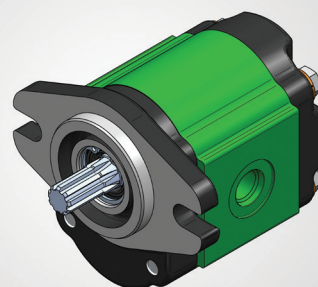
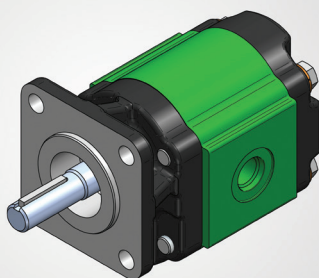
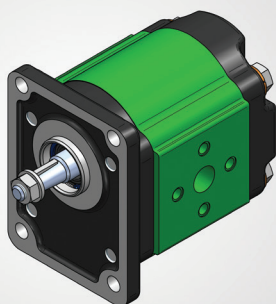
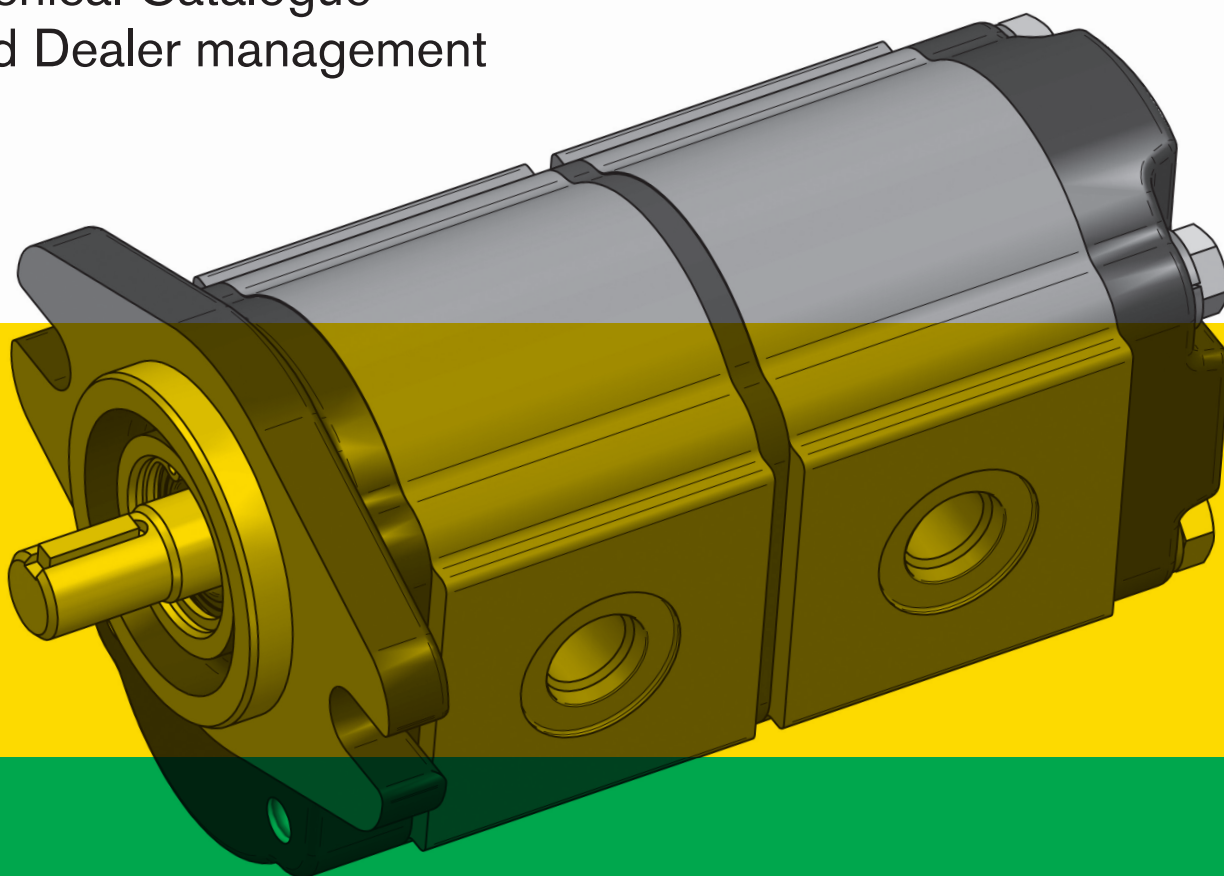


# 1.5 PE

## Aluminium gear pumps

Technical Catalogue  
and Dealer management

E0.109.01 14.14.00-IM00



Company  
with quality system  
certified by DNV  
**UNI EN ISO 9001/2008**

**salamj**  <sup>TM</sup>

**L'Azienda Salami Spa** rappresenta un'eccellenza italiana nel settore della potenza idraulica applicata a macchine mobili e veicoli industriali.

E' stata fondata nel 1956 con precise linee guida che hanno condotto il marchio Salami a identificarsi come simbolo di **Garanzia e Affidabilità** nel proprio settore, in Italia e nel Mondo. Salami Spa è rimasta fedele nel tempo ai tre punti di forza dettati dal suo fondatore che hanno reso riconoscibile e grande il marchio Salami nel mondo: **Qualità, Innovazione, Servizio**. Attraverso le proprie sedi di Spagna, Francia, Stati Uniti d'America, Canada e ai suoi partner commerciali, distribuisce i propri prodotti mettendo al servizio del mondo intero l'eccellenza ingegneristica italiana.

In questo volume vi presentiamo **la nuova gamma di pompe in alluminio del Gruppo 1**, denominate SAE AA secondo la classificazione americana.

Il **progetto 1,5PE** è stato sviluppato basandosi sul concetto di "**modularità**".

Grazie alla nostra esperienza di oltre 50 anni nella produzione di pompe in alluminio, all'utilizzo di **materiali innovativi e tecnologie produttive all'avanguardia**, ai preziosi **suggerimenti dei nostri clienti**, il nostro team di ingegneri è riuscito a realizzare un **prodotto** altamente **performante, affidabile** ed estremamente **personalizzabile**.

**La prima parte** di questo catalogo è dedicata alla descrizione tecnica delle pompe.

**Nella seconda parte**, denominata *Dealer management*, sono elencati i codici di ordinazione sia per le pompe singole, sia per i kit di trasformazione che vi permetteranno di realizzare in autonomia le varie combinazioni di pompe doppie e triple.

Benvenuti nel team Salami.

**Il Direttore Commerciale**  
**Michele Piazza**

*The **Salami Company** is one of the best Italian engineering excellences in the field of fluid power applied to mobile applications.*

*It was founded in 1956 with specific guidelines that have led the brand to identify Salami as a symbol of **Warranty and Reliability** in its sector, in Italy and in the World.*

*Salami Hydraulics proudly manufactures in Italy and it has remained loyal in time to its three strengths dictated by its founder.*

***Quality, Innovation and Service** have made the brand Salami recognizable and great in the world. Through its offices in North America, Spain, France, together with its business partners, the company distributes its own products by putting the excellence of Italian engineering at the service of the whole world.*

*In this volume we present you the **new range of Group 1 aluminum pumps**, known as SAE AA according to the American classification*

*The **project 1.5PE** has been developed and **based on the concept of “modularity”**.*

*Thanks to our experience of over 50 years in the production of aluminum pumps, the research of innovative materials and advanced production technologies, the valuable advices of our customers, **our engineering team has achieved a highly efficient, reliable and extremely customizable product.***

***The first part** of this catalog is dedicated to the technical description of the pumps.*

***The second part**, called Dealer management , includes the order part numbers for both single pump and conversion kit. These informations will allow you to combine in complete autonomy the different series of double and triple pumps configurations.*

*Welcome into Salami Team.*

**Commercial Director**  
**Michele Piazza**

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### E0.109.0114.14.00/IM00

The data on this catalogue refer to the standard product. The policy of Salami consist of a continuous improvement of its products. It reserves the right to change the specifications of the different products whenever necessary and without giving any information. If any doubts, please get in touch with our sales department.



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# 1.5 PE

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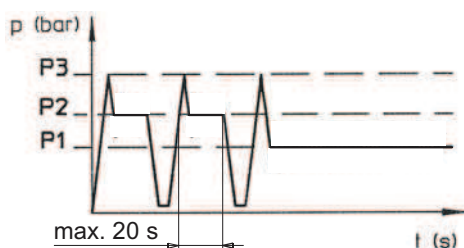
## Aluminium gear pumps

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### Section A - Tecnical catalogue

E0.109.1213.02.00-IM00

## DEFINITION OF PRESSURES



P3 = Peak pressure  
P2 = Intermittent operating pressure  
P1 = Continuous operating pressure

## GENERAL

- Superior performance and reliability in heavy-duty hydraulic application
- Construction with large area, high efficiency and long life in severe operating environments
- The design includes an advanced bushing and seal configuration, which optimizes performance even in high temperature and low viscosity conditions
- Double pump with common suction reduces mounting costs, allow for a small package size

## WORKING CONDITIONS

|                                                               |                                 |
|---------------------------------------------------------------|---------------------------------|
| - Pump inlet pressure (absolute pressure) .....               | 0.75 to 2,5 bar<br>10 to 36 psi |
| - Minimum operating fluid viscosity <sup>1</sup> .....        | 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   |
| - Fluid operating temperature range .....                     | - 15 to 85 °C                   |
| - Fluid operating temperature range with FPM seals(Viton) ... | - 20 to 110°C                   |
| - Hydraulic fluid .....                                       | mineral oil                     |

### Important:

in case of assembling of pumps without shaft seals, you have to keep the value of min. suction pressure (0.75 bar (abs)) in the vane between pump and coupling too. Lower pressure can lead to suction of oil through the front flange (seat of the shaft without seal); this can damage seriously the pump.

1 - With reduction 80% of working pressure and at minimum speed.

### Suggestion:

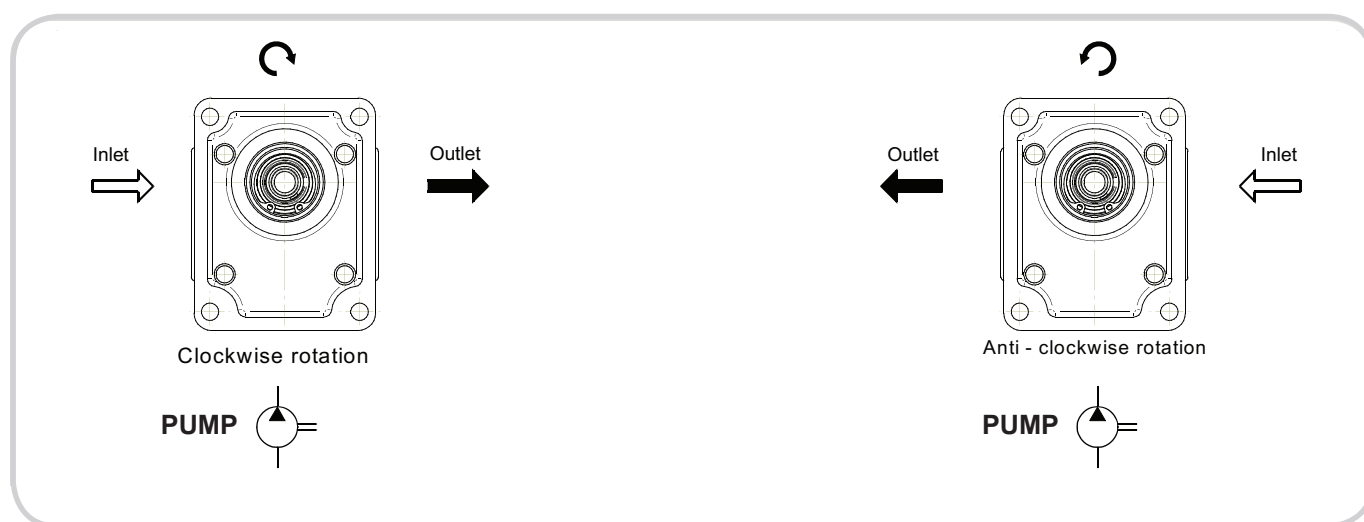
to have the best behaviour and duty life of the pump/motor, use a cooling system in order to keep the fluid temperature at 60°C and viscosity at 20 cSt. In addition to the recommended filtration index of page 3.



## DRIVE SHAFTS

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

## DIRECTION VIEWED AT THE DRIVE SHAFT



## 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:

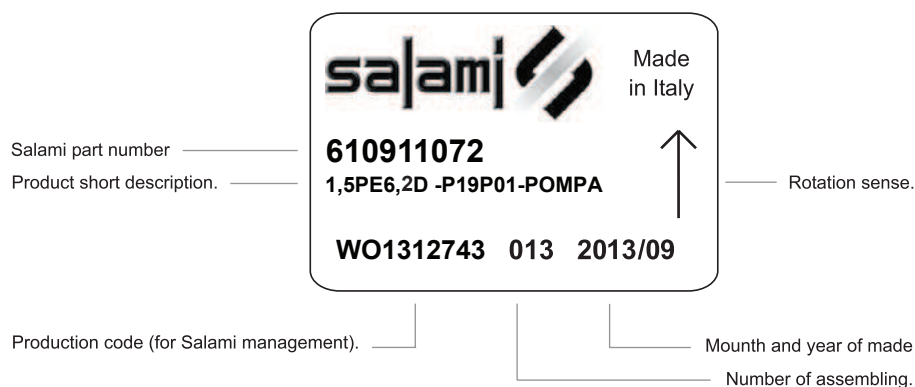
From 1 to 2 m/sec on suction pipe line  
From 6 to 10 m/sec on pressure pipe line

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.

## DESCRIPTION OF THE PRODUCT IDENTIFICATION LABEL



## 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             |

## FIRE RESISTENT FLUID

| Type | Description                 | Max pressure     | Max speed (rpm) | Temperature |
|------|-----------------------------|------------------|-----------------|-------------|
| HFB  | oil emulsion with 40% water | 130 bar/1880 psi | 2500            | 3°C +65°C   |
| HFC  | Water glycol                | 180 bar/2600 psi | 1500            | -20°C +65°C |
| HFD  | Phosphate esters            |                  | 1750            | -10°C +80°C |

## COMMON FORMULAS FOR PUMPS

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

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

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

## LEGENDA

$\Delta p$  = Working pressure (bar)

$q$  = Displacement (cm<sup>3</sup>/rev)

$n$  = Speed (min<sup>-1</sup>)

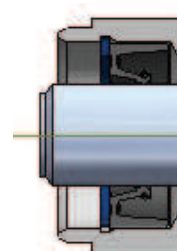
$\eta_m$  = Mechanical eff. (0.92)

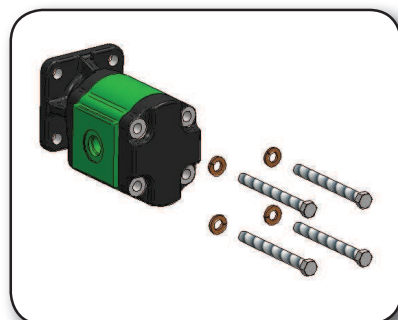
$\eta_v$  = Volumetric eff. (0.95)

## SHAFT SEAL DESIGN, PRESSURE AND MATERIALS AVAILABLE

|                       |                  |
|-----------------------|------------------|
| Max pressure          | 3 bar ( 44 psi ) |
| Material BUNA (NBR)   | -15° C - 85°C    |
| Material VITON (FPM)* | -20° C - 110° C  |

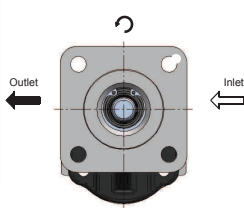
\*Available for quantity



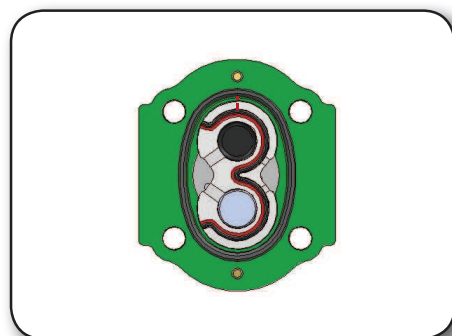
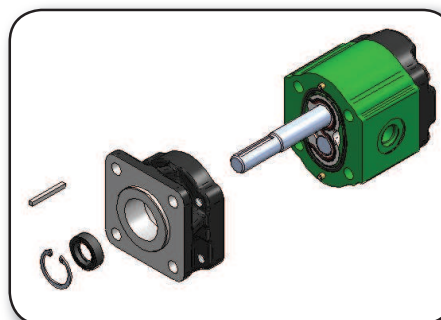


**Step 1:**  
unscrew and take off the 4  
assembling bolts.

**ANTI-CLOCKWISE**

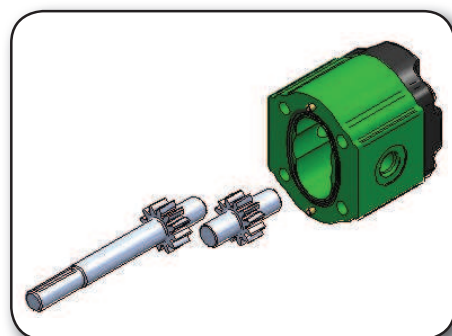
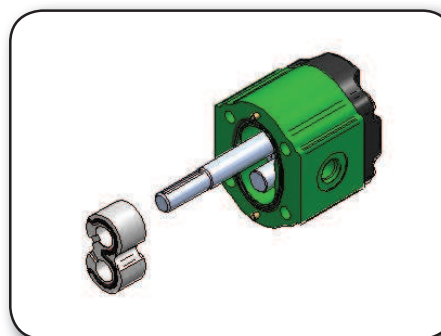


**Step 2:**  
take off the front  
flange, complete of  
shaft seal.  
In case of key, it has  
to be taken off before  
of the flange.  
To avoid the damage  
of the shaft seal.



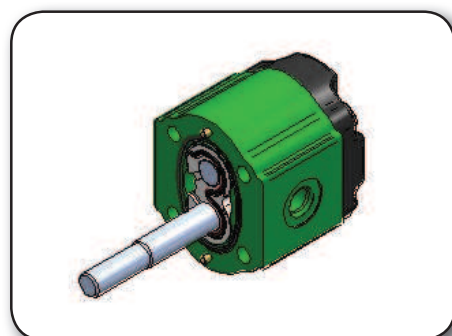
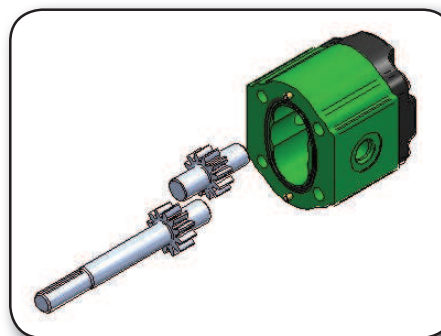
**Step 3:**  
take note of the  
assembling position of  
the bronze thrust plate.  
If necessary, you can  
put a mark which help  
you remembering the  
position of the plate re-  
lated to the body. This is  
very important, because  
at the end you must re-  
assemble it in this way.

**Step 4:**  
take off the bushing.



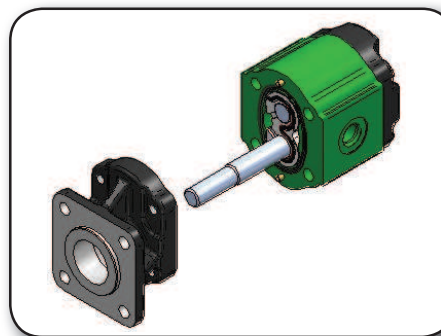
**Step 5:**  
take off both the  
shafts, drive and  
driven.

**Step 6:**  
reverse their position  
and re-assemble  
them.



**Step 7:**  
re-assemble the  
thrust plate in the  
same position it was  
at the beginning.  
Reference step 3.

**Step 8:**  
reverse and re-  
assemble the front  
flange.

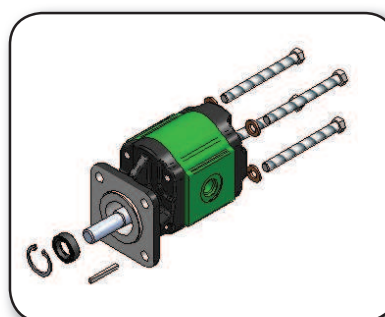
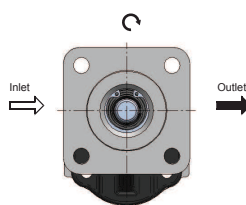


RELEASE SHOWED **R83S1**

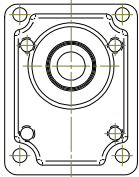
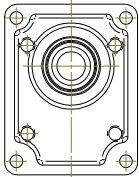
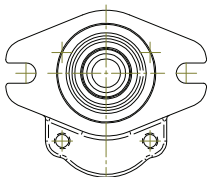
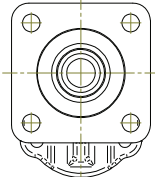
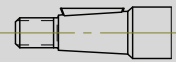
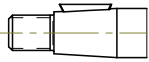
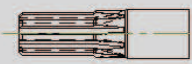
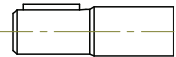
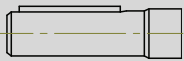
The instruction is valid for all the configurations.

