

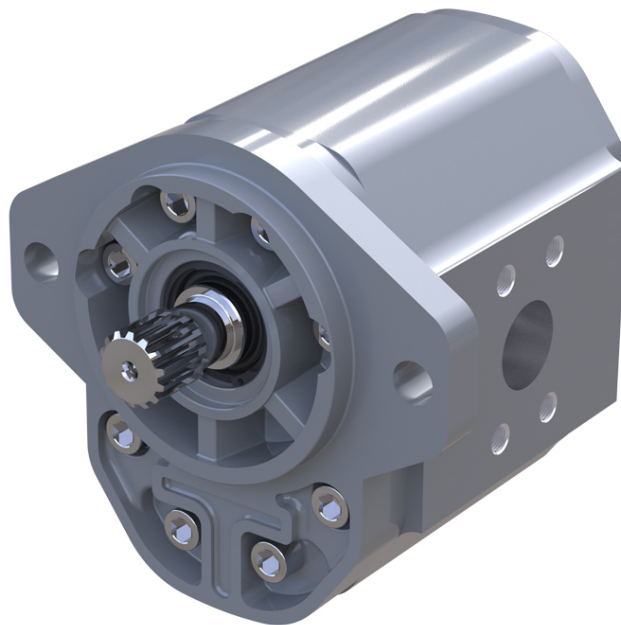
ENGINEERING  
TOMORROW



Technical Information

# Gear Pumps

## Group 4



**Revision history***Table of revisions*

| Date         | Changed       | Rev  |
|--------------|---------------|------|
| October 2019 | First edition | 0101 |

## Contents

### General Information

|                                          |   |
|------------------------------------------|---|
| Overview.....                            | 4 |
| Group 4 gear pumps attributes.....       | 4 |
| Pump displacements.....                  | 4 |
| Pump design.....                         | 5 |
| Technical data for TAP4NN.....           | 5 |
| Determination of nominal pump sizes..... | 6 |

### Product Code

|                                       |    |
|---------------------------------------|----|
| Model code.....                       | 7  |
| A Family.....                         | 7  |
| B Displacement.....                   | 7  |
| C Rotation.....                       | 7  |
| D Project version.....                | 7  |
| E Mounting flange.....                | 7  |
| F Drive gear.....                     | 8  |
| G Rear cover.....                     | 8  |
| H Inlet size; I Outlet size.....      | 8  |
| J Ports positions & Special body..... | 9  |
| K Seals.....                          | 9  |
| L Screws.....                         | 9  |
| M Set valve.....                      | 9  |
| N Type mark.....                      | 9  |
| O Mark position.....                  | 10 |

### System Requirements

|                                |    |
|--------------------------------|----|
| Pressure.....                  | 11 |
| Speed.....                     | 11 |
| Hydraulic fluids.....          | 12 |
| Temperature and viscosity..... | 12 |
| Filtration.....                | 13 |
| Filters.....                   | 13 |
| Selecting a filter.....        | 13 |
| Reservoir.....                 | 13 |
| Line sizing.....               | 14 |
| Pump drive.....                | 14 |
| Pump drive data form.....      | 15 |
| Pump Life.....                 | 16 |

### Product Options

|                                             |    |
|---------------------------------------------|----|
| Shaft, flange, and port configurations..... | 17 |
| Mounting flanges.....                       | 17 |
| Shaft options.....                          | 17 |
| Port configurations.....                    | 18 |
| Porting.....                                | 19 |

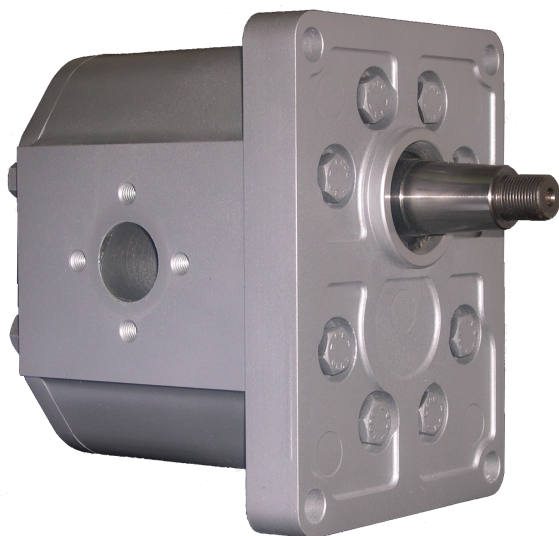
### Dimensions

|                                    |    |
|------------------------------------|----|
| TAP4NN - 01FA, 01DA, and 01BA..... | 21 |
| TAP4NN - 02RA, and 02GA.....       | 22 |

## General Information

### Overview

The Danfoss Group 4 is a range of peak performance fixed-displacement gear pumps. Constructed of a high-strength extruded aluminum body with aluminum cover and flange, all pumps are pressure-balanced for exceptional efficiency.

