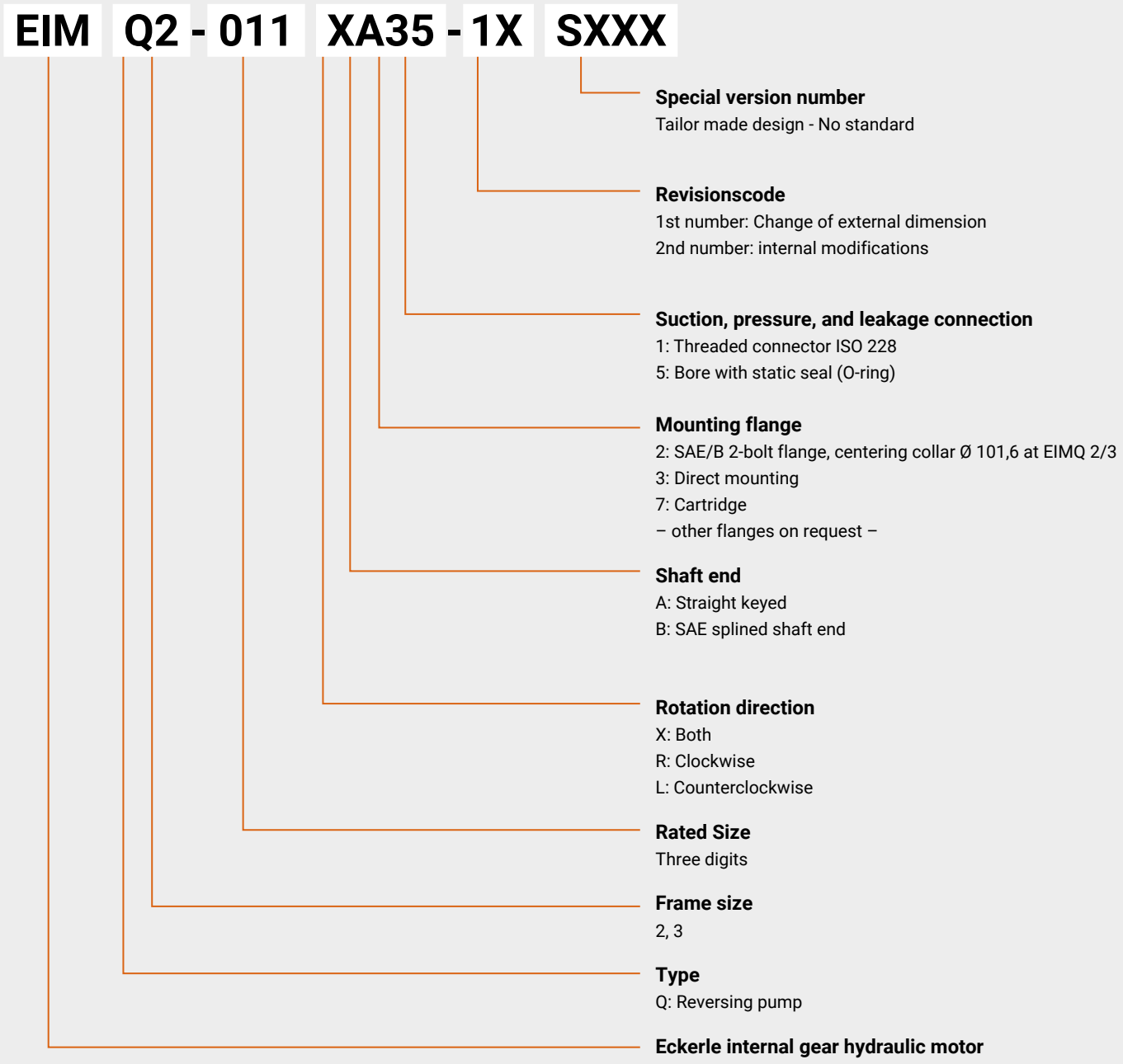
Eckerle internal gear pumps are usually able to run highly dynamically in the opposite direction of rotation in order to lower pressure peaks, or by means of a hydraulic motor. Additionally, the EIMQ and EIPQ series allow simultaneous operation in two quadrants (pump + motor). [1) 3)]

