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# Gear Pumps

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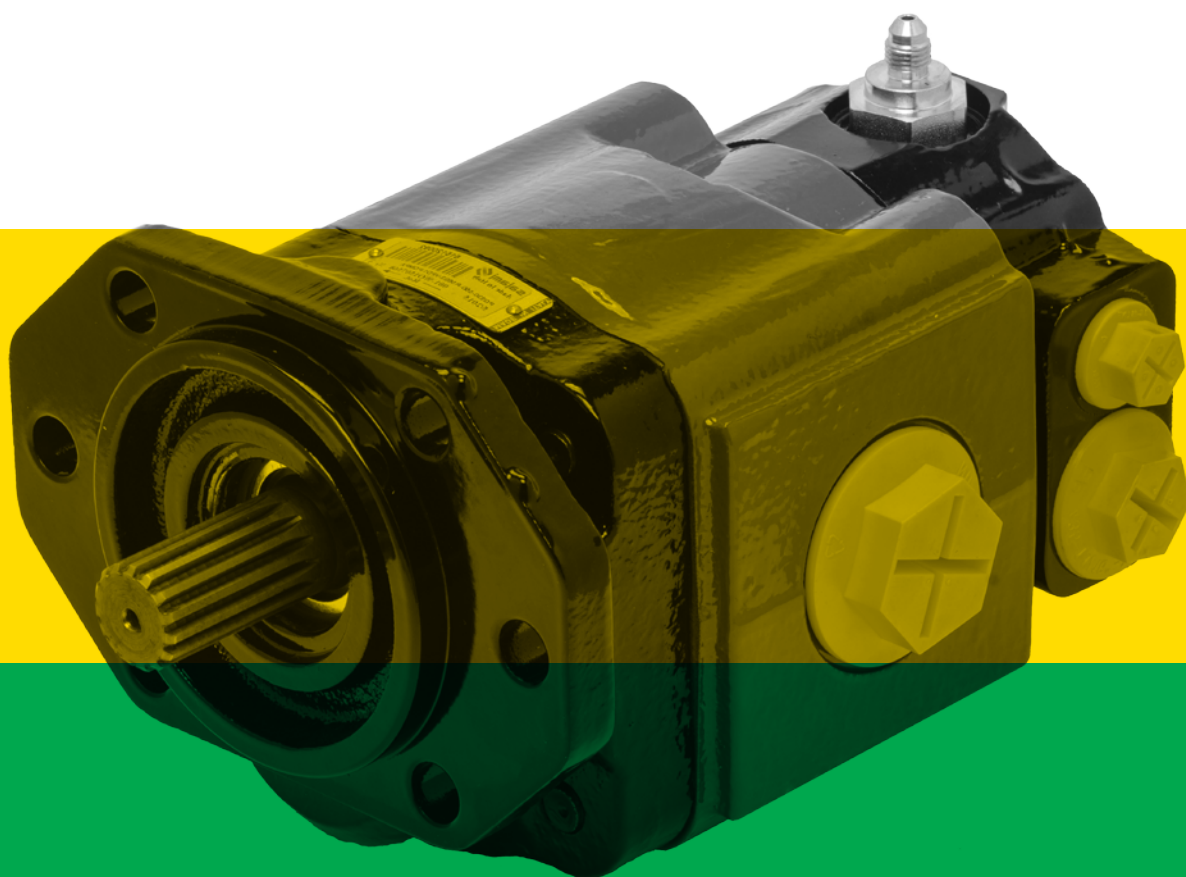
## Cast Iron Gear Housing

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### Technical/Spare Parts Catalogue

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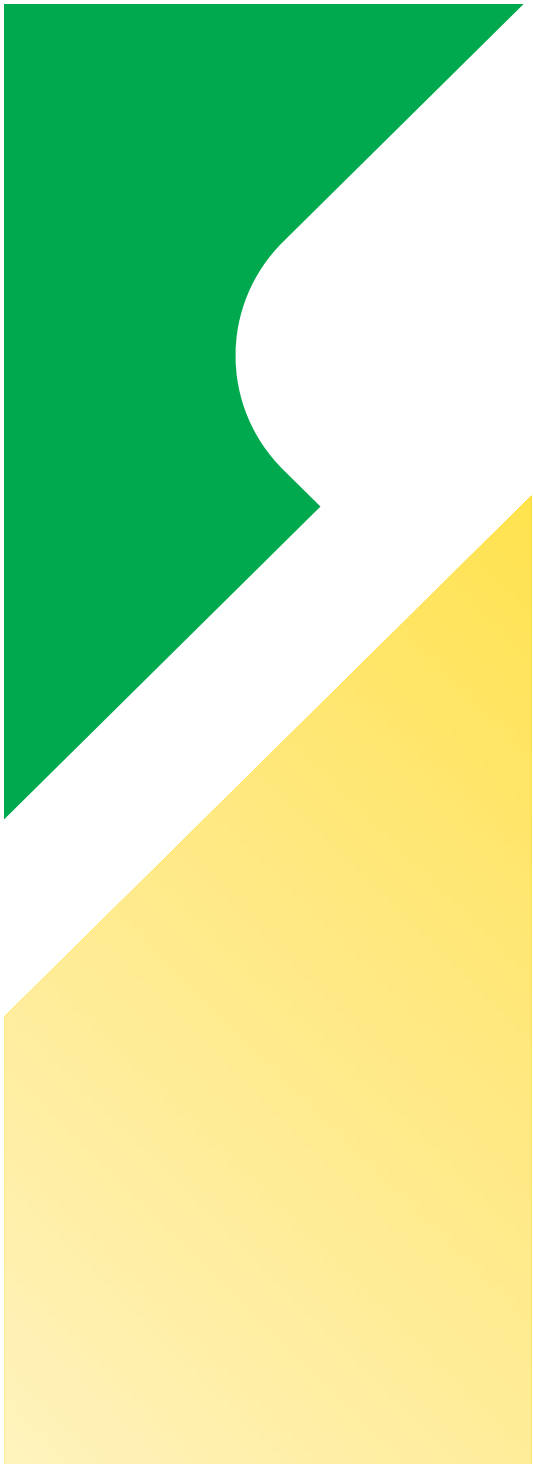
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**salami**   
FLUID POWER SYSTEMS <sup>®</sup>

**Final revised edition - April 2023**

The data in this catalogue refers to the standard product. The policy of Salami S.p.A. consists of a continuous improvement of its products. It reserves the right to change the specifications of the different products whenever necessary and without giving prior information.

***If any doubts, please contact our sales department.***



**Contents**

Gear Pumps - Features ..... 3

2PGE ..... 9

PG330 ..... 53

PG331 ..... 89

## Symbol Designation



**INFORMATION:**

Indicates reminders and communications to be taken into account for the correct configuration and mounting of the product.



**CAUTION:**

Indicates the recommendations and rules, to be observed before proceeding with the product's configuration.



**REVIEW:**

Indicates update or modify data.

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# Gear Pumps

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Cast Iron Gear Housing:  
2PGE/PG330/PG331

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Features

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## 2PGE and PG330/331 Features

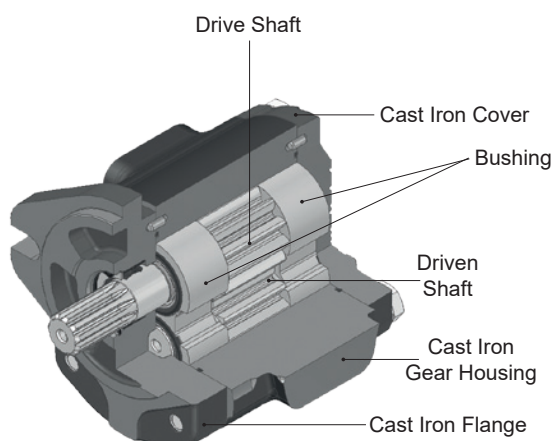
The PG330/PG331 and 2PGE Series Cast Iron Pumps has been specifically designed for high flow applications, demanding peak performance and long life in extreme operating conditions. PG330 optimized for high volume and for OEM's customers. Displacements available:

**2PGE:** 6.5 cm<sup>3</sup>/rev to 26.7 cm<sup>3</sup>/rev (from 0.40 cu.in/rev to 1.63 cu.in/rev)

**PG330/PG331:** 23.4 cm<sup>3</sup>/rev to 80.6 cm<sup>3</sup>/rev (from 1.43 cu.in/rev to 4.91 cu.in/rev)

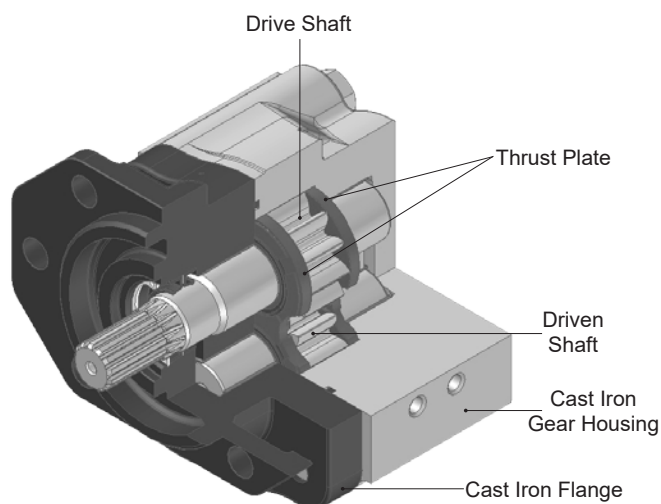
Several options of shafts, flanges and ports as for European, German and American standards are available for all the pumps.

- High volumetric efficiency thanks to an innovative design and an accurate control of machining tolerances.
- DU bearings to ensure high pressure capability.
- 12 teeth solid gear shaft.
- Cast iron construction.
- Double shaft seals.
- Standard nitrile seals and Viton seals for high temperature applications.
- All pumps are hydraulically tested after assembly to ensure the highest standard performance.
- Typical applications: construction, agriculture, material handling, municipality vehicles, light duty equipment, aerial working platforms, hoists, fan drive.



### 2PGE

- Cast iron body, flange and cover.
- Common parts with 2PE series.
- High resistance.
- Axial compensation achieved by the use of floating bushes that allow high volumetric efficiency throughout the working pressure range.
- Available with SAE 13T splined shaft that allow torque up to 200 Nm.
- Telltale leakage inspection hole on mounting flanges.



### PG330

- Two pieces compact construction made with high strength cast iron. Cast iron offers thermal stability, contamination resistance and strength for consistent performance and durability in severe duty cycle applications.
- Advanced pressure-balanced thrust plates optimize volumetric efficiency across the range of operating speeds and pressures.
- Heavy duty low friction DU bushes provide long life in low viscosity and high pressure conditions.
- Compact design in single and double configuration is ideal for fitting into narrow spaces.
- PG330 Sharing the same features with PG331, in terms of dimensions and working conditions.
- Multiple pumps and combo with 2PE or 2PGE series available.

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### PG331 Features

#### PG331

PG331 has been designed for Distributors and easing local conversion from single to multiple stage pump configuration.

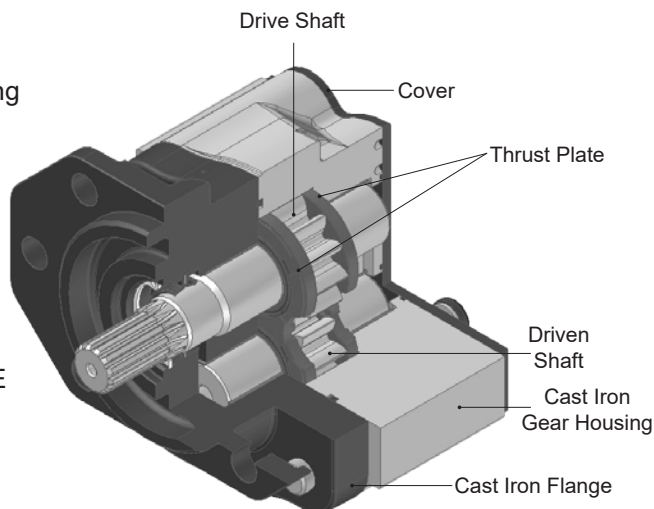
Sharing the same features with PG330:

- dimensions;
- working conditions;
- ports type, flanges and drive shafts.

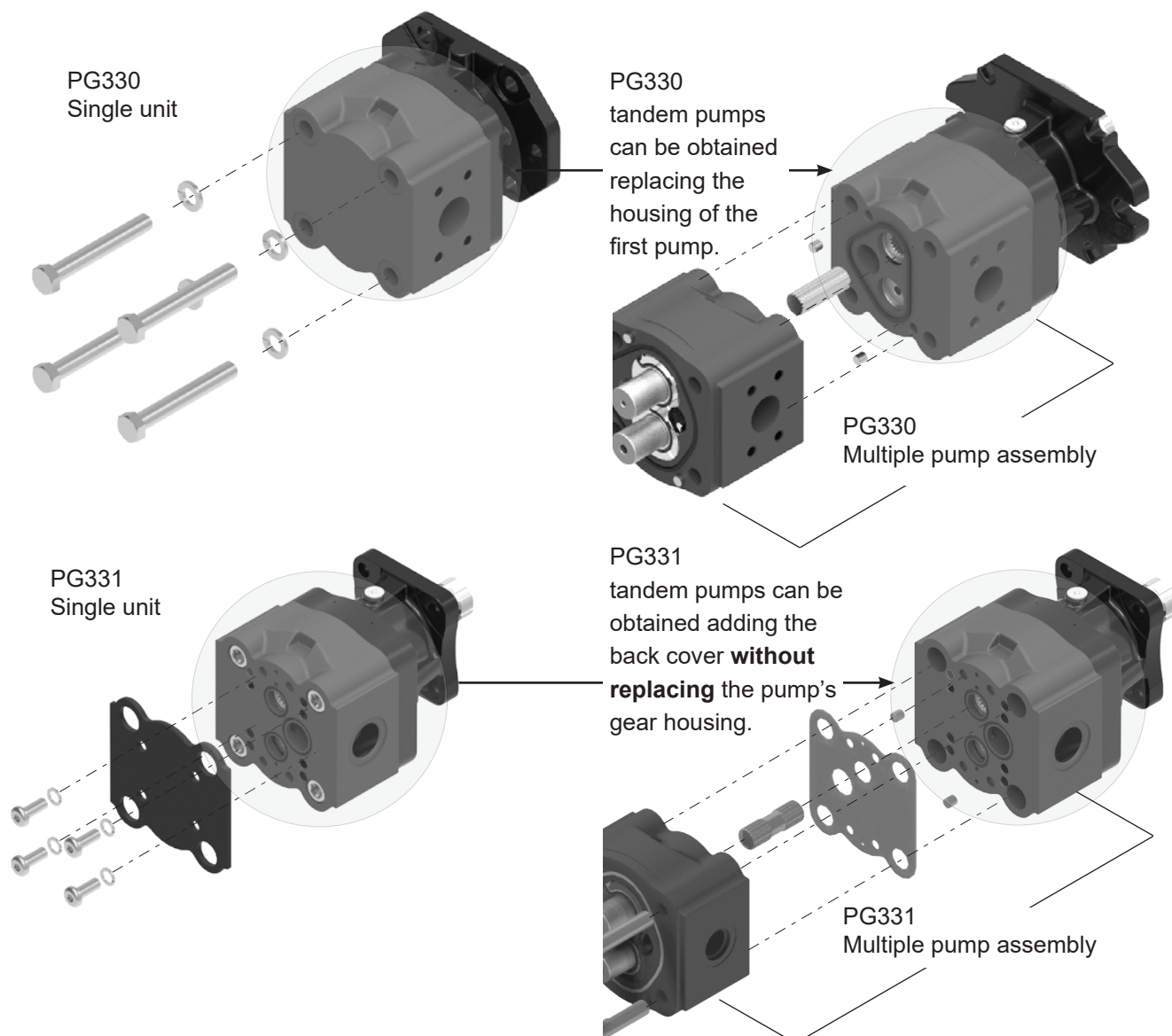
Is available in single, double (also with 2PE or 2PGE piggy back pump), triple and quadruple version.



Please see PG331 Product manual at page 87



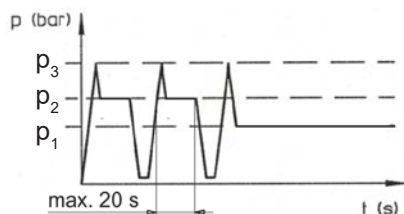
### PG330/331 Pump assembly



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## Definition of Pressures

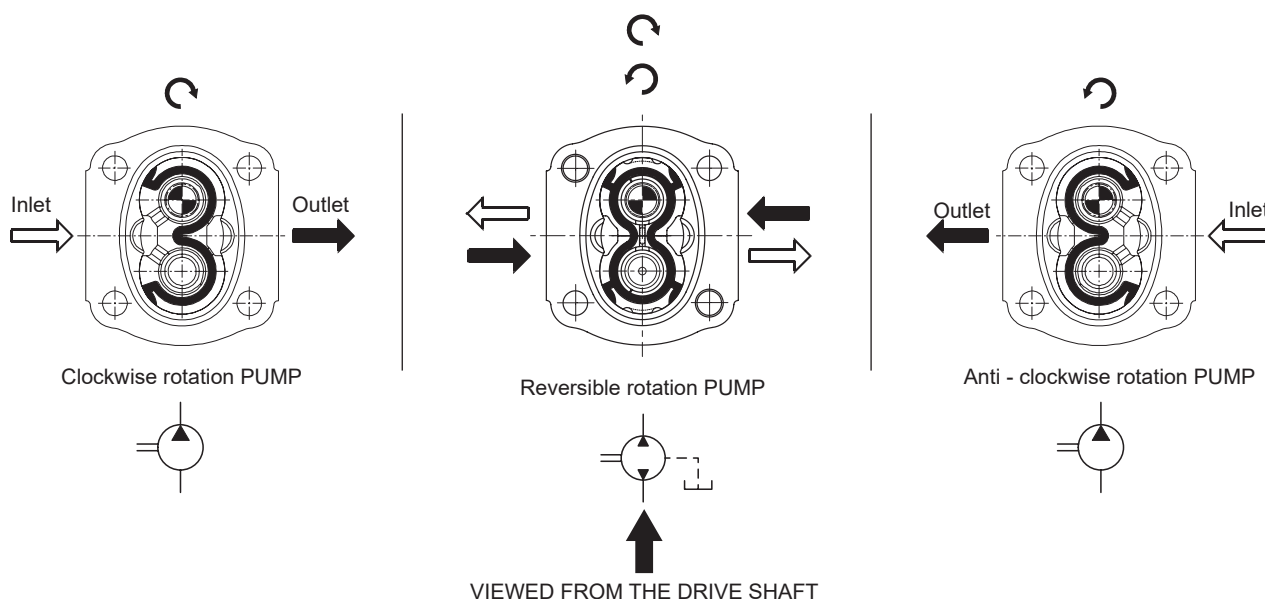
 $p_3$  = Peak pressure $p_2$  = Intermittent operating pressure (1/3 of working time) $p_1$  = Continuous operating pressure

## Drive Shaft

Radial and axial loads on the shafts must be avoided since they reduce the life of the unit.

In order to avoid misalignment during the assembly with the primary engine, a connection with “Oldham” coupling (or coupling having convex toothed hub) is recommended.

## Pump Rotation



## Working Conditions

**HYDRAULIC FLUID**

Mineral oil according to DIN 51524, other hydraulic fluids on request.

|                                                |                                                          |                                   |
|------------------------------------------------|----------------------------------------------------------|-----------------------------------|
| <b>Pump inlet pressure (absolute pressure)</b> |                                                          | 0.8 to 1.5 bar (11.6 to 21.7 psi) |
| <b>Viscosity</b>                               | Minimum operating fluid viscosity                        | 12 mm <sup>2</sup> /sec           |
|                                                | Max starting viscosity                                   | 800 mm <sup>2</sup> /sec          |
|                                                | Suggested fluid viscosity range                          | 17 ÷ 65 mm <sup>2</sup> /sec      |
| <b>Temperature</b>                             | fluid operating temperature range                        | -25 ÷ 80 °C                       |
|                                                | fluid operating temperature range with FPM seals (Viton) | -20 ÷ 110 °C                      |
|                                                | fluid operating temperature range with HNBR seals*       | -30 ÷ 110 °C                      |

\* Available on request



### Hydraulic Pipe Line

To ensure favorable suction conditions it is important to keep pressure drop in suction pipe line to a minimum value (see Working Conditions). To calculate hydraulic pipe line size, the designer can use, as an approximate guide, the following fluid speed figures:

From 1 to 2 m/sec on suction pipe line  
From 6 to 10 m/sec on pressure pipe line

From 3.28 to 6.36 ft/sec on suction pipe line  
From 19.7 to 32.8 ft/sec on pressure pipe line

The lowest fluid speed values in pipe lines is recommended when the operating temperature range is high and/or for continuous duty. The highest value is recommended when the temperature difference is low and/or for intermittent duty.

**i** 2PGE: When tandem pumps are supplied by 2 different reservoirs with 2 different fluids it is mandatory to specify "AS" version.

### Filtration Index Recommended

| Working pressure                  | >200 bar/2900 psi | <200 bar/2900 psi |
|-----------------------------------|-------------------|-------------------|
| Contamination class NAS 1638      | 9                 | 10                |
| Contamination class ISO 4406      | 19/18/15          | 20/19/16          |
| Achieved with filter $\beta_x=75$ | 15 $\mu\text{m}$  | 25 $\mu\text{m}$  |

### Common Formulas

$$C = \text{Input torque} = \frac{q \cdot \Delta p}{62.8 \cdot \eta_m} \text{ (Nm)}$$

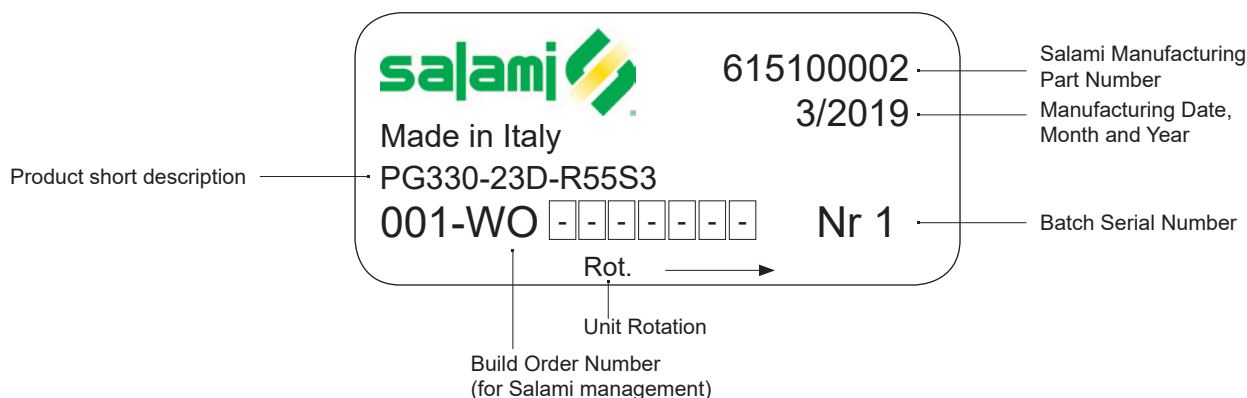
$$P = \text{Input power} = \frac{q \cdot n \cdot \Delta p \cdot 10^{-3}}{600 \eta_m} \text{ (kW)}$$

$$Q = \text{Outlet flow} = \frac{q \cdot n \cdot \eta_v}{1000} \text{ (l/min)}$$

#### LEGENDA

$\Delta p$ = Working pressure (bar)  
 $q$ = Displacement (cm<sup>3</sup>/rev)  
 $n$ = Speed (min<sup>-1</sup>)  
 $\eta_m$  = Mechanical efficiency (0.92)  
 $\eta_v$  = Volumetric efficiency (0.95)

### Identification Label



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# 2PGE

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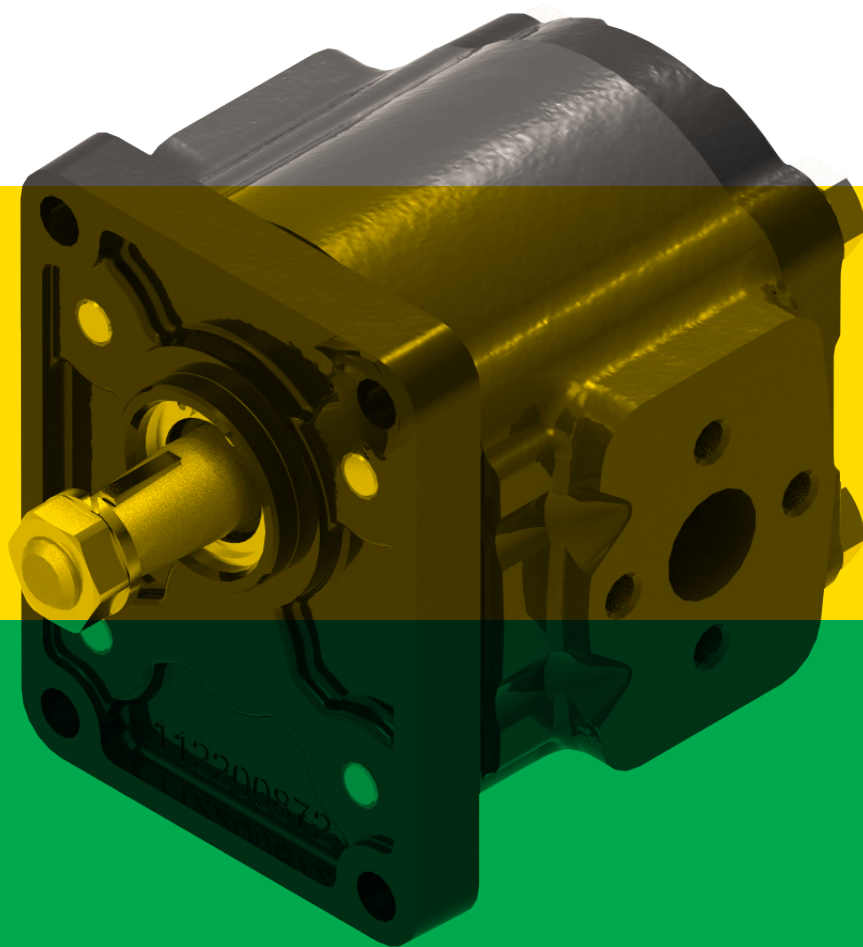
## Cast Iron Gear Pumps

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### Technical/Spare Parts Catalogue

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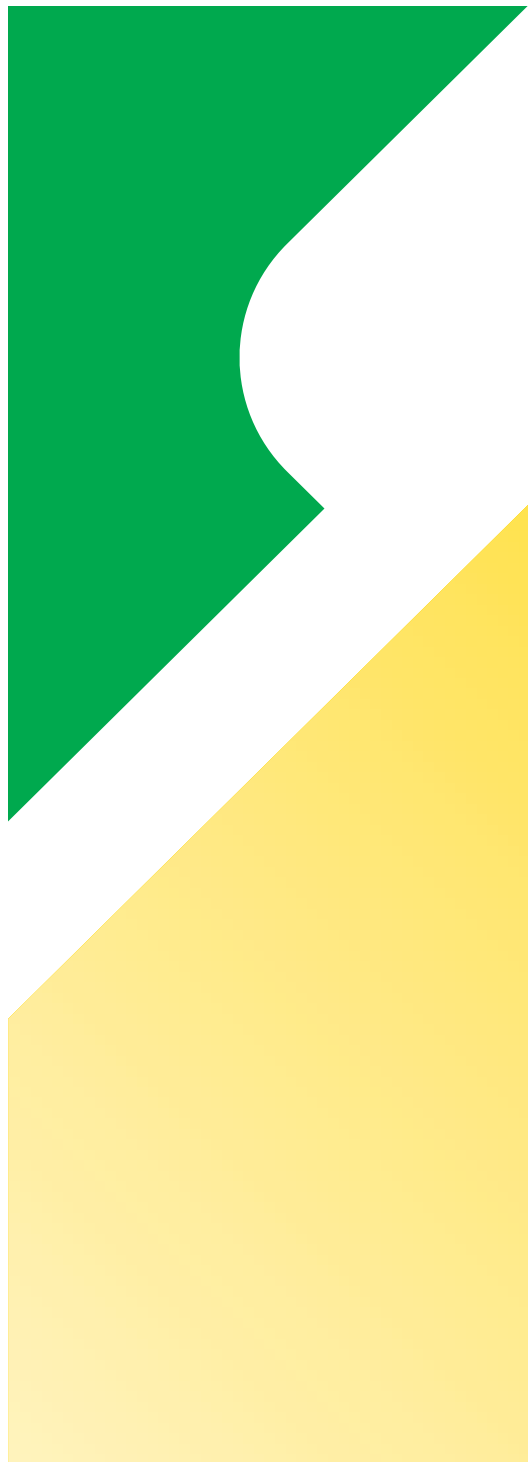
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## Contents

|                                                                          |    |
|--------------------------------------------------------------------------|----|
| 2PGE Single Pump.....                                                    | 13 |
| Pump Performance Charts .....                                            | 14 |
| Shaft and Flange Combinations .....                                      | 18 |
| Continental Shaft and Flange With Outrigger Bearing<br>Combinations..... | 20 |
| Flanged Ports/ Threaded Ports .....                                      | 21 |
| Drive Shaft.....                                                         | 23 |
| Continental Shaft.....                                                   | 25 |
| Mounting Flanges .....                                                   | 26 |
| Mounting Flanges with Outrigger Bearing .....                            | 29 |
| Rear Covers .....                                                        | 34 |
| Rear Covers with Valves .....                                            | 35 |
| HOW TO ORDER SINGLE PUMP .....                                           | 41 |
| Single Pump Changing Rotation Instructions.....                          | 42 |
| Unidirectional Pump Seal Spare Parts Kit .....                           | 43 |
| Bidirectional Pump Seal Spare Parts Kit .....                            | 44 |
| 2PGE Multiple Pump - Dimensions .....                                    | 45 |
| 2PGE Combination with Pump 1.5PE (Aluminium gear<br>housing).....        | 46 |
| HOW TO ORDER MULTIPLE PUMP .....                                         | 48 |
| HOW TO ORDER MULTIPLE PUMP<br>WITH 2PE/1.5PE.....                        | 50 |





## 2PGE Single Pump - Dimensions and Technical Data



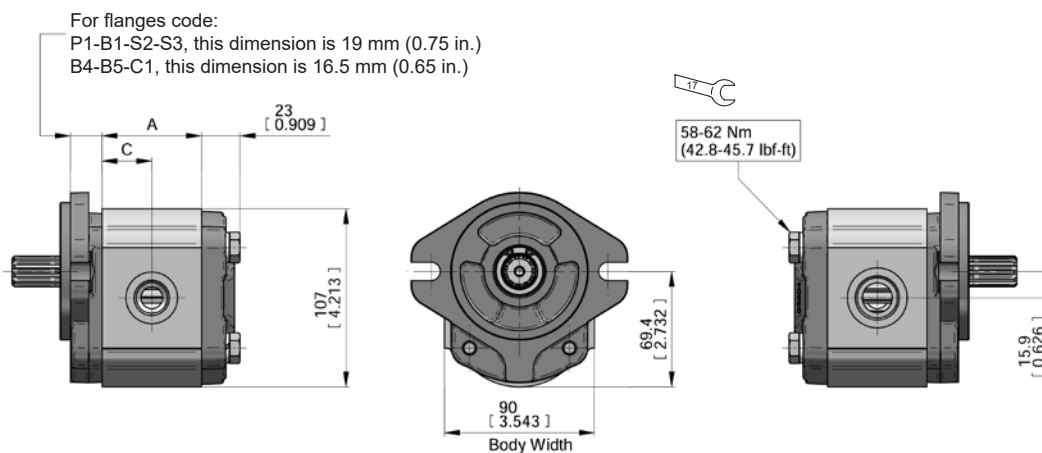
20 bar (290 psi)  
Max pressure discharge

Displacements up to 26.7 cm<sup>3</sup>/rev - 1.63 cu.in./rev  
Pressure up to 320 bar - 4650 psi

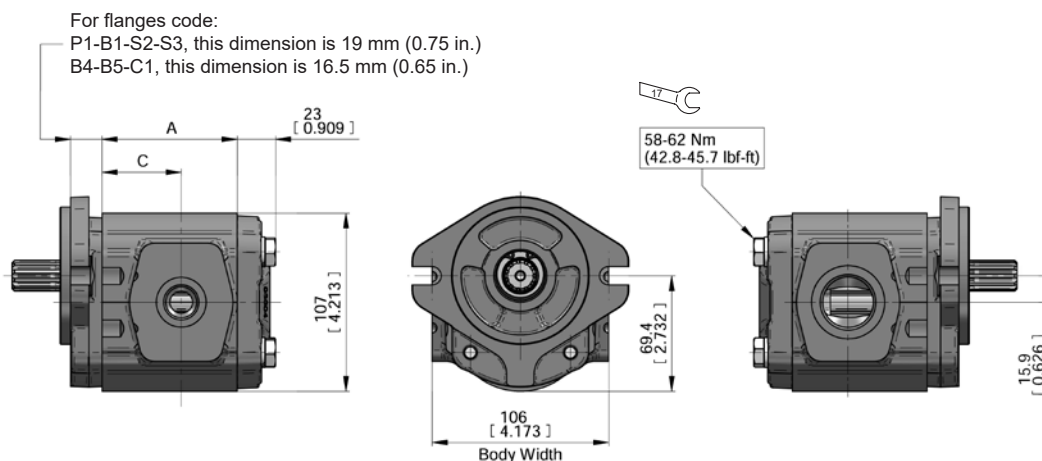
| TYPE        | Displacement         |            | Dimension A |      | Dimension C |      | Continuous pressure p <sub>1</sub> |      | Intermittent pressure p <sub>2</sub> |      | Peak pressure p <sub>3</sub> |      | Min. speed at p <sub>1</sub> | Max. speed at p <sub>2</sub> | Weight |       |
|-------------|----------------------|------------|-------------|------|-------------|------|------------------------------------|------|--------------------------------------|------|------------------------------|------|------------------------------|------------------------------|--------|-------|
|             | cm <sup>3</sup> /rev | cu.in./rev | mm          | in   | mm          | in   | bar                                | psi  | bar                                  | psi  | bar                          | psi  | rpm                          |                              | kg     | lbs   |
| 2PGE - 6.5  | 6.5                  | 0.40       | 49.95       | 1.97 | 25          | 0.98 | 270                                | 3915 | 300                                  | 4350 | 320                          | 4650 | 600                          | 4000                         | 4.8    | 10.58 |
| 2PGE - 8.3  | 8.3                  | 0.51       | 52.8        | 2.07 | 26.4        | 1.04 | 270                                | 3915 | 300                                  | 4350 | 320                          | 4650 | 500                          | 3500                         | 5.0    | 11.02 |
| 2PGE - 11.3 | 11.5                 | 0.68       | 59.7        | 2.35 | 29.75       | 1.17 | 270                                | 3915 | 300                                  | 4350 | 320                          | 4650 | 500                          | 3500                         | 5.2    | 11.46 |
| 2PGE - 13.8 | 14                   | 0.85       | 63.5        | 2.50 | 31.75       | 1.25 | 270                                | 3915 | 300                                  | 4350 | 320                          | 4650 | 500                          | 3500                         | 5.4    | 11.90 |
| 2PGE - 16   | 16.6                 | 1.01       | 67.5        | 2.65 | 39.5        | 1.56 | 270                                | 3915 | 300                                  | 4350 | 320                          | 4650 | 500                          | 3000                         | 6.6    | 14.55 |
| 2PGE - 19   | 19.4                 | 1.18       | 75.6        | 2.97 | 39.5        | 1.56 | 270                                | 3915 | 300                                  | 4350 | 320                          | 4650 | 500                          | 3000                         | 7.1    | 15.65 |
| 2PGE - 22.5 | 22.9                 | 1.37       | 81          | 3.19 | 47.5        | 1.87 | 250                                | 3625 | 280                                  | 4060 | 300                          | 4350 | 500                          | 2750                         | 7.5    | 16.53 |
| 2PGE - 26   | 26.7                 | 1.63       | 86.8        | 3.42 | 47.5        | 1.87 | 230                                | 3335 | 260                                  | 3750 | 280                          | 4060 | 500                          | 2500                         | 7.8    | 17.20 |

⚠ Max Speed must be lowered by 10% for system working continuously at p<sub>1</sub> pressure.  
Max pressure must be lowered by 10% for bi-directional pump.

From  
Displacement  
6.5 to 13.8



From  
Displacement  
16 to 26

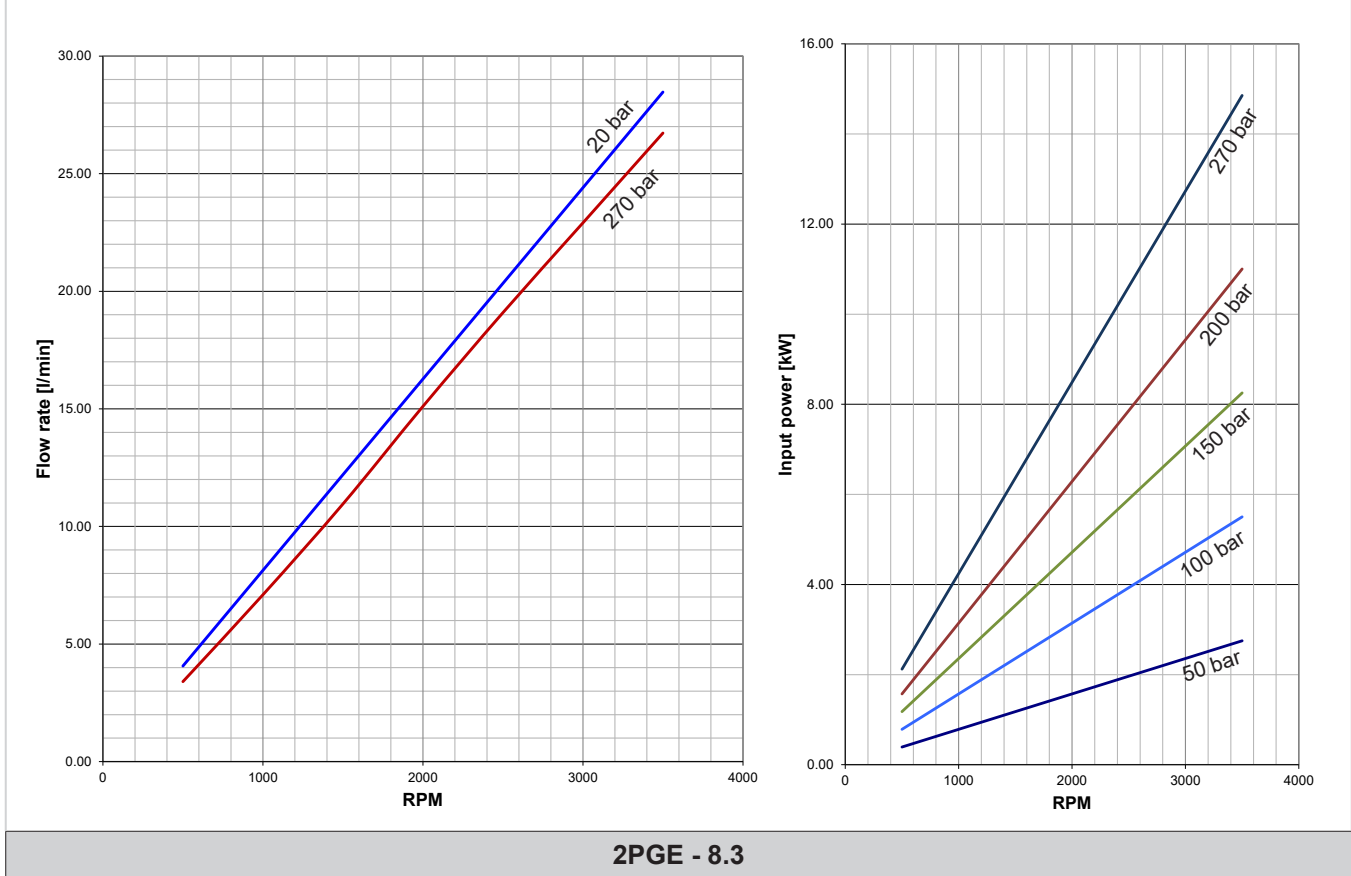
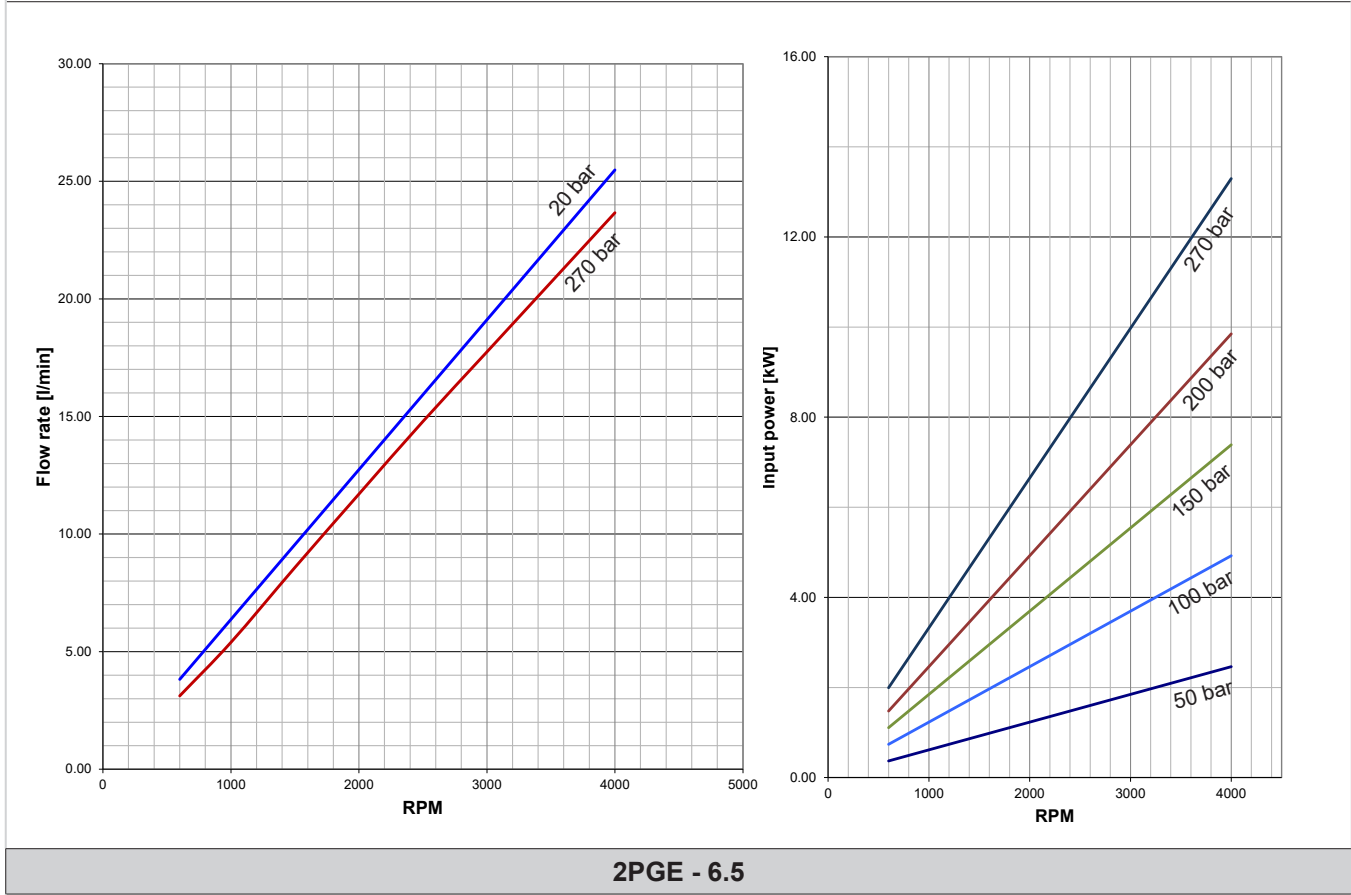


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Pump Performance Charts

Performance curves carried out with oil viscosity at 21 cSt and oil temperature at 50°C

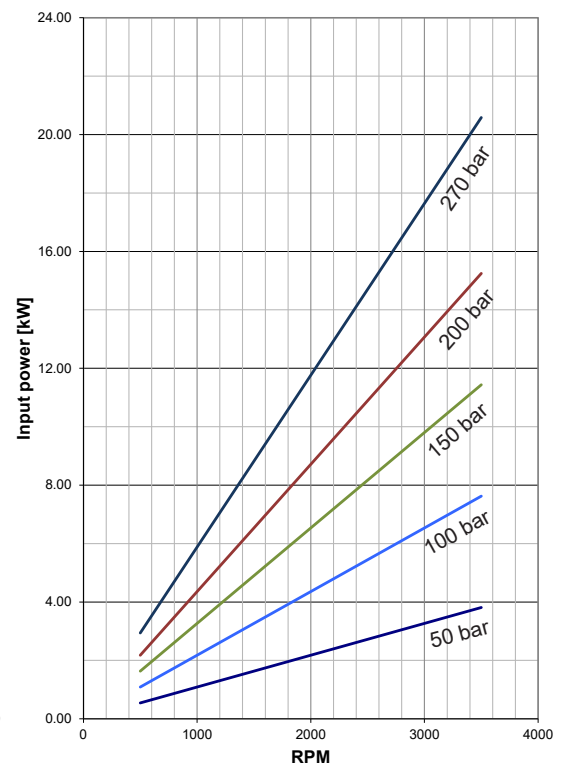
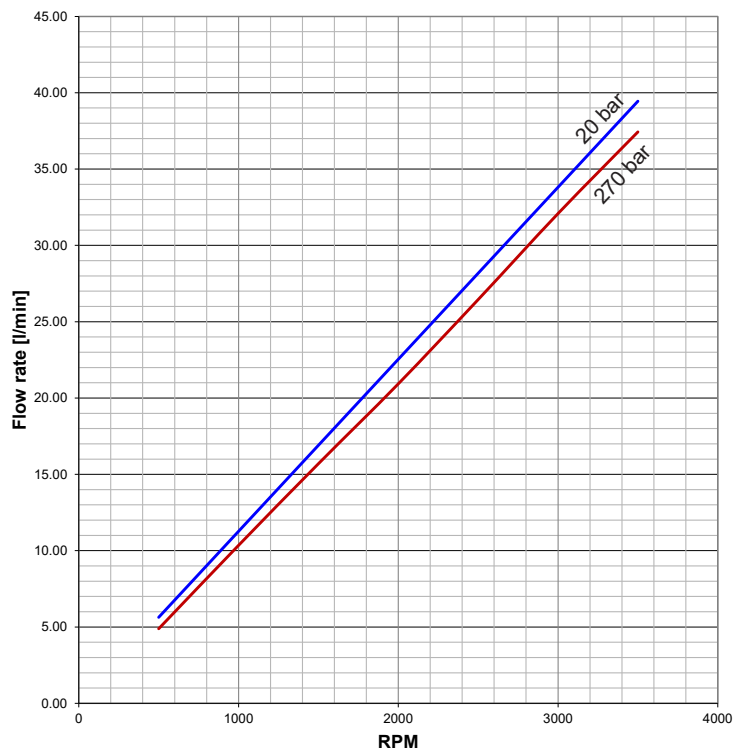


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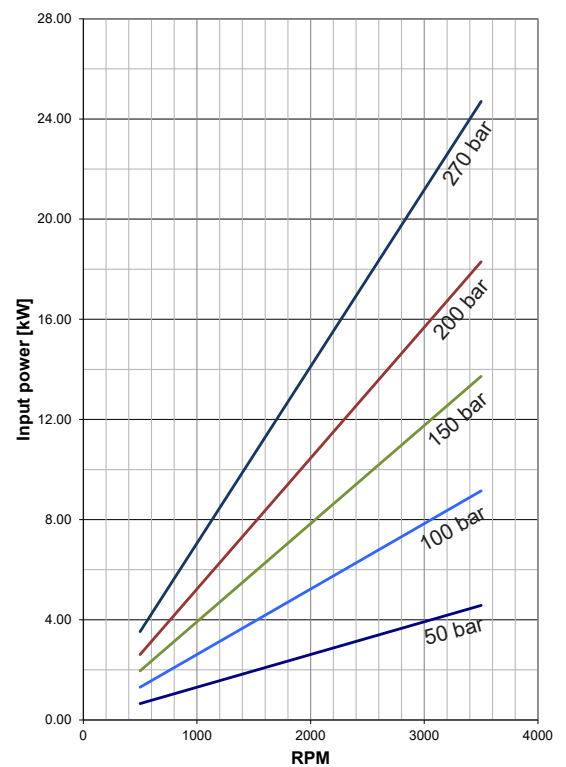
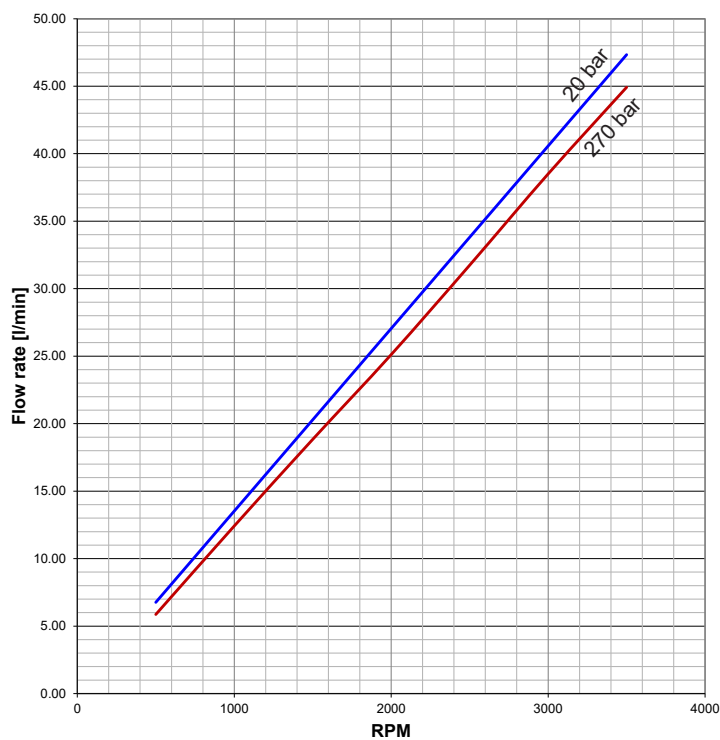


## Pump Performance Charts

Performance curves carried out with oil viscosity at 21 cSt and oil temperature at 50°C



2PGE - 11.3

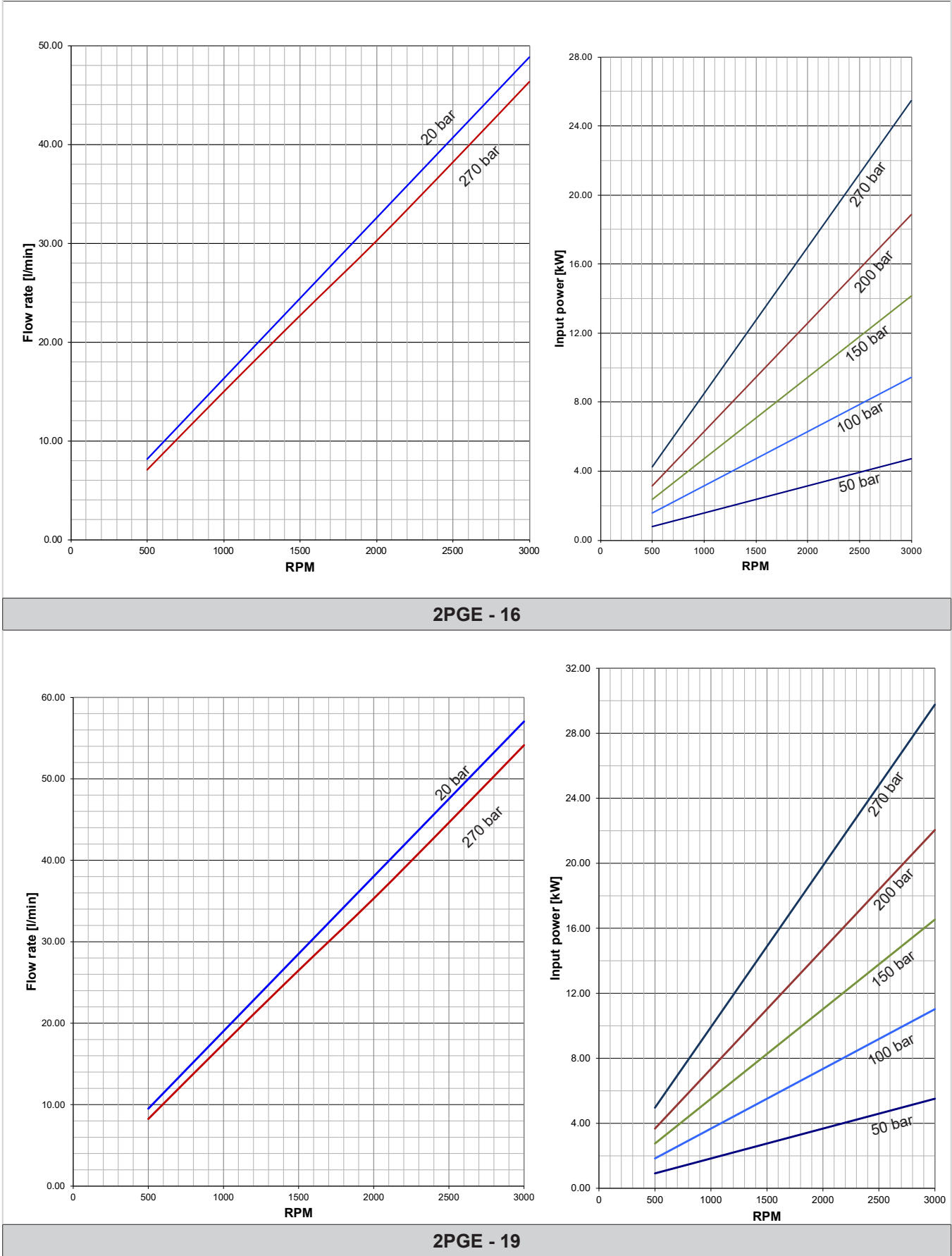


2PGE - 13.8

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Pump Performance Charts

Performance curves carried out with oil viscosity at 21 cSt and oil temperature at 50°C

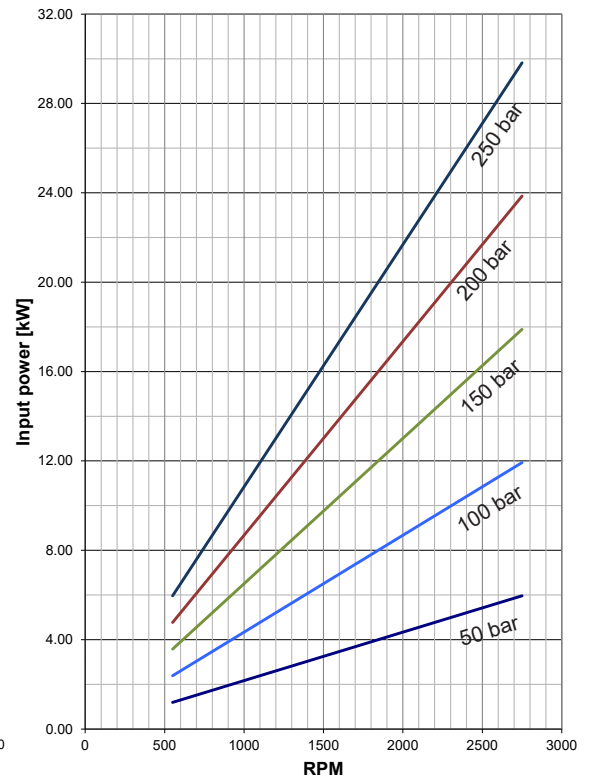
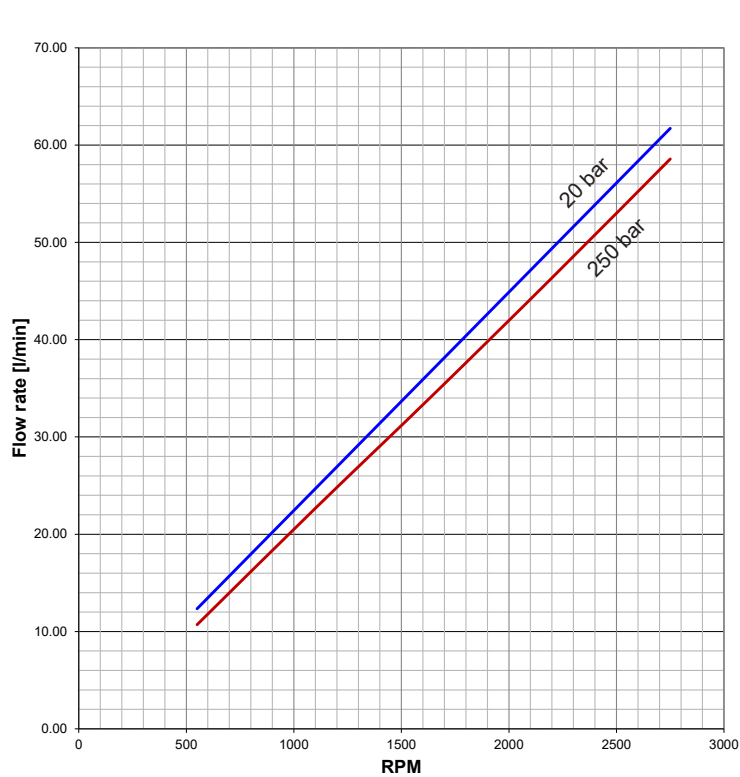


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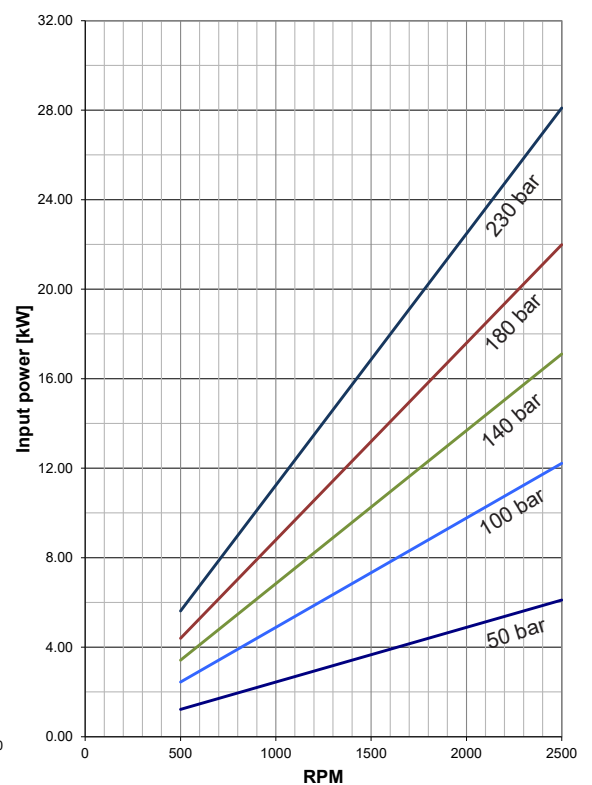
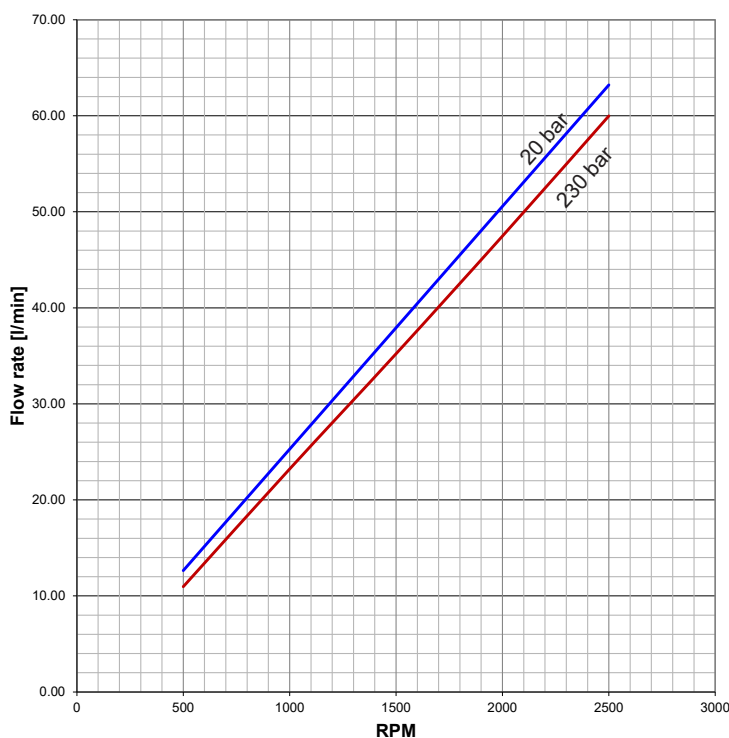


## Pump Performance Charts

Performance curves carried out with oil viscosity at 21 cSt and oil temperature at 50°C



### 2PGE - 22.5

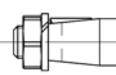
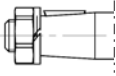
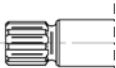
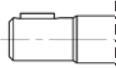


### 2PGE - 26

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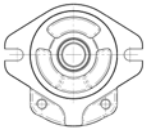
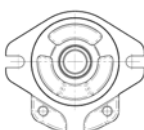
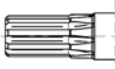
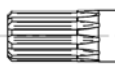
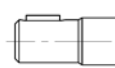
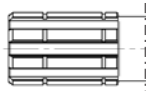
## Shaft and Flange Combinations

| Shaft and Flange Combinations |                                                                                                |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
|-------------------------------|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 2PGE                          |               |  |  |  |  |
|                               | CODE P1                                                                                        | CODE B1                                                                           | CODE B2-B3                                                                        | CODE B4-B5                                                                          | CODE C1                                                                             |
|                               | FLANGES                                                                                        |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
| SHAFT                         | <br>CODE 03   |                                                                                   | 03B2<br>03B3                                                                      |                                                                                     |                                                                                     |
|                               | <br>CODE 04  |                                                                                   |                                                                                   | 04B4<br>04B5                                                                        |                                                                                     |
|                               | <br>CODE 25 |                                                                                   | 25B1                                                                              | 25B4<br>25B5                                                                        |                                                                                     |
|                               | <br>CODE 28 | 28P1                                                                              |                                                                                   |                                                                                     |                                                                                     |
|                               | <br>CODE 62 | 62P1                                                                              | 62B1                                                                              | 62B4<br>62B5                                                                        | 62C1                                                                                |
|                               | <br>CODE 82 | 82P1                                                                              |                                                                                   |                                                                                     |                                                                                     |

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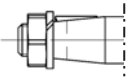
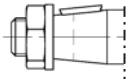
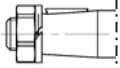
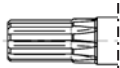
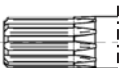
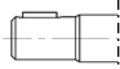
Shaft and Flange Combinations

| Shaft and Flange Combinations |                                                                                                |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|-------------------------------|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 2PGE                          |               |  |  |  |  |
|                               | CODE S2                                                                                        | CODE S3                                                                           | CODE S6                                                                            | CODE T1                                                                             | CODE Z2                                                                             |
|                               | FLANGES                                                                                        |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
| SHAFT                         | <br>CODE 52   | 52S2                                                                              |                                                                                    | 52S6                                                                                |                                                                                     |
|                               | <br>CODE 54   | 54S2                                                                              |                                                                                    | 54S6                                                                                |                                                                                     |
|                               | <br>CODE 55 |                                                                                   | 55S3                                                                               |                                                                                     |                                                                                     |
|                               | <br>CODE 82 | 82S2                                                                              |                                                                                    | 82S6                                                                                |                                                                                     |
|                               | <br>CODE 85 | 85S2                                                                              |                                                                                    | 85S6                                                                                |                                                                                     |
|                               | <br>CODE 67 |                                                                                   |                                                                                    |                                                                                     | 67Z2                                                                                |
| CONTINUED                     | <br>CODE 73 |                                                                                   |                                                                                    | 73T1                                                                                |                                                                                     |

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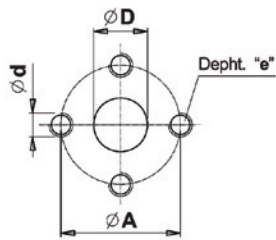
## Continental Shaft and Flange With Outrigger Bearing Combinations

| 2PGE              |               |  |  |  |  |  |  |
|-------------------|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                   | CODE CL                                                                                        | CODE CF                                                                           | CODE CS                                                                           | CODE CB                                                                           | CODE CP                                                                            | CODE CSB                                                                            | CODE Z1                                                                             |
|                   | FLANGES WITH OUTRIGGER BEARING                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
| CONTINENTAL SHAFT | <br>CODE 25   | 25CL                                                                              | 25CF                                                                              |                                                                                   | 25CB                                                                               |                                                                                     |                                                                                     |
|                   | <br>CODE 26   | 26CL                                                                              |                                                                                   |                                                                                   | 26CB                                                                               |                                                                                     |                                                                                     |
|                   | <br>CODE 28  |                                                                                   |                                                                                   |                                                                                   | 28CP                                                                               |                                                                                     |                                                                                     |
|                   | <br>CODE 52 |                                                                                   |                                                                                   | 52CS                                                                              |                                                                                    |                                                                                     |                                                                                     |
|                   | <br>CODE 54 |                                                                                   |                                                                                   | 54CS                                                                              |                                                                                    |                                                                                     |                                                                                     |
|                   | <br>CODE 82 |                                                                                   |                                                                                   | 82CS                                                                              |                                                                                    |                                                                                     |                                                                                     |
|                   | <br>CODE 85 |                                                                                   |                                                                                   | 85CS                                                                              |                                                                                    |                                                                                     |                                                                                     |
|                   | <br>CODE 87 |                                                                                   |                                                                                   |                                                                                   |                                                                                    | 87CSB                                                                               |                                                                                     |
|                   | <br>CODE 66 |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     | 66Z1                                                                                |

EO.146.0423.14.00IM02



## Flanged Ports



code P

Flanged ports  
european standard

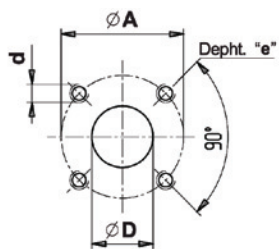
|    |                     |
|----|---------------------|
| M6 | 8 Nm (5.9 lbf-ft)   |
| M8 | 20 Nm (14.7 lbf-ft) |



| UNI-DIRECTIONAL   |               |               |    |               |               |               |    |               |
|-------------------|---------------|---------------|----|---------------|---------------|---------------|----|---------------|
| PUMPS             | INLET         |               |    |               | OUTLET        |               |    |               |
|                   | Ø D           | Ø A           | d  | e             | Ø D           | Ø A           | d  | e             |
| From 6.5 to       | 13<br>(0.51") | 30<br>(1.18") | M6 | 13<br>(0.51") | 13<br>(0.51") | 30<br>(1.18") | M6 | 13<br>(0.51") |
| From 11.3 to 22.5 | 20<br>(0.79") | 40<br>(1.57") | M8 | 13<br>(0.51") | 13<br>(0.51") | 30<br>(1.18") | M6 | 13<br>(0.51") |
| 26                | 22<br>(0.87") |               |    |               |               |               |    |               |



| BI-DIRECTIONAL  |               |               |    |               |               |               |    |               |
|-----------------|---------------|---------------|----|---------------|---------------|---------------|----|---------------|
| PUMPS           | INLET         |               |    |               | OUTLET        |               |    |               |
|                 | Ø D           | Ø A           | d  | e             | Ø D           | Ø A           | d  | e             |
| From 6.5 to 8.3 | 13<br>(0.51") | 30<br>(1.18") | M6 | 13<br>(0.51") | 13<br>(0.51") | 30<br>(1.18") | M6 | 13<br>(0.51") |
| From 11.3 to 26 | 20<br>(0.79") | 40<br>(1.57") | M8 | 13<br>(0.51") | 20<br>(0.79") | 40<br>(1.57") | M8 | 13<br>(0.51") |



code B

Flanged ports  
german standard

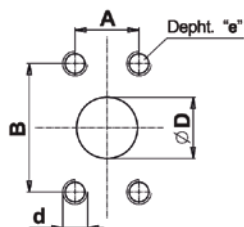
|    |                   |
|----|-------------------|
| M6 | 8 Nm (5.9 lbf-ft) |
|----|-------------------|



| UNI-DIRECTIONAL  |               |               |    |               |               |               |    |               |
|------------------|---------------|---------------|----|---------------|---------------|---------------|----|---------------|
| PUMPS            | INLET         |               |    |               | OUTLET        |               |    |               |
|                  | Ø D           | Ø A           | d  | e             | Ø D           | Ø A           | d  | e             |
| From 6.5 to 22.5 | 20<br>(0.79") | 40<br>(1.57") | M6 | 13<br>(0.51") | 15<br>(0.59") | 35<br>(1.38") | M6 | 13<br>(0.51") |
| 26               | 22<br>(0.87") |               |    |               |               |               |    |               |



| BI-DIRECTIONAL  |               |               |    |               |               |               |    |               |
|-----------------|---------------|---------------|----|---------------|---------------|---------------|----|---------------|
| PUMPS           | INLET         |               |    |               | OUTLET        |               |    |               |
|                 | Ø D           | Ø A           | d  | e             | Ø D           | Ø A           | d  | e             |
| From 6.5 to 8.3 | 15<br>(0.59") | 35<br>(1.38") | M6 | 13<br>(0.51") | 15<br>(0.59") | 35<br>(1.38") | M6 | 13<br>(0.51") |
| From 11.3 to 26 | 20<br>(0.79") | 40<br>(1.57") | M6 | 13<br>(0.51") | 20<br>(0.79") | 40<br>(1.57") | M6 | 13<br>(0.51") |



code W

Flanged ports  
SAE J518 - METRIC THREAD

|     |                     |
|-----|---------------------|
| M8  | 20 Nm (14.7 lbf-ft) |
| M10 | 35 Nm (25.8 lbf-ft) |



| UNI-DIRECTIONAL |                 |                 |                 |     |               |                 |                 |                 |     |               |
|-----------------|-----------------|-----------------|-----------------|-----|---------------|-----------------|-----------------|-----------------|-----|---------------|
| PUMPS           | INLET           |                 |                 |     |               | OUTLET          |                 |                 |     |               |
|                 | ØD              | B               | A               | d   | e             | ØD              | B               | A               | d   | e             |
| From 16 to 19   | 19<br>(0.75")   | 47.6<br>(1.87") | 22.2<br>(0.87") | M10 | 15<br>(0.59") | 12.7<br>(0.50") | 38.1<br>(1.50") | 17.5<br>(0.69") | M8  | 15<br>(0.59") |
| From 22.5 to 26 | 25.4<br>(1.00") | 52.4<br>(2.06") | 26.2<br>(1.03") | M10 | 15<br>(0.59") | 19<br>(0.75")   | 47.6<br>(1.87") | 22.2<br>(0.87") | M10 | 15<br>(0.59") |