**Step 9:**  
re-place and screw the bolts,  
taking care of the torque 25  
- 30 Nm.

**CLOCKWISE**



## SUGGESTED COMBINATIONS OF FLANGES AND SHAFTS AVAILABLE

| 1.5 PE                                                                                                                  |  |  |  |  |
|-------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                                                                                                         | CODE <b>P0</b> - (Ø25,4 mm) European stand.                                       | CODE <b>P01</b> - (Ø30 mm) European stand.                                        | CODE <b>S0</b> - SAE AA 2 bolts                                                    | CODE <b>S1</b> - SAE AA 4 bolts                                                     |
| <br>CODE <b>18</b> - Tapered 1:8       | 18P0                                                                              |                                                                                   |                                                                                    |                                                                                     |
| <br>CODE <b>19</b> - Tapered 1:8       |                                                                                   | 19P01                                                                             |                                                                                    |                                                                                     |
| <br>CODE <b>51</b> - SAE A 9T        |                                                                                   |                                                                                   | 51S0                                                                               |                                                                                     |
| <br>CODE <b>80</b> - SAE AA PARALLEL |                                                                                   |                                                                                   | 80S0                                                                               |                                                                                     |
| <br>CODE <b>83</b> - SAE STRAIGHT    |                                                                                   |                                                                                   |                                                                                    | 83S1                                                                                |

Showed release with flange P0  
and shaft 18

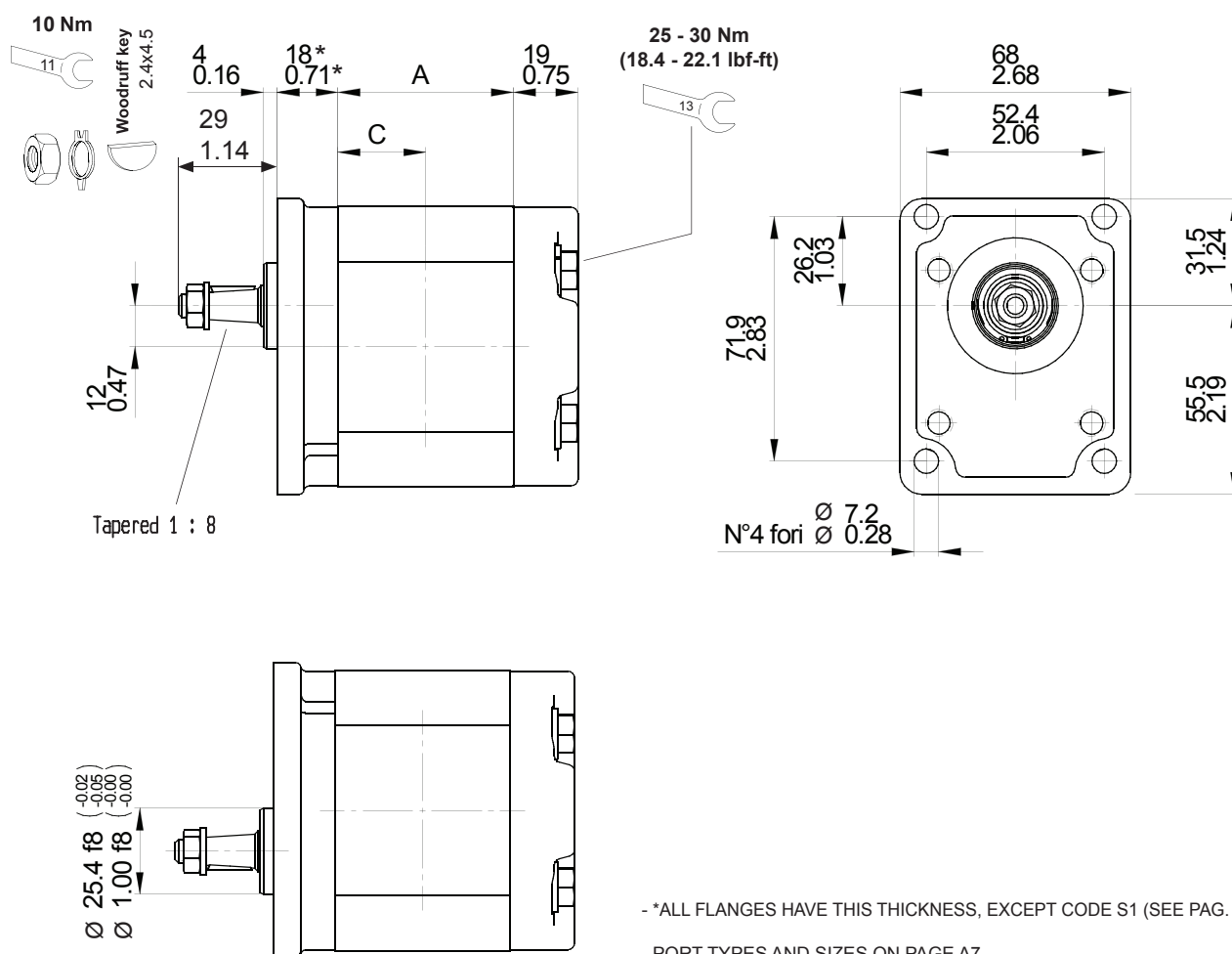


GEAR PUMPS

Performance carried out with oil viscosity at 16 cSt and oil temperature at 60°C.

| TYPE                     |                      | 1,4  | 2,1   | 2,8   | 3,5   | 4,1  | 5,2   | 6,2   | 7,6   | 9,3   | 11    |
|--------------------------|----------------------|------|-------|-------|-------|------|-------|-------|-------|-------|-------|
| Displacements            | cm <sup>3</sup> /rev | 1,4  | 2,1   | 2,8   | 3,5   | 4,1  | 5,2   | 6,2   | 7,6   | 9,3   | 11    |
|                          | cu.in./rev           | 0,09 | 0,13  | 0,17  | 0,21  | 0,25 | 0,32  | 0,38  | 0,46  | 0,57  | 0,67  |
| Dimension A              | mm                   | 44   | 45,9  | 47,9  | 49,9  | 51,6 | 54,7  | 57,5  | 61,5  | 66,3  | 71,1  |
|                          | in                   | 1,73 | 1,81  | 1,89  | 1,96  | 2,03 | 2,15  | 2,26  | 2,42  | 2,61  | 2,80  |
| Dimension C              | mm                   | 22   | 22,95 | 23,95 | 24,95 | 25,8 | 27,35 | 28,75 | 30,75 | 33,15 | 35,55 |
|                          | in                   | 0,87 | 0,90  | 0,94  | 0,98  | 1,02 | 1,08  | 1,13  | 1,21  | 1,31  | 1,40  |
| Working pressure P1*     | bar                  | 250  | 250   |       |       |      | 230   |       | 200   | 180   | 170   |
|                          | psi                  | 3625 | 3625  |       |       |      | 3335  |       | 2900  | 2610  | 2465  |
| Intermittent pressure P2 | bar                  | 270  | 270   |       |       |      | 250   |       | 220   | 200   | 190   |
|                          | psi                  | 3915 | 3915  |       |       |      | 3625  |       | 3190  | 2900  | 2755  |
| Peak pressure P3         | bar                  | 290  | 290   |       |       |      | 270   |       | 250   | 240   | 220   |
|                          | psi                  | 4205 | 4205  |       |       |      | 3915  |       | 3625  | 3480  | 3190  |
| Max. speed at P2         |                      | 5000 |       | 4500  |       | 4000 |       | 3600  | 3300  | 3000  |       |
| Min. speed at P1         |                      | rpm  |       | 700   |       |      |       | 600   |       |       |       |

\*For working conditions, using exclusively pressure P1, the value of max. speed must be reduced of 15%.



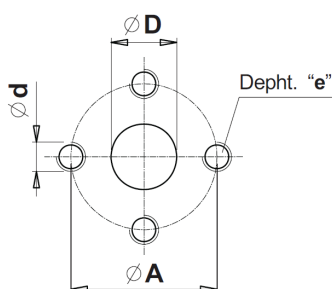
- \*ALL FLANGES HAVE THIS THICKNESS, EXCEPT CODE S1 (SEE PAG. A10 - A11)

- PORT TYPES AND SIZES ON PAGE A7

- AVAILABLE SHAFTS ON PAGE A12

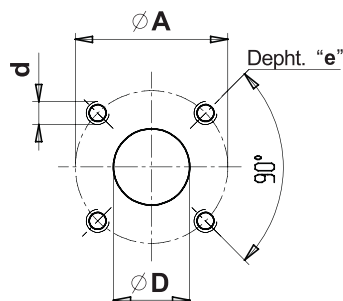


## AVAILABLE PORTS



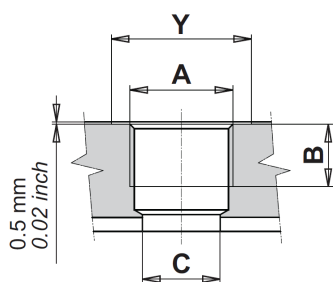
code P

| TYPE              | INLET |      |    |      | OUTLET |      |    |      |
|-------------------|-------|------|----|------|--------|------|----|------|
|                   | Ø D   | Ø A  | d  | e    | Ø D    | Ø A  | d  | e    |
| From 1.4<br>to 11 | 13    | 30   | M6 | 13   | 12     | 30   | M6 | 13   |
|                   | 0,51  | 1,18 |    | 0,51 | 0,47   | 1,18 |    | 0,51 |



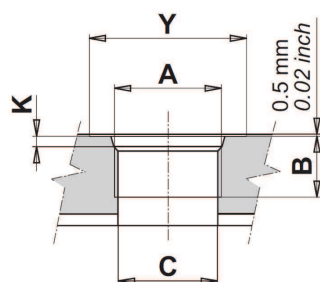
code B

| TYPE              | INLET |      |    |      | OUTLET |      |    |      |
|-------------------|-------|------|----|------|--------|------|----|------|
|                   | Ø D   | Ø A  | d  | e    | Ø D    | Ø A  | d  | e    |
| From 1.4<br>to 11 | 13    | 30   | M6 | 13   | 12     | 30   | M6 | 13   |
|                   | 0,51  | 1,18 |    | 0,51 | 0,47   | 1,18 |    | 0,51 |



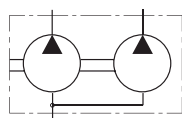
code G British standard pipe parallel (BSPP)

| TYPE            | INLET |      |      |      | OUTLET |      |      |      |
|-----------------|-------|------|------|------|--------|------|------|------|
|                 | A     | B    | C    | Y    | A      | B    | C    | Y    |
| From 1.4 to 6.2 | G1/2" | 15   | 18   | 30   | G3/8"  | 13   | 13   | 25   |
|                 |       | 0,59 | 0,71 | 1,18 |        | 0,51 | 0,51 | 0,98 |
| From 7.6 to 11  | G1/2" | 15   | 18   | 30   | G1/2"  | 15   | 13   | 30   |
|                 |       | 0,59 | 0,71 | 1,18 |        | 0,59 | 0,51 | 1,18 |

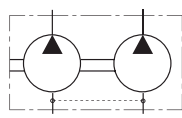


code R SAE threaded (ODT)

| TYPE            | INLET  |      |      |      |      | OUTLET |      |      |      |      |
|-----------------|--------|------|------|------|------|--------|------|------|------|------|
|                 | A      | B    | C    | Y    | K    | A      | B    | C    | Y    | K    |
| From 1.4 to 6.2 | 3/4"   | 14,5 | 17,3 | 30   | 2,5  | 9/16"  | 13   | 13   | 25   | 2,5  |
|                 | 16 UNF | 0,57 | 0,68 | 1,18 | 0,10 | 18 UNF | 0,51 | 0,51 | 0,98 | 0,10 |
| From 7.6 to 11  | 7/8"   | 16,7 | 20,2 | 34   | 2,5  | 3/4"   | 14,5 | 15   | 30   | 2,5  |
|                 | 14 UNF | 0,66 | 0,80 | 1,34 | 0,10 | 16 UNF | 0,57 | 0,59 | 1,18 | 0,10 |



**MULTIPLE  
GEAR PUMPS**  
with common inlet port\*



**MULTIPLE  
GEAR PUMPS**  
with inlet port  
on each body

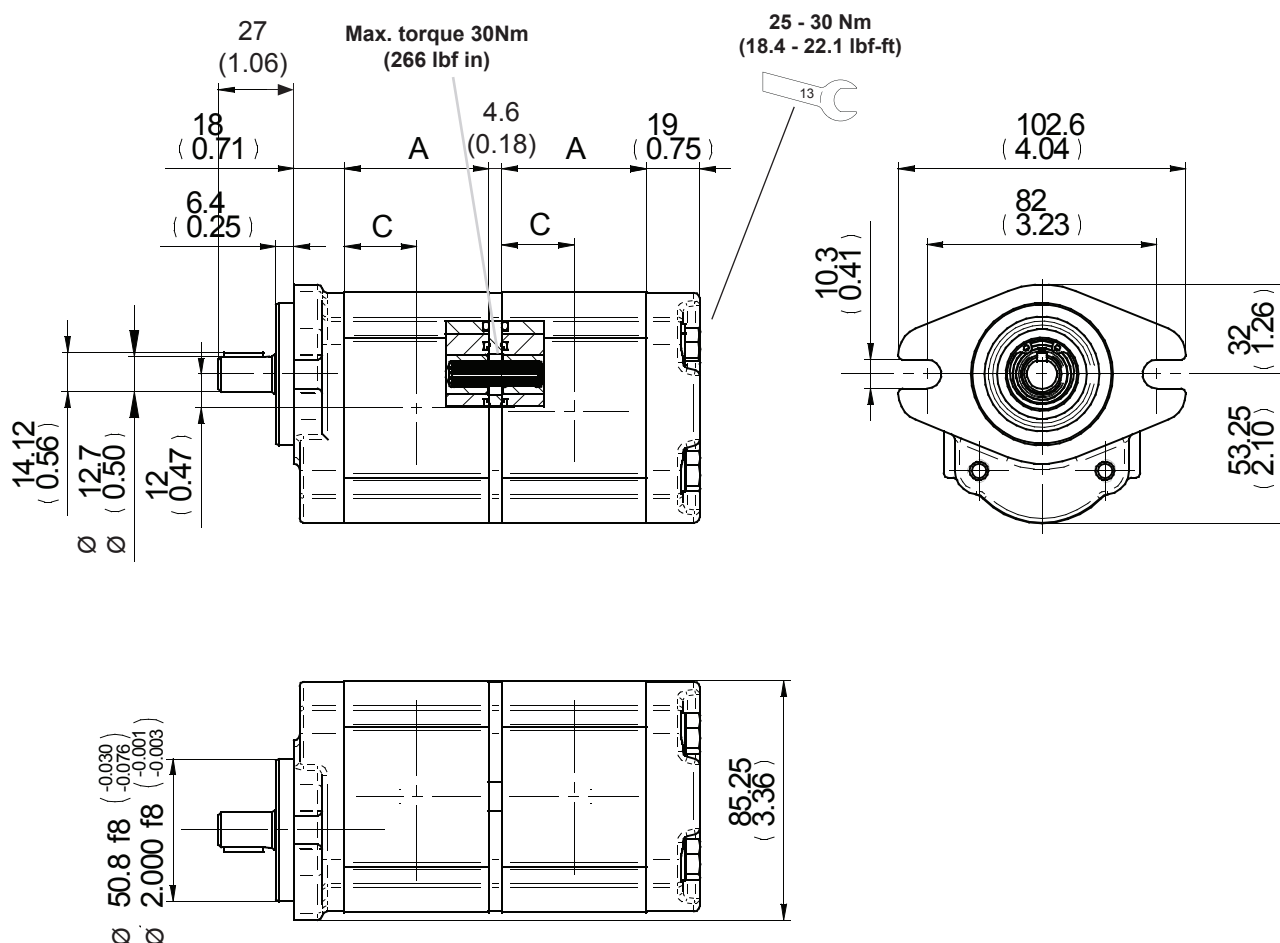
**Showed release with  
flange S0 and shaft 80**

In case of common inlet port, to avoid too high value of oil speed, 12 l/min is the max. sucked flow for the downstream pump.

Performance carried out with oil viscosity at 16 cSt and oil temperature at 60°C.

| TYPE                     |                      | 1,4  | 2,1   | 2,8   | 3,5   | 4,1  | 5,2   | 6,2   | 7,6   | 9,3   | 11    |
|--------------------------|----------------------|------|-------|-------|-------|------|-------|-------|-------|-------|-------|
| Displacements            | cm <sup>3</sup> /rev | 1,4  | 2,1   | 2,8   | 3,5   | 4,1  | 5,2   | 6,2   | 7,6   | 9,3   | 11    |
|                          | cu.in./rev           | 0,09 | 0,13  | 0,17  | 0,21  | 0,25 | 0,32  | 0,38  | 0,46  | 0,57  | 0,67  |
| Dimension A              | mm                   | 44   | 45,9  | 47,9  | 49,9  | 51,6 | 54,7  | 57,5  | 61,5  | 66,3  | 71,1  |
|                          | in                   | 1,73 | 1,81  | 1,89  | 1,96  | 2,03 | 2,15  | 2,26  | 2,42  | 2,61  | 2,80  |
| Dimension C              | mm                   | 22   | 22,95 | 23,95 | 24,95 | 25,8 | 27,35 | 28,75 | 30,75 | 33,15 | 35,55 |
|                          | in                   | 0,87 | 0,90  | 0,94  | 0,98  | 1,02 | 1,08  | 1,13  | 1,21  | 1,31  | 1,40  |
| Working pressure P1*     | bar                  | 250  | 250   |       |       | 230  |       | 200   |       | 170   |       |
|                          | psi                  | 3625 | 3625  |       |       | 3335 |       | 2900  |       | 2465  |       |
| Intermittent pressure P2 | bar                  | 270  | 270   |       |       | 250  |       | 220   |       | 190   |       |
|                          | psi                  | 3915 | 3915  |       |       | 3625 |       | 3190  |       | 2755  |       |
| Peak pressure P3         | bar                  | 290  | 290   |       |       | 270  |       | 250   |       | 220   |       |
|                          | psi                  | 4205 | 4205  |       |       | 3915 |       | 3625  |       | 3190  |       |
| Max. speed at P2         |                      | 5000 |       | 4500  |       | 4000 |       | 3600  | 3300  | 3000  |       |
| Min. speed at P1         |                      | rpm  |       | 700   |       |      |       | 600   |       |       |       |

\*For working conditions, using exclusively pressure P1, the value of max. speed must be reduced of 15%.



- \*ALL FLANGES HAVE THIS THICKNESS, EXCEPT CODE S1 (SEE PAG. A10 - A11)

- AVAILABLE SHAFTS ON PAGE A12

- PORT TYPES AND SIZES ON PAGE A7

- COMMON SUCTION PORT SIZE ON PAGE A9

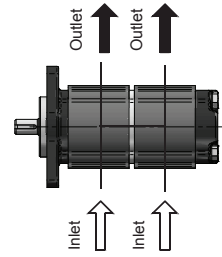


## GEAR PUMPS "E" SERIES

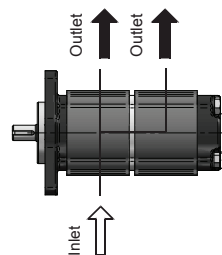
1.5PE

FOR REASON OF READABILITY, IN CASE OF INTENSIVE USE, WE CAN PROVIDE THE FOLLOWING TABLE AS A STANDALONE EXCEL FILE, WITH MORE DETAILED DATA(VALUES OF SPEED AND FLOW).