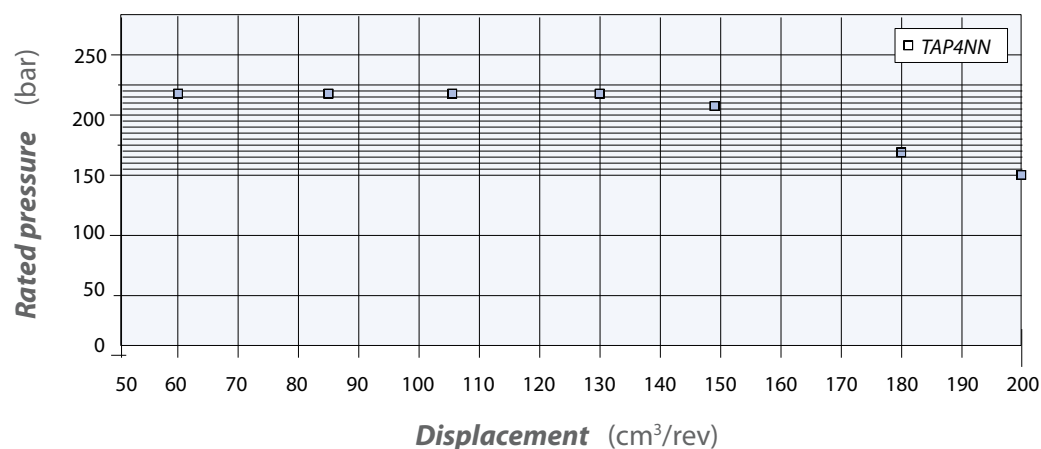


### Group 4 gear pumps attributes

- Wide range of displacements from 60 to 200 cm<sup>3</sup>/rev [from 3.66 to 12.2 in<sup>3</sup>/rev]
- Continuous pressure rating up to 220 bar [3191 psi]
- Speeds up to 3000 min<sup>-1</sup> (rpm)
- SAE and European standard mounting flanges
- High quality case hardened steel gears
- Multiple pump configurations in combination with SNP1NN, SNP2NN and SNP3NN

### Pump displacements

*Quick reference chart for pump displacements vs. rated pressure*



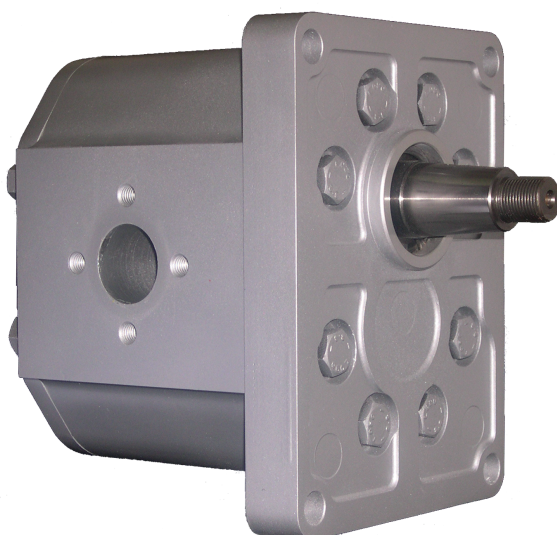
## General Information

### Pump design

#### TAP4NN

The TAP4NN gear pump is available in a displacement range from 60.0 to 200.0 cm<sup>3</sup>/rev [from 3.66 to 12.2 in<sup>3</sup>/rev]. Suitable for applications where the pressure is lower than 220 bar[3191 psi] continuous, the TAP4NN range is released into SAE and European configurations.