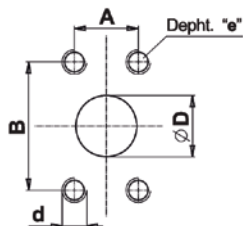


| BI-DIRECTIONAL |               |                 |                 |     |               |               |                 |                 |     |               |
|----------------|---------------|-----------------|-----------------|-----|---------------|---------------|-----------------|-----------------|-----|---------------|
| PUMPS          | INLET         |                 |                 |     |               | OUTLET        |                 |                 |     |               |
|                | ØD            | B               | A               | d   | e             | ØD            | B               | A               | d   | e             |
| From 16 to 26  | 19<br>(0.75") | 47.6<br>(1.87") | 22.2<br>(0.87") | M10 | 15<br>(0.59") | 19<br>(0.75") | 47.6<br>(1.87") | 22.2<br>(0.87") | M10 | 15<br>(0.59") |

EO.146.0423.14.00IM02



## Flanged Ports



code S

Flanged ports  
SAE J518  
AMERICAN STANDARD THREAD

|             |                     |
|-------------|---------------------|
| 5/16-18 UNC | 20 Nm (14.7 lbf-ft) |
| 3/8-16 UNC  | 30 Nm (22.1 lbf-ft) |

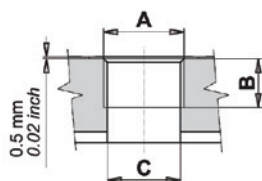


| UNI-DIRECTIONAL |                 |                 |                 |               |               |                 |                 |                 |                |               |
|-----------------|-----------------|-----------------|-----------------|---------------|---------------|-----------------|-----------------|-----------------|----------------|---------------|
| PUMPS           | INLET           |                 |                 |               |               | OUTLET          |                 |                 |                |               |
|                 | ØD              | B               | A               | d             | e             | ØD              | B               | A               | d              | e             |
| From 16 to 19   | 19<br>(0.75")   | 47.6<br>(1.87") | 22.2<br>(0.87") | 3/8-16<br>UNC | 15<br>(0.59") | 12.7<br>(0.50") | 38.1<br>(1.50") | 17.5<br>(0.69") | 5/16-18<br>UNC | 15<br>(0.59") |
| From 22.5 to 26 | 25.4<br>(1.00") | 52.4<br>(2.06") | 26.2<br>(1.03") | 3/8-16<br>UNC | 15<br>(0.59") | 19<br>(0.75")   | 47.6<br>(1.87") | 22.2<br>(0.87") | 3/8-16<br>UNC  | 15<br>(0.59") |



| BI-DIRECTIONAL |               |                 |                 |               |               |               |                 |                 |               |               |
|----------------|---------------|-----------------|-----------------|---------------|---------------|---------------|-----------------|-----------------|---------------|---------------|
| PUMPS          | INLET         |                 |                 |               |               | OUTLET        |                 |                 |               |               |
|                | ØD            | B               | A               | d             | e             | ØD            | B               | A               | d             | e             |
| From 16 to 26  | 19<br>(0.75") | 47.6<br>(1.87") | 22.2<br>(0.87") | 3/8-16<br>UNC | 15<br>(0.59") | 19<br>(0.75") | 47.6<br>(1.87") | 22.2<br>(0.87") | 3/8-16<br>UNC | 15<br>(0.59") |

## Threaded Ports



code G

Threaded ports  
GAS (BSPP)

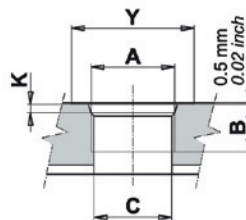
|      |                      |
|------|----------------------|
| G1/2 | 60 Nm (44.3 lbf-ft)  |
| G3/4 | 90 Nm (66.4 lbf-ft)  |
| G1   | 130 Nm (95.8 lbf-ft) |



| UNI-DIRECTIONAL |       |               |               |        |               |               |
|-----------------|-------|---------------|---------------|--------|---------------|---------------|
| PUMPS           | INLET |               |               | OUTLET |               |               |
|                 | A     | B             | C             | A      | B             | C             |
| From 6.5 to 19  | G 3/4 | 17<br>(0.67") | 18<br>(0.71") | G 1/2  | 15<br>(0.59") | 13<br>(0.79") |
| From 22.5 to 26 | G1    | 20<br>(0.79") | 25<br>(0.98") |        |               |               |



| BI-DIRECTIONAL  |       |               |               |        |               |               |
|-----------------|-------|---------------|---------------|--------|---------------|---------------|
| PUMPS           | INLET |               |               | OUTLET |               |               |
|                 | A     | B             | C             | A      | B             | C             |
| From 6.5 to 8.3 | G 1/2 | 15<br>(0.59") | 13<br>(0.79") | G 1/2  | 15<br>(0.59") | 13<br>(0.79") |
| From 11.3 to 26 | G 3/4 | 17<br>(0.67") | 18<br>(0.71") | G 3/4  | 17<br>(0.67") | 18<br>(0.71") |



code R

Threaded ports  
SAE (ODT)

|        |                      |
|--------|----------------------|
| SAE 10 | 60 Nm (44.3 lbf-ft)  |
| SAE 12 | 90 Nm (66.4 lbf-ft)  |
| SAE 16 | 130 Nm (95.8 lbf-ft) |



| UNI-DIRECTIONAL |                          |               |               |               |                |                        |               |               |               |                |
|-----------------|--------------------------|---------------|---------------|---------------|----------------|------------------------|---------------|---------------|---------------|----------------|
| PUMPS           | INLET                    |               |               |               |                | OUTLET                 |               |               |               |                |
|                 | A                        | B             | C             | Y             | K              | A                      | B             | C             | Y             | K              |
| From 6.5 to 19  | 1-1/16-12 UN<br>(SAE 12) | 19<br>(0.75") | 18<br>(0.71") | 41<br>(1.61") | 3.3<br>(0.13") | 7/8-14 UNF<br>(SAE 10) | 17<br>(0.67") | 13<br>(0.79") | 34<br>(1.32") | 2.5<br>(0.10") |
| From 22.5 to 26 | 1-5/16-12 UN<br>(SAE 16) | 19<br>(0.75") | 25<br>(0.98") | 49<br>(1.93") | 3.3<br>(0.13") |                        |               |               |               |                |

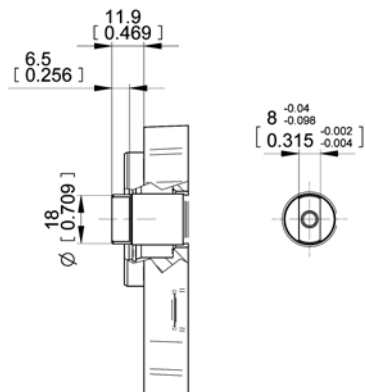
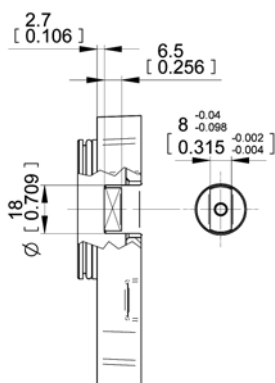
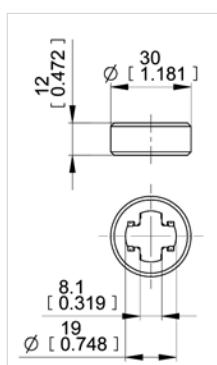


| BI-DIRECTIONAL  |                          |               |               |               |                |                          |               |               |               |                |
|-----------------|--------------------------|---------------|---------------|---------------|----------------|--------------------------|---------------|---------------|---------------|----------------|
| PUMPS           | INLET                    |               |               |               |                | OUTLET                   |               |               |               |                |
|                 | A                        | B             | C             | Y             | K              | A                        | B             | C             | Y             | K              |
| From 6.5 to 8.3 | 7/8-14 UNF<br>(SAE 10)   | 17<br>(0.67") | 13<br>(0.79") | 34<br>(1.32") | 2.5<br>(0.10") | 7/8-14 UNF<br>(SAE 10)   | 17<br>(0.67") | 13<br>(0.79") | 34<br>(1.32") | 2.5<br>(0.10") |
| From 11.3 to 26 | 1-1/16-12 UN<br>(SAE 12) | 19<br>(0.75") | 20<br>(0.79") | 41<br>(1.61") | 3.3<br>(0.13") | 1-1/16-12 UN<br>(SAE 12) | 19<br>(0.75") | 20<br>(0.79") | 41<br>(1.61") | 3.3<br>(0.13") |

EO.146.0423.14.00IM02



## Drive Shaft



### code 03

Max torque 70 Nm (620 lbf in)

Tang drive for electric motors (without shaft seal)

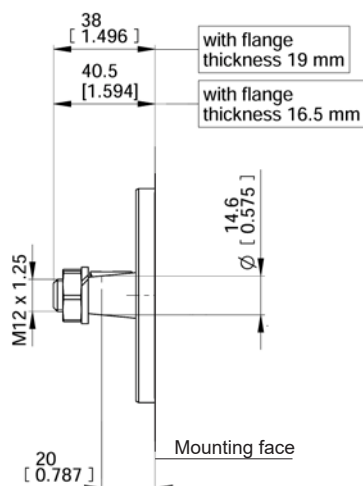
- Woodruff Key  
3x6,5-UNI 6606  
3x5 (for bearing version  
CL-CF-CB)
- Washer  
M12 TE-UNI 1751B
- Nut  
M12x1,25-UNI 5589  
40 Nm-29.7 lbf-ft

#### Part Number

Kit Woodruff  
Key+Nut+Washer

R12280180

R12283030 (bearing version)



### code 04

Max torque 70 Nm (620 lbf in)

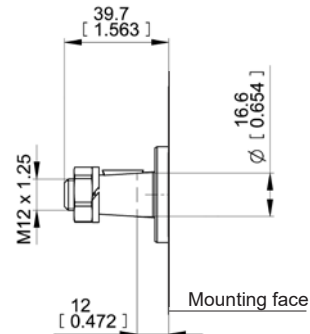
Tang drive

- Woodruff Key  
3,165x6,2
- Washer  
M12 TE-UNI 1751B
- Nut  
M12x1,25-UNI 5589  
40 Nm-29.7 lbf-ft

#### Part Number

Kit Woodruff  
Key+Nut+Washer

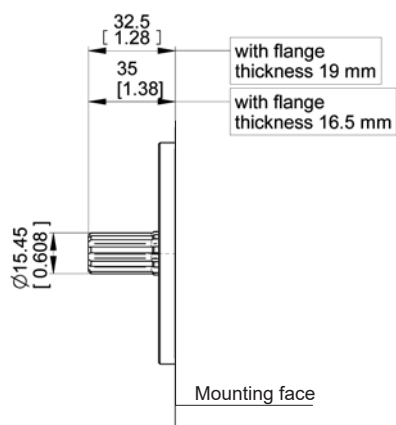
R12280170



### code 25

Max torque 130 Nm (1151 lbf in)

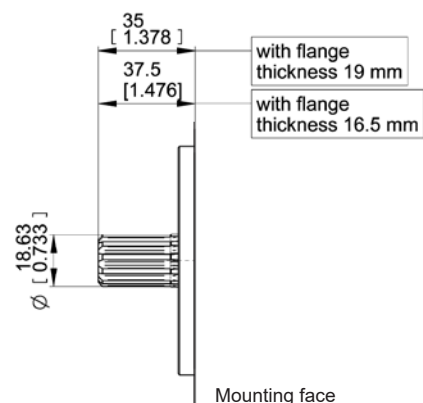
Tapered 1:5



### code 28

Max torque 130 Nm (1151 lbf in)

Tapered 1:8



### code 52

Max torque 110 Nm (974 lbf in)

SAE A 9T-16/32DP SPLINED

### code 54

Max torque 160 Nm (1416 lbf in)

SAE A 11T-16/32DP SPLINED

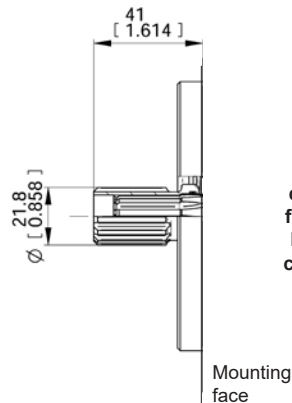


## Drive Shaft

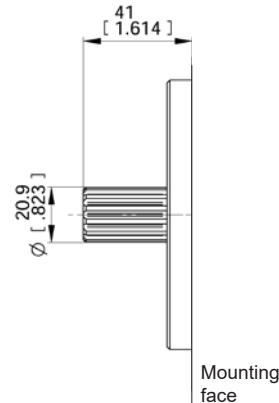
## Part Number

Coupling  
Sleeve+O ring

R12040210



**i**  
for  
displacements  
from 6.5 to 13.8  
Mounting with  
coupling sleeve



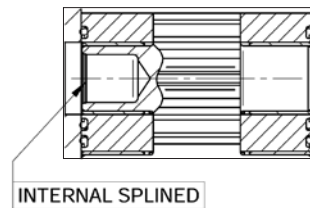
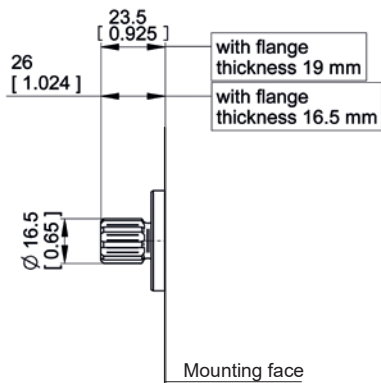
**i**  
for  
displacements  
from 16 to 26  
Mounting with  
solid shaft.

## code 55

Max torque 100 Nm (885 lbt in)

Max torque 200 Nm (1770 lbt in)

## SAE B 13T-16/32DP SPLINED



## code 62

Max torque 140 Nm (1239 lbt in)

## code 60

Max torque 100 Nm (885 lbt in)

## 9 teeth DIN 5482 splined

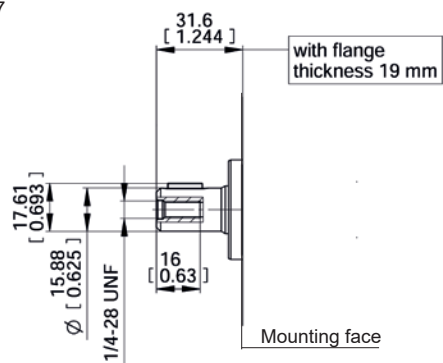
## DIN 5480 internal splined (only for rear pumps)

Key  
3,97x3.97x12,7

## Part Number

Key

796620700

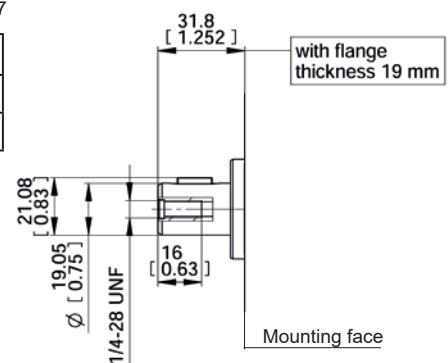


Key  
4,76x4,76x12,7

## Part Number

Key

796621000



## code 82

Max torque 75 Nm (664 lbt in)

## code 85

Max torque 110 Nm (974 lbt in)

## 5/8" SAE A parallel

## 3/4" SAE A parallel

E0.146.0423.14.00IM02



## Continental Shaft

Woodruff Key  
4x6,5 UNI 6606

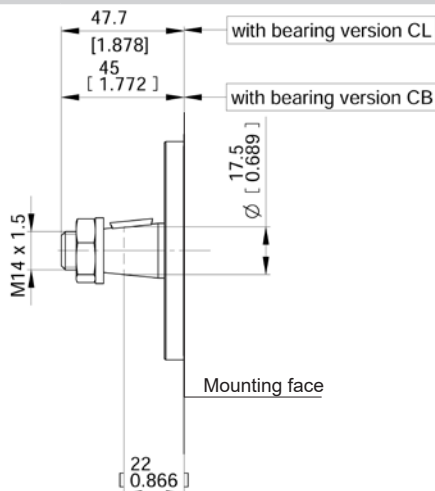
Washer  
M14 UNI 1751

Nut  
M14x1,5 ISO 8675  
40 Nm-29.7 lbf-ft

### Part Number

Kit Woodruff  
Key+Nut+Washer

R12240080

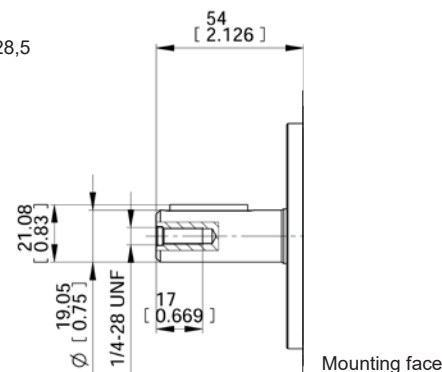


Key  
4,76x4,76x28,5

### Part Number

Key

796622800



**code 26**

Max torque 100 Nm (885 lbt in)

Tapered 1:5 (only for CB, CL)

**code 86**

Max torque 100 Nm (885 lbt in)

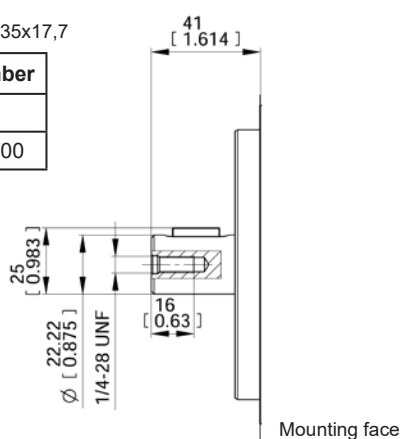
3/4" SAE A parallel

Key  
6,35x6,35x17,7

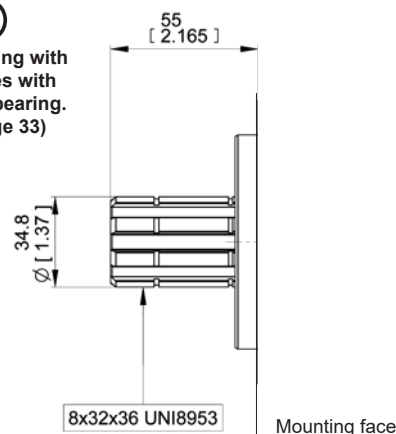
### Part Number

Key

796620800



For mounting with  
Z1 Flanges with  
outrigger bearing.  
(See page 33)



**code 87**

Max torque 200 Nm (1770 lbt in)

7/8" SAE B parallel

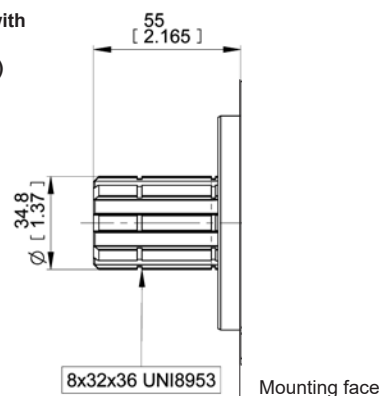
**code 66**

Max torque 200 Nm (1770 lbt in)

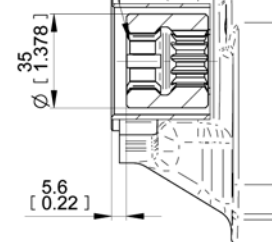
8x32x36 UNI 8953 SPLINED



For mounting with  
Z2 Flanges.  
(See page 28)



6X21X25 UNI 8953



**code 67**

Max torque 200 Nm (1770 lbt in)

8x32x36 UNI 8953 SPLINED

**code 73**

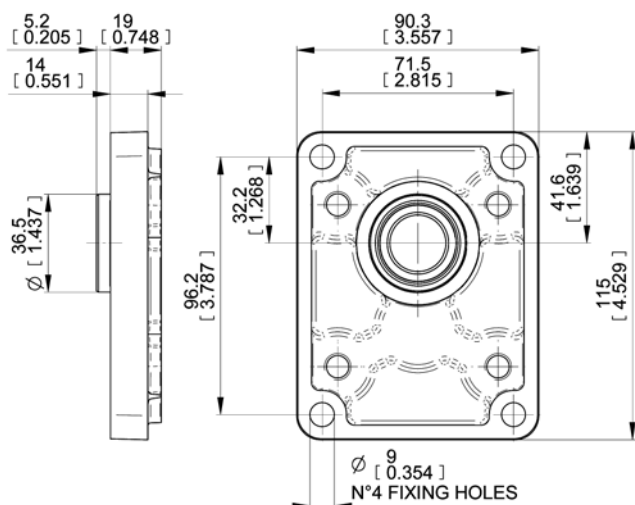
Max torque 200 Nm (1770 lbt in)

6x21x25 UNI 8953 INTERNAL SPLINED

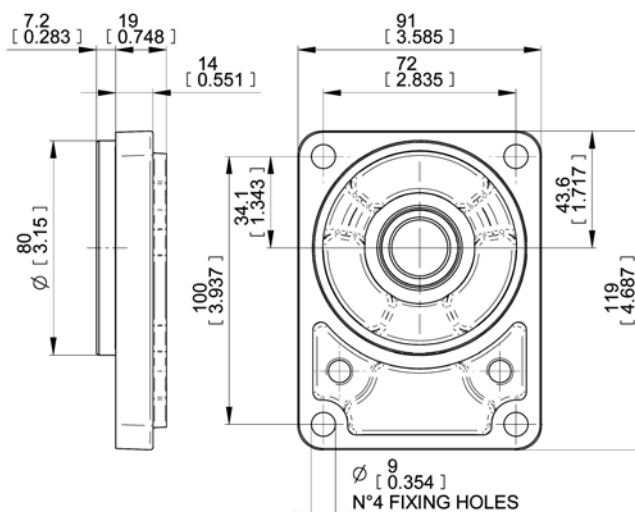
EO.146.0423.14.001M02



## Mounting Flanges



| Code | Part Number (Unidirectional Pump) |                                    |
|------|-----------------------------------|------------------------------------|
|      | Flange+Shaft seal kit             | Shaft seal kit<br>(See page 43-44) |
| 28P1 |                                   |                                    |
| 62P1 | R12240012 (NBR)                   | R12240010 (NBR)                    |
| 82P1 | R12240420 (FPM)                   | R12240021 (FPM)                    |



| Code | Part Number (Unidirectional Pump) |                                    |
|------|-----------------------------------|------------------------------------|
|      | Flange+Shaft seal kit             | Shaft seal kit<br>(See page 43-44) |
| 25B1 | R12240610 (NBR)                   | R12240010 (NBR)                    |
| 62B1 | R12240611 (FPM)                   | R12240021 (FPM)                    |

**code P1**

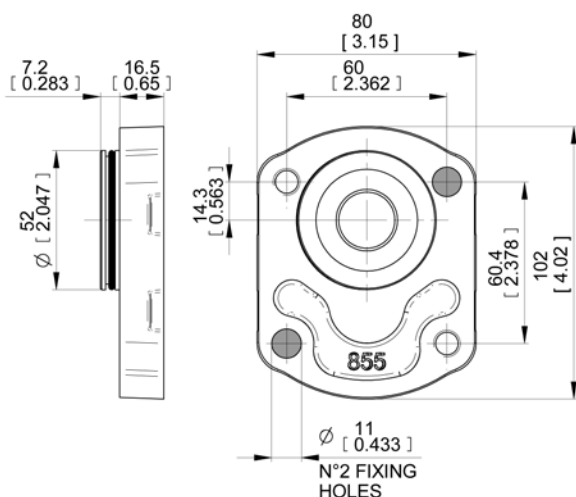
With shaft code 28-62-82

European standard

**code B1**

With shaft code 25-62

German standard

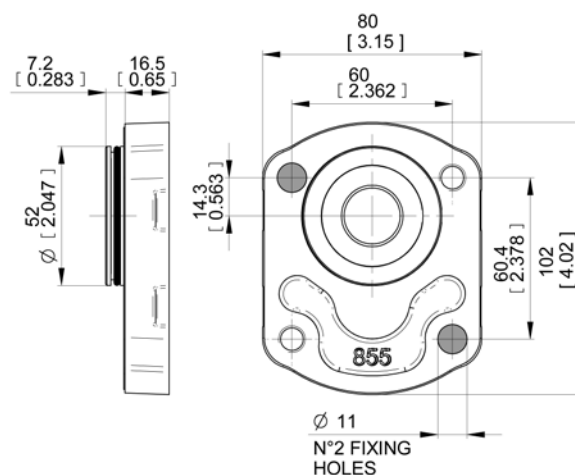


| Code | Part Number (Unidirectional Pump) |                                      |
|------|-----------------------------------|--------------------------------------|
|      | Flange+O-ring                     | O-ring (OR3187-AT<br>47,29x2,62-NBR) |
| 03B2 | R12240050                         | 799113400                            |

**code B2**

With shaft code 03

German standard



| Code | Part Number (Unidirectional Pump) |                                      |
|------|-----------------------------------|--------------------------------------|
|      | Flange+O-ring                     | O-ring (OR3187-AT<br>47,29x2,62-NBR) |
| 03B3 | R12240060                         | 799113400                            |

**code B3**

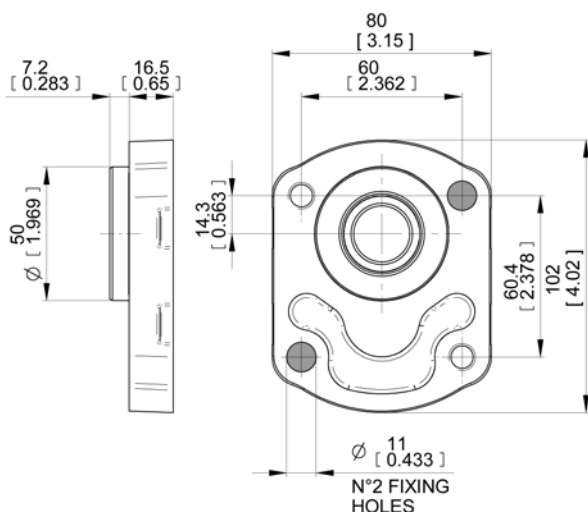
With shaft code 03

German standard

EO.146.0423.14.00IM02



## Mounting Flanges

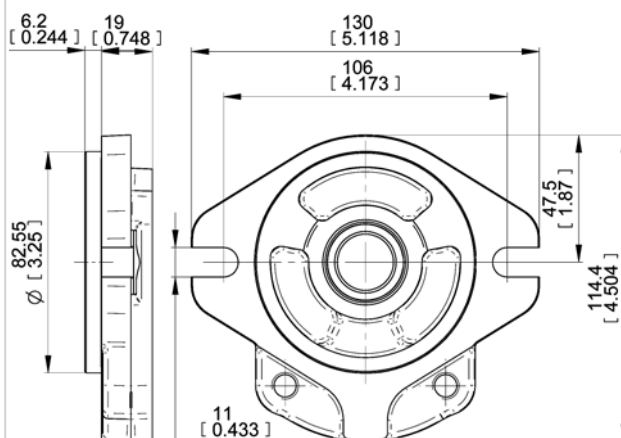


| Code | Part Number (Unidirectional Pump) |                                    |
|------|-----------------------------------|------------------------------------|
|      | Flange+Shaft seal kit             | Shaft seal kit<br>(See page 43-44) |
| 04B4 | R12240136 (NBR)                   | R12240110 (NBR)                    |
|      | R12240137 (FPM)                   | R12240115 (FPM)                    |
| 25B4 | R12240100 (NBR)                   | R12240010 (NBR)                    |
| 62B4 | R12240102 (FPM)                   | R12240021 (FPM)                    |

**B4**

With shaft code 04-25-62

German standard

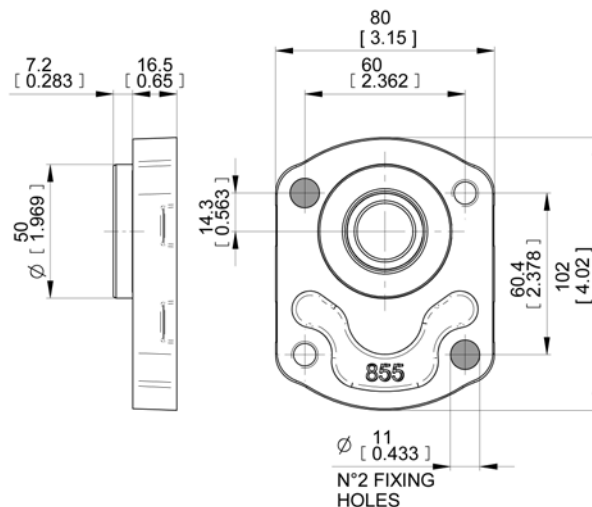


| Code | Part Number (Unidirectional Pump) |                                    |
|------|-----------------------------------|------------------------------------|
|      | Flange+Shaft seal kit             | Shaft seal kit<br>(See page 43-44) |
| 52S2 | R14640100 (NBR)                   | R12240010 (NBR)                    |
| 82S2 | R14640101 (FPM)                   | R12240021 (FPM)                    |
| 54S2 | R14640110 (NBR)                   | R12240110 (NBR)                    |
| 85S2 | R14640111 (FPM)                   | R12240115 (FPM)                    |

**S2**

With shaft code 52-54-82-85

SAE A 2 Bolts

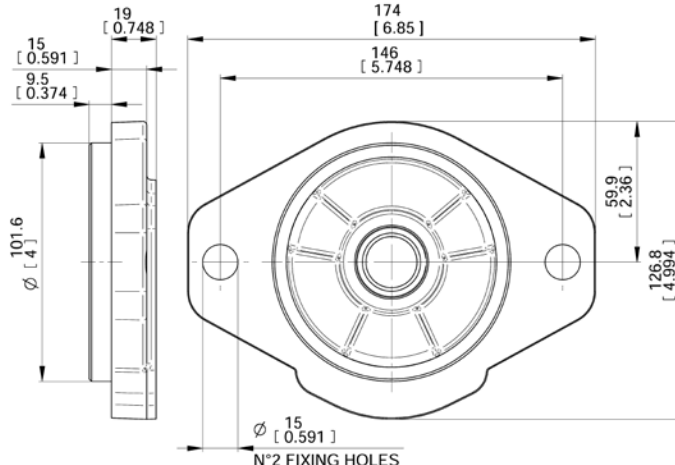


| Code | Part Number (Unidirectional Pump) |                                    |
|------|-----------------------------------|------------------------------------|
|      | Flange+Shaft seal kit             | Shaft seal kit<br>(See page 43-44) |
| 04B5 | R12240134 (NBR)                   | R12240110 (NBR)                    |
|      | R12240138 (FPM)                   | R12240115 (FPM)                    |
| 25B5 | R12240130 (NBR)                   | R12240010 (NBR)                    |
| 62B5 | R12240133 (FPM)                   | R12240021 (FPM)                    |

**B5**

With shaft code 04-25-62

German standard



| Code                           | Part Number (Unidirectional Pump) |                                    |
|--------------------------------|-----------------------------------|------------------------------------|
|                                | Flange+Shaft seal kit             | Shaft seal kit<br>(See page 43-44) |
| 55S3<br>from cy 6.5 to<br>13.8 | R12040310 (NBR)                   | R12240010 (NBR)                    |
|                                | R12040311 (FPM)                   | R12240021 (FPM)                    |
| 55S3<br>from cy 16<br>to 26    | R14640050 (NBR)                   | R14640010 (NBR)                    |
|                                | R14640060 (FPM)                   | R14640011 (FPM)                    |

**S3**

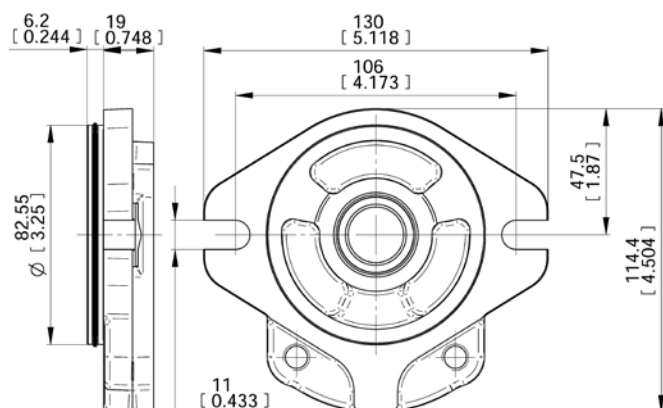
With shaft code 55

SAE B 2 Bolts

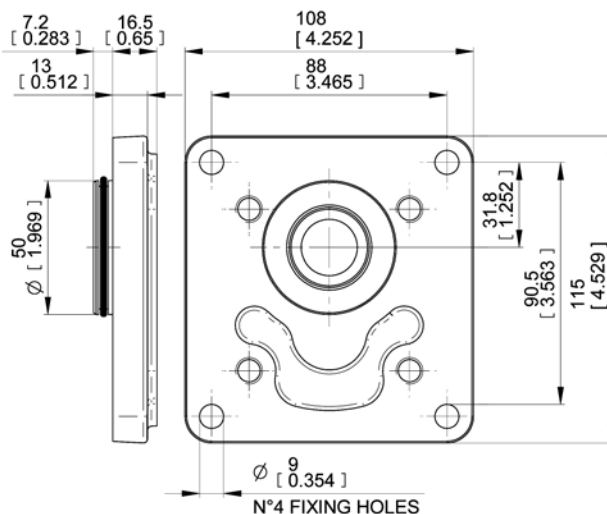
EO.146.0423.14.00IM02



## Mounting Flanges



| Code | Part Number (Unidirectional Pump) |                                    |
|------|-----------------------------------|------------------------------------|
|      | Flange+Shaft seal kit             | Shaft seal kit<br>(See page 43-44) |
| 52S6 | R14640020 (NBR)                   | R12240010 (NBR)                    |
| 82S6 | R14640021 (FPM)                   | R12240021 (FPM)                    |
| 54S6 | R14640022 (NBR)                   | R12240110 (NBR)                    |
| 85S6 | R14640023 (FPM)                   | R12240115 (FPM)                    |



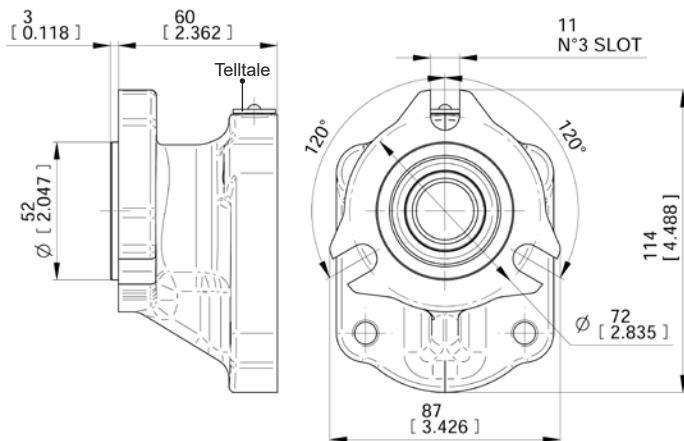
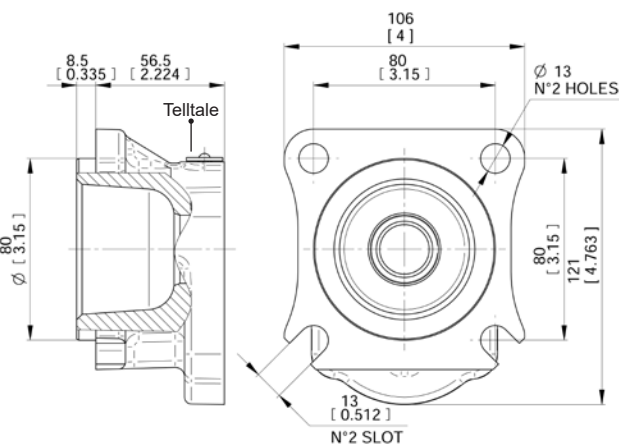
| Code | Part Number (Unidirectional Pump)  |                                    |
|------|------------------------------------|------------------------------------|
|      | Flange+Shaft seal kit              | Shaft seal kit<br>(See page 43-44) |
| 62C1 | R12040300 (NBR)<br>R12040301 (FPM) | R12240010 (NBR)<br>R12240021 (FPM) |

**S6**

With shaft code 52-54-82-85

**SAE A 2 BOLTS (with O-ring on the centering collar)****C1**

With shaft code 62

**4 bolts for Iveco engines**Continental shaft 73  
included.TellTale  
drop in plug in case of failure,  
outside leakage trough the  
crossing hole is visible.Continental shaft 67  
included.

| Code | Part Number (Unidirectional Pump)  |                                    |
|------|------------------------------------|------------------------------------|
|      | Flange+Shaft seal kit              | Shaft seal kit<br>(See page 43-44) |
| 73T1 | R14620030 (NBR)<br>R14620031 (FPM) | R14640010 (NBR)<br>R14640011 (FPM) |

**T1**

With shaft code 73

**3 Bolts UNI 8953 for gear box**

| Code | Part Number (Unidirectional Pump)  |                                    |
|------|------------------------------------|------------------------------------|
|      | Flange+Shaft seal kit              | Shaft seal kit<br>(See page 43-44) |
| 67Z2 | R14620011 (NBR)<br>R14620012 (FPM) | R14640010 (NBR)<br>R14640011 (FPM) |

**Z2**

With shaft code 67

**4 Bolts for zf gear box**

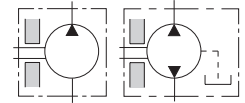
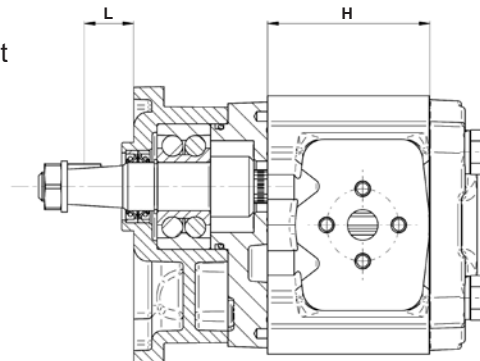
EO.146.0423.14.00IM02



## Mounting Flanges with Outtrigger Bearing

The following diagrams show radial load capacity of the bearing.  
Calculation according to ISO 281 at 10 cSt

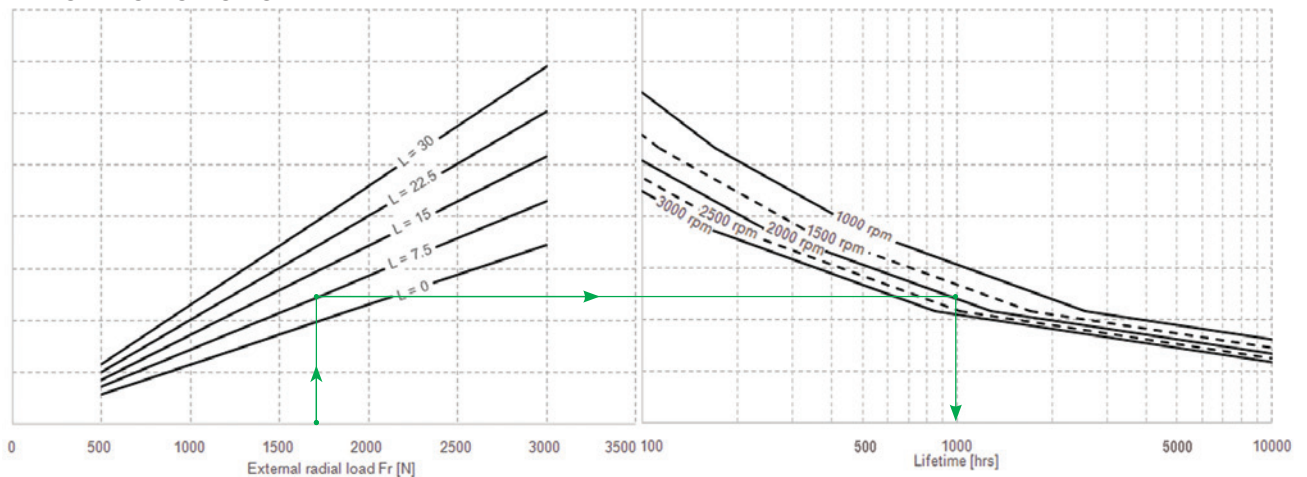
L=Distance between  
mounting flange and  
radial force point of  
application [mm-inches]



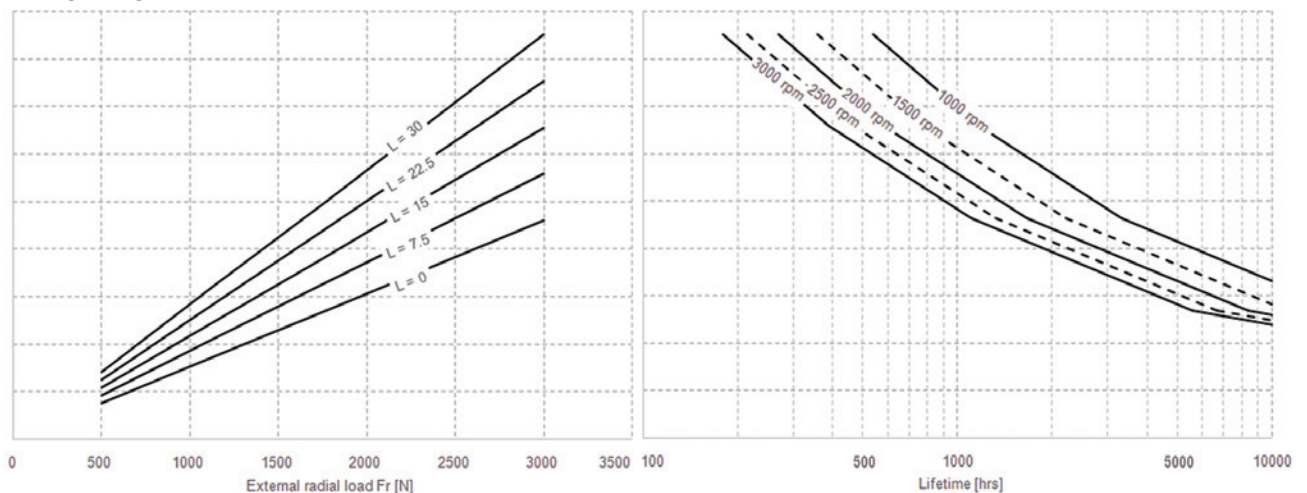
Example:  
Fr = 1700 N  
L = 7.5  
Speed = 2000 rpm  
→ Expected life: 1000 hrs

| TYPE | H             |
|------|---------------|
| 6.5  | 49.95 (1.97") |
| 8.3  | 52.8 (2.08")  |
| 11.3 | 59.7 (2.35")  |
| 13.8 | 63.5 (2.5")   |
| 16   | 67.5 (2.66")  |
| 19   | 75.6 (2.97")  |
| 22.5 | 81 (3.19")    |
| 26   | 86.6 (3.42")  |

For Code CP-CB-CL-CS



For Code CF

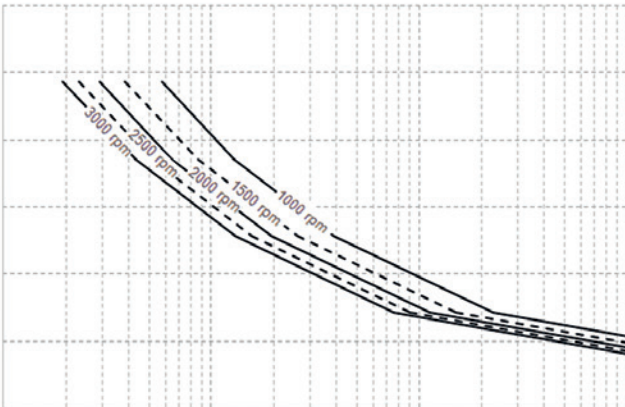
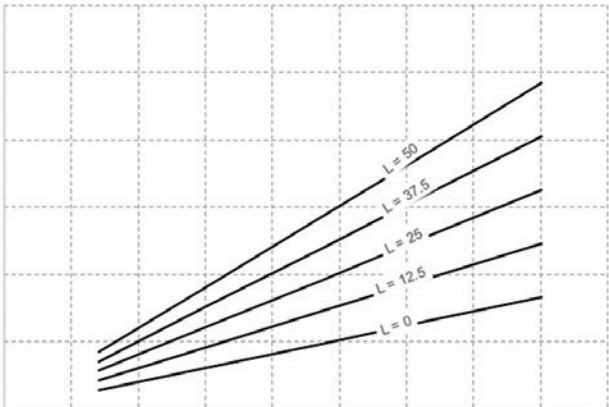


EO.146.0423.14.00IM02

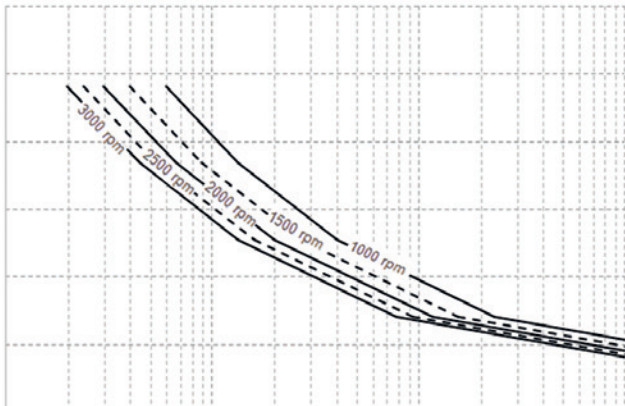
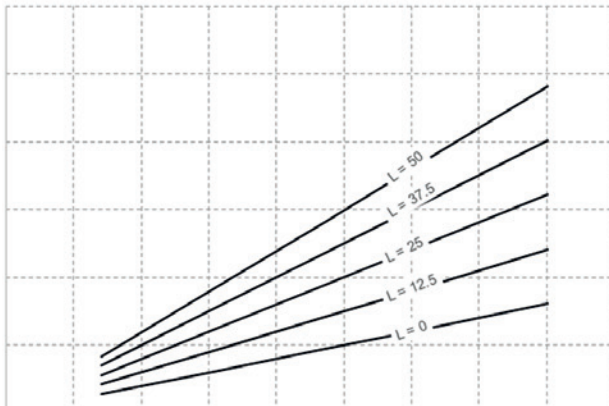


Mounting Flanges with Outrigger Bearing

For Code Z1

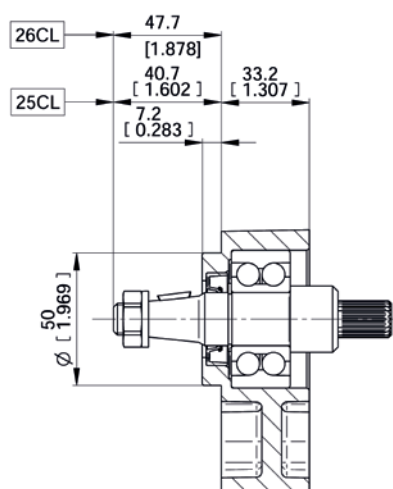


For Code CSB

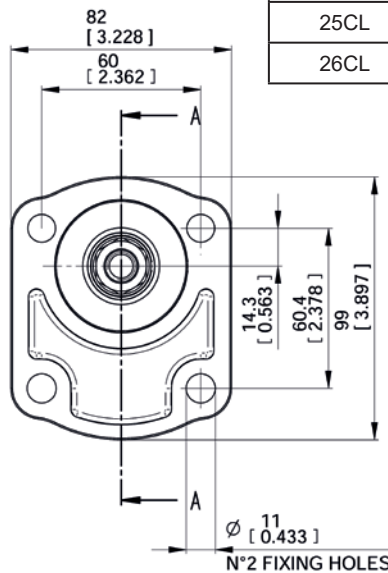




## Aluminium Mounting Flanges with Outrigger Bearing



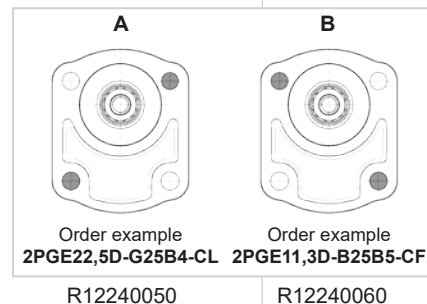
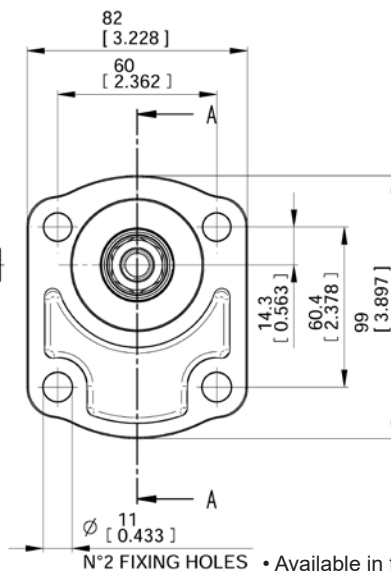
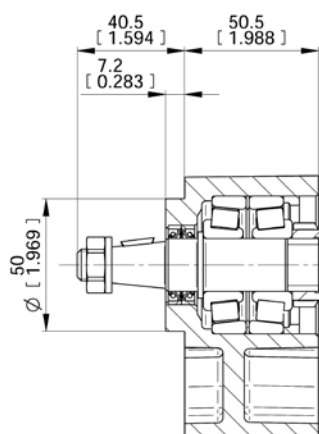
| Code | Part Number            |                             |
|------|------------------------|-----------------------------|
|      | Flange+Bearing support | Kit Woodruff Key+Nut+Washer |
| 25CL | R12040090              | R12283030                   |
| 26CL | R12040060              | R12240080                   |



• Available in two positions: A - B

Mounting with shaft code 25

|                                        |           |                                                        |
|----------------------------------------|-----------|--------------------------------------------------------|
|                                        | <b>CL</b> | With shaft code 25-26 - Max torque 100 Nm (885 lbt in) |
| <b>For Internal combustion engines</b> |           |                                                        |

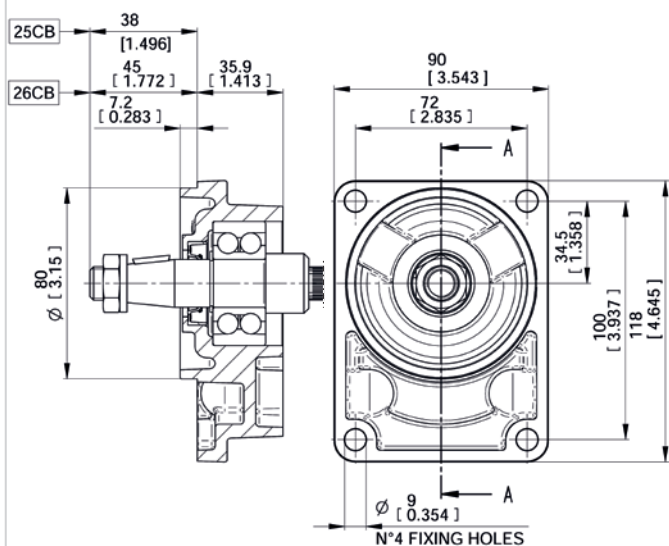


| Code | Part Number            |                             |
|------|------------------------|-----------------------------|
|      | Flange+Bearing support | Kit Woodruff Key+Nut+Washer |
| 25CF | R12040101              | R12283030                   |

|                                                                    |                                                     |
|--------------------------------------------------------------------|-----------------------------------------------------|
| <b>CF</b>                                                          | With shaft code 25 - Max torque 100 Nm (885 lbt in) |
| <b>FOR INTERNAL COMBUSTION ENGINES WITH AXIAL AND RADIAL LOADS</b> |                                                     |

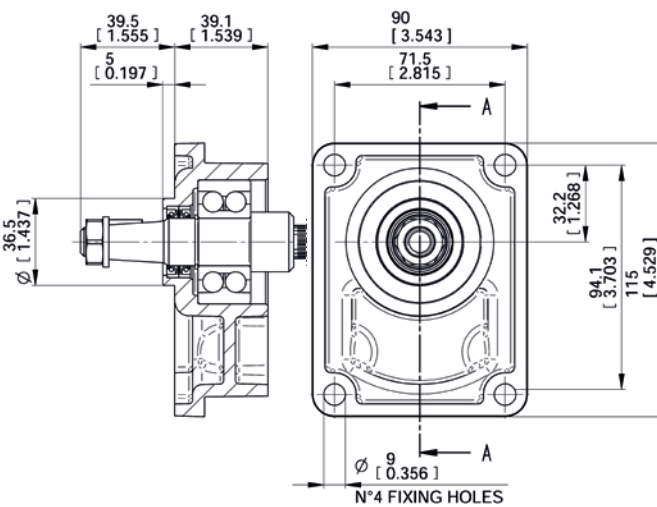


## Aluminium Mounting Flanges with Outrigger Bearing



Mounting with shaft code 26

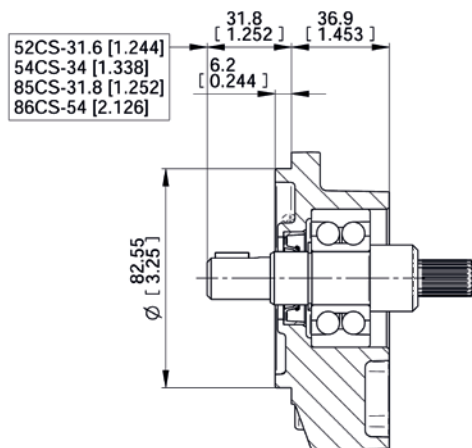
| Code | Part Number            |                             |
|------|------------------------|-----------------------------|
|      | Flange+Bearing support | Kit Woodruff Key+Nut+Washer |
| 25CB | R12040070              | R12283030                   |
| 26CB | R12040080              | R12240080                   |



| Code | Part Number            |                             |
|------|------------------------|-----------------------------|
|      | Flange+Bearing support | Kit Woodruff Key+Nut+Washer |
| 28CP | R12040010              | R12240070                   |

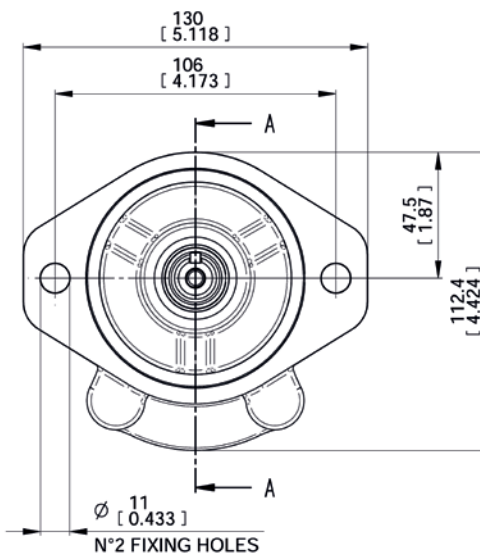
| CB | With shaft code 25-26<br>Max torque 100 Nm (885 lbt in) |  |
|----|---------------------------------------------------------|--|
|    | German standard                                         |  |

| CP | With shaft code 28<br>Max torque 100 Nm (885 lbt in) |  |
|----|------------------------------------------------------|--|
|    | European standard                                    |  |



Mounting with shaft code 82

| Code | Part Number            |  |
|------|------------------------|--|
|      | Flange+Bearing support |  |
| 52CS | R12040030              |  |
| 54CS | R12040020              |  |



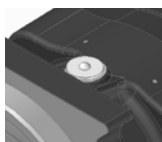
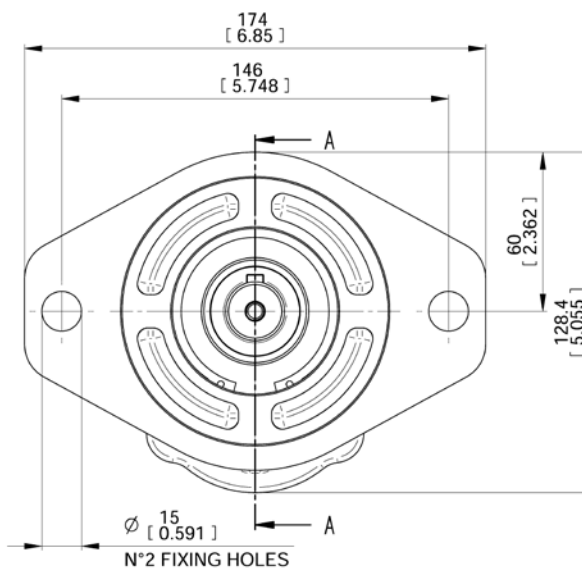
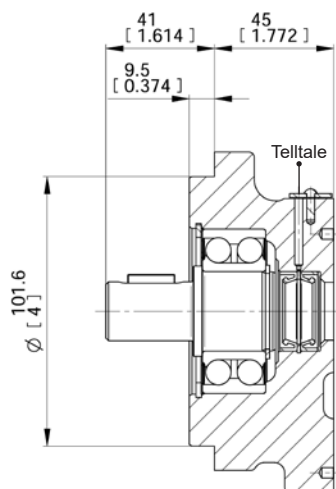
| Code | Part Number            |           |
|------|------------------------|-----------|
|      | Flange+Bearing support | Key       |
| 82CS | R12040040              | 796620700 |
| 85CS | R12040050              | 796621000 |
| 86CS | R12040130              | 796622800 |

| CS | With shaft code 52-54-82-85-86 - Max torque 100 Nm (885 lbt in) |  |
|----|-----------------------------------------------------------------|--|
|    | SAE A                                                           |  |

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## Cast Iron Mounting Flanges with Outrigger Bearing



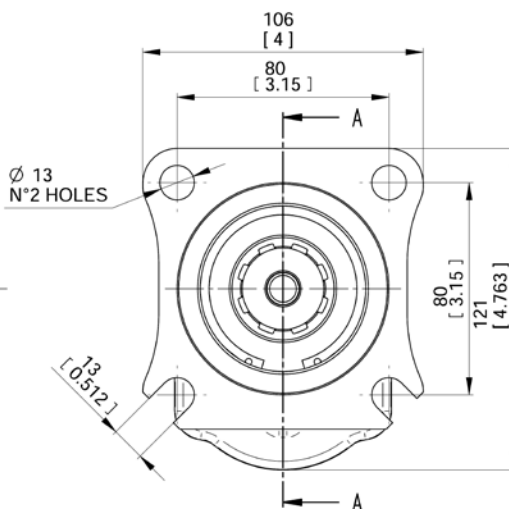
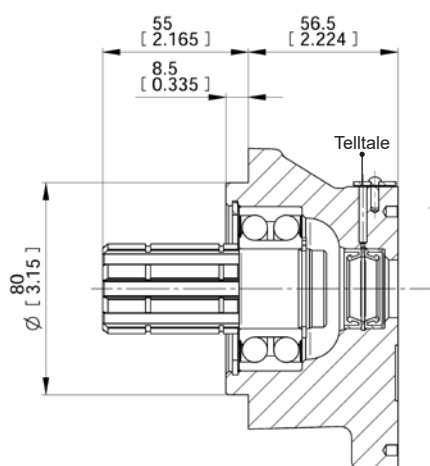
TellTale  
drop in plug in case of failure,  
outside leakage trough the  
crossing hole is visible.

| Code  | Part Number            |           |
|-------|------------------------|-----------|
|       | Flange+Bearing support | Key       |
| 87CSB | R14620020              | 796620800 |

**CSB**

With shaft code 87 - Max torque 200 Nm (1770 lbt in)

**SAE B**



Available only for  
displacements  
from 11.3 to 26

| Code | Part Number            |  |
|------|------------------------|--|
|      | Flange+Bearing support |  |
| 66Z1 | R14620010              |  |

**Z1**

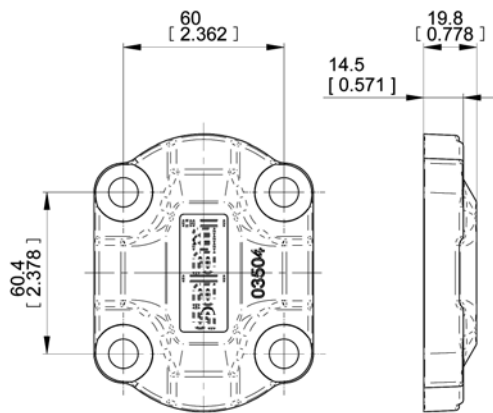
With shaft code 66 - Max torque 200 Nm (1770 lbt in)

**4 Bolts for ZF gear box**

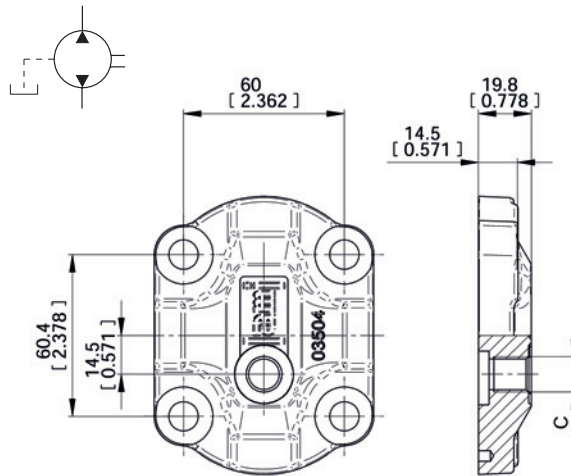
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## Rear Covers



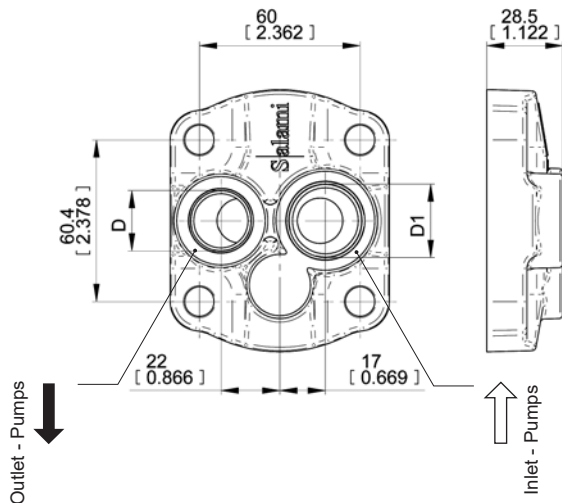
| Code           | Part Number |
|----------------|-------------|
| Standard Cover | 312203529   |



| Code                      | Part Number | Threaded Port        |
|---------------------------|-------------|----------------------|
|                           |             | C (Drain)            |
| Cover with External Drain | 312203552   | 7/16-20 UNF-2B SAE 4 |
|                           | 312203551   | G 1/4                |

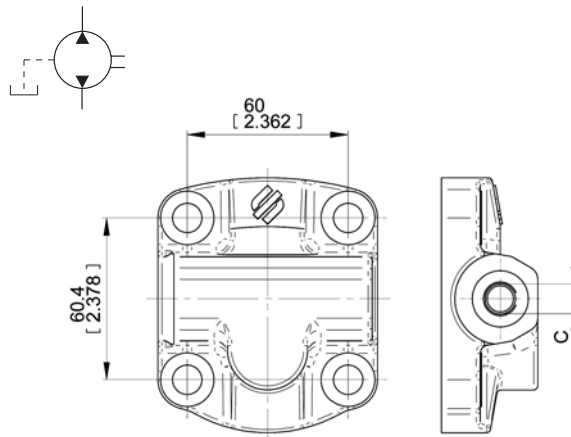
### STANDARD REAR COVER FOR UNIDIRECTIONAL PUMPS

### STANDARD REAR COVER WITH EXTERNAL DRAIN PORT (C) FOR BIDIRECTIONAL PUMPS



| Code                       | Part Number | Threaded Ports       |                        |
|----------------------------|-------------|----------------------|------------------------|
|                            |             | D (Outlet)           | D1 (Inlet)             |
| 1<br>Cover with rear ports | 312203535   | 7/8-14 UNF-2B SAE 10 | 1-1/16-12 UN-2B SAE 12 |
|                            | 312203543   | G 1/2                | G 3/4                  |

On request outlet port only.



| Code                            | Part Number | Threaded Port        |
|---------------------------------|-------------|----------------------|
|                                 |             | C (Drain)            |
| LD<br>Cover with External Drain | 312203545   | 7/16-20 UNF-2B SAE 4 |
|                                 | 312003509   | G 1/4                |

EO.146.0423.14.00IM02

1

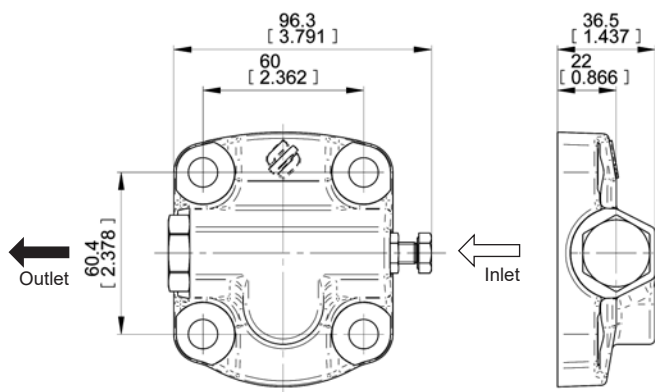
LD

### REAR COVER WITH PORTS FOR UNIDIRECTIONAL PUMPS

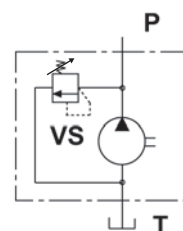
### REAR COVER WITH SIDE DRAIN PORT (C) FOR BIDIRECTIONAL PUMPS



## Rear Covers with Valves

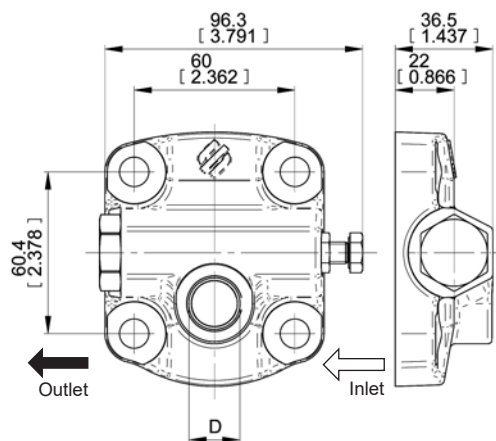


| Code                     | Part Number | Pressure relief valve setting range |
|--------------------------|-------------|-------------------------------------|
| VS<br>Internal Discharge | R12275013   | 15-30 bar                           |
|                          | R12275020   | 30-60 bar                           |
|                          | R12275040   | 61-120 bar                          |
|                          | R12275050   | 121-170 bar                         |
|                          | R12275060   | 171-250 bar                         |

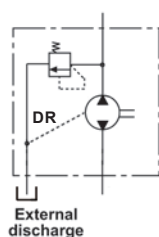
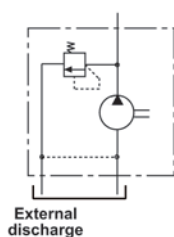


### VS

#### INTERNAL DISCHARGE FOR UNIDIRECTIONAL PUMPS



| Code                      | Part Number | Pressure relief valve setting range | D (external discharge) |
|---------------------------|-------------|-------------------------------------|------------------------|
| VSE<br>External Discharge | R12275014   | 15-30 bar                           | SAE 8                  |
|                           | R12275021   | 30-60 bar                           |                        |
|                           | R12275041   | 61-120 bar                          |                        |
|                           | R12275051   | 121-170 bar                         |                        |
|                           | R12275061   | 171-250 bar                         |                        |
|                           | R12275015   | 15-30 bar                           | M18x1.5                |
|                           | R12275022   | 30-60 bar                           |                        |
|                           | R12275042   | 61-120 bar                          |                        |
|                           | R12275052   | 121-170 bar                         |                        |
|                           | R12275062   | 171-250 bar                         |                        |
|                           | R12275016   | 15-30 bar                           | G 3/8                  |
|                           | R12275023   | 30-60 bar                           |                        |
|                           | R12275043   | 61-120 bar                          |                        |
|                           | R12275053   | 121-170 bar                         |                        |
|                           | R12275063   | 171-250 bar                         |                        |



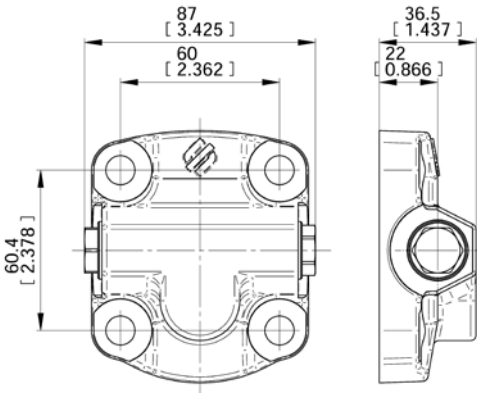
### VSE

#### EXTERNAL DISCHARGE FOR UNIDIRECTIONAL AND BIDIRECTIONAL PUMPS

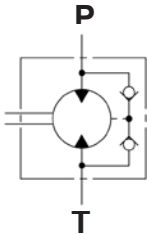
EO.146.0423.14.001M02



Rear Covers with Valves



| Code                  | Part Number |
|-----------------------|-------------|
| IDV<br>Internal drain | R12203501   |



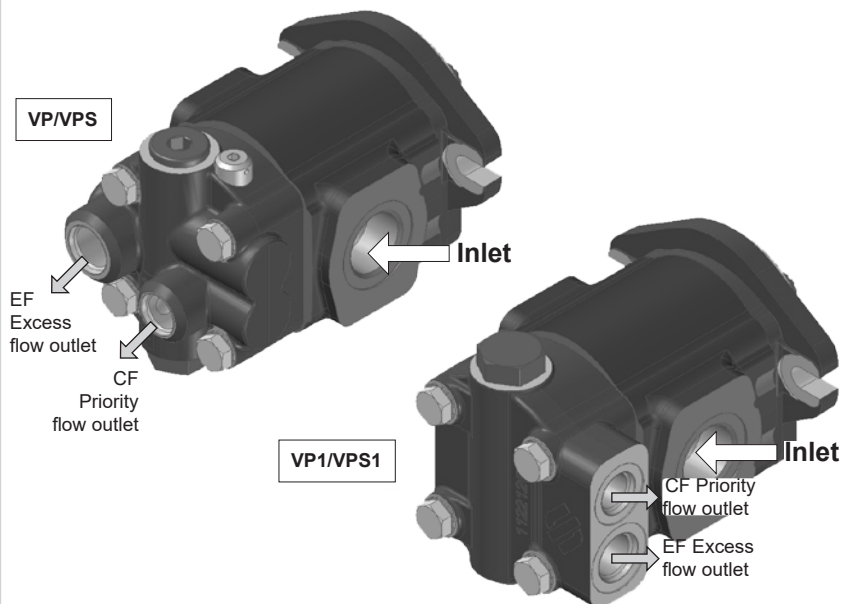
IDV

INTERNAL DRAIN FOR BIDIRECTIONAL PUMPS

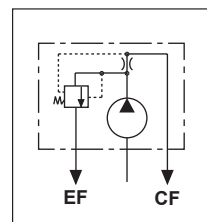


## Rear Covers with Valves

Pressure compensated priority flow valve to feed two pressurized circuit at the same time, priority flow CF remains constant regardless of pump speed and system pressure variations. Excess flow EF is directly proportional to pump speed. Priority flow is determined by diameter of calibrated orifice, see table at page 38). The max. pressure of the priority circuit can be limited by valve which relieves into pump suction line.