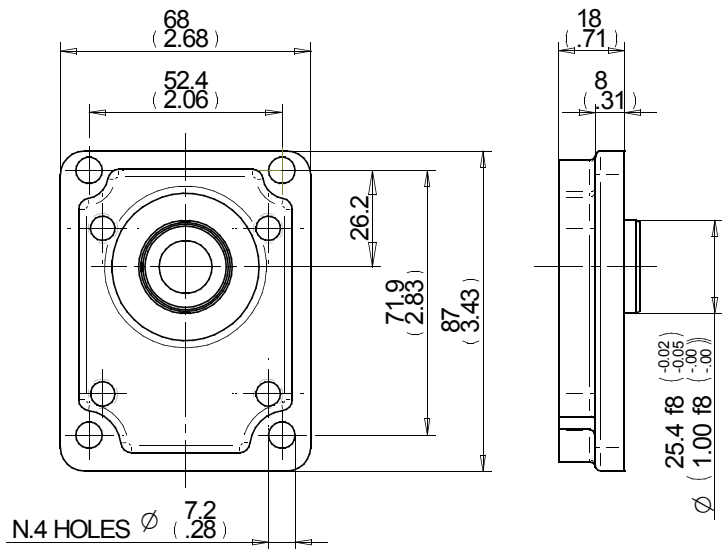
| SPEED<br>m/sec | FLOW - l/min |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | PIPE INTERNAL DIAMETER - mm |       | PIPE INTERNAL AREA - cm <sup>2</sup> |
|----------------|--------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----------------------------|-------|--------------------------------------|
|                | 2            | 4     | 6     | 8     | 10    | 12    | 14    | 16    | 18    | 20    | 22    | 24    | 26    | 28    | 30    | 32    | 34                          | 36    | 40                                   |
| SUCTION        | 0.5          | 9.2   | 13.0  | 15.9  | 18.4  | 20.6  | 22.6  | 24.4  | 26.0  | 27.6  | 29.1  | 30.5  | 31.9  | 33.2  | 34.5  | 35.7  | 36.8                        | 38.0  | 41.2                                 |
|                |              | 0.666 | 0.999 | 1.332 | 1.665 | 1.998 | 2.331 | 2.664 | 2.997 | 3.330 | 3.663 | 3.996 | 4.329 | 4.662 | 4.995 | 5.328 | 5.661                       | 5.994 | 6.660                                |
|                | 1            | 6.5   | 8.0   | 9.2   | 10.3  | 11.3  | 12.2  | 13.0  | 13.8  | 14.6  | 15.3  | 15.9  | 16.6  | 17.2  | 17.8  | 18.4  | 19.0                        | 19.5  | 20.6                                 |
| BACK TO TANK   | 1.3          | 0.333 | 0.500 | 0.666 | 0.833 | 0.999 | 1.166 | 1.332 | 1.499 | 1.665 | 1.832 | 1.998 | 2.165 | 2.331 | 2.498 | 2.664 | 2.831                       | 2.997 | 3.330                                |
|                |              | 5.7   | 7.0   | 8.1   | 9.0   | 9.9   | 10.7  | 11.4  | 12.1  | 12.8  | 13.4  | 14.0  | 14.6  | 15.1  | 15.6  | 16.2  | 16.7                        | 17.1  | 18.1                                 |
|                | 1.5          | 0.256 | 0.384 | 0.512 | 0.640 | 0.768 | 0.897 | 1.025 | 1.153 | 1.281 | 1.409 | 1.537 | 1.665 | 1.793 | 1.921 | 2.049 | 2.177                       | 2.305 | 2.562                                |
| PRESSURE LINE  | 1.8          | 5.3   | 6.5   | 7.5   | 8.4   | 9.2   | 9.9   | 10.6  | 11.3  | 11.9  | 12.5  | 13.0  | 13.6  | 14.1  | 14.6  | 15.0  | 15.5                        | 15.9  | 16.8                                 |
|                |              | 0.222 | 0.333 | 0.444 | 0.555 | 0.666 | 0.777 | 0.888 | 0.999 | 1.110 | 1.221 | 1.332 | 1.443 | 1.554 | 1.665 | 1.776 | 1.887                       | 1.998 | 2.220                                |
|                | 2            | 4.9   | 5.9   | 6.9   | 7.7   | 8.4   | 9.1   | 9.7   | 10.3  | 10.9  | 11.4  | 11.9  | 12.4  | 12.8  | 13.3  | 13.7  | 14.1                        | 14.6  | 15.3                                 |
|                | 2.5          | 0.185 | 0.278 | 0.370 | 0.463 | 0.555 | 0.648 | 0.740 | 0.833 | 0.925 | 1.018 | 1.110 | 1.203 | 1.295 | 1.388 | 1.480 | 1.573                       | 1.665 | 1.850                                |
|                |              | 4.6   | 5.6   | 6.5   | 7.3   | 8.0   | 8.6   | 9.2   | 9.8   | 10.3  | 10.8  | 11.3  | 11.7  | 12.2  | 12.6  | 13.0  | 13.4                        | 13.8  | 14.6                                 |
|                | 3            | 0.167 | 0.250 | 0.333 | 0.416 | 0.500 | 0.583 | 0.666 | 0.749 | 0.833 | 0.916 | 0.999 | 1.082 | 1.166 | 1.249 | 1.332 | 1.415                       | 1.499 | 1.665                                |
|                | 3.5          | 4.1   | 5.0   | 5.8   | 6.5   | 7.1   | 7.7   | 8.2   | 8.7   | 9.2   | 9.7   | 10.1  | 10.5  | 10.9  | 11.3  | 11.6  | 12.0                        | 12.4  | 13.0                                 |
|                |              | 0.133 | 0.200 | 0.266 | 0.333 | 0.400 | 0.466 | 0.533 | 0.599 | 0.666 | 0.733 | 0.799 | 0.866 | 0.932 | 0.999 | 1.066 | 1.132                       | 1.199 | 1.332                                |
|                | 4            | 3.8   | 4.6   | 5.3   | 5.9   | 6.5   | 7.0   | 7.5   | 8.0   | 8.4   | 8.8   | 9.2   | 9.6   | 9.9   | 10.3  | 10.6  | 11.0                        | 11.3  | 11.9                                 |
|                | 4.5          | 0.111 | 0.167 | 0.222 | 0.278 | 0.333 | 0.389 | 0.444 | 0.500 | 0.555 | 0.611 | 0.666 | 0.722 | 0.777 | 0.833 | 0.888 | 0.944                       | 0.999 | 1.110                                |
|                |              | 3.5   | 4.3   | 4.9   | 5.5   | 6.0   | 6.5   | 7.0   | 7.4   | 7.8   | 8.2   | 8.5   | 8.9   | 9.2   | 9.5   | 9.8   | 10.1                        | 10.4  | 10.7                                 |
|                | 5            | 0.095 | 0.143 | 0.190 | 0.238 | 0.285 | 0.333 | 0.381 | 0.428 | 0.476 | 0.523 | 0.571 | 0.618 | 0.666 | 0.714 | 0.761 | 0.809                       | 0.856 | 0.951                                |
|                | 5.5          | 2.9   | 3.6   | 4.1   | 4.6   | 5.0   | 5.4   | 5.8   | 6.2   | 6.5   | 6.8   | 7.1   | 7.4   | 7.7   | 8.0   | 8.2   | 8.5                         | 8.7   | 9.2                                  |
|                |              | 0.083 | 0.125 | 0.167 | 0.208 | 0.250 | 0.291 | 0.333 | 0.375 | 0.416 | 0.458 | 0.500 | 0.541 | 0.583 | 0.624 | 0.666 | 0.708                       | 0.749 | 0.791                                |
|                | 6            | 3.1   | 3.8   | 4.3   | 4.9   | 5.3   | 5.7   | 6.1   | 6.5   | 6.9   | 7.2   | 7.5   | 7.8   | 8.1   | 8.4   | 8.7   | 8.9                         | 9.2   | 9.5                                  |
|                | 6.5          | 0.074 | 0.111 | 0.148 | 0.185 | 0.222 | 0.259 | 0.296 | 0.333 | 0.370 | 0.407 | 0.444 | 0.481 | 0.518 | 0.555 | 0.592 | 0.629                       | 0.666 | 0.740                                |
|                |              | 2.7   | 3.3   | 3.8   | 4.2   | 4.6   | 5.0   | 5.3   | 5.6   | 5.9   | 6.2   | 6.5   | 6.8   | 7.0   | 7.3   | 7.5   | 7.8                         | 8.0   | 8.4                                  |
|                | 7            | 0.056 | 0.083 | 0.111 | 0.139 | 0.167 | 0.194 | 0.222 | 0.250 | 0.278 | 0.305 | 0.333 | 0.361 | 0.389 | 0.416 | 0.444 | 0.472                       | 0.500 | 0.555                                |
| SPEED<br>m/sec |              | 2.6   | 3.1   | 3.6   | 4.0   | 4.4   | 4.8   | 5.1   | 5.4   | 5.7   | 6.0   | 6.3   | 6.5   | 6.8   | 7.0   | 7.2   | 7.4                         | 7.7   | 8.1                                  |
|                |              | 0.051 | 0.077 | 0.102 | 0.128 | 0.154 | 0.179 | 0.205 | 0.231 | 0.256 | 0.282 | 0.307 | 0.333 | 0.359 | 0.384 | 0.410 | 0.435                       | 0.461 | 0.512                                |
|                |              | 2.5   | 3.0   | 3.5   | 3.9   | 4.3   | 4.6   | 4.9   | 5.2   | 5.5   | 5.8   | 6.0   | 6.3   | 6.5   | 6.7   | 7.0   | 7.2                         | 7.4   | 7.8                                  |
|                |              | 0.048 | 0.071 | 0.095 | 0.119 | 0.143 | 0.167 | 0.190 | 0.214 | 0.238 | 0.262 | 0.285 | 0.309 | 0.333 | 0.357 | 0.381 | 0.404                       | 0.428 | 0.476                                |



In case of common suction configuration, we have to take care of the area of the common suction port to avoid cavitation. The suggested speed of the oil at suction line is 1.5 m/sec, using this table and according of which is the total flow which goes into the pump, you can obtain the value of the proper diameter (mm) and proper area (cm<sup>2</sup>).



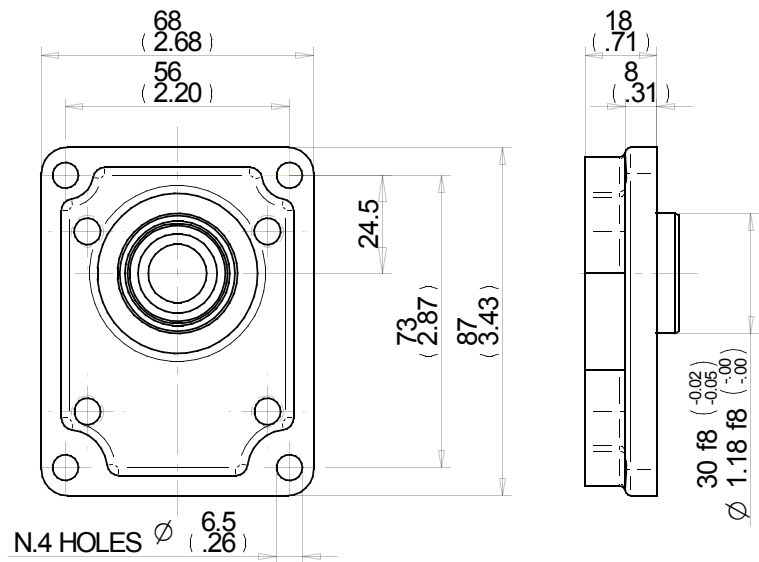
AVAILABLE FLANGES



European standard mounting flange

Material: cast iron

| P0      | Available assembling shafts |  |  |  |
|---------|-----------------------------|--|--|--|
| Tapered | 18                          |  |  |  |



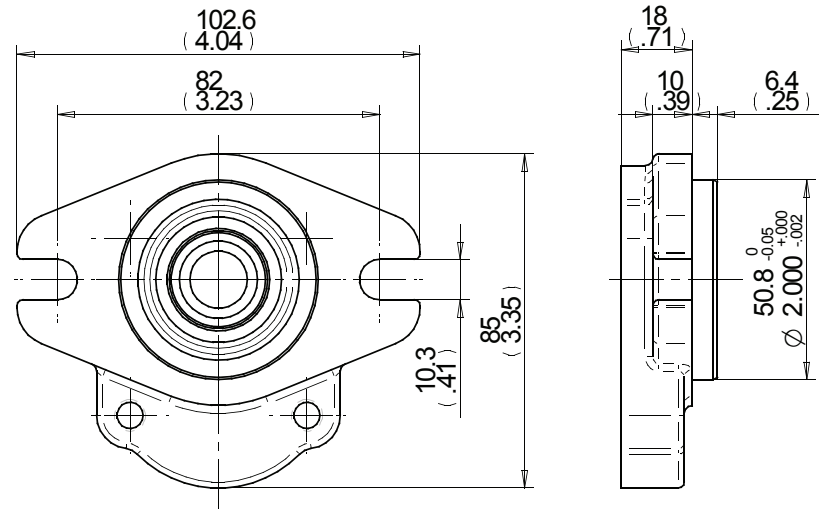
European standard mounting flange

Material: cast iron

| P01     | Available assembling shafts |  |  |  |
|---------|-----------------------------|--|--|--|
| Tapered | 19                          |  |  |  |



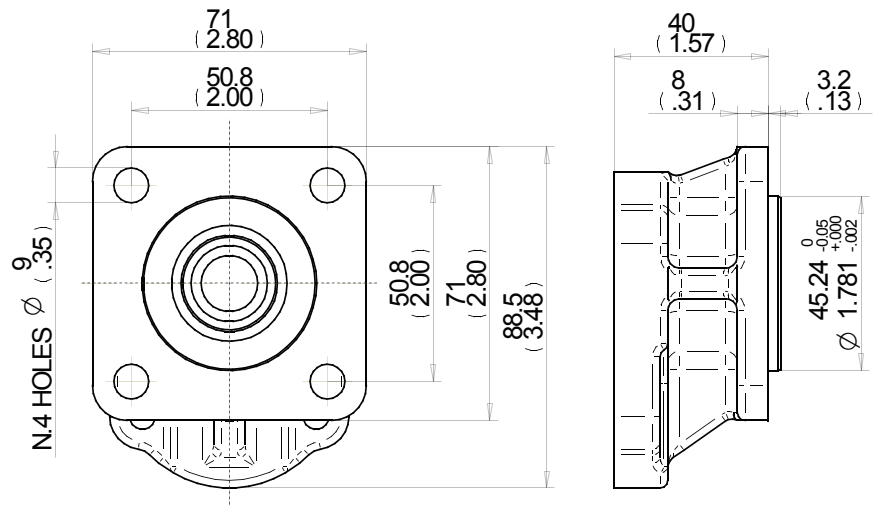
AVAILABLE FLANGES



SAE AA mounting flange (2 bolts)

Material: cast iron

| S0       | Available assembling shafts |  |  |  |
|----------|-----------------------------|--|--|--|
| Splined  | 51                          |  |  |  |
| Straight | 80                          |  |  |  |



SAE mounting flange (4 bolts)

Material: cast iron

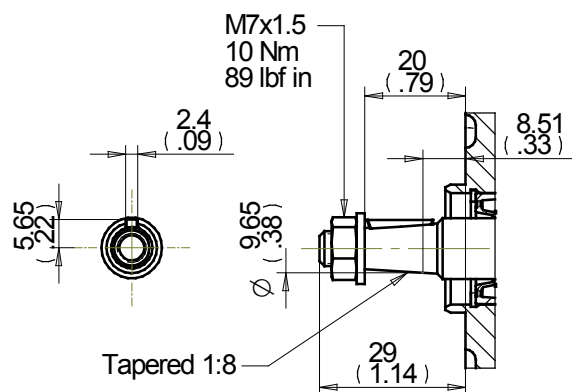
| S1       | Available assembling shafts |  |  |  |
|----------|-----------------------------|--|--|--|
| Straight | 83                          |  |  |  |



## AVAILABLE SHAFTS

### EUROPEAN TAPERED 1:8

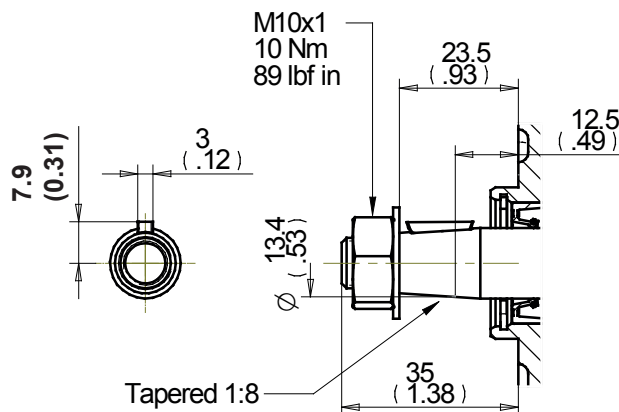
Code 18



MAX 35 Nm (310 lbf in)

### EUROPEAN TAPERED 1:8

Code 19

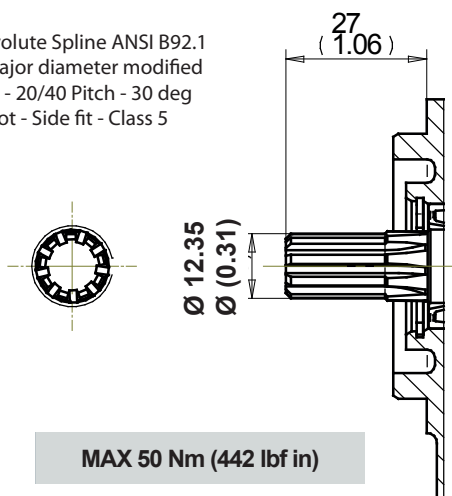


MAX 60 Nm (531 lbf in)

### SAE "AA" SPLINE

Code 51

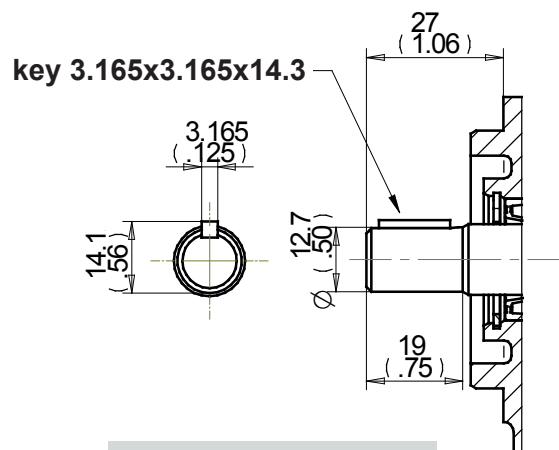
Ext. Involute Spline ANSI B92.1  
with major diameter modified  
9 teeth - 20/40 Pitch - 30 deg  
Flat Root - Side fit - Class 5



MAX 50 Nm (442 lbf in)

### SAE "AA" STRAIGHT

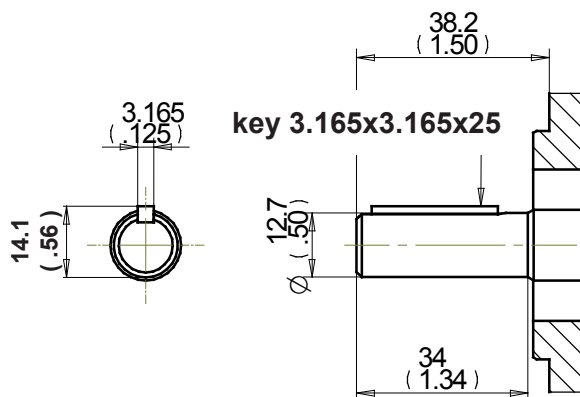
Code 80



MAX 40 Nm (354 lbf in)

### SAE STRAIGHT

Code 83



MAX 40 Nm (354 lbf in)

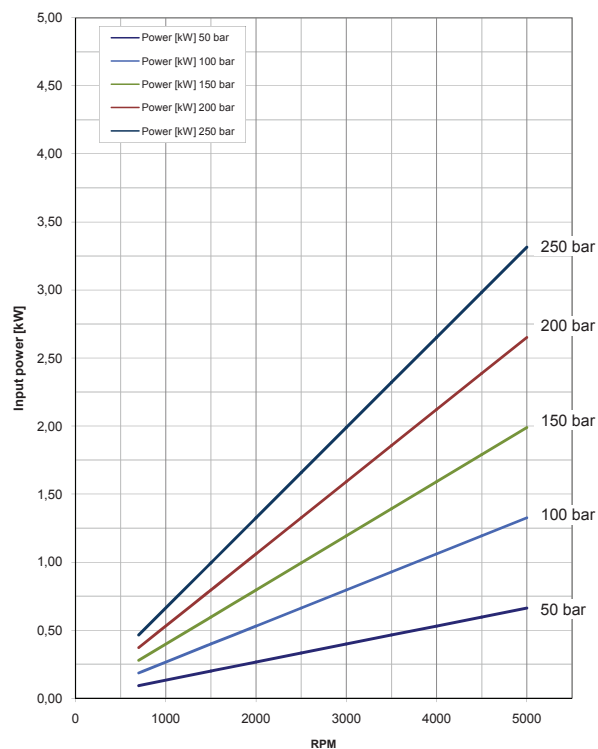
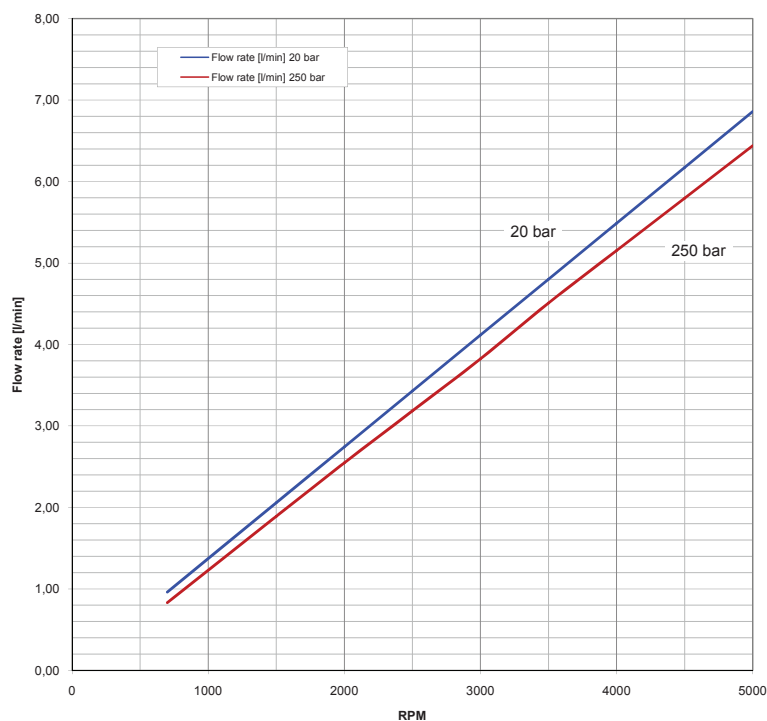
## GEAR PUMPS “E” SERIES

# 1.5PE

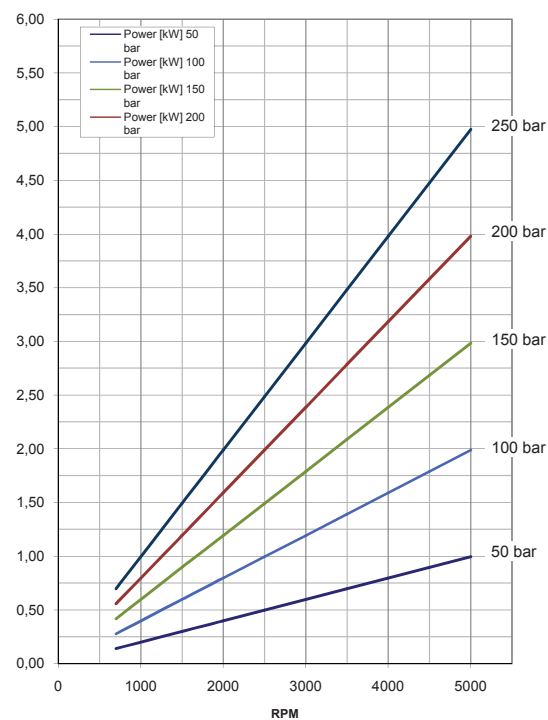
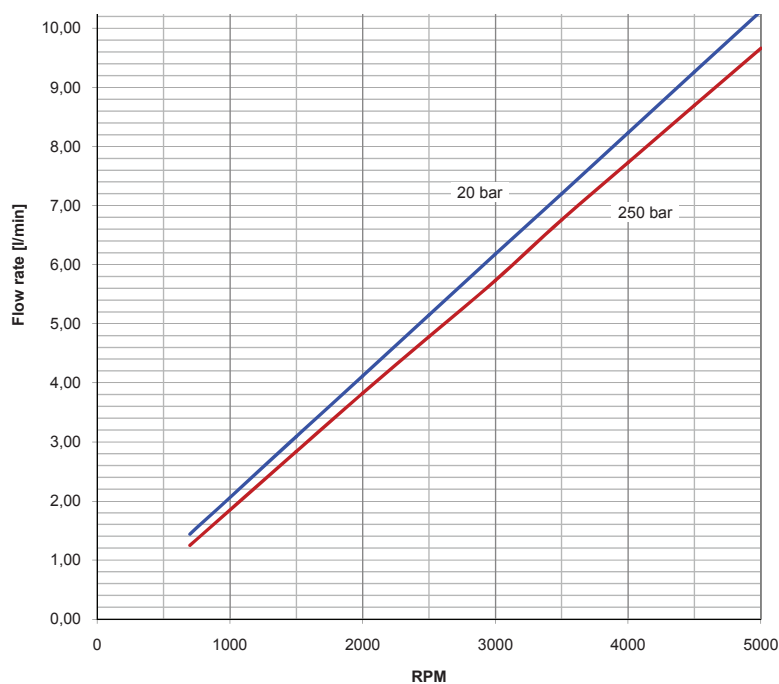
Performance curves carried out with oil viscosity at 21 cSt and oil temperature at 50°C

The performance of these diagrams are approximate. In case you need approved values, please get in touch with our technical dept.