TAP4NN 01BA



### Technical data for TAP4NN

| TAP4NN pump model                        |                                                                                   | Frame size       |                 |                  |                   |                   |                   |                   |
|------------------------------------------|-----------------------------------------------------------------------------------|------------------|-----------------|------------------|-------------------|-------------------|-------------------|-------------------|
|                                          |                                                                                   | 60               | 85              | 106              | 130               | 148               | 180               | 200               |
| Displacement                             | cm <sup>3</sup> /rev [in <sup>3</sup> /rev]                                       | 58.0<br>[3.54]   | 83.3<br>[5.08]  | 103.4<br>[6.31]  | 126.1<br>[7.69]   | 143.8<br>[8.77]   | 174.1<br>[10.62]  | 194.3<br>[11.86]  |
| Peak pressure                            | bar [psi]                                                                         | 230<br>[3335]    | 230<br>[3335]   | 230<br>[3335]    | 230<br>[3335]     | 220<br>[3190]     | 180<br>[2610]     | 160<br>[2320]     |
| Rated pressure                           |                                                                                   | 220<br>[3190]    | 220<br>[3190]   | 220<br>[3190]    | 220<br>[3190]     | 210<br>[3045]     | 170<br>[2465]     | 150<br>[2175]     |
| Minimum speed                            | min <sup>-1</sup> (rpm)                                                           | 650              | 650             | 600              | 550               | 500               | 500               | 480               |
| Maximum speed                            |                                                                                   | 3000             | 3000            | 2500             | 2500'             | 2400              | 2400              | 2400              |
| Weight                                   | kg [lb]                                                                           | 13.45<br>[29.65] | 14.4<br>[31.75] | 14.9<br>[32.85]  | 15.75<br>[34.72]  | 17.2<br>[37.92]   | 17.25<br>[38.03]  | 18<br>[39.68]     |
| Moment of inertia of rotating components | x 10 <sup>-6</sup> kg·m <sup>2</sup><br>[x 10 <sup>-6</sup> lbf·ft <sup>2</sup> ] | 682,7<br>16193,6 | 839<br>19901,1  | 965,2<br>22894,5 | 1106,5<br>26246,2 | 1216,4<br>28853,0 | 1216,4<br>28853,0 | 1530,3<br>36298,7 |
| Theoretical flow at maximum speed        | l/min<br>[US gal/min]                                                             | 174.0<br>[46.0]  | 249.9<br>[66.0] | 258.5<br>[68.3]  | 315.2<br>[83.3]   | 345.1<br>[91.2]   | 417.8<br>[110.4]  | 466.3<br>[123.2]  |

#### ⚠ Caution

The rated and peak pressure mentioned are for pumps with flanged ports only. When threaded ports are required a derated performance must be considered. To verify the compliance of an high pressure application with a threaded ports pump apply to a Danfoss representative.

## General Information

### Determination of nominal pump sizes

Use these formula to determine the nominal pump size for a specific application:

#### Based on SI units

*Output flow:*  $Q = \frac{V_g \cdot n \cdot \eta_v}{1000} \text{ l/min}$

*Input torque:*  $M = \frac{V_g \cdot \Delta p}{20 \cdot \pi \cdot \eta_m} \text{ N}\cdot\text{m}$

*Input power:*  $P = \frac{M \cdot n}{9550} = \frac{Q \cdot \Delta p}{600 \cdot \eta_t} \text{ kW}$

#### Based on US units

$Q = \frac{V_g \cdot n \cdot \eta_v}{231} \text{ [US gal/min]}$

$M = \frac{V_g \cdot \Delta p}{2 \cdot \pi \cdot \eta_m} \text{ [lbf}\cdot\text{in]}$

$P = \frac{M \cdot n}{63.025} = \frac{Q \cdot \Delta p}{1714 \cdot \eta_t} \text{ [hp]}$

|              |                                              |                                             |
|--------------|----------------------------------------------|---------------------------------------------|
| $V_g =$      | Displacement per rev.                        | cm <sup>3</sup> /rev [in <sup>3</sup> /rev] |
| $P_{HD} =$   | Outlet pressure                              | bar [psi]                                   |
| $P_{ND} =$   | Inlet pressure                               | bar [psi]                                   |
| $\Delta p =$ | $P_{HD} - P_{ND}$                            | bar [psi]                                   |
| $n =$        | Speed                                        | min <sup>-1</sup> (rpm)                     |
| $\eta_v =$   | Volumetric efficiency                        |                                             |
| $\eta_m =$   | Mechanical (torque) efficiency               |                                             |
| $\eta_t =$   | Overall efficiency ( $\eta_v \cdot \eta_m$ ) |                                             |

Technical Information  
**Gear Pumps Group 4 Technical Information**

**Product Code**

**Model code**

**A Family**

| A |   |   |   |   |   |   |  | B |  |  | C | D | E | F | G | H | I | J | K | L |   | M |  |  | N | O |
|---|---|---|---|---|---|---|--|---|--|--|---|---|---|---|---|---|---|---|---|---|---|---|--|--|---|---|
| • | • | • | • | • | • | / |  |   |  |  |   |   |   |   |   |   |   |   |   |   | / |   |  |  |   |   |

|               |                                    |
|---------------|------------------------------------|
| <b>TAP4NN</b> | Group 4 pumps from 60 up to 200 cc |
|---------------|------------------------------------|

**B Displacement**

| A |  | B | C | D | E | F | G | H | I | J | K | L |   | M | N | O |
|---|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   |  |   |   |   |   |   |   |   |   |   |   |   | / |   |   |   |

|            |          |
|------------|----------|
| <b>060</b> | 58 cc    |
| <b>085</b> | 83,3 cc  |
| <b>106</b> | 103,4 cc |
| <b>130</b> | 126,1 cc |
| <b>148</b> | 143,8 cc |
| <b>180</b> | 174,1 cc |
| <b>200</b> | 194,3 cc |