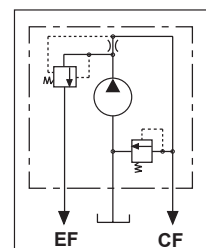
VP - VP1



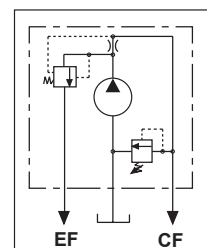
CF= Priority flow port  
EF= Excess flow port

Priority flow valve, excess flow available to second actuator.

VPS



VPS1



Priority flow valve, excess flow available to second actuator with pressure relief valve on priority flow line.

### VP/VP1/VPS/VPS1

### PRESSURE COMPENSATED PRIORITY FLOW VALVES

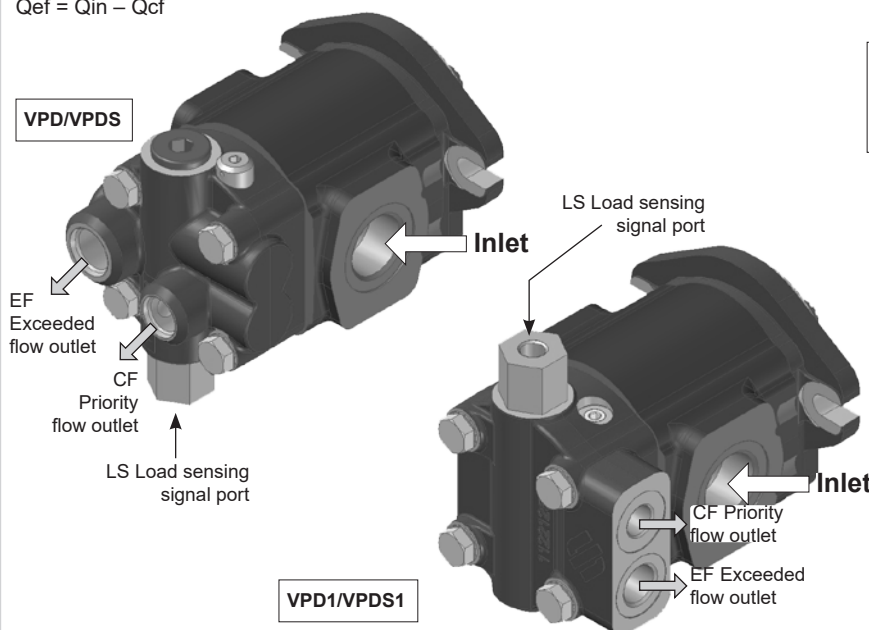
The load sensing priority valve is a control valve able to divide the flow generated by the pump, coming from the port P, in two different flows named Qcf and Qef. The Qcf flow follows the user request, the flow Qef changes according to the equation:

$$Q_{in} = Q_{cf} + Q_{ef}$$

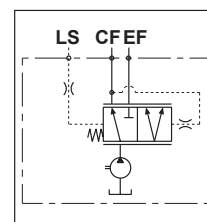
This valve is used in hydraulic steering systems, the CF port is connected to the inlet of power steering unit while the other functions (lifter etc...) are connected to the EF port. The load sensing LS signal of the valve is connected to the LS of powersteering unit.

The regulated flow Qcf depends on the steering speed, the remaining flow Qef is available for the other functions and complies with the equation:

$$Q_{ef} = Q_{in} - Q_{cf}$$



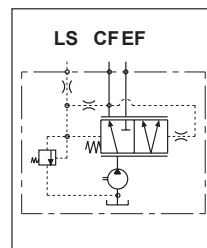
VPD - VPD1



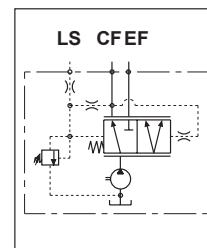
CF= Priority flow port  
EF= Exceeded flow port  
LS= Load sensing signal port

Load sensing priority valve with dynamic signal without pressure relief valve.

VPDS



VPDS1



Load sensing priority valve with dynamic signal with pressure relief valve.

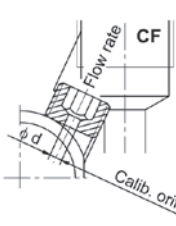
### VPD/VPD1/VPDS/VPDS1

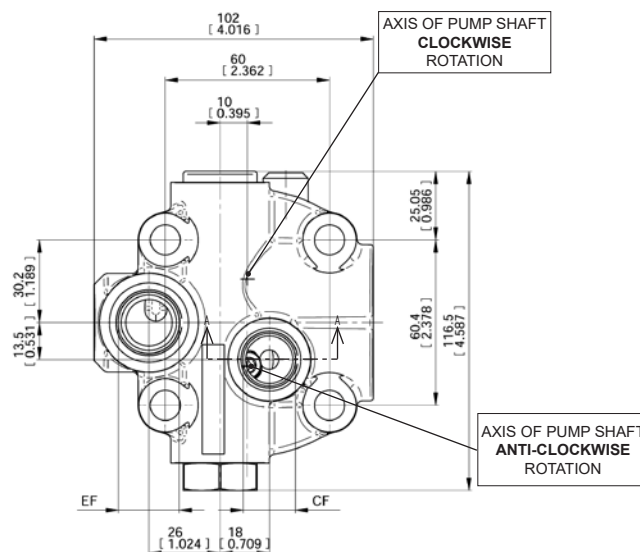
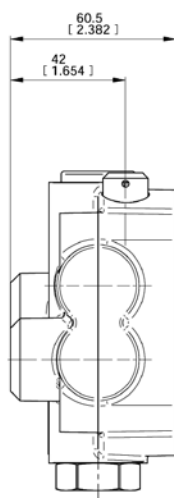
### LOAD SENSING PRIORITY VALVES

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## Pressure Compensated Priority Flow Valve

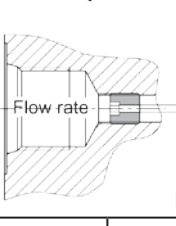
| Flow Rate Table                                                                                   |      |                         |      |
|---------------------------------------------------------------------------------------------------|------|-------------------------|------|
|  <p>Det. A-A</p> |      |                         |      |
| Calibrated Orifice<br>$\phi d$                                                                    |      | Flow Rate<br>$\pm 10\%$ |      |
| mm                                                                                                | inch | l/min                   | gpm  |
| 1.5                                                                                               | 0.06 | 2.5                     | 0.66 |
| 2                                                                                                 | 0.08 | 4                       | 1.06 |
| 2.4                                                                                               | 0.09 | 6                       | 1.59 |
| 2.8                                                                                               | 0.11 | 8                       | 2.11 |
| 3.1                                                                                               | 0.12 | 10                      | 2.64 |
| 3.5                                                                                               | 0.14 | 12.5                    | 3.30 |
| 4                                                                                                 | 0.16 | 16                      | 4.23 |
| 4.4                                                                                               | 0.17 | 20                      | 5.28 |
| 4.9                                                                                               | 0.19 | 25                      | 6.61 |

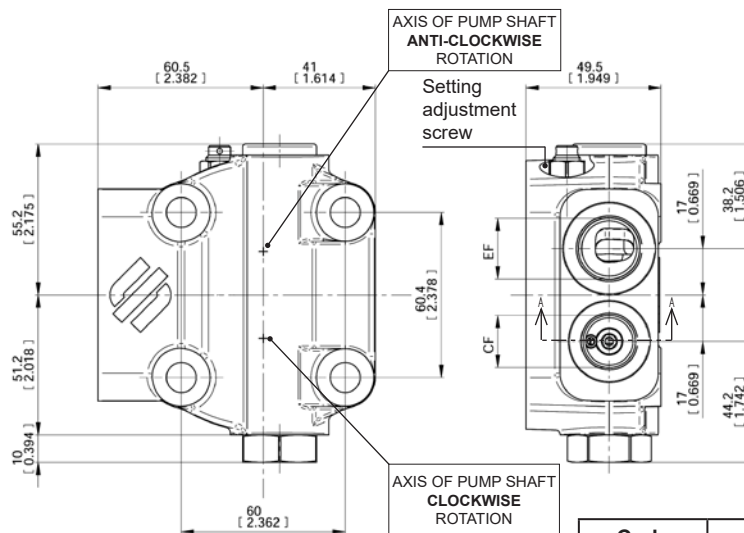


| Threaded Port           |                            |
|-------------------------|----------------------------|
| CF= Priority flow port  | EF= Excess flow port       |
| G 3/8                   | G 1/2                      |
| SAE 6<br>9/16-18 UNF-2B | SAE 8<br>3/4 - 16 UNF - 2B |

| Code                                | Part Number                         |
|-------------------------------------|-------------------------------------|
| VP - VPS                            | Please contact our sales department |
| Pressure Relief Valve setting range |                                     |
| 20-240 bar                          |                                     |

| VP                                                    | VPS                                                                                                                         |
|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Excess flow available to second actuator - REAR PORTS | Excess flow available to second actuator with <b>fixed setting</b> pressure relief valve on priority flow line - REAR PORTS |

| Flow Rate Table                                                                                                      |      |                         |      |
|----------------------------------------------------------------------------------------------------------------------|------|-------------------------|------|
| <p>CF - port</p>  <p>Det. A-A</p> |      |                         |      |
| Calibrated Orifice<br>$\phi d$                                                                                       |      | Flow Rate<br>$\pm 10\%$ |      |
| mm                                                                                                                   | inch | l/min                   | gpm  |
| 1.5                                                                                                                  | 0.06 | 2.5                     | 0.66 |
| 2                                                                                                                    | 0.08 | 4                       | 1.06 |
| 2.4                                                                                                                  | 0.09 | 6                       | 1.59 |
| 2.8                                                                                                                  | 0.11 | 8                       | 2.11 |
| 3.1                                                                                                                  | 0.12 | 10                      | 2.64 |
| 3.5                                                                                                                  | 0.14 | 12.5                    | 3.30 |
| 4                                                                                                                    | 0.16 | 16                      | 4.23 |
| 4.4                                                                                                                  | 0.17 | 20                      | 5.28 |
| 4.9                                                                                                                  | 0.19 | 25                      | 6.61 |



| Threaded Port              |                             |
|----------------------------|-----------------------------|
| CF= Priority flow port     | EF= Excess flow port        |
| G 3/8                      | G 1/2                       |
| SAE 8<br>3/4 - 16 UNF - 2B | SAE 10<br>7/8 - 14 UNF - 2B |

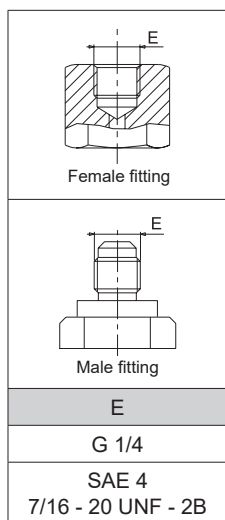
| Code                                | Part Number                         |
|-------------------------------------|-------------------------------------|
| VP1 - VPS1                          | Please contact our sales department |
| Pressure Relief Valve setting range |                                     |
| 30-110 bar                          |                                     |
| 110-380 bar                         |                                     |

| VP1                                                   | VPS1                                                                                                                             |
|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Excess flow available to second actuator - SIDE PORTS | Excess flow available to second actuator with <b>adjustable setting</b> pressure relief valve on priority flow line - SIDE PORTS |

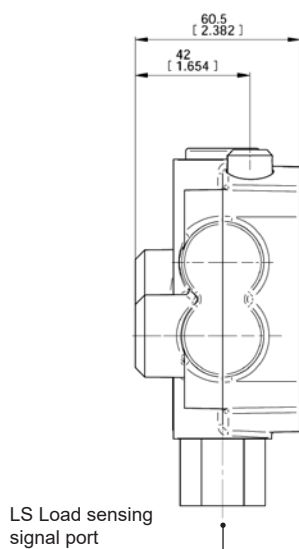
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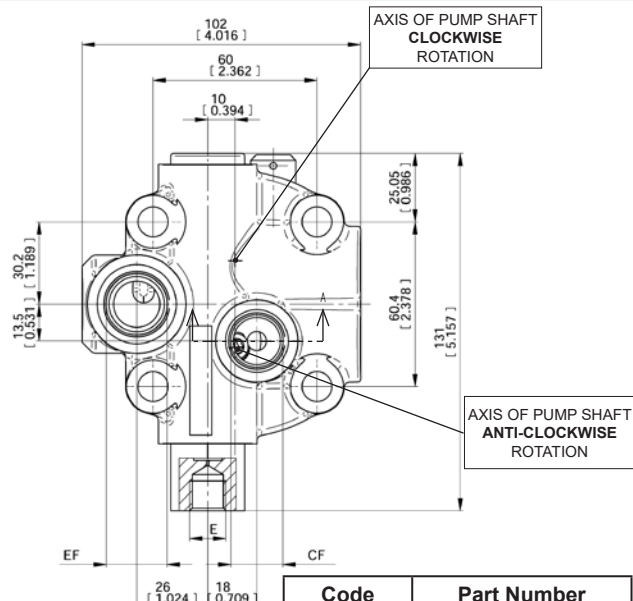
## Load Sensing Priority Valve



Minimum load  
sensing signal (LS)  
= 4 bar (28 psi)



| Threaded Port           |                            |
|-------------------------|----------------------------|
| CF= Priority flow port  | EF= Excess flow port       |
| G 3/8                   | G 1/2                      |
| SAE 6<br>9/16-18 UNF-2B | SAE 8<br>3/4 - 16 UNF - 2B |



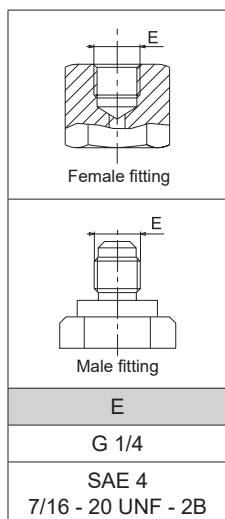
| Code                                   | Part Number                            |
|----------------------------------------|----------------------------------------|
| VPD -<br>VPDS                          | Please contact our<br>sales department |
| Pressure Relief Valve<br>setting range |                                        |
| 20-240 bar                             |                                        |

### VPD

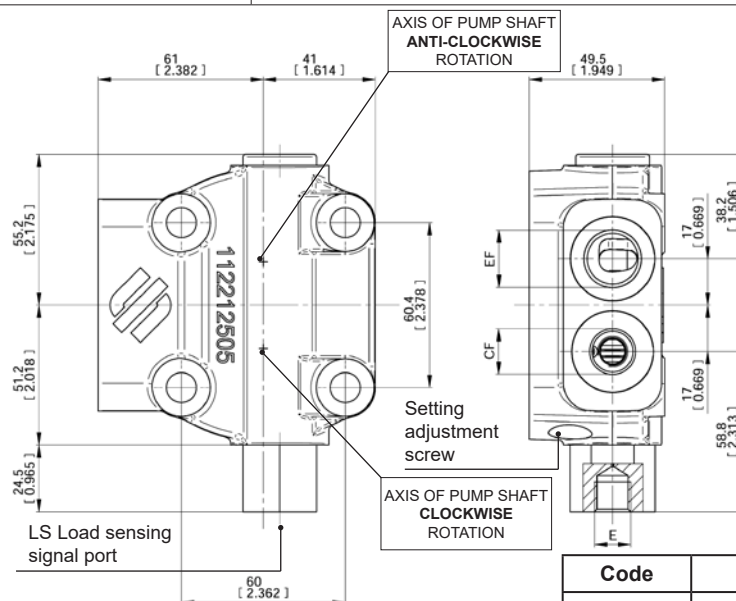
Dynamic signal without pressure relief valve  
REAR PORTS

### VPDS

Dynamic signal with **fixed setting** pressure relief valve  
REAR PORTS



Minimum load  
sensing signal (LS)  
= 4 bar (28 psi)



| Threaded Port              |                             |
|----------------------------|-----------------------------|
| CF= Priority flow port     | EF= Excess flow port        |
| G 3/8                      | G 1/2                       |
| SAE 8<br>3/4 - 16 UNF - 2B | SAE 10<br>7/8 - 14 UNF - 2B |

| Code                                   | Part Number                            |
|----------------------------------------|----------------------------------------|
| VPD1 -<br>VPDS1                        | Please contact our<br>sales department |
| Pressure Relief Valve<br>setting range |                                        |
| 30-110 bar                             |                                        |
| 110-380 bar                            |                                        |

### VPD1

Dynamic signal without pressure relief valve  
SIDE PORTS

### VPDS1

Dynamic signal with **adjustable setting** pressure relief valve  
SIDE PORTS

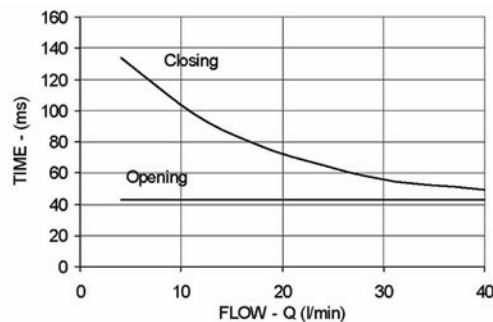
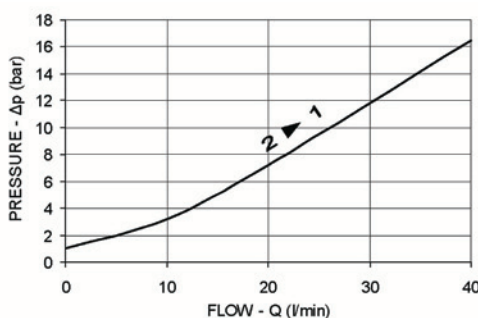
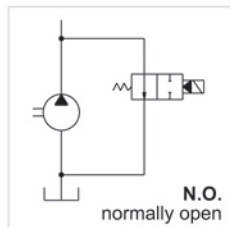
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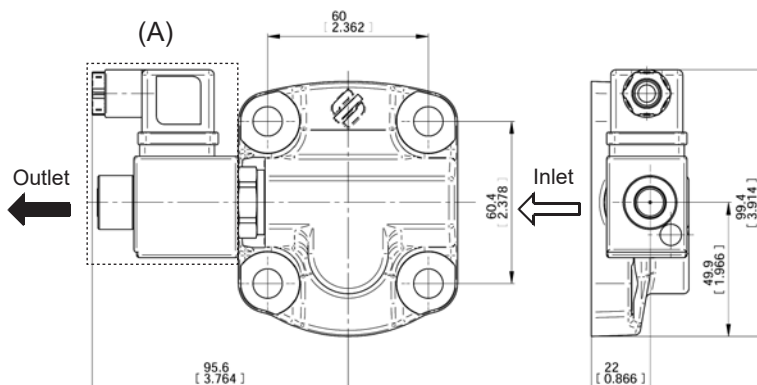
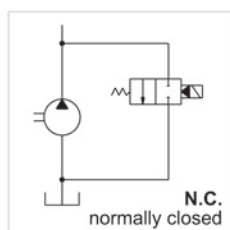
## Rear Covers with Valves



EV1 - 12 Vcc  
EV2 - 24 Vcc



EV3 - 12 Vcc  
EV4 - 24 Vcc



| Code | Part Number |
|------|-------------|
| EV1  | R12273273   |
| EV2  | R12273272   |
| EV3  | R12273275   |
| EV4  | R12273274   |

## EV1-EV2-EV3-EV4

## UNLOADING 2W-2P SOLENOID VALVE

## Part Number

(A) Coil+Mech.Part+Connector

| EV1/EVS1  | EV2/EVS2  | EV3/EVS3  | EV4/EVS4  |
|-----------|-----------|-----------|-----------|
| 796332680 | 796332681 | 412271232 | 412271233 |

## Part Number

Connector DIN 43650  
A/ISO 4400

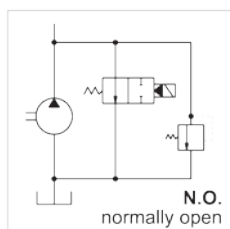
796361600



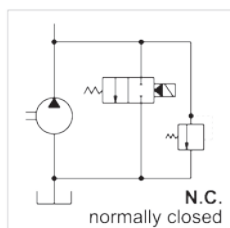
## COIL SPECIFICATIONS - EV/EVS

- Coil resistance: 12 Vdc - 24 Vdc
- Coil power: 18W
- Connector: DIN 43650
- Protection index with connector: IP 65
- ED 100%

EVS1 - 12 Vcc  
EVS2 - 24 Vcc

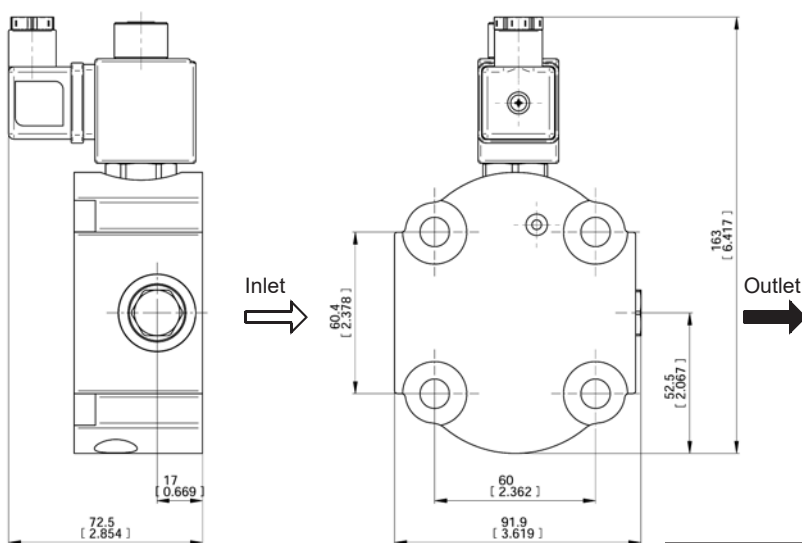


EVS3 - 12 Vcc  
EVS4 - 24 Vcc



Pressure Relief Valve  
setting range

25-210 bar



| Code                   | Part Number                         |
|------------------------|-------------------------------------|
| EVS1-EVS2<br>EVS3-EVS4 | Please contact our sales department |

## EVS1-EVS2-EVS3-EVS4

## UNLOADING 2W-2P SOLENOID VALVE AND RELIEF

EO.146.0423.14.00IM02



## How to order Single Pump

2PGE, displacement (19),  
clockwise rotation (D), ports SAE (R),  
drive shaft (54), mounting flange (S2)=  
**2PGE19D-R54S2**

|      |   |   |   |   |   |   |   |  |   |  |   |  |   |  |   |   |
|------|---|---|---|---|---|---|---|--|---|--|---|--|---|--|---|---|
| 2PGE |   |   | - |   |   |   | - |  | - |  | - |  | / |  | - |   |
| A    | B | C | D | E | F | G | H |  |   |  |   |  |   |  |   | I |

• Adjustable flow l/min

■ pressure relief valve setting (bar)

| A | CODE | DISPLACEMENTS              |                 |
|---|------|----------------------------|-----------------|
|   | 6.5  | 6.5 cm <sup>3</sup> /rev.  | 0.40 cu.in/rev. |
|   | 8.3  | 8.3 cm <sup>3</sup> /rev.  | 0.51 cu.in/rev. |
|   | 11.3 | 11.5 cm <sup>3</sup> /rev. | 0.68 cu.in/rev. |
|   | 13.8 | 14 cm <sup>3</sup> /rev.   | 0.85 cu.in/rev. |
|   | 16   | 16.6 cm <sup>3</sup> /rev. | 1.01 cu.in/rev. |
|   | 19   | 19.4 cm <sup>3</sup> /rev. | 1.18 cu.in/rev. |
|   | 22.5 | 22.9 cm <sup>3</sup> /rev. | 1.37 cu.in/rev. |
|   | 26   | 26.7 cm <sup>3</sup> /rev. | 1.63 cu.in/rev. |

| B | ROTATION       | CODE |
|---|----------------|------|
|   | Clockwise      | D    |
|   | Anti-clockwise | S    |
|   | Reversible     | R    |

| C | PORTS                                           | CODE |
|---|-------------------------------------------------|------|
|   | Flanged ports european standard                 | P    |
|   | Flanged ports german standard                   | B    |
|   | Flanged ports SAE J518 Metric thread            | W    |
|   | Flanged ports SAE J518 American standard thread | S    |
|   | Threaded ports GAS (BSPP)                       | G    |
|   | Threaded ports SAE (ODT)                        | R    |

| D | DRIVE SHAFT                                                 | CODE |
|---|-------------------------------------------------------------|------|
|   | Tang drive for electric motors                              | 03   |
|   | Tang drive                                                  | 04   |
|   | Tapered 1:5                                                 | 25   |
|   | Tapered 1:8                                                 | 28   |
|   | SAE A splined 9T                                            | 52   |
|   | SAE A splined 11T                                           | 54   |
|   | SAE B splined 13T                                           | 55   |
|   | 9 teeth DIN 5482 splined                                    | 62   |
|   | DIN 5480 internal splined (only for rear pumps-see page 24) | 60   |
|   | 5/8" SAE A parallel                                         | 82   |
|   | 3/4" SAE A parallel (Mounting face 31.8 mm)                 | 85   |
|   | Tapered 1:5 (only for CB-CL) Continental shaft              | 26   |
|   | 3/4" SAE A Parallel Continental shaft (Mounting face 54 mm) | 86   |
|   | 7/8" SAE B Parallel Continental shaft                       | 87   |
|   | 8x32x36 UNI 8953 splined Continental shaft                  | 66   |
|   | 8x32x36 UNI 8953 splined Continental shaft                  | 67   |
|   | 6x21x25 UNI 8953 splined Continental shaft                  | 73   |

| E | MOUNTING FLANGES                                                                      | CODE  |
|---|---------------------------------------------------------------------------------------|-------|
|   | European standard                                                                     | P1    |
|   | German standard Ø80                                                                   | B1    |
|   | German standard Ø52                                                                   | B2-B3 |
|   | German standard Ø50                                                                   | B4-B5 |
|   | 4 bolts for Iveco engines                                                             | C1    |
|   | SAE A 2 bolts                                                                         | S2    |
|   | SAE B 2 bolts                                                                         | S3    |
|   | SAE A 2 Bolts (with o-ring on the centering collar)                                   | S6    |
|   | 3 BOLT UNI 8953 for gear box                                                          | T1    |
|   | 4 Bolts for ZF gear box                                                               | Z2    |
|   | For Internal combustion engines with Outtrigger bearing                               | CL    |
|   | For Internal combustion engines with axial and radial loads - with Outtrigger bearing | CF    |
|   | SAE A with Outtrigger bearing                                                         | CS    |
|   | German standard with Outtrigger bearing                                               | CB    |
|   | European standard with Outtrigger bearing                                             | CP    |
|   | SAE B with Outtrigger bearing                                                         | CSB   |
|   | 4 Bolts for ZF gear box with Outtrigger bearing                                       | Z1    |

| F | SEAL                                   | CODE |
|---|----------------------------------------|------|
|   | Buna standard (standard configuration) | -    |
|   | Viton                                  | V    |

| G | PORTS LAYOUT                        | CODE |
|---|-------------------------------------|------|
|   | Side ports (standard configuration) | -    |
|   | Rear ports                          | 1    |

| H | REAR COVERS                                                                     | CODE         |
|---|---------------------------------------------------------------------------------|--------------|
|   | Lateral drain                                                                   | LD           |
|   | Adjustable pressure relief valve-Internal discharge                             | ■ VS         |
|   | Adjustable setting pressure relief valve-External discharge                     | ■ VSE        |
|   | Internal drain valve                                                            | IDV          |
|   | Priority flow valve with excess flow to 2nd actuator                            | ● VP-VP1     |
|   | Priority flow valve with excess flow to 2nd actuator with pressure relief valve | ■ ● VPS-VPS1 |
|   | Load sensing priority valve with dynamic signal                                 | VPD-VPD1     |
|   | Load sensing priority valve with dynamic signal and pressure relief valve       | ■ VPDS VPDS1 |
|   | Electric unloading valve (12V)                                                  | EV1/EV3      |
|   | Electric unloading valve (24V)                                                  | EV2/EV4      |
|   | Pressure relief and electric unloading valves (12V)                             | EVS1/EVS3    |
|   | Pressure relief and electric unloading valves (24V)                             | EVS2/EVS4    |
|   | Pre-arranged for 1.5PE rear                                                     | PD1.5        |

| I | PAINTING                             | CODE |
|---|--------------------------------------|------|
|   | Not painted (standard configuration) | -    |
|   | Black painted RAL 9005               | BP   |

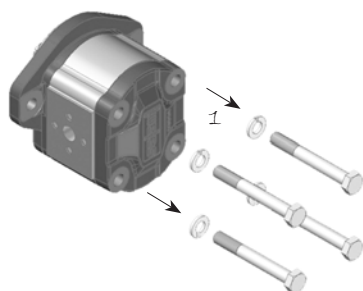
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## Single Pump Changing Rotation Instructions

- ⚠ Keep the working surface cleaned as well as the exterior of the pump before starting and avoid inner contamination of the pump. The pump shown below is a clockwise rotating pump.  
To achieve anti - clockwise rotation, please read the following instructions carefully.

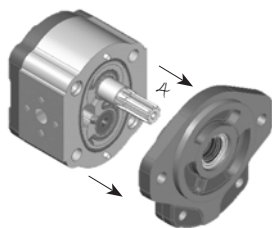
### CLOCKWISE ROTATION



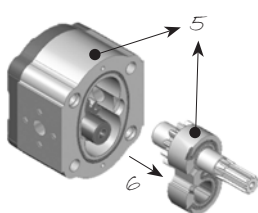
**1** - Loosen and fully unscrew the bolts.

**2** - Lay the pump on the working area in order to have the mounting flange turned upside.

**3** - Coat the shaft end with grease to avoid damaging the shaft seal.

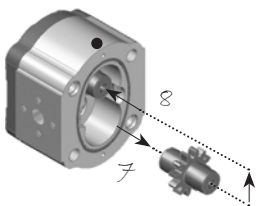


**4** - Remove the flange and lay it on the working area; verify that the seal is correctly located in the body seat.



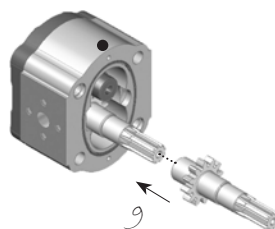
**5** - Mark the position of the bushing and eventually of the thrust plate, as well, with reference to the body.

**6** - Remove the bushing, thrust plate and the driving gear taking care to avoid driven gear axial shifts.

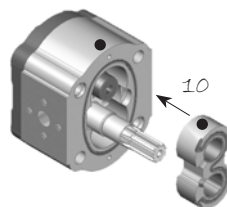


**7** - Draw out the driven gear from its housing, taking care to avoid rear cover axial shifts.

**8** - Re-locate the driven gear in the position previously occupied by the driving gear.



**9** - Re-locate the driving gear in the position previously occupied by the driven gear.



**10** - Replace the bushing and thrust plate taking care that:  
- marks are located as on the picture  
- surface containing the seal is visible  
- seal and its protection are correctly located.

**11** - Clean the body and mounting flange facing surfaces.

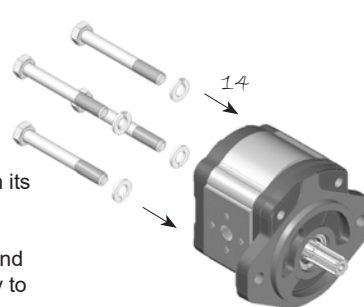
**12** - Verify that the two plugs are located in the body.

**13** - Refit the mounting flange, turned 180° from its original position.

**14** - Replace the bolts and tighten clockwise evenly to an appropriate torque.

**15** - Check that the shaft rotates freely.

**16** - Mark on the flange the new direction of rotation.

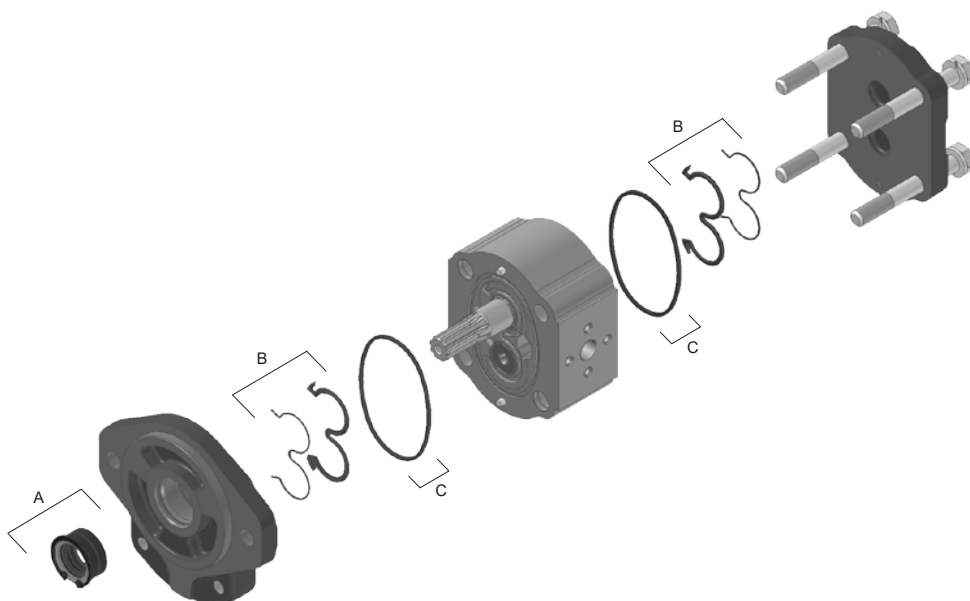


### ANTI - CLOCKWISE ROTATION





## Unidirectional Pump Seal Spare Parts Kit



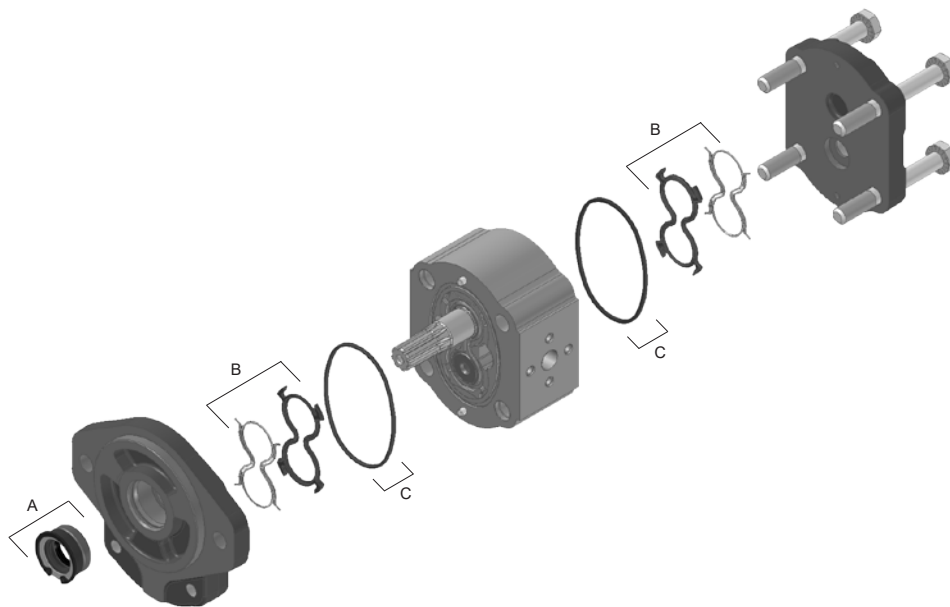
|   |                  |
|---|------------------|
| A | Shaft seal       |
| B | Bushing seal kit |
| C | Body seal kit    |

| SHAFT & FLANGE TYPE                                                                                                                 | NBR COMPOUND                    |                                 | FPM COMPOUND                    |                                 |
|-------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
|                                                                                                                                     | Complete seal kit (A+B+C)       | Shaft seal kit (A)              | Complete seal kit (A+B+C)       | Shaft seal kit (A)              |
| <b>28P1</b><br><b>25B1/B4/B5</b><br><b>62P1/B1/B4/B5</b><br><b>82P1/S2/S6</b><br><b>52S2/S6</b><br><b>55S3</b><br>(Coupling sleeve) | <b>Part Number</b><br>R12292830 | <b>Part Number</b><br>R12240010 | <b>Part Number</b><br>R12292950 | <b>Part Number</b><br>R12240021 |
| <b>55S3</b><br>(Solid Shaft)<br><br><b>73T1</b><br><b>67Z2</b>                                                                      | <b>Part Number</b><br>R14690010 | <b>Part Number</b><br>R14640010 | <b>Part Number</b><br>R14690020 | <b>Part Number</b><br>R14640011 |
| <b>54S2/S6</b><br><b>85S2/S6</b><br><b>04B4/B5</b>                                                                                  | <b>Part Number</b><br>R12292833 | <b>Part Number</b><br>R12240110 | <b>Part Number</b><br>R12292834 | <b>Part Number</b><br>R12240115 |

EO.146.0423.14.001M02



## Bidirectional Pump Seal Spare Parts Kit



|   |                  |
|---|------------------|
| A | Shaft seal       |
| B | Bushing seal kit |
| C | Body seal kit    |

| SHAFT & FLANGE TYPE                                                                                                                     | NBR COMPOUND                    |                                 | FPM COMPOUND                    |                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
|                                                                                                                                         | Complete seal kit (A+B+C)       | Shaft seal kit (A)              | Complete seal kit (A+B+C)       | Shaft seal kit (A)              |
| <b>28P1</b><br><b>25B1/B4/B5</b><br><b>62P1/B1/B4/B5</b><br><b>82P1/S2/S6</b><br><b>52S2/S6</b><br><br><b>55S3</b><br>(Coupling sleeve) | <b>Part Number</b><br>R12081820 | <b>Part Number</b><br>R12040122 | <b>Part Number</b><br>R12081830 | <b>Part Number</b><br>R12040123 |
| <b>55S3</b><br>(Solid Shaft)<br><br><b>73T1</b><br><b>67Z2</b>                                                                          | <b>Part Number</b><br>R14690031 | <b>Part Number</b><br>R14640012 | <b>Part Number</b><br>R14690041 | <b>Part Number</b><br>R14640013 |
| <b>54S2/S6</b><br><b>85S2/S6</b>                                                                                                        | <b>Part Number</b><br>R12092835 | <b>Part Number</b><br>R12240114 | <b>Part Number</b><br>R12092836 | <b>Part Number</b><br>R12240113 |

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## 2PGE Multiple Pump - Dimensions

For flanges code:  
**P1-B1-S2-S3** → 19 mm (0.75 in.)  
**B4-B5-C1** → 16.5 mm (0.65 in.)

Max. Torque 100 Nm (885 lbf-in)

5.6 [0.22] 23 [0.92]

A C

Part Number  
Multiple pumps kit  
R12030020

58 - 62 Nm (42.8 - 45.7 lbf-ft)

Back pump: equipped with drive shaft suitable for multiple pumps, code 60.  
Also available with 2PE Combination (Aluminium gear housing)

Front Pump: drive shaft back end pre-arranged for second pump female splined end.

ALL THE PUMPS CAN BE ALSO MULTIPLE

Part Number  
Coupling Sleeve  
Splined W14x0.6x8f  
DIN 5480  
312002515

MULTIPLE GEAR PUMPS with individual inlet port

MULTIPLE GEAR PUMPS with common inlet port

Recommended to limit the inflow of the downstream pump at 30 l/min MAX to avoid cavitation. Only for common suction port configuration:  
**Commercial code UA.**

| 2PGE-Type   |    | 6.5   | 8.3  | 11.3  | 13.8  | 16   | 19   | 22.5 | 26   |
|-------------|----|-------|------|-------|-------|------|------|------|------|
| Dimension A | mm | 49.95 | 52.8 | 59.7  | 63.5  | 67.5 | 75.6 | 81   | 86.8 |
| 2PGE        | in | 1.97  | 2.07 | 2.35  | 2.5   | 2.65 | 2.97 | 3.19 | 3.42 |
| Dimension C | mm | 25    | 26.4 | 29.75 | 31.75 | 39.5 | 39.5 | 47.5 | 47.5 |
| 2PGE        | in | 0.98  | 1.04 | 1.17  | 1.25  | 1.56 | 1.56 | 1.87 | 1.87 |

| 2PE-Type    |    | 3.2*  | 3.9* | 4.5 | 6.5   | 8.3  | 10.5  | 11.3  | 12.5 | 13.8  | 16    | 19    | 22.5 | 26   |
|-------------|----|-------|------|-----|-------|------|-------|-------|------|-------|-------|-------|------|------|
| Dimension A | mm | 47.1  |      |     | 49.95 | 52.8 | 56.3  | 59.7  |      | 63.5  | 67.5  | 75.6  | 81   | 86.8 |
| 2PE         | in | 1.83  |      |     | 1.97  | 2.07 | 2.22  | 2.35  |      | 2.5   | 2.65  | 2.97  | 3.19 | 3.42 |
| Dimension C | mm | 23.55 |      |     | 25    | 26.4 | 28.15 | 29.75 |      | 31.75 | 33.75 | 37.80 | 40.5 | 43.4 |
| 2PE         | in | 0.93  |      |     | 0.98  | 1.04 | 1.11  | 1.17  |      | 1.25  | 1.33  | 1.49  | 1.59 | 1.71 |

\*Available only as rear pump

For flanges code:  
**P1-B1-S2-S3** → 19 mm (0.75 in.)  
**B4-B5-C1** → 16.5 mm (0.65 in.)

Max. Torque 100 Nm (885 lbf-in)

21.6 [0.85] 23 [0.92]

A C

Part Number  
Multiple pumps kit with separated stages for different fluid (2 tanks) - Code AS  
R12090020 (NBR)  
R12090021 (FPM)

58 - 62 Nm (42.8 - 45.7 lbf-ft)

Back pump: equipped with drive shaft suitable for multiple pumps, code 60.

Front Pump: drive shaft back end pre-arranged for second pump female splined end.

ALL THE PUMPS CAN BE ALSO MULTIPLE

Part Number  
Shaft seal  
19,05x28,58x6,3  
796105350 (NBR)  
796105340 (FPM)

Part Number  
Body seal  
312206409 (NBR)  
312206411 (FPM)

MULTIPLE GEAR PUMPS with separated stages

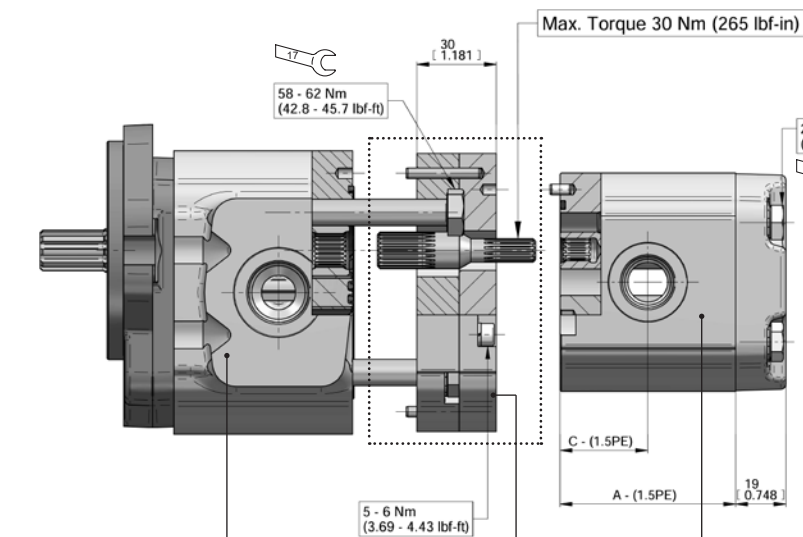
Coupling Sleeve  
Splined W14x0.6x8f  
DIN 5480  
312002515

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## 2PGE Combination with Pump 1.5PE (Aluminium gear housing)

**PD1.5** Multiple pumps kit  
Pre-arranged for 1.5PE rear.



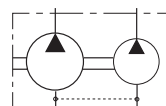
Front Pump:  
drive shaft back end pre-arranged  
for second pump female splined  
end.

**Part Number**  
Multiple  
pumps kit  
R12090043

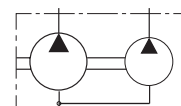
Back pump:  
equipped with drive shaft  
suitable for multiple pumps,  
code 60.

**Part Number**  
O-ring  
53,7x1,78  
799103400

**Part Number**  
Coupling Sleeve  
Splined W14x0.6x8f  
DIN 5480  
310903504



**MULTIPLE  
GEAR PUMPS  
with individual  
inlet port**



**MULTIPLE  
GEAR PUMPS  
with common  
inlet port**

Recommended to limit the  
inflow of the downstream  
pump at 12 l/min MAX  
to avoid cavitation. Only  
for common suction port  
configuration:  
**Commercial code UA.**

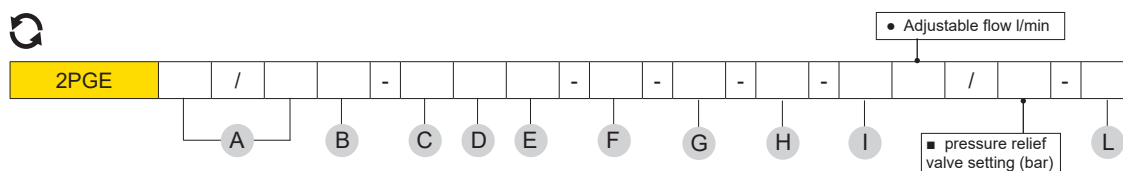
Not available  
combinations with  
flange: B2-B3-B4-B5

ALL THE PUMPS  
CAN BE ALSO  
MULTIPLE

| 1.5PE-Type           |          | 1.4        | 2.1           | 2.8           | 3.5           | 4.1          | 5.2           | 6.2           | 7.6           | 9.3           | 11            |
|----------------------|----------|------------|---------------|---------------|---------------|--------------|---------------|---------------|---------------|---------------|---------------|
| Dimension A<br>1.5PE | mm<br>in | 44<br>1.73 | 45.9<br>1.81  | 47.9<br>1.89  | 49.9<br>1.96  | 51.6<br>2.03 | 54.7<br>2.15  | 57.5<br>2.26  | 61.5<br>2.42  | 66.3<br>2.61  | 71.1<br>2.80  |
| Dimension C<br>1.5PE | mm<br>in | 22<br>0.87 | 22.95<br>0.90 | 23.95<br>0.94 | 24.95<br>0.98 | 25.8<br>1.02 | 27.35<br>1.08 | 28.75<br>1.13 | 30.75<br>1.21 | 33.15<br>1.31 | 35.55<br>1.40 |



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| A | CODE | DISPLACEMENTS                              |
|---|------|--------------------------------------------|
|   | 6.5  | 6.5 cm <sup>3</sup> /rev. 0.40 cu.in/rev.  |
|   | 8.3  | 8.3 cm <sup>3</sup> /rev. 0.51 cu.in/rev.  |
|   | 11.3 | 11.5 cm <sup>3</sup> /rev. 0.68 cu.in/rev. |
|   | 13.8 | 14 cm <sup>3</sup> /rev. 0.85 cu.in/rev.   |
|   | 16   | 16.6 cm <sup>3</sup> /rev. 1.01 cu.in/rev. |
|   | 19   | 19.4 cm <sup>3</sup> /rev. 1.18 cu.in/rev. |
|   | 22.5 | 22.9 cm <sup>3</sup> /rev. 1.37 cu.in/rev. |
|   | 26   | 26.6 cm <sup>3</sup> /rev. 1.63 cu.in/rev. |

| B | ROTATION       | CODE |
|---|----------------|------|
|   | Clockwise      | D    |
|   | Anti-clockwise | S    |

| C | PORTS                                           | CODE |
|---|-------------------------------------------------|------|
|   | Flanged ports european standard                 | P    |
|   | Flanged ports german standard                   | B    |
|   | Flanged ports SAE J518 Metric thread            | W    |
|   | Flanged ports SAE J518 American standard thread | S    |
|   | Threaded ports GAS (BSPP)                       | G    |
|   | Threaded ports SAE (ODT)                        | R    |

| D | DRIVE SHAFT                                                 | CODE |
|---|-------------------------------------------------------------|------|
|   | Tang drive for electric motors                              | 03   |
|   | Tang drive                                                  | 04   |
|   | Tapered 1:5                                                 | 25   |
|   | Tapered 1:8                                                 | 28   |
|   | SAE A splined 9T                                            | 52   |
|   | SAE A splined 11T                                           | 54   |
|   | SAE B splined 13T                                           | 55   |
|   | 9 teeth DIN 5482 splined                                    | 62   |
|   | DIN 5480 internal splined (only for rear pumps-see page 24) | 60   |
|   | 5/8" SAE A parallel                                         | 82   |
|   | 3/4" SAE A parallel (Mounting face 31.8 mm)                 | 85   |
|   | Tapered 1:5 (only for CB-CL) Continental shaft              | 26   |
|   | 3/4" SAE A parallel Continental shaft (Mounting face 54 mm) | 86   |
|   | 7/8" SAE B parallel Continental shaft                       | 87   |
|   | 8x32x36 UNI 8953 splined Continental shaft                  | 66   |
|   | 8x32x36 UNI 8953 splined Continental shaft                  | 67   |
|   | 6x21x25 UNI 8953 splined Continental shaft                  | 73   |

| E | MOUNTING FLANGES                                                                      | CODE  |
|---|---------------------------------------------------------------------------------------|-------|
|   | European standard                                                                     | P1    |
|   | German standard Ø80                                                                   | B1    |
|   | German standard Ø52                                                                   | B2-B3 |
|   | German standard Ø50                                                                   | B4-B5 |
|   | 4 bolts for Iveco engines                                                             | C1    |
|   | SAE A 2 bolts                                                                         | S2    |
|   | SAE B 2 bolts                                                                         | S3    |
|   | SAE A 2 Bolts (with o-ring on the centering collar)                                   | S6    |
|   | 3 BOLT UNI 8953 for gear box                                                          | T1    |
|   | 4 Bolts for ZF gear box                                                               | Z2    |
|   | For Internal combustion engines with Outtrigger bearing                               | CL    |
|   | For Internal combustion engines with axial and radial loads - with Outtrigger bearing | CF    |
|   | SAE A with Outtrigger bearing                                                         | CS    |
|   | German standard with Outtrigger bearing                                               | CB    |
|   | European standard with Outtrigger bearing                                             | CP    |
|   | SAE B with Outtrigger bearing                                                         | CSB   |
|   | 4 Bolts for ZF gear box with Outtrigger bearing                                       | Z1    |

| F | SEAL                                   | CODE |
|---|----------------------------------------|------|
|   | Buna standard (standard configuration) | -    |
|   | Viton                                  | V    |



## Note

| G | PORTS LAYOUT                        | CODE |
|---|-------------------------------------|------|
|   | Side ports (standard configuration) | -    |
|   | Rear ports                          | 1    |

| H | INLET PORTS                                                                                                                                                   | CODE |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
|   | Separated stages:<br>Pump with separated stages for different fluid (2 tanks).<br><i>Number 1, 2 or 3 identify the body where Kit AS is mounted.</i>          | AS   |
|   | Common Inlet:<br>Pump with one inlet port opened, all the other inlet port are closed.<br><i>Number 1, 2 or 3 identify the body where inlet port is open.</i> | UA   |

| I | REAR COVERS                                                                     | CODE            |
|---|---------------------------------------------------------------------------------|-----------------|
|   | Lateral drain                                                                   | LD              |
|   | Adjustable pressure relief valve-Internal discharge                             | ■ VS            |
|   | Adjustable setting pressure relief valve-External discharge                     | ■ VSE           |
|   | Internal drain valve                                                            | IDV             |
|   | Priority flow valve with excess flow to 2nd actuator                            | ● VP-VP1        |
|   | Priority flow valve with excess flow to 2nd actuator with pressure relief valve | ■ ● VPS-VPS1    |
|   | Load sensing priority valve with dinamic signal                                 | VPD-VPD1        |
|   | Load sensing priority valve with dinamic signal and pressure relief valve       | ■ VPDS<br>VPDS1 |
|   | Electric unloading valve (12V)                                                  | EV1/EV3         |
|   | Electric unloading valve (24V)                                                  | EV2/EV4         |
|   | Pressure relief and electric unloading valves (12V)                             | EVS1/EVS3       |
|   | Pressure relief and electric unloading valves (24V)                             | EVS2/EVS4       |
|   | Pre-arranged for 1.5PE rear                                                     | PD1.5           |

| L | PAINTING                             | CODE |
|---|--------------------------------------|------|
|   | Not painted (standard configuration) | -    |
|   | Black painted RAL 9005               | BP   |

**How to order Multiple pump**

2PGE, displacement first stage (16), displacement second stage (16), clockwise rotation (D), ports European (P), drive shaft (55), mounting flange (S3)= **2PGE16/16D-P55S3**

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## Note

| G | COMBINATION WITH 1.5PE or 2PE                                                                                                                                                                                                                                                                                                                                               |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | <p><b>1.5PE</b> Piggy back configuration:</p> <ul style="list-style-type: none"> <li>• Displacement at page 46</li> <li>• Port type See 1.5PE Technical catalogue at page 17</li> </ul> <p><b>2PE</b> Piggy back configuration:</p> <ul style="list-style-type: none"> <li>• Displacement at page 45</li> <li>• Port type See 2PE Technical catalogue at page 35</li> </ul> |

| H | INLET PORTS                                                                                                                                                            | CODE |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
|   | <p>Separated stages:<br/>Pump with separated stages for different fluid (2 tanks).<br/><i>Number 1, 2 or 3 identify the body where Kit AS is mounted.</i></p>          | AS   |
|   | <p>Common Inlet:<br/>Pump with one inlet port opened, all the other inlet port are closed.<br/><i>Number 1, 2 or 3 identify the body where inlet port is open.</i></p> | UA   |

| I | PORTS LAYOUT                        | CODE |
|---|-------------------------------------|------|
|   | Side ports (standard configuration) | -    |
|   | Rear ports                          | 1    |

| L | REAR COVERS                                                                     | CODE         |
|---|---------------------------------------------------------------------------------|--------------|
|   | Lateral drain                                                                   | LD           |
|   | Adjustable pressure relief valve-Internal discharge                             | ■ VS         |
|   | Adjustable setting pressure relief valve-External discharge                     | ■ VSE        |
|   | Internal drain valve                                                            | IDV          |
|   | Priority flow valve with excess flow to 2nd actuator                            | ● VP-VP1     |
|   | Priority flow valve with excess flow to 2nd actuator with pressure relief valve | ■ ● VPS-VPS1 |
|   | Load sensing priority valve with dinamic signal                                 | VPD-VPD1     |
|   | Load sensing priority valve with dinamic signal and pressure relief valve       | ■ VPDS VPDS1 |
|   | Electric unloading valve (12V)                                                  | EV1/EV3      |
|   | Electric unloading valve (24V)                                                  | EV2/EV4      |
|   | Pressure relief and electric unloading valves (12V)                             | EVS1/EVS3    |
|   | Pressure relief and electric unloading valves (24V)                             | EVS2/EVS4    |

| M | PAINTING                             | CODE |
|---|--------------------------------------|------|
|   | Not painted (standard configuration) | -    |
|   | Black painted RAL 9005               | BP   |

**How to order Multiple pump with 2PE or 1.5PE**

2PGE, displacement first stage (16), displacement second stage (6.5), anti-clockwise rotation (S), ports European (P), drive shaft (28), mounting flange (P1)+1.5PE, displacement (2.1), ports European (P)=  
**2PGE16/6.5S-P28P1-1.5PE2.1P**

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# PG330

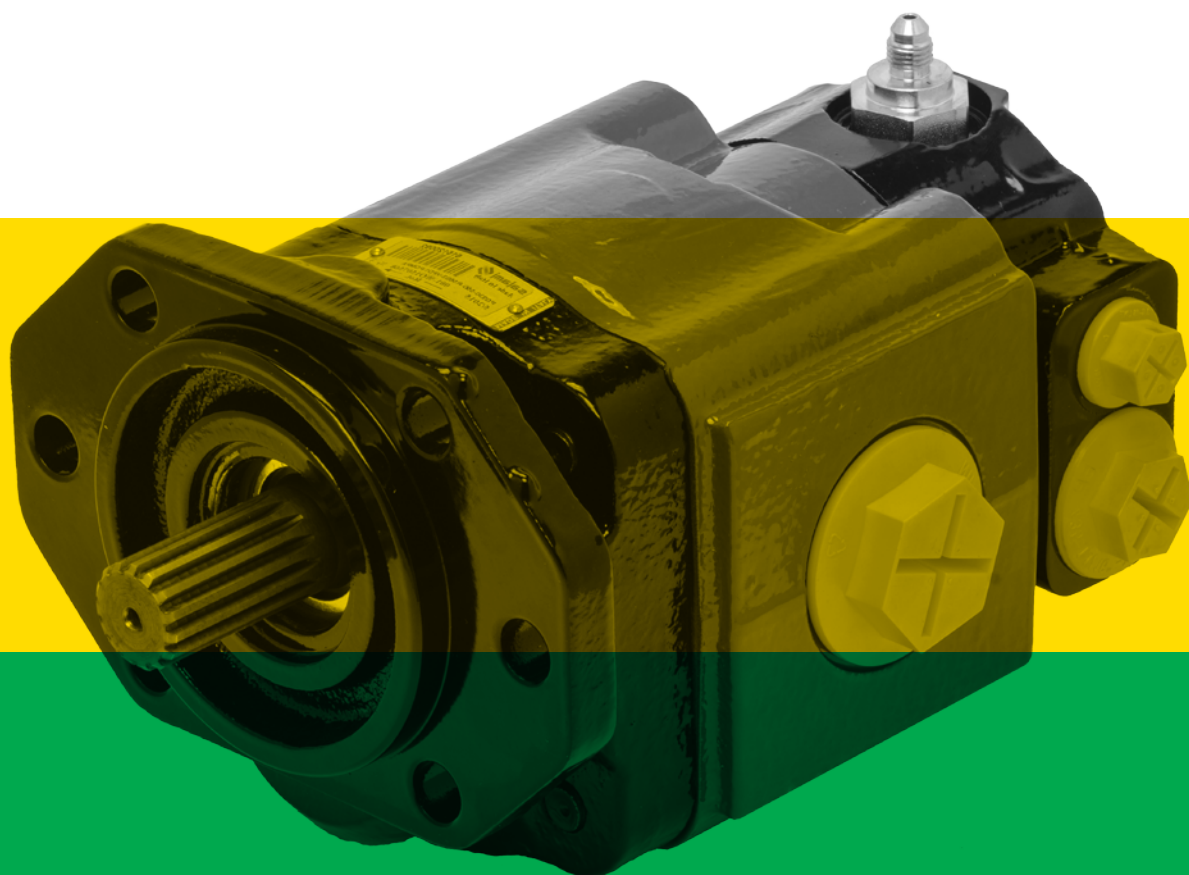
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## Cast Iron Gear Pumps

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### Technical/Spare Parts Catalogue

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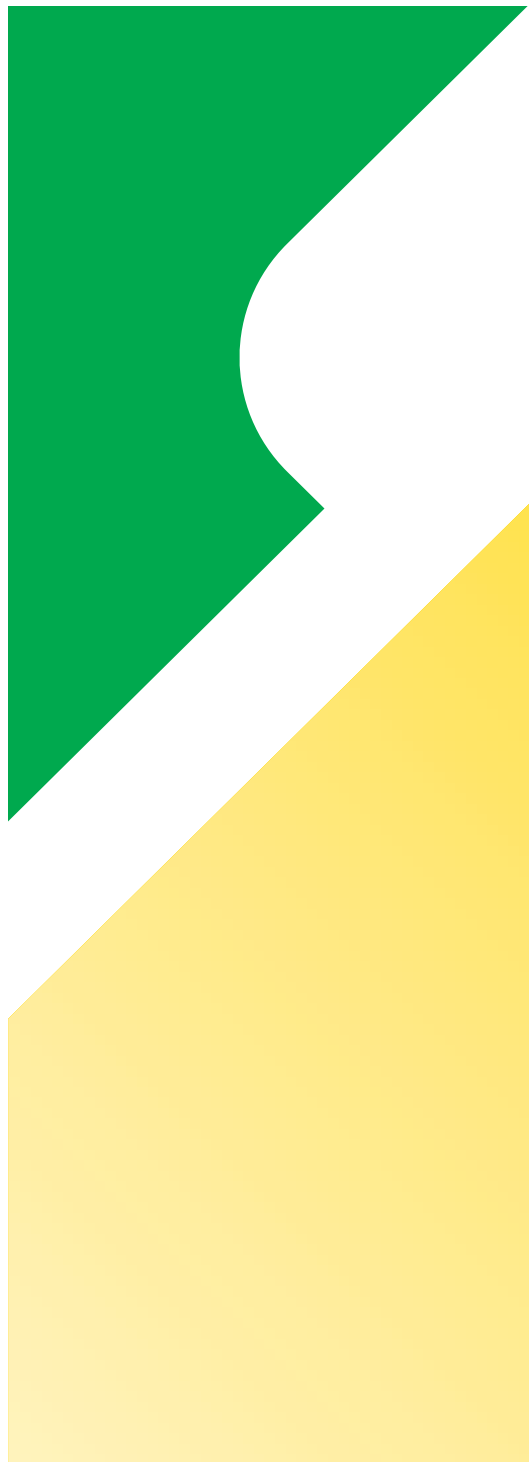
COMPANY WITH  
QUALITY SYSTEM  
CERTIFIED BY DNV  
ISO 9001

**salami**   
FLUID POWER SYSTEMS <sup>®</sup>

**Final revised edition - April 2023**

The data in this catalogue refers to the standard product. The policy of Salami S.p.A. consists of a continuous improvement of its products. It reserves the right to change the specifications of the different products whenever necessary and without giving prior information.