### VI. Acceleration:

With Eckerle internal gear pumps very large speed-ups can be run. These are limited by inlet pressure, geometry of the suction line and viscosity. However, these may not drop below the specified minimum inlet pressure of the series. [1) 3)]

1) See Characteristics
2) See Technical data
3) To avoid critical operating points, we recommend taking measurements of the pump's inlet and outlet pressure near the pump with a scanning rate of at least 1 kHz when a new pump cycle starts.

# Ordering code

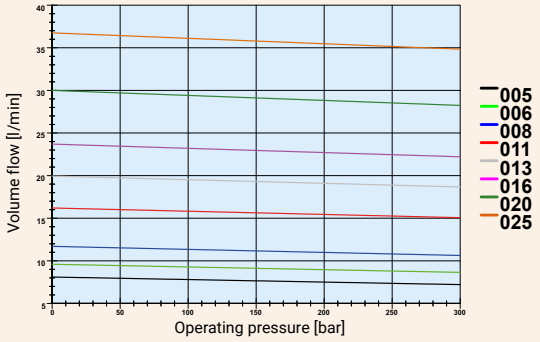



Order example
**EIMQ2-011XA35-1X**

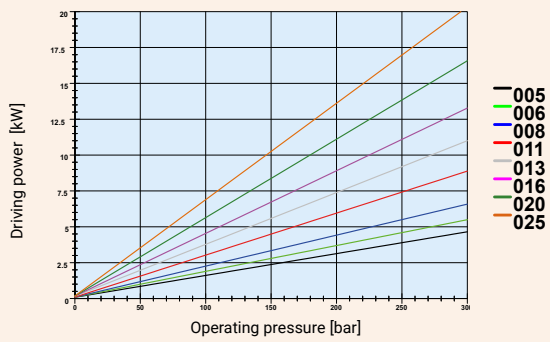
Hydromotor size 2 with 10.8 cm3/rev, both directions of rotation,
cylindrical shaft end, direct mounting with static O-ring seal, revision code 1X