**C Rotation**

| A |  | B | C | D | E | F | G | H | I | J | K | L |   | M | N | O |
|---|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   |  |   | • |   |   |   |   |   |   |   |   |   | / |   |   |   |

|          |                |
|----------|----------------|
| <b>L</b> | Left rotation  |
| <b>R</b> | Right rotation |

**D Project version**

| A |  | B | C | D | E | F | G | H | I | J | K | L |   | M | N | O |
|---|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   |  |   |   | • |   |   |   |   |   |   |   |   | / |   |   |   |

|          |                        |
|----------|------------------------|
| <b>N</b> | Std Version of Project |
|----------|------------------------|

**E Mounting flange**

| A |  | B | C | D | E | F | G | H | I | J | K | L |   | M | N | O |
|---|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   |  |   |   |   | • | • |   |   |   |   |   |   | / |   |   |   |

| Code      | Description (Type of flange • Type of drive gear • Preferred ports for configuration) |
|-----------|---------------------------------------------------------------------------------------|
| <b>01</b> | European 4 bolt - Pilot Ø63,5                                                         |
| <b>02</b> | SAE C 2 bolt - Pilot Ø127                                                             |
| <b>F1</b> | European 4 bolt - Pilot Ø63,5 (special FIAT-ALLIS)                                    |

## Product Code

### F Drive gear

| A |   | B | C | D | E | F | G | H | I | J | K | L |   | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   | / |   |   |   |   | • | • |   |   |   |   |   | / |   |   |   |

|           |                                         |
|-----------|-----------------------------------------|
| <b>BA</b> | Taper 1:8-M20x1,5-Key 6,375             |
| <b>DA</b> | Spline DIN 5482 B35x31xL44              |
| <b>FA</b> | Parallel Ø30-Key 8x7xL50                |
| <b>GA</b> | Parallel Ø31,75-Key 7,962x7x36          |
| <b>RA</b> | Splined-SAE J498-14T-12/24-SAE C 2 bolt |

### G Rear cover

| A |   | B | C | D | E | F | G | H | I | J | K | L |   | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   | / |   |   |   |   |   | • | • |   |   |   |   | / |   |   |   |

|           |                         |
|-----------|-------------------------|
| <b>P1</b> | Standard cover for pump |
|-----------|-------------------------|

### H Inlet size; I Outlet size

| A |   | B | C | D | E | F | G | H | I | J | K | L |   | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   | / |   |   |   |   |   |   | • | • | • | • |   | / |   |   |   |

|           |                            |  |
|-----------|----------------------------|--|
| <b>A4</b> | 31x30,18x58,72x7/16-14UNC  |  |
| <b>A5</b> | 37,5x35,71x69,85x1/2-13UNC |  |
| <b>A6</b> | 50x42,88x77,77x1/2-13UNC   |  |
| <b>CB</b> | 30x56xM10                  |  |
| <b>CC</b> | 32x62xM10                  |  |
| <b>CD</b> | 36x62xM10                  |  |
| <b>CE</b> | 32x62xM12                  |  |
| <b>CF</b> | 38x72,5xM12                |  |
| <b>CG</b> | 40x72,5xM12                |  |
| <b>CH</b> | 45x72,5xM12                |  |
| <b>CK</b> | 48x72,5xM12                |  |
| <b>CL</b> | 56x92xM12                  |  |

|           |           |  |
|-----------|-----------|--|
| <b>F7</b> | 1-1/4 GAS |  |
| <b>F8</b> | 1-1/2 GAS |  |
| <b>F9</b> | 1-3/4 GAS |  |

# Technical Information

## Gear Pumps Group 4 Technical Information

### Product Code

|           |                   |  |
|-----------|-------------------|--|
| <b>GE</b> | 32x62x7/16-14UNC  |  |
| <b>GF</b> | 38x72,5x1/2-13UNC |  |
| <b>GK</b> | 48x72,5x1/2-13UNC |  |

### J Ports positions & Special body

| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   |   |   |   |   |   |   |   |   | • | • |   |   |   |   |

|           |                                                 |
|-----------|-------------------------------------------------|
| <b>NN</b> | Std position from catalogue                     |
| <b>SD</b> | Body width side ports=151mm (Std for 02 Flange) |
| <b>G9</b> | Ports distance from flange=79 - Special         |
| <b>I5</b> | Ports distance from flange =95 - Special        |
| <b>L0</b> | Ports distance from flange =100 - Special       |
| <b>LI</b> | Ports distance from flange =104,5 - Special     |