***If any doubts, please contact our sales department.***



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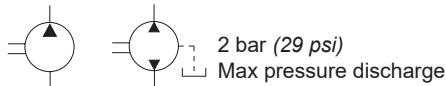
## Contents

|                                                                        |    |
|------------------------------------------------------------------------|----|
| PG330 Single Pump .....                                                | 57 |
| Dimensions - Shaft 55/Flange S3 (SAE B).....                           | 58 |
| Dimensions - Shaft 38/Flange P2 (European).....                        | 58 |
| Dimensions - Shaft 58/Flange S4 (SAE C).....                           | 58 |
| Pump Performance Charts .....                                          | 59 |
| Shaft And Flange Combinations .....                                    | 64 |
| Flanged Ports .....                                                    | 65 |
| Threaded Ports .....                                                   | 66 |
| Ports layout - Single Pump .....                                       | 67 |
| Drive Shaft.....                                                       | 68 |
| Continental Shaft.....                                                 | 69 |
| Mounting Flanges .....                                                 | 70 |
| Mounting Flanges with Outrigger Bearing for Medium Loads (R3).....     | 72 |
| Mounting Flanges with Outrigger Bearing for Heavy Loads (Z1- R8) ..... | 73 |
| External Drain for Bidirectional Pump.....                             | 75 |
| Internal Drain Valve for Bidirectional Pump .....                      | 75 |
| Rear Covers with Valves .....                                          | 76 |
| HOW TO ORDER SINGLE PUMP .....                                         | 78 |
| Single Pump Changing Rotation Instructions.....                        | 79 |
| Unidirectional Pump Seal Spare Parts Kit.....                          | 80 |
| Bidirectional Pump Seal Spare Parts Kit .....                          | 81 |
| PG330 Multiple Pump.....                                               | 82 |
| PG330 Triple Pump.....                                                 | 83 |
| PG330 with Pump 2PE or 2PGE piggy back pump... 84                      |    |
| PG330 Multiple with Pump 2PE or 2PGE piggy back pump.....              | 85 |
| Rear Cover - Dimensions .....                                          | 85 |
| HOW TO ORDER MULTIPLE PUMP .....                                       | 86 |
| HOW TO ORDER MULTIPLE PUMP WITH GROUP 2 .....                          | 87 |





## PG330 Single Pump - Dimensions and Technical Data



Displacements up to 80.6 cm<sup>3</sup>/rev - 4.91 cu.in./rev  
Pressure up to 320 bar - 4650 psi

| TYPE       | Displacement         |            | Dimension A |      | Dimension C |      | Continuous pressure p <sub>1</sub> |      | Intermittent pressure p <sub>2</sub> |      | Peak pressure p <sub>3</sub> |      | Min. speed at p <sub>1</sub> | Max. speed at p <sub>2</sub> | Weight |       |
|------------|----------------------|------------|-------------|------|-------------|------|------------------------------------|------|--------------------------------------|------|------------------------------|------|------------------------------|------------------------------|--------|-------|
|            | cm <sup>3</sup> /rev | cu.in./rev | mm          | in   | mm          | in   | bar                                | psi  | bar                                  | psi  | bar                          | psi  | rpm                          |                              | kg     | lbs   |
| PG330 - 23 | 23.4                 | 1.43       | 77          | 3.03 | 35          | 1.38 | 260                                | 3750 | 280                                  | 4060 | 300                          | 4350 | 400                          | 3000                         | 13.2   | 29.10 |
| PG330 - 28 | 28.6                 | 1.74       | 81          | 3.19 | 38          | 1.49 | 280                                | 4060 | 300                                  | 4350 | 320                          | 4650 | 400                          | 3000                         | 13.7   | 30.20 |
| PG330 - 34 | 34.4                 | 2.10       | 85.5        | 3.36 | 42.5        | 1.67 | 280                                | 4060 | 300                                  | 4350 | 320                          | 4650 | 400                          | 3000                         | 14.2   | 31.30 |
| PG330 - 40 | 40.3                 | 2.46       | 90          | 3.54 | 47          | 1.85 | 260                                | 3750 | 280                                  | 4060 | 300                          | 4350 | 400                          | 2700                         | 14.7   | 32.41 |
| PG330 - 47 | 47.4                 | 2.89       | 101.5       | 3.40 | 50          | 1.97 | 280                                | 4060 | 300                                  | 4350 | 320                          | 4650 | 400                          | 2700                         | 17.0   | 37.48 |
| PG330 - 55 | 55.2                 | 3.37       | 107.5       | 4.23 | 56          | 2.20 | 260                                | 3750 | 280                                  | 4060 | 300                          | 4350 | 400                          | 2700                         | 17.7   | 39.02 |
| PG330 - 64 | 64.3                 | 3.92       | 114.5       | 4.51 | 58          | 2.28 | 240                                | 3480 | 260                                  | 3750 | 280                          | 4060 | 350                          | 2500                         | 18.5   | 40.79 |
| PG330 - 72 | 73.4                 | 4.48       | 121.5       | 4.78 | 61          | 2.40 | 220                                | 3190 | 240                                  | 3480 | 260                          | 3750 | 350                          | 2500                         | 19.4   | 42.77 |
| PG330 - 80 | 80.6                 | 4.91       | 127.5       | 5.02 | 65          | 2.56 | 200                                | 2900 | 220                                  | 3190 | 240                          | 3480 | 350                          | 2500                         | 22.5   | 49.60 |

### • Technical Data - Shaft 38/Flange P2

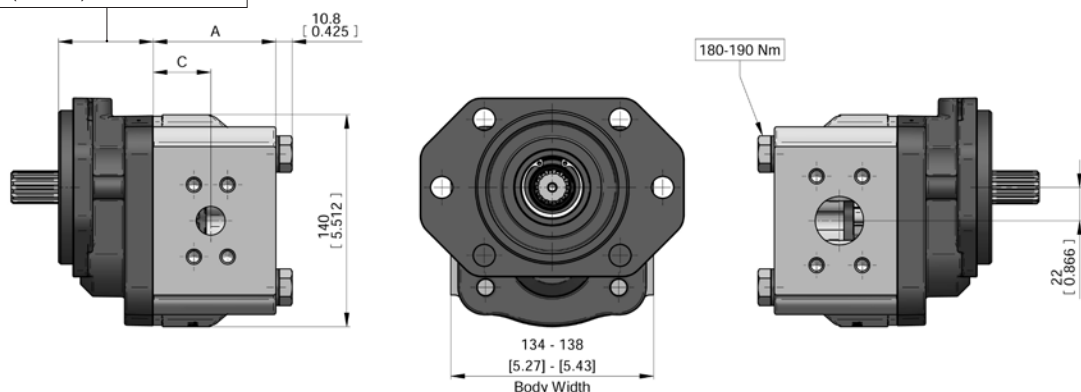
| TYPE         | Displacement         |            | Continuous pressure p <sub>1</sub> |      | Intermittent pressure p <sub>2</sub> |      | Peak pressure p <sub>3</sub> |      | Min. speed at p <sub>1</sub> | Max. speed at p <sub>2</sub> | Weight |       |
|--------------|----------------------|------------|------------------------------------|------|--------------------------------------|------|------------------------------|------|------------------------------|------------------------------|--------|-------|
|              | cm <sup>3</sup> /rev | cu.in./rev | bar                                | psi  | bar                                  | psi  | bar                          | psi  | rpm                          |                              | kg     | lbs   |
| PG330 - 55 • | 55.2                 | 3.37       | 230                                | 3335 | 250                                  | 3625 | 270                          | 3915 | 400                          | 2700                         | 17.7   | 39.02 |
| PG330 - 64 • | 64.3                 | 3.92       | 200                                | 2900 | 220                                  | 3190 | 240                          | 3480 | 350                          | 2500                         | 18.5   | 40.79 |
| PG330 - 72 • | 73.4                 | 4.48       | 170                                | 2465 | 190                                  | 2755 | 210                          | 3045 | 350                          | 2500                         | 19.4   | 42.77 |

•=Max torque of 250 Nm for the displacements 55-64-72 cc/rev



Max Speed must be lowered by 10% for system working continuously at p<sub>1</sub> pressure.  
Max pressure must be lowered by 10% for birectional pump.

For flanges code:  
S3→ 53 mm (2.09 in.) for displ. 23 to 40  
64 mm (2.52 in.) for displ. 47 to 80  
P2→ 54 mm (2.13 in.)  
S4/R8/Z1/Z2→ 85 mm (3.35 in.)  
R3→ 64 mm (2.52 in.)

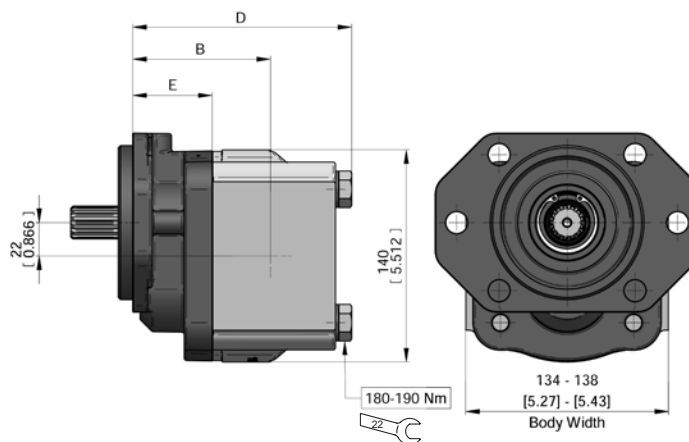


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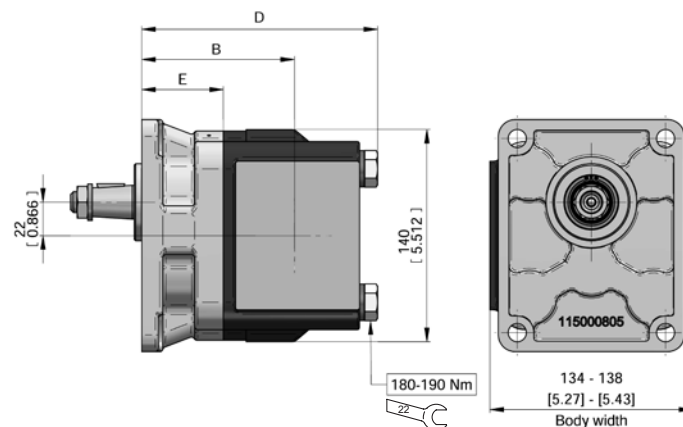
### Dimensions - Shaft 55/Flange S3 (SAE B)

| TYPE | Dimension D |      | Dimension B |      | Dimension E |      |
|------|-------------|------|-------------|------|-------------|------|
|      | mm          | in   | mm          | in   | mm          | in   |
| 23   | 140.8       | 5.54 | 88          | 3.46 | 53          | 2.09 |
| 28   | 144.8       | 5.70 | 91          | 3.58 |             |      |
| 34   | 149.3       | 5.88 | 95.5        | 3.76 |             |      |
| 40   | 153.8       | 6.00 | 100         | 3.94 |             |      |
| 47   | 176.3       | 6.94 | 114         | 4.49 | 64          | 2.52 |
| 55   | 182.3       | 7.18 | 120         | 4.72 |             |      |
| 64   | 189.3       | 7.45 | 122         | 4.80 |             |      |
| 72   | 196.3       | 7.73 | 125         | 4.92 |             |      |
| 80   | 202.3       | 7.96 | 129         | 5.08 |             |      |



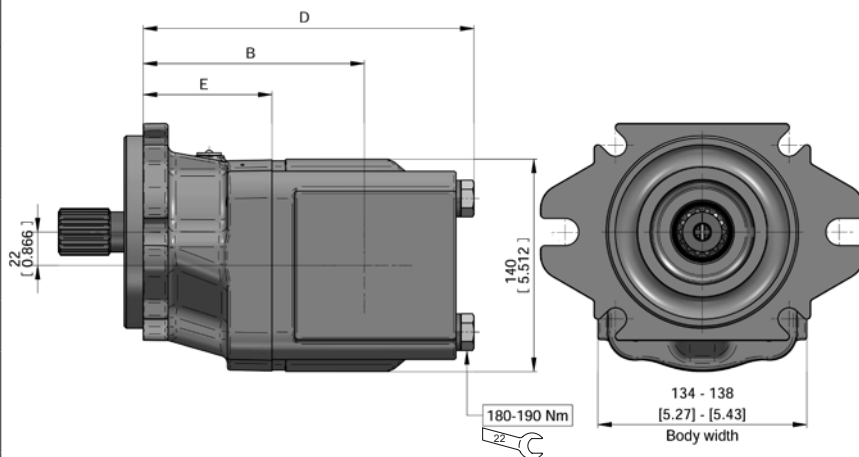
### Dimensions - Shaft 38/Flange P2 (European)

| TYPE | Dimension D |      | Dimension B |      | Dimension E |      |
|------|-------------|------|-------------|------|-------------|------|
|      | mm          | in   | mm          | in   | mm          | in   |
| 23   | 141.8       | 5.58 | 89          | 3.50 | 54          | 2.13 |
| 28   | 145.8       | 5.74 | 92          | 3.62 |             |      |
| 34   | 150.3       | 5.92 | 96.5        | 3.80 |             |      |
| 40   | 154.3       | 6.10 | 101         | 3.98 |             |      |
| 47   | 166.3       | 6.55 | 104         | 4.10 |             |      |
| 55   | 172.3       | 6.78 | 110         | 4.33 |             |      |
| 64   | 179.3       | 7.05 | 112         | 4.41 |             |      |
| 72   | 186.3       | 7.33 | 115         | 4.53 |             |      |



### Dimensions - Shaft 58/Flange S4 (SAE C)

| TYPE | Dimension D |      | Dimension B |      | Dimension E |      |
|------|-------------|------|-------------|------|-------------|------|
|      | mm          | in   | mm          | in   | mm          | in   |
| 23   | 172.8       | 6.80 | 120         | 4.72 | 85          | 3.35 |
| 28   | 176.8       | 6.96 | 123         | 4.84 |             |      |
| 34   | 181.3       | 7.14 | 127.5       | 5.02 |             |      |
| 40   | 185.3       | 7.30 | 132         | 5.20 |             |      |
| 47   | 197.3       | 7.77 | 135         | 5.31 |             |      |
| 55   | 203.3       | 8.00 | 141         | 5.55 |             |      |
| 64   | 210.3       | 8.28 | 143         | 5.63 |             |      |
| 72   | 217.3       | 8.55 | 146         | 5.75 |             |      |
| 80   | 223.3       | 8.79 | 150         | 5.91 |             |      |

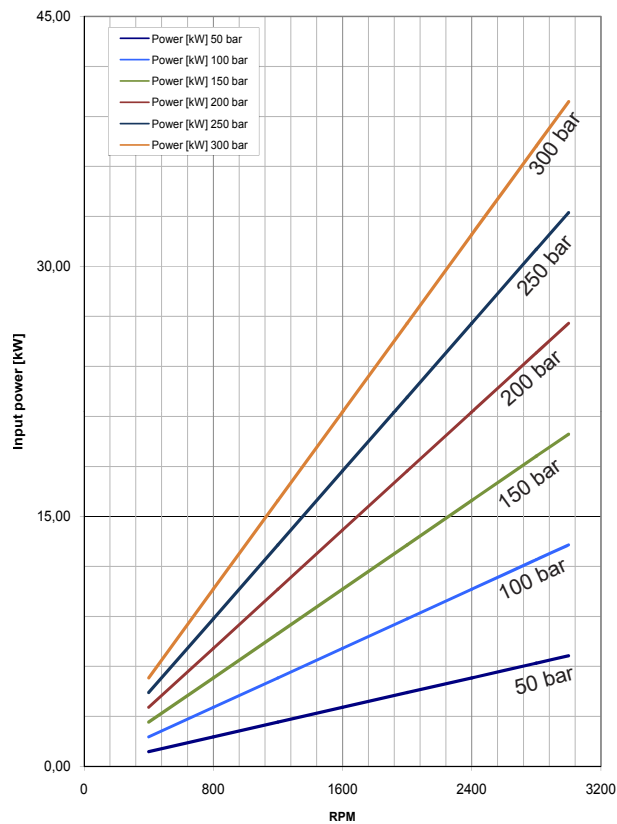
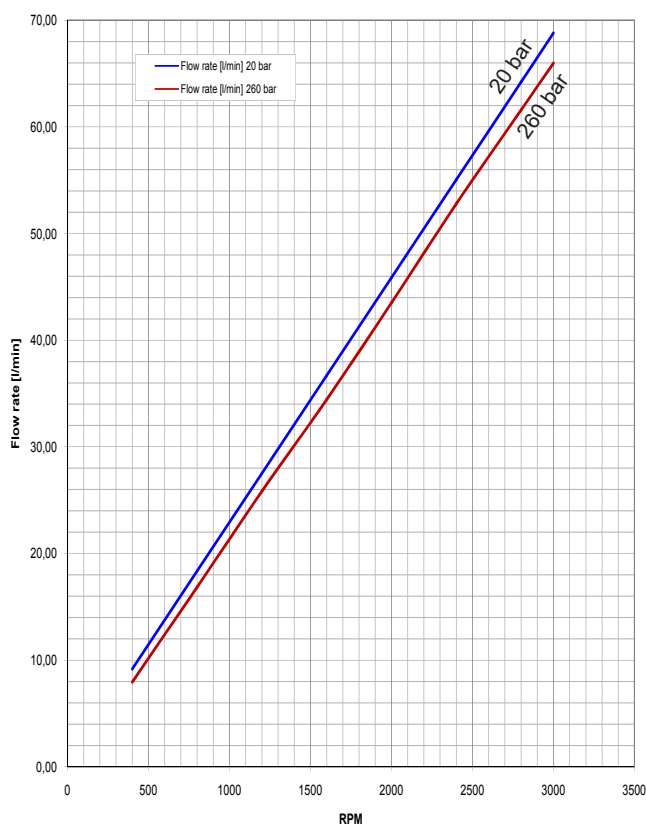


EO.151.0423.14.00IM01

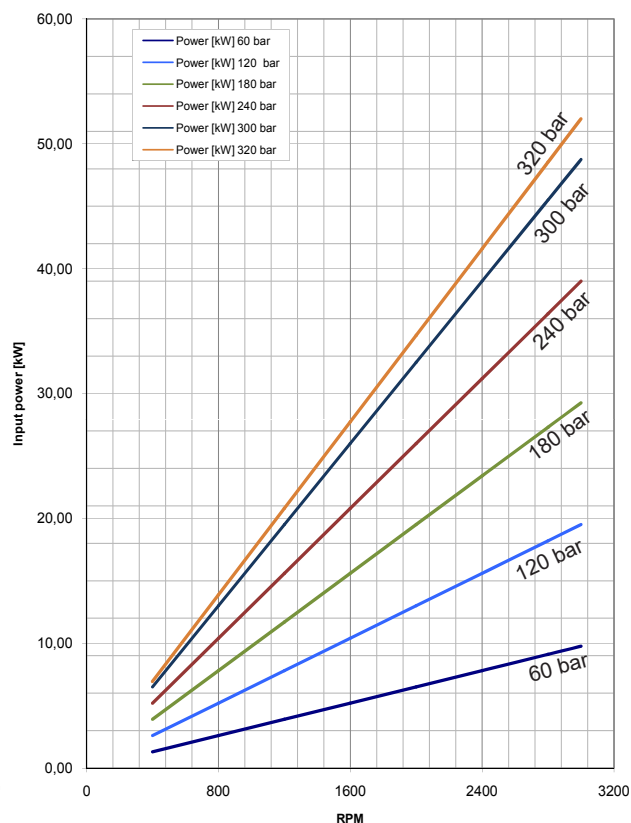
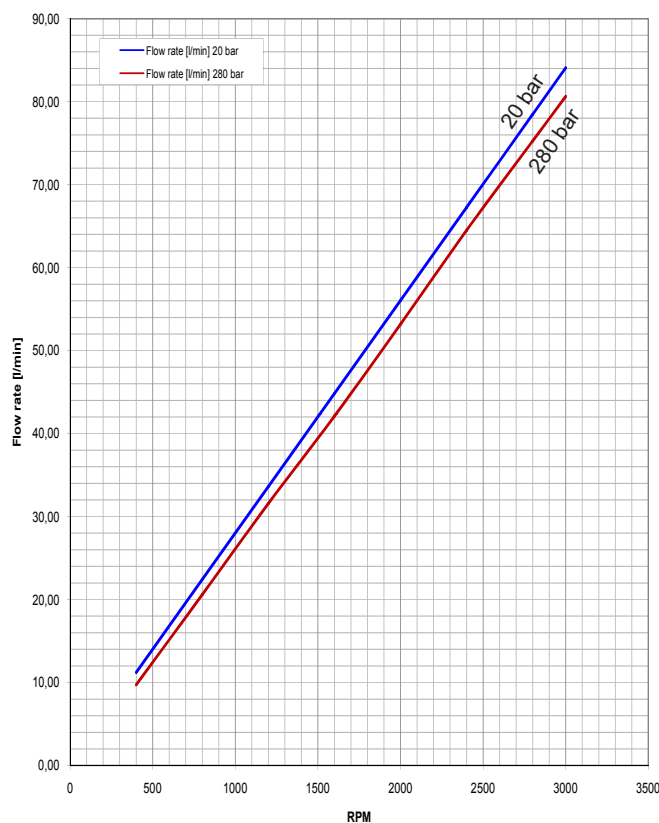


## Pump Performance Charts

Performance curves carried out with oil viscosity at 21 cSt and oil temperature at 50°C



PG330 - 23



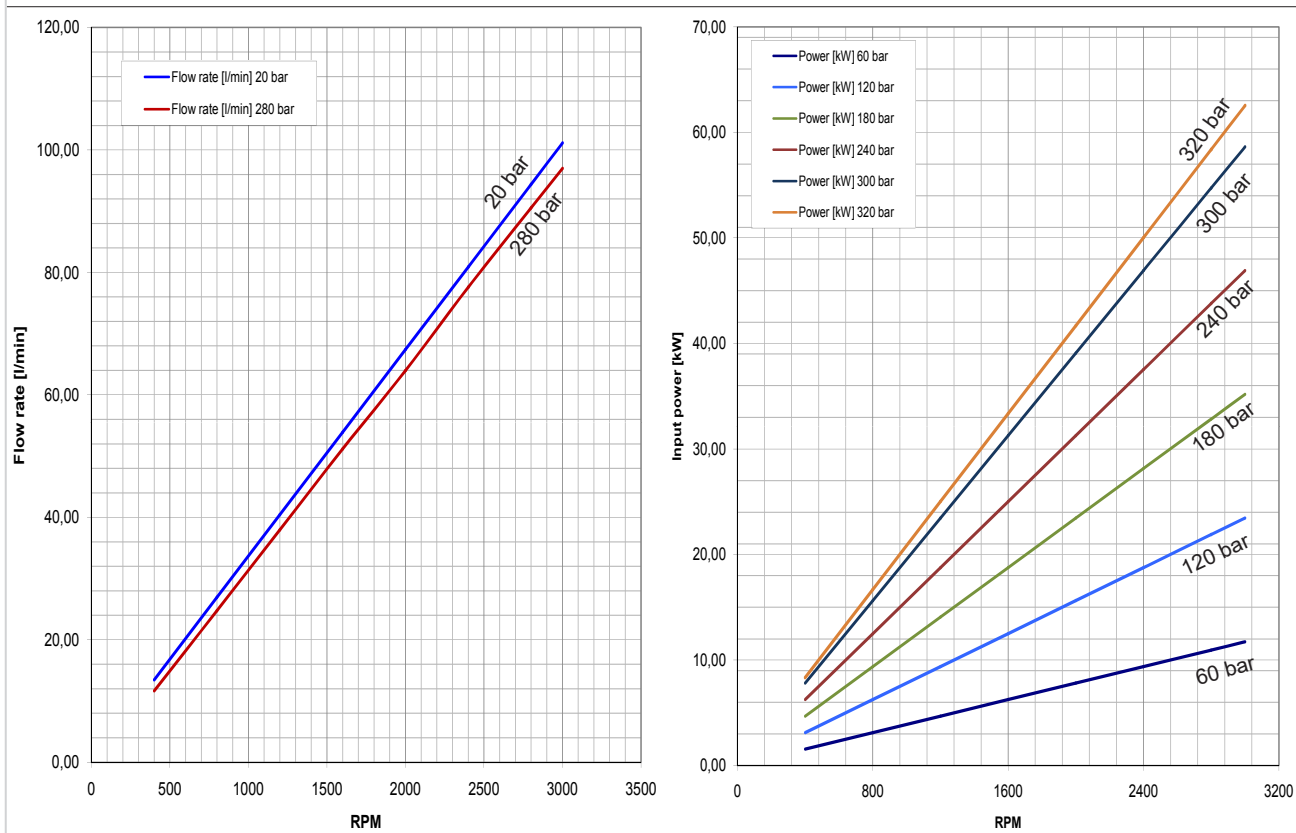
PG330 - 28

EO.151.0423.14.00IM01

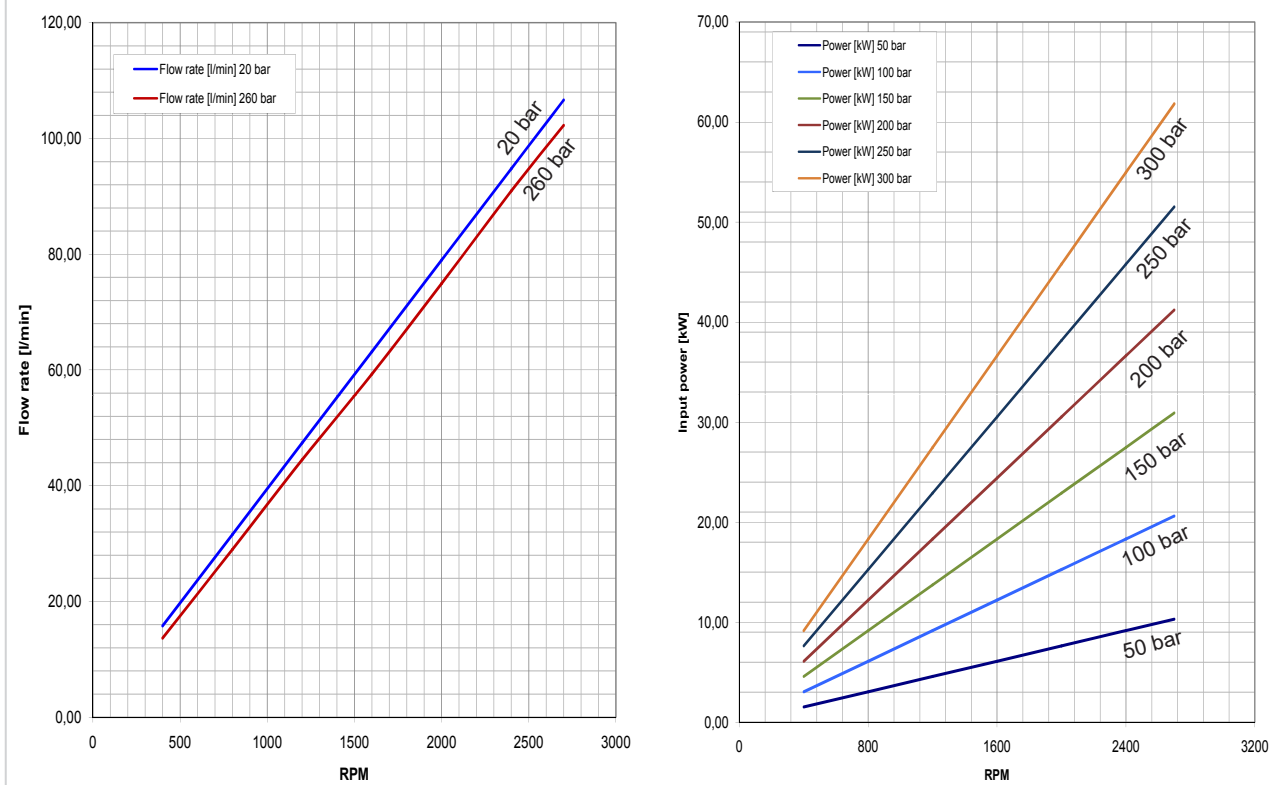


Pump Performance Charts

Performance curves carried out with oil viscosity at 21 cSt and oil temperature at 50°C



PG330 - 34



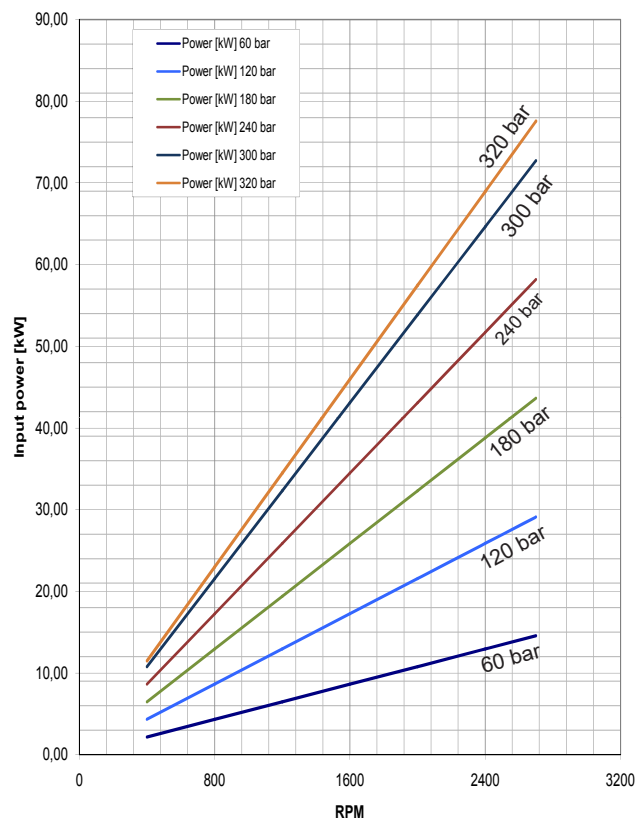
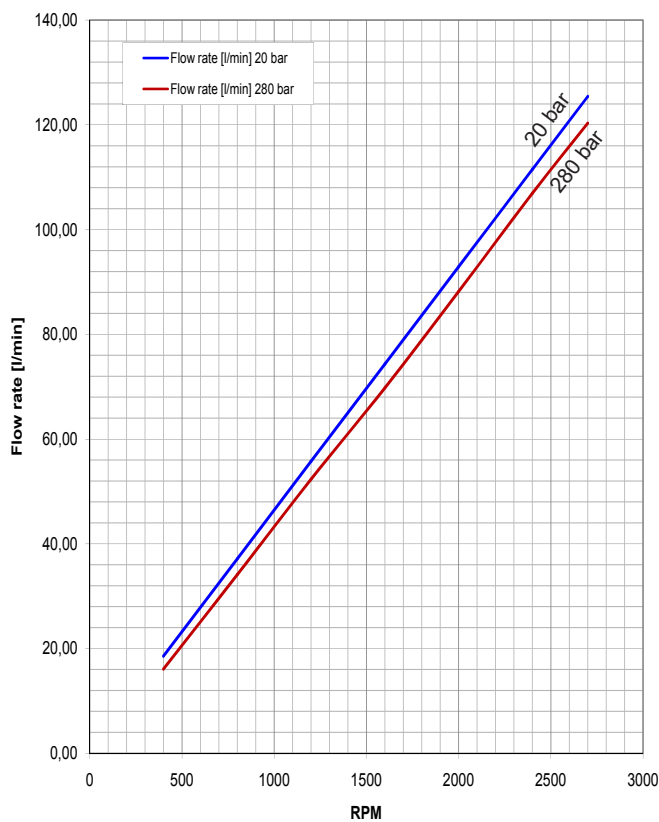
PG330 - 40

E0.151.0423.14.00IM01

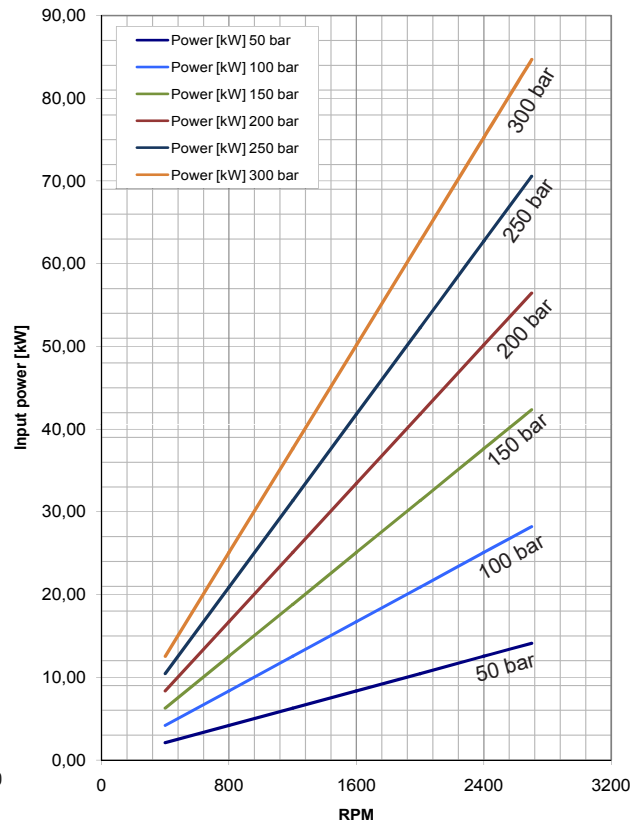
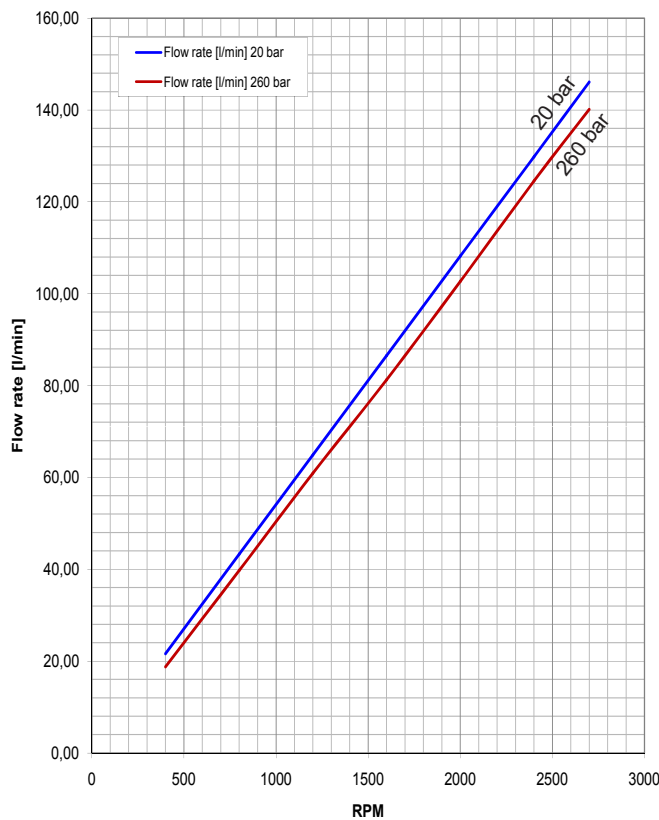


## Pump Performance Charts

Performance curves carried out with oil viscosity at 21 cSt and oil temperature at 50°C



PG330 - 47



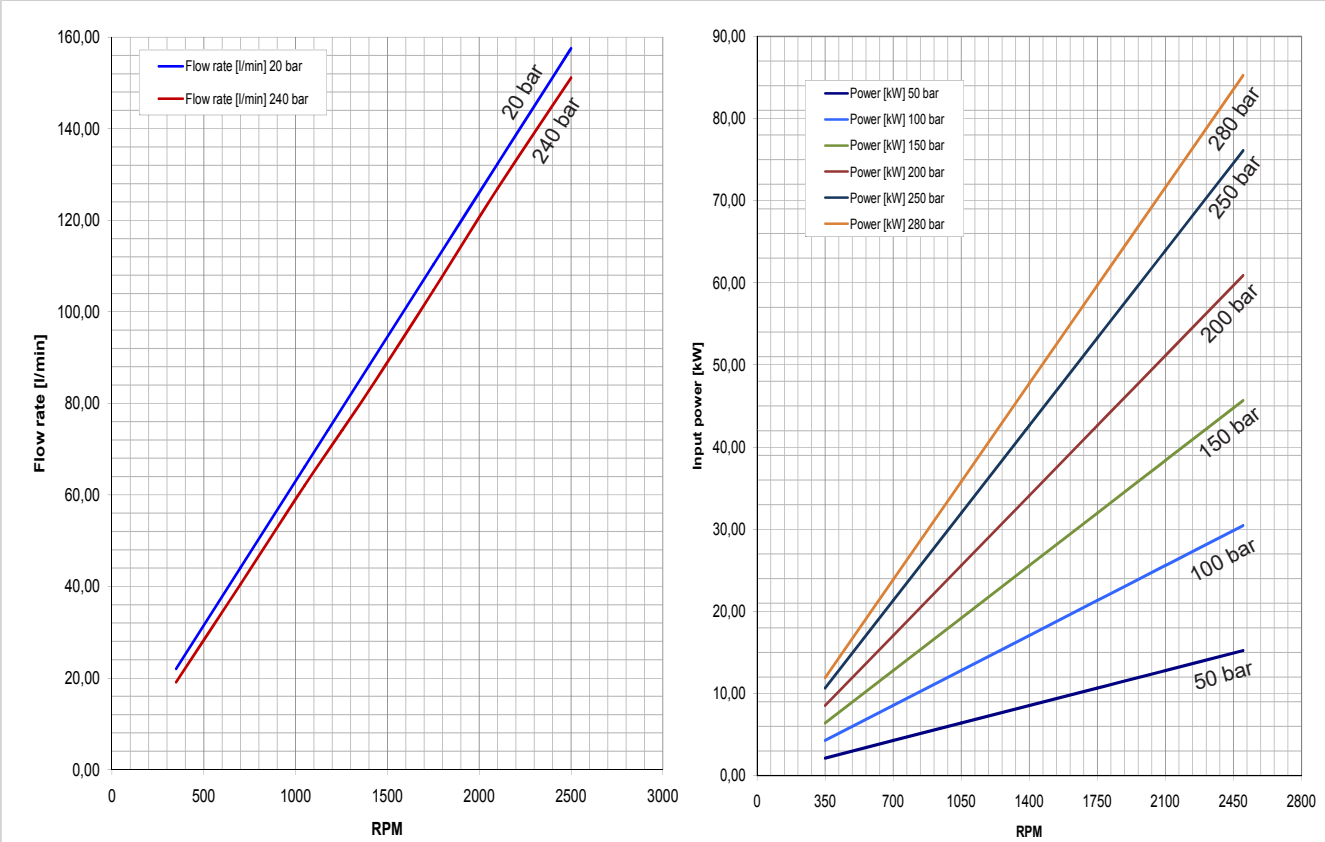
PG330 - 55

EO.151.0423.14.00IM01

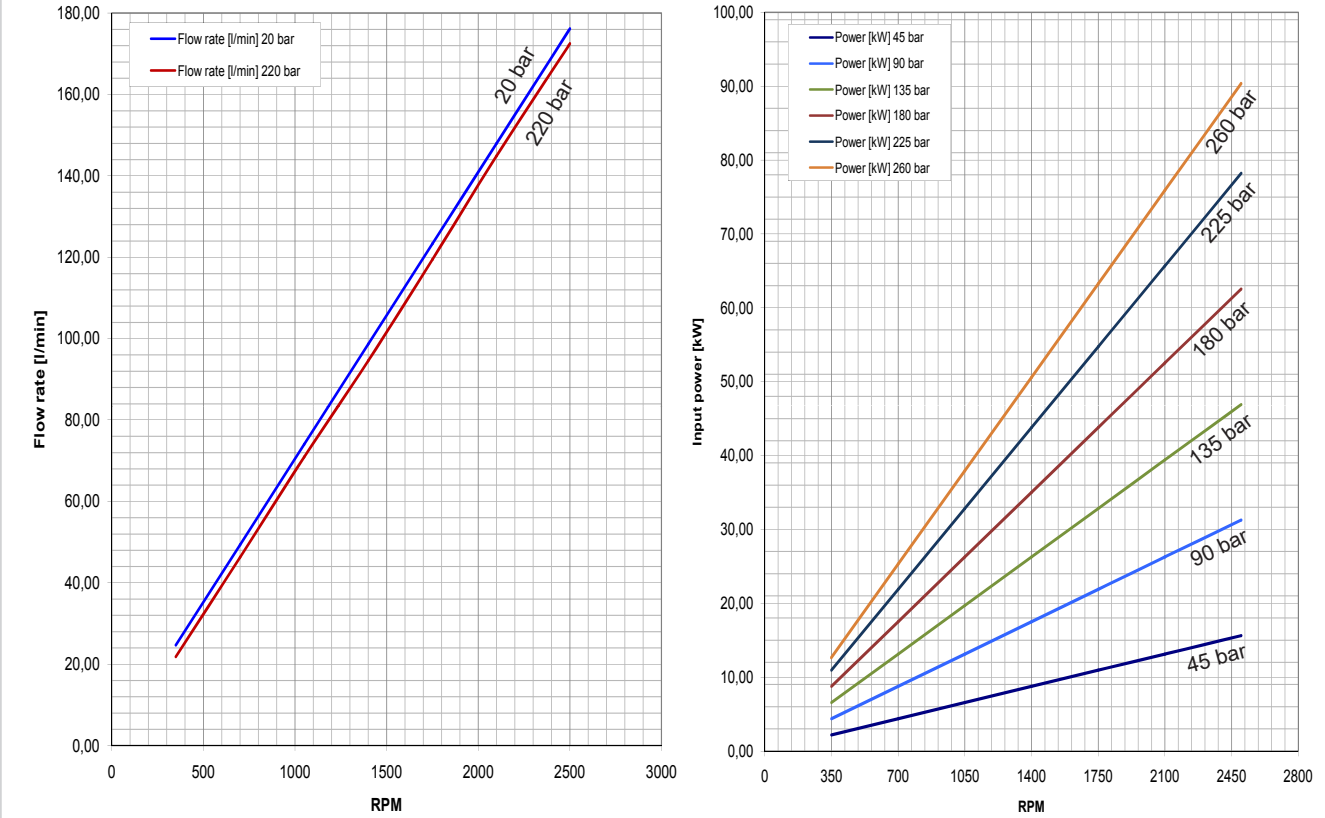


Pump Performance Charts

Performance curves carried out with oil viscosity at 21 cSt and oil temperature at 50°C



PG330 - 64

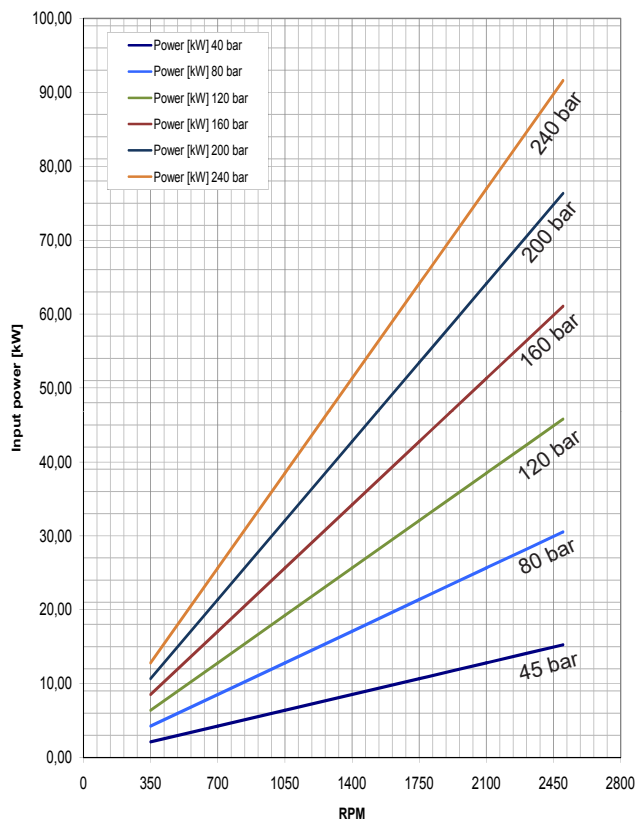
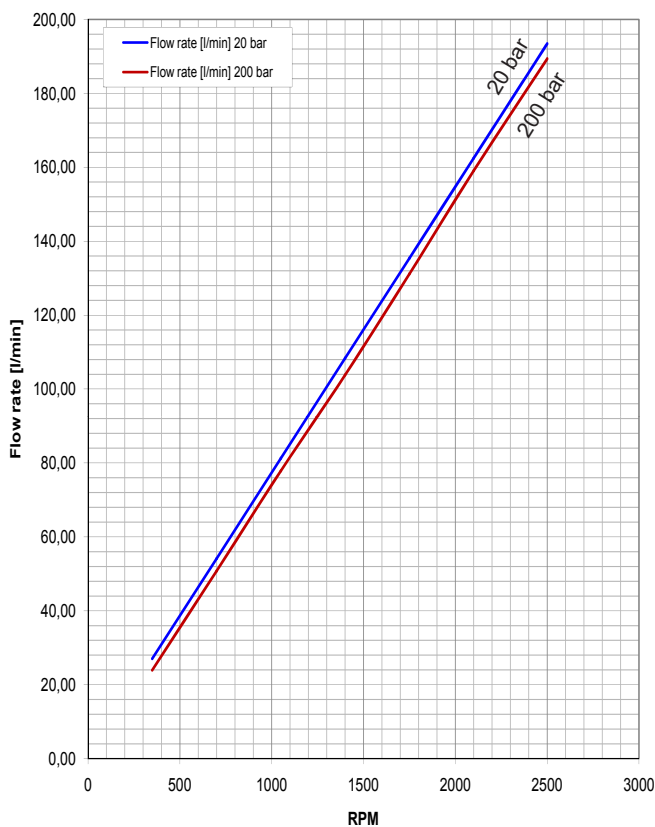


PG330 - 72



## Pump Performance Charts

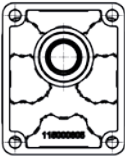
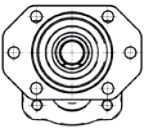
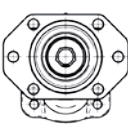
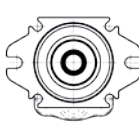
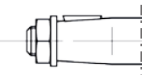
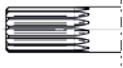
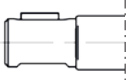
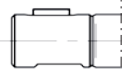
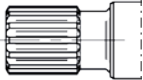
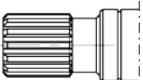
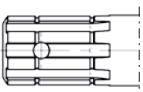
Performance curves carried out with oil viscosity at 21 cSt and oil temperature at 50°C



PG330 - 80



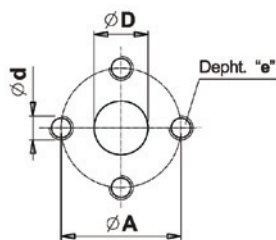
### Shaft And Flange Combinations

| PG330                 |                                                                                             |  |  |  |  |  |  |  |
|-----------------------|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                       |                                                                                             | CODE P2                                                                           | CODE S3                                                                           | CODE S4                                                                           | CODE Z2                                                                           | CODE R3                                                                            | CODE R8                                                                             | CODE Z1                                                                             |
|                       |                                                                                             | FLANGES                                                                           |                                                                                   |                                                                                   |                                                                                   | FLANGES WITH OUTRIGGER BEARING                                                     |                                                                                     |                                                                                     |
| SHAFT END             |  CODE 38   | 38P2                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                       |  CODE 55   |                                                                                   | 55S3                                                                              |                                                                                   |                                                                                   | 55R3                                                                               |                                                                                     |                                                                                     |
|                       |  CODE 56  |                                                                                   | 56S3                                                                              |                                                                                   |                                                                                   | 56R3                                                                               |                                                                                     |                                                                                     |
|                       |  CODE 87 |                                                                                   | 87S3                                                                              |                                                                                   |                                                                                   | 87R3                                                                               |                                                                                     |                                                                                     |
|                       |  CODE 88 |                                                                                   | 88S3                                                                              |                                                                                   |                                                                                   | 88R3                                                                               |                                                                                     |                                                                                     |
| CONTINENTAL SHAFT END |  CODE 58 |                                                                                   | 58S3                                                                              | 58S4                                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                       |  CODE 67 |                                                                                   |                                                                                   |                                                                                   | 67Z2                                                                              |                                                                                    |                                                                                     |                                                                                     |
|                       |  CODE 57 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    | 57R8                                                                                |                                                                                     |
|                       |  CODE 66 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     | 66Z1                                                                                |
|                       |  CODE 89 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    | 89R8                                                                                |                                                                                     |

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## Flanged Ports



code P

Flanged ports  
european standard

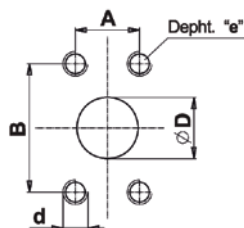
|     |                     |
|-----|---------------------|
| M8  | 20 Nm (14.7 lbf-ft) |
| M10 | 35 Nm (25.8 lbf-ft) |
| M12 | 65 Nm (47.9 lbf-ft) |



| UNI-DIRECTIONAL  |               |               |     |               |               |               |     |               |
|------------------|---------------|---------------|-----|---------------|---------------|---------------|-----|---------------|
| PUMPS            | INLET         |               |     |               | OUTLET        |               |     |               |
|                  | Ø D           | Ø A           | d   | e             | Ø D           | Ø A           | d   | e             |
| 23               | 20<br>(0.79") | 40<br>(1.57") | M8  | 16<br>(0.63") | 16<br>(0.63") | 40<br>(1.57") | M8  | 16<br>(0.63") |
| From 28<br>to 47 | 27<br>(1.07") | 51<br>(2.01") | M10 | 16<br>(0.63") | 16<br>(0.63") | 40<br>(1.57") | M8  | 16<br>(0.63") |
| From 55<br>to 72 | 33<br>(1.3")  | 62<br>(2.44") | M12 | 16<br>(0.63") | 21<br>(0.83") | 51<br>(2.01") | M10 | 16<br>(0.63") |



| BI-DIRECTIONAL   |               |               |     |               |               |               |     |               |
|------------------|---------------|---------------|-----|---------------|---------------|---------------|-----|---------------|
| PUMPS            | INLET         |               |     |               | OUTLET        |               |     |               |
|                  | Ø D           | Ø A           | d   | e             | Ø D           | Ø A           | d   | e             |
| 23               | 20<br>(0.79") | 40<br>(1.57") | M8  | 16<br>(0.63") | 20<br>(0.79") | 40<br>(1.57") | M8  | 16<br>(0.63") |
| From 28<br>to 47 | 27<br>(1.07") | 51<br>(2.01") | M10 | 16<br>(0.63") | 27<br>(1.07") | 51<br>(2.01") | M10 | 16<br>(0.63") |
| From 55<br>to 72 | 33<br>(1.3")  | 62<br>(2.44") | M12 | 16<br>(0.63") | 33<br>(1.3")  | 62<br>(2.44") | M12 | 16<br>(0.63") |



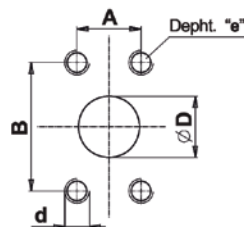
code W

Flanged ports  
SAE J518  
METRIC THREAD

|     |                     |
|-----|---------------------|
| M10 | 35 Nm (25.8 lbf-ft) |
| M12 | 65 Nm (47.9 lbf-ft) |



| UNI-DIRECTIONAL  |                 |                  |                  |     |               |               |                  |                  |     |               |
|------------------|-----------------|------------------|------------------|-----|---------------|---------------|------------------|------------------|-----|---------------|
| PUMPS            | INLET           |                  |                  |     |               | OUTLET        |                  |                  |     |               |
|                  | ØD              | B                | A                | d   | e             | ØD            | B                | A                | d   | e             |
| From 23<br>to 47 | 32<br>(1.26")   | 58.72<br>(2.31") | 38.18<br>(1.19") | M10 | 18<br>(0.71") | 19<br>(0.75") | 47.6<br>(1.87")  | 22.2<br>(0.87")  | M10 | 18<br>(0.71") |
| From 55<br>to 80 | 39.3<br>(1.55") | 69.8<br>(2.75")  | 35.7<br>(1.40")  | M12 | 15<br>(0.59") | 32<br>(1.26") | 58.72<br>(2.31") | 30.18<br>(1.19") | M10 | 18<br>(0.71") |



code S

Flanged ports  
SAE J518  
AMERICAN STANDARD  
THREAD

|             |                     |
|-------------|---------------------|
| 3/8-16 UNC  | 35 Nm (25.8 lbf-ft) |
| 7/16-14 UNC | 45 Nm (33.2 lbf-ft) |
| 1/2-13 UNC  | 65 Nm (47.9 lbf-ft) |

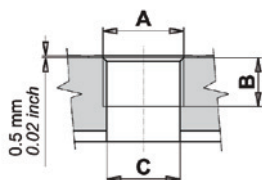


| UNI-DIRECTIONAL  |                 |                  |                  |                |               |               |                  |                  |               |               |
|------------------|-----------------|------------------|------------------|----------------|---------------|---------------|------------------|------------------|---------------|---------------|
| PUMPS            | INLET           |                  |                  |                |               | OUTLET        |                  |                  |               |               |
|                  | ØD              | B                | A                | d              | e             | ØD            | B                | A                | d             | e             |
| From 23<br>to 47 | 32<br>(1.26")   | 58.72<br>(2.31") | 30.18<br>(1.19") | 7/16-14<br>UNC | 18<br>(0.71") | 19<br>(0.75") | 47.6<br>(1.87")  | 22.2<br>(0.87")  | 3/8-16<br>UNC | 18<br>(0.71") |
| From 55<br>to 80 | 39.3<br>(1.55") | 69.8<br>(2.75")  | 35.7<br>(1.40")  | 1/2-13<br>UNC  | 15<br>(0.59") | 32<br>(1.26") | 58.72<br>(2.31") | 30.18<br>(1.19") | 3/8-16<br>UNC | 18<br>(0.71") |

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## Threaded Ports



code G

Threaded ports  
GAS (BSPP)

|        |                       |
|--------|-----------------------|
| G3/4   | 90 Nm (66.4 lbf-ft)   |
| G1     | 130 Nm (95.8 lbf-ft)  |
| G1 1/4 | 170 Nm (125.4 lbf-ft) |



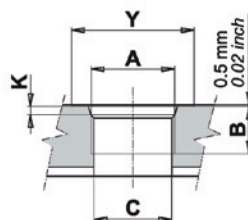
| UNI-DIRECTIONAL |        |               |                |        |               |                 |
|-----------------|--------|---------------|----------------|--------|---------------|-----------------|
| PUMPS           | INLET  |               |                | OUTLET |               |                 |
|                 | A      | B             | C              | A      | B             | C               |
| From 23 to 40   | G1     | 22<br>(0.87") | 30.5<br>(1.2") | G3/4   | 16<br>(0.62") | 24.4<br>(0.96") |
| From 47 to 80   | G1 1/4 | 24<br>(0.94") | 37<br>(1.46")  | G1     | 22<br>(0.87") | 30.5<br>(1.2")  |



| BI-DIRECTIONAL |        |               |                |        |               |                |
|----------------|--------|---------------|----------------|--------|---------------|----------------|
| PUMPS          | INLET  |               |                | OUTLET |               |                |
|                | A      | B             | C              | A      | B             | C              |
| From 23 to 40  | G1     | 22<br>(0.87") | 30.5<br>(1.2") | G1     | 22<br>(0.87") | 30.5<br>(1.2") |
| From 47 to 80  | G1 1/4 | 24<br>(0.94") | 37<br>(1.46")  | G1 1/4 | 24<br>(0.94") | 37<br>(1.46")  |



| BI-DIRECTIONAL - REAR PORTS |       |               |                |        |               |                |
|-----------------------------|-------|---------------|----------------|--------|---------------|----------------|
| PUMPS                       | INLET |               |                | OUTLET |               |                |
|                             | A     | B             | C              | A      | B             | C              |
| From 23 to 64               | G1    | 22<br>(0.87") | 30.5<br>(1.2") | G1     | 22<br>(0.87") | 30.5<br>(1.2") |



code R

Threaded ports  
SAE (ODT)

|       |                       |
|-------|-----------------------|
| SAE12 | 90 Nm (66.4 lbf-ft)   |
| SAE16 | 130 Nm (95.8 lbf-ft)  |
| SAE20 | 170 Nm (125.4 lbf-ft) |



| UNI-DIRECTIONAL |                          |               |                 |               |                |                          |               |                 |               |                |
|-----------------|--------------------------|---------------|-----------------|---------------|----------------|--------------------------|---------------|-----------------|---------------|----------------|
| PUMPS           | INLET                    |               |                 |               |                | OUTLET                   |               |                 |               |                |
|                 | A                        | B             | C               | Y             | K              | A                        | B             | C               | Y             | K              |
| From 23 to 40   | 1-5/16-12 UN<br>(SAE 16) | 19<br>(0.75") | 31<br>(1.22")   | 49<br>(1.93") | 3.3<br>(0.13") | 1-1/16-12 UN<br>(SAE 12) | 19<br>(0.75") | 24.7<br>(0.97") | 41<br>(1.16") | 3.3<br>(0.13") |
| From 47 to 80   | 1-5/8-12 UN<br>(SAE 20)  | 19<br>(0.75") | 38.9<br>(1.53") | 58<br>(2.28") | 3.3<br>(0.13") | 1-5/16-12 UN<br>(SAE 16) | 19<br>(0.75") | 31<br>(1.22")   | 49<br>(1.93") | 3.3<br>(0.13") |



| BI-DIRECTIONAL |                          |               |                 |               |                |                          |               |                 |               |                |
|----------------|--------------------------|---------------|-----------------|---------------|----------------|--------------------------|---------------|-----------------|---------------|----------------|
| PUMPS          | INLET                    |               |                 |               |                | OUTLET                   |               |                 |               |                |
|                | A                        | B             | C               | Y             | K              | A                        | B             | C               | Y             | K              |
| From 23 to 40  | 1-5/16-12 UN<br>(SAE 16) | 19<br>(0.75") | 31<br>(1.22")   | 49<br>(1.93") | 3.3<br>(0.13") | 1-5/16-12 UN<br>(SAE 16) | 19<br>(0.75") | 31<br>(1.22")   | 49<br>(1.93") | 3.3<br>(0.13") |
| From 47 to 80  | 1-5/8-12 UN<br>(SAE 20)  | 19<br>(0.75") | 38.9<br>(1.53") | 58<br>(2.28") | 3.3<br>(0.13") | 1-5/8-12 UN<br>(SAE 20)  | 19<br>(0.75") | 38.9<br>(1.53") | 58<br>(2.28") | 3.3<br>(0.13") |



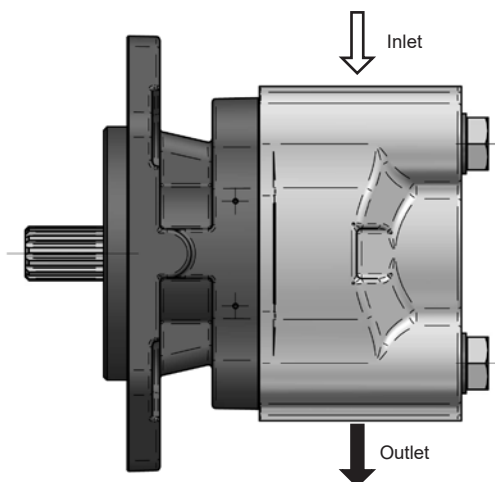
| BI-DIRECTIONAL - REAR PORTS |                          |               |               |               |                |                          |               |               |               |                |
|-----------------------------|--------------------------|---------------|---------------|---------------|----------------|--------------------------|---------------|---------------|---------------|----------------|
| PUMPS                       | INLET                    |               |               |               |                | OUTLET                   |               |               |               |                |
|                             | A                        | B             | C             | Y             | K              | A                        | B             | C             | Y             | K              |
| From 23 to 64               | 1-5/16-12 UN<br>(SAE 16) | 19<br>(0.75") | 31<br>(1.22") | 49<br>(1.93") | 3.3<br>(0.13") | 1-5/16-12 UN<br>(SAE 16) | 19<br>(0.75") | 31<br>(1.22") | 49<br>(1.93") | 3.3<br>(0.13") |

E0.151.0423.14.00IM01

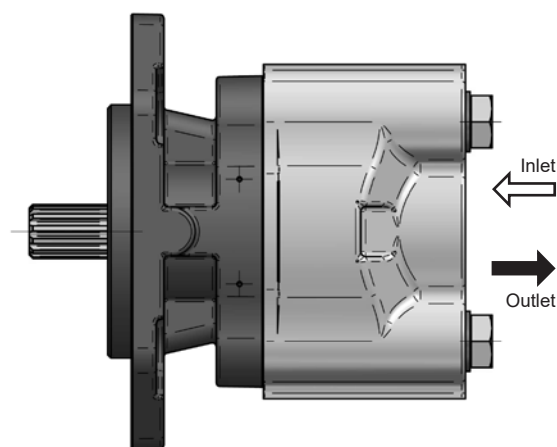


 example with clockwise rotation / **X** = plugged port

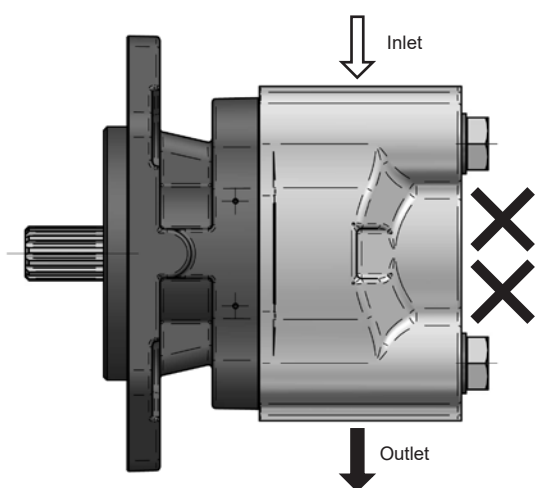
## Ports layout - Single Pump



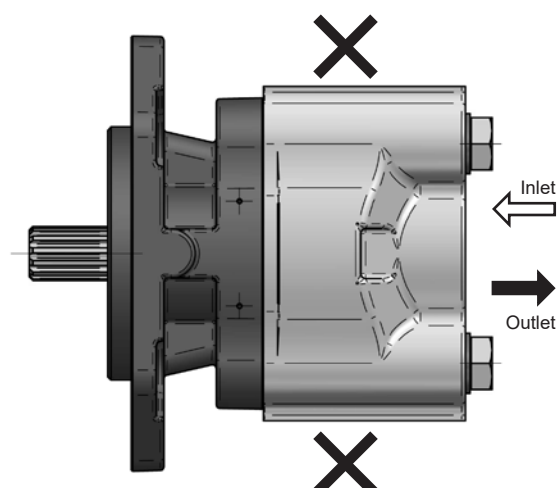
STANDARD CONFIGURATION



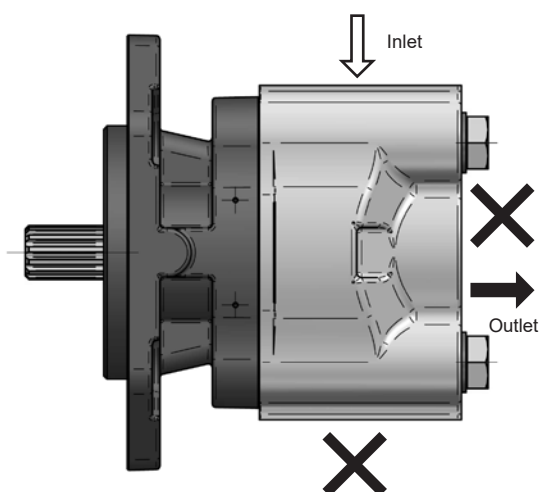
CODE 1



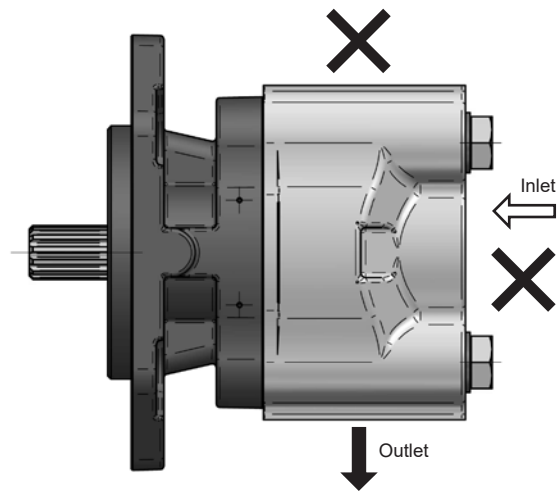
CODE 2



CODE 3



CODE 4

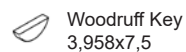


CODE 5

EO.151.0423.14.001M01



### Drive Shaft



Woodruff Key  
3,958x7,5

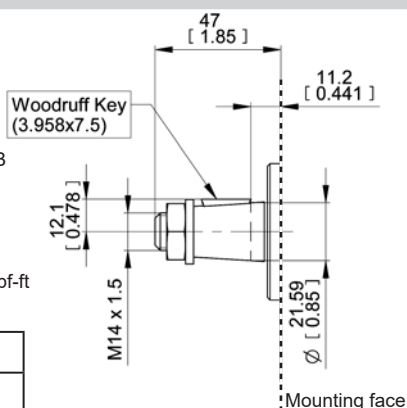


Washer  
M14 TE-UNI 1751B



Nut  
M14x1,5 ISO 8675

40 Nm-29.7 lbf-ft



Pressure values are lower for  
displacement 55-64-72 cc/rev,  
see page 57.