### 1.5PE - 1.4



### 1.5PE - 2.1

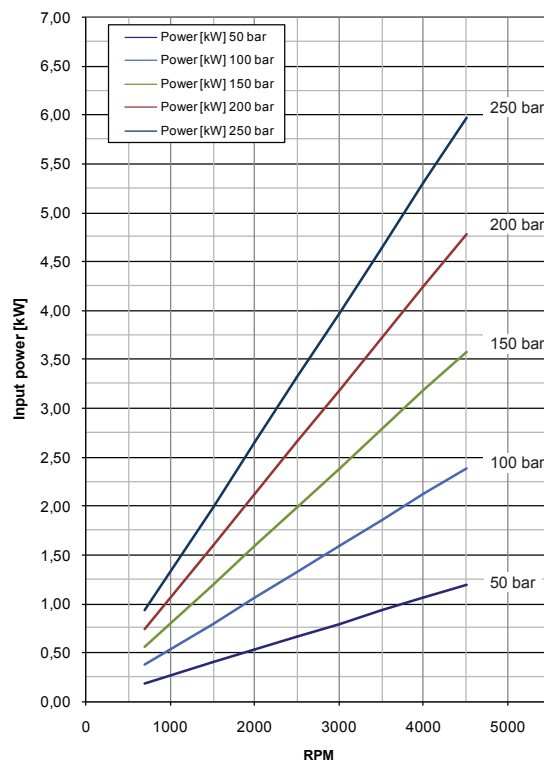
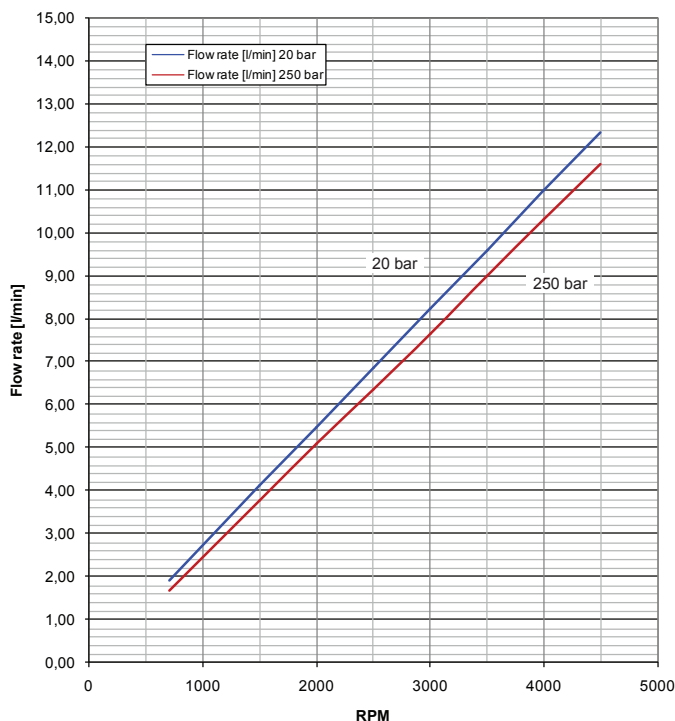


Performance curves carried out with oil viscosity at 21 cSt and oil temperature at 50°C.

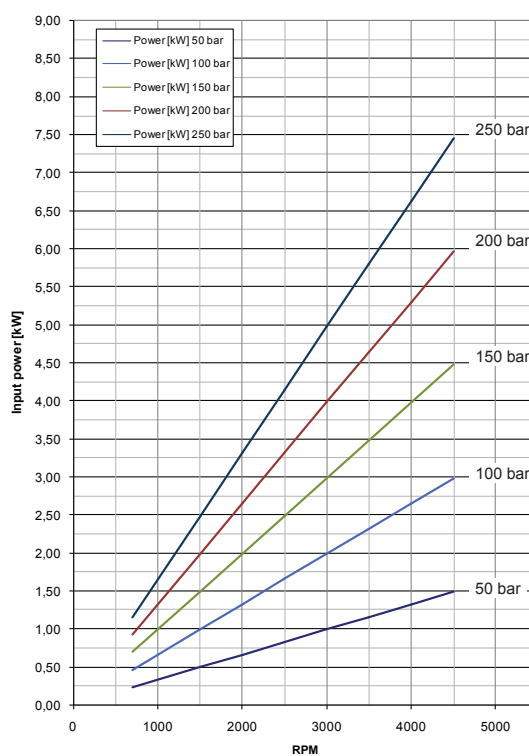
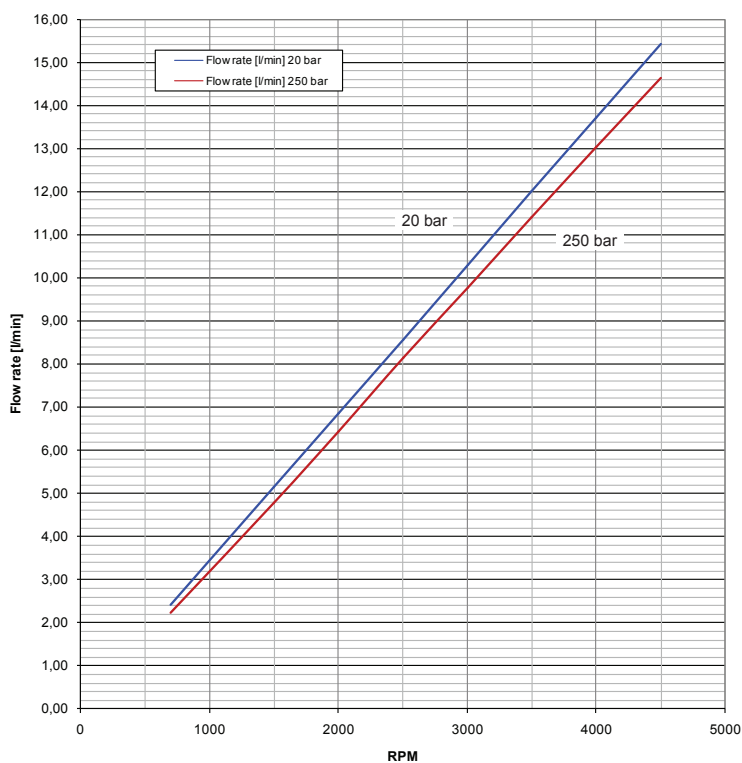
The performance of these diagrams are approximate. In case you need approved values, please get in touch with our technical dept.

E0.109.1213.02.00/IM00

### 1.5PE - 2.8



### 1.5PE - 3.5



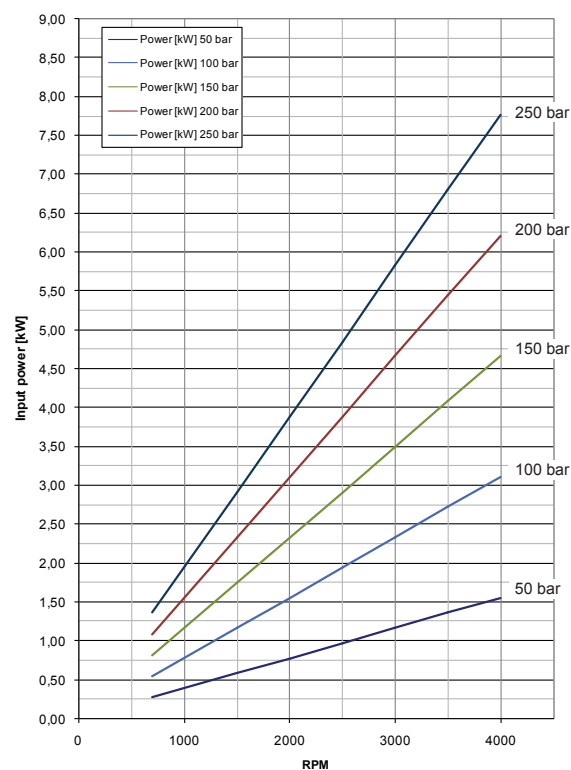
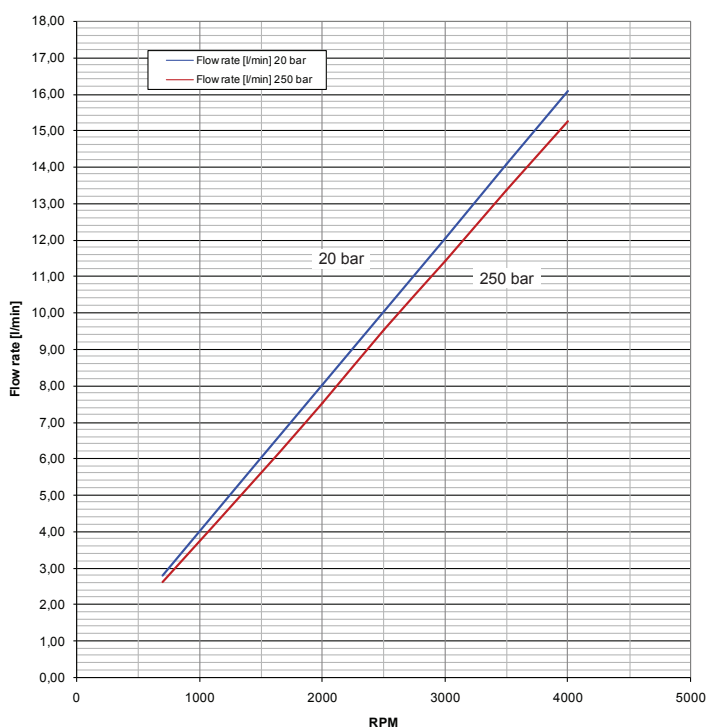
## GEAR PUMPS "E" SERIES

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

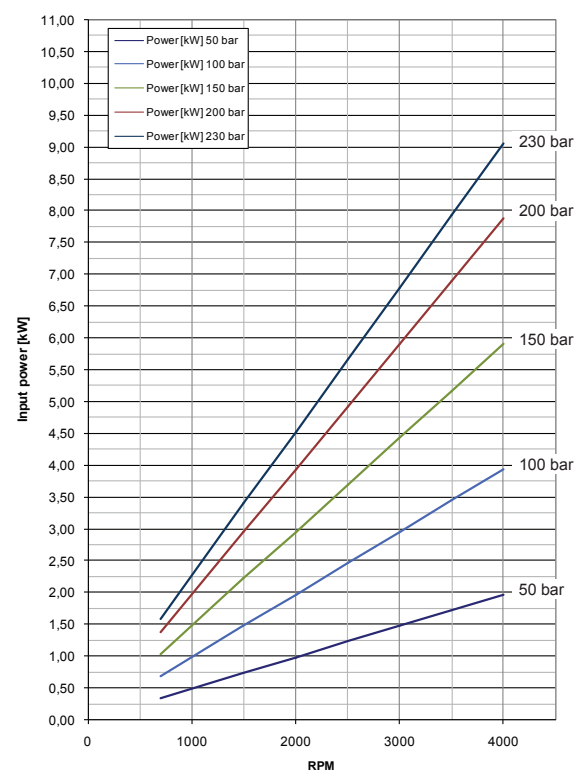
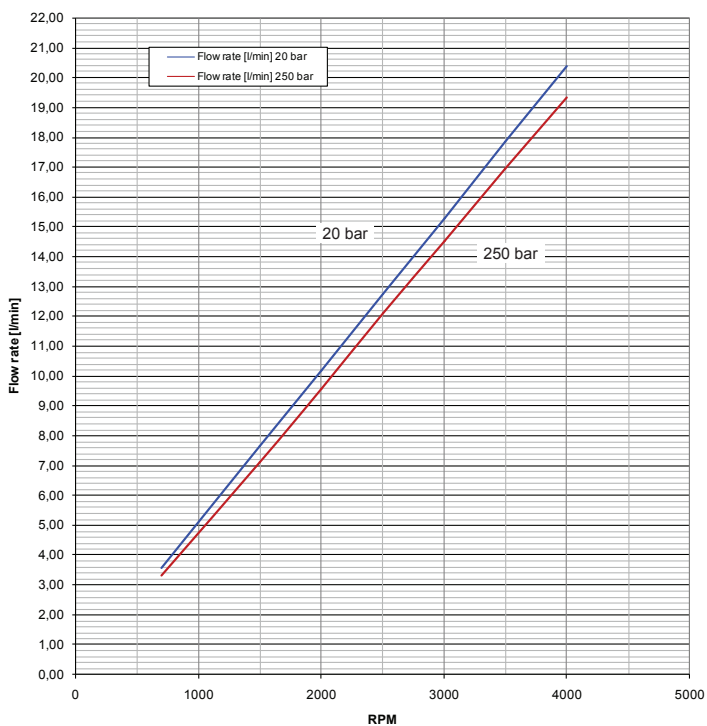
The performance of these diagrams are approximate. In case you need approved values, please get in touch with our technical dept.

# 1.5PE

### 1.5PE - 4.1



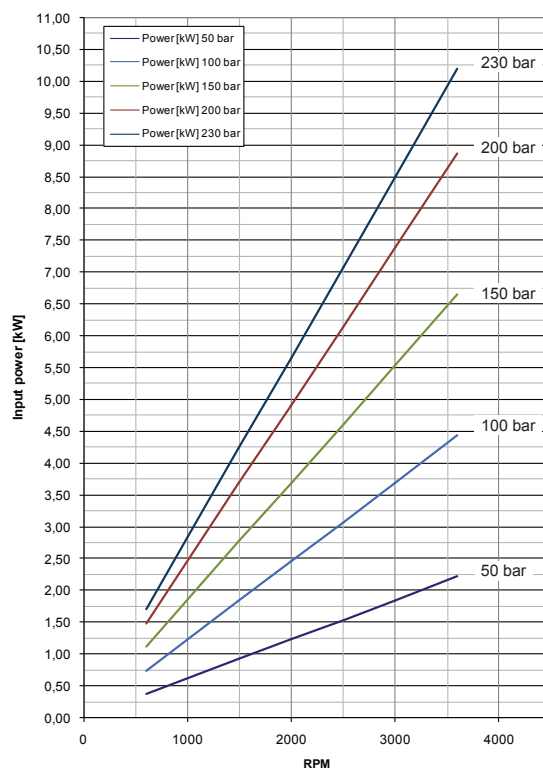
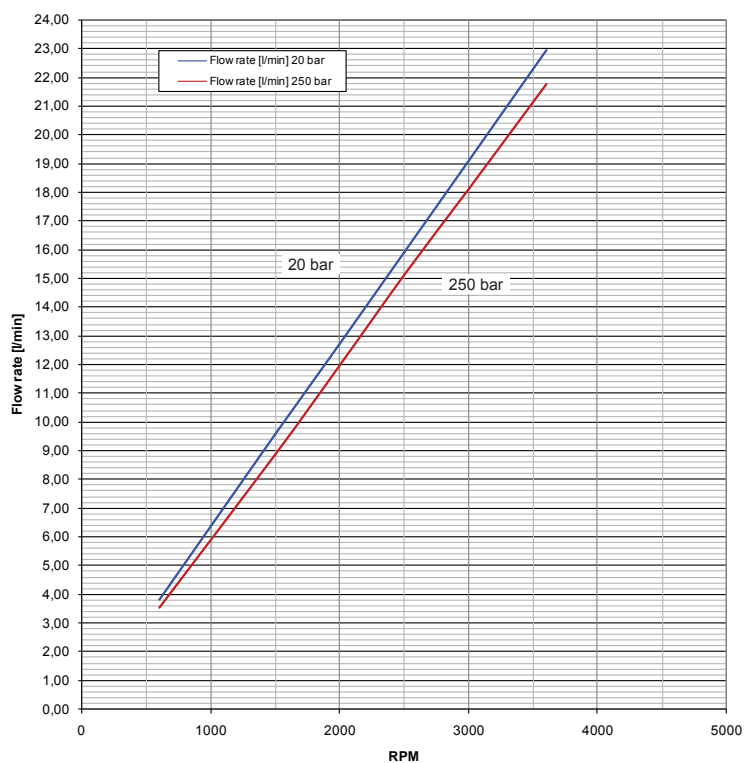
### 1.5PE - 5.2



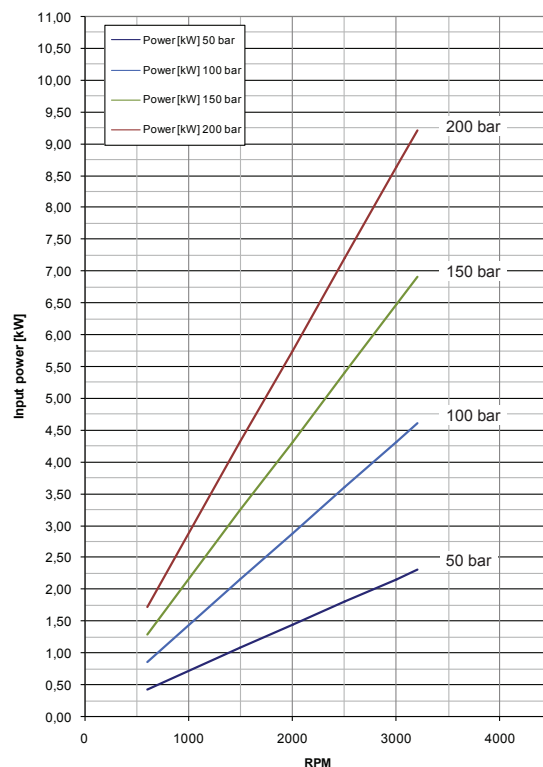
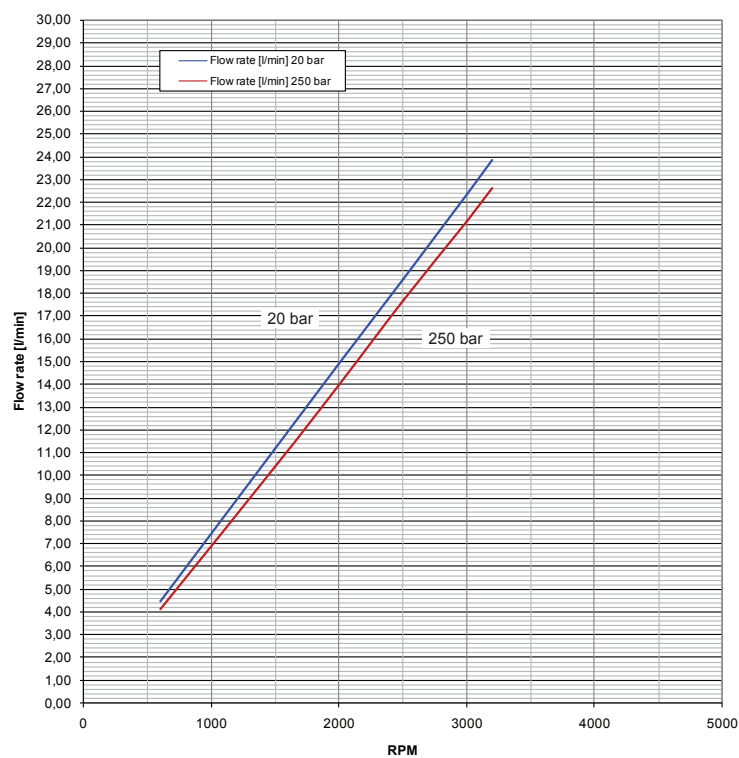
Performance curves carried out with oil viscosity at 21 cSt and oil temperature at 50°C.

The performance of these diagrams are approximate. In case you need approved values, please get in touch with our technical dept.