# Characteristics

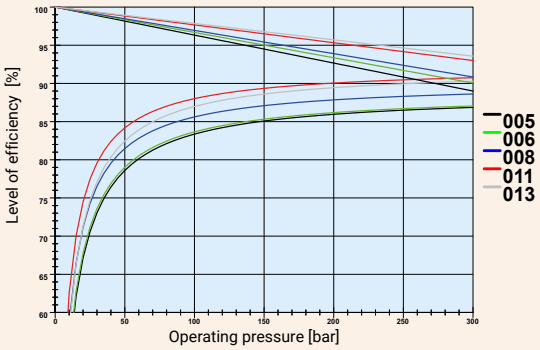
## Volume flow

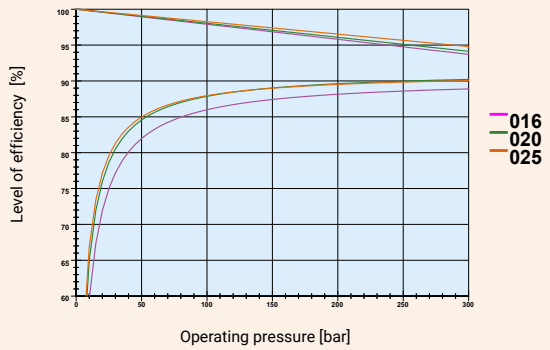



## Driving power

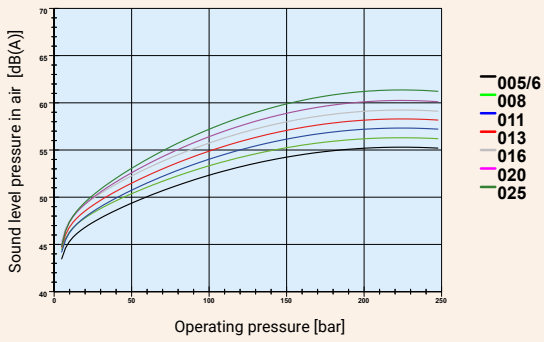



## Level of efficiency



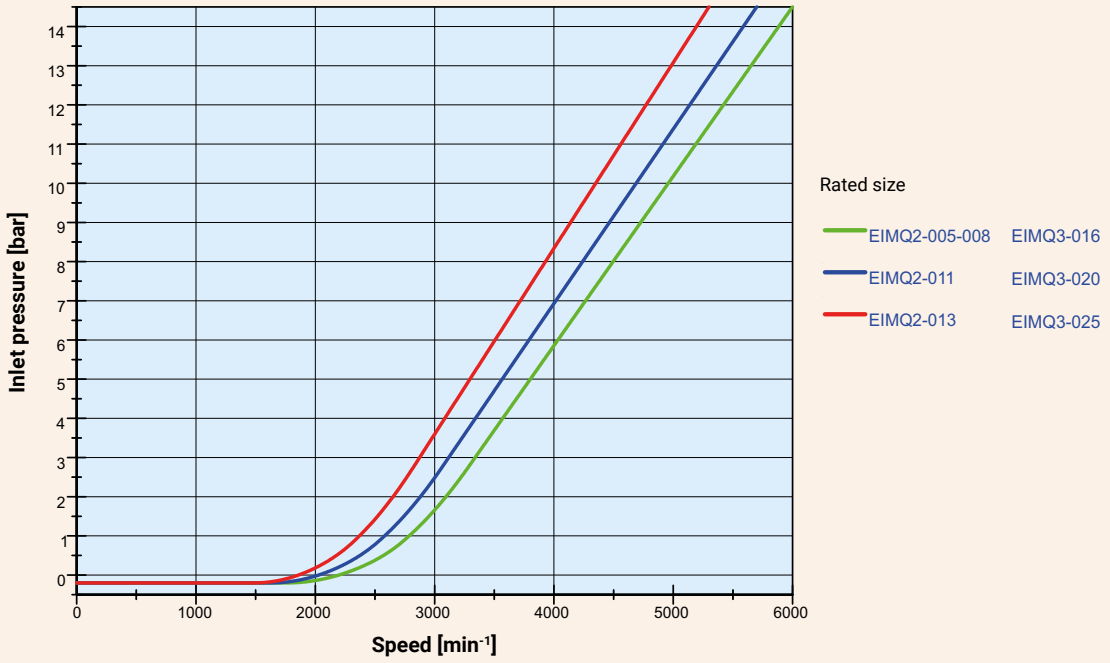




## Sound level pressure in air

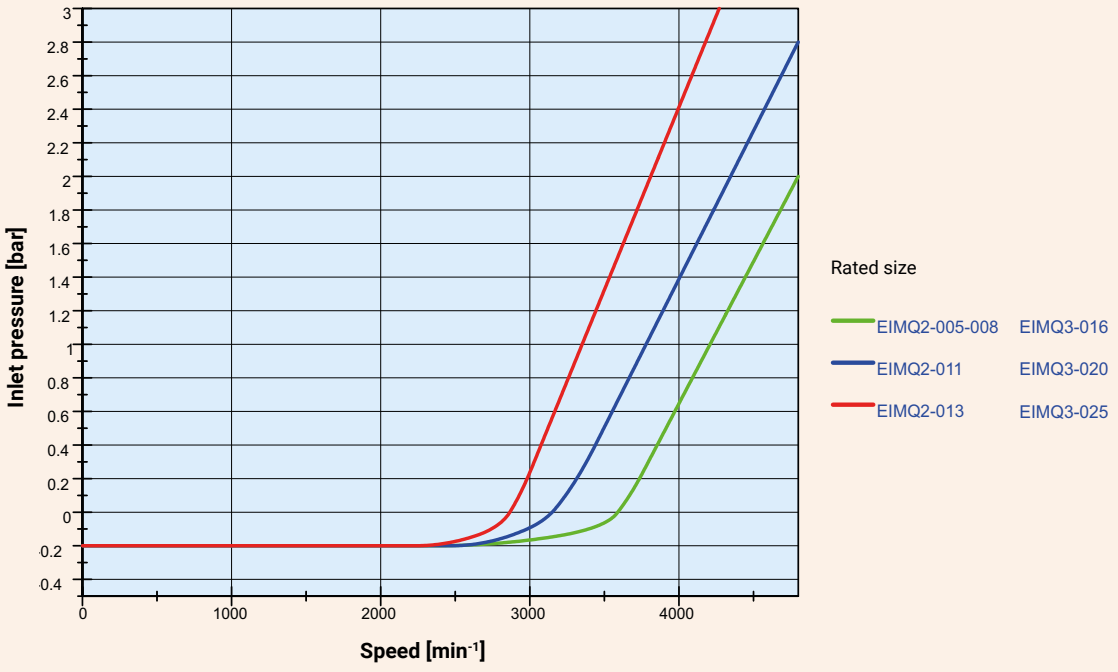


## Minimum inlet pressures and self-priming speed for ISO VG 46 at 50°C

### EIMQ2/3 - Motor



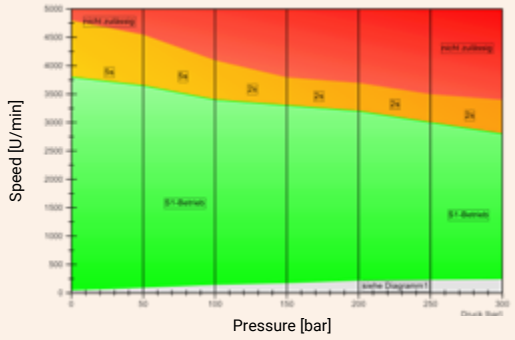

### EIMQ2/3 - Pump



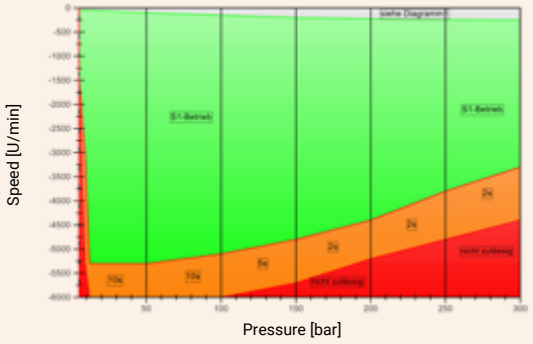