#### Part Number

Kit Woodruff  
Key+Nut+Washer

R12980070

Mounting face

Ext. Involute Spline  
SAE J498B with outer  
diameter modified 13  
teeth - 16/32 Pitch  
- 30 deg - Flat Root -  
Side fit - Class 1

code 38



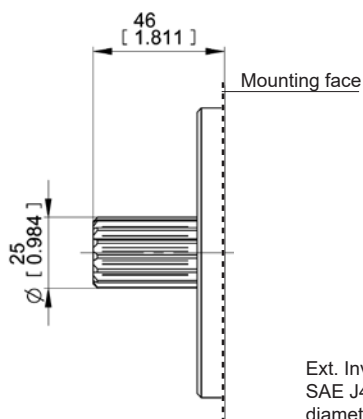
Max torque 250 Nm (2213 lbf in)

code 55

Max torque 330 Nm (2921 lbf in)

Tapered 1:8

SAE B 13T-16/32DP SPLINED



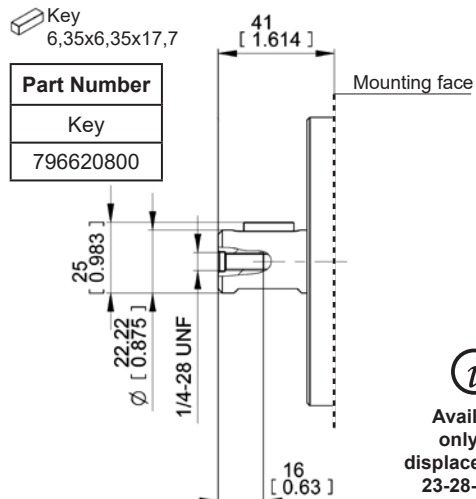
Ext. Involute Spline  
SAE J498B with outer  
diameter modified 15  
teeth - 16/32 Pitch  
- 30 deg - Flat Root -  
Side fit - Class 1

Key  
6,35x6,35x17,7

#### Part Number

Key

796620800



Available  
only for  
displacements:  
23-28-34-40

code 56

Max torque 480 Nm (4250 lbf in)

code 87

Max torque 220 Nm (1950 lbf in)

SAE BB 15T-16/32DP SPLINED

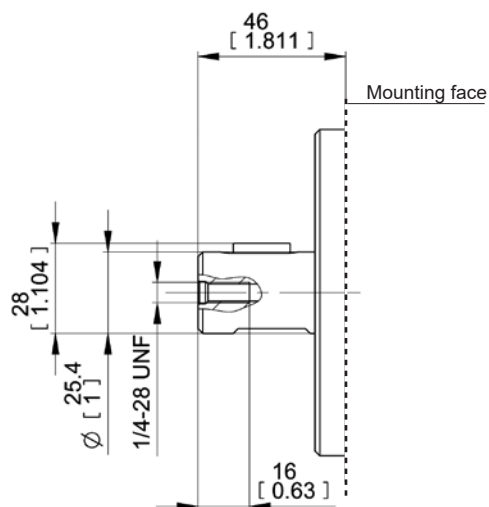
SAE B PARALLEL

Key  
6,35x6,35x17,7

#### Part Number

Key

796620800



code 88

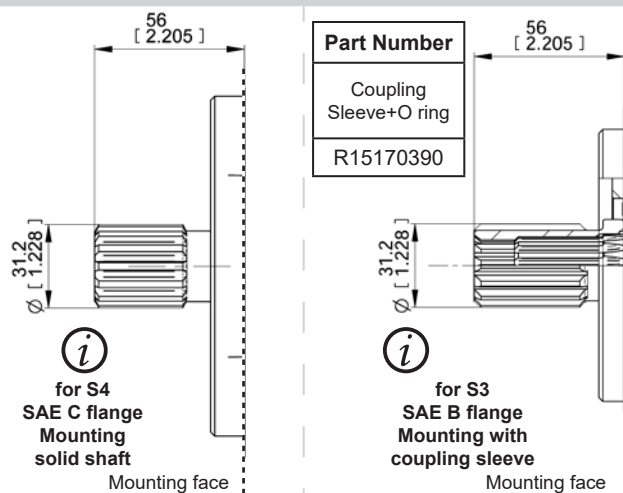
Max torque 320 Nm (2830 lbf in)

SAE BB PARALLEL

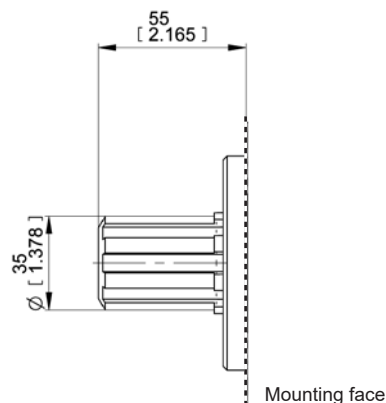
E0.151.0423.14.00IM01



Continental Shaft



Ext. Involute Spline SAE J498B with outer diameter modified 14 teeth - 12/24 Pitch - 30 deg - Flat Root - Side fit - Class 1



code 58

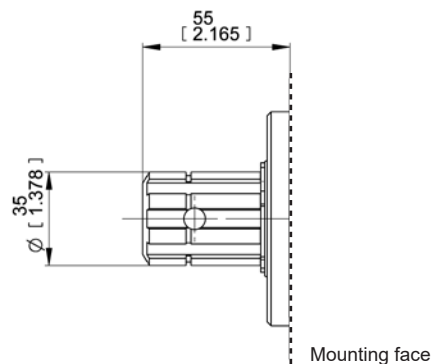
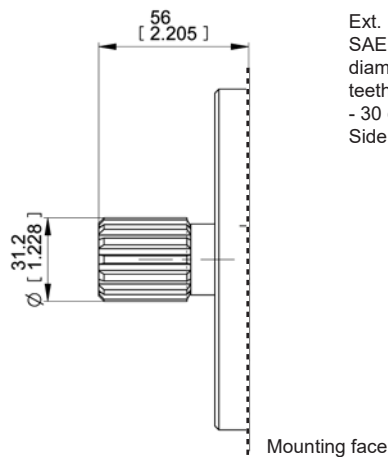
Max torque 480 Nm (4250 lbt in)    Max torque 330 Nm (4250 lbt in)

SAE C 14T-12/24DP SPLINED

code 67

Max torque 480 Nm (4250 lbt in)

B8x32x36 DIN 5462 SPLINED



code 57

Max torque 480 Nm (4250 lbt in)

SAE C 14T-12/24DP SPLINED

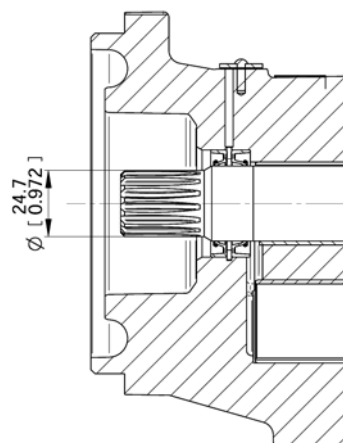
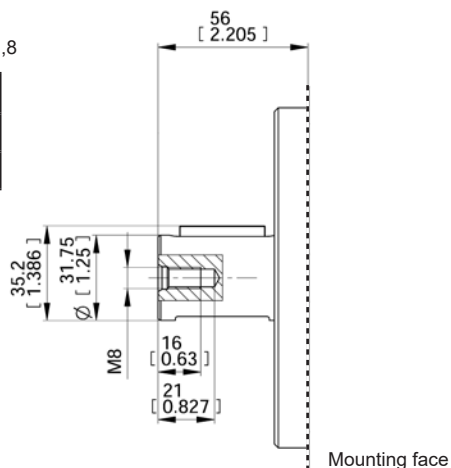
code 66

Max torque 480 Nm (4250 lbt in)

B8x32x36 DIN 5462 SPLINED

Key  
7,94x7,94x31,8

| Part Number |
|-------------|
| Key         |
| 796620800   |



code 89

Max torque 480 Nm (4250 lbt in)

SAE C PARALLEL

code 70

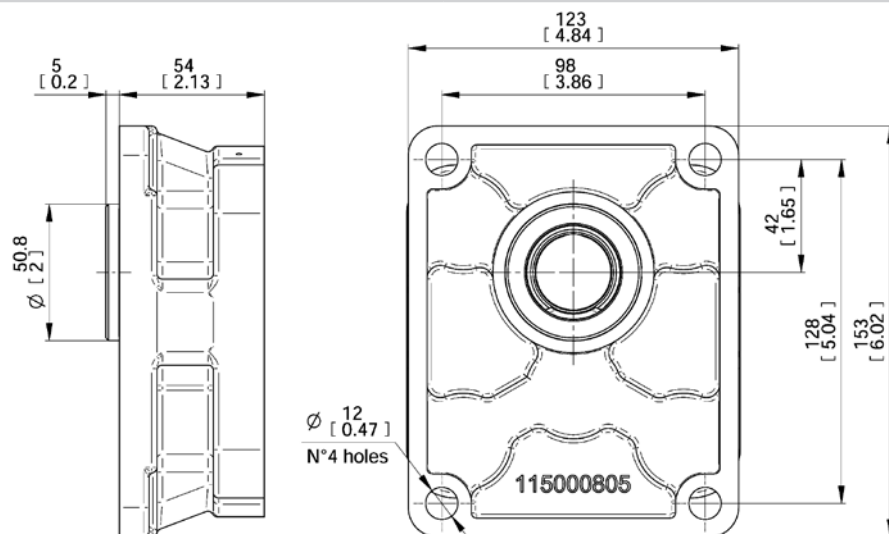
Max torque 480 Nm (4250 lbt in)

INTERNAL DRIVE SHAFT - W25X1.5X15X8F DIN 5480 SPLINED

EO.151.0423.14.00IM01



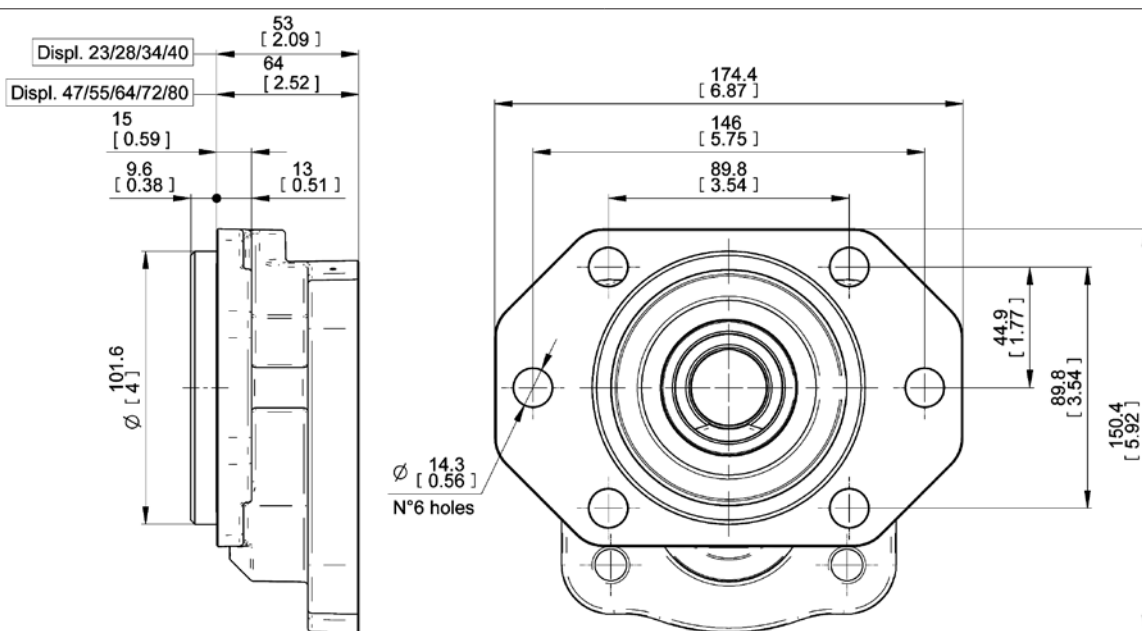
## Mounting Flanges



| Code | Part Number (Unidirectional Pump) |                                 |
|------|-----------------------------------|---------------------------------|
|      | Flange+Shaft seal kit             | Shaft seal kit (See page 80-81) |
| 38P2 | R15240030 (NBR)                   | R12940010 (NBR)                 |
|      | R15240031 (FPM)                   | R12940020 (FPM)                 |

**P2**

With shaft code 38

**EUROPEAN STANDARD**

| Code | Part Number (Unidirectional Pump) |                                    |                                 |                                    |
|------|-----------------------------------|------------------------------------|---------------------------------|------------------------------------|
|      | Flange+Shaft seal kit             |                                    | Shaft seal kit (See page 80-81) |                                    |
| 55S3 | Displ. from 23 to 40              | R15240010 (NBR)<br>R15240011 (FPM) | Displ. from 47 to 80            | R12940030 (NBR)<br>R12940033 (FPM) |
| 56S3 |                                   |                                    |                                 |                                    |
| 87S3 |                                   |                                    |                                 |                                    |
| 88S3 |                                   |                                    |                                 |                                    |
| 58S3 | Displ. from 23 to 40              | R15240012 (NBR)<br>R15240013 (FPM) | Displ. from 47 to 80            | R15020190 (NBR)<br>R15020191 (FPM) |

**S3**

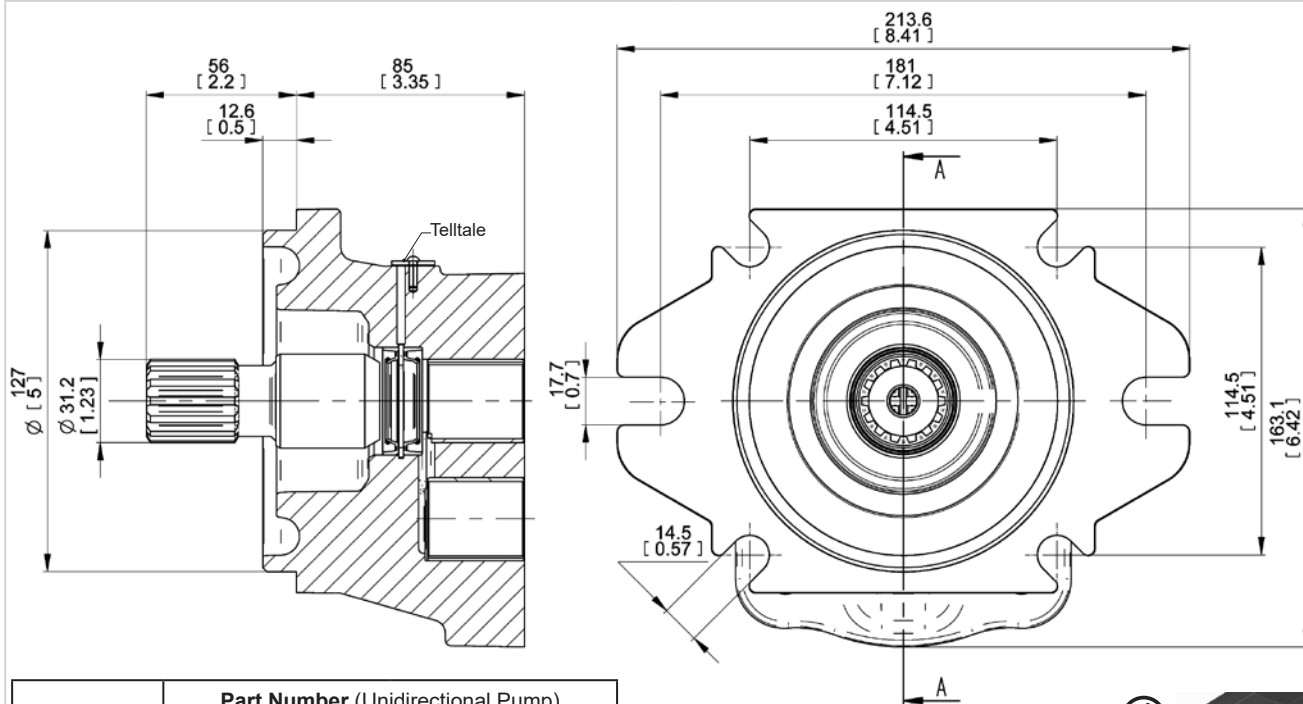
With shaft code 55-56-58-87-88

**SAE B 2-4 BOLTS**

E0.151.0423.14.00IM01



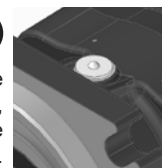
## Mounting Flanges



| Code | Part Number (Unidirectional Pump) |                                    |
|------|-----------------------------------|------------------------------------|
|      | Flange+Shaft seal kit             | Shaft seal kit<br>(See page 80-81) |
| 58S4 | R15020015 (NBR)                   | R15020190 (NBR)                    |
|      | R15020017 (FPM)                   | R15020191 (FPM)                    |



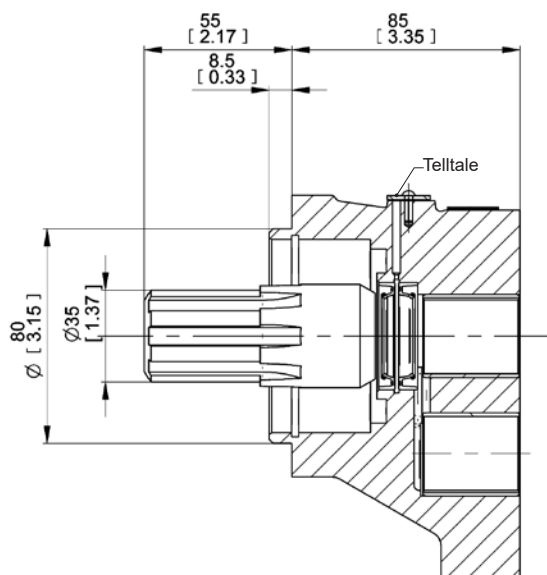
TellTale  
drop in plug in case of failure,  
outside leakage trough the  
crossing hole is visible.



**S4**

With shaft code 58

SAE C 2-4 BOLTS



| Code | Part Number (Unidirectional Pump) |                                    |
|------|-----------------------------------|------------------------------------|
|      | Flange+Shaft seal kit             | Shaft seal kit<br>(See page 80-81) |
| 67Z2 | R15020013 (NBR)                   | R15020200 (NBR)                    |
|      | R15020120 (FPM)                   | R15020201 (FPM)                    |

**Z2**

With shaft code 67

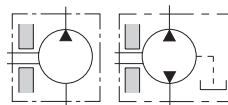
4 Bolts for ZF gear box

EO.151.0423.14.001M01

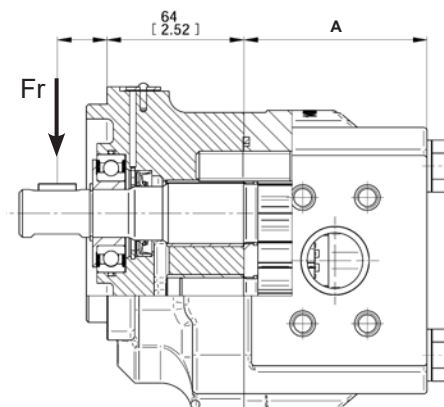
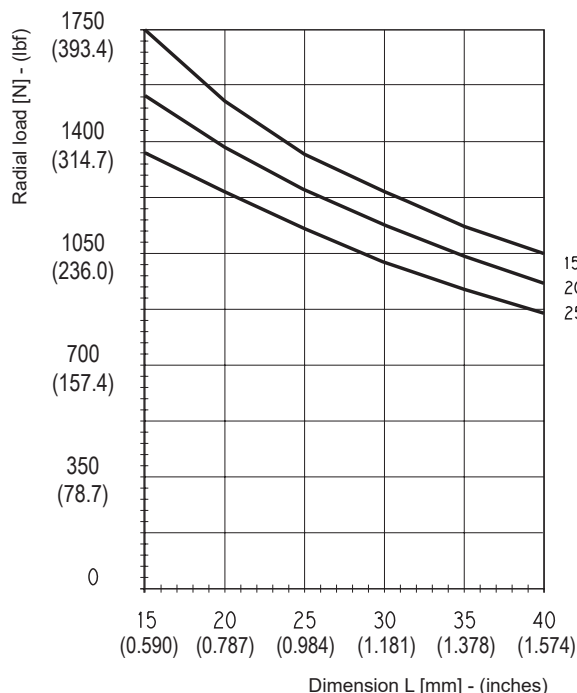


### Mounting Flanges with Outrigger Bearing for Medium Loads (R3)

The following diagram shows radial load bearing capacity, in case of parallel axis drag.  
The duty life of 3500 - 4000 hours is referred to a typical mobile application, when duty cycle is less than 100%.



L=Distance between mounting flange and radial force point of application [mm-inches]

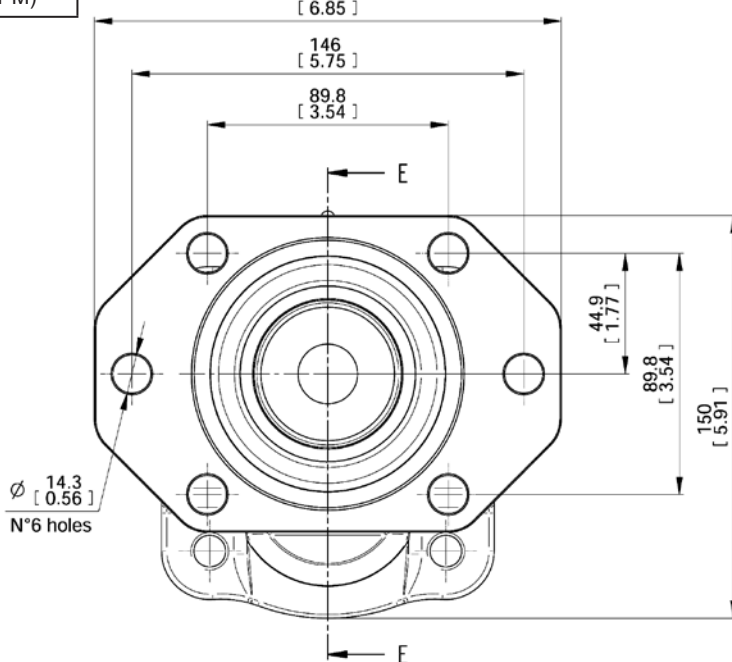
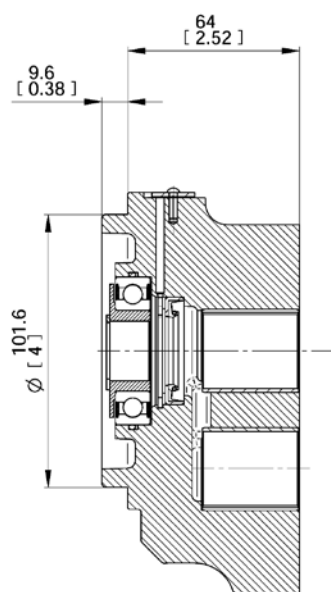


| Type       | A     |      |
|------------|-------|------|
|            | mm    | in   |
| PG330 - 23 | 77    | 3.03 |
| PG330 - 28 | 81    | 3.19 |
| PG330 - 34 | 85.5  | 3.36 |
| PG330 - 40 | 90    | 3.54 |
| PG330 - 47 | 101.5 | 3.40 |
| PG330 - 55 | 107.5 | 4.23 |
| PG330 - 64 | 114.5 | 4.51 |
| PG330 - 72 | 121.5 | 4.78 |
| PG330 - 80 | 127.5 | 5.02 |

| Code | Part Number            |
|------|------------------------|
|      | Flange+Bearing support |
| 55R3 | R15020023 (NBR)        |
| 87R3 | R15020090 (FPM)        |
| 56R3 | R15020021 (NBR)        |
| 88R3 | R15020080 (FPM)        |



Mounting with special shafts.  
(Please contact our sales department).



R3



With shaft code 55-56-87-88

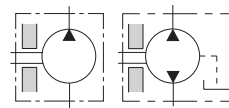
SAE B 2-4 BOLTS

E0.151.0423.14.00IM01

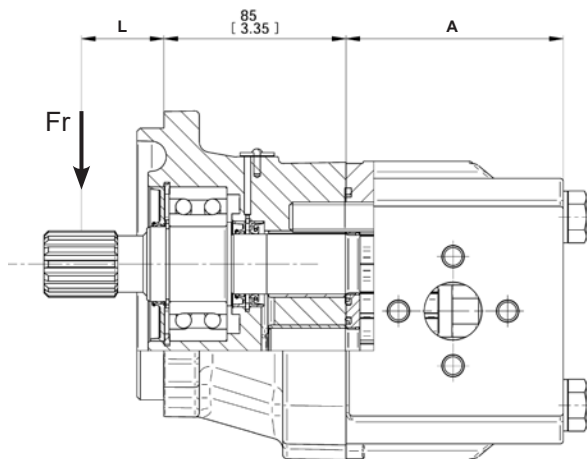


## Mounting Flanges with Outrigger Bearing for Heavy Loads (Z1- R8)

The following diagram shows radial load bearing capacity, in case of parallel axis drag.  
The duty life of 3500 - 4000 hours is referred to a typical mobile application, when duty cycle is less than 100%.



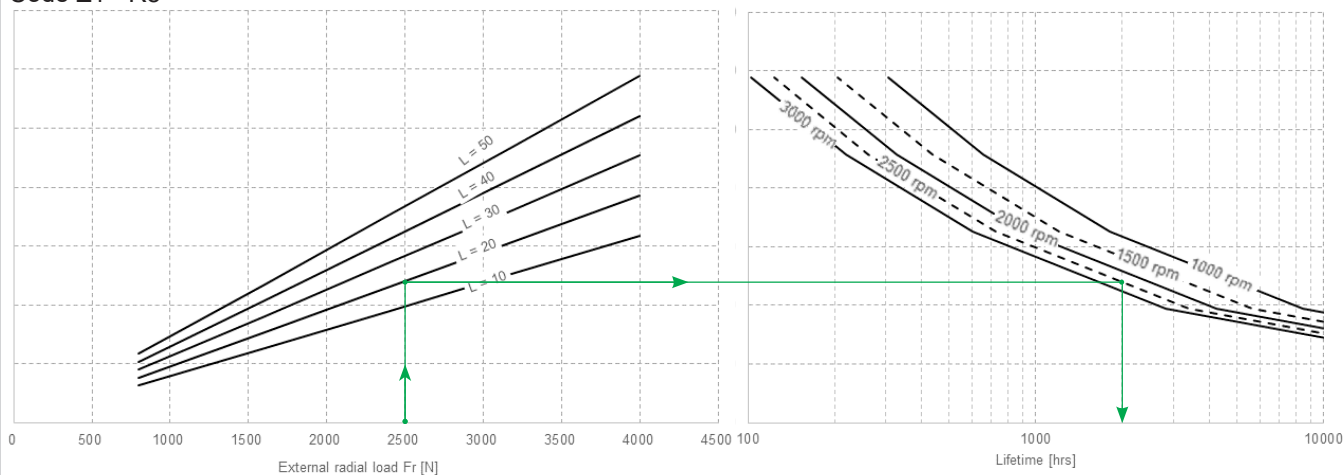
L=Distance between mounting flange and radial force point of application [mm-inches]



| Type       | A     |      |
|------------|-------|------|
|            | mm    | in   |
| PG330 - 23 | 77    | 3.03 |
| PG330 - 28 | 81    | 3.19 |
| PG330 - 34 | 85.5  | 3.36 |
| PG330 - 40 | 90    | 3.54 |
| PG330 - 47 | 101.5 | 3.40 |
| PG330 - 55 | 107.5 | 4.23 |
| PG330 - 64 | 114.5 | 4.51 |
| PG330 - 72 | 121.5 | 4.78 |
| PG330 - 80 | 127.5 | 5.02 |

Example:  
Fr = 2500 N  
L = 20 → Expected life: 2000 hrs  
Speed = 2500 rpm

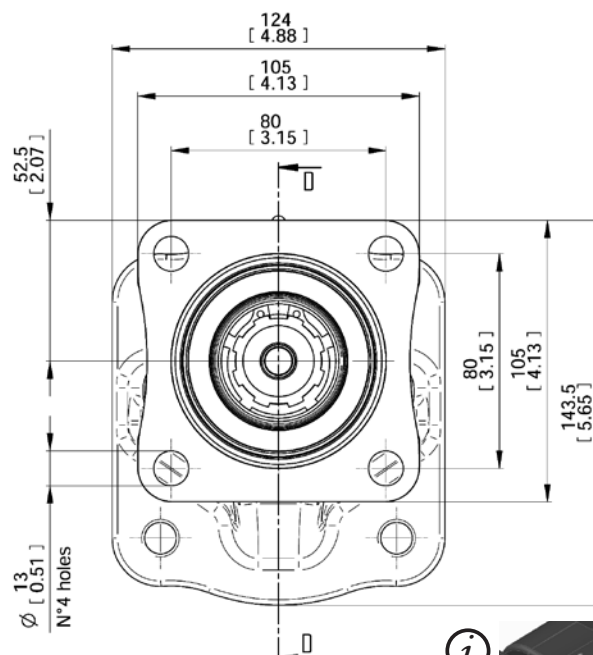
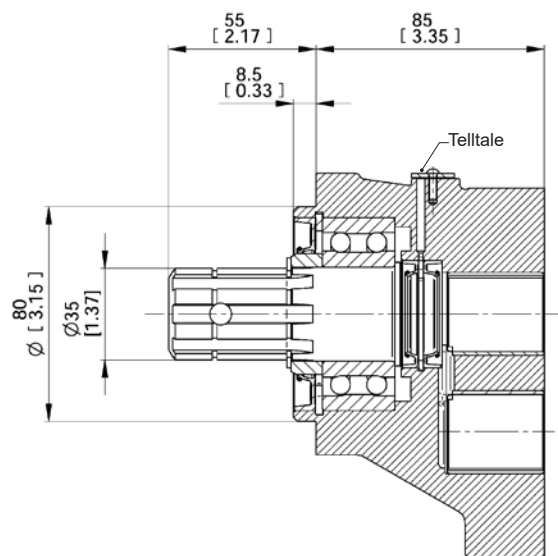
Code Z1 - R8



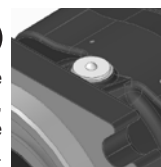
EO.151.0423.14.00IM01



### Mounting Flanges with Outrigger Bearing for Heavy Loads (Z1- R8)



TellTale  
drop in plug in case of failure,  
outside leakage trough the  
crossing hole is visible.

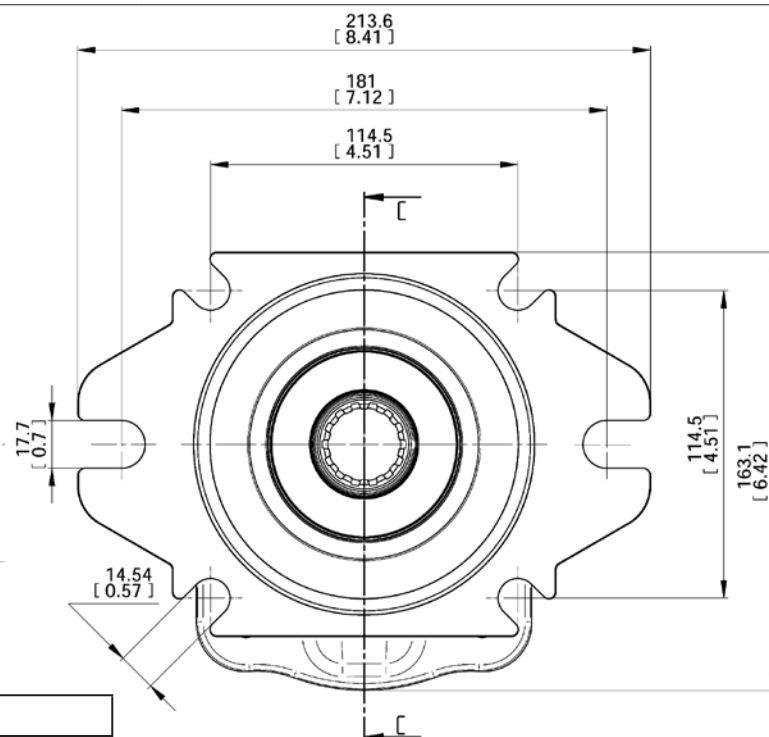
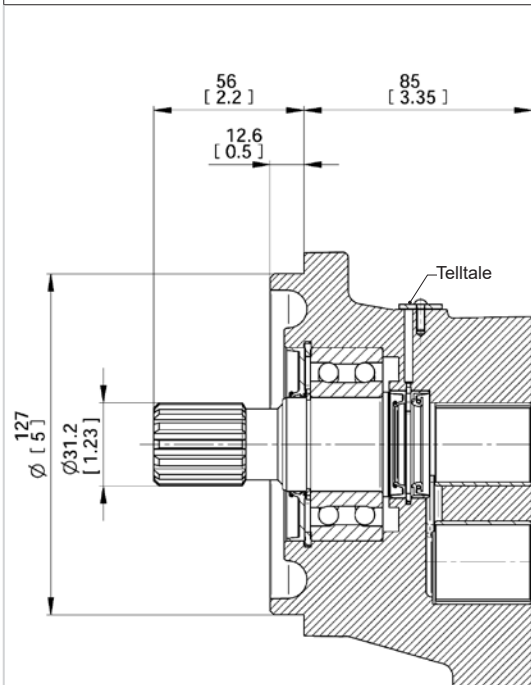


| Code | Part Number            |                 |
|------|------------------------|-----------------|
|      | Flange+Bearing support |                 |
| 66Z1 | R15020012 (NBR)        | R15020018 (FPM) |

**Z1**

With shaft code 66

#### 4 BOLTS FOR ZF GEAR



| Code | Part Number            |                 |
|------|------------------------|-----------------|
|      | Flange+Bearing support |                 |
| 57R8 | R15020010 (NBR)        | R15020030 (FPM) |
| 89R8 | R15020014 (NBR)        | R15020040 (FPM) |

**R8**

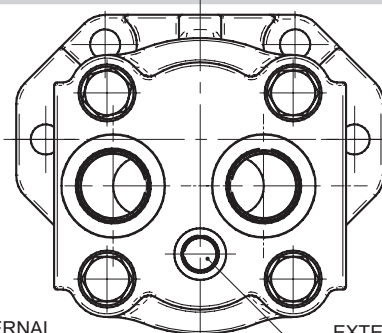
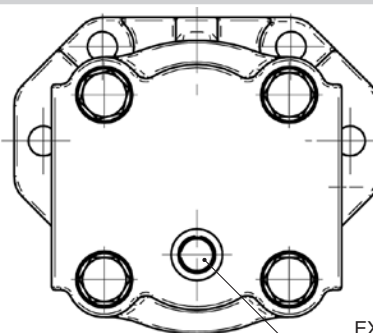
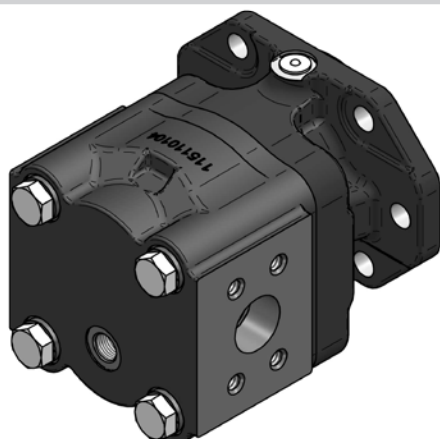
With shaft code 57-89

SAE C 2-4 BOLTS

E0.151.0423.14.00IM01



## External Drain for Bidirectional Pump



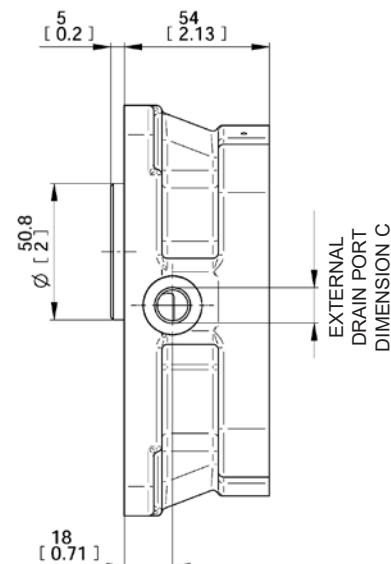
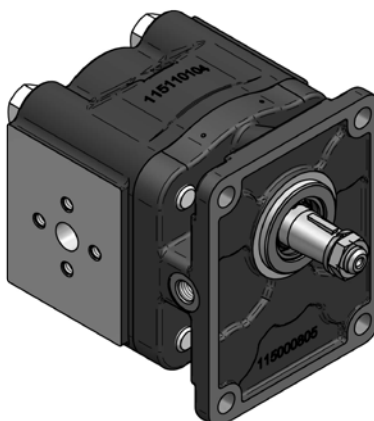
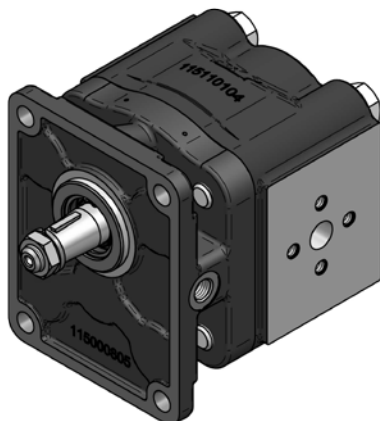
EXTERNAL  
DRAIN PORT  
DIMENSION C

EXTERNAL  
DRAIN PORT  
DIMENSION C

| Threaded Drain Port     |
|-------------------------|
| C                       |
| 9/16-18 UNF-2B<br>SAE 6 |
| G 3/8                   |

Available only threaded  
ports see page 66

## GEAR HOUSING TYPES



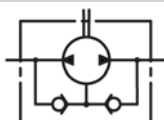
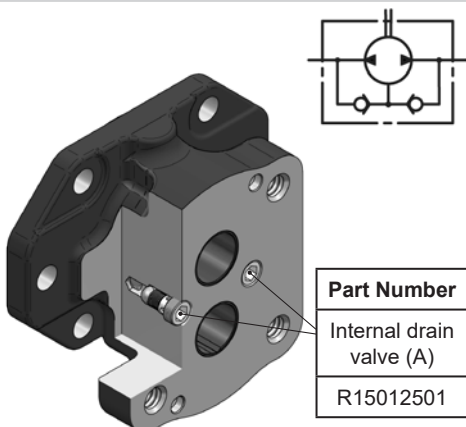
| Code                     | Part Number | Threaded Drain Port |
|--------------------------|-------------|---------------------|
|                          |             | C                   |
| P2<br>with lateral drain | R15000815   | G1/4                |



LD

P2 (EUROPEAN STANDARD) WITH LATERAL DRAIN

## Internal Drain Valve for Bidirectional Pump



| Part Number                 |
|-----------------------------|
| Internal drain<br>valve (A) |
| R15012501                   |

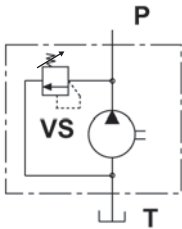
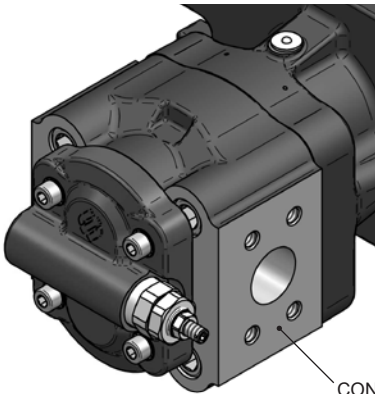
| Code   | Part Number                                    |                                        |                                        |                                        |
|--------|------------------------------------------------|----------------------------------------|----------------------------------------|----------------------------------------|
|        | Flange+Shaft seal kit+Internal drain valve (A) |                                        |                                        |                                        |
| P2-IDV | R15030020 (NBR)                                |                                        | R15030030 (FPM)                        |                                        |
| S3-IDV | shafts 55-56-58-87                             | shaft 88                               | shafts 55-56-58-87                     | shaft 88                               |
|        | R15012503 (NBR)<br>(from 23cc to 40cc)         | R15012511 (NBR)<br>(from 23cc to 40cc) | R15012505 (FPM)<br>(from 23cc to 40cc) | R15012512 (FPM)<br>(from 23cc to 40cc) |
|        | R15012502 (NBR)<br>(from 47cc to 80cc)         | R15012513 (NBR)<br>(from 47cc to 80cc) | R15012506 (FPM)<br>(from 47cc to 80cc) | R15012514 (FPM)<br>(from 47cc to 80cc) |
| S4-IDV | R15012507 (NBR)                                |                                        | R15012508 (FPM)                        |                                        |
| R8-IDV | R15012509 (NBR)                                |                                        | R15012510 (FPM)                        |                                        |
| Z1-IDV | R15170460 (NBR)                                |                                        | R15170461 (FPM)                        |                                        |
| Z2-IDV | R15030040 (NBR)                                |                                        | R15030050 (FPM)                        |                                        |

IDV

INTERNAL DRAIN FOR BI-DIRECTIONAL PUMP

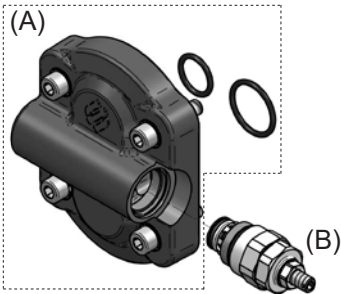
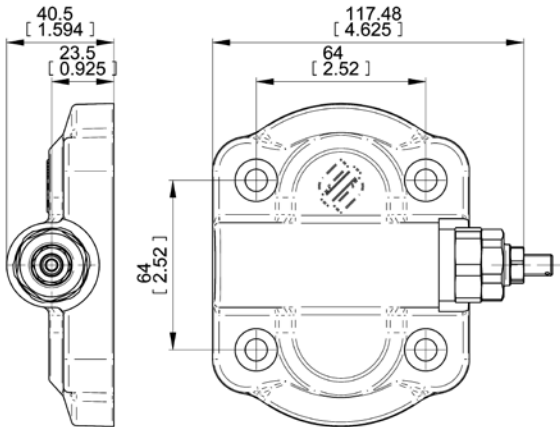


Rear Covers with Valves



Available up to 80 l/min

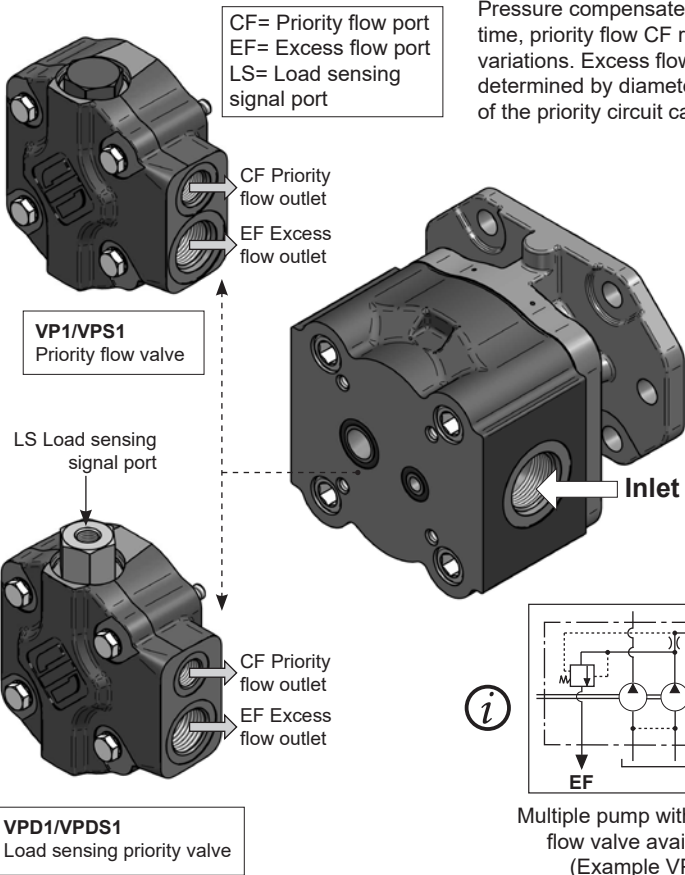
CONFIGURATION WITH SPECIAL  
GEAR HOUSING



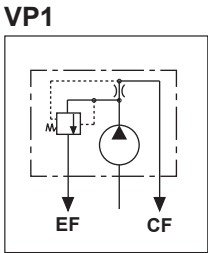
| Code                        | Part Number                      |                                            |
|-----------------------------|----------------------------------|--------------------------------------------|
|                             | Cast iron<br>Cover+O-ring<br>(A) | Pressure relief valve (B)<br>setting range |
| VS<br>Internal<br>Discharge | R15030010                        | 796366200 20-70 bar                        |
|                             |                                  | 796366300 71-150 bar                       |
|                             |                                  | 796366400 151-215 bar                      |
|                             |                                  | 796366500 216-265 bar                      |

VS

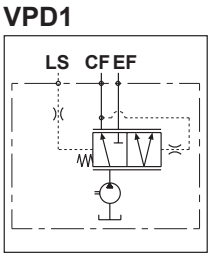
MAIN RELIEF VALVE



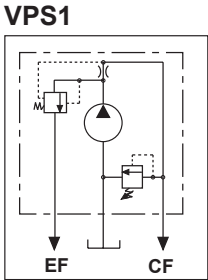
Pressure compensated priority flow valve to feed two pressurized circuit at the same time, priority flow CF remains constant regardless of pump speed and system pressure variations. Excess flow EF is directly proportional to pump speed. Priority flow is determined by diameter of calibrated orifice, see table at page 77). The max. pressure of the priority circuit can be limited by valve which relieves into pump suction line.



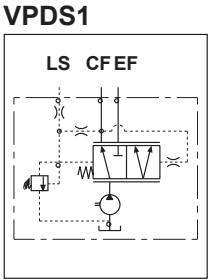
Priority flow valve, excess flow available to second actuator.



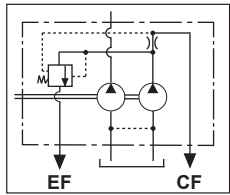
Load sensing priority valve with dynamic signal without main relief valve.



Priority flow valve, excess flow available to second actuator with pressure relief valve on priority flow line.



Load sensing priority valve with dynamic signal with main relief valve.



Multiple pump with Priority flow valve available. (Example VP1)

VP1-VPS1

PRESSURE COMPENSATED PRIORITY FLOW VALVES

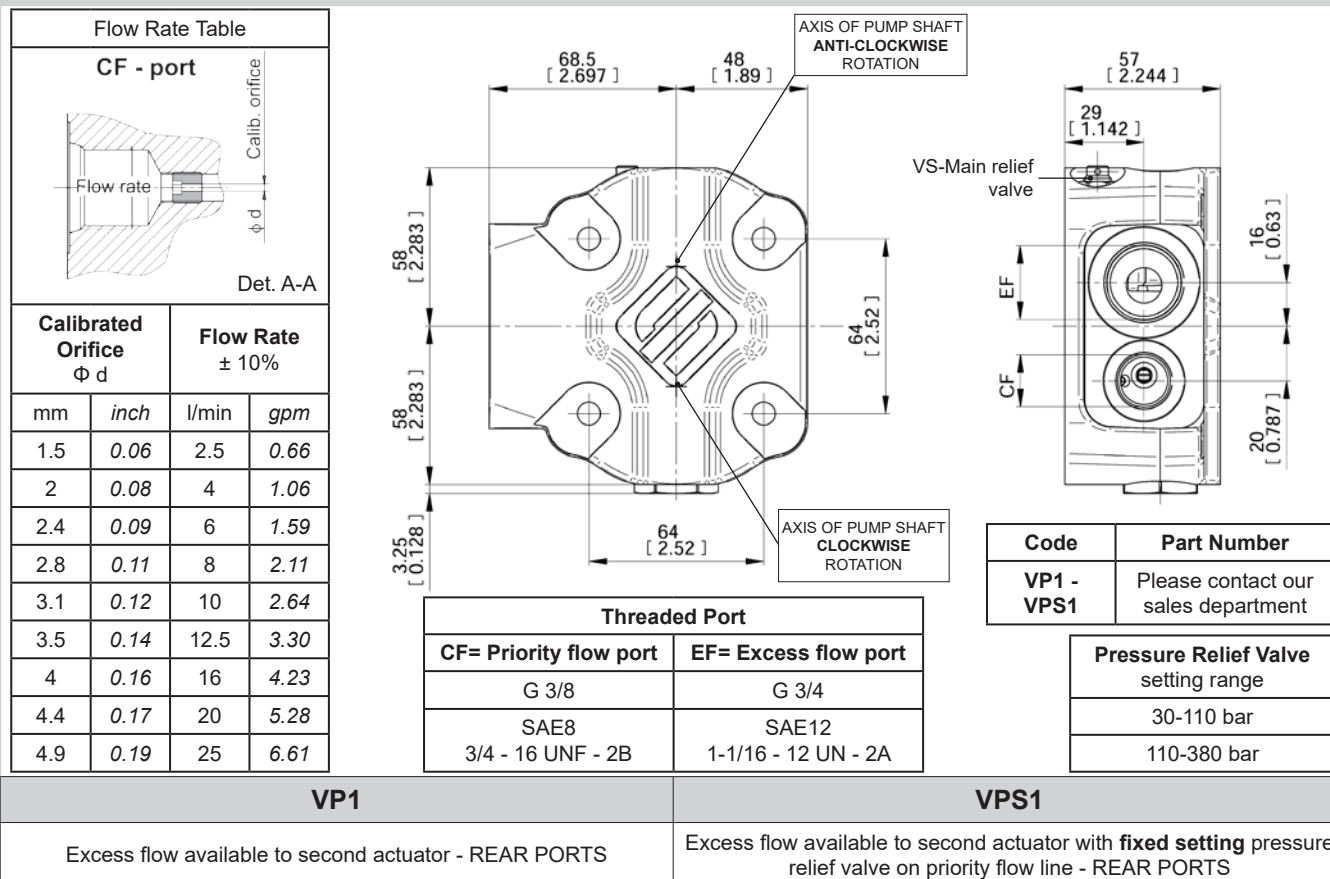
VPD1-VPDS1

LOAD SENSING PRIORITY VALVES

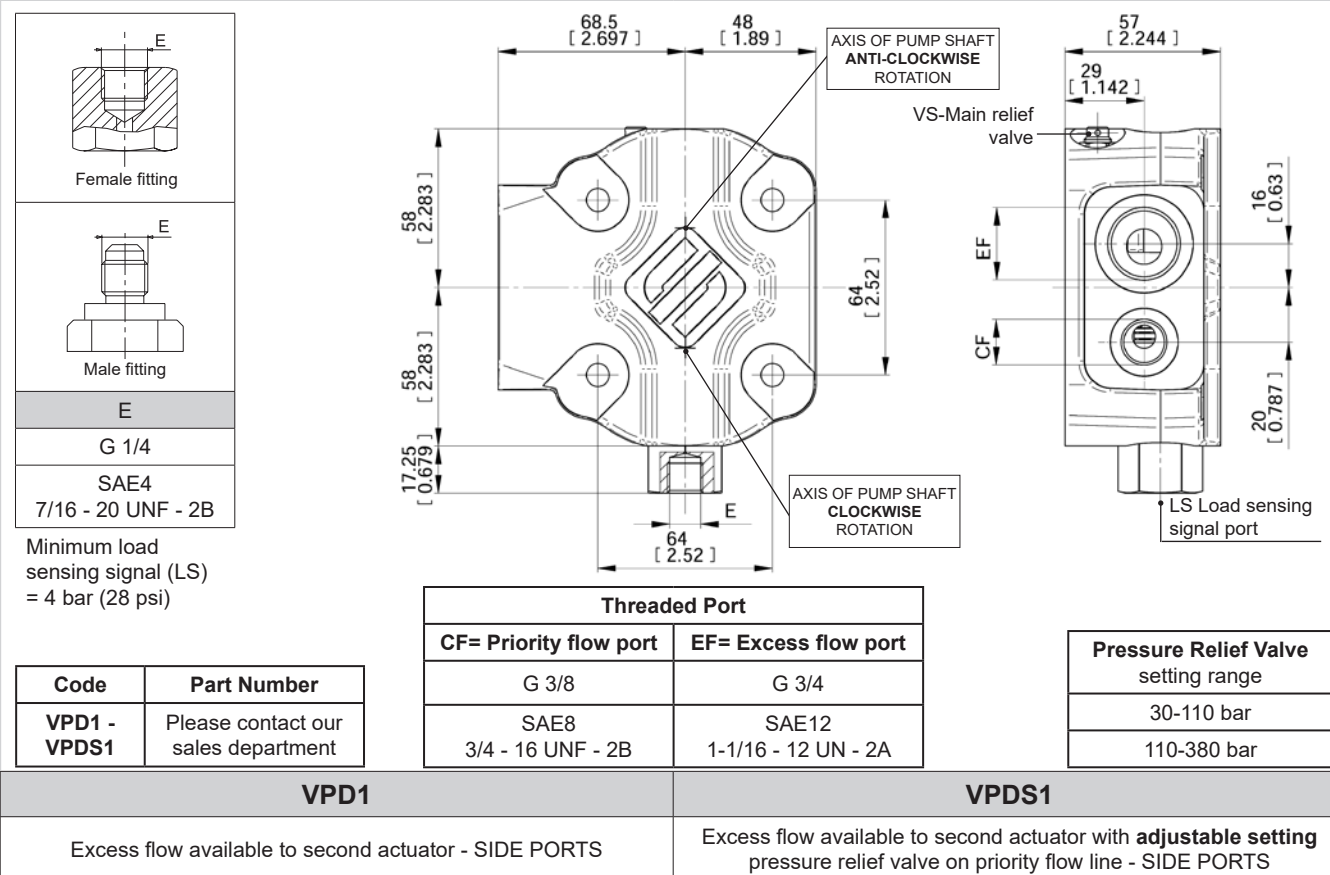
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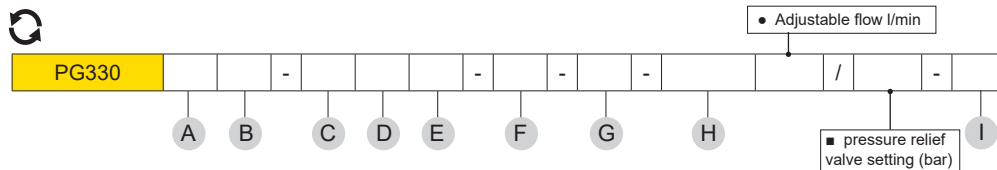
## Pressure Compensated Priority Flow Valve



## Load Sensing Priority Valve



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| A | CODE | DISPLACEMENTS              |                 |
|---|------|----------------------------|-----------------|
|   | 23   | 23.4 cm <sup>3</sup> /rev. | 1.43 cu.in/rev. |
|   | 28   | 28.6 cm <sup>3</sup> /rev. | 1.74 cu.in/rev. |
|   | 34   | 34.4 cm <sup>3</sup> /rev. | 2.1 cu.in/rev.  |
|   | 40   | 40.3 cm <sup>3</sup> /rev. | 2.46 cu.in/rev. |
|   | 47   | 47.5 cm <sup>3</sup> /rev. | 2.89 cu.in/rev. |
|   | 55   | 55.2 cm <sup>3</sup> /rev. | 3.37 cu.in/rev. |
|   | 64   | 64.3 cm <sup>3</sup> /rev. | 3.92 cu.in/rev. |
|   | 72   | 73.4 cm <sup>3</sup> /rev. | 4.48 cu.in/rev. |
|   | 80   | 80.6 cm <sup>3</sup> /rev. | 4.91 cu.in/rev. |

| B | ROTATION       | CODE |
|---|----------------|------|
|   | Clockwise      | D    |
|   | Anti-clockwise | S    |
|   | Reversible     | R    |

| C | PORTS                                           | CODE |
|---|-------------------------------------------------|------|
|   | Flanged ports european standard                 | P    |
|   | Flanged ports SAE J518 Metric thread            | W    |
|   | Flanged ports SAE J518 American standard thread | S    |
|   | Threaded ports GAS (BSPP)                       | G    |
|   | Threaded ports SAE (ODT)                        | R    |

| D | DRIVE SHAFT                                | CODE |
|---|--------------------------------------------|------|
|   | Tapered 1:8                                | 38   |
|   | SAE B splined 13T                          | 55   |
|   | SAE BB splined 15T                         | 56   |
|   | SAE B PARALLEL                             | 87   |
|   | SAE BB PARALLEL                            | 88   |
|   | SAE C 14T-12/24DP Continental Shaft        | 58   |
|   | 8x32x36 UNI 8953 splined Continental Shaft | 67   |
|   | SAE C 14T-12/24DP Continental Shaft        | 57   |
|   | 8x32x36 UNI 8953 splined Continental Shaft | 66   |
|   | SAE C PARALLEL Continental Shaft           | 89   |

| E | MOUNTING FLANGES                                      | CODE |
|---|-------------------------------------------------------|------|
|   | European standard Ø50.8                               | P2   |
|   | SAE B 2-4 BOLTS                                       | S3   |
|   | SAE C 2-4 BOLTS                                       | S4   |
|   | 4 BOLTS FOR ZF GEAR BOX                               | Z2   |
|   | SAE B 2-4 BOLTS - Medium Loads with Outrigger bearing | R3   |
|   | SAE C 2-4 BOLTS - Heavy Loads with Outrigger bearing  | R8   |
|   | 4 BOLTS FOR ZF GEAR with Outrigger bearing            | Z1   |

| F | SEAL                                   | CODE |
|---|----------------------------------------|------|
|   | Buna standard (standard configuration) | -    |
|   | Viton                                  | V    |

| G | PORTS LAYOUT                        | CODE |
|---|-------------------------------------|------|
|   | Side ports (standard configuration) | -    |
|   | Rear ports                          | 1    |
|   | Side ports - Rear ports plugged     | 2    |
|   | Rear ports - Side ports plugged     | 3    |
|   | Side Inlet port - Rear outlet port  | 4    |
|   | Rear Inlet port - Side outlet port  | 5    |

| H | FLANGES AND REAR COVERS                                                     | CODE    |
|---|-----------------------------------------------------------------------------|---------|
|   | Priority flow valve with excess flow to 2nd actuator                        | • VP1   |
|   | Priority flow valve with excess flow to 2nd actuator with main relief valve | ■ VPS1  |
|   | Load sensing priority valve with dinamic signal                             | • VPD1  |
|   | Load sensing priority valve with dinamic signal and main relief valve       | ■ VPDS1 |
|   | Adjustable main relief valve                                                | ■ VS    |
|   | Internal drain valve (Flange)                                               | IDV     |
|   | Lateral drain on P2 (Flange European standard)                              | LD      |

| I | PAINTING                             | CODE |
|---|--------------------------------------|------|
|   | Not painted (standard configuration) | -    |
|   | Black painted RAL 9005               | BP   |

#### How to order Single pump

PG330, displacement (28), clockwise rotation (D), ports European (P), drive shaft (38), mounting flange (P2)= **PG330-28D-P38P2**

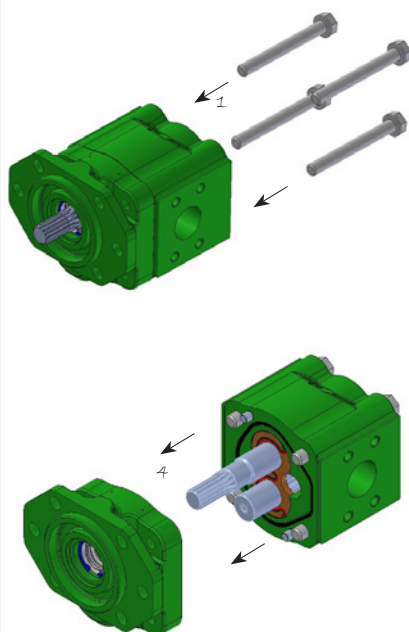
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## Single Pump Changing Rotation Instructions

- !** Keep the working surface cleaned as well as the exterior of the pump before starting and avoid inner contamination of the pump. The pump shown below is a anti - clockwise rotating pump. To achieve clockwise rotation, please read the following instructions carefully.

### ANTI - CLOCKWISE ROTATION

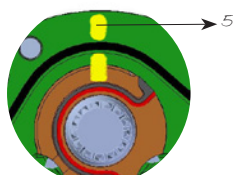


1 - Loosen and fully unscrew the bolts.

2 - Lay the pump on the working area in order to have the mounting flange turned upside.

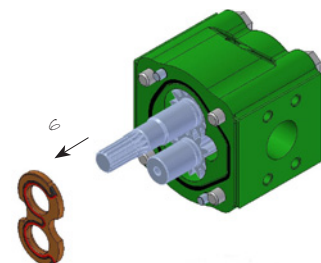
3 - Coat the shaft end with grease to avoid damaging the shaft seal.

4 - Remove the flange and lay it on the working area; verify that the seal is correctly located in the body seat.



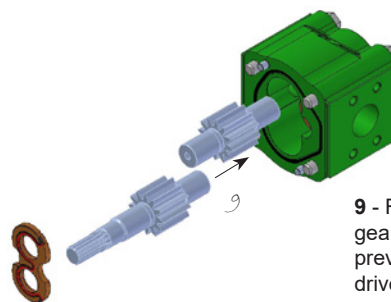
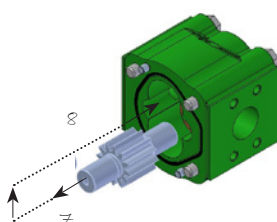
5 - Mark the position of the bushing and eventually of the thrust plates, as well with reference to the body.

6 - Remove the bushing, thrust plate and the driving gear taking care to avoid driven gear axial shifts.

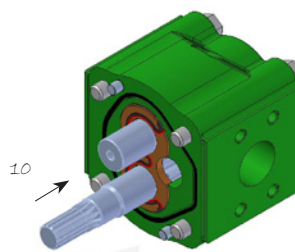


7 - Draw out the driven gear from its housing, taking care to avoid rear cover axial shifts.

8 - Re-locate the driven gear in the position previously occupied by the driving gear.



9 - Re-locate the driving gear in the position previously occupied by the driven gear.



10 - Replace the bushing and thrust plate taking care that:  
- marks are located as on the picture  
- surface containing the seal is visible  
- seal and its protection are correctly located.

11 - Clean the body and mounting flange facing surfaces.

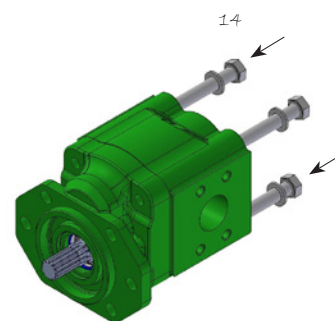
12 - Verify that the two plugs are located in the body.

13 - Refit the mounting flange, turned 180° from its original position.

14 - Replace the bolts and tighten clockwise evenly to an appropriate torque.

15 - Check that the shaft rotates freely.

16 - Mark on the flange the new direction of rotation.



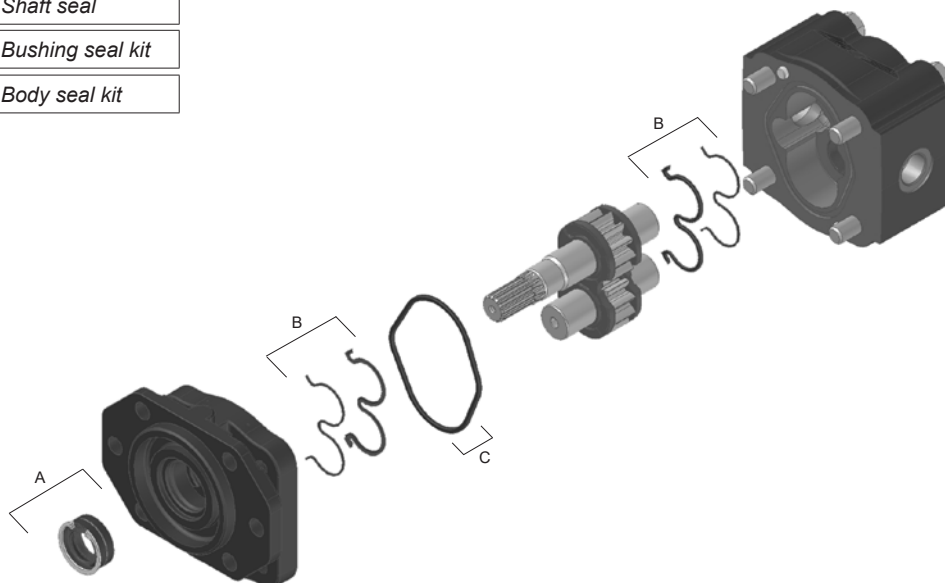
### CLOCKWISE ROTATION





## Unidirectional Pump Seal Spare Parts Kit

|   |                  |
|---|------------------|
| A | Shaft seal       |
| B | Bushing seal kit |
| C | Body seal kit    |



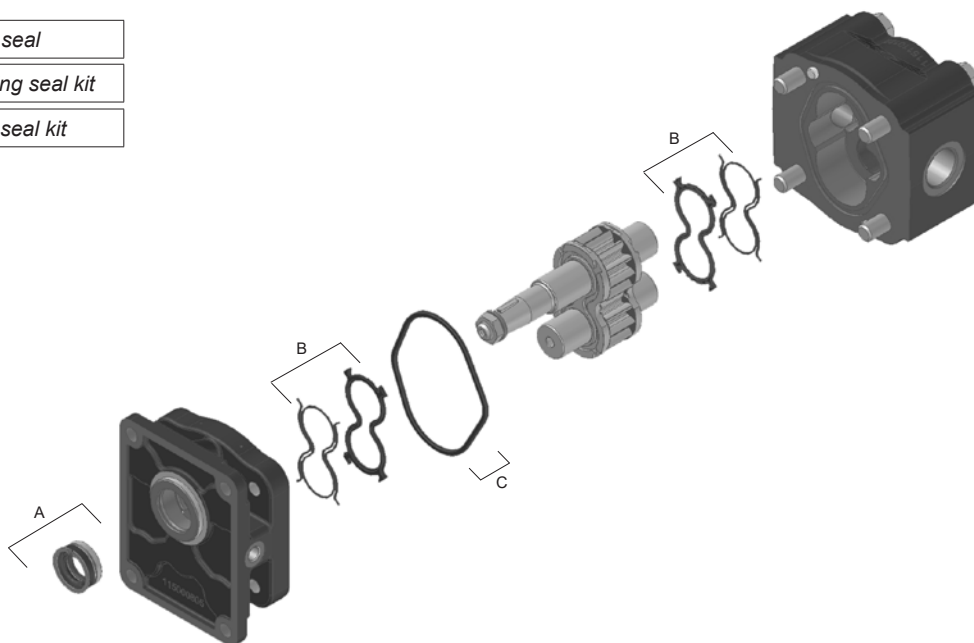
| SHAFT & FLANGE TYPE                  | NBR COMPOUND              |                    | FPM COMPOUND              |                    |
|--------------------------------------|---------------------------|--------------------|---------------------------|--------------------|
|                                      | Complete seal kit (A+B+C) | Shaft seal kit (A) | Complete seal kit (A+B+C) | Shaft seal kit (A) |
| 38P2                                 | Part Number<br>R15170010  |                    | Part Number<br>R15170013  |                    |
|                                      |                           | Drive Shaft        |                           | Drive Shaft        |
| 55S3<br>56S3<br>58S3<br>87S3<br>88S3 | Part Number<br>R15170020  |                    | Part Number<br>R15170023  |                    |
|                                      |                           | Drive Shaft        |                           | Drive Shaft        |
| 58S4                                 | Part Number<br>R15170030  |                    | Part Number<br>R15170031  |                    |
|                                      |                           | Drive Shaft        |                           | Drive Shaft        |
| 67Z2                                 | Part Number<br>R15170430  |                    | Part Number<br>R15170431  |                    |
|                                      |                           | Drive Shaft        |                           | Drive Shaft        |

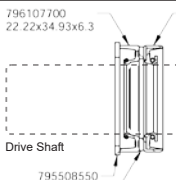
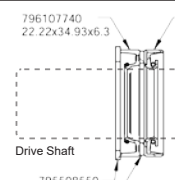
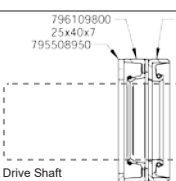
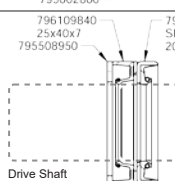
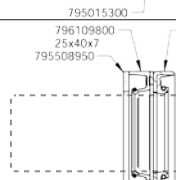
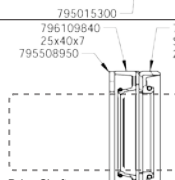
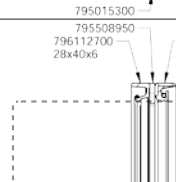
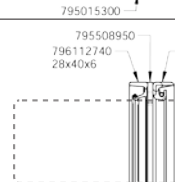
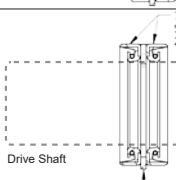
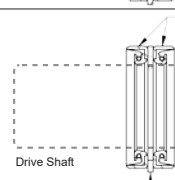
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## Bidirectional Pump Seal Spare Parts Kit

|   |                  |
|---|------------------|
| A | Shaft seal       |
| B | Bushing seal kit |
| C | Body seal kit    |

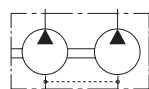


| SHAFT & FLANGE TYPE | NBR COMPOUND              |                                                                                                                                                                                                        | FPM COMPOUND              |                                                                                                                                                                                                          |
|---------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     | Complete seal kit (A+B+C) | Shaft seal kit (A)                                                                                                                                                                                     | Complete seal kit (A+B+C) | Shaft seal kit (A)                                                                                                                                                                                       |
| <b>38P2</b>         | Part Number<br>R15170350  |  <p>796107700<br/>22.22x34.93x6.3<br/>796127100<br/>SBHP 22.22x34.93x6.3<br/>20 bar<br/>795508550<br/>795002800</p> | Part Number<br>R15170360  |  <p>796107740<br/>22.22x34.93x6.3<br/>796127140<br/>SBHP 22.22x34.93x6.3<br/>20 bar<br/>795508550<br/>795002800</p> |
|                     | Part Number<br>R15170370  |  <p>796109800<br/>25x40x7<br/>795508950<br/>796126600<br/>SBHP 25x40x7<br/>20 bar<br/>795015300</p>                 | Part Number<br>R15170380  |  <p>796109840<br/>25x40x7<br/>795508950<br/>796126640<br/>SBHP 25x40x7<br/>20 bar<br/>795015300</p>                 |
| <b>88S3</b>         | Part Number<br>R15170160  |  <p>796109800<br/>25x40x7<br/>795508950<br/>796126700<br/>SBHP 25.4x40x7<br/>20 bar<br/>795015300</p>               | Part Number<br>R15170400  |  <p>796109840<br/>25x40x7<br/>795508950<br/>796126740<br/>SBHP 25.4x40x7<br/>20 bar<br/>795015300</p>               |
|                     | Part Number<br>R15170410  |  <p>795508950<br/>796112700<br/>28x40x6<br/>796126500<br/>SBHP 28x40x7<br/>20 bar</p>                               | Part Number<br>R15170420  |  <p>795508950<br/>796112740<br/>28x40x6<br/>796126540<br/>SBHP 28x40x7<br/>20 bar</p>                               |
| <b>67Z2</b>         | Part Number<br>R15170470  |  <p>796126500<br/>SBHP 28x40x7<br/>20 bar<br/>795508950</p>                                                         | Part Number<br>R15170471  |  <p>796126540<br/>SBHP 28x40x7<br/>20 bar<br/>795508950</p>                                                         |

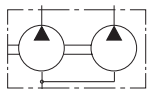
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### PG330 Multiple Pump - Dimensions and Technical Data



**DOUBLE  
GEAR PUMPS**  
with individual inlet port



**DOUBLE  
GEAR PUMPS**  
with common inlet port



Recommended to limit the inflow of the downstream pump at 60 l/min MAX to avoid cavitation. Only for common suction port configuration:  
**Commercial code UA.**

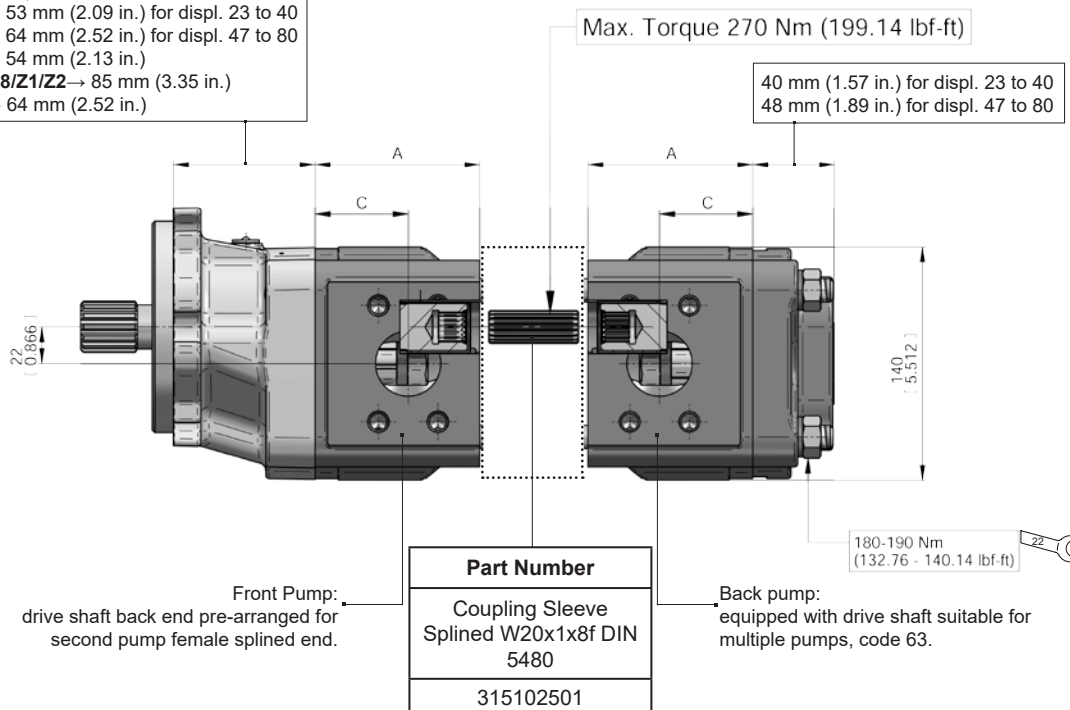
| TYPE       | Displacement         |           | Dimension A |      | Dimension C (Front and Back pump) |      |             |      |               |      | Continuous pressure $p_1$ |       | Intermittent pressure $p_2$ |       | Peak pressure $p_3$ |       | Min. speed at $p_1$ | Max. speed at $p_2$ |
|------------|----------------------|-----------|-------------|------|-----------------------------------|------|-------------|------|---------------|------|---------------------------|-------|-----------------------------|-------|---------------------|-------|---------------------|---------------------|
|            | cm <sup>3</sup> /rev | cu.in/rev | mm          | in   | Type port G-R                     |      | Type port P |      | Type port W-S |      | bar                       | psi   | bar                         | psi   | bar                 | psi   | rpm                 |                     |
|            |                      |           |             |      | mm                                | in   | mm          | in   | mm            | in   |                           |       |                             |       |                     |       |                     |                     |
| PG330 - 23 | 23.4                 | 1.43      | 68          | 2.68 | 35                                | 1.38 | 35          | 1.38 | 33            | 1.30 | 260                       | 3750  | 280                         | 4060  | 300                 | 4350  | 400                 | 3000                |
| PG330 - 28 | 28.6                 | 1.74      | 72          | 2.83 | 38                                | 1.49 | 34          | 1.34 | 36            | 1.42 | 280                       | 4060  | 300                         | 4350  | 320                 | 4650  | 400                 | 3000                |
| PG330 - 34 | 34.4                 | 2.10      | 76.5        | 3.01 | 42.5                              | 1.67 | 37.5        | 1.48 | 40            | 1.57 | 280                       | 4060  | 300                         | 4350  | 320                 | 4650  | 400                 | 3000                |
| PG330 - 40 | 40.3                 | 2.46      | 81          | 3.19 | 47                                | 1.85 | 42          | 1.65 | 44.5          | 1.75 | 260                       | 3750  | 280                         | 4060  | 300                 | 4350  | 400                 | 2700                |
| PG330 - 47 | 47.4                 | 2.89      | 93          | 3.66 | 50                                | 1.97 | 50          | 1.97 | 50            | 1.97 | 280                       | 4060  | 300                         | 4350  | 320                 | 4650  | 400                 | 2700                |
| PG330 - 55 | 55.2                 | 3.37      | 99          | 6.78 | 56                                | 2.20 | 52          | 2.05 | 56            | 2.20 | 260                       | 3750  | 280                         | 4060  | 300                 | 4350  | 400                 | 2700                |
|            |                      |           |             |      |                                   |      |             |      |               |      | 230*                      | 3335* | 250*                        | 3625* | 270*                | 3915* |                     |                     |
| PG330 - 64 | 64.3                 | 3.92      | 106         | 7.05 | 58                                | 2.28 | 58          | 2.28 | 58            | 2.28 | 240                       | 3480  | 260                         | 3750  | 280                 | 4060  | 350                 | 2500                |
|            |                      |           |             |      |                                   |      |             |      |               |      | 200*                      | 2900* | 220*                        | 3190* | 240*                | 3480* |                     |                     |
| PG330 - 72 | 73.4                 | 4.48      | 113         | 7.33 | 61                                | 2.40 | 61          | 2.40 | 61            | 2.40 | 220                       | 3190  | 240                         | 3480  | 260                 | 3750  | 350                 | 2500                |
|            |                      |           |             |      |                                   |      |             |      |               |      | 170*                      | 2465* | 190*                        | 2755* | 210*                | 3045* |                     |                     |
| PG330 - 80 | 80.6                 | 4.91      | 119         | 7.57 | 65                                | 2.56 | 65          | 2.56 | 65            | 2.56 | 200                       | 2900  | 220                         | 3190  | 240                 | 3480  | 350                 | 2500                |

\*Values of pressure with configuration **with Shaft 38-Flange P2** on the displacement 55-64-72, due to max Torque of 250 Nm.  
**Displacement 80 not available.**



Max Speed must be lowered by 10% for system working continuously at  $p_1$  pressure.  
Max pressure must be lowered by 10% for birectional pump.