### 1.5PE - 6.2



### 1.5PE - 7.6



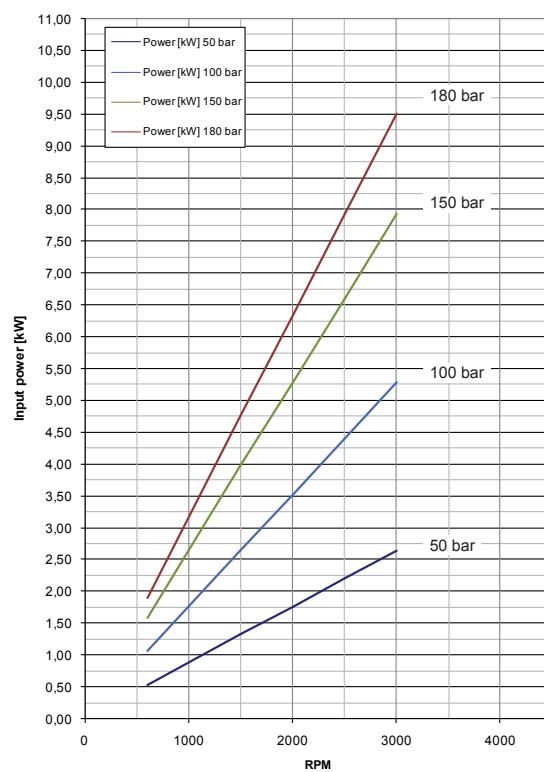
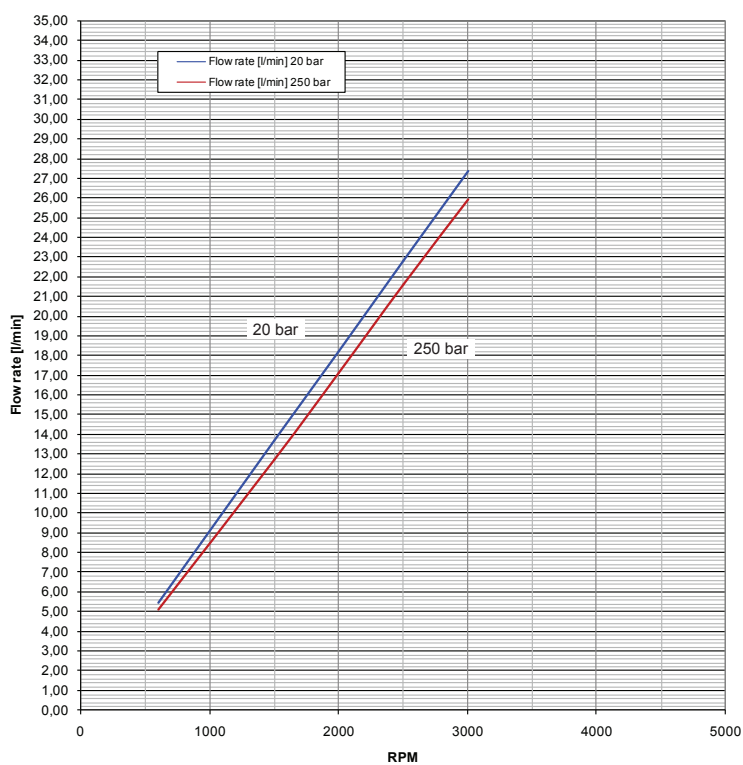
## GEAR PUMPS “E” SERIES

# 1.5PE

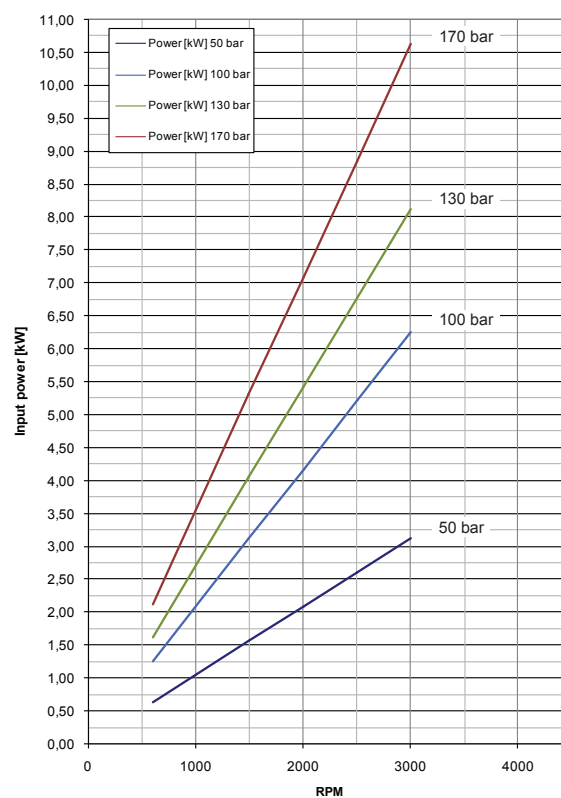
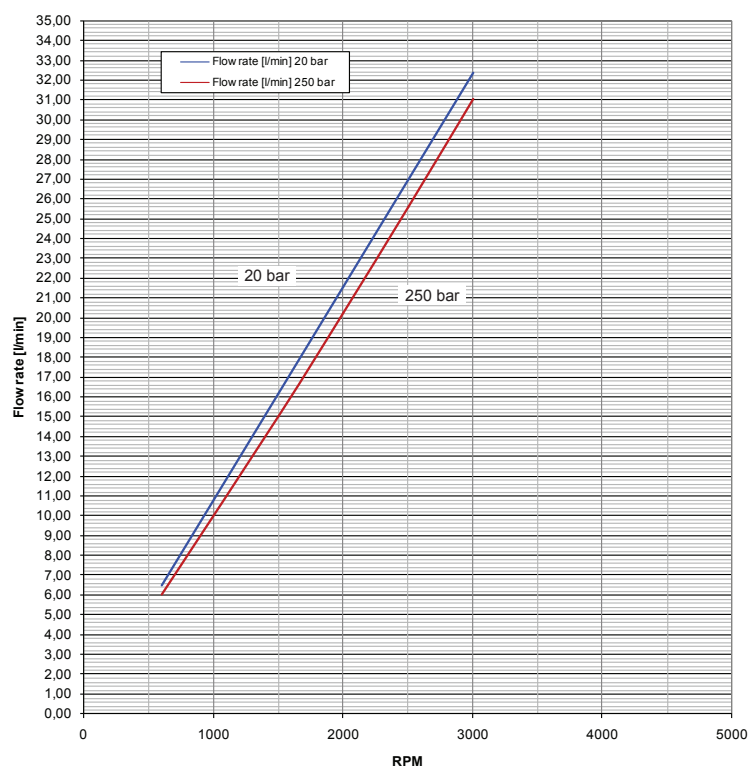
Performance curves carried out with oil viscosity at 21 cSt and oil temperature at 50°C

The performance of these diagrams are approximate. In case you need approved values, please get in touch with our technical dept.

### 1.5PE - 9.3



### 1.5PE - 11



## HOW TO ORDER 1.5PE SINGLE PUMP

**A** **B** **C** **D** **E** **F** **G** **H**

**1.5** **P E** **2,1** **D - P** **1 8** **P 0 - V**

**A**  
DIMENSION

**B**  
SERIES

**C**

| TYPE | DISPLACEMENTS<br>cm <sup>3</sup> /rev - cu.in./rev. |
|------|-----------------------------------------------------|
| 1.4  | 1,4 - 0,09                                          |
| 2.1  | 2,1 - 0,13                                          |
| 2.8  | 2,8 - 0,17                                          |
| 3.5  | 3,5 - 0,21                                          |
| 4.1  | 4,1 - 0,25                                          |
| 5.2  | 5,2 - 0,32                                          |
| 6.2  | 6,2 - 0,38                                          |
| 7.6  | 7,6 - 0,46                                          |
| 9.3  | 9,3 - 0,57                                          |
| 11   | 11 - 0,67                                           |

**D**

| CODE | ROTATION (page 2) |
|------|-------------------|
| D    | CLOCKWISE         |
| S    | ANTI-CLOCKWISE    |

**E**

| CODE | AVAILABLE PORTS (page 8)        |
|------|---------------------------------|
| G    | GAS THREADED PORTS (BSPP)       |
| R    | SAE THREADED PORTS (ODT)        |
| P    | FLANGED PORTS EUROPEAN STANDARD |
| B    | FLANGED PORTS GERMAN STANDARD   |

**F**

| CODE | AVAILABLE SHAFTS (pages 13) |
|------|-----------------------------|
| 18   | EUROPEAN TAPERED 1:8 SHAFT  |
| 19   | EUROPEAN TAPERED 1:8 SHAFT  |
| 51   | SAE AA 9T-20/40DP           |
| 80   | SAE AA STRAIGHT             |
| 83   | SAE STRAIGHT                |

**H**

| AVAILABLE INTERNAL SEALS       | CODE |
|--------------------------------|------|
| NITRILE-BUTADIENE RUBBER (NBR) |      |
| FLUOROELASTOMER (VITON)        | V    |

**G**

| AVAILABLE MOUNTING FLANGES (pages 11 and 12) | CODE |
|----------------------------------------------|------|
| EUROPEAN STANDARD Ø 25,4 mm                  | P0   |
| EUROPEAN STANDARD Ø 30 mm                    | P01  |
| SAE AA 2 BOLTS Ø 50,8 mm                     | S0   |
| SAE 4 BOLTS Ø 45,24 mm                       | S1   |



## HOW TO ORDER 1.5PE MULTIPLE PUMP

**A** **B** **C** **D** **E** **F** **G** **H** **I**

**1.5** **P E** **6,2** / **4,1** / **2,1** **D - R** **5 1** **S 0 - V - U A 1**

**A** DIMENSION

**B** SERIES

**C**

| TYPE | DISPLACEMENTS                      |
|------|------------------------------------|
|      | cm <sup>3</sup> /rev - cu.in./rev. |
| 1.4  | 1,4 - 0,09                         |
| 2.1  | 2,1 - 0,13                         |
| 2.8  | 2,8 - 0,17                         |
| 3.5  | 3,5 - 0,21                         |
| 4.1  | 4,1 - 0,25                         |
| 5.2  | 5,2 - 0,32                         |
| 6.2  | 6,2 - 0,38                         |
| 7.6  | 7,6 - 0,46                         |
| 9.3  | 9,3 - 0,57                         |
| 11   | 11 - 0,67                          |

**D**

| CODE | ROTATION (page 2) |
|------|-------------------|
| D    | CLOCKWISE         |
| S    | ANTI-CLOCKWISE    |

**E**

| CODE | AVAILABLE PORTS (page 8)        |
|------|---------------------------------|
| G    | GAS THREADED PORTS (BSPP)       |
| R    | SAE THREADED PORTS (ODT)        |
| P    | FLANGED PORTS EUROPEAN STANDARD |
| B    | FLANGED PORTS GERMAN STANDARD   |

**F**

| CODE | AVAILABLE SHAFTS (pages 13) |
|------|-----------------------------|
| 18   | EUROPEAN TAPERED 1:8 SHAFT  |
| 19   | EUROPEAN TAPERED 1:8 SHAFT  |
| 51   | SAE AA 9T-20/40DP           |
| 80   | SAE AA STRAIGHT             |
| 83   | SAE STRAIGHT                |

**I**

| SUCTION TYPES (page 10) |  | CODE |
|-------------------------|--|------|
| COMMON SUCTION          |  | UA   |

The number after UA, means the stage where the common inlet is. For example: UA1 means the common inlet is on the first stage after the front flange.

**H**

| AVAILABLE INTERNAL SEALS       |  | CODE |
|--------------------------------|--|------|
| NITRILE-BUTADIENE RUBBER (NBR) |  | V    |
| FLUOROELASTOMER (VITON)        |  | V    |

**G**

| AVAILABLE MOUNTING FLANGES (pages 11 and 12) |  | CODE |
|----------------------------------------------|--|------|
| EUROPEAN STANDARD Ø 25,4 mm                  |  | P0   |
| EUROPEAN STANDARD Ø 30 mm                    |  | P01  |
| SAE AA 2 BOLTS Ø 50,8 mm                     |  | S0   |
| SAE 4 BOLTS Ø 45,24 mm                       |  | S1   |



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# 1.5 PE

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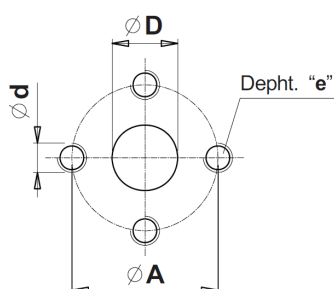
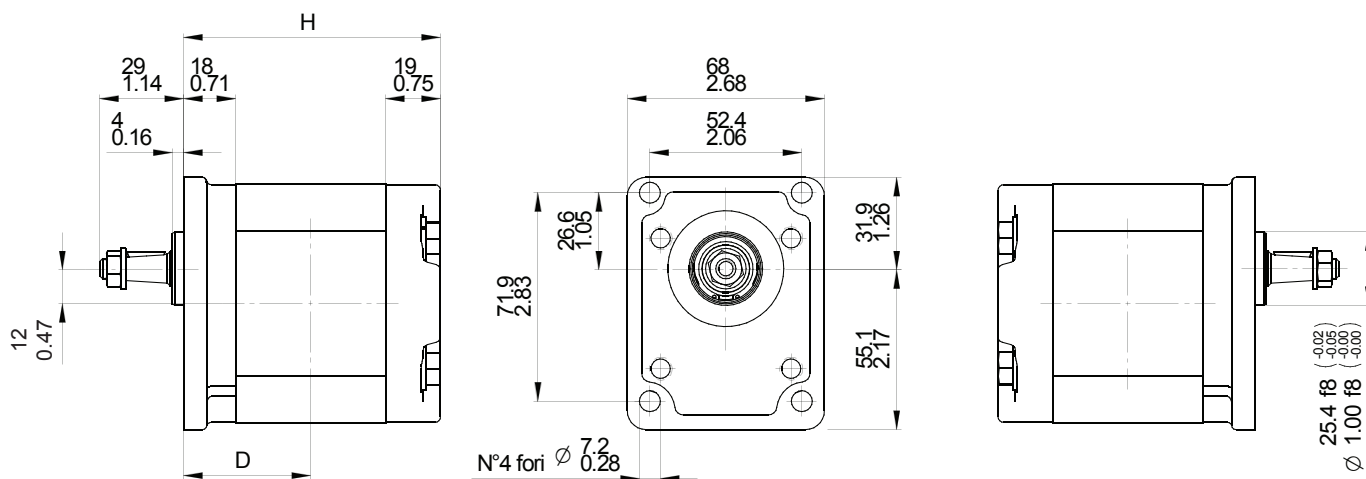
## Aluminium gear pumps

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### Section B - Dealer management

E0.109.1213.05.00-IM00

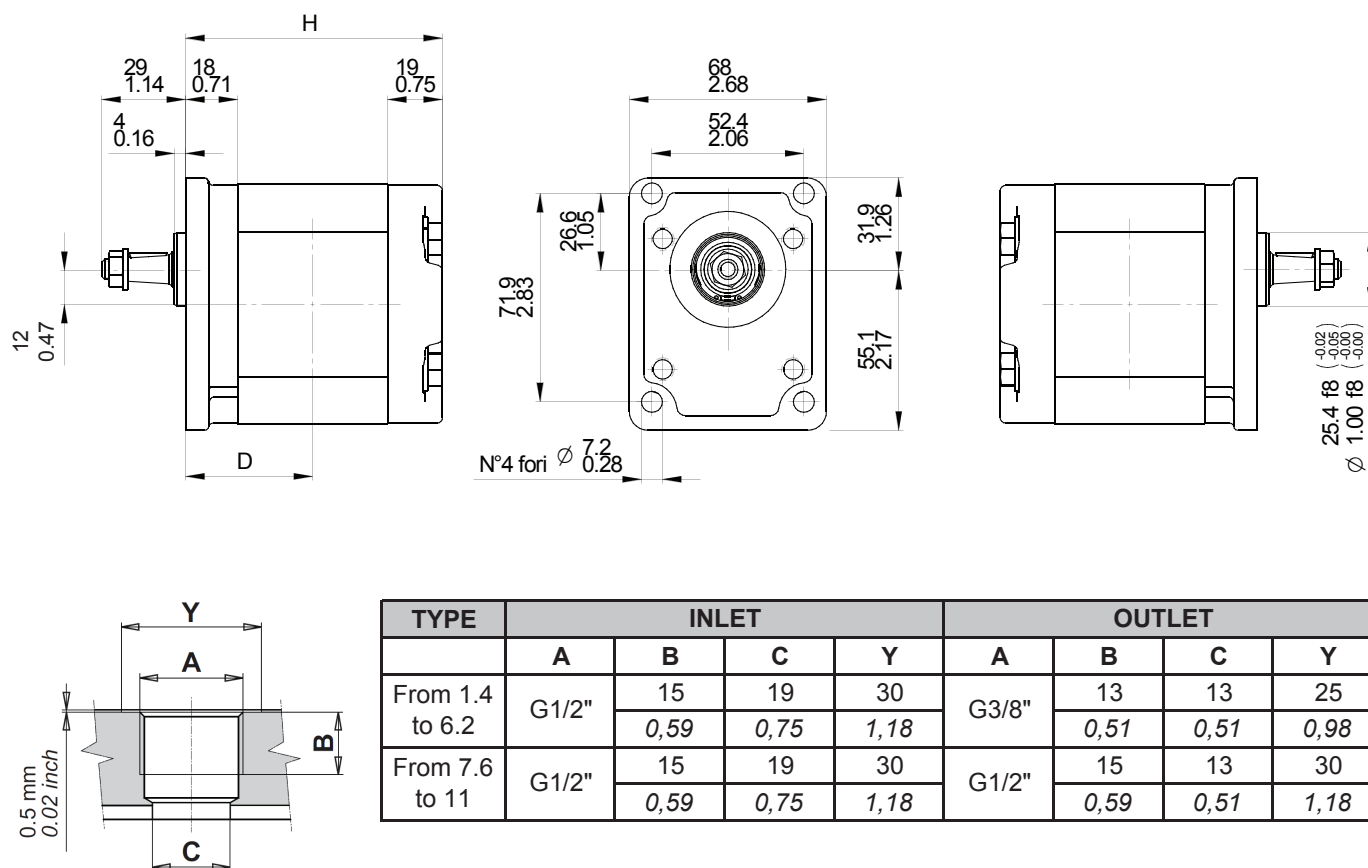
## P18P0 - Clockwise and anti-clockwise rotation codes



| TYPE           | INLET           |                 |    |      | OUTLET          |                 |    |      |
|----------------|-----------------|-----------------|----|------|-----------------|-----------------|----|------|
|                | $\varnothing D$ | $\varnothing A$ | d  | e    | $\varnothing D$ | $\varnothing A$ | d  | e    |
| From 1.4 to 11 | 13              | 30              | M6 | 13   | 12              | 30              | M6 | 13   |
|                | 0,51            | 1,18            |    | 0,51 | 0,47            | 1,18            |    | 0,51 |

| DISPLACEMENT         |            | DIMENSIONS |      |       |      | ANTI-CLOCKWISE | CLOCKWISE   |
|----------------------|------------|------------|------|-------|------|----------------|-------------|
|                      |            | D          |      | H     |      |                |             |
|                      |            |            |      |       |      |                |             |
| cm <sup>3</sup> /rev | cu.in./rev | mm         | in   | mm    | in   |                |             |
| 1,4                  | 0,09       | 40         | 1,57 | 81,0  | 3,19 | 6109 111 11    | 6109 111 12 |
| 2,1                  | 0,13       | 40,95      | 1,61 | 82,9  | 3,26 | 6109 111 21    | 6109 111 22 |
| 2,8                  | 0,17       | 41,95      | 1,65 | 84,9  | 3,34 | 6109 111 31    | 6109 111 32 |
| 3,5                  | 0,21       | 42,95      | 1,69 | 86,9  | 3,42 | 6109 111 41    | 6109 111 42 |
| 4,1                  | 0,25       | 43,8       | 1,72 | 88,6  | 3,49 | 6109 111 51    | 6109 111 52 |
| 5,2                  | 0,32       | 45,35      | 1,79 | 91,7  | 3,61 | 6109 111 61    | 6109 111 62 |
| 6,2                  | 0,38       | 46,75      | 1,84 | 94,5  | 3,72 | 6109 111 71    | 6109 111 72 |
| 7,6                  | 0,46       | 48,75      | 1,92 | 98,5  | 3,88 | 6109 111 81    | 6109 111 82 |
| 9,3                  | 0,57       | 51,15      | 2,01 | 103,3 | 4,07 | 6109 111 91    | 6109 111 92 |
| 11                   | 0,67       | 53,55      | 2,11 | 108,1 | 4,26 | 6109 112 01    | 6109 112 02 |

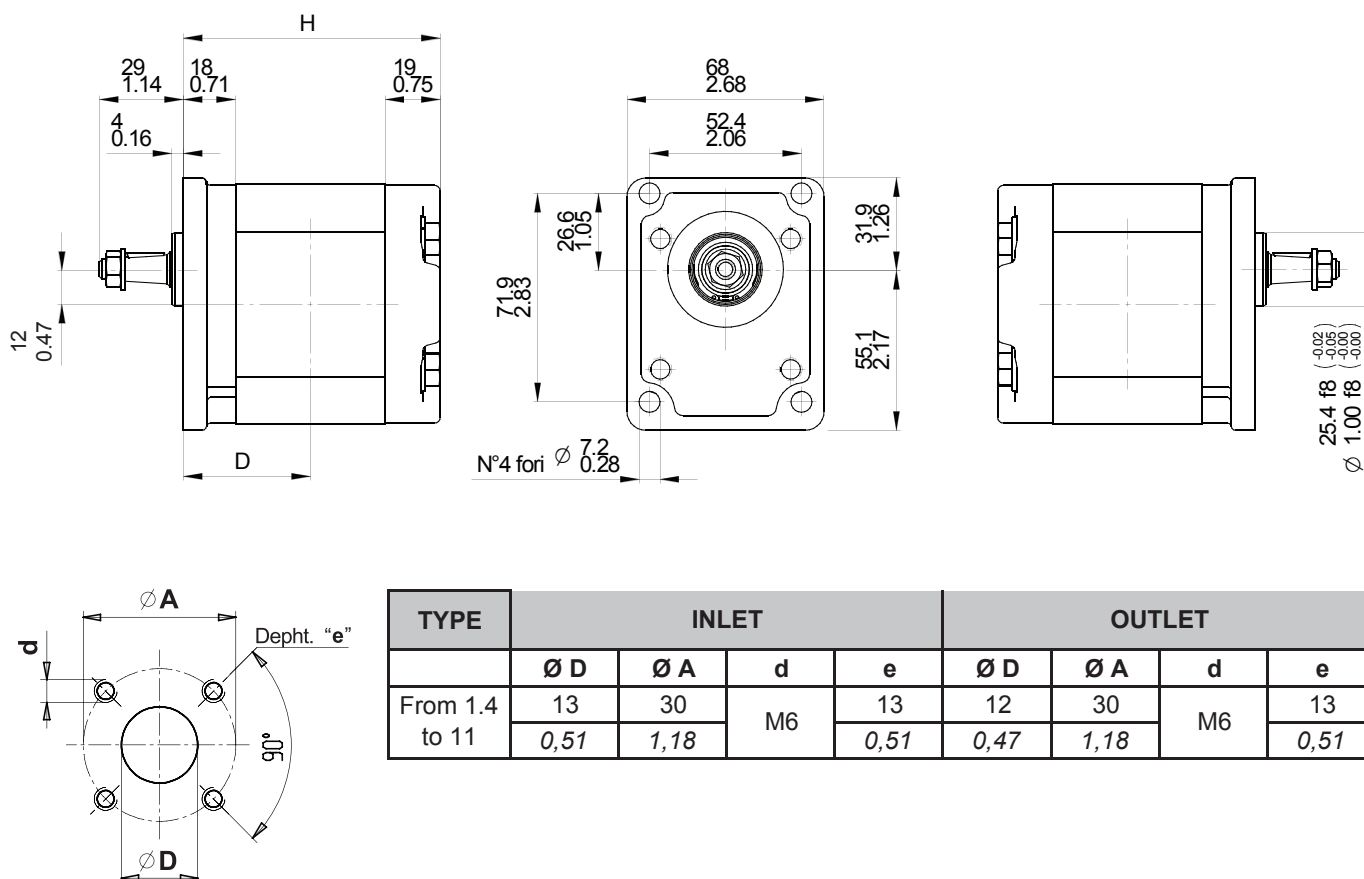
## G18P0 - Clockwise and anti-clockwise rotation codes



| TYPE            | INLET |      |      |      | OUTLET |      |      |      |
|-----------------|-------|------|------|------|--------|------|------|------|
|                 | A     | B    | C    | Y    | A      | B    | C    | Y    |
| From 1.4 to 6.2 | G1/2" | 15   | 19   | 30   | G3/8"  | 13   | 13   | 25   |
|                 |       | 0,59 | 0,75 | 1,18 |        | 0,51 | 0,51 | 0,98 |
| From 7.6 to 11  | G1/2" | 15   | 19   | 30   | G1/2"  | 15   | 13   | 30   |
|                 |       | 0,59 | 0,75 | 1,18 |        | 0,59 | 0,51 | 1,18 |