### K Seals

| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   |   |   |   |   |   |   |   |   |   | • |   |   |   |   |

|          |                    |
|----------|--------------------|
| <b>N</b> | Standard NBR seals |
|----------|--------------------|

### L Screws

| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   |   |   |   |   |   |   |   |   |   |   | • |   |   |   |

|          |                      |
|----------|----------------------|
| <b>N</b> | Std burnished screws |
|----------|----------------------|

### M Set valve

| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   |   |   |   |   |   |   |   |   |   |   |   | • | • | • |

|            |          |
|------------|----------|
| <b>NNN</b> | No valve |
|------------|----------|

### N Type mark

| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   |   |   |   |   |   |   |   |   |   |   |   |   | • |   |

|          |                                        |
|----------|----------------------------------------|
| <b>N</b> | Standard Danfoss Marking               |
| <b>A</b> | Standard Danfoss Marking+Customer Code |
| <b>Z</b> | Without Marking                        |

**Product Code**
**O Mark position**

| A |  |  |  |  |   | B |  |  | C | D | E | F | G | H | I | J | K | L |   | M |  |  | N | O |
|---|--|--|--|--|---|---|--|--|---|---|---|---|---|---|---|---|---|---|---|---|--|--|---|---|
|   |  |  |  |  | / |   |  |  |   |   |   |   |   |   |   |   |   |   | / |   |  |  |   | • |

|          |                                        |
|----------|----------------------------------------|
| <b>N</b> | Std Marking position (on top)          |
| <b>A</b> | Special Marking position on the bottom |

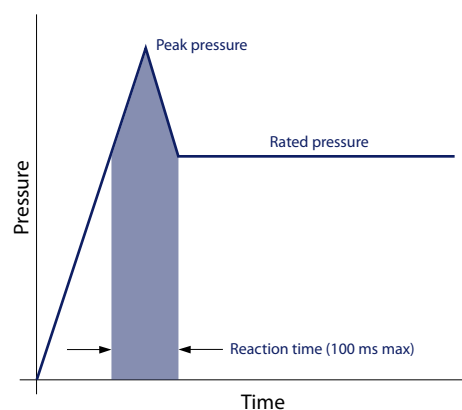
## System Requirements

### Pressure

The inlet vacuum must be controlled in order to realize expected pump life and performance. The system design must meet inlet pressure requirements during all modes of operation. Expect lower inlet pressures during cold start. It should improve quickly as the fluid warms.

|                                 |                   |            |
|---------------------------------|-------------------|------------|
| <b>Max. continuous vacuum</b>   | bar abs. [in. Hg] | 0.8 [23.6] |
| <b>Max. intermittent vacuum</b> |                   | 0.6 [17.7] |
| <b>Max. pressure</b>            |                   | 3.0 [88.5] |

**Peak pressure** is the highest intermittent pressure allowed. The relief valve overshoot (reaction time) determines peak pressure. It is assumed to occur for less than 100 ms. The accompanying illustration shows peak pressure in relation to rated pressure and reaction time (100 ms maximum).



**Rated pressure** is the average, regularly occurring, operating pressure that should yield satisfactory product life. The maximum machine load demand determines rated pressure. For all systems, the load should move below this pressure.

**System pressure** is the differential of pressure between the outlet and inlet ports. It is a dominant operating variable affecting hydraulic unit life. High system pressure, resulting from high load, reduces expected life. System pressure must remain at, or below, rated pressure during normal operation to achieve expected life.

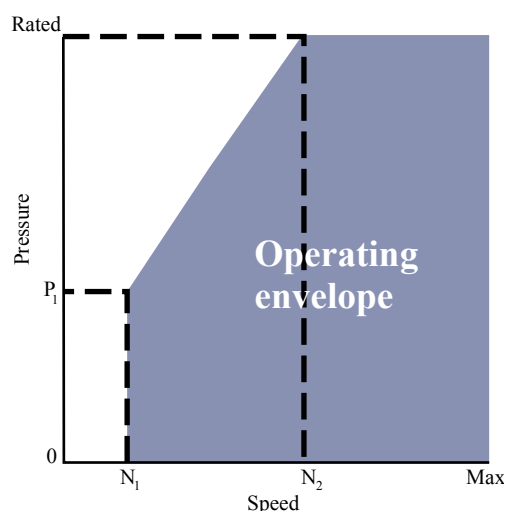
### Speed

**Maximum speed** is the limit recommended by Danfoss for a particular gear pump when operating at rated pressure. It is the highest speed at which normal life can be expected.

The lower limit of operating speed is the **minimum speed**. It is the lowest speed at which normal life can be expected. The minimum speed increases as operating pressure increases. When operating under higher pressures, a higher minimum speed must be maintained, as illustrated here.