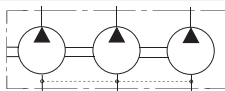
For flanges code:  
**S3**→ 53 mm (2.09 in.) for displ. 23 to 40  
64 mm (2.52 in.) for displ. 47 to 80  
**P2**→ 54 mm (2.13 in.)  
**S4/R8/Z1/Z2**→ 85 mm (3.35 in.)  
**R3**→ 64 mm (2.52 in.)



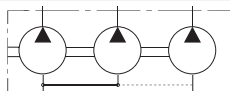
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## PG330 Triple Pump - Dimensions and Technical Data



**TRIPLE  
GEAR PUMPS**  
with individual inlet port

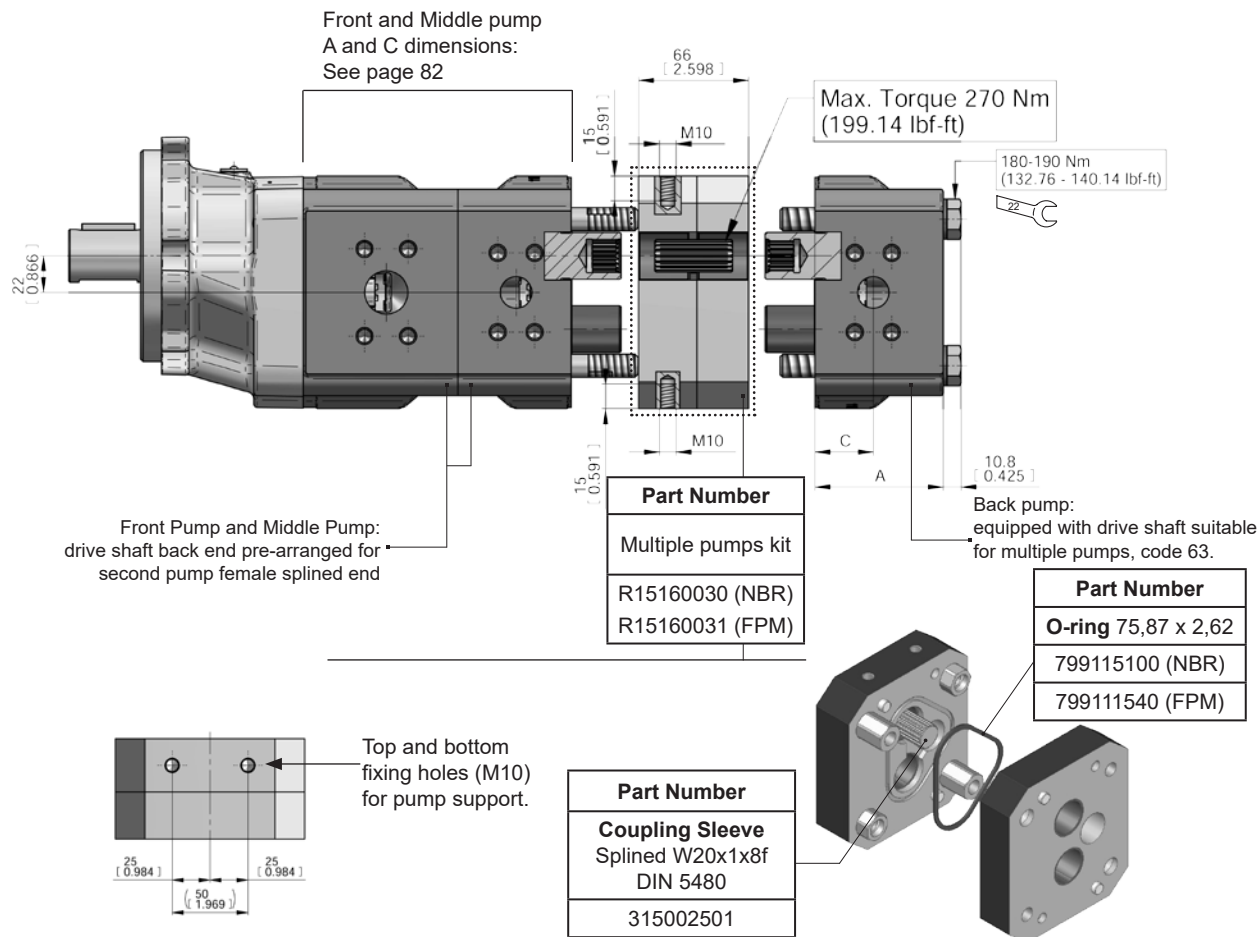


**TRIPLE  
GEAR PUMPS**  
with common inlet port

| TYPE       | Displacement         |           | Dimension A (Back pump) |      | Dimension C (Back pump) |      | Continuous pressure $p_1$ |       | Intermittent pressure $p_2$ |       | Peak pressure $p_3$ |       | Min. speed at $p_1$ | Max. speed at $p_2$ |
|------------|----------------------|-----------|-------------------------|------|-------------------------|------|---------------------------|-------|-----------------------------|-------|---------------------|-------|---------------------|---------------------|
|            | cm <sup>3</sup> /rev | cu.in/rev | mm                      | in   | mm                      | in   | bar                       | psi   | bar                         | psi   | bar                 | psi   | rpm                 |                     |
| PG330 - 23 | 23.4                 | 1.43      | 77                      | 3.03 | 35                      | 1.38 | 260                       | 3750  | 280                         | 4060  | 300                 | 4350  | 400                 | 3000                |
| PG330 - 28 | 28.6                 | 1.74      | 81                      | 3.19 | 38                      | 1.49 | 280                       | 4060  | 300                         | 4350  | 320                 | 4650  | 400                 | 3000                |
| PG330 - 34 | 34.4                 | 2.10      | 85.5                    | 3.36 | 42.5                    | 1.67 | 280                       | 4060  | 300                         | 4350  | 320                 | 4650  | 400                 | 3000                |
| PG330 - 40 | 40.3                 | 2.46      | 90                      | 3.54 | 47                      | 1.85 | 260                       | 3750  | 280                         | 4060  | 300                 | 4350  | 400                 | 2700                |
| PG330 - 47 | 47.4                 | 2.89      | 101.5                   | 3.40 | 50                      | 1.97 | 280                       | 4060  | 300                         | 4350  | 320                 | 4650  | 400                 | 2700                |
| PG330 - 55 | 55.2                 | 3.37      | 107.5                   | 4.23 | 56                      | 2.20 | 260                       | 3750  | 280                         | 4060  | 300                 | 4350  | 400                 | 2700                |
|            |                      |           |                         |      |                         |      | 230*                      | 3335* | 250*                        | 3625* | 270*                | 3915* |                     |                     |
| PG330 - 64 | 64.3                 | 3.92      | 114.5                   | 4.51 | 58                      | 2.28 | 240                       | 3480  | 260                         | 3750  | 280                 | 4060  | 350                 | 2500                |
|            |                      |           |                         |      |                         |      | 200*                      | 2900* | 220*                        | 3190* | 240*                | 3480* |                     |                     |
| PG330 - 72 | 73.4                 | 4.48      | 121.5                   | 4.78 | 61                      | 2.40 | 220                       | 3190  | 240                         | 3480  | 260                 | 3750  | 350                 | 2500                |
|            |                      |           |                         |      |                         |      | 170*                      | 2465* | 190*                        | 2755* | 210*                | 3045* |                     |                     |
| PG330 - 80 | 80.6                 | 4.91      | 127.5                   | 5.02 | 65                      | 2.56 | 200                       | 2900  | 220                         | 3190  | 240                 | 3480  | 350                 | 2500                |

\*Values of pressure with configuration **with Shaft 38-Flange P2** on the displacement 55-64-72, due to max Torque of 250 Nm.  
**Displacement 80 not available.**

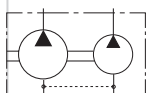
ⓘ **Max Speed must be lowered by 10% for system working continuously at  $p_1$  pressure.**  
**Max pressure must be lowered by 10% for birectional pump.**



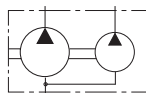
EO.151.0423.14.001M01



### PG330 with Pump 2PE or 2PGE piggy back pump - Dimensions



**MULTIPLE  
GEAR PUMPS  
with individual inlet port**



**MULTIPLE  
GEAR PUMPS  
with common inlet port**



Recommended to limit the inflow of the downstream pump at 30 l/min MAX to avoid cavitation. Only for common suction port configuration:  
**Commercial code UA.**

| TYPE       | Displacement |           | Dimension A |      | Dimension C<br>(Front and Back pump) |      |             |      |               |      | TYPE        | Displacement |           | Dimension A<br>(2PGE-2PE) |       | Dimension C<br>(2PGE-2PE) |       |      |
|------------|--------------|-----------|-------------|------|--------------------------------------|------|-------------|------|---------------|------|-------------|--------------|-----------|---------------------------|-------|---------------------------|-------|------|
|            | cm³/rev      | cu.in/rev | mm          | in   | Type port G-R                        |      | Type port P |      | Type port W-S |      |             | cm³/rev      | cu.in/rev | mm                        | in    | mm                        | in    |      |
|            |              |           |             |      | mm                                   | in   | mm          | in   | mm            | in   |             |              |           |                           |       |                           |       |      |
| PG330 - 23 | 23.4         | 1.43      | 72          | 2.83 | 35                                   | 1.38 | 35          | 1.38 | 33            | 1.30 | -           | 2PE - 3.2    | 3.2       | 0.19                      | 47.1  | 1.83                      | 23.55 | 0.93 |
| PG330 - 28 | 28.6         | 1.74      | 76          | 2.99 | 38                                   | 1.49 | 34          | 1.34 | 36            | 1.42 | -           | 2PE - 3.9    | 3.9       | 0.24                      |       |                           |       |      |
|            |              |           |             |      |                                      |      |             |      |               |      | -           | 2PE - 4.5    | 4.6       | 0.27                      |       |                           |       |      |
| PG330 - 34 | 34.4         | 2.10      | 80.5        | 3.17 | 42.5                                 | 1.67 | 37.5        | 1.48 | 40            | 1.57 | 2PGE - 6.5  | 2PE - 6.5    | 6.5       | 0.40                      | 49.95 | 1.97                      | 25    | 0.98 |
| PG330 - 40 | 40.3         | 2.46      | 85          | 3.35 | 47                                   | 1.85 | 42          | 1.65 | 44.5          | 1.75 | 2PGE - 8.3  | 2PE - 8.3    | 8.2       | 0.50                      | 52.8  | 2.07                      | 26.4  | 1.04 |
|            |              |           |             |      |                                      |      |             |      |               |      | -           | 2PE - 10.5   | 10.6      | 0.65                      | 56.3  | 2.35                      | 28.15 | 1.11 |
| PG330 - 47 | 47.4         | 2.89      | 96          | 3.78 | 50                                   | 1.97 | 50          | 1.97 | 50            | 1.97 | 2PGE - 11.3 | 2PE - 11.3   | 11.5      | 0.68                      | 59.7  | 2.35                      | 29.75 | 1.17 |
| PG330 - 55 | 55.2         | 3.37      | 102         | 4.02 | 56                                   | 2.20 | 52          | 2.05 | 56            | 2.20 | -           | 2PE - 12.5   | 12.7      | 0.77                      |       |                           |       |      |
|            |              |           |             |      |                                      |      |             |      |               |      | 2PGE - 13.8 | 2PE - 13.8   | 13.8      | 0.84                      | 63.5  | 2.5                       | 31.75 | 1.25 |
| PG330 - 64 | 64.3         | 3.92      | 109         | 4.29 | 58                                   | 2.28 | 58          | 2.28 | 58            | 2.28 | 2PGE - 16   | 2PE - 16     | 16.6      | 1.01                      | 67.5  | 2.65                      | 33.75 | 1.25 |
| PG330 - 72 | 73.4         | 4.48      | 116         | 4.57 | 61                                   | 2.40 | 61          | 2.40 | 61            | 2.40 | 2PGE - 19   | 2PE - 19     | 19.4      | 1.15                      | 75.6  | 2.97                      | 37.80 | 1.49 |
|            |              |           |             |      |                                      |      |             |      |               |      | 2PGE - 22.5 | 2PE - 22.5   | 22.9      | 1.37                      | 81    | 3.19                      | 40.5  | 1.59 |
| PG330 - 80 | 80.6         | 4.91      | 122         | 4.80 | 65                                   | 2.56 | 65          | 2.56 | 65            | 2.56 | 2PGE - 26   | 2PE - 26     | 25.8      | 1.58                      | 86.8  | 3.42                      | 43.4  | 1.71 |

2PE and 2PGE can be single or multiple and/or with built in valve in the rear cover.

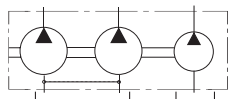
Available AS configuration

#### Part Number

Multiple pumps kit with separated stages for different fluid (2 tanks) - **Code AS**

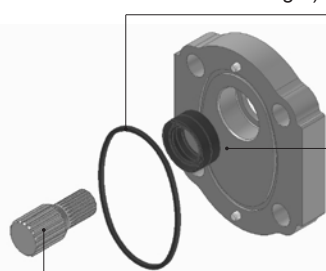
R15190010 (NBR)

R15190011 (FPM)



**MULTIPLE GEAR PUMPS  
with separated stages**

(Example: **Code AS2**= Separated inlet between second and third stage.)



#### Part Number

##### Body seal

312206409 (NBR)

312206411 (FPM)

#### Part Number

##### Shaft seal

19,05x28,58x6,3

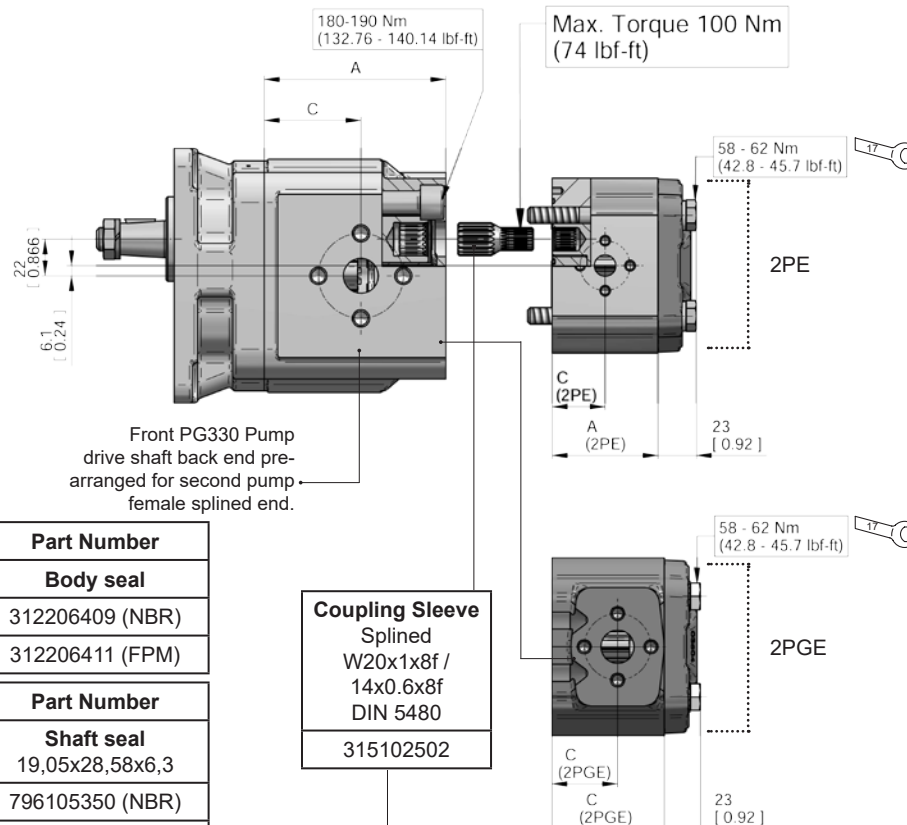
796105350 (NBR)

796105340 (FPM)

#### Coupling Sleeve

Splined  
W20x1x8f /  
14x0.6x8f  
DIN 5480

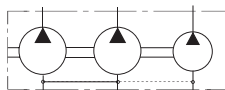
315102502



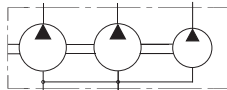
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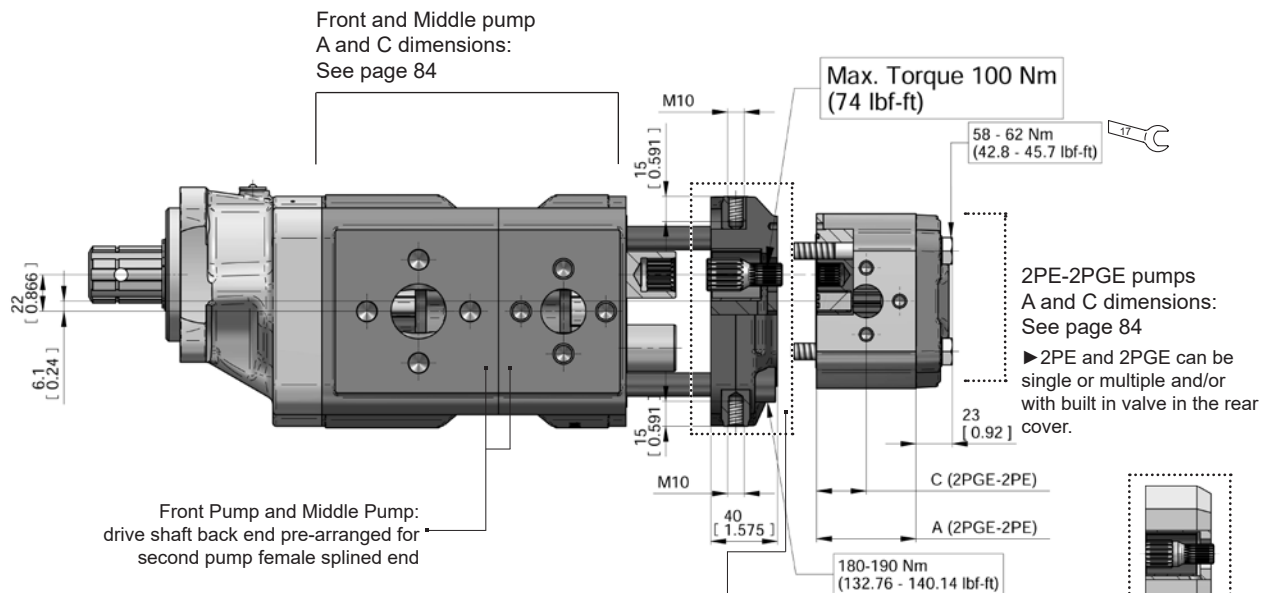
## PG330 Multiple with Pump 2PE or 2PGE piggy back pump - Dimensions



**MULTIPLE  
GEAR PUMPS**  
with individual inlet port



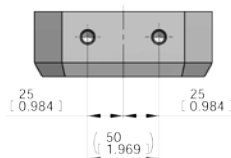
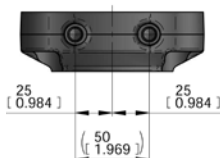
**MULTIPLE  
GEAR PUMPS**  
with common inlet port on first two stages



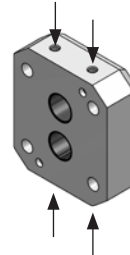
| Part Number                      |                                  |
|----------------------------------|----------------------------------|
| Multiple pumps kit               |                                  |
| R15160050 (Displ. from 23 to 40) | R15160060 (Displ. from 47 to 80) |



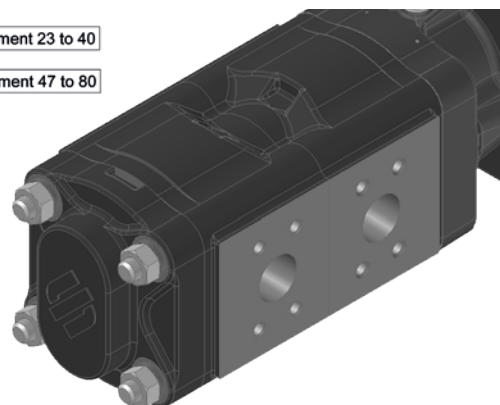
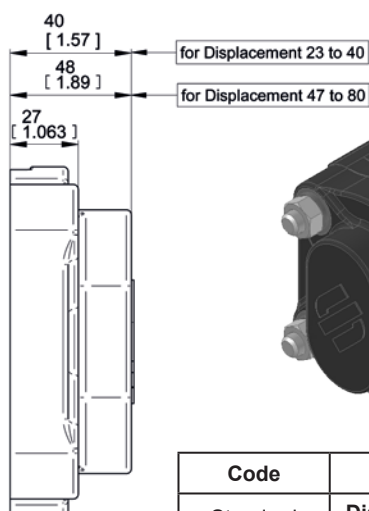
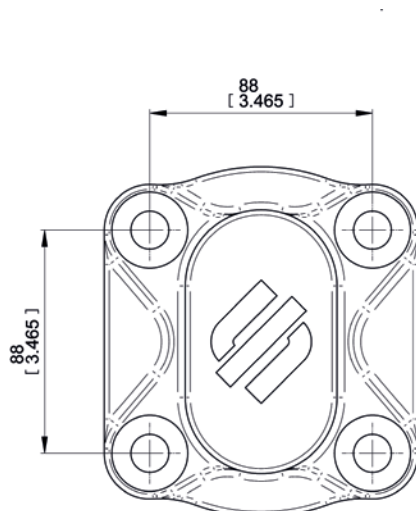
Top and bottom  
fixing holes (M10)  
for pump support.



Top and bottom  
fixing holes (M10)  
for pump support.

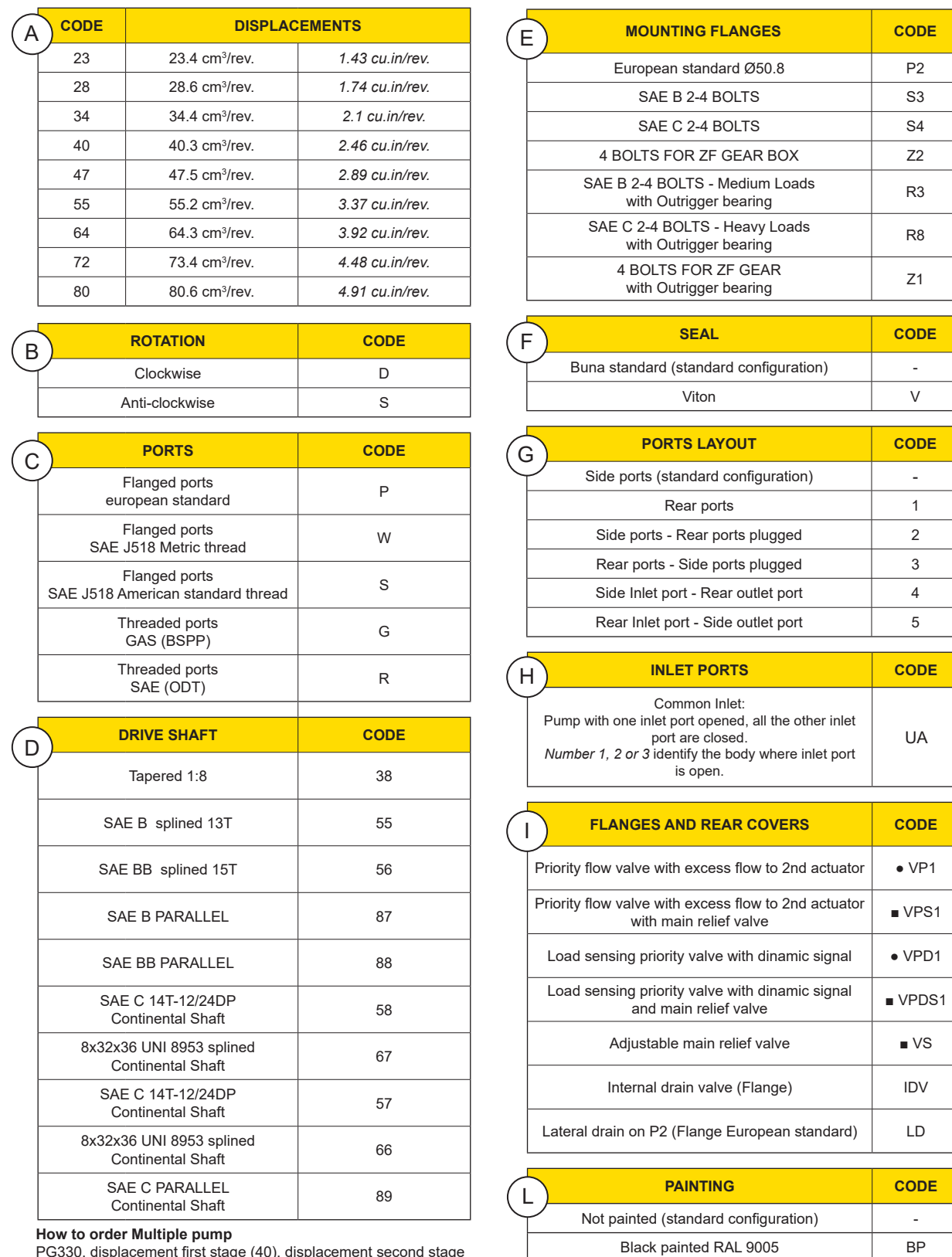


## Rear Cover - Dimensions

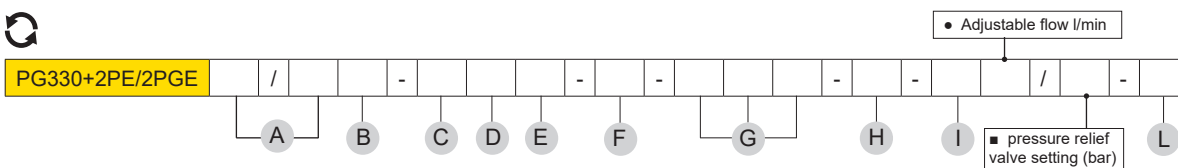


| Code           | Part Number          |                      |
|----------------|----------------------|----------------------|
|                | Displ. from 23 to 40 | Displ. from 47 to 80 |
| Standard Cover | R15003501            | R15003508            |

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PG330, displacement first stage (40), displacement second stage (28), clockwise rotation (D), ports European (P), drive shaft (38), mounting flange (P2)= **PG330-40/28D-P38P2**



| A | CODE | DISPLACEMENTS                 |
|---|------|-------------------------------|
|   | 23   | 23.4 cm³/rev. 1.43 cu.in/rev. |
|   | 28   | 28.6 cm³/rev. 1.74 cu.in/rev. |
|   | 34   | 34.4 cm³/rev. 2.1 cu.in/rev.  |
|   | 40   | 40.3 cm³/rev. 2.46 cu.in/rev. |
|   | 47   | 47.5 cm³/rev. 2.89 cu.in/rev. |
|   | 55   | 55.2 cm³/rev. 3.37 cu.in/rev. |
|   | 64   | 64.3 cm³/rev. 3.92 cu.in/rev. |
|   | 72   | 73.4 cm³/rev. 4.48 cu.in/rev. |
|   | 80   | 80.6 cm³/rev. 4.91 cu.in/rev. |

| B | ROTATION       | CODE |
|---|----------------|------|
|   | Clockwise      | D    |
|   | Anti-clockwise | S    |

| C | PORTS                                           | CODE |
|---|-------------------------------------------------|------|
|   | Flanged ports european standard                 | P    |
|   | Flanged ports SAE J518 Metric thread            | W    |
|   | Flanged ports SAE J518 American standard thread | S    |
|   | Threaded ports GAS (BSPP)                       | G    |
|   | Threaded ports SAE (ODT)                        | R    |

| D | DRIVE SHAFT                                | CODE |
|---|--------------------------------------------|------|
|   | Tapered 1:8                                | 38   |
|   | SAE B splined 13T                          | 55   |
|   | SAE BB splined 15T                         | 56   |
|   | SAE B PARALLEL                             | 87   |
|   | SAE BB PARALLEL                            | 88   |
|   | SAE C 14T-12/24DP Continental Shaft        | 58   |
|   | 8x32x36 UNI 8953 splined Continental Shaft | 67   |
|   | SAE C 14T-12/24DP Continental Shaft        | 57   |
|   | 8x32x36 UNI 8953 splined Continental Shaft | 66   |
|   | SAE C PARALLEL Continental Shaft           | 89   |

**How to order Multiple pump with 2PE or 2PGE**

PG330, displacement first stage (47), displacement second stage (28), clockwise rotation (D), ports European (P), drive shaft (55), mounting flange (S3) + 2PE, displacement (8.3), ports European (P)= PG330-47/28D-P55S3-2PE8.3P

| E | MOUNTING FLANGES                                      | CODE |
|---|-------------------------------------------------------|------|
|   | European standard Ø50.8                               | P2   |
|   | SAE B 2-4 BOLTS                                       | S3   |
|   | SAE C 2-4 BOLTS                                       | S4   |
|   | 4 BOLTS FOR ZF GEAR BOX                               | Z2   |
|   | SAE B 2-4 BOLTS - Medium Loads WITH OUTRIGGER BEARING | R3   |
|   | SAE C 2-4 BOLTS - Heavy Loads with Outtrigger bearing | R8   |
|   | 4 BOLTS FOR ZF GEAR with Outtrigger bearing           | Z1   |

| F | SEAL                                   | CODE |
|---|----------------------------------------|------|
|   | Buna standard (standard configuration) | -    |
|   | Viton                                  | V    |

| G | COMBINATION WITH 2PE or 2PGE                                                                                                                                                                                                                                                                                                                          |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | <b>2PE Piggy back configuration:</b> <ul style="list-style-type: none"> <li>Displacement at page 84</li> <li>Port type See 2PE Technical catalogue at page 35</li> </ul> <b>2PGE Piggy back configuration:</b> <ul style="list-style-type: none"> <li>Displacement at page 84</li> <li>Port type See 2PE Technical catalogue at page 21/22</li> </ul> |

| H | INLET PORTS                                                                                                                                            | CODE |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------|------|
|   | Separated stages:<br>Pump with separated stages for different fluid (2 tanks).<br>Number 1, 2 or 3 identify the body where Kit AS is mounted.          | AS   |
|   | Common Inlet:<br>Pump with one inlet port opened, all the other inlet port are closed.<br>Number 1, 2 or 3 identify the body where inlet port is open. | UA   |

| I | FLANGES AND REAR COVERS                                                     | CODE  |
|---|-----------------------------------------------------------------------------|-------|
|   | Priority flow valve with excess flow to 2nd actuator                        | VP1   |
|   | Priority flow valve with excess flow to 2nd actuator with main relief valve | VPS1  |
|   | Load sensing priority valve with dinamic signal                             | VPD1  |
|   | Load sensing priority valve with dinamic signal and main relief valve       | VPDS1 |
|   | Adjustable main relief valve                                                | VS    |
|   | Internal drain valve (Flange)                                               | IDV   |
|   | Lateral drain on P2 (Flange European standard)                              | LD    |

| L | PAINTING                             | CODE |
|---|--------------------------------------|------|
|   | Not painted (standard configuration) | -    |
|   | Black painted RAL 9005               | BP   |

## Note



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# PG331

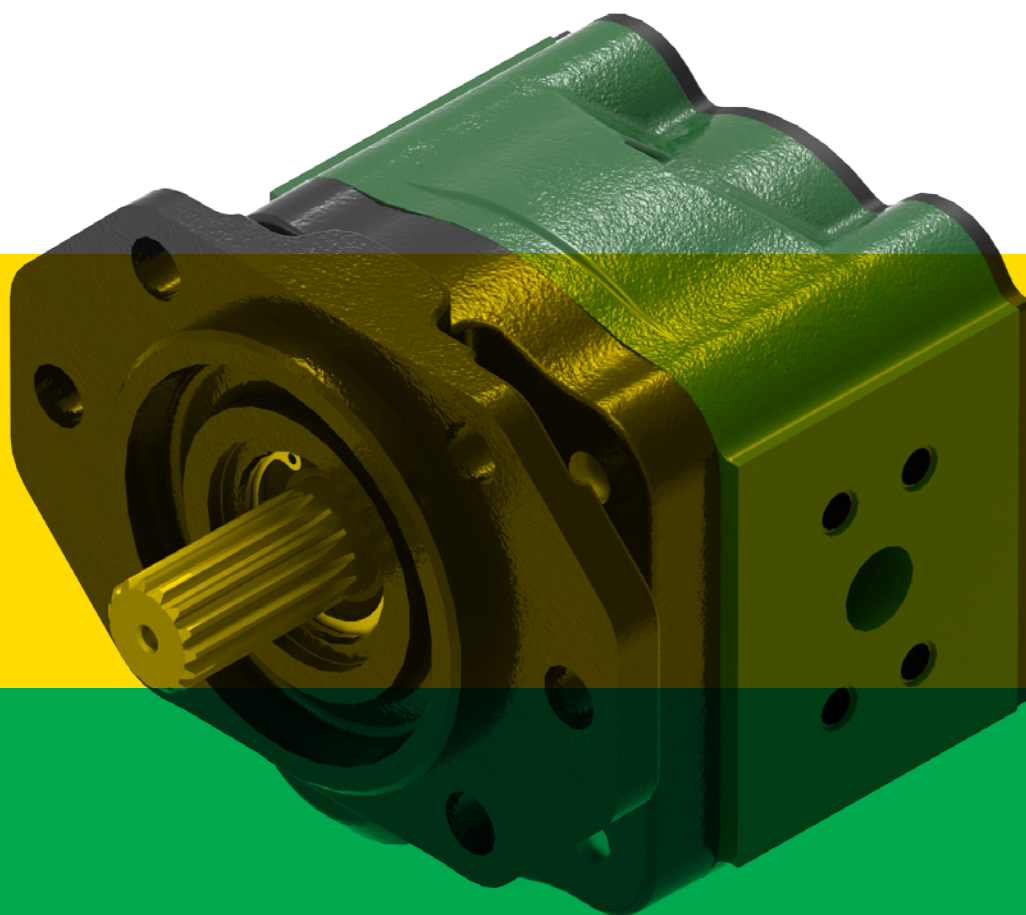
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## Cast Iron Gear Pumps

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### Product Manual

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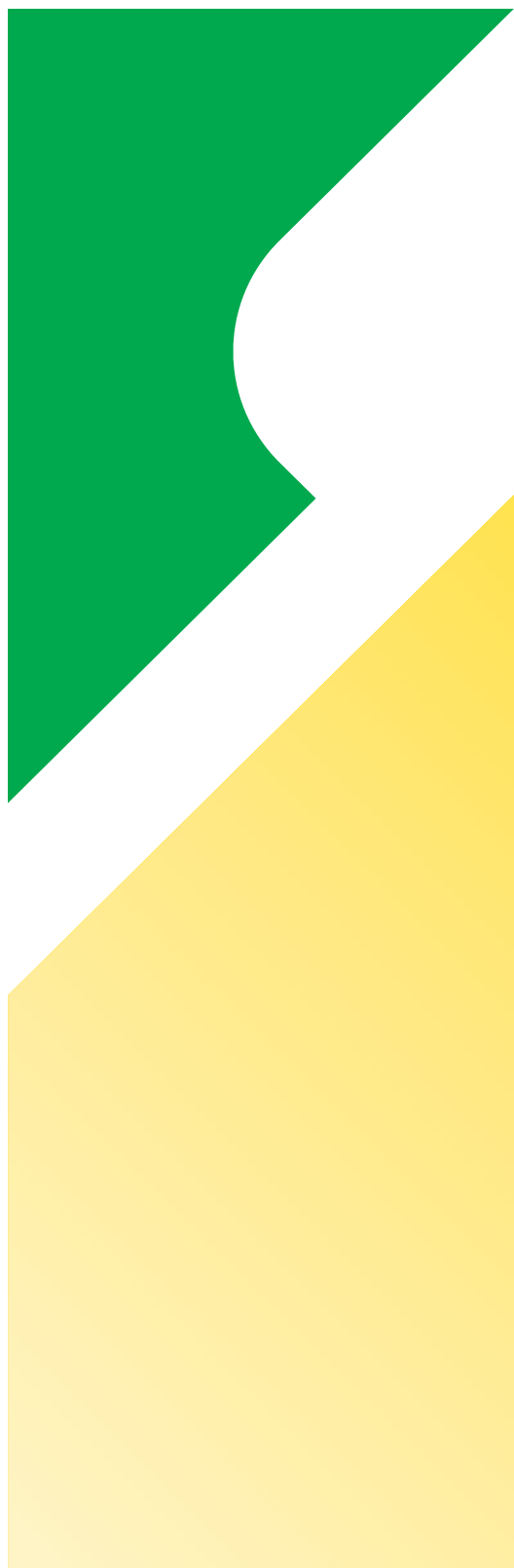
COMPANY WITH  
QUALITY SYSTEM  
CERTIFIED BY DNV  
ISO 9001

**salami**   
FLUID POWER SYSTEMS <sup>®</sup>

**Final revised edition - April 2023**

The data in this catalogue refers to the standard product. The policy of Salami S.p.A. consists of a continuous improvement of its products. It reserves the right to change the specifications of the different products whenever necessary and without giving prior information.

***If any doubts, please contact our sales department.***



EO.152.0423.05.00IM02

## Contents

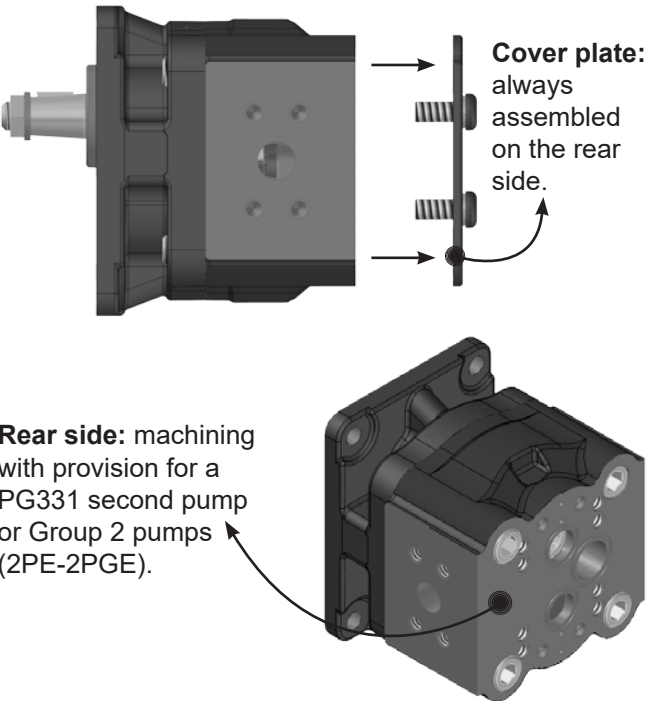
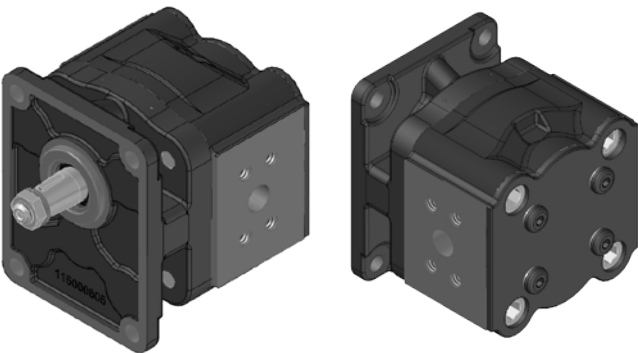
|                                                                         |     |
|-------------------------------------------------------------------------|-----|
| Features .....                                                          | 92  |
| Assembling Multiple pumps.....                                          | 94  |
| Assembling Triple pumps .....                                           | 99  |
| Assembling Quadruple pumps .....                                        | 102 |
| Assembling Single pump with 2PE .....                                   | 104 |
| Assembling Single pump with 2PGE .....                                  | 108 |
| Assembling multiple pump with 2PE .....                                 | 112 |
| Replacing mounting flange with outrigger bearing ..                     | 115 |
| HOW TO ORDER SINGLE PUMP .....                                          | 117 |
| Configuration - P38P2 .....                                             | 118 |
| Configuration - G55S3 .....                                             | 119 |
| Configuration - R55S3 .....                                             | 120 |
| Configuration - W56S3 .....                                             | 121 |
| Configuration - P63-R.....                                              | 122 |
| Configuration - G63-R .....                                             | 123 |
| Configuration - R63-R.....                                              | 124 |
| Configuration - W63-R.....                                              | 125 |
| Appendix A - Tie rods length calculation (Multiple pump) .....          | 126 |
| Appendix B - Tie rods length calculation and Screws (Triple pump) ..... | 127 |
| Appendix C - Tie rods length calculation (Quadruple pump) .....         | 128 |
| Appendix D - Screws (Multiple PG331+2PE) .....                          | 129 |
| Appendix E - (Triple pump) .....                                        | 130 |
| Appendix F - (Quadruple pump) .....                                     | 133 |



Features

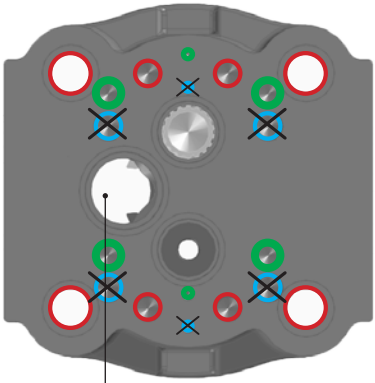
It's never been so easy to build multiple stage pumps, until the PG331 Series arrived in the market. Unlike the PG330, the PG331 Series has been designed to provide Salami's Distributors the possibility of an easy build of multiple stage pumps, without compromising the compact design of the PG330 Series.

To accomplish this flexible option, in the rear side of the gear housing, the PG331 Series employs all the machining required for an easy fit of a second PG331 as well as a 2PE or 2PGE Series second pump. Cost effective dedicated assembling kits are provided for all the different multiple stage pump assemblies.



| Code                                                                                                   | Part Number |                             |
|--------------------------------------------------------------------------------------------------------|-------------|-----------------------------|
| <br>Cover Plate Kit |             | 1) 2x O-Ring 2093           |
|                                                                                                        |             | 2) 1x Cover plate           |
|                                                                                                        |             | 3) 4x Washer DIN7980        |
|                                                                                                        |             | 4) 4x Screw M10x25 ISO 7380 |
|                                                                                                        |             | 5) 1x O-Ring 2118           |

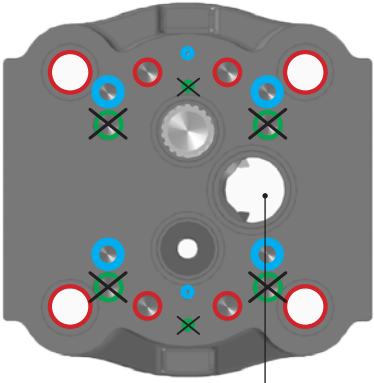
Anti - clockwise rotation



REAR SIDE MACHINING

-  Machining for 2PE-2PGE assembling **Clockwise rotation**
-  Machining for 2PE-2PGE assembling **Anti Clockwise rotation**
-  Machining for PG331 assembling

Clockwise rotation

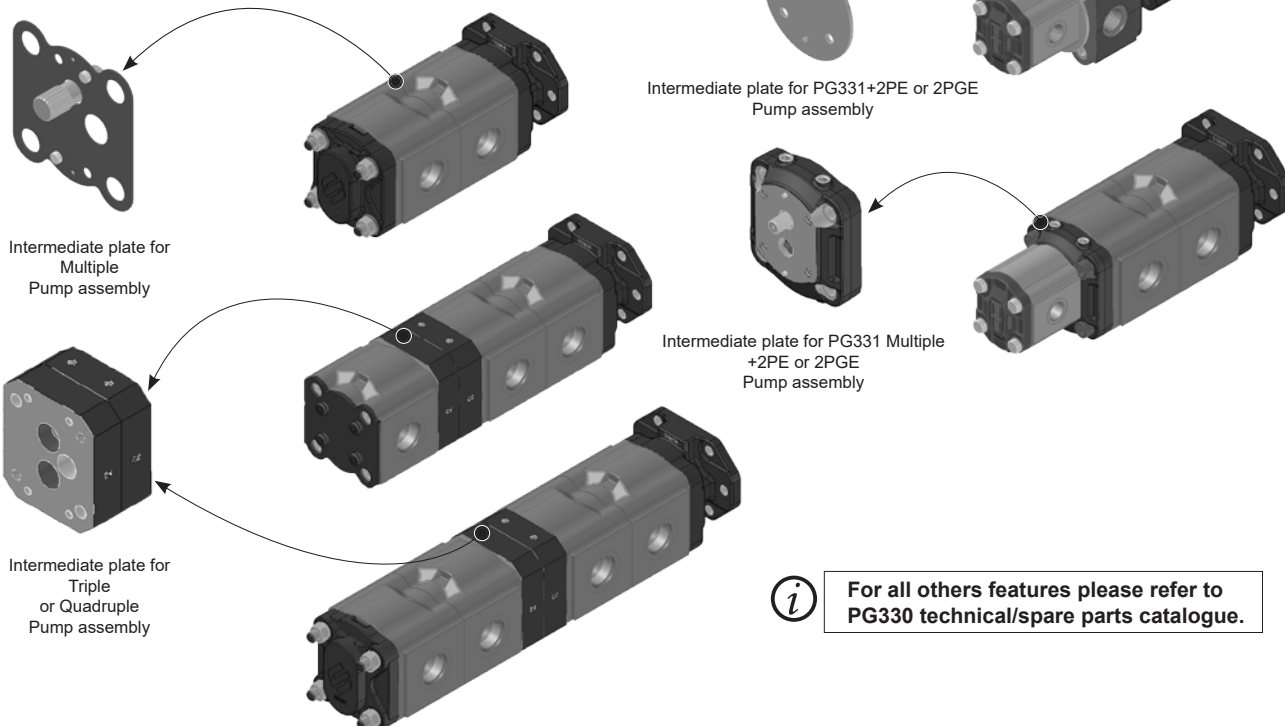


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## Features

**Intermediate plates:** by replacing the rear cover code R15200004 you can obtain multiple pumps with different displacements and pump groups.



For all others features please refer to PG330 technical/spare parts catalogue.

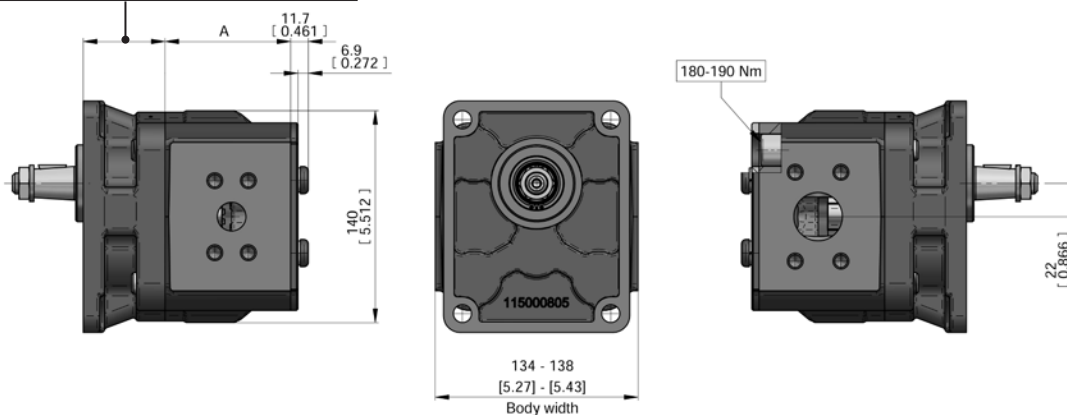
For flanges code:

**S3** → 53 mm (2.09 in.) for displ. 23 to 40  
64 mm (2.52 in.) for displ. 47 to 80

**P2** → 54 mm (2.13 in.)

**S4/R8/Z1/Z2** → 85 mm (3.35 in.)

**R3** → 64 mm (2.52 in.)



| TYPE       | Displacement         |           | Dimension A |      |
|------------|----------------------|-----------|-------------|------|
|            | cm <sup>3</sup> /rev | cu.in/rev | mm          | in   |
| PG331 - 23 | 23.4                 | 1.43      | 70          | 2.75 |
| PG331 - 28 | 28.6                 | 1.74      | 74          | 2.91 |
| PG331 - 34 | 34.4                 | 2.10      | 78.5        | 3.10 |
| PG331 - 40 | 40.3                 | 2.46      | 83          | 3.27 |

| TYPE       | Displacement         |           | Dimension A |      |
|------------|----------------------|-----------|-------------|------|
|            | cm <sup>3</sup> /rev | cu.in/rev | mm          | in   |
| PG331 - 47 | 47.4                 | 2.89      | 94.5        | 3.72 |
| PG331 - 55 | 55.2                 | 3.37      | 100.5       | 3.96 |
| PG331 - 64 | 64.3                 | 3.92      | 107.5       | 4.23 |
| PG331 - 72 | 73.4                 | 4.48      | 114.5       | 4.50 |
| PG331 - 80 | 80.6                 | 4.91      | 120.5       | 4.74 |

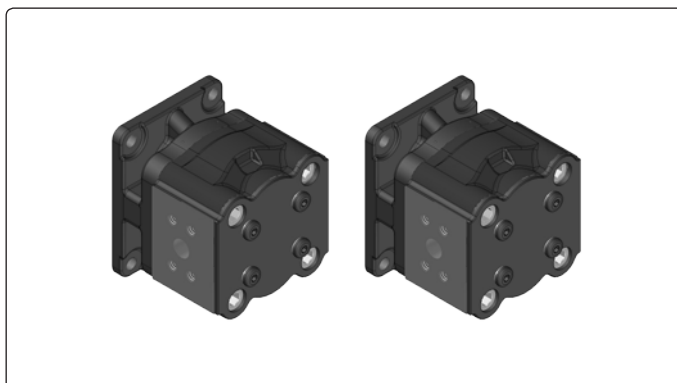


### Assembling Multiple pumps

#### What you need from stock

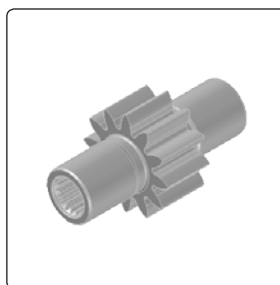
➔ **2x PG331\*\*D Single Pumps**  
(with requested cc/rev)

| Part Number                            |
|----------------------------------------|
| see configurations<br>at pages 118-121 |



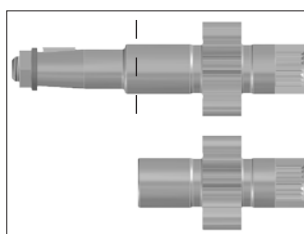
➔ **1x Drive shaft for rear pump**  
(with same cc/rev)

| Part Number     |
|-----------------|
| see table below |



Drive shaft for rear pump dimensions

| MODELLO | A     | B    | C    | D    | CODICE      |
|---------|-------|------|------|------|-------------|
| 23      | 91    | 18   | 36.5 | 36.5 | 3150 003 41 |
| 28      | 95    | 22   | 36.5 | 36.5 | 3150 003 42 |
| 34      | 99.5  | 26.5 | 36.5 | 36.5 | 3150 003 43 |
| 40      | 104   | 31   | 36.5 | 36.5 | 3150 003 44 |
| 47      | 121.5 | 36.5 | 42.5 | 42.5 | 3150 003 45 |
| 55      | 127.5 | 42.5 | 42.5 | 42.5 | 3150 003 46 |
| 64      | 134.5 | 49.5 | 42.5 | 42.5 | 3150 003 47 |
| 72      | 141.5 | 56.5 | 42.5 | 42.5 | 3150 003 48 |

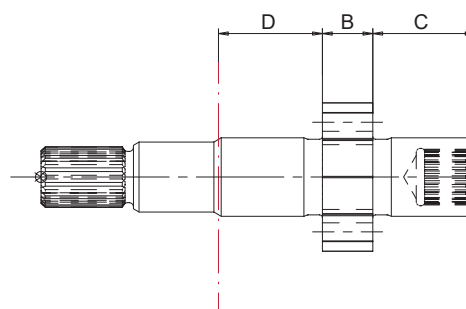
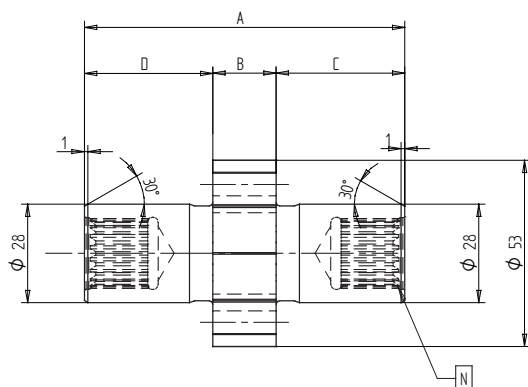


If not available, cut the Drive shaft of the second single pump as indicated in figure A. See instructions below.

Figure A

#### Cutting instructions:

First measure the dimension "C" and then cut the drive end in order to get the requested "D" dimension.



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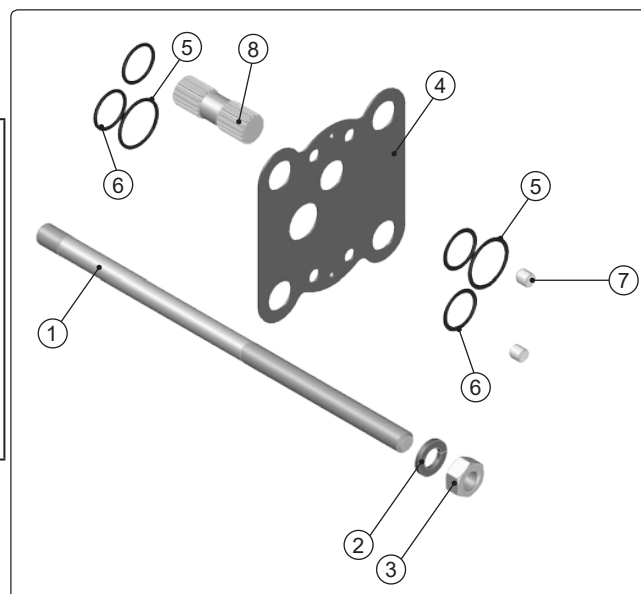


## Assembling Multiple pumps



### 1x Multiple pump kit

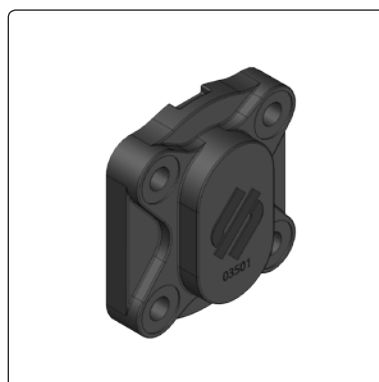
| Code              | Part Number |                                                                                                                                                                                                                                                                                            |
|-------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Multiple pump kit | R15200002   | 1) <b>4x</b> Tie rods M14x310 CL.10.9<br>2) <b>4x</b> Washer UNI 9195<br>3) <b>4x</b> Nut M14 UNI 5588 - CL.10<br>4) <b>1x</b> Intermediate plate PG331/PG331<br>5) <b>2x</b> O-Ring 2118<br>6) <b>4x</b> O-Ring 2093<br>7) <b>2x</b> Pin - DIN 5402<br>8) <b>1x</b> PG331-Coupling Sleeve |



### 1x Rear cover



| Part Number                       |
|-----------------------------------|
| Displ. from 23 to 40<br>R15003501 |
| Displ. from 47 to 80<br>R15003508 |



see page 85 (PG330  
technical/spare parts  
catalogue)

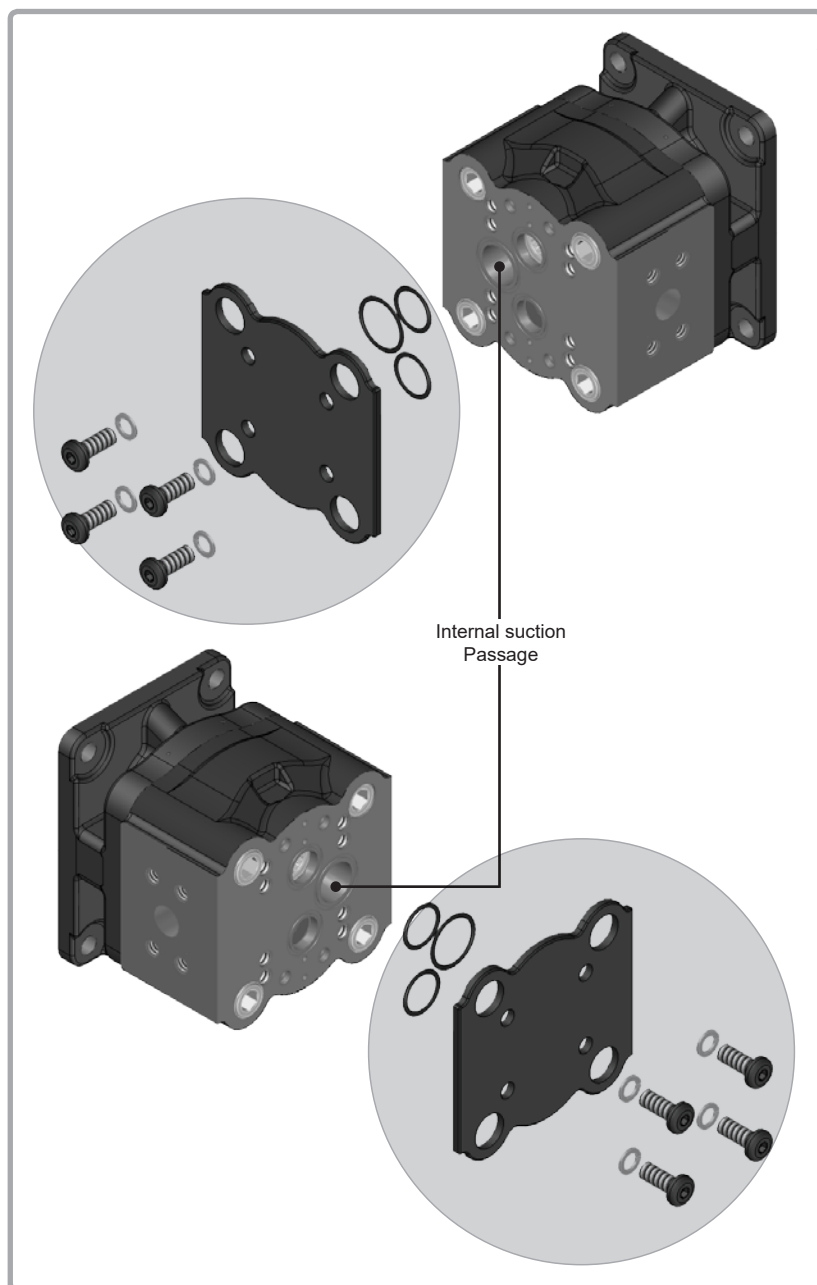


## Assembling Multiple pumps

### What you return to stock:

The disassembly and re-assembly operations must be carried out on a clean bench and away from any dirty areas.

Proceed as follows:

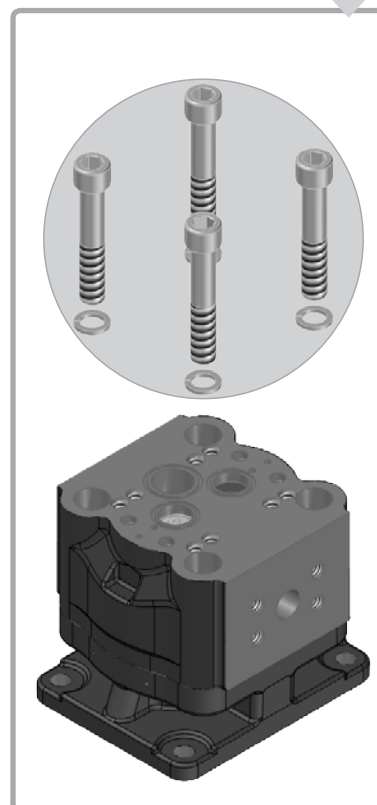


**STEP 1 - Single pumps:**  
Remove cover plate from both pumps.



During assembling of multiple pumps, the internal suction passage must always be aligned. In this case, the rear pump must be rotated upside down, in order to have the internal suction passage aligned with the first stage.

**STEP 2:**  
Clamp the first pump in vertical position. Loosen and fully unscrew the 4xM14 screws. Do not yet disassemble the pump. Repeat the operation for the second pump.



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## Assembling Multiple pumps

### STEP 3:

Place the second pump on a flat and clean surface, remove the front flange but don't disassemble shaft seals and circlip. Remove the thrust plate with his seals, the drive and driven shafts. After assembly is completed, the thrust plate must be relocated exactly in the same position.

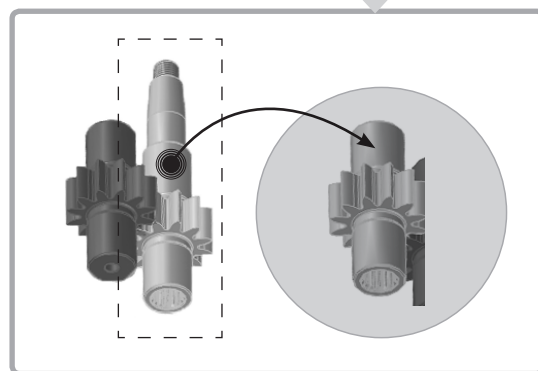


Mark the position of the thrust plate with reference to the body.



### STEP 4:

Swap the drive shaft with the drive shaft for second pump of the same cc/rev.

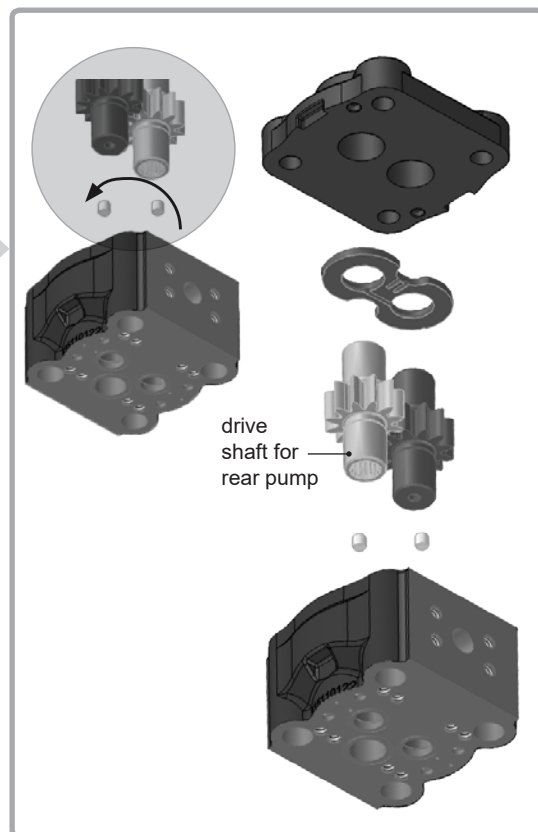


### STEP 5:

Reverse the shaft positions and mount the drive shaft for rear pump. Insert the dowel pins, if not already in place.



After assembly is completed, the thrust plate must be relocated exactly in the same position.

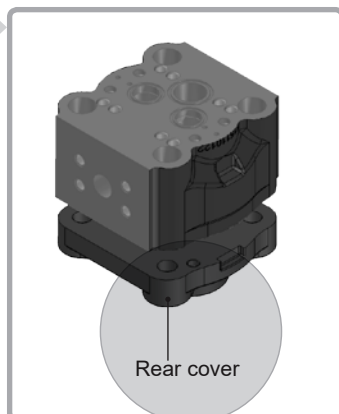




## Assembling Multiple pumps

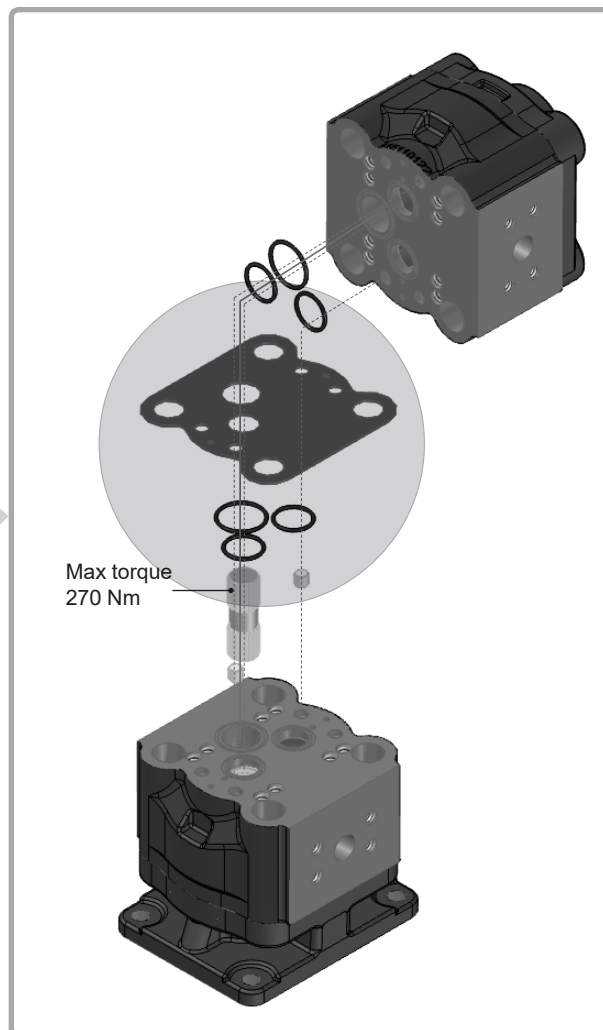
### STEP 6:

By using the dowel pins as a reference, fit the rear end cover in the right position on the pump's body.



### STEP 7:

Clamp the front pump in vertical position, fit the dowel pins and in case replace the o-rings, fit the intermediate plate and the coupling shaft. Be careful to not damage the pins when installing the rear pump on the front pump.



Max  
150 ± 5% Nm



### STEP 8:

Cut tie rods at right length (see Appendix A at page 126) screw tie rods into the front flange and make sure that the shorter threaded end is fit into the front flange proceed with washers and nuts. Tight at torque.