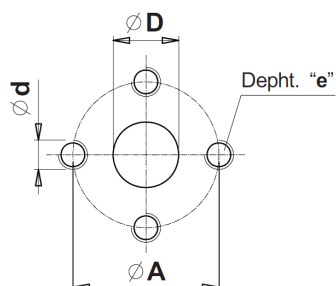
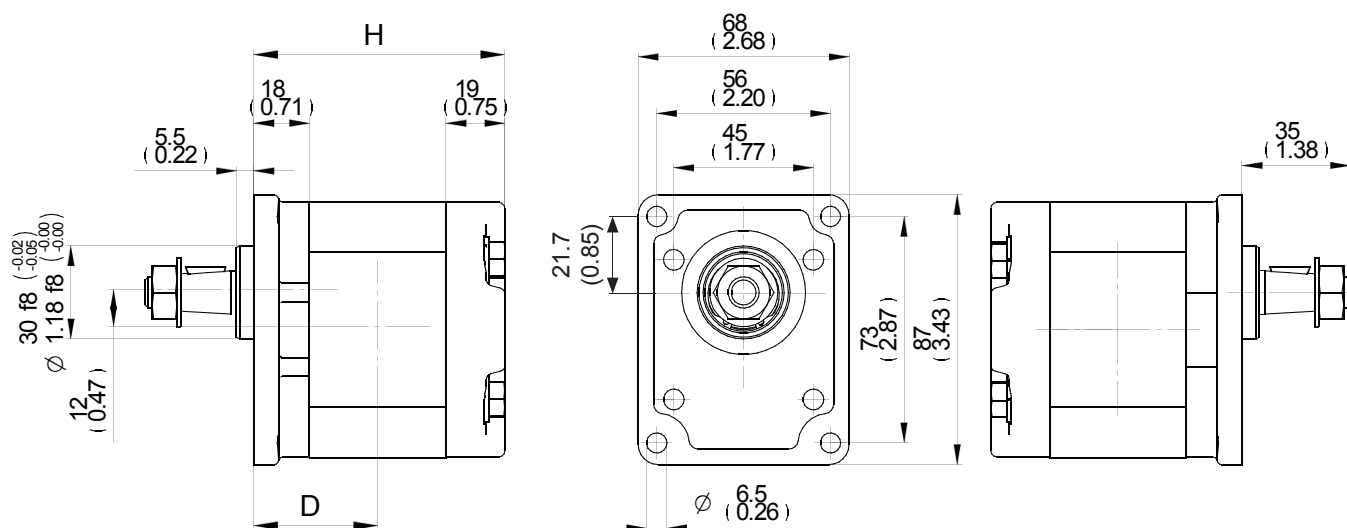
| DISPLACEMENT |            |       |      |       |      | ANTI-CLOCKWISE | CLOCKWISE   |
|--------------|------------|-------|------|-------|------|----------------|-------------|
|              |            |       |      |       |      |                |             |
| cm³/rev      | cu.in./rev | D     |      | H     |      |                |             |
| mm           | in         | mm    | in   | mm    | in   |                |             |
| 1,4          | 0,09       | 40    | 1,57 | 81,0  | 3,19 | 6109 101 01    | 6109 101 02 |
| 2,1          | 0,13       | 40,95 | 1,61 | 82,9  | 3,26 | 6109 101 11    | 6109 101 12 |
| 2,8          | 0,17       | 41,95 | 1,65 | 84,9  | 3,34 | 6109 101 21    | 6109 101 22 |
| 3,5          | 0,21       | 42,95 | 1,69 | 86,9  | 3,42 | 6109 101 31    | 6109 101 32 |
| 4,1          | 0,25       | 43,8  | 1,72 | 88,6  | 3,49 | 6109 101 41    | 6109 101 42 |
| 5,2          | 0,32       | 45,35 | 1,79 | 91,7  | 3,61 | 6109 101 51    | 6109 101 52 |
| 6,2          | 0,38       | 46,75 | 1,84 | 94,5  | 3,72 | 6109 101 61    | 6109 101 62 |
| 7,6          | 0,46       | 48,75 | 1,92 | 98,5  | 3,88 | 6109 101 71    | 6109 101 72 |
| 9,3          | 0,57       | 51,15 | 2,01 | 103,3 | 4,07 | 6109 101 81    | 6109 101 82 |
| 11           | 0,67       | 53,55 | 2,11 | 108,1 | 4,26 | 6109 101 91    | 6109 101 92 |

## B18P0 - Clockwise and anti-clockwise rotation codes



|              |            |            |      |       |      | ANTI-CLOCKWISE                                                                        | CLOCKWISE                                                                             |
|--------------|------------|------------|------|-------|------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| DISPLACEMENT |            | DIMENSIONS |      |       |      |  |  |
|              |            | D          |      | H     |      |                                                                                       |                                                                                       |
| cm³/rev      | cu.in./rev | mm         | in   | mm    | in   |                                                                                       |                                                                                       |
| 1,4          | 0,09       | 40         | 1,57 | 81,0  | 3,19 | 6109 102 01                                                                           | 6109 102 02                                                                           |
| 2,1          | 0,13       | 40,95      | 1,61 | 82,9  | 3,26 | 6109 102 11                                                                           | 6109 102 12                                                                           |
| 2,8          | 0,17       | 41,95      | 1,65 | 84,9  | 3,34 | 6109 102 21                                                                           | 6109 102 22                                                                           |
| 3,5          | 0,21       | 42,95      | 1,69 | 86,9  | 3,42 | 6109 102 31                                                                           | 6109 102 32                                                                           |
| 4,1          | 0,25       | 43,8       | 1,72 | 88,6  | 3,49 | 6109 102 41                                                                           | 6109 102 42                                                                           |
| 5,2          | 0,32       | 45,35      | 1,79 | 91,7  | 3,61 | 6109 102 51                                                                           | 6109 102 52                                                                           |
| 6,2          | 0,38       | 46,75      | 1,84 | 94,5  | 3,72 | 6109 102 61                                                                           | 6109 102 62                                                                           |
| 7,6          | 0,46       | 48,75      | 1,92 | 98,5  | 3,88 | 6109 102 71                                                                           | 6109 102 72                                                                           |
| 9,3          | 0,57       | 51,15      | 2,01 | 103,3 | 4,07 | 6109 102 81                                                                           | 6109 102 82                                                                           |
| 11           | 0,67       | 53,55      | 2,11 | 108,1 | 4,26 | 6109 102 91                                                                           | 6109 102 92                                                                           |

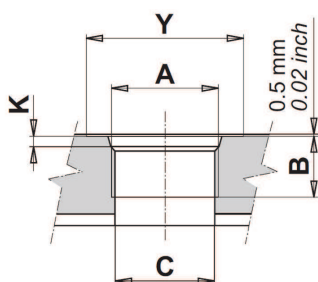
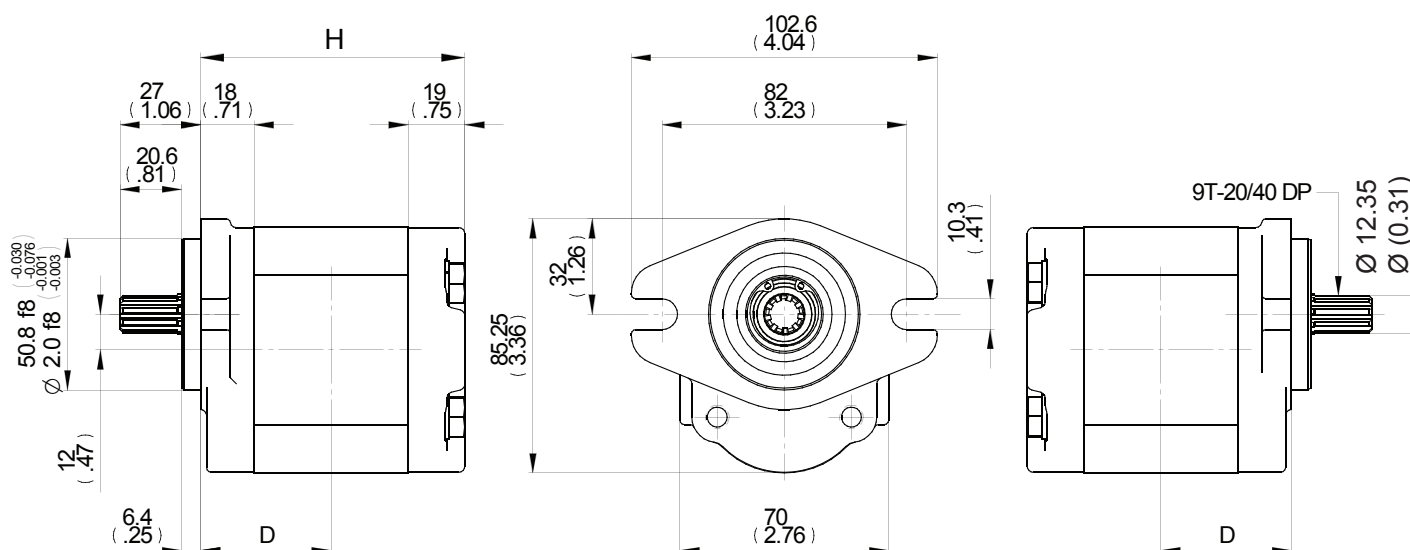
## P19P01 - Clockwise and anti-clockwise rotation codes



| TYPE           | INLET           |                 |     |      | OUTLET          |                 |     |      |
|----------------|-----------------|-----------------|-----|------|-----------------|-----------------|-----|------|
|                | $\varnothing D$ | $\varnothing A$ | $d$ | $e$  | $\varnothing D$ | $\varnothing A$ | $d$ | $e$  |
| From 1.4 to 11 | 13              | 30              | M6  | 13   | 12              | 30              | M6  | 13   |
|                | 0,51            | 1,18            |     | 0,51 | 0,47            | 1,18            |     | 0,51 |

| DISPLACEMENT         |            | DIMENSIONS |      |       |      | ANTI-CLOCKWISE                                                                        | CLOCKWISE                                                                             |
|----------------------|------------|------------|------|-------|------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                      |            | D          |      | H     |      |  |  |
| cm <sup>3</sup> /rev | cu.in./rev | mm         | in   | mm    | in   |                                                                                       |                                                                                       |
| 1,4                  | 0,09       | 40         | 1,57 | 81,0  | 3,19 | 6109 110 11                                                                           | 6109 110 12                                                                           |
| 2,1                  | 0,13       | 40,95      | 1,61 | 82,9  | 3,26 | 6109 110 21                                                                           | 6109 110 22                                                                           |
| 2,8                  | 0,17       | 41,95      | 1,65 | 84,9  | 3,34 | 6109 110 31                                                                           | 6109 110 32                                                                           |
| 3,5                  | 0,21       | 42,95      | 1,69 | 86,9  | 3,42 | 6109 110 41                                                                           | 6109 110 42                                                                           |
| 4,1                  | 0,25       | 43,8       | 1,72 | 88,6  | 3,49 | 6109 110 51                                                                           | 6109 110 52                                                                           |
| 5,2                  | 0,32       | 45,35      | 1,79 | 91,7  | 3,61 | 6109 110 61                                                                           | 6109 110 62                                                                           |
| 6,2                  | 0,38       | 46,75      | 1,84 | 94,5  | 3,72 | 6109 110 71                                                                           | 6109 110 72                                                                           |
| 7,6                  | 0,46       | 48,75      | 1,92 | 98,5  | 3,88 | 6109 103 31                                                                           | 6109 103 32                                                                           |
| 9,3                  | 0,57       | 51,15      | 2,01 | 103,3 | 4,07 | 6109 103 51                                                                           | 6109 103 52                                                                           |
| 11                   | 0,67       | 53,55      | 2,11 | 108,1 | 4,26 | 6109 103 71                                                                           | 6109 103 72                                                                           |

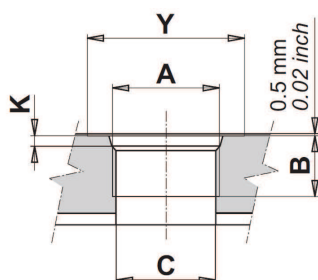
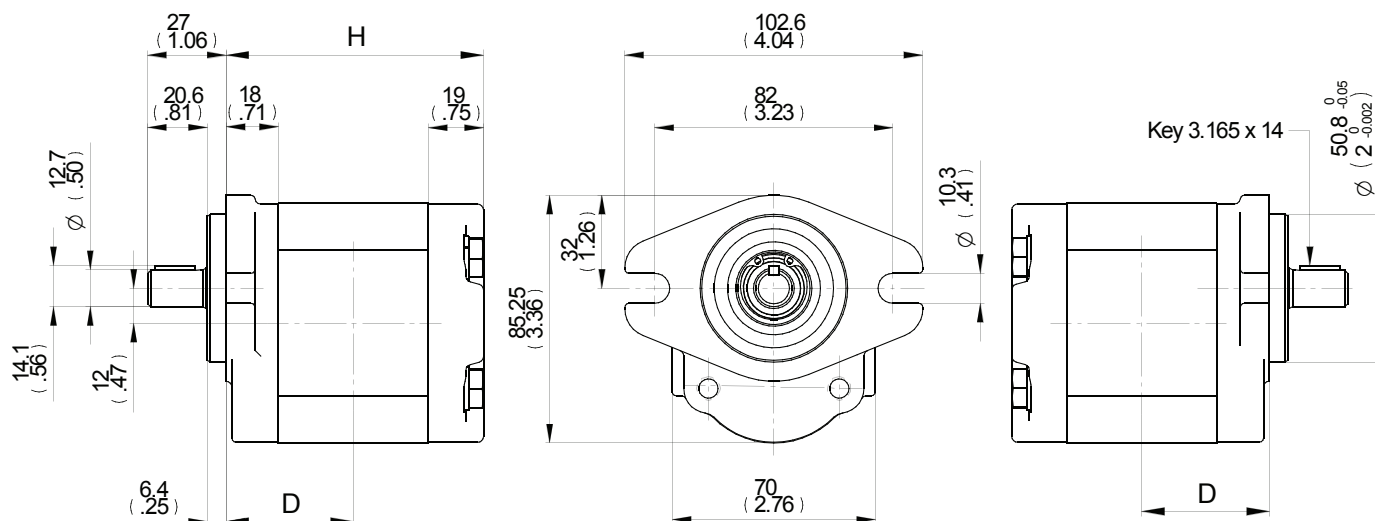
## R51S0 - Clockwise and anti-clockwise rotation codes



| TYPE            | INLET  |      |      |      |      | OUTLET |      |      |      |      |
|-----------------|--------|------|------|------|------|--------|------|------|------|------|
|                 | A      | B    | C    | Y    | K    | A      | B    | C    | Y    | K    |
| From 1.4 to 6.2 | 3/4"   | 14,5 | 17,3 | 30   | 2,5  | 9/16"  | 13   | 12,7 | 25   | 2,5  |
|                 | 16 UNF | 0,57 | 0,68 | 1,18 | 0,10 | 18 UNF | 0,51 | 0,50 | 0,98 | 0,10 |
| From 7.6 to 11  | 7/8"   | 16,7 | 20,2 | 34   | 2,5  | 3/4"   | 14,5 | 15   | 30   | 2,5  |
|                 | 14 UNF | 0,66 | 0,80 | 1,34 | 0,10 | 16 UNF | 0,57 | 0,59 | 1,18 | 0,10 |

| DISPLACEMENT         |            | DIMENSIONS |      |       |      | ANTI-CLOCKWISE                                                                        | CLOCKWISE                                                                             |
|----------------------|------------|------------|------|-------|------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                      |            | D          |      | H     |      |  |  |
| cm <sup>3</sup> /rev | cu.in./rev | mm         | in   | mm    | in   |                                                                                       |                                                                                       |
| 1,4                  | 0,09       | 40         | 1,57 | 81,0  | 3,19 | 6109 104 01                                                                           | 6109 104 02                                                                           |
| 2,1                  | 0,13       | 40,95      | 1,61 | 82,9  | 3,26 | 6109 104 11                                                                           | 6109 104 12                                                                           |
| 2,8                  | 0,17       | 41,95      | 1,65 | 84,9  | 3,34 | 6109 104 21                                                                           | 6109 104 22                                                                           |
| 3,5                  | 0,21       | 42,95      | 1,69 | 86,9  | 3,42 | 6109 104 31                                                                           | 6109 104 32                                                                           |
| 4,1                  | 0,25       | 43,8       | 1,72 | 88,6  | 3,49 | 6109 104 41                                                                           | 6109 104 42                                                                           |
| 5,2                  | 0,32       | 45,35      | 1,79 | 91,7  | 3,61 | 6109 104 51                                                                           | 6109 104 52                                                                           |
| 6,2                  | 0,38       | 46,75      | 1,84 | 94,5  | 3,72 | 6109 104 61                                                                           | 6109 104 62                                                                           |
| 7,6                  | 0,46       | 48,75      | 1,92 | 98,5  | 3,88 | 6109 104 71                                                                           | 6109 104 72                                                                           |
| 9,3                  | 0,57       | 51,15      | 2,01 | 103,3 | 4,07 | 6109 104 81                                                                           | 6109 104 82                                                                           |
| 11                   | 0,67       | 53,55      | 2,11 | 108,1 | 4,26 | 6109 104 91                                                                           | 6109 104 92                                                                           |