## System Requirements

*Speed versus pressure*



Where:

$N_1$  = Minimum speed at 100 bar

$N_2$  = Minimum speed at 180 bar

## Hydraulic fluids

Ratings and data for TAP4NN gear pumps are based on operating with premium hydraulic fluids containing oxidation, rust, and foam inhibitors. These fluids must possess good thermal and hydrolytic stability to prevent wear, erosion, and corrosion of internal components. They include:

- Hydraulic fluids following DIN 51524, part 2 (HLP) and part 3 (HVLP) specifications
- API CD engine oils conforming to SAE J183
- M2C33F or G automatic transmission fluids
- Certain agricultural tractor fluids

Use only clean fluid in the pump and hydraulic circuit.

### **Caution**

**Never mix hydraulic fluids.**

## Temperature and viscosity

**Temperature and viscosity requirements** must be concurrently satisfied. Use petroleum / mineral-based fluids.

High temperature limits apply at the inlet port to the pump. The pump should run at or below the maximum continuous temperature. The peak temperature is based on material properties. Don't exceed it.

Cold oil, generally, doesn't affect the durability of pump components. It may affect the ability of oil to flow and transmit power. For this reason, keep the temperature at 16 °C [60 °F] above the pour point of the hydraulic fluid.

Minimum (cold start) temperature relates to the physical properties of component materials.

Minimum viscosity occurs only during brief occasions of maximum ambient temperature and severe duty cycle operation. You will encounter maximum viscosity only at cold start. During this condition, limit speeds until the system warms up. Size heat exchangers to keep the fluid within these limits. Test regularly to verify that these temperatures and viscosity limits aren't exceeded. For maximum unit efficiency and bearing life, keep the fluid viscosity in the recommended viscosity range.

## System Requirements

### Fluid viscosity

|                             |                          |                |
|-----------------------------|--------------------------|----------------|
| <b>Maximum (cold start)</b> | mm <sup>2</sup> /s [SUS] | 1000 [4600]    |
| <b>Recommended range</b>    |                          | 12-60 [66-290] |
| <b>Minimum</b>              |                          | 10 [60]        |

### Temperature

|                             |         |          |
|-----------------------------|---------|----------|
| <b>Minimum (cold start)</b> | °C [°F] | -20 [-4] |
| <b>Maximum continuous</b>   |         | 80 [176] |
| <b>Peak (intermittent)</b>  |         | 90 [194] |

## Filtration

### Filters

Use a filter that conforms to Class 22/18/13 of ISO 4406 (or better). It may be on the pump outlet (pressure filtration), inlet (suction filtration), or reservoir return (return-line filtration).

### Selecting a filter

When selecting a filter, please consider:

- contaminant ingress rate (determined by factors such as the number of actuators used in the system)
- generation of contaminants in the system
- required fluid cleanliness
- desired maintenance interval
- filtration requirements of other system components

Measure filter efficiency with a Beta ratio ( $\beta_x$ ). For:

- suction filtration, with controlled reservoir ingress, use a  $\beta_{35-45} = 75$  filter
- return or pressure filtration, use a pressure filtration with an efficiency of  $\beta_{10} = 75$

$\beta_x$  ratio is a measure of filter efficiency defined by ISO 4572. It is the ratio of the number of particles greater than a given diameter ( "x" in microns) upstream of the filter to the number of these particles downstream of the filter.

### Fluid cleanliness level and $\beta_x$ ratio

|                                                                   |                                           |
|-------------------------------------------------------------------|-------------------------------------------|
| <b>Fluid cleanliness level (per ISO 4406)</b>                     | Class 22/18/13 or better                  |
| <b><math>\beta_x</math> ratio (suction filtration)</b>            | $\beta_{35-45} = 75$ and $\beta_{10} = 2$ |
| <b><math>\beta_x</math> ratio (pressure or return filtration)</b> | $\beta_{10} = 75$                         |
| <b>Recommended inlet screen size</b>                              | 100-125 $\mu$ m [0.004-0.005 in]          |

The filtration requirements for each system are unique. Evaluate filtration system capacity by monitoring and testing prototypes.

### Reservoir

The **reservoir** provides clean fluid, dissipates heat, removes entrained air, and allows fluid volume changes associated with fluid expansion and cylinder differential volumes. A correctly sized reservoir accommodates maximum volume changes during all system operating modes. It promotes deaeration of the fluid as it passes through, and accommodates a fluid dwell-time between 60 and 180 seconds, allowing entrained air to escape.

## System Requirements

**Minimum reservoir capacity** depends on the volume required to cool and hold the oil from all retracted cylinders, allowing for expansion due to temperature changes. A fluid volume of 1 to 3 times the pump output flow (per minute) is satisfactory. The minimum reservoir capacity is 125% of the fluid volume.