EO.152.0423.05.00IM02

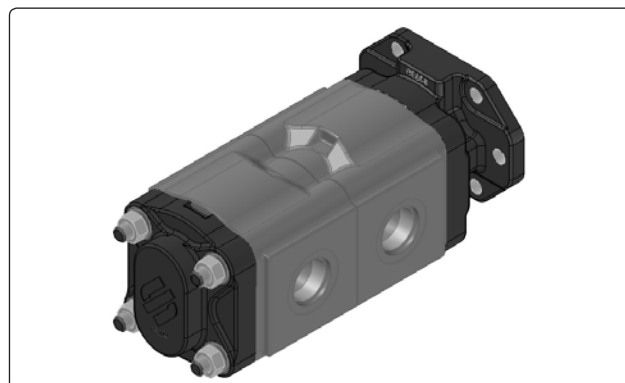


## Assembling Triple pumps

### What you need from stock



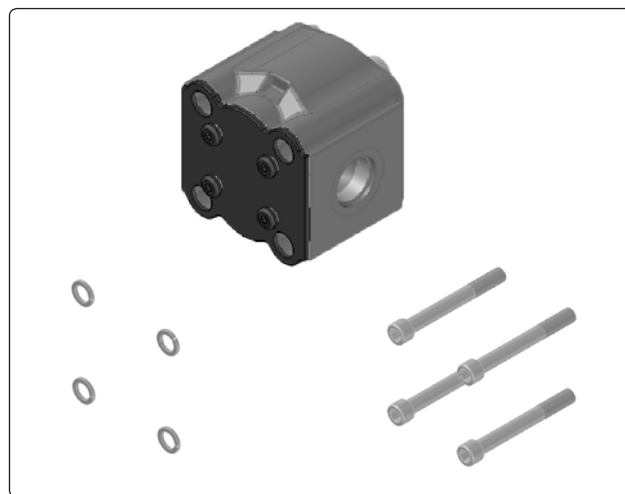
**1x PG331\*\*D Multiple Pump**  
(with requested cc/rev)



**1x Rear pump**

#### Part Number

see configurations  
at pages 122-125



**4x Washer DIN 7980**

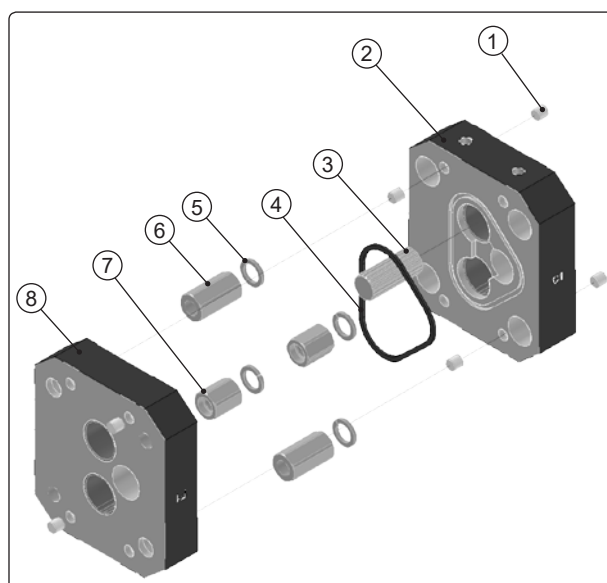


**4x Hex socket head cup M14 x**  
(see Appendix B at page 127)



**1x Triple pump kit**

| Code             | Part Number                                                                     |                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Triple pump Kits | R15160030<br>1° - 2° - 3°<br>Stage= Displ.<br>23-40 cc                          | 1) <b>6x</b> Pin - DIN 5402<br>2) <b>1x</b> Plate for Displ. 23-40 cc (H=35)<br>or for Displ. 47-72 cc (H=41)<br>3) <b>1x</b> PG331-Coupling Sleeve<br>4) <b>1x</b> O-RING 2-151<br>5) <b>4x</b> Washer DIN 7980<br>6) <b>2x</b> Special Nut M14 (longer)<br>7) <b>2x</b> Special Nut M14 (shorter)<br>8) <b>1x</b> Plate for Displ. 23-40 cc (H=31)<br>or for Displ. 47-72 cc (H=37) |
|                  | R15160040<br>1° - 2° - 3°<br>Stage= Displ.<br>47-72 cc                          |                                                                                                                                                                                                                                                                                                                                                                                       |
|                  | R15160041<br>1° - 2° Stage<br>=Displ. 47-72 cc<br>3° Stage = Displ.<br>23-40 cc |                                                                                                                                                                                                                                                                                                                                                                                       |



Nut (7) are partially threaded and shorter  
Nut (6) are completely threaded and longer

EO.152.0423.05.001M02



### Assembling Triple pumps

#### What you return to stock:

The disassembly and re-assembly operations must be carried out on a clean bench and away from any dirty areas.

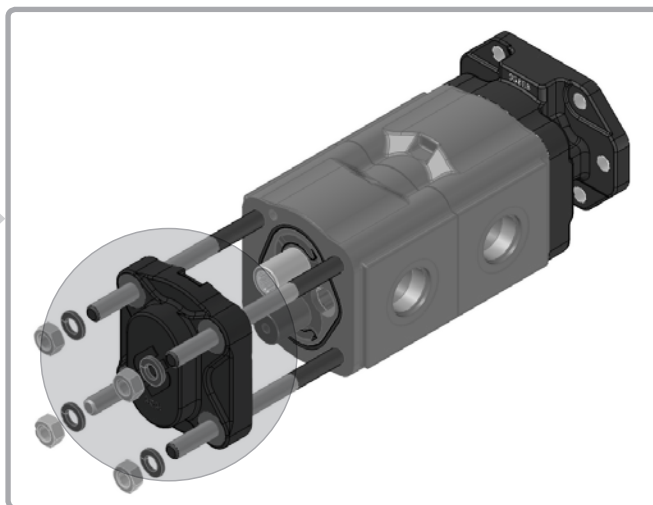
Proceed as follows:

#### STEP 1 - Multiple pump:

Remove the cover and screw the tie rods to the front flange.  
Cut tie rods at right length.  
(See Appendix B at page 127)



Assembling instructions  
Double pump at page 94.

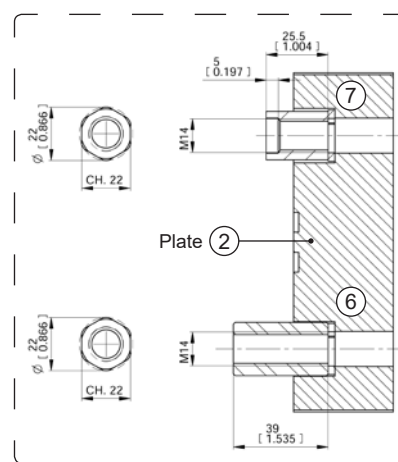
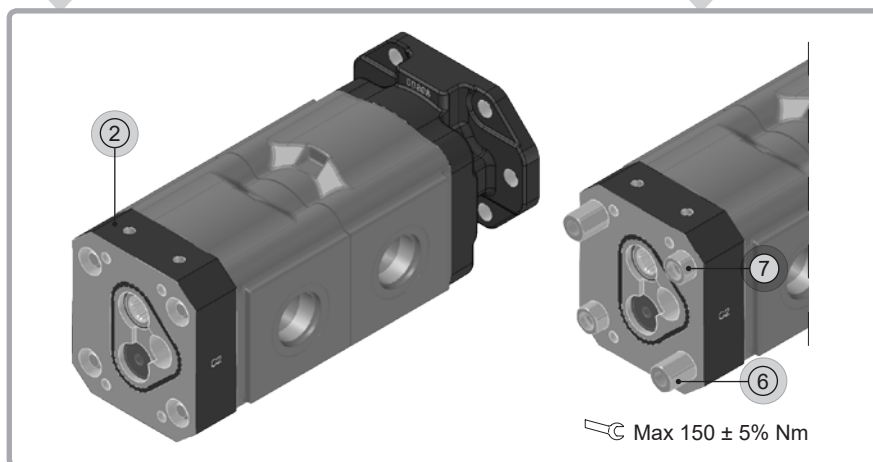


#### STEP 2:

Fit the plate (2)  
on the rear pump

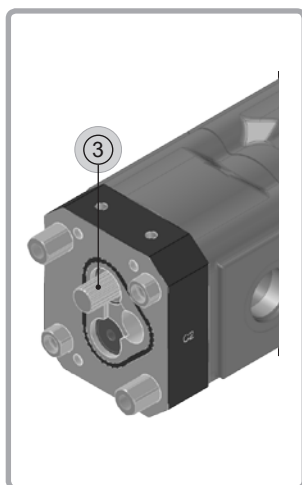
#### STEP 3:

Screw special  
nuts (6) and (7)



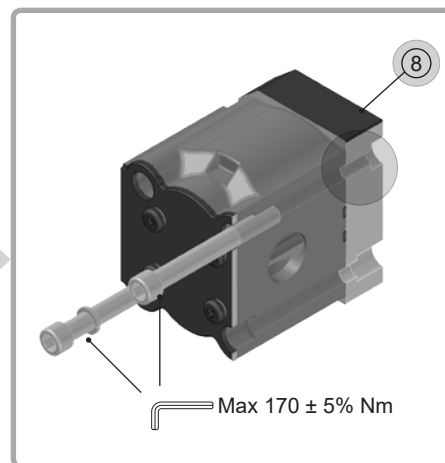
#### STEP 4:

Insert the coupling  
shaft (3).



#### STEP 5:

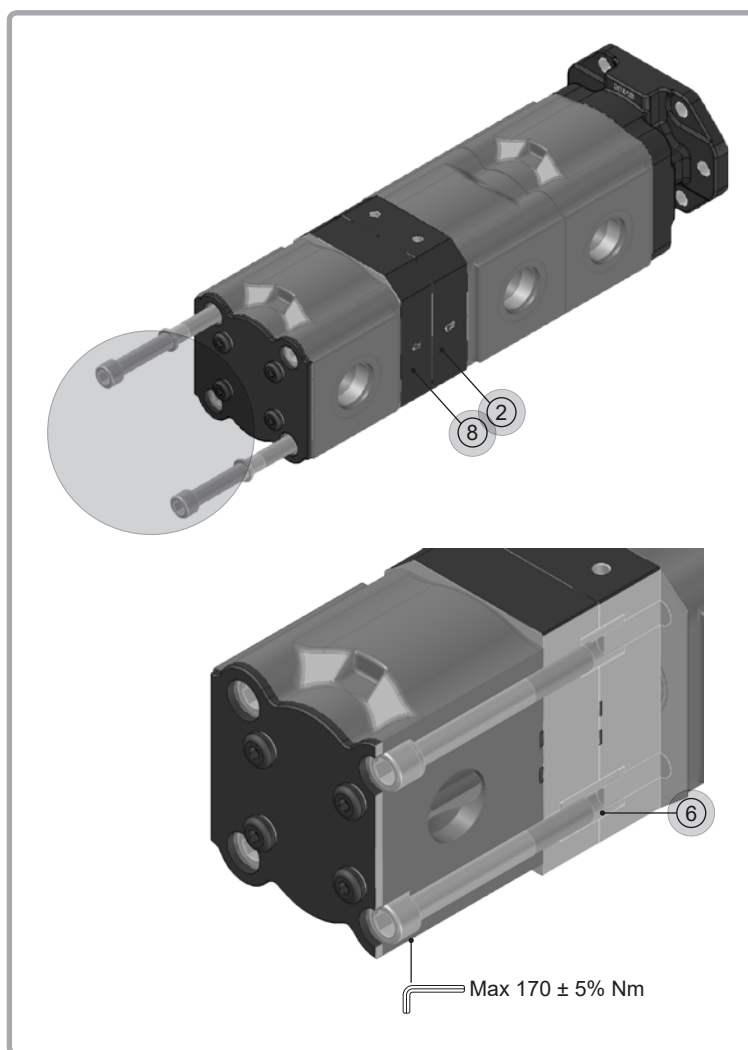
By using the dowel pins as a reference, fit the rear pump on the plate (8). The plate has four assembling holes, two are threaded M14, two are through holes Ø 14.5 mm. Insert washers and screw the screws into the threaded holes (see Appendix B page 127 for right length).



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## Assembling Triple pumps



### STEP 6:

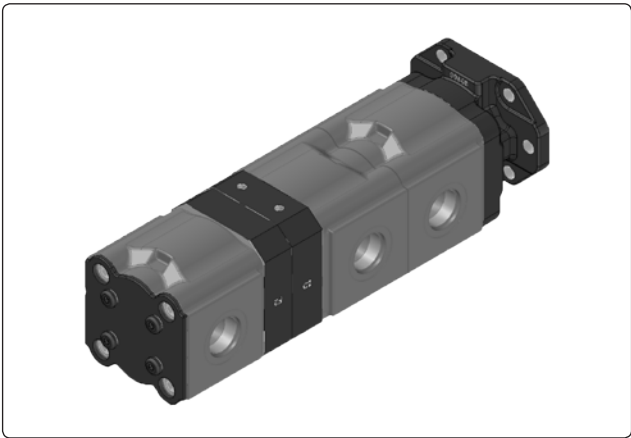
By using the dowel pins as a reference, fit the third stage with plate (8) prepared, on the rear plate (2). Match properly the coupling shaft with the inner shaft of the rear pump. Insert washers and screw the two screws into the special longer nuts (6).



Assembling Quadruple pumps

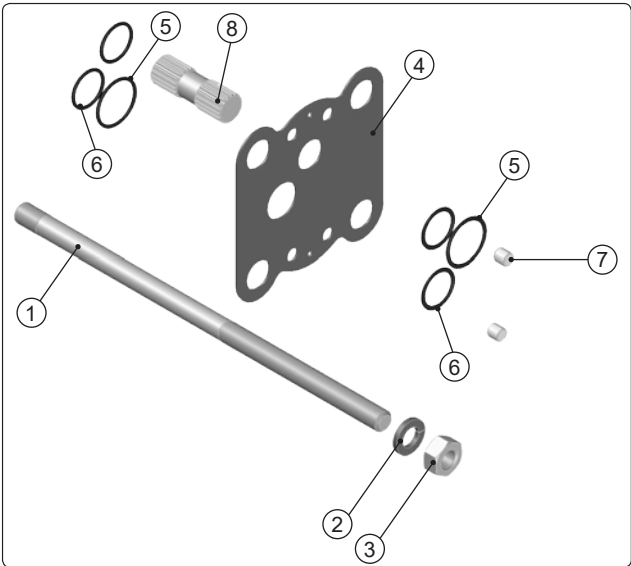
What you need from stock

➔ **1x PG331\*\*D Triple Pump**  
(with requested cc/rev)



➔ **1x Multiple pump kit**

| Code              | Part Number |                                             |
|-------------------|-------------|---------------------------------------------|
| Multiple pump Kit | R15200002   | 1) <b>4x</b> Tie rods M14x310 CL.10.9       |
|                   |             | 2) <b>4x</b> Washer UNI 9195                |
|                   |             | 3) <b>4x</b> Nut M14 UNI 5588 - CL.10       |
|                   |             | 4) <b>1x</b> Intermediate plate PG331/PG331 |
|                   |             | 5) <b>2x</b> O-Ring 2118                    |
|                   |             | 6) <b>4x</b> O-Ring 2093                    |
|                   |             | 7) <b>2x</b> Pin - DIN 5402                 |
|                   |             | 8) <b>1x</b> PG331-Coupling Sleeve          |



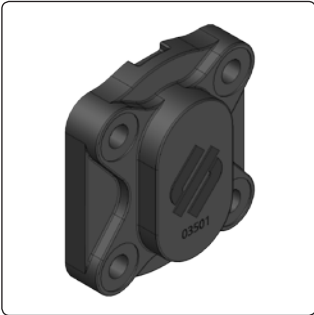
➔ **1x Rear pump**

| Part Number                            |
|----------------------------------------|
| see configurations<br>at pages 122-125 |



➔ **1x Rear cover**

| Part Number                 |
|-----------------------------|
| <b>Displ. from 23 to 40</b> |
| R15003501                   |
| <b>Displ. from 47 to 80</b> |
| R15003508                   |



**i** see page 85 (PG330 technical/spare parts catalogue)

EO.152.0423.05.00IM02

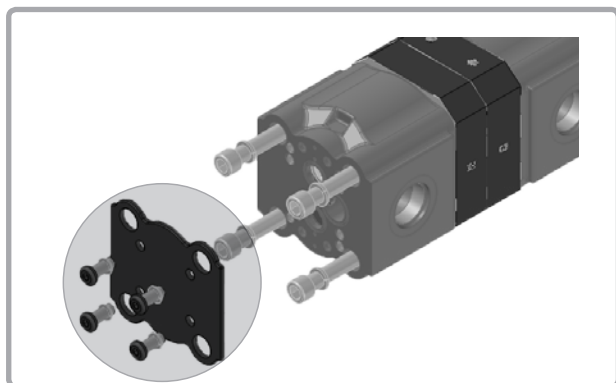


## Assembling Quadruple pumps

### What you return to stock:

The disassembly and re-assembly operations must be carried out on a clean bench and away from any dirty areas.

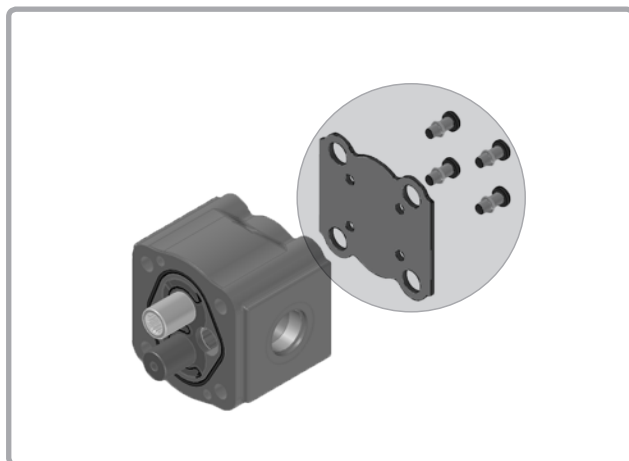
Proceed as follows:



**STEP 1 - Triple pump:**  
Remove cover plate from last stage.



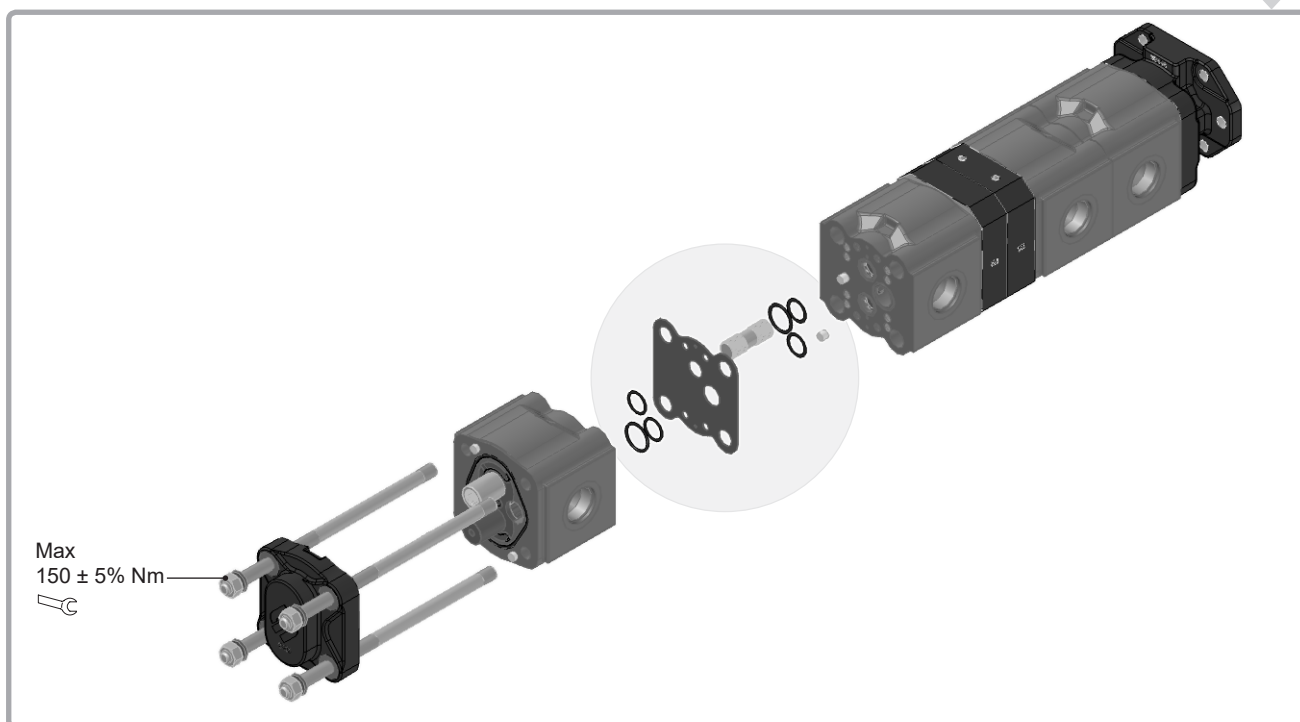
Assembling instructions Triple pump at page 99.



**STEP 2 - Rear pump:**  
Remove cover plate.

### STEP 3:

Fit the fourth stage on the triple pump by using the same instruction already given on page 98 (Step 7).  
Cut tie rods at right length.  
(See Appendix C at page 128).





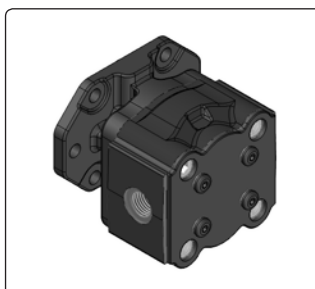
### Assembling Single pump with 2PE

#### What you need from stock



**1x PG331\*\*D Single Pump**  
(with requested cc/rev)

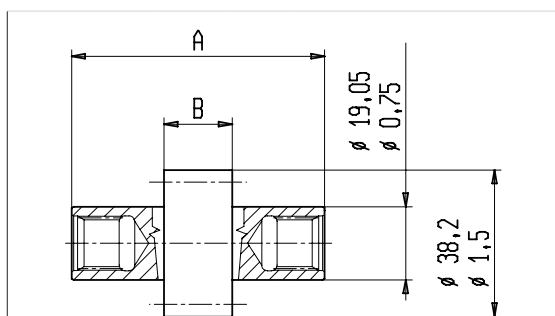
| Part Number                            |
|----------------------------------------|
| see configurations<br>at pages 118-121 |



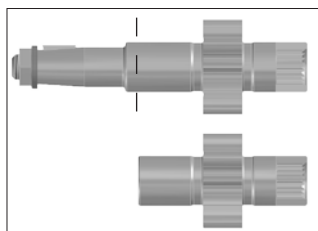
**1x 2PE\*\*D-Rear pump**  
(with requested cc/rev)



If not available, use a 2PE single pump. The full list of 2PE Single and Rear Pumps are available on our DEALER 2PE SPARE PARTS CATALOGUE.



| Displacement         |           | Dimensions |      |      |      | Part Number |
|----------------------|-----------|------------|------|------|------|-------------|
|                      |           | A          |      | B    |      |             |
| cm <sup>3</sup> /rev | cu.in/rev | mm         | in   | mm   | in   |             |
| 3.2                  | 0.19      | 46.7       | 1.84 | 5.1  | 0.20 | 312000310   |
| 3.9                  | 0.24      |            |      | 6.1  | 0.24 | 312050306   |
| 4.6                  | 0.27      |            |      | 7.1  | 0.28 | 312000314   |
| 6.5                  | 0.40      | 49.55      | 1.95 | 9.95 | 0.39 | 312060302   |
| 8.2                  | 0.50      | 52.4       | 2.06 | 12.8 | 0.50 | 312050309   |
| 11.5                 | 0.68      | 59.3       | 2.33 | 17.7 | 0.70 | 312050312   |
| 13.8                 | 0.84      | 63.1       | 2.48 | 21.5 | 0.85 | 312000315   |
| 16.6                 | 1.01      | 67.1       | 2.64 | 25.5 | 1.00 | 312000316   |
| 19.4                 | 1.18      | 75.2       | 2.96 | 29.8 | 1.17 | 312000317   |
| 22.9                 | 1.37      | 80.6       | 3.17 | 35.2 | 1.39 | 312000318   |
| 26.6                 | 1.62      | 86.4       | 3.40 | 41   | 1.61 | 312000319   |

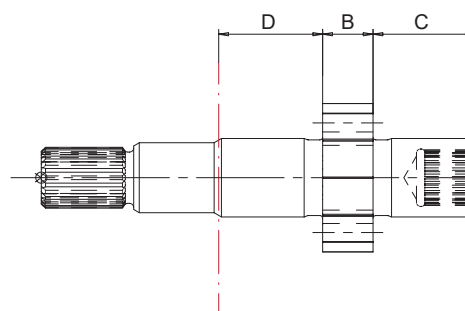


Cut the Drive shaft of 2PE single pump as indicated in figure A to obtain a rear drive shaft. See instructions below.

Figure A

#### Cutting instructions:

First measure the dimension "C" and then cut the drive end in order to get the requested "D" dimension.



E0.152.0423.05.00IM02

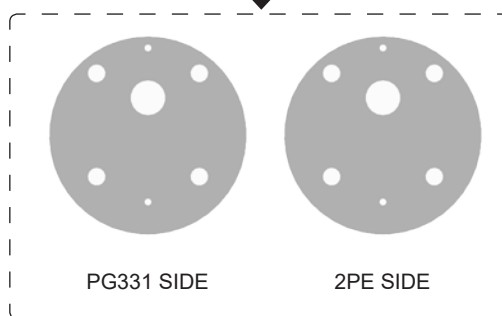
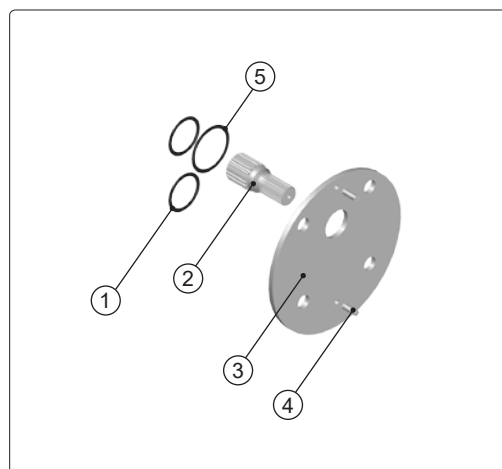


Assembling Single pump with 2PE



1x Multiple pump kit 2PE-2PGE

| Code              | Part Number |                                                                                                                                              |
|-------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Multiple pump kit | R15200001   | 1) 4x O-Ring 2093<br>2) 1x PG331/2PE-Coupling Sleeve<br>3) 1x Intermediate plate PG331/2PE-2PGE<br>4) 2x Pin - UNI 1707<br>5) 2x O-Ring 2118 |



Multiple pump kit doesn't provide the Common Suction Option. As shown in the picture, it doesn't have a preferred mounting orientation.

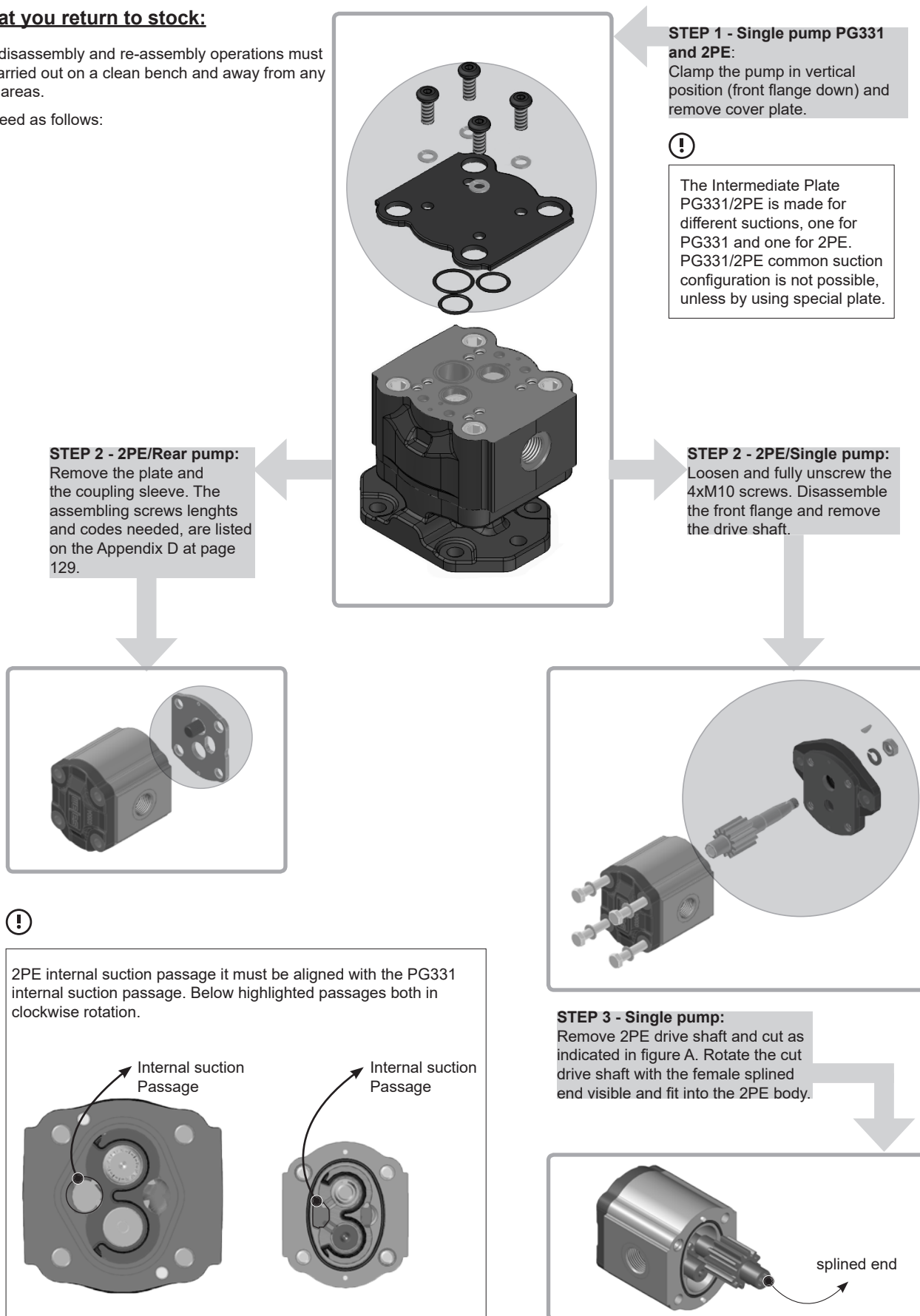


### Assembling Single pump with 2PE

#### What you return to stock:

The disassembly and re-assembly operations must be carried out on a clean bench and away from any dirty areas.

Proceed as follows:



EO.152.0423.05.00IM02

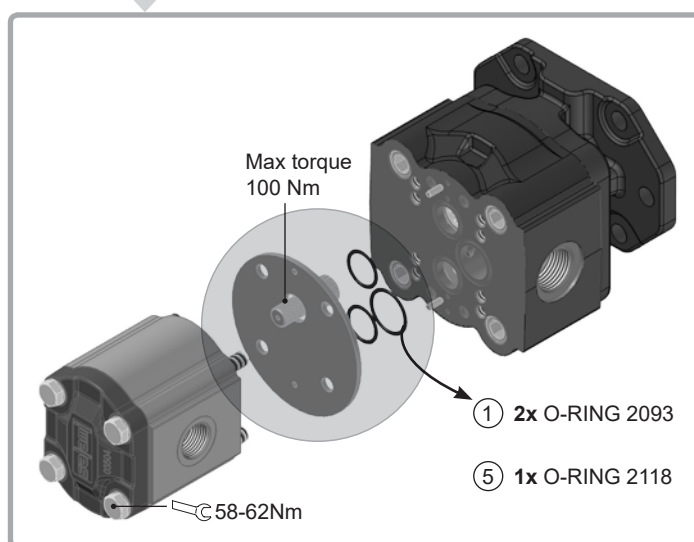


## Assembling Single pump with 2PE

**STEP 4:** Fit the coupling shaft and the two dowel pins into the central top and bottom dowel pin holes. Fit the multiple pump kit and the 2PE rear pump.



Replace damaged O-Rings by using brand new ones (items 1&5 in the PG331/2PE assembling kit).



The PG331/2PE build employ individual suction ports. In case you want to build a PG331/2PE for different fluids you need to assemble a 2PE rear pump "AS" type.



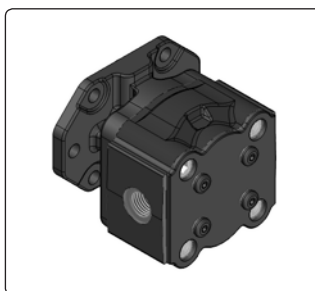
## Assembling Single pump with 2PGE

### What you need from stock



**1x PG331\*\*D Single Pump**  
(with requested cc/rev)

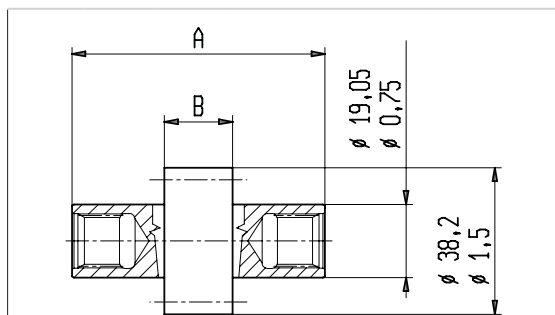
| Part Number                            |
|----------------------------------------|
| see configurations<br>at pages 118-121 |



**1x 2PGE\*\*D-Rear pump**  
(with requested cc/rev)



If not available, use a 2PGE single pump.



| Displacement         |           | Dimensions |      |      |      | Part Number |
|----------------------|-----------|------------|------|------|------|-------------|
|                      |           | A          |      | B    |      |             |
| cm <sup>3</sup> /rev | cu.in/rev | mm         | in   | mm   | in   |             |
| 3.2                  | 0.19      | 46.7       | 1.84 | 5.1  | 0.20 | 312000310   |
| 3.9                  | 0.24      |            |      | 6.1  | 0.24 | 312050306   |
| 4.6                  | 0.27      |            |      | 7.1  | 0.28 | 312000314   |
| 6.5                  | 0.40      | 49.55      | 1.95 | 9.95 | 0.39 | 312060302   |
| 8.2                  | 0.50      | 52.4       | 2.06 | 12.8 | 0.50 | 312050309   |
| 11.5                 | 0.68      | 59.3       | 2.33 | 17.7 | 0.70 | 312050312   |
| 13.8                 | 0.84      | 63.1       | 2.48 | 21.5 | 0.85 | 312000315   |
| 16.6                 | 1.01      | 67.1       | 2.64 | 25.5 | 1.00 | 312000316   |
| 19.4                 | 1.18      | 75.2       | 2.96 | 29.8 | 1.17 | 312000317   |
| 22.9                 | 1.37      | 80.6       | 3.17 | 35.2 | 1.39 | 312000318   |
| 26.6                 | 1.62      | 86.4       | 3.40 | 41   | 1.61 | 312000319   |

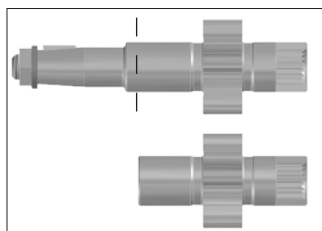


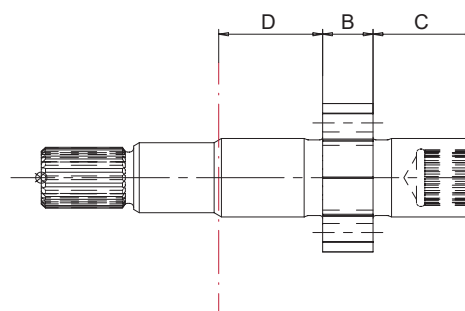
Figure A



Cut the Drive shaft of 2PGE single pump as indicated in figure A to obtain a rear drive shaft. See instructions below.

### Cutting instructions:

First measure the dimension "C" and then cut the drive end in order to get the requested "D" dimension.



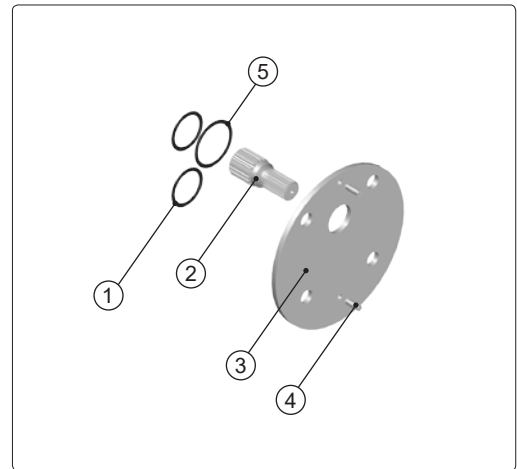
EO.152.0423.05.00IM02



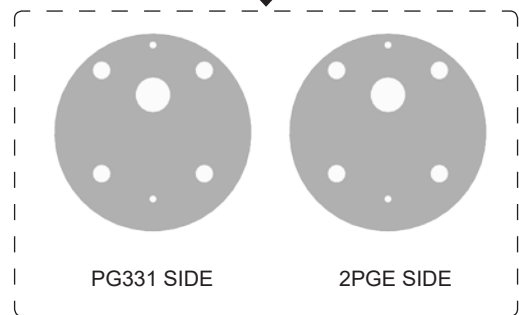
Assembling Single pump with 2PGE

➔ 1x Multiple pump kit 2PE-2PGE

| Code              | Part Number |                                                                                                                                              |
|-------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Multiple pump kit | R15200001   | 1) 4x O-Ring 2093<br>2) 1x PG331/2PE-Coupling Sleeve<br>3) 1x Intermediate plate PG331/2PE-2PGE<br>4) 2x Pin - UNI 1707<br>5) 2x O-Ring 2118 |



Multiple pump kit doesn't provide the Common Suction Option. As shown in the picture, it doesn't have a preferred mounting orientation.



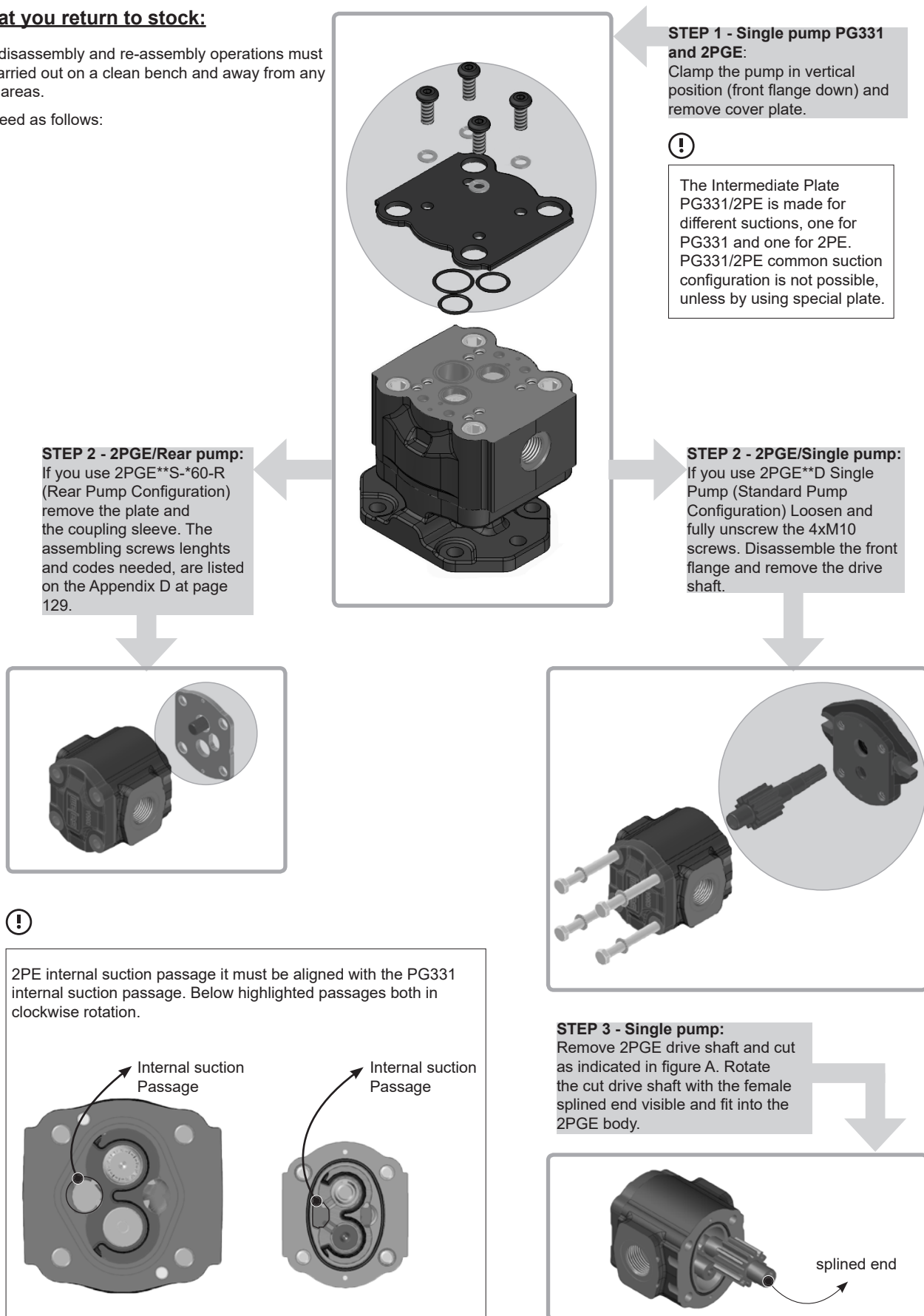


### Assemble Single pump with 2PGE

#### What you return to stock:

The disassembly and re-assembly operations must be carried out on a clean bench and away from any dirty areas.

Proceed as follows:



EO.152.0423.05.00IM02

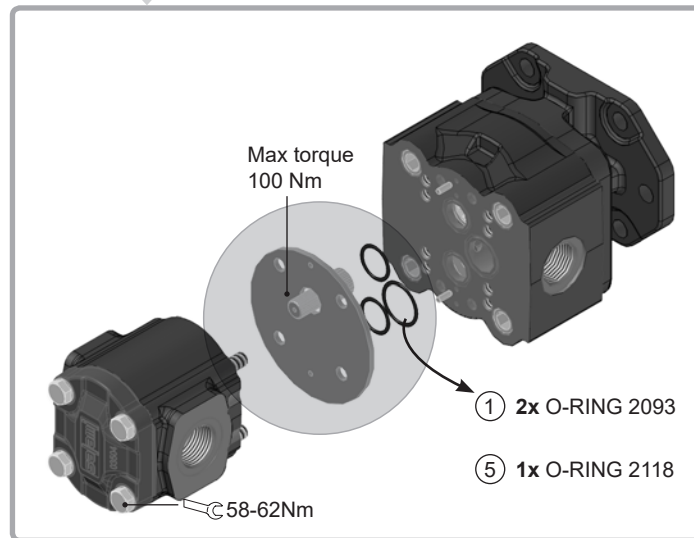


## Assemble Single pump with 2PGE

**STEP 4:** Fit the coupling shaft and the two dowel pins into the central top and bottom dowel pin holes. Fit the multiple pump kit and the 2PGE rear pump.



Replace damaged O-Rings by using brand new ones (items 1&5 in the PG331/2PE assembling kit).



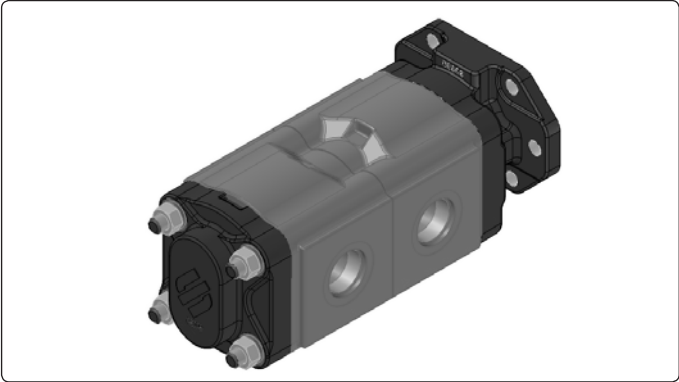
The PG331/2PGE build employ individual suction ports. In case you want to build a PG331/2PGE for different fluids you need to assemble a 2PGE rear pump "AS" type.



Assembling multiple pump with 2PE

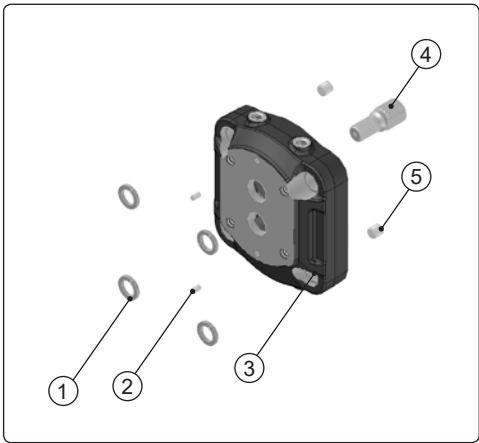
What you need from stock

➔ **1x PG331\*\*D Multiple Pump**  
(with requested cc/rev)



➔ **1x Multiple pump kit 2PE/2PGE**

| Code                                                                                                     | Part Number                  |                                                                                                                                 |
|----------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <br>Multiple pump Kit | R15160050<br>Displ. 23-40 cc | 1) <b>4x</b> Washer DIN 7980<br>2) <b>2x</b> Pin - UNI 1707<br>3) <b>1x</b> Plate for Displ. 23-40 cc<br>or for Displ. 47-72 cc |
|                                                                                                          | R15160060<br>Displ. 47-72 cc | 4) <b>1x</b> PG331/2PE-Coupling Sleeve<br>5) <b>2x</b> Pin - DIN 5402                                                           |



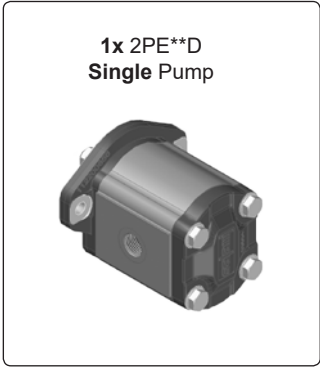
➔ **1x 2PE\*\*D-Rear pump**  
(with requested cc/rev)



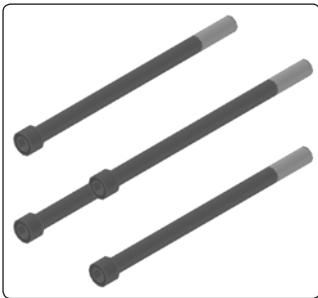
If not available, use a 2PE single pump. The full list of 2PE Single and Rear Pumps are available on our DEALER 2PE SPARE PARTS CATALOGUE.



Mounting also available with 2PGE pump.



➔ **4x Screw M14 x**  
(see Appendix D at page 129)



EO.152.0423.05.00IM02



## Assembling multiple pump with 2PE

### What you return to stock:

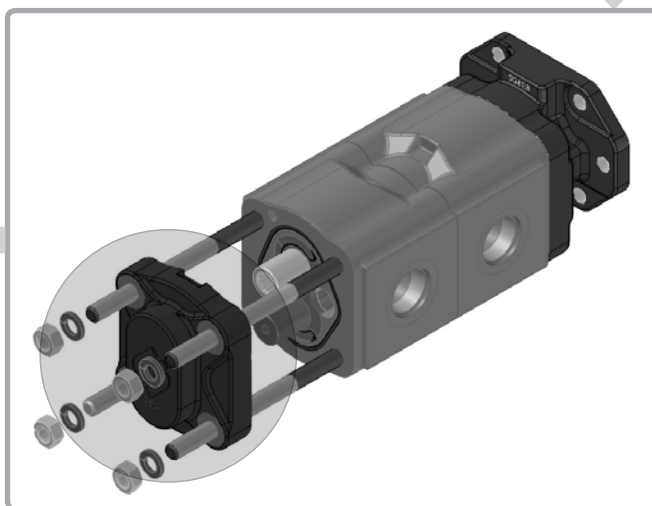
The disassembly and re-assembly operations must be carried out on a clean bench and away from any dirty areas.

Proceed as follows:

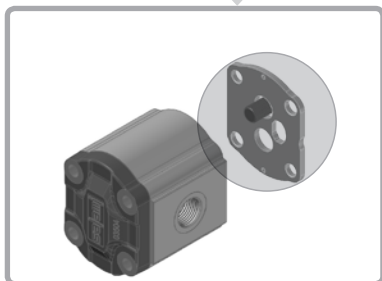
**STEP 1 - Multiple pump:**  
Remove the rear cover, tie rods, nuts and washers.



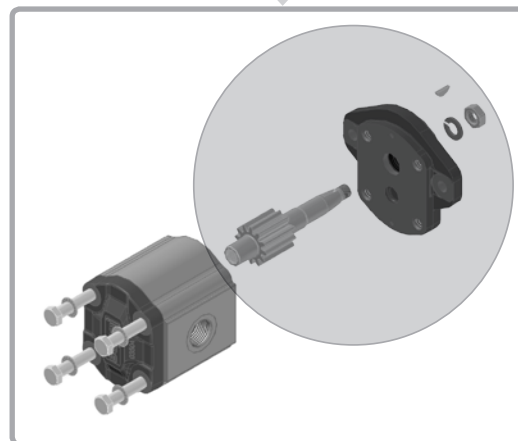
Assembling instructions  
Double pump at page 94.



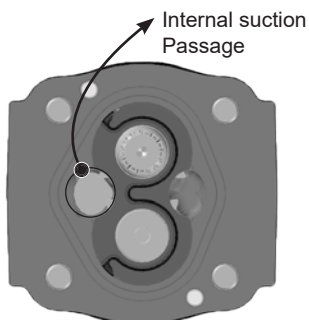
**STEP 2 - 2PE/Rear pump:**  
Remove the plate and the coupling sleeve. The assembling screws lengths and codes needed, are listed on the Appendix D at page 129.



**STEP 2 - 2PE/Single pump:**  
Loosen and fully unscrew the 4xM10 screws. Disassemble the front flange and remove the drive shaft.

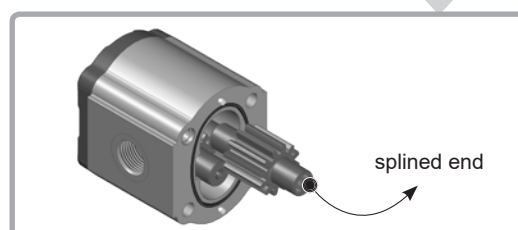


2PE internal suction passage it must be aligned with the PG331 internal suction passage. Below highlighted passages both in clockwise rotation.



Internal suction  
Passage

**STEP 3 - Single pump:**  
Remove 2PE drive shaft and cut as indicated in figure A. Rotate the cut drive shaft with the female splined end visible and fit into the 2PE body.

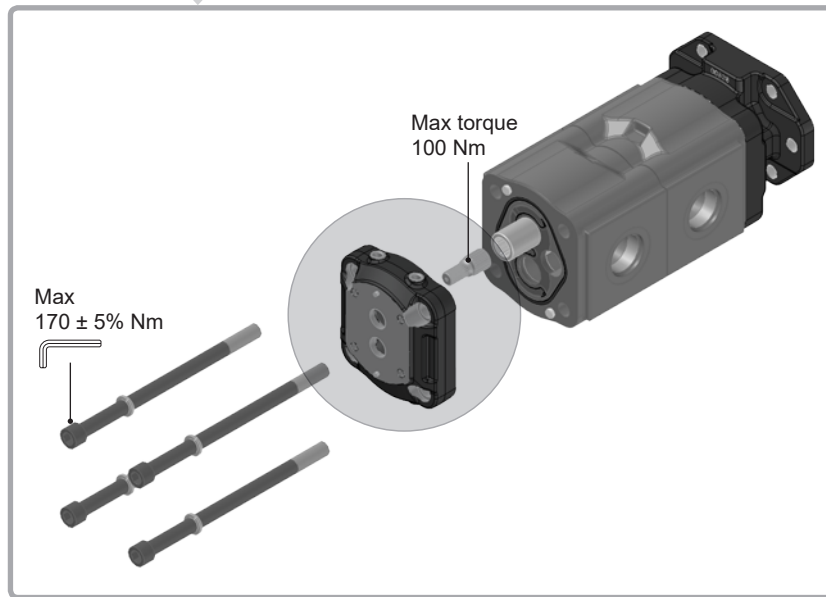




## Assembling multiple pump with 2PE

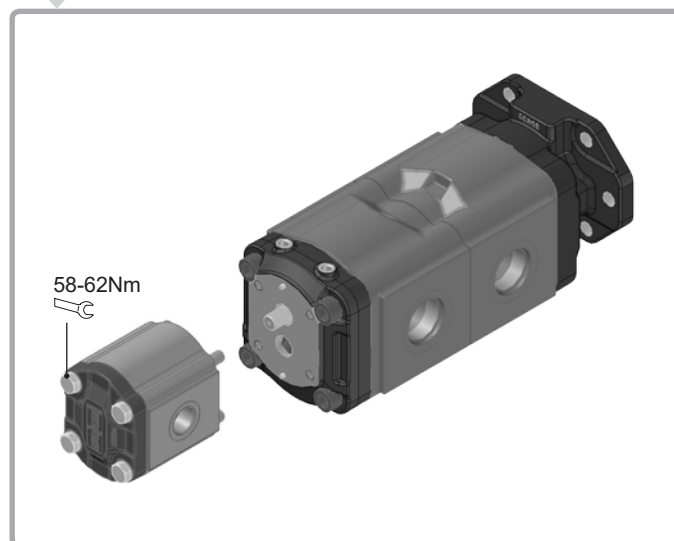
**STEP 4:** Insert the coupling shaft (4) into the drive shaft on the second stage of the PG331.

By using the dowel pins (5) as a reference, assemble the plate (3) to the Multiple pump fit washers and screws M14.



**STEP 5:**

By using the dowel pins as a reference, assemble 2PE pump on the plate. Match properly the coupling shaft with the inner shaft of the 2PE pump.

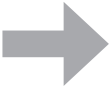


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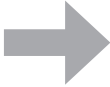
Replacing mounting flange with outrigger bearing

What you need from stock



**1x PG331\*\*D Single Pump**  
(with requested cc/rev)

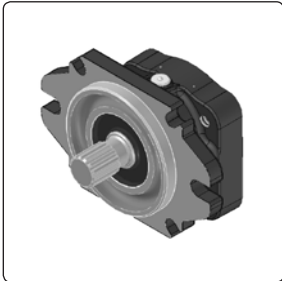
| Part Number                            |
|----------------------------------------|
| see configurations<br>at pages 118-121 |



**1x Mounting flange with  
bearing type R8 or Z1.**



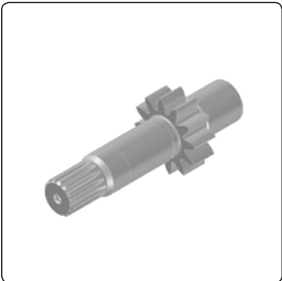
see page 73 (PG330  
technical/spare parts  
catalogue)



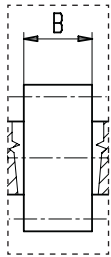
**1x Drive shaft type 70**  
(with same cc/rev)



see page 68 (PG330  
technical/spare parts  
catalogue)



| Code | Displacement | B    | Part Number |
|------|--------------|------|-------------|
| 70   | 23           | 18   | 315000371   |
|      | 28           | 22   | 315000372   |
|      | 34           | 26.5 | 315000373   |
|      | 40           | 31   | 315000374   |
|      | 47           | 36.5 | 315000375   |
|      | 55           | 42.5 | 315000376   |
|      | 64           | 49.5 | 315000377   |
|      | 72           | 56.5 | 315000378   |
|      | 80           | 62   | 315000379   |



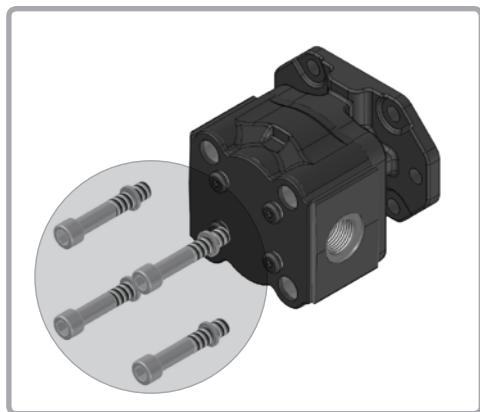


## Replacing mounting flange with outrigger bearing

### What you return to stock:

The disassembly and re-assembly operations must be carried out on a clean bench and away from any dirty areas.

Proceed as follows:

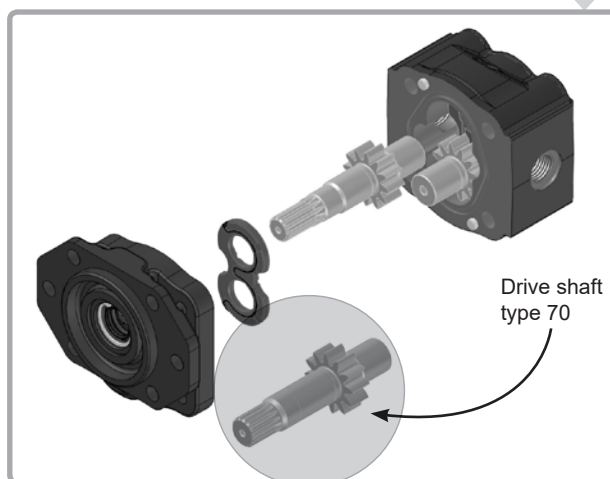


**STEP 1 - Single pump PG331**  
(with mounting flange type P2/S3/  
S4/Z2):  
Unscrew the screws and remove  
the washers.

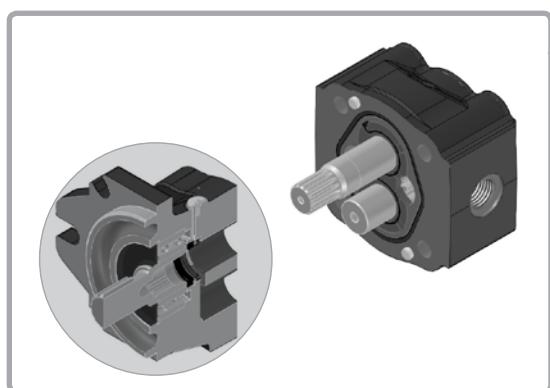
**STEP 2:** Disassemble the front  
flange, mark the position of the  
trust plate with reference to the  
body. Remove the thrust plate with  
seals and the drive shaft.  
Replace it with the shaft code 70  
please see the table below.  
Reassemble the thrust plate with  
seals in the same position you  
found it.



Mark the position of the trust plate  
with reference to the body.

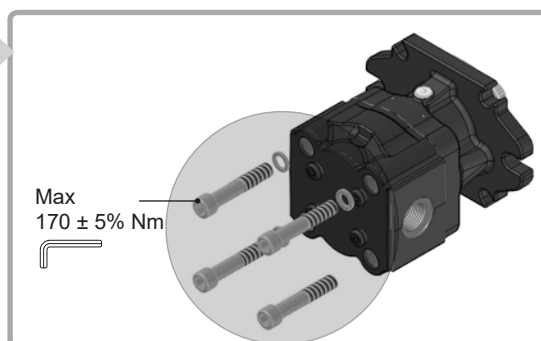


Drive shaft  
type 70



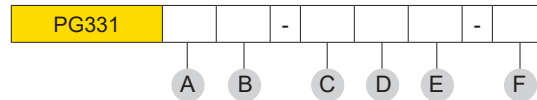
**STEP 3:** Replace the flange with  
the outrigger bearing type and  
by using the dowel pins as a  
reference.  
Apply grease on the shaft code 70,  
by pay attention to not damage the  
shaft seals.  
Match the male splined end of  
shaft code 70 with the female  
spline of the continental shaft  
already assembled on the  
outrigger bearing kit.