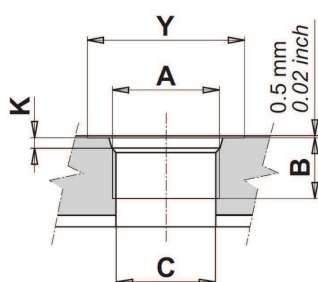
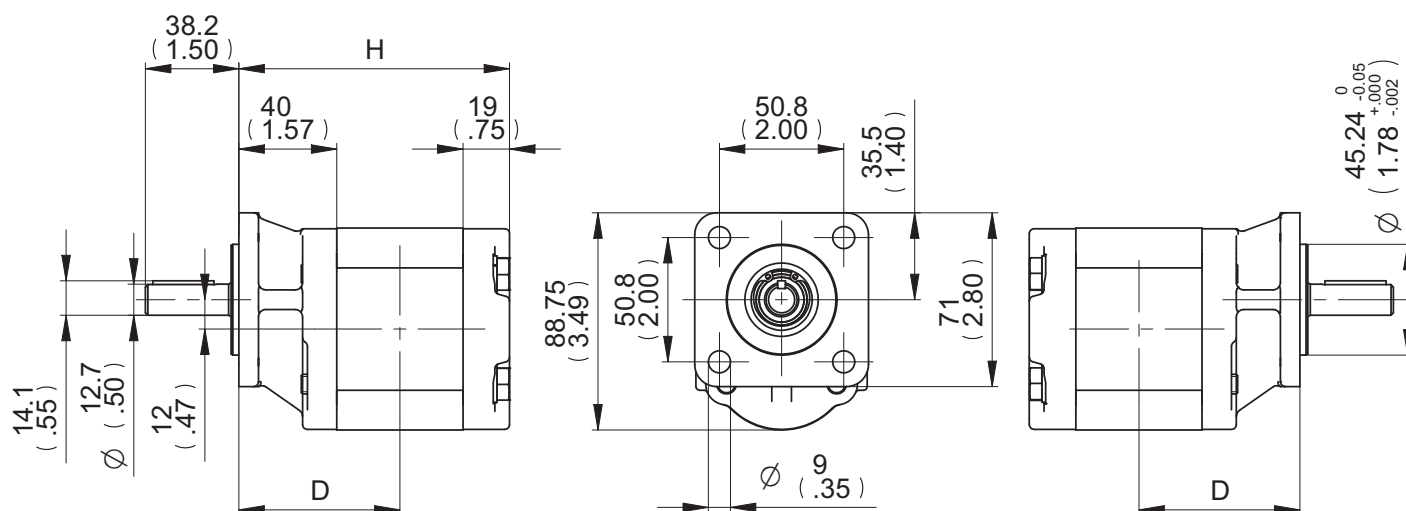
## R80S0 - Clockwise and anti-clockwise rotation codes



| TYPE            | INLET  |      |      |      |      | OUTLET |      |      |      |      |
|-----------------|--------|------|------|------|------|--------|------|------|------|------|
|                 | A      | B    | C    | Y    | K    | A      | B    | C    | Y    | K    |
| From 1.4 to 6.2 | 3/4"   | 14,5 | 17,3 | 30   | 2,5  | 9/16"  | 13   | 12,7 | 25   | 2,5  |
|                 | 16 UNF | 0,57 | 0,68 | 1,18 | 0,10 | 18 UNF | 0,51 | 0,50 | 0,98 | 0,10 |
| From 7.6 to 11  | 7/8"   | 16,7 | 20,2 | 34   | 2,5  | 3/4"   | 14,5 | 15   | 30   | 2,5  |
|                 | 14 UNF | 0,66 | 0,80 | 1,34 | 0,10 | 16 UNF | 0,57 | 0,59 | 1,18 | 0,10 |

| DISPLACEMENT         |            | DIMENSIONS |      |       |      | ANTI-CLOCKWISE                                                                        | CLOCKWISE                                                                             |
|----------------------|------------|------------|------|-------|------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                      |            | D          |      | H     |      |  |  |
| cm <sup>3</sup> /rev | cu.in./rev | mm         | in   | mm    | in   |                                                                                       |                                                                                       |
| 1,4                  | 0,09       | 40         | 1,57 | 81,0  | 3,19 | 6109 103 01                                                                           | 6109 103 02                                                                           |
| 2,1                  | 0,13       | 40,95      | 1,61 | 82,9  | 3,26 | 6109 103 11                                                                           | 6109 103 12                                                                           |
| 2,8                  | 0,17       | 41,95      | 1,65 | 84,9  | 3,34 | 6109 103 21                                                                           | 6109 103 22                                                                           |
| 3,5                  | 0,21       | 42,95      | 1,69 | 86,9  | 3,42 | 6109 110 81                                                                           | 6109 110 82                                                                           |
| 4,1                  | 0,25       | 43,8       | 1,72 | 88,6  | 3,49 | 6109 103 41                                                                           | 6109 103 42                                                                           |
| 5,2                  | 0,32       | 45,35      | 1,79 | 91,7  | 3,61 | 6109 110 91                                                                           | 6109 110 92                                                                           |
| 6,2                  | 0,38       | 46,75      | 1,84 | 94,5  | 3,72 | 6109 103 61                                                                           | 6109 103 62                                                                           |
| 7,6                  | 0,46       | 48,75      | 1,92 | 98,5  | 3,88 | 6109 111 01                                                                           | 6109 111 02                                                                           |
| 9,3                  | 0,57       | 51,15      | 2,01 | 103,3 | 4,07 | 6109 103 81                                                                           | 6109 103 82                                                                           |
| 11                   | 0,67       | 53,55      | 2,11 | 108,1 | 4,26 | 6109 103 91                                                                           | 6109 103 92                                                                           |

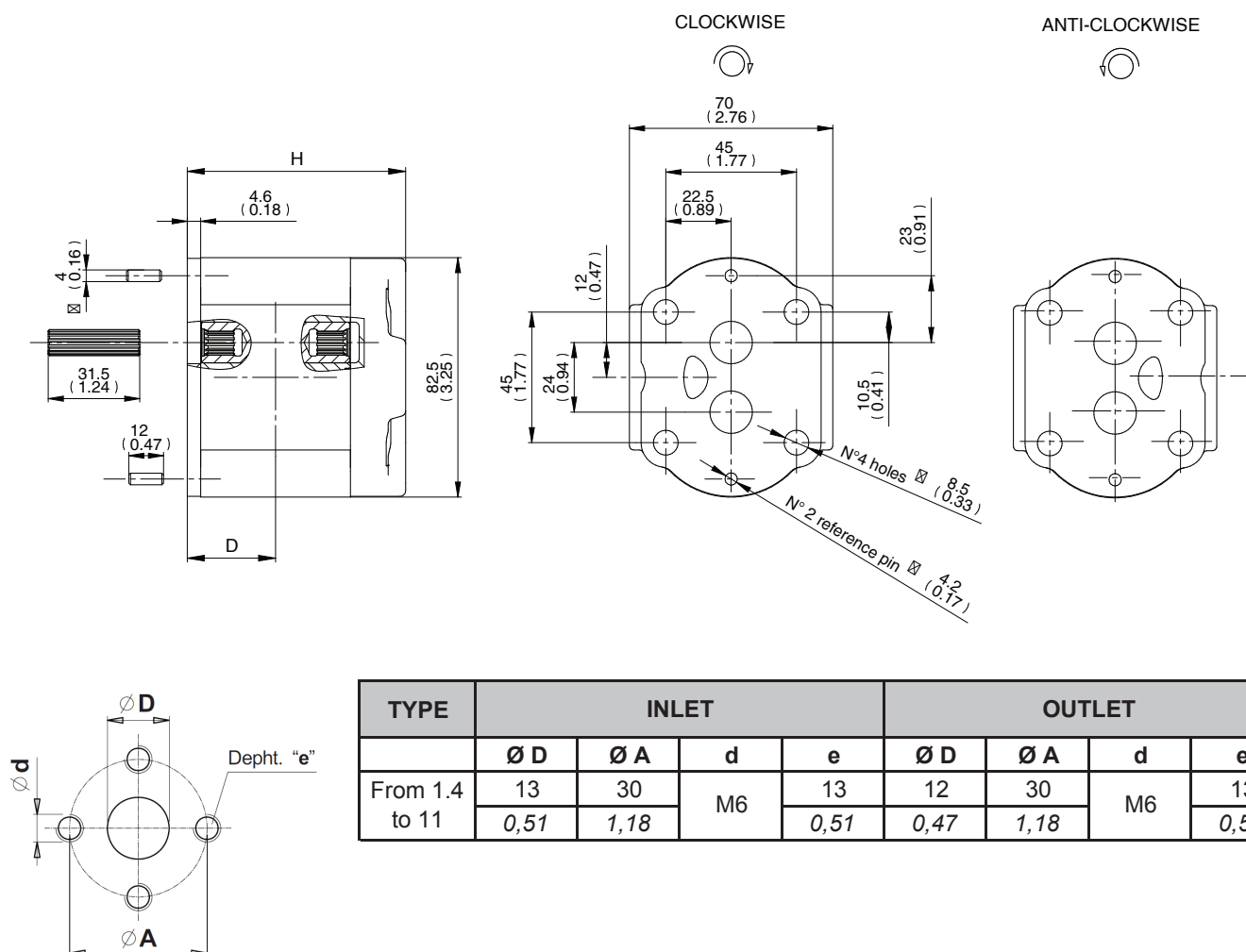
## R83S1 - Clockwise and anti-clockwise rotation codes



| TYPE            | INLET  |      |      |      |      | OUTLET |      |      |      |      |
|-----------------|--------|------|------|------|------|--------|------|------|------|------|
|                 | A      | B    | C    | Y    | K    | A      | B    | C    | Y    | K    |
| From 1.4 to 6.2 | 3/4"   | 14,5 | 17,3 | 30   | 2,5  | 9/16"  | 13   | 12,7 | 25   | 2,5  |
|                 | 16 UNF | 0,57 | 0,68 | 1,18 | 0,10 | 18 UNF | 0,51 | 0,50 | 0,98 | 0,10 |
| From 7.6 to 11  | 7/8"   | 16,7 | 20,2 | 34   | 2,5  | 3/4"   | 14,5 | 15   | 30   | 2,5  |
|                 | 14 UNF | 0,66 | 0,80 | 1,34 | 0,10 | 16 UNF | 0,57 | 0,59 | 1,18 | 0,10 |

| DISPLACEMENT         |            | DIMENSIONS |      |       |      | ANTI-CLOCKWISE | CLOCKWISE   |
|----------------------|------------|------------|------|-------|------|----------------|-------------|
|                      |            | D          |      | H     |      |                |             |
|                      |            | mm         | in   | mm    | in   |                |             |
| cm <sup>3</sup> /rev | cu.in./rev |            |      |       |      |                |             |
| 1,4                  | 0,09       | 62         | 2,44 | 103,0 | 4,06 | 6109 105 01    | 6109 105 02 |
| 2,1                  | 0,13       | 62,95      | 2,48 | 104,9 | 4,13 | 6109 105 11    | 6109 105 12 |
| 2,8                  | 0,17       | 63,95      | 2,52 | 106,9 | 4,21 | 6109 105 21    | 6109 105 22 |
| 3,5                  | 0,21       | 64,95      | 2,56 | 108,9 | 4,29 | 6109 105 31    | 6109 105 32 |
| 4,1                  | 0,25       | 65,8       | 2,59 | 110,6 | 4,35 | 6109 105 41    | 6109 105 42 |
| 5,2                  | 0,32       | 67,35      | 2,65 | 113,7 | 4,48 | 6109 105 51    | 6109 105 52 |
| 6,2                  | 0,38       | 68,75      | 2,71 | 116,5 | 4,59 | 6109 105 61    | 6109 105 62 |
| 7,6                  | 0,46       | 70,75      | 2,79 | 120,5 | 4,74 | 6109 105 71    | 6109 105 72 |
| 9,3                  | 0,57       | 73,15      | 2,88 | 125,3 | 4,93 | 6109 105 81    | 6109 105 82 |
| 11                   | 0,67       | 75,55      | 2,97 | 130,1 | 5,12 | 6109 105 91    | 6109 105 92 |

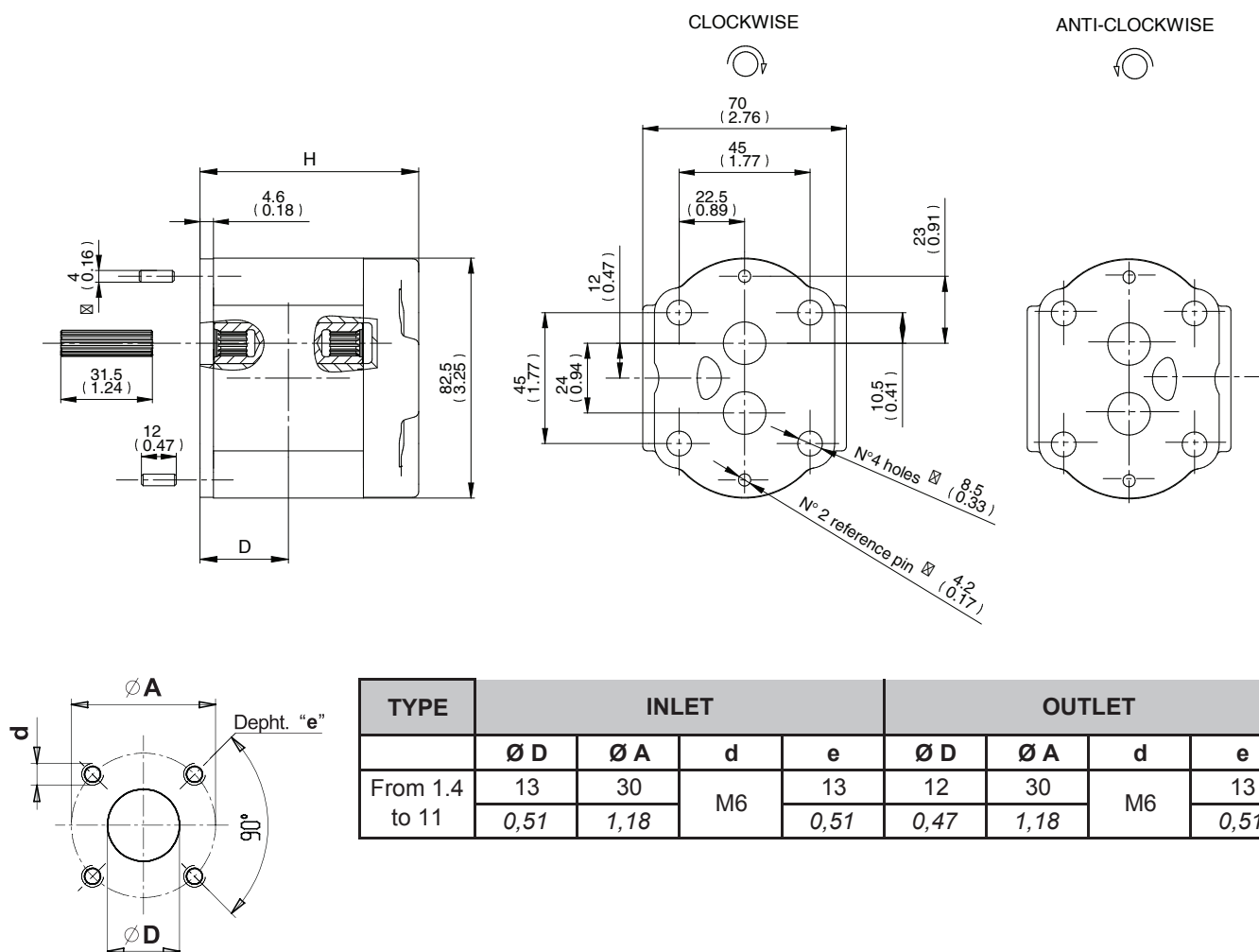
## P59R - Clockwise and anti-clockwise rotation codes



| TYPE           | INLET |      |    |      | OUTLET |      |    |      |
|----------------|-------|------|----|------|--------|------|----|------|
|                | Ø D   | Ø A  | d  | e    | Ø D    | Ø A  | d  | e    |
| From 1.4 to 11 | 13    | 30   | M6 | 13   | 12     | 30   | M6 | 13   |
|                | 0,51  | 1,18 |    | 0,51 | 0,47   | 1,18 |    | 0,51 |

| DISPLACEMENT |            | DIMENSIONS |      |      |      | ANTI-CLOCKWISE | CLOCKWISE   |
|--------------|------------|------------|------|------|------|----------------|-------------|
|              |            | D          |      | H    |      |                |             |
| cm³/rev      | cu.in./rev | mm         | in   | mm   | in   |                |             |
| 1,4          | 0,09       | 26,6       | 1,05 | 67,6 | 2,66 | 6109 311 11    | 6109 311 12 |
| 2,1          | 0,13       | 27,55      | 1,08 | 69,5 | 2,74 | 6109 311 21    | 6109 311 22 |
| 2,8          | 0,17       | 28,55      | 1,12 | 71,5 | 2,81 | 6109 311 31    | 6109 311 32 |
| 3,5          | 0,21       | 29,55      | 1,16 | 73,5 | 2,89 | 6109 311 41    | 6109 311 42 |
| 4,1          | 0,25       | 30,4       | 1,20 | 75,2 | 2,96 | 6109 311 51    | 6109 311 52 |
| 5,2          | 0,32       | 31,95      | 1,26 | 78,3 | 3,08 | 6109 311 61    | 6109 311 62 |
| 6,2          | 0,38       | 33,35      | 1,31 | 81,1 | 3,19 | 6109 311 71    | 6109 311 72 |
| 7,6          | 0,46       | 35,35      | 1,39 | 85,1 | 3,35 | 6109 311 81    | 6109 311 82 |
| 9,3          | 0,57       | 37,75      | 1,49 | 89,9 | 3,54 | 6109 311 91    | 6109 311 92 |
| 11           | 0,67       | 40,15      | 1,58 | 94,7 | 3,73 | 6109 312 01    | 6109 312 02 |

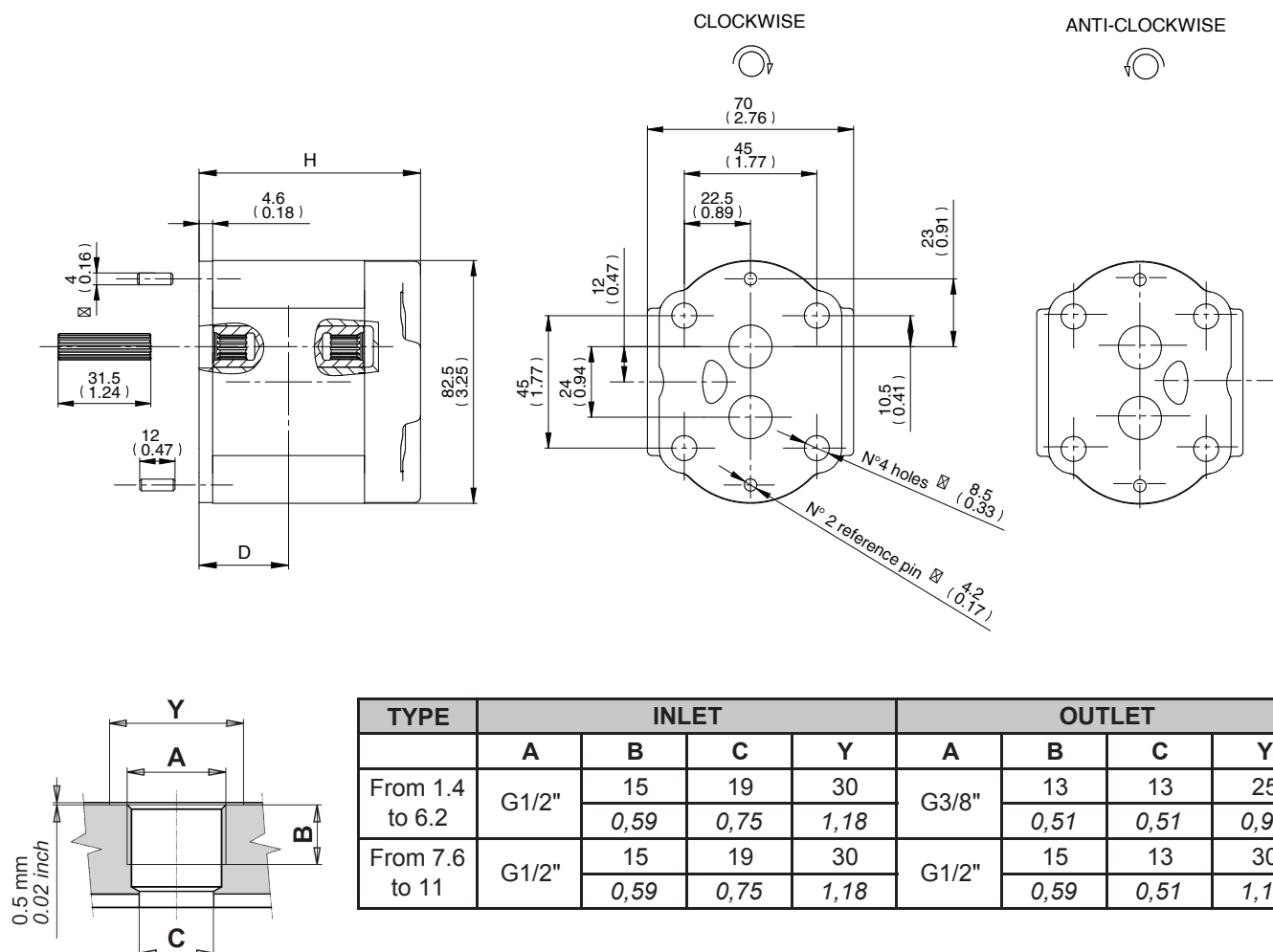
## B59R - Clockwise and anti-clockwise rotation codes



| TYPE           | INLET |      |    |      | OUTLET |      |    |      |
|----------------|-------|------|----|------|--------|------|----|------|
|                | Ø D   | Ø A  | d  | e    | Ø D    | Ø A  | d  | e    |
| From 1.4 to 11 | 13    | 30   | M6 | 13   | 12     | 30   | M6 | 13   |
|                | 0,51  | 1,18 |    | 0,51 | 0,47   | 1,18 |    | 0,51 |