Install the suction line above the bottom of the reservoir to take advantage of gravity separation and prevent large foreign particles from entering the line. Cover the line with a 100-125 micron screen. The pump should be below the lowest expected fluid level. Put the return-line below the lowest expected fluid level to allow discharge into the reservoir for maximum dwell and efficient deaeration. A baffle (or baffles) between the return and suction lines promotes deaeration and reduces fluid surges.

## Line sizing

Choose pipe sizes that accommodate minimum fluid velocity to reduce system noise, pressure drops, and overheating. This maximizes system life and performance.

Design inlet piping that maintains continuous pump inlet pressure above 0.8 bar absolute during normal operation. The line velocity should not exceed the values in this table:

*Maximum line velocity*

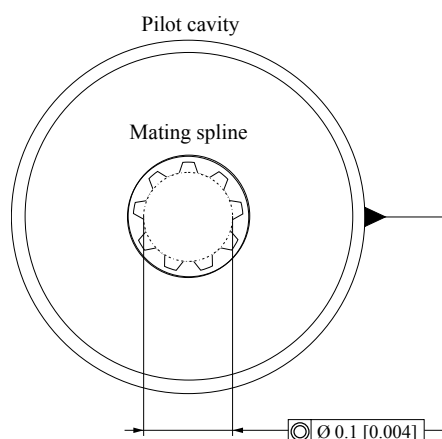
|               |              |            |
|---------------|--------------|------------|
| <b>Inlet</b>  | m/s [ft/sec] | 2.5 [8.2]  |
| <b>Outlet</b> |              | 5.0 [16.4] |
| <b>Return</b> |              | 3.0 [9.8]  |

Most systems use hydraulic oil containing 10% dissolved air by volume. Under high inlet vacuum conditions the oil releases bubbles. They collapse when subjected to pressure, resulting in cavitation, causing adjacent metal surfaces to erode. **Over-aeration** is the result of air leaks on the inlet side of the pump, and flow-line restrictions. These include inadequate pipe sizes, sharp bends, or elbow fittings, causing a reduction of flow line cross sectional area. This problem will not occur if inlet vacuum and rated speed requirements are maintained, and reservoir size and location are adequate.

## Pump drive

Shaft options for Group 4 gear pumps include tapered, splined, or parallel shafts. They are suitable for a wide range of direct and indirect drive applications for radial and thrust loads.

**Plug-in drives**, acceptable only with a splined shaft, can impose severe radial loads when the mating spline is rigidly supported. Increasing spline clearance does not alleviate this condition.



Use **plug-in drives** if the concentricity between the mating spline and pilot diameter is within 0.1 mm [0.004 in]. Lubricate the drive by flooding it with oil. A 3-piece coupling minimizes radial or thrust shaft loads.

## System Requirements

### ! Caution

In order to avoid spline shaft damages it is recommended to use carburized and hardened steel couplings with 80-82 HRA surface hardness.

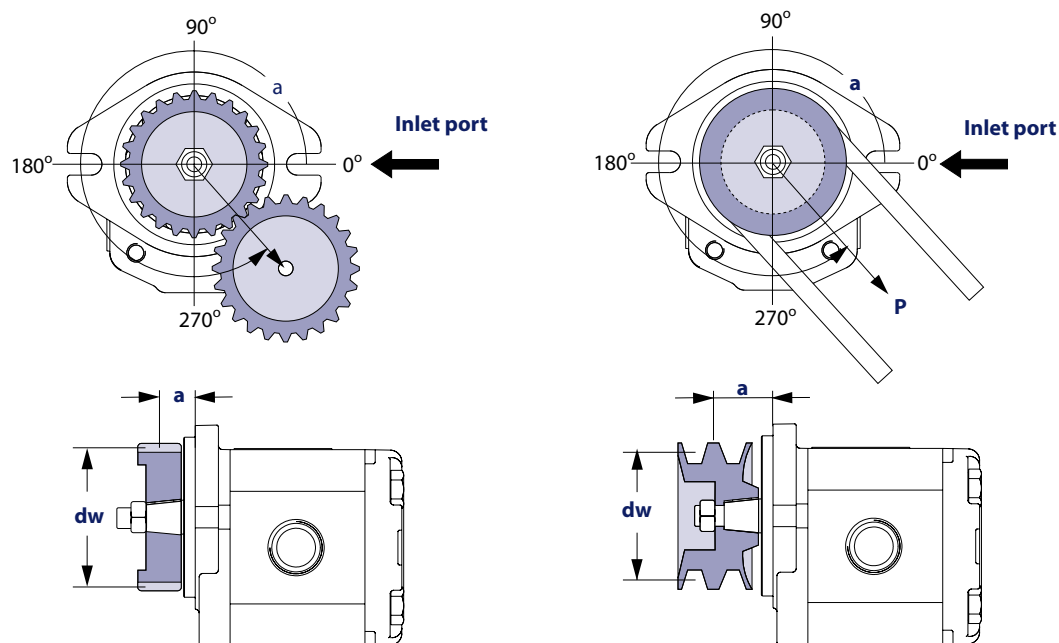
Allowable **radial shaft loads** are a function of the load position, load orientation, and operating pressure of the hydraulic pump. All external shaft loads have an effect on bearing life, and may affect pump performance.