**STEP 4:** Fit the screws and  
washers disassembled before.



Max  
 $170 \pm 5\%$  Nm

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| A | CODE | DISPLACEMENTS              |                 |
|---|------|----------------------------|-----------------|
|   | 23   | 23.4 cm <sup>3</sup> /rev. | 1.43 cu.in/rev. |
|   | 28   | 28.6 cm <sup>3</sup> /rev. | 1.74 cu.in/rev. |
|   | 34   | 34.4 cm <sup>3</sup> /rev. | 2.1 cu.in/rev.  |
|   | 40   | 40.3 cm <sup>3</sup> /rev. | 2.46 cu.in/rev. |
|   | 47   | 47.5 cm <sup>3</sup> /rev. | 2.89 cu.in/rev. |
|   | 55   | 55.2 cm <sup>3</sup> /rev. | 3.37 cu.in/rev. |
|   | 64   | 64.3 cm <sup>3</sup> /rev. | 3.92 cu.in/rev. |
|   | 72   | 73.4 cm <sup>3</sup> /rev. | 4.48 cu.in/rev. |
|   | 80   | 80.6 cm <sup>3</sup> /rev. | 4.91 cu.in/rev. |

| B | ROTATION       | CODE |
|---|----------------|------|
|   | Clockwise      | D    |
|   | Anti-clockwise | S    |

| C | PORTS                                              | CODE |
|---|----------------------------------------------------|------|
|   | Flanged ports<br>european standard                 | P    |
|   | Flanged ports<br>SAE J518 Metric thread            | W    |
|   | Flanged ports<br>SAE J518 American standard thread | S    |
|   | Threaded ports<br>GAS (BSPP)                       | G    |
|   | Threaded ports<br>SAE (ODT)                        | R    |

| D | DRIVE SHAFT END                               | CODE |
|---|-----------------------------------------------|------|
|   | Tapered 1:8                                   | 38   |
|   | SAE B splined 13T                             | 55   |
|   | SAE BB splined 15T                            | 56   |
|   | SAE B PARALLEL                                | 87   |
|   | SAE BB PARALLEL                               | 88   |
|   | SAE C 14T-12/24DP<br>Continental Shaft        | 58   |
|   | 8x32x36 UNI 8953 splined<br>Continental Shaft | 67   |
|   | SAE C 14T-12/24DP<br>Continental Shaft        | 57   |
|   | 8x32x36 UNI 8953 splined<br>Continental Shaft | 66   |
|   | SAE C PARALLEL<br>Continental Shaft           | 89   |

| E | MOUNTING FLANGES               | CODE |
|---|--------------------------------|------|
|   | European standard Ø50.8        | P2   |
|   | SAE B 2-4 BOLTS                | S3   |
|   | SAE C 2-4 BOLTS                | S4   |
|   | SAE B 2-4 BOLTS (Medium Loads) | R3   |
|   | SAE C 2-4 BOLTS (Heavy Loads)  | R8   |
|   | 4 BOLTS FOR ZF GEAR            | Z1   |
|   | 4 Bolts for ZF gear box        | Z2   |

| F | SEAL                                   | CODE |
|---|----------------------------------------|------|
|   | Buna standard (standard configuration) | -    |
|   | Viton                                  | V    |

**How to order Single pump**

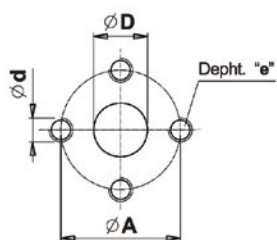
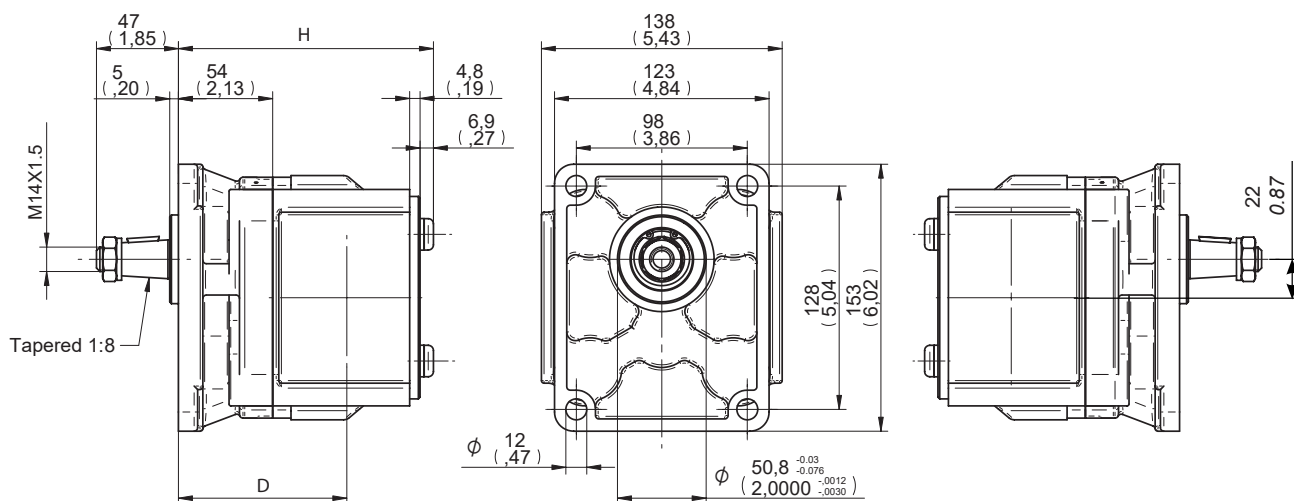
PG331, displacement first stage (28), clockwise rotation (D), ports European (P), drive shaft (38), mounting flange (P2)=  
**PG331-28D-P38P2**

**PG330 Technical/Spare parts catalogue reference**

|   |                                              |
|---|----------------------------------------------|
| C | Flanged and Threaded Port<br>see pages 65/66 |
| D | Drive shaft<br>see pages 68/69               |
| E | Mounting flanged<br>see pages 70/74          |



### Configuration - P38P2



code P

Flanged ports  
european standard



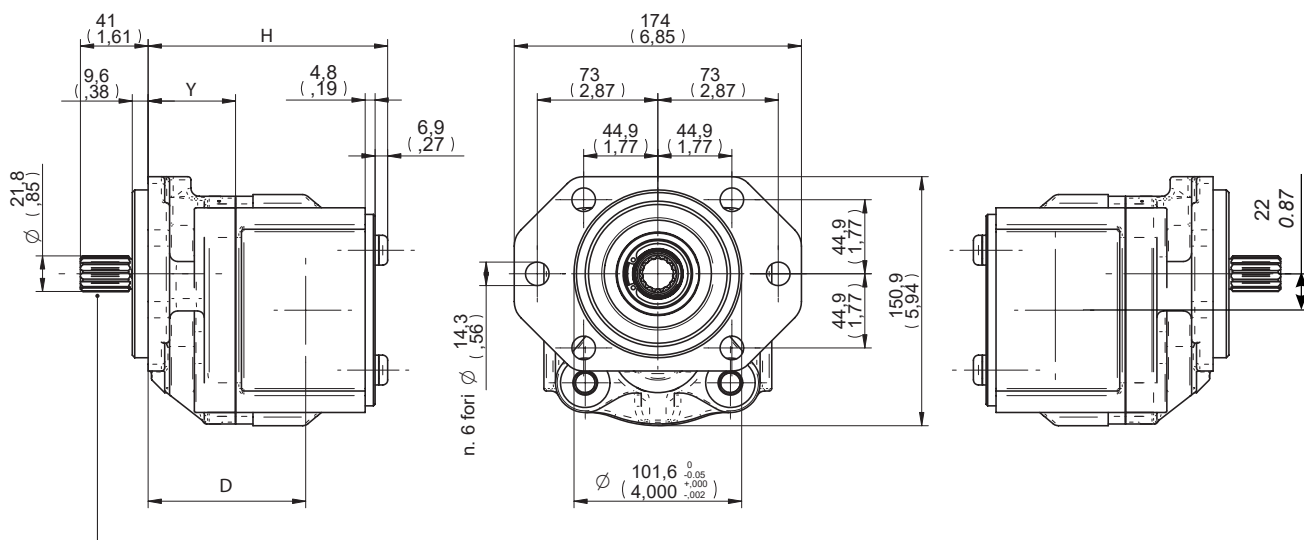
| UNI-DIRECTIONAL  |               |               |     |               |               |               |     |               |
|------------------|---------------|---------------|-----|---------------|---------------|---------------|-----|---------------|
| PUMPS            | INLET         |               |     |               | OUTLET        |               |     |               |
|                  | Ø D           | Ø A           | d   | e             | Ø D           | Ø A           | d   | e             |
| 23               | 20<br>(0.79") | 40<br>(1.57") | M8  | 16<br>(0.63") | 16<br>(0.63") | 40<br>(1.57") | M8  | 16<br>(0.63") |
| From 28<br>to 47 | 27<br>(1.07") | 51<br>(2.01") | M10 | 16<br>(0.63") | 16<br>(0.63") | 40<br>(1.57") | M8  | 16<br>(0.63") |
| From 55<br>to 72 | 33<br>(1.3")  | 62<br>(2.44") | M12 | 16<br>(0.63") | 21<br>(0.83") | 51<br>(2.01") | M10 | 16<br>(0.63") |

|     |                     |
|-----|---------------------|
| M8  | 20 Nm (14.7 lbf-ft) |
| M10 | 35 Nm (25.8 lbf-ft) |
| M12 | 65 Nm (47.9 lbf-ft) |

| Displacement         |           | Dimensions |      |       |      | ANTI-CLOCKWISE | CLOCKWISE |
|----------------------|-----------|------------|------|-------|------|----------------|-----------|
|                      |           | D          |      | H     |      |                |           |
| cm <sup>3</sup> /rev | cu.in/rev | mm         | in   | mm    | in   |                |           |
| 23.4                 | 1.43      | 89         | 3.50 | 135.8 | 5.35 | 615200201      | 615200202 |
| 28.6                 | 1.74      | 88         | 3.46 | 139.8 | 5.50 | 615200211      | 615200212 |
| 34.4                 | 2.10      | 91.5       | 3.60 | 144.3 | 5.68 | 615200221      | 615200222 |
| 40.3                 | 2.46      | 96         | 3.80 | 148.8 | 5.85 | 615200231      | 615200232 |
| 47.4                 | 2.89      | 104        | 4.09 | 160.3 | 6.31 | 615200241      | 615200242 |
| 55.2                 | 3.37      | 106        | 4.17 | 167.3 | 6.59 | 615200251      | 615200252 |
| 64.3                 | 3.92      | 112        | 4.41 | 173.3 | 6.82 | 615200261      | 615200262 |
| 73.4                 | 4.48      | 115        | 4.53 | 180.3 | 7.10 | 615200271      | 615200272 |



Configuration - G55S3



Ext. Involute Spline  
SAE J498B with outer  
diameter modified 13  
teeth - 16/32 Pitch  
- 30 deg - Flat Root -  
Side fit - Class 1



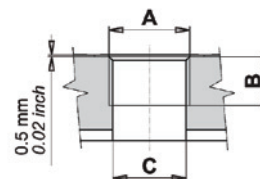
Y → 53 mm (2.09 in.) for displ. 23 to 40  
64 mm (2.52 in.) for displ. 47 to 80



| UNI-DIRECTIONAL |        |               |                |        |               |                 |
|-----------------|--------|---------------|----------------|--------|---------------|-----------------|
| PUMPS           | INLET  |               |                | OUTLET |               |                 |
|                 | A      | B             | C              | A      | B             | C               |
| From 23 to 40   | G1     | 22<br>(0.87") | 30.5<br>(1.2") | G3/4   | 16<br>(0.62") | 24.4<br>(0.96") |
| From 47 to 80   | G1 1/4 | 24<br>(0.94") | 37<br>(1.46")  | G1     | 22<br>(0.87") | 30.5<br>(1.2")  |



|        |                       |
|--------|-----------------------|
| G3/4   | 90 Nm (66.4 lbf-ft)   |
| G1     | 130 Nm (95.8 lbf-ft)  |
| G1 1/4 | 170 Nm (125.4 lbf-ft) |



code G

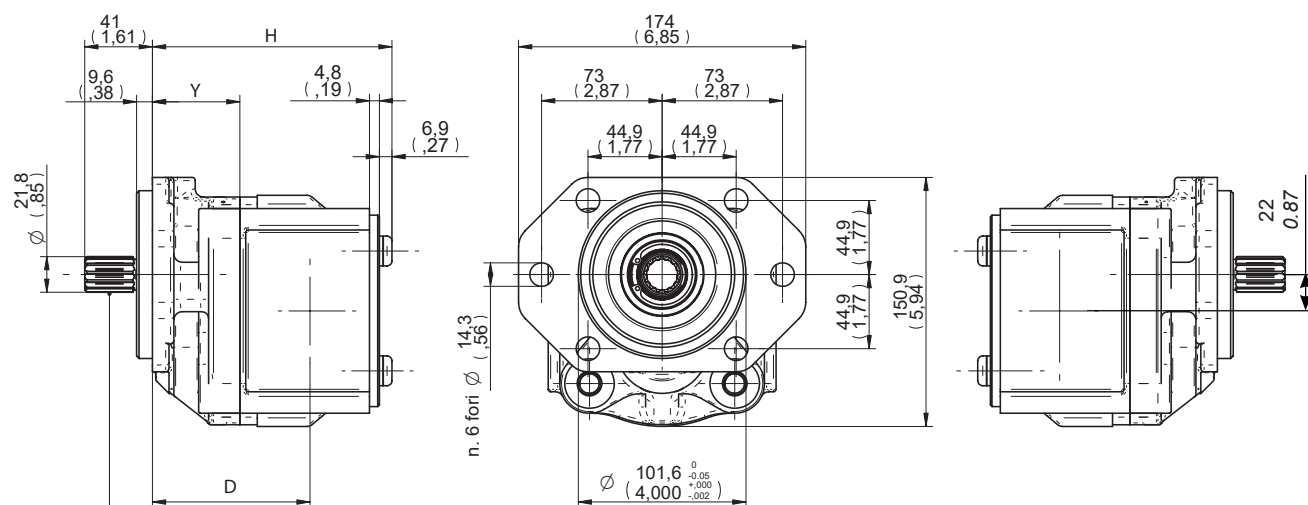
Threaded ports  
GAS (BSPP)

| Displacement         |           | Dimensions |      |       |      | ANTI-CLOCKWISE | CLOCKWISE |
|----------------------|-----------|------------|------|-------|------|----------------|-----------|
|                      |           | D          |      | H     |      |                |           |
| cm <sup>3</sup> /rev | cu.in/rev | mm         | in   | mm    | in   |                |           |
| 23.4                 | 1.43      | 88         | 3.46 | 136.7 | 5.38 | 615200101      | 615200102 |
| 28.6                 | 1.74      | 91         | 3.58 | 140.7 | 5.54 | 615200111      | 615200112 |
| 34.4                 | 2.10      | 95.5       | 3.76 | 145.2 | 5.72 | 615200121      | 615200122 |
| 40.3                 | 2.46      | 100        | 3.94 | 149.7 | 5.89 | 615200131      | 615200132 |
| 47.4                 | 2.89      | 114        | 4.49 | 172.2 | 6.78 | 615200141      | 615200142 |
| 55.2                 | 3.37      | 120        | 4.72 | 179.2 | 7.06 | 615200151      | 615200152 |
| 64.3                 | 3.92      | 122        | 4.80 | 185.2 | 7.29 | 615200161      | 615200162 |
| 73.4                 | 4.48      | 125        | 4.92 | 192.2 | 7.57 | 615200171      | 615200172 |
| 80.6                 | 4.92      | 129        | 5.08 | 198.2 | 7.80 | 615200181      | 615200182 |

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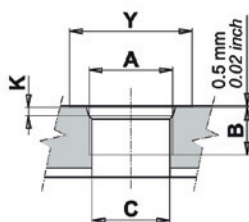
### Configuration - R55S3



Ext. Involute Spline  
SAE J498B with outer  
diameter modified 13  
teeth - 16/32 Pitch  
- 30 deg - Flat Root -  
Side fit - Class 1



Y → 53 mm (2.09 in.) for displ. 23 to 40  
64 mm (2.52 in.) for displ. 47 to 80



code R

Threaded ports  
SAE (ODT)



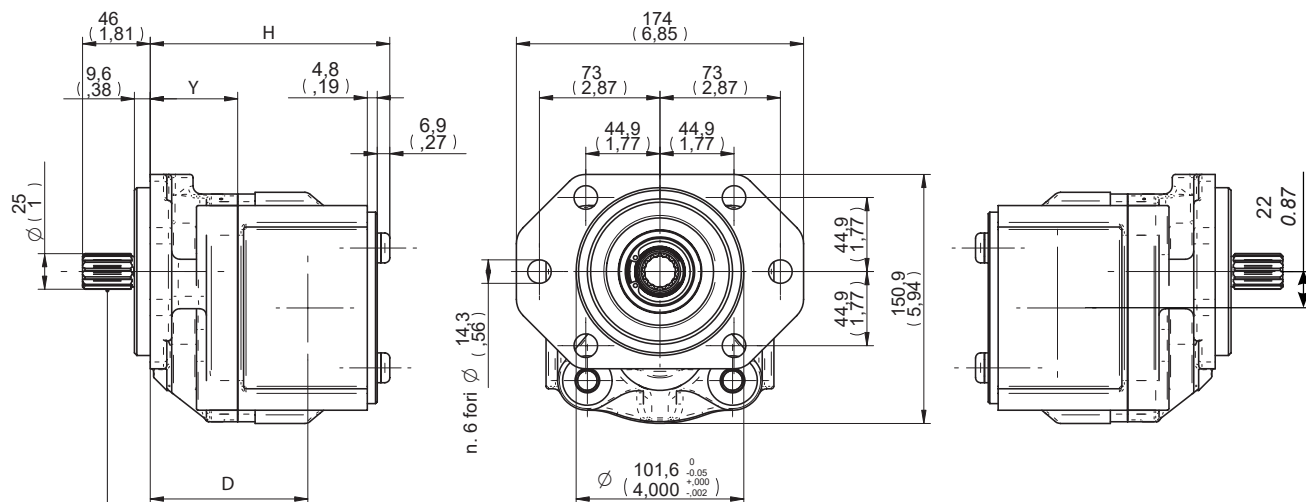
| UNI-DIRECTIONAL |                       |            |              |            |             |                       |            |              |            |             |
|-----------------|-----------------------|------------|--------------|------------|-------------|-----------------------|------------|--------------|------------|-------------|
| PUMPS           | INLET                 |            |              |            |             | OUTLET                |            |              |            |             |
|                 | A                     | B          | C            | Y          | K           | A                     | B          | C            | Y          | K           |
| From 23 to 40   | 1-5/16-12 UN (SAE 16) | 19 (0.75") | 31 (1.22")   | 49 (1.93") | 3.3 (0.13") | 1-1/16-12 UN (SAE 12) | 19 (0.75") | 24.7 (0.97") | 41 (1.16") | 3.3 (0.13") |
| From 47 to 80   | 1-5/8-12 UN (SAE 20)  | 19 (0.75") | 38.9 (1.53") | 58 (2.28") | 3.3 (0.13") | 1-5/16-12 UN (SAE 16) | 19 (0.75") | 31 (1.22")   | 49 (1.93") | 3.3 (0.13") |

|       |                       |
|-------|-----------------------|
| SAE12 | 90 Nm (66.4 lbf-ft)   |
| SAE16 | 130 Nm (95.8 lbf-ft)  |
| SAE20 | 170 Nm (125.4 lbf-ft) |

| Displacement         |           | Dimensions |      |       |      | ANTI-CLOCKWISE | CLOCKWISE |
|----------------------|-----------|------------|------|-------|------|----------------|-----------|
|                      |           | D          |      | H     |      |                |           |
| cm <sup>3</sup> /rev | cu.in/rev | mm         | in   | mm    | in   |                |           |
| 23.4                 | 1.43      | 88         | 3.46 | 136.7 | 5.38 | 615200001      | 615200002 |
| 28.6                 | 1.74      | 91         | 3.58 | 140.7 | 5.54 | 615200011      | 615200012 |
| 34.4                 | 2.10      | 95.5       | 3.76 | 145.2 | 5.72 | 615200021      | 615200022 |
| 40.3                 | 2.46      | 100        | 3.94 | 149.7 | 5.89 | 615200031      | 615200032 |
| 47.4                 | 2.89      | 114        | 4.49 | 172.2 | 6.78 | 615200041      | 615200042 |
| 55.2                 | 3.37      | 120        | 4.72 | 179.2 | 7.06 | 615200051      | 615200052 |
| 64.3                 | 3.92      | 122        | 4.80 | 185.2 | 7.29 | 615200061      | 615200062 |
| 73.4                 | 4.48      | 125        | 4.92 | 192.2 | 7.57 | 615200071      | 615200072 |
| 80.6                 | 4.92      | 129        | 5.08 | 198.2 | 7.80 | 615200081      | 615200082 |



Configuration - W56S3



Ext. Involute Spline  
SAE J498B with outer  
diameter modified 15  
teeth - 16/32 Pitch  
- 30 deg - Flat Root -  
Side fit - Class 1



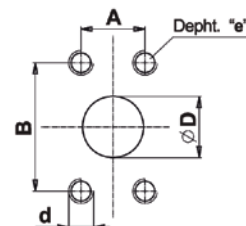
Y → 53 mm (2.09 in.) for displ. 23 to 40  
64 mm (2.52 in.) for displ. 47 to 80



| PUMPS            | UNI-DIRECTIONAL |                  |                  |     |               |               |                  |                  |     |               |
|------------------|-----------------|------------------|------------------|-----|---------------|---------------|------------------|------------------|-----|---------------|
|                  | INLET           |                  |                  |     |               | OUTLET        |                  |                  |     |               |
|                  | ØD              | B                | A                | d   | e             | ØD            | B                | A                | d   | e             |
| From 23<br>to 47 | 32<br>(1.26")   | 58.72<br>(2.31") | 38.18<br>(1.19") | M10 | 18<br>(0.71") | 19<br>(0.75") | 47.6<br>(1.87")  | 22.2<br>(0.87")  | M10 | 18<br>(0.71") |
| From 55<br>to 80 | 39.3<br>(1.55") | 69.8<br>(2.75")  | 35.7<br>(1.40")  | M12 | 15<br>(0.59") | 32<br>(1.26") | 58.72<br>(2.31") | 30.18<br>(1.19") | M10 | 18<br>(0.71") |



|     |                     |
|-----|---------------------|
| M10 | 35 Nm (25.8 lbf-ft) |
| M12 | 65 Nm (47.9 lbf-ft) |



code W

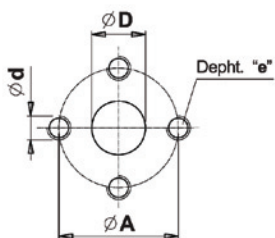
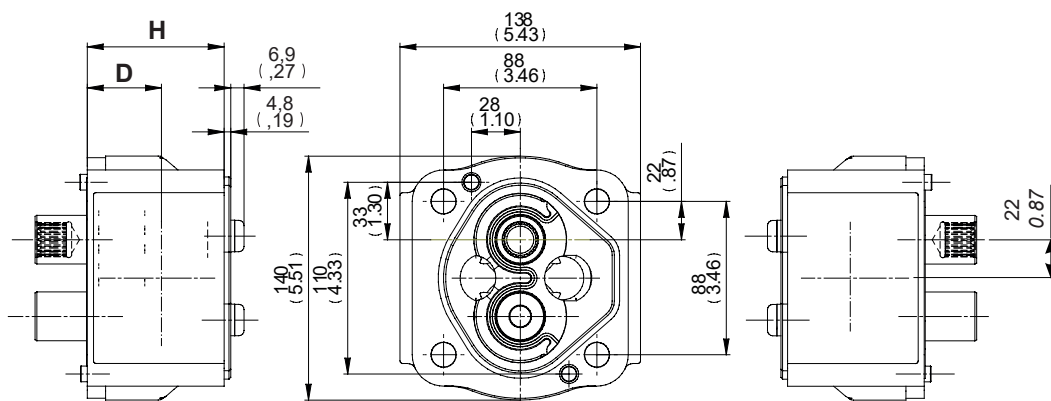
Flanged ports  
SAE J518  
METRIC THREAD

| Displacement         |           | Dimensions |      |       |      | ANTI-CLOCKWISE | CLOCKWISE |
|----------------------|-----------|------------|------|-------|------|----------------|-----------|
|                      |           | D          |      | H     |      |                |           |
| cm <sup>3</sup> /rev | cu.in/rev | mm         | in   | mm    | in   |                |           |
| 23.4                 | 1.43      | 84         | 3.31 | 136.7 | 5.38 | 615200411      | 615200412 |
| 28.6                 | 1.74      | 88         | 3.46 | 140.7 | 5.54 | 615200421      | 615200422 |
| 34.4                 | 2.10      | 92.5       | 3.64 | 145.2 | 5.72 | 615200431      | 615200432 |
| 40.3                 | 2.46      | 97         | 3.82 | 149.7 | 5.89 | 615200441      | 615200442 |
| 47.4                 | 2.89      | 114        | 4.49 | 172.2 | 6.78 | 615200451      | 615200452 |
| 55.2                 | 3.37      | 120        | 4.72 | 178.2 | 7.02 | 615200461      | 615200462 |
| 64.3                 | 3.92      | 122        | 4.80 | 185.2 | 7.29 | 615200471      | 615200472 |
| 73.4                 | 4.48      | 125        | 4.92 | 192.2 | 7.57 | 615200481      | 615200482 |
| 80.6                 | 4.92      | 129        | 5.08 | 198.2 | 7.80 | 615200491      | 615200492 |

EO.152.0423.05.00IM02



### Configuration - P63-R



code P

Flanged ports  
european standard



| UNI-DIRECTIONAL  |               |               |     |               |               |               |     |               |
|------------------|---------------|---------------|-----|---------------|---------------|---------------|-----|---------------|
| PUMPS            | INLET         |               |     |               | OUTLET        |               |     |               |
|                  | Ø D           | Ø A           | d   | e             | Ø D           | Ø A           | d   | e             |
| 23               | 20<br>(0.79") | 40<br>(1.57") | M8  | 16<br>(0.63") | 16<br>(0.63") | 40<br>(1.57") | M8  | 16<br>(0.63") |
| From 28<br>to 47 | 27<br>(1.07") | 51<br>(2.01") | M10 | 16<br>(0.63") | 16<br>(0.63") | 40<br>(1.57") | M8  | 16<br>(0.63") |
| From 55<br>to 72 | 33<br>(1.3")  | 62<br>(2.44") | M12 | 16<br>(0.63") | 21<br>(0.83") | 51<br>(2.01") | M10 | 16<br>(0.63") |

|     |                     |
|-----|---------------------|
| M8  | 20 Nm (14.7 lbf-ft) |
| M10 | 35 Nm (25.8 lbf-ft) |
| M12 | 65 Nm (47.9 lbf-ft) |

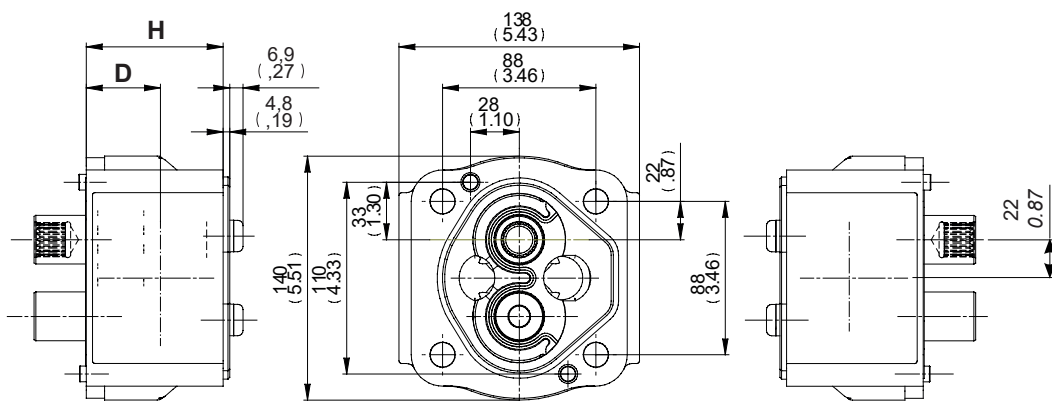


| Displacement         |           | Dimensions |      |       |      | ANTI-CLOCKWISE | CLOCKWISE |
|----------------------|-----------|------------|------|-------|------|----------------|-----------|
|                      |           | D          |      | H     |      |                |           |
| cm <sup>3</sup> /rev | cu.in/rev | mm         | in   | mm    | in   |                |           |
| 23.4                 | 1.43      | 35         | 1.38 | 70    | 2.76 | 615210011      | 615210012 |
| 28.6                 | 1.74      | 34         | 1.34 | 74    | 2.91 | 615210021      | 615210022 |
| 34.4                 | 2.10      | 37.5       | 1.48 | 78.5  | 3.09 | 615210031      | 615210032 |
| 40.3                 | 2.46      | 42         | 1.65 | 83    | 3.27 | 615210041      | 615210042 |
| 47.4                 | 2.89      | 50         | 1.97 | 94.5  | 3.72 | 615210051      | 615210052 |
| 55.2                 | 3.37      | 52         | 2.05 | 100.5 | 3.96 | 615210061      | 615210062 |
| 64.3                 | 3.92      | 58         | 2.28 | 107.5 | 4.23 | 615210071      | 615210072 |
| 73.4                 | 4.48      | 61         | 2.40 | 114.5 | 4.51 | 615210081      | 615210082 |

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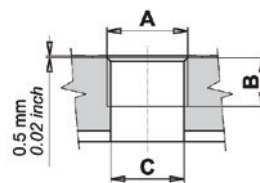
Configuration - G63-R



| UNI-DIRECTIONAL |        |               |                |        |               |                 |
|-----------------|--------|---------------|----------------|--------|---------------|-----------------|
| PUMPS           | INLET  |               |                | OUTLET |               |                 |
|                 | A      | B             | C              | A      | B             | C               |
| From 23 to 40   | G1     | 22<br>(0.87") | 30.5<br>(1.2") | G3/4   | 16<br>(0.62") | 24.4<br>(0.96") |
| From 47 to 80   | G1 1/4 | 24<br>(0.94") | 37<br>(1.46")  | G1     | 22<br>(0.87") | 30.5<br>(1.2")  |



|        |                       |
|--------|-----------------------|
| G3/4   | 90 Nm (66.4 lbf-ft)   |
| G1     | 130 Nm (95.8 lbf-ft)  |
| G1 1/4 | 170 Nm (125.4 lbf-ft) |



code G

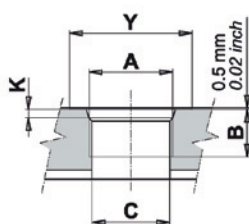
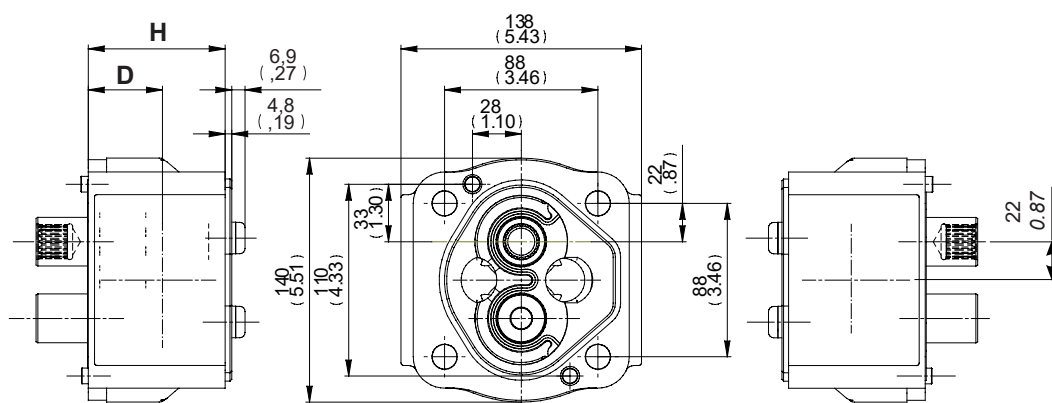
Threaded ports  
GAS (BSPP)

| Displacement |           | Dimensions |      |       |      | ANTI-CLOCKWISE | CLOCKWISE |
|--------------|-----------|------------|------|-------|------|----------------|-----------|
|              |           | D          |      | H     |      |                |           |
| cm³/rev      | cu.in/rev | mm         | in   | mm    | in   |                |           |
| 23.4         | 1.43      | 35         | 1.38 | 70    | 2.76 | 615210091      | 615210092 |
| 28.6         | 1.74      | 38         | 1.50 | 74    | 2.91 | 615210101      | 615210102 |
| 34.4         | 2.10      | 42.5       | 1.67 | 78.5  | 3.09 | 615210111      | 615210112 |
| 40.3         | 2.46      | 47         | 1.85 | 83    | 3.27 | 615210121      | 615210122 |
| 47.4         | 2.89      | 50         | 1.97 | 94.5  | 3.72 | 615210131      | 615210132 |
| 55.2         | 3.37      | 56         | 2.20 | 100.5 | 3.96 | 615210141      | 615210142 |
| 64.3         | 3.92      | 58         | 2.28 | 107.5 | 4.23 | 615210151      | 615210152 |
| 73.4         | 4.48      | 61         | 2.40 | 114.5 | 4.51 | 615210161      | 615210162 |

E0.152.0423.05.00IM02



## Configuration - R63-R



code R

Threaded ports  
SAE (ODT)

| UNI-DIRECTIONAL |                       |            |              |            |             |                       |            |              |            |             |
|-----------------|-----------------------|------------|--------------|------------|-------------|-----------------------|------------|--------------|------------|-------------|
| PUMPS           | INLET                 |            |              |            |             | OUTLET                |            |              |            |             |
|                 | A                     | B          | C            | Y          | K           | A                     | B          | C            | Y          | K           |
| From 23 to 40   | 1-5/16-12 UN (SAE 16) | 19 (0.75") | 31 (1.22")   | 49 (1.93") | 3.3 (0.13") | 1-1/16-12 UN (SAE 12) | 19 (0.75") | 24.7 (0.97") | 41 (1.16") | 3.3 (0.13") |
| From 47 to 80   | 1-5/8-12 UN (SAE 20)  | 19 (0.75") | 38.9 (1.53") | 58 (2.28") | 3.3 (0.13") | 1-5/16-12 UN (SAE 16) | 19 (0.75") | 31 (1.22")   | 49 (1.93") | 3.3 (0.13") |

|       |                       |
|-------|-----------------------|
| SAE12 | 90 Nm (66.4 lbf-ft)   |
| SAE16 | 130 Nm (95.8 lbf-ft)  |
| SAE20 | 170 Nm (125.4 lbf-ft) |

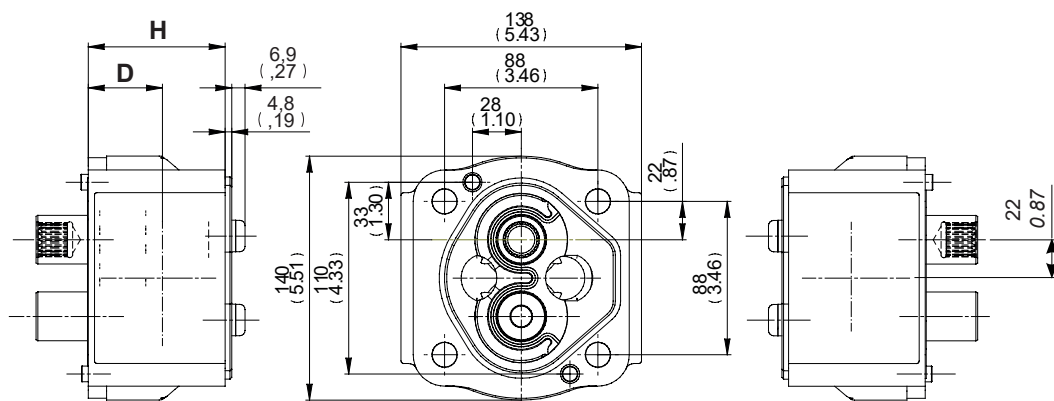


| Displacement         |           | Dimensions |      |       |      | ANTI-CLOCKWISE | CLOCKWISE |
|----------------------|-----------|------------|------|-------|------|----------------|-----------|
|                      |           | D          |      | H     |      |                |           |
| cm <sup>3</sup> /rev | cu.in/rev | mm         | in   | mm    | in   |                |           |
| 23.4                 | 1.43      | 35         | 1.38 | 70    | 2.76 | 615210171      | 615210172 |
| 28.6                 | 1.74      | 38         | 1.50 | 74    | 2.91 | 615210181      | 615210182 |
| 34.4                 | 2.10      | 42.5       | 1.67 | 78.5  | 3.09 | 615210191      | 615210192 |
| 40.3                 | 2.46      | 47         | 1.85 | 83    | 3.27 | 615210201      | 615210202 |
| 47.4                 | 2.89      | 50         | 1.97 | 94.5  | 3.72 | 615210211      | 615210212 |
| 55.2                 | 3.37      | 56         | 2.20 | 100.5 | 3.96 | 615210221      | 615210222 |
| 64.3                 | 3.92      | 58         | 2.28 | 107.5 | 4.23 | 615210231      | 615210232 |
| 73.4                 | 4.48      | 61         | 2.40 | 114.5 | 4.51 | 615210241      | 615210242 |

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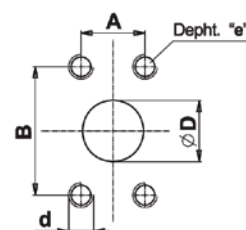
Configuration - W63-R



| PUMPS         | UNI-DIRECTIONAL |                  |                  |     |               |               |                  |                  |     |               |
|---------------|-----------------|------------------|------------------|-----|---------------|---------------|------------------|------------------|-----|---------------|
|               | INLET           |                  |                  |     |               | OUTLET        |                  |                  |     |               |
|               | ØD              | B                | A                | d   | e             | ØD            | B                | A                | d   | e             |
| From 23 to 47 | 32<br>(1.26")   | 58.72<br>(2.31") | 38.18<br>(1.19") | M10 | 18<br>(0.71") | 19<br>(0.75") | 47.6<br>(1.87")  | 22.2<br>(0.87")  | M10 | 18<br>(0.71") |
| From 55 to 80 | 39.3<br>(1.55") | 69.8<br>(2.75")  | 35.7<br>(1.40")  | M12 | 15<br>(0.59") | 32<br>(1.26") | 58.72<br>(2.31") | 30.18<br>(1.19") | M10 | 18<br>(0.71") |



|     |                     |
|-----|---------------------|
| M10 | 35 Nm (25.8 lbf-ft) |
| M12 | 65 Nm (47.9 lbf-ft) |



code W

Flanged ports  
SAE J518  
METRIC THREAD

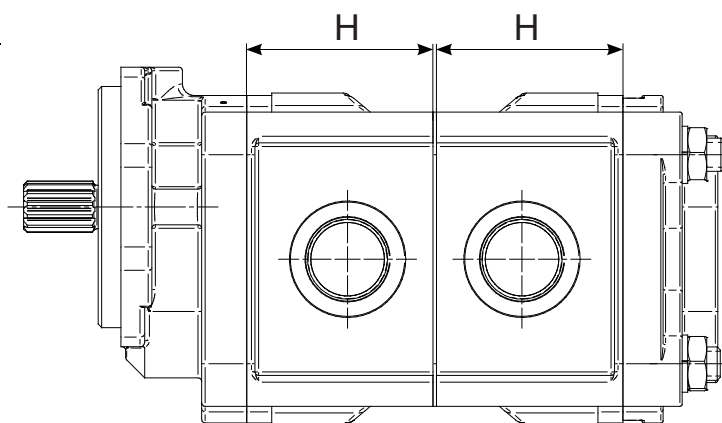
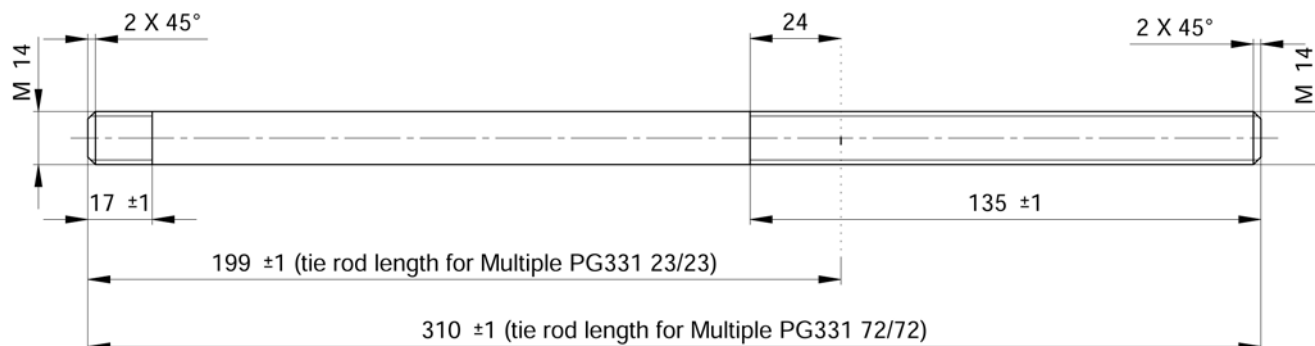
| Displacement |           | Dimensions |      |       |      | ANTI-CLOCKWISE | CLOCKWISE |
|--------------|-----------|------------|------|-------|------|----------------|-----------|
|              |           | D          |      | H     |      |                |           |
| cm³/rev      | cu.in/rev | mm         | in   | mm    | in   |                |           |
| 23.4         | 1.43      | 31         | 1.22 | 70    | 2.76 | 615210251      | 615210252 |
| 28.6         | 1.74      | 35         | 1.38 | 74    | 2.91 | 615210261      | 615210262 |
| 34.4         | 2.10      | 39.5       | 1.56 | 78.5  | 3.09 | 615210271      | 615210272 |
| 40.3         | 2.46      | 44         | 1.73 | 83    | 3.27 | 615210281      | 615210282 |
| 47.4         | 2.89      | 50         | 1.97 | 94.5  | 3.72 | 615210291      | 615210292 |
| 55.2         | 3.37      | 56         | 2.20 | 100.5 | 3.96 | 615210301      | 615210302 |
| 64.3         | 3.92      | 58         | 2.28 | 107.5 | 4.23 | 615210311      | 615210312 |
| 73.4         | 4.48      | 61         | 2.40 | 114.5 | 4.51 | 615210321      | 615210322 |

E0.152.0423.05.00IM02



## Appendix A - Tie rods length calculation (Multiple pump)

1°- 2° Stages (tie rods 339514937 M14X310 CL. 10.9)



To calculate the length of tie rods, you have to make the sum of all these lengths:  
 $(H)+H)+(1)+(2)+(3)+(4)+(5)+(6)$



For cutting length calculation an automatic excel file is available, please contact our sales department.

Table for the double PG331 tie-rod calculation

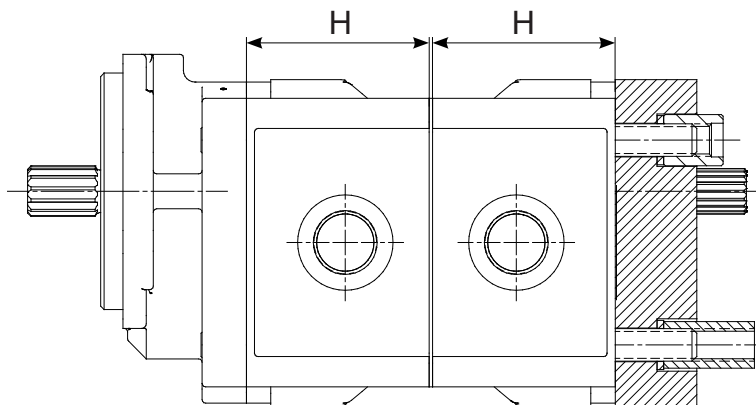
| TYPE |                                                                    |          | 23           | 28         | 34           | 40         | 47           | 55            | 64            | 72            |
|------|--------------------------------------------------------------------|----------|--------------|------------|--------------|------------|--------------|---------------|---------------|---------------|
| (H)  | Dimension H                                                        | mm<br>in | 70<br>2.76   | 74<br>2.91 | 78.5<br>3.09 | 83<br>3.27 | 94.5<br>3.72 | 100.5<br>3.96 | 107.5<br>4.23 | 114.5<br>4.51 |
| (1)  | Spessore filetto in presa sulla flangia<br>Grip length             | mm<br>in | 22<br>0.87   |            |              |            |              |               |               |               |
| (2)  | Spessore coperchio std.<br>Thickness of the std. cover             | mm<br>in | 26.5<br>1.04 |            |              |            |              |               |               |               |
| (3)  | Spessore dado M14 UNI5588<br>Thickness of the nut M14 UNI5588      | mm<br>in | 11<br>0.43   |            |              |            |              |               |               |               |
| (4)  | Spessore rondella UNI9195<br>Thickness of the washer UNI9195       | mm<br>in | 3.5<br>0.14  |            |              |            |              |               |               |               |
| (5)  | Spessore piastra PG331/PG331<br>Thickness of the plate PG331/PG331 | mm<br>in | 1.5<br>0.06  |            |              |            |              |               |               |               |
| (6)  | Sporgenza sulle estremità del tirante<br>Overhang on the tie-rods  | mm<br>in | 8<br>0.31    |            |              |            |              |               |               |               |

EO.152.0423.05.00IM02



## Appendix B - Tie rods length calculation and Screws (Triple pump)

1° - 2° Stages (tie rods 339514937 M14X310 CL. 10.9)



To calculate the length of tie rods, you have to make the sum of all these lengths:  
 $(H) + (H) + (1) + [(2) \text{ Displ. 23-40 cc or } (3) \text{ Displ. 47-72 cc}] + (4)$

Table for tie-rod calculation of a double PG331 pre-arranged to become a triple or quadruple PG331

| TYPE |                                                                    |          | 23           | 28         | 34           | 40         | 47           | 55            | 64            | 72            |
|------|--------------------------------------------------------------------|----------|--------------|------------|--------------|------------|--------------|---------------|---------------|---------------|
| (H)  | Dimension H                                                        | mm<br>in | 70<br>2.76   | 74<br>2.91 | 78.5<br>3.09 | 83<br>3.27 | 94.5<br>3.72 | 100.5<br>3.96 | 107.5<br>4.23 | 114.5<br>4.51 |
| (1)  | Spessore filetto in presa sulla flangia<br>Grip length             | mm<br>in | 22<br>0.87   |            |              |            |              |               |               |               |
| (2)  | Lunghezza fissa cil. 23 - 40<br>Fixed length for displ. 23 - 40    | mm<br>in | 34.5<br>1.36 |            |              |            |              |               |               |               |
| (3)  | Lunghezza fissa cil. 47 - 72<br>Fixed length for displ. 47 - 72    | mm<br>in | 40.5<br>1.59 |            |              |            |              |               |               |               |
| (4)  | Spessore piastra PG331/PG331<br>Thickness of the plate PG331/PG331 | mm<br>in | 1.5<br>0.06  |            |              |            |              |               |               |               |

3° Stage/Rear pump (screws M14 TCEI UNI 5931 - CL. 12.9 - Burnished)

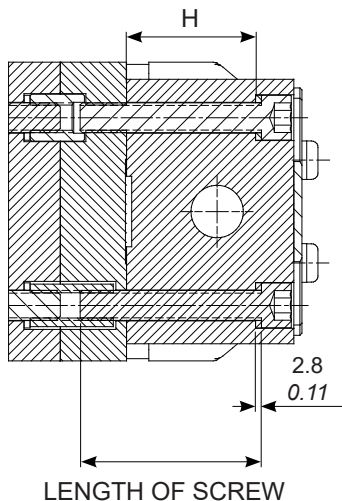


Tabella lunghezze viti TCEI PG331 terzo stadio  
Table for third stage PG331 length of TCEI screws

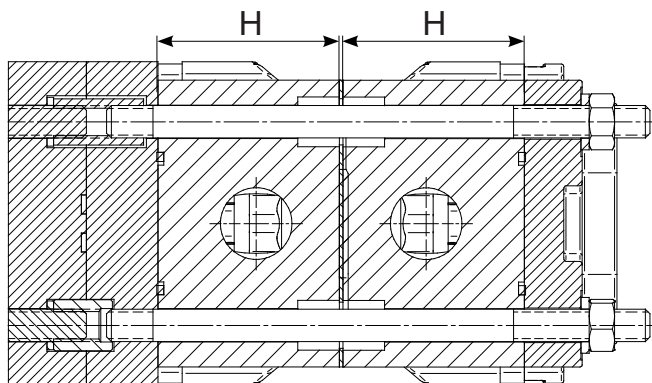
| DISPLACEMENT<br>OF THE THIRD STAGE | LENGTH OF SCREW | CODE      |
|------------------------------------|-----------------|-----------|
| 23                                 | 75              | 790677900 |
|                                    | 2.95            |           |
| 28                                 | 80              | 790622900 |
|                                    | 3.15            |           |
| 34                                 | 85              | 790623000 |
|                                    | 3.35            |           |
| 40                                 | 90              | 790623100 |
|                                    | 3.54            |           |
| 47                                 | 110             | 790677431 |
|                                    | 4.33            |           |
| 55                                 | 110             | 790677431 |
|                                    | 4.33            |           |
| 64                                 | 120             | 790623400 |
|                                    | 4.72            |           |
| 72                                 | 130             | 790623500 |
|                                    | 5.12            |           |

EO.152.0423.05.001M02



## Appendix C - Tie rods length calculation (Quadruple pump)

3°- 4° Stages (tie rods 339514937 M14X310 CL. 10.9)



To calculate the length of tie rods, you have to make the sum of all these lengths:  
 $(H)+H)+(1)+(2)+(3)+(4)+(5)+(6)$

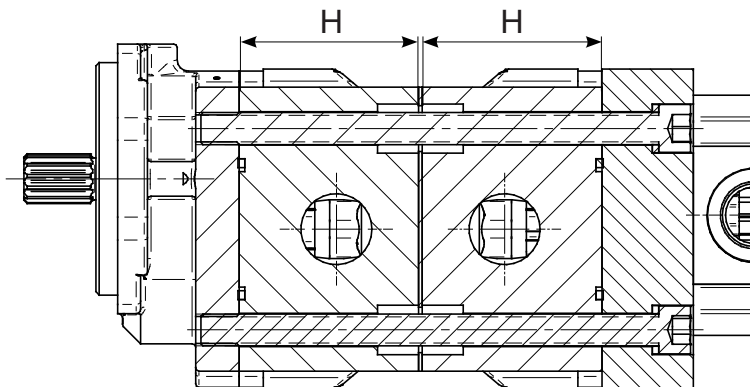
Table for the double PG331 tie-rod calculation

| TYPE |                                                                    |          | 23           | 28         | 34           | 40         | 47           | 55            | 64            | 72            |
|------|--------------------------------------------------------------------|----------|--------------|------------|--------------|------------|--------------|---------------|---------------|---------------|
| (H)  | Dimension H                                                        | mm<br>in | 70<br>2.76   | 74<br>2.91 | 78.5<br>3.09 | 83<br>3.27 | 94.5<br>3.72 | 100.5<br>3.96 | 107.5<br>4.23 | 114.5<br>4.51 |
| (1)  | Spessore filetto in presa sulla flangia<br>Grip length             | mm<br>in | 22<br>0.87   |            |              |            |              |               |               |               |
| (2)  | Spessore coperchio std.<br>Thickness of the std. cover             | mm<br>in | 26.5<br>1.04 |            |              |            |              |               |               |               |
| (3)  | Spessore dado M14 UNI5588<br>Thickness of the nut M14 UNI5588      | mm<br>in | 11<br>0.43   |            |              |            |              |               |               |               |
| (4)  | Spessore rondella UNI9195<br>Thickness of the washer UNI9195       | mm<br>in | 3.5<br>0.14  |            |              |            |              |               |               |               |
| (5)  | Spessore piastra PG331/PG331<br>Thickness of the plate PG331/PG331 | mm<br>in | 1.5<br>0.06  |            |              |            |              |               |               |               |
| (6)  | Sporgenza sulle estremità del tirante<br>Overhang on the tie-rods  | mm<br>in | 8<br>0.31    |            |              |            |              |               |               |               |



## Appendix D - Screws (Multiple PG331+2PE)

1° - 2° Stages (screws M14 TCEI UNI 5931 - CL. 12.9 - Burnished)

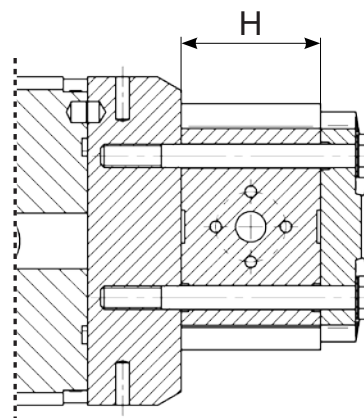
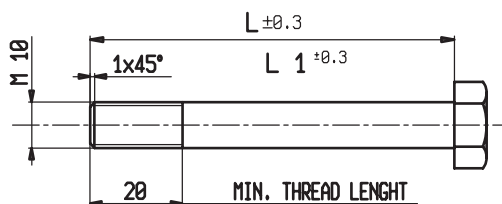


To calculate the length of tie rods, you have to make the sum of all these lengths:  
**(H)+(H)+(1)+[(2) Displ. 23-40 cc or (3) Displ. 47-72 cc ]**

Table for double PG331 with 2PE TCEI screw calculation

| Table for double PG331 with 2PE TCEI screw calculation |                                                                        |          |            |            |              |            |              |               |               |               |
|--------------------------------------------------------|------------------------------------------------------------------------|----------|------------|------------|--------------|------------|--------------|---------------|---------------|---------------|
| TYPE                                                   |                                                                        |          | 23         | 28         | 34           | 40         | 47           | 55            | 64            | 72            |
| (H)                                                    | Dimension H                                                            | mm<br>in | 70<br>2.76 | 74<br>2.91 | 78.5<br>3.09 | 83<br>3.27 | 94.5<br>3.72 | 100.5<br>3.96 | 107.5<br>4.23 | 114.5<br>4.51 |
| (1)                                                    | Spessore filetto in presa sulla flangia<br><i>Grip length</i>          | mm<br>in | 20<br>0.79 |            |              |            |              |               |               |               |
| (2)                                                    | Lunghezza fissa cil. 23 - 40<br><i>Fixed length for displ. 23 - 40</i> | mm<br>in | 25<br>0.98 |            |              |            |              |               |               |               |
| (3)                                                    | Lunghezza fissa cil. 47 - 72<br><i>Fixed lenath for displ. 47 - 72</i> | mm<br>in | 31<br>1.22 |            |              |            |              |               |               |               |

2PE Rear pump (screws M10 UNI 5737 - CL. 10.9)

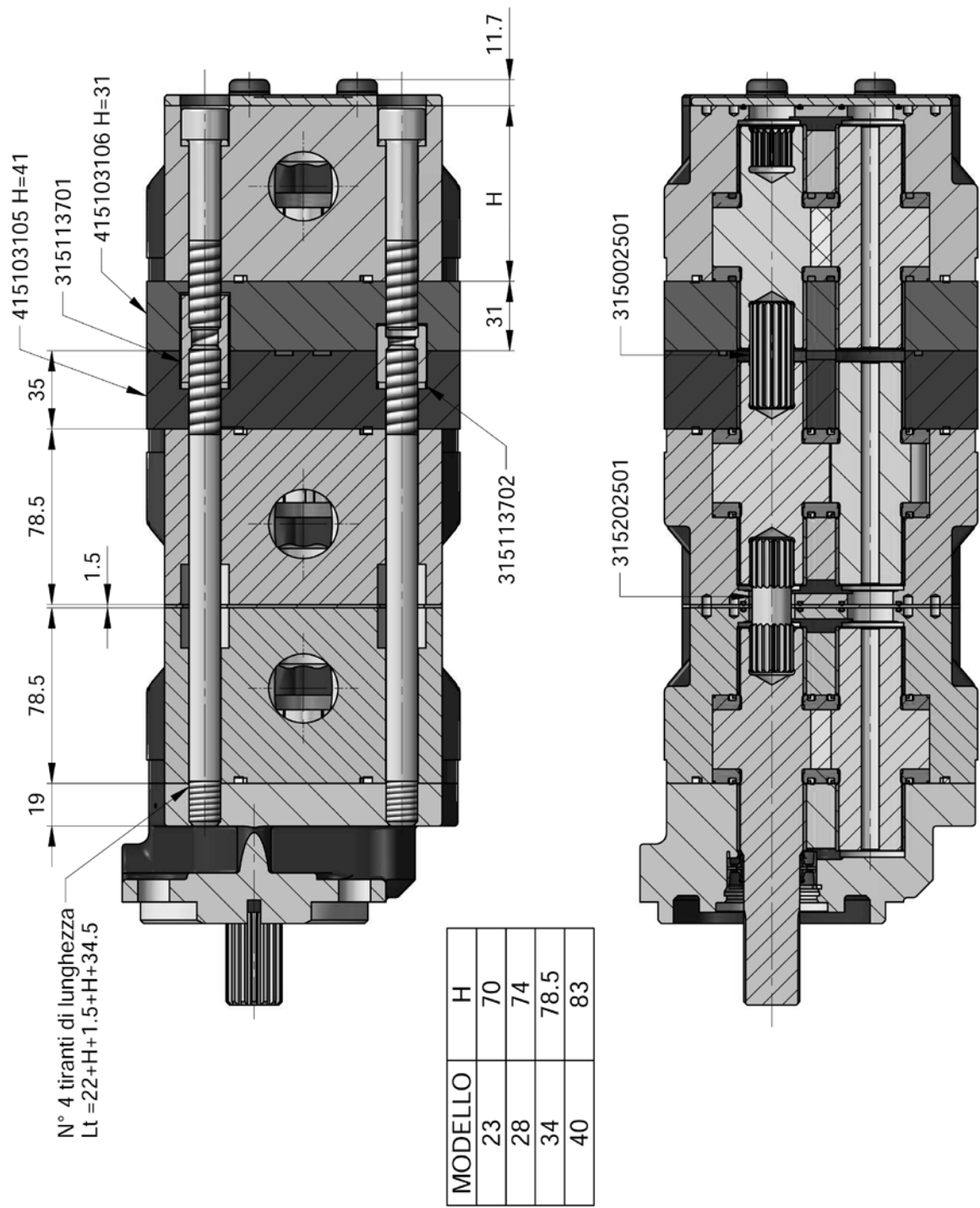


| DISPLACEMENT    | BODY<br>H | FLANGE (H=19)     |             | *SR* WASHER THICKN. |             |
|-----------------|-----------|-------------------|-------------|---------------------|-------------|
|                 |           | SCREW LENGTH M 10 |             | *SR*                | CODE        |
|                 |           | L1                | CODE        |                     |             |
| 3.2-3.9-4.5-6.2 | 47.1      | 80                | 7901 170 31 | 1                   | 7952 524 51 |
| 5.5             | 48.6      | 80                | 7901 170 31 | 1                   | 7952 524 51 |
| 8.3             | 52.8      | 85                | 7901 171 31 | 1                   | 7952 524 51 |
| 10.5            | 56.3      | 90                | 7901 172 31 | 2.2                 | 7952 396 51 |
| 11.3-12.5       | 59.7      | 90                | 7901 172 31 | 1                   | 7952 524 51 |
| 13.8            | 63.5      | 95                | 7901 173 31 | 1                   | 7952 524 51 |
| 16              | 67.5      | 100               | 7901 174 31 | 1                   | 7952 524 51 |
| 19              | 75.6      | 110               | 7901 176 31 | 2.2                 | 7952 396 51 |
| 22.5            | 81        | 115               | 7901 177 31 | 2.2                 | 7952 396 51 |
| 26              | 86.8      | 120               | 7901 178 31 | 1                   | 7952 524 51 |

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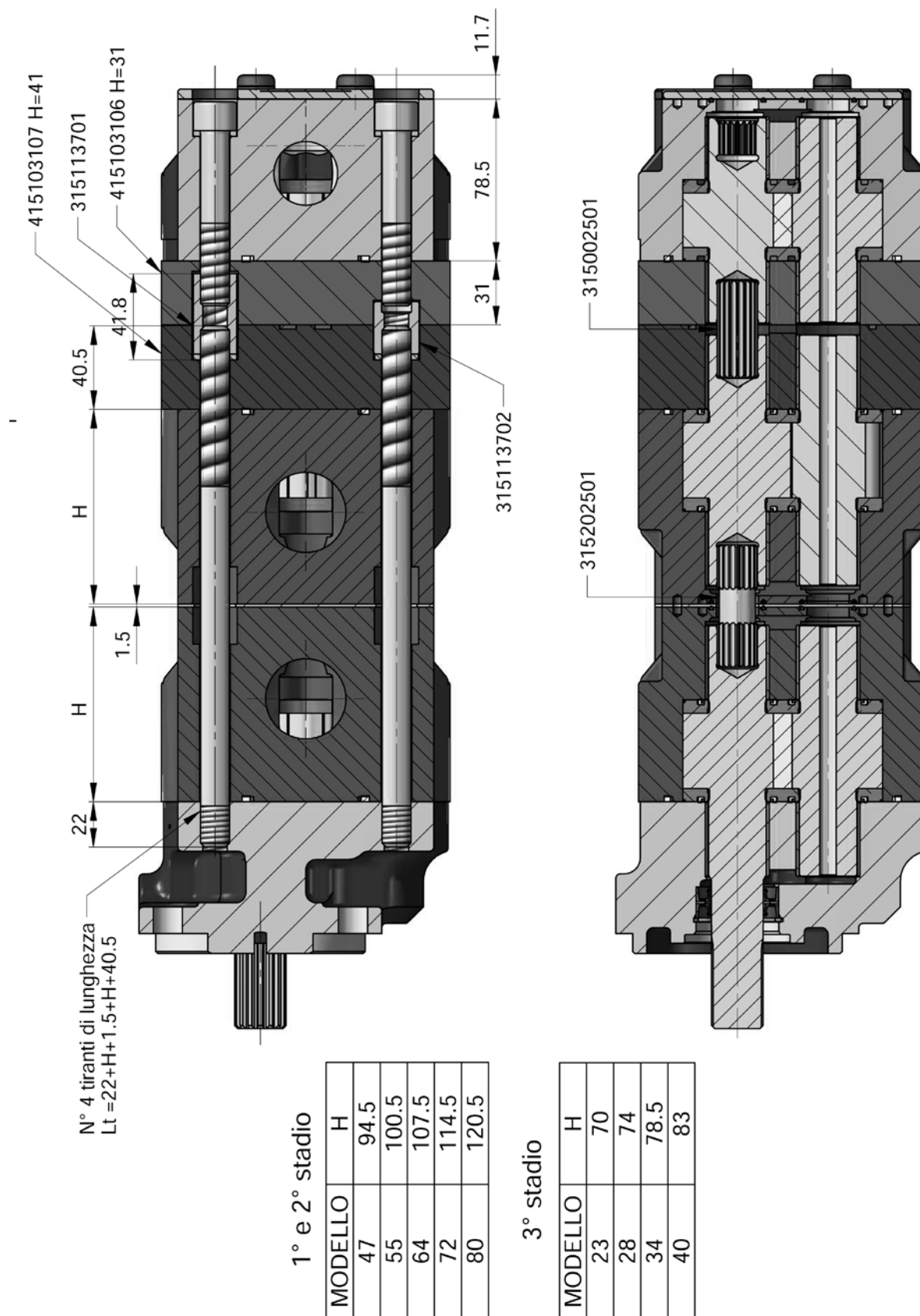
Appendix E - (Triple pump) 1°/2°/3° Stage Displ. 23-40 cc



EO.152.0423.05.00IM02



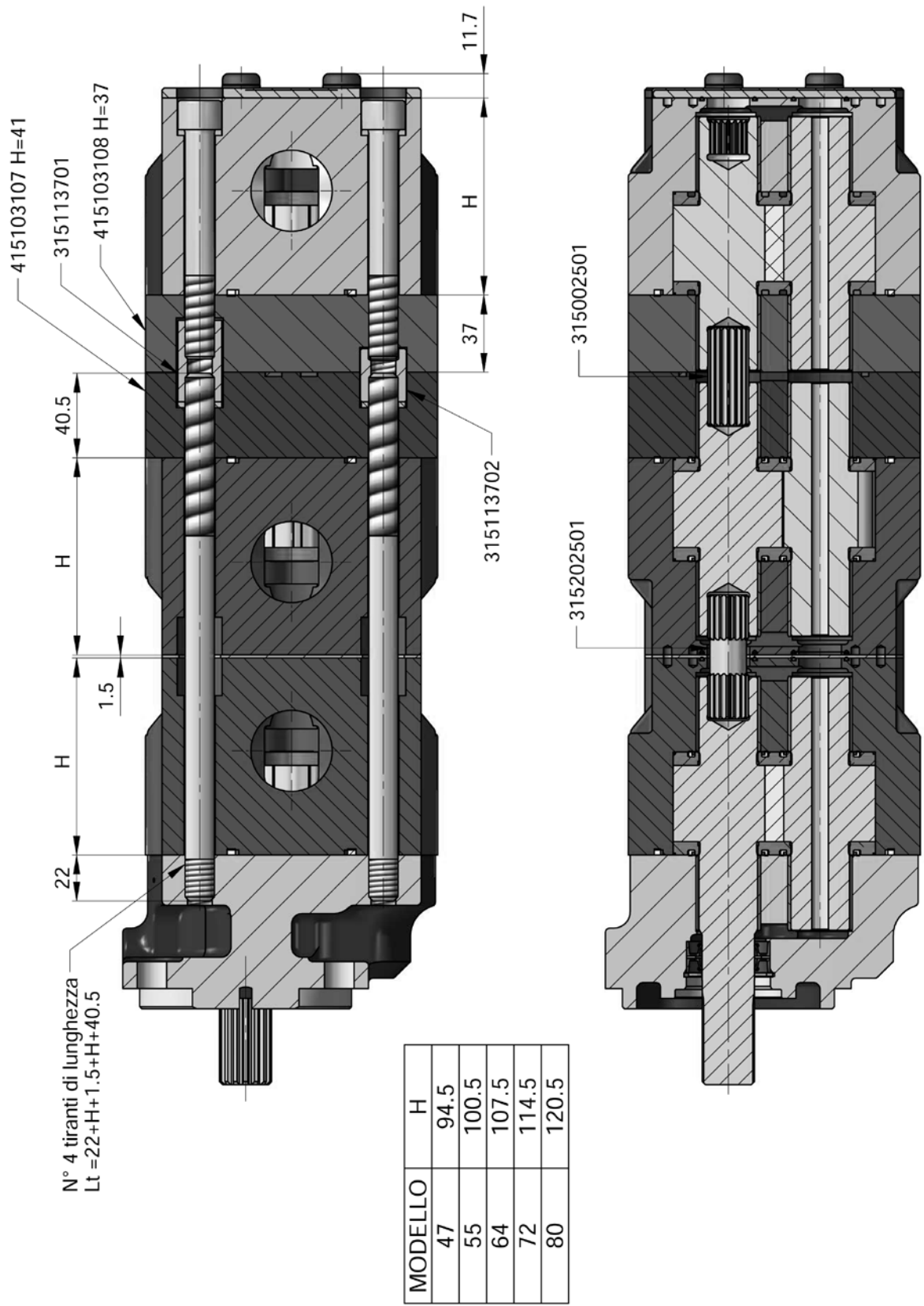
Appendix E - (Triple pump) 1°/2° Stage Displ. 47-80 cc/3° Stage Displ. 23-40 cc



EO.152.0423.05.00IM02



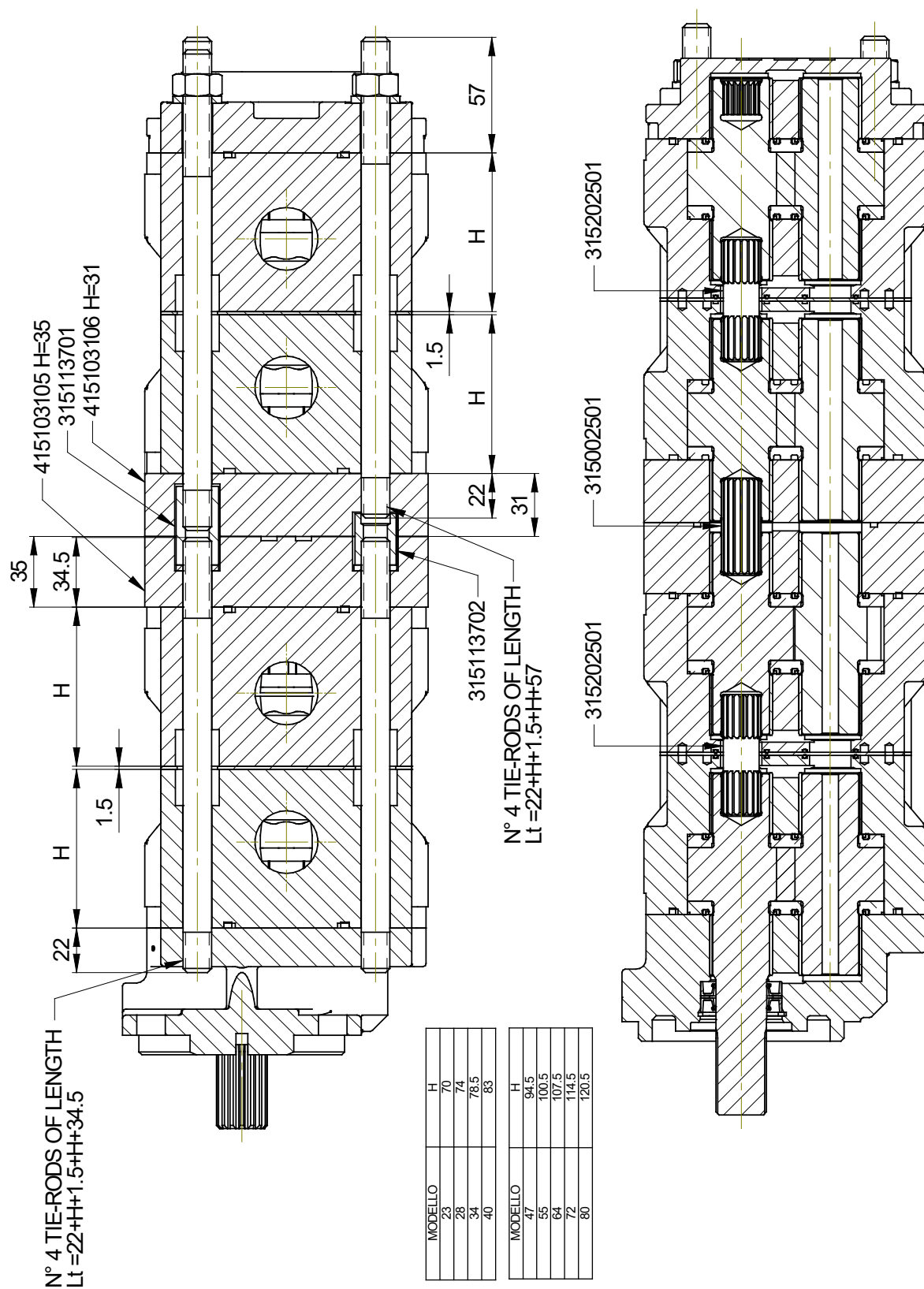
Appendix E - (Triple pump) 1°/2°+3° Stage Displ. 47-80 cc



EO.152.0423.05.00IM02



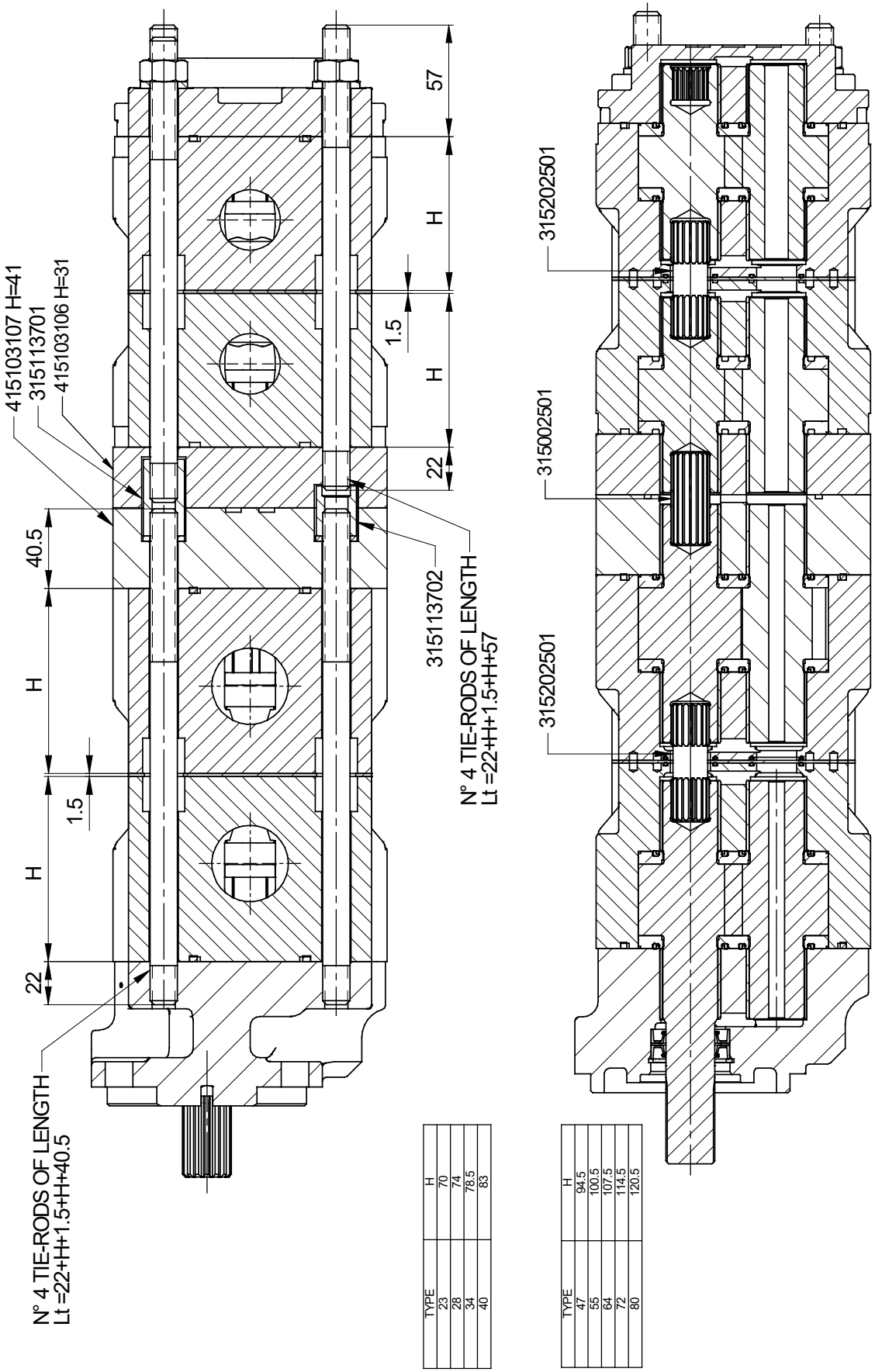
Appendix F - (Quadruple pump) 1°/2°+3°/4° Stage Displ. 23-40 cc



EO.152.0423.05.001M02



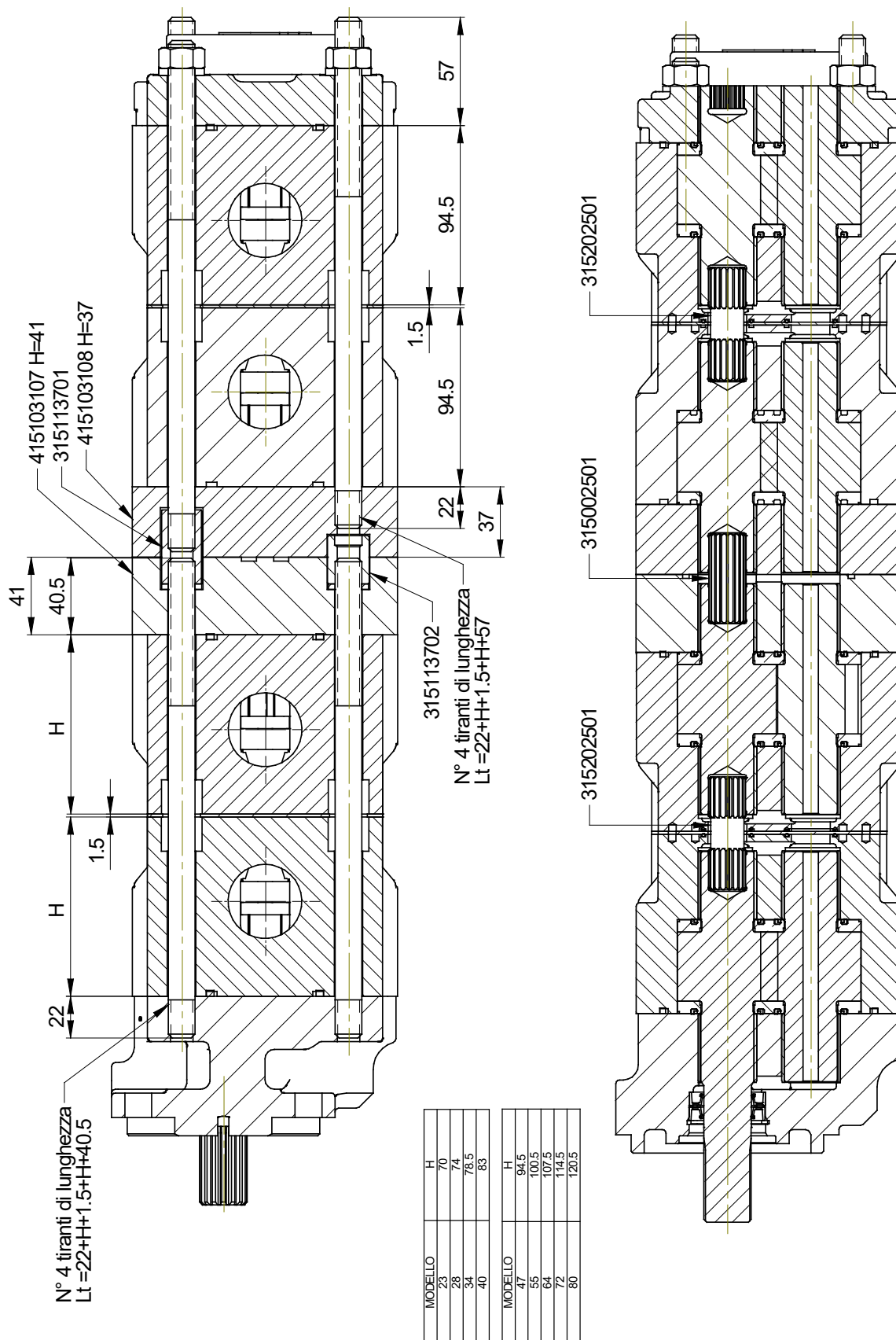
Appendix F - (Quadruple pump) 1°/2° Stage Displ. 47-80 cc+3°/4° Stage Displ. 23-40 cc



EO.152.0423.05.00IM02



Appendix F - (Quadruple pump)  $1\frac{1}{2}^{\circ}+3\frac{3}{4}^{\circ}$  Stage Displ. 47-80 cc



EO.152.0423.05.001M02



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