# Operating Limits



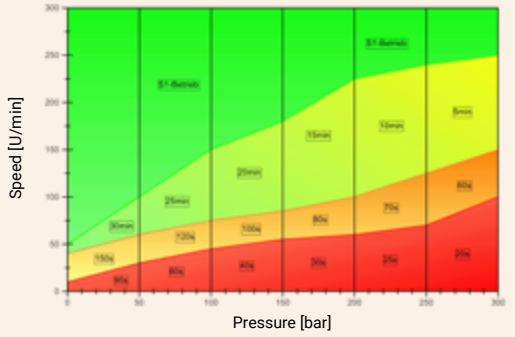
## EIMQ2 005-008 & EIMQ3 016 - Pump



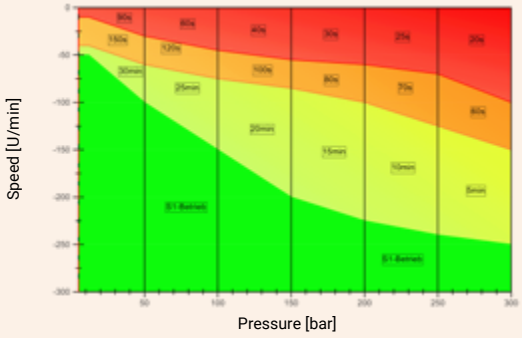

## EIMQ2 005-008 & EIMQ3 016 - Motor



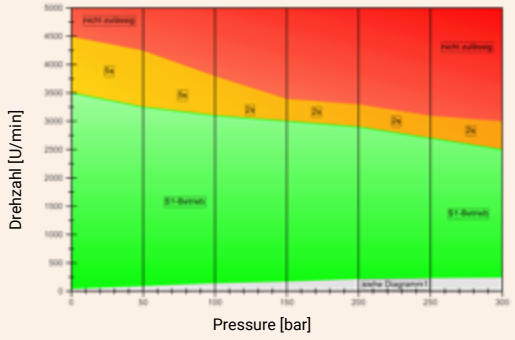

## EIMQ2 005-008 & EIMQ3 016 - Pump



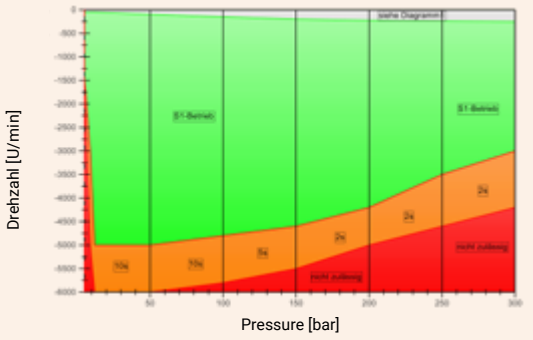

## EIMQ2 005-008 & EIMQ3 016 - Motor



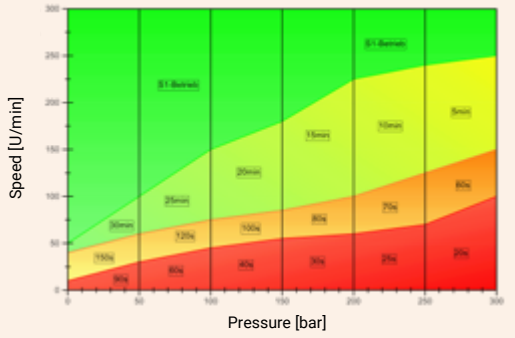

## EIMQ2 011-013 & EIMQ3 020-025 - Pump



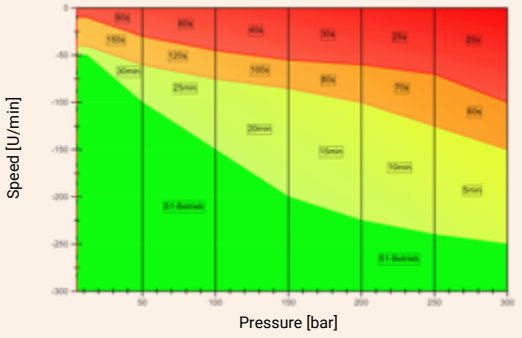

## EIMQ2 011-013 & EIMQ3 020-025 - Motor




## EIMQ2 011-013 & EIMQ3 020-025 - Pump




## EIMQ2 011-013 & EIMQ3 020-025 - Motor



# Notes

# Notes

**For further information please visit:**
**eckerle.com**

All indicated data serve alone the product description and are not as characteristics in the legal sense to be understood. Subject to alterations.

## Committed to the Environment – Certified Quality:

TÜV AUSTRIA
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ISO 5001:2018
TA270193005270
TÜV AUSTRI A GMBH

Managementsystem
ISO 9001 ISO 14001

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