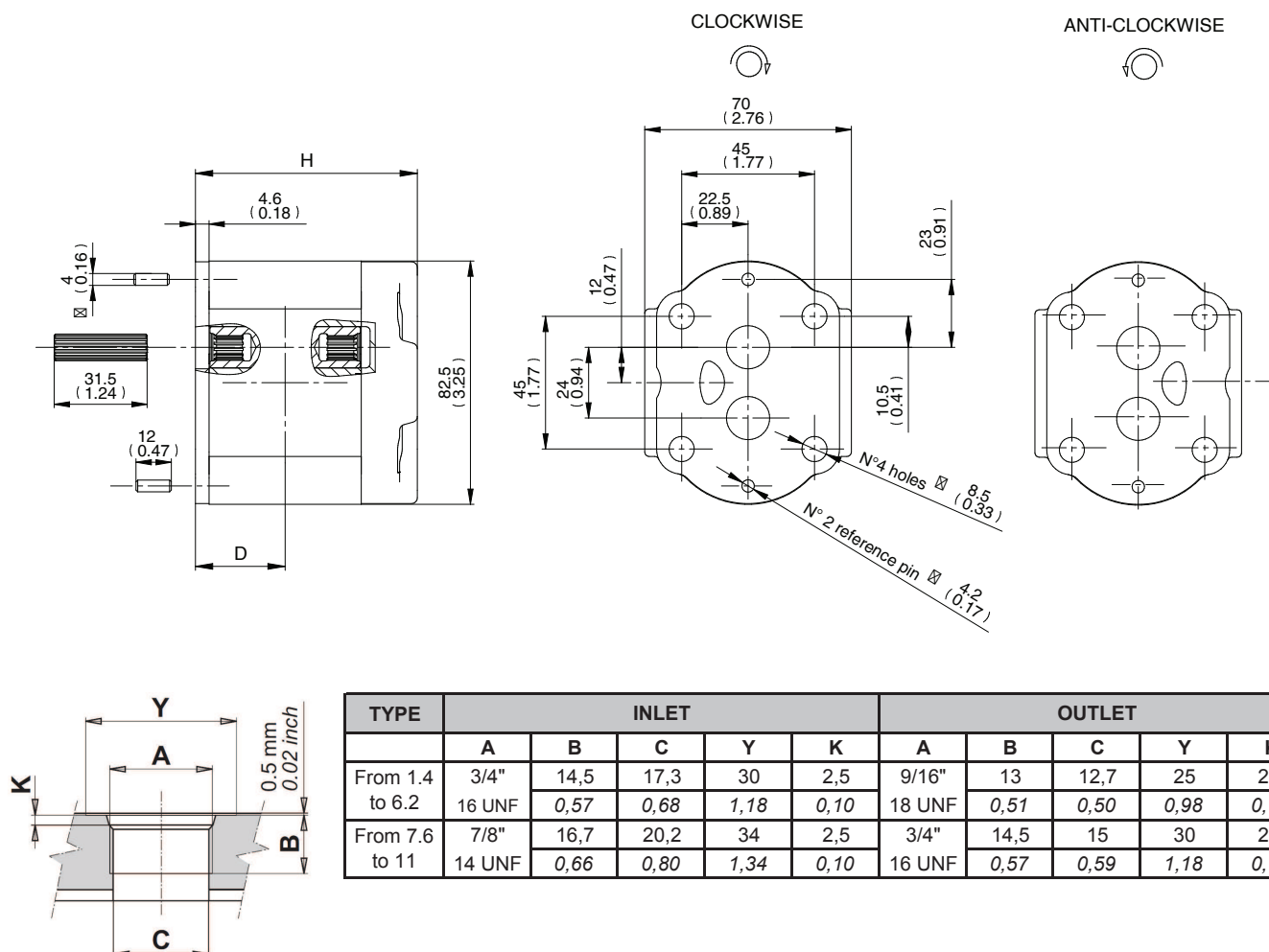
| DISPLACEMENT         |            | DIMENSIONS |      |      |      | ANTI-CLOCKWISE | CLOCKWISE   |
|----------------------|------------|------------|------|------|------|----------------|-------------|
|                      |            | D          |      | H    |      |                |             |
|                      |            | mm         | in   | mm   | in   |                |             |
| cm <sup>3</sup> /rev | cu.in./rev |            |      |      |      |                |             |
| 1,4                  | 0,09       | 26,6       | 1,05 | 67,6 | 2,66 | 6109 302 01    | 6109 302 02 |
| 2,1                  | 0,13       | 27,55      | 1,08 | 69,5 | 2,74 | 6109 302 11    | 6109 302 12 |
| 2,8                  | 0,17       | 28,55      | 1,12 | 71,5 | 2,81 | 6109 302 21    | 6109 302 22 |
| 3,5                  | 0,21       | 29,55      | 1,16 | 73,5 | 2,89 | 6109 302 31    | 6109 302 32 |
| 4,1                  | 0,25       | 30,4       | 1,20 | 75,2 | 2,96 | 6109 302 41    | 6109 302 42 |
| 5,2                  | 0,32       | 31,95      | 1,26 | 78,3 | 3,08 | 6109 302 51    | 6109 302 52 |
| 6,2                  | 0,38       | 33,35      | 1,31 | 81,1 | 3,19 | 6109 302 61    | 6109 302 62 |
| 7,6                  | 0,46       | 35,35      | 1,39 | 85,1 | 3,35 | 6109 302 71    | 6109 302 72 |
| 9,3                  | 0,57       | 37,75      | 1,49 | 89,9 | 3,54 | 6109 302 81    | 6109 302 82 |
| 11                   | 0,67       | 40,15      | 1,58 | 94,7 | 3,73 | 6109 302 91    | 6109 302 92 |

## G59R - Clockwise and anti-clockwise rotation codes



| DISPLACEMENT         |            | DIMENSIONS |      |      |      | ANTI-CLOCKWISE                                                                        | CLOCKWISE                                                                             |
|----------------------|------------|------------|------|------|------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                      |            | D          |      | H    |      |  |  |
| cm <sup>3</sup> /rev | cu.in./rev | mm         | in   | mm   | in   |                                                                                       |                                                                                       |
| 1,4                  | 0,09       | 26,6       | 1,05 | 67,6 | 2,66 | 6109 301 01                                                                           | 6109 301 02                                                                           |
| 2,1                  | 0,13       | 27,55      | 1,08 | 69,5 | 2,74 | 6109 301 11                                                                           | 6109 301 12                                                                           |
| 2,8                  | 0,17       | 28,55      | 1,12 | 71,5 | 2,81 | 6109 301 21                                                                           | 6109 301 22                                                                           |
| 3,5                  | 0,21       | 29,55      | 1,16 | 73,5 | 2,89 | 6109 301 31                                                                           | 6109 301 32                                                                           |
| 4,1                  | 0,25       | 30,4       | 1,20 | 75,2 | 2,96 | 6109 301 41                                                                           | 6109 301 42                                                                           |
| 5,2                  | 0,32       | 31,95      | 1,26 | 78,3 | 3,08 | 6109 301 51                                                                           | 6109 301 52                                                                           |
| 6,2                  | 0,38       | 33,35      | 1,31 | 81,1 | 3,19 | 6109 301 61                                                                           | 6109 301 62                                                                           |
| 7,6                  | 0,46       | 35,35      | 1,39 | 85,1 | 3,35 | 6109 301 71                                                                           | 6109 301 72                                                                           |
| 9,3                  | 0,57       | 37,75      | 1,49 | 89,9 | 3,54 | 6109 301 81                                                                           | 6109 301 82                                                                           |
| 11                   | 0,67       | 40,15      | 1,58 | 94,7 | 3,73 | 6109 301 91                                                                           | 6109 301 92                                                                           |

## R59R - Clockwise and anti-clockwise rotation codes



| DISPLACEMENT         |            | DIMENSIONS |      |      |      | ANTI-CLOCKWISE                                                                        | CLOCKWISE                                                                             |
|----------------------|------------|------------|------|------|------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                      |            | D          |      | H    |      |  |  |
|                      |            | mm         | in   | mm   | in   |                                                                                       |                                                                                       |
| cm <sup>3</sup> /rev | cu.in./rev |            |      |      |      |                                                                                       |                                                                                       |
| 1,4                  | 0,09       | 26,6       | 1,05 | 67,6 | 2,66 | 6109 303 01                                                                           | 6109 303 02                                                                           |
| 2,1                  | 0,13       | 27,55      | 1,08 | 69,5 | 2,74 | 6109 303 11                                                                           | 6109 303 12                                                                           |
| 2,8                  | 0,17       | 28,55      | 1,12 | 71,5 | 2,81 | 6109 303 21                                                                           | 6109 303 22                                                                           |
| 3,5                  | 0,21       | 29,55      | 1,16 | 73,5 | 2,89 | 6109 303 31                                                                           | 6109 303 32                                                                           |
| 4,1                  | 0,25       | 30,4       | 1,20 | 75,2 | 2,96 | 6109 303 41                                                                           | 6109 303 42                                                                           |
| 5,2                  | 0,32       | 31,95      | 1,26 | 78,3 | 3,08 | 6109 303 51                                                                           | 6109 303 52                                                                           |
| 6,2                  | 0,38       | 33,35      | 1,31 | 81,1 | 3,19 | 6109 303 61                                                                           | 6109 303 62                                                                           |
| 7,6                  | 0,46       | 35,35      | 1,39 | 85,1 | 3,35 | 6109 303 71                                                                           | 6109 303 72                                                                           |
| 9,3                  | 0,57       | 37,75      | 1,49 | 89,9 | 3,54 | 6109 303 81                                                                           | 6109 303 82                                                                           |
| 11                   | 0,67       | 40,15      | 1,58 | 94,7 | 3,73 | 6109 303 91                                                                           | 6109 303 92                                                                           |

### R109 6001 0 - Tie-rod code and cutting length instructions (1.5PE DOUBLE)

(an automated excel file is available for these calculations)

Tabella dati per calcolo lunghezze tiranti 1,5PE doppia

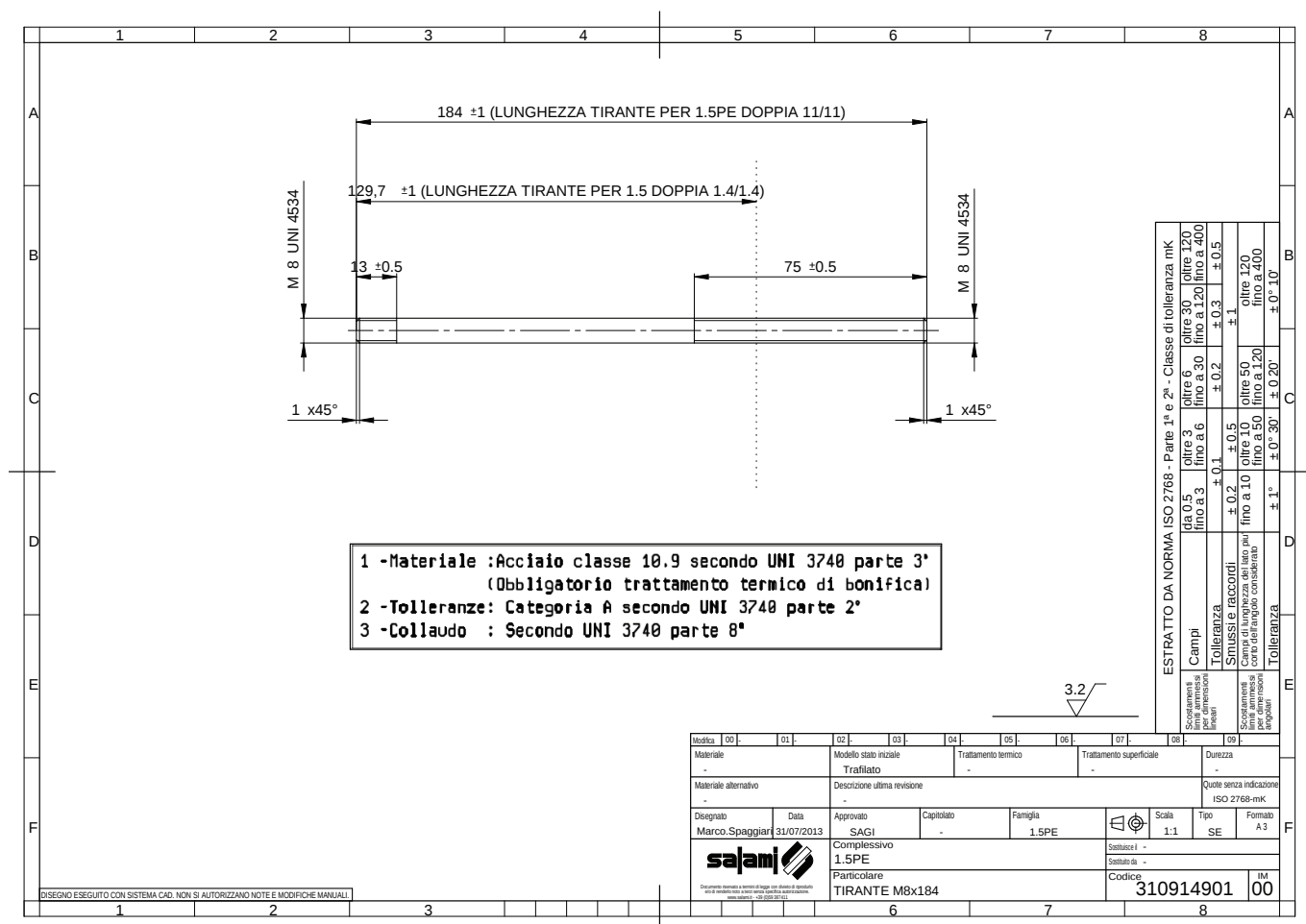
Table for the double 1.5PE tie-rod calculation

| TYPE                                    |                                                                                 |          | 1,4               | 2,1               | 2,8          | 3,5          | 4,1          | 5,2          | 6,2          | 7,6          | 9,3           | 11           |
|-----------------------------------------|---------------------------------------------------------------------------------|----------|-------------------|-------------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|--------------|
| (H)                                     | Dimension H                                                                     | 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 |
| (1)                                     | Spessore filettato sulle flange<br><i>Thickness of the flange threaded</i>      | mm<br>in | 16<br>0,63        |                   |              |              |              |              |              |              |               |              |
| (2)                                     | Spessore coperchio std.<br><i>Thickness of the std. cover</i>                   | mm<br>in | 12<br>0,47        |                   |              |              |              |              |              |              |               |              |
| (3)                                     | Spessore dado M8 UNI5588<br><i>Thickness of the nut M8 UNI5588</i>              | mm<br>in | 6,5<br>0,26       |                   |              |              |              |              |              |              |               |              |
| (4)                                     | Spessore rondella UNI6592<br><i>Thickness of the washer UNI6592</i>             | mm<br>in | 1,6<br>0,06       |                   |              |              |              |              |              |              |               |              |
| (5)                                     | Spessore piastra 1,5PE<br><i>Thickness of the plate 1,5PE</i>                   | mm<br>in | 4,6<br>0,18       |                   |              |              |              |              |              |              |               |              |
| (6)                                     | Lunghezza radice del tirante(fissa)<br><i>Root thread end of tie-rod(fixed)</i> | mm<br>in | 12<br>0,47        |                   |              |              |              |              |              |              |               |              |
| (7)                                     | Lunghezza fissa da aggiungere<br><i>Fixed adding lenght on tie-rod</i>          | mm<br>in | 5<br>0,20         |                   |              |              |              |              |              |              |               |              |
|                                         |                                                                                 |          | A 1 <sup>ST</sup> | A 2 <sup>ND</sup> | (2)          | (3)          | (4)          | (5)          | (6)          | (7)          |               |              |
| Calcolo lunghezza tirante 1,5PE         |                                                                                 |          | 44                | 44                | 12           | 6,5          | 1,6          | 4,6          | 12           | 5            | Tot.          |              |
| <i>Tie rod length calculation 1,5PE</i> |                                                                                 |          | 1,73              | 1,73              | 0,47         | 0,26         | 0,06         | 0,18         | 0,47         | 0,20         | 129,7<br>5,11 |              |

Esempi di lunghezze tiranti/Examples of tie-rod lengths

Doppia 1,5PE entrambe le cilindrata 11 cc/Double 1,5PEboth displ. 11 cc - L tiranti = 183,9

Doppia 1.5PE entrambe le cilindrate 1.4 cc/*Double 1.5PE both displ. 1.4 cc* - L tiranti = 129.7 mm



## R109 6002 0 - Tie-rod code and cutting length instructions (1.5PE TRIPLE)

(an automated excel file is available for these calculations)

Tabella dati per calcolo lunghezze tiranti 1,5PE doppia

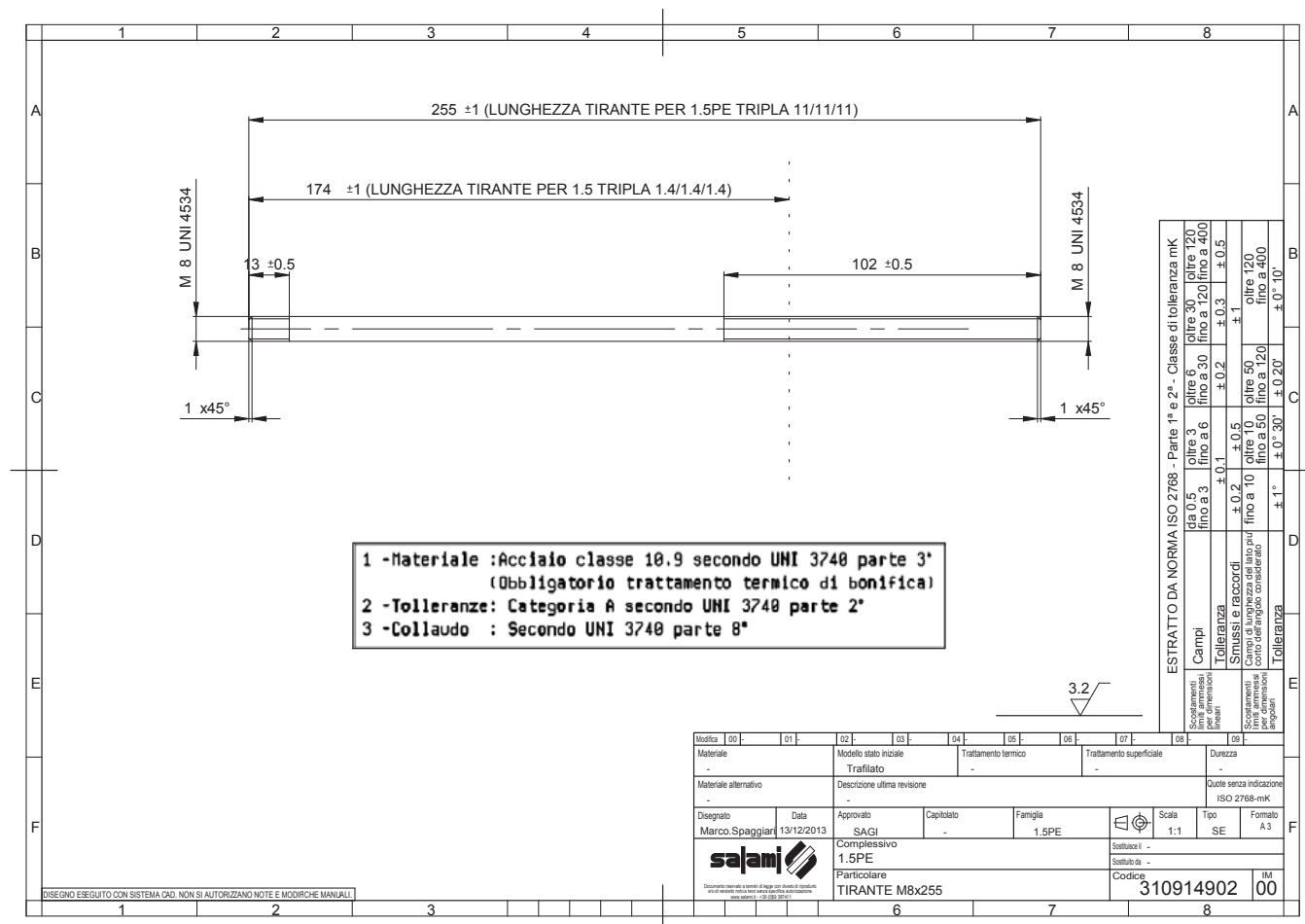
Table for the double 1,5PE tie-rod calculation

| TYPE                             |                                                                          |    | 1,4               | 2,1               | 2,8               | 3,5  | 4,1  | 5,2  | 6,2  | 7,6  | 9,3  | 11    |
|----------------------------------|--------------------------------------------------------------------------|----|-------------------|-------------------|-------------------|------|------|------|------|------|------|-------|
| (H)                              | Dimension H                                                              | mm | 44                | 45,9              | 47,9              | 49,9 | 51,6 | 54,7 | 57,5 | 61,5 | 66,3 | 71,1  |
|                                  |                                                                          | in | 1,73              | 1,81              | 1,89              | 1,96 | 2,03 | 2,15 | 2,26 | 2,42 | 2,61 | 2,80  |
| (1)                              | Spessore filettato sulle flange<br>Thickness of the flange threaded      | mm |                   |                   |                   |      |      | 16   |      |      |      |       |
|                                  |                                                                          | in |                   |                   |                   |      |      | 0,63 |      |      |      |       |
| (2)                              | Spessore coperchio std.<br>Thickness of the std. cover                   | mm |                   |                   |                   |      |      | 12   |      |      |      |       |
|                                  |                                                                          | in |                   |                   |                   |      |      | 0,47 |      |      |      |       |
| (3)                              | Spessore dado M8 UNI5588<br>Thickness of the nut M8 UNI5588              | mm |                   |                   |                   |      |      | 6,5  |      |      |      |       |
|                                  |                                                                          | in |                   |                   |                   |      |      | 0,26 |      |      |      |       |
| (4)                              | Spessore rondella UNI6592<br>Thickness of the washer UNI6592             | mm |                   |                   |                   |      |      | 1,6  |      |      |      |       |
|                                  |                                                                          | in |                   |                   |                   |      |      | 0,06 |      |      |      |       |
| (5)                              | Spessore piastra 1,5PE<br>Thickness of the plate 1,5PE                   | mm |                   |                   |                   |      |      | 4,6  |      |      |      |       |
|                                  |                                                                          | in |                   |                   |                   |      |      | 0,18 |      |      |      |       |
| (6)                              | Lunghezza radice del tirante(fissa)<br>Root thread end of tie-rod(fixed) | mm |                   |                   |                   |      |      | 12   |      |      |      |       |
|                                  |                                                                          | in |                   |                   |                   |      |      | 0,47 |      |      |      |       |
| (7)                              | Lunghezza fissa da aggiungere<br>Fixed adding lenght on tie-rod          | mm |                   |                   |                   |      |      | 5    |      |      |      |       |
|                                  |                                                                          | in |                   |                   |                   |      |      | 0,20 |      |      |      |       |
|                                  |                                                                          |    | A 1 <sup>ST</sup> | A 2 <sup>ND</sup> | A 3 <sup>RD</sup> | (2)  | (3)  | (4)  | (5)  | (6)  | (7)  | Tot.  |
| Calcolo lunghezza tirante 1,5PE  |                                                                          |    | 71,1              | 71,1              | 71,1              | 12   | 6,5  | 1,6  | 4,6  | 12   | 5    | 255   |
| Tie rod length calculation 1,5PE |                                                                          |    | 2,80              | 2,80              | 2,80              | 0,47 | 0,26 | 0,06 | 0,18 | 0,47 | 0,20 | 10,04 |

Esempi di lunghezze tiranti/Examples of tie-rod lengths

Tripla 1,5PE tutte le cilindrate 11 cc/ Triple 1,5PE all displ. 11 cc - L tiranti = 255 mm

Tripla 1,5PE tutte le cilindrate 1,4 cc/ Triple 1,5PE all displ. 1,4 cc - L tiranti = 173,7 mm



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