In applications where external shaft loads can't be avoided, minimize the impact on the pump by optimizing the orientation and magnitude of the load. Use a tapered input shaft; don't use splined shafts for belt or gear drive applications. A spring-loaded belt tension-device is recommended for belt drive applications to avoid excessive tension. Avoid thrust loads in either direction.

## Pump drive data form

Contact Danfoss if continuously applied external radial or thrust loads occur. Fill out this page and send the complete form to your Danfoss representative for an assistance in applying pumps with belt or gear drive. This illustration shows a pump with counterclockwise orientation:

### Optimal radial load position



### Application data

| Item                                     |   | Value | Unit                                        |
|------------------------------------------|---|-------|---------------------------------------------|
| Pump displacement                        |   |       | cm <sup>3</sup> /rev [in <sup>3</sup> /rev] |
| Rated system pressure                    |   |       | bar psi                                     |
| Relief valve setting                     |   |       |                                             |
| Pump shaft rotation                      |   |       | left right                                  |
| Pump minimum speed                       |   |       | min <sup>-1</sup> (rpm)                     |
| Pump maximum speed                       |   |       |                                             |
| Drive gear helix angle (gear drive only) |   |       | degree                                      |
| Belt type (gear drive only)              |   |       | V notch                                     |
| Belt tension (gear drive only)           | P |       | N lbf                                       |

## System Requirements

*Application data (continued)*

| Item                                              |          | Value | Unit   |
|---------------------------------------------------|----------|-------|--------|
| Angular orientation of gear or belt to inlet port | $\alpha$ |       | degree |
| Pitch diameter of gear or pulley                  | $dw$     |       | mm in  |
| Distance from flange to center of gear or pulley  | $a$      |       |        |

## Pump Life

Pump life is a function of speed, system pressure, and other system parameters (such as fluid quality and cleanliness).

All Danfoss gear pumps use hydrodynamic journal bearings that have an oil film maintained between the gear/shaft and bearing surfaces at all times. If the oil film is sufficiently sustained through proper system maintenance and operating within recommended limits, long life can be expected.

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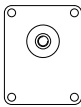
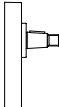
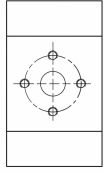
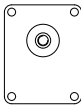
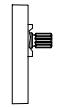
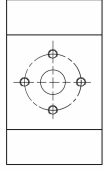
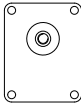
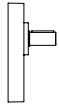
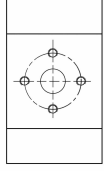
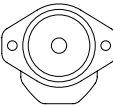
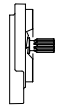
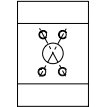
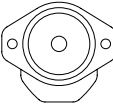
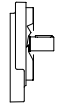
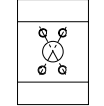
[B<sub>10</sub> life expectancy number is generally associated with rolling element bearings. It does not exist for hydrodynamic bearings.](#)

---

High pressure, resulting from high loads, impacts pump life. When submitting an application for review, provide machine duty cycle data that includes percentages of time at various loads and speeds. We strongly recommend a prototype testing program to verify operating parameters and their impact on life expectancy before finalizing any system design.

## Product Options

### Shaft, flange, and port configurations

| Motor  | Code | Flange                                             |                                                                                     | Shaft                             |                                                                                       | Port                            |                                                                                       |
|--------|------|----------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------|---------------------------------------------------------------------------------------|---------------------------------|---------------------------------------------------------------------------------------|
| TAP4NN | 01BA | pilot Ø 63.5 mm<br>[2.5 in]<br>European 01, 4-bolt |    | 1:8 tapered                       |    | European flanged port + pattern |    |
| TAP4NN | 01DA | pilot Ø 63.5 mm<br>[2.5 in]<br>European 01, 4-bolt |    | Spline DIN 5482<br>B35x31xL44     |    | European flanged port + pattern |    |
| TAP4NN | 01FA | pilot Ø 63.5 mm<br>[2.5 in]<br>European 01, 4-bolt |    | Parallel Ø30-Key<br>8x7xL50       |    | European flanged port + pattern |    |
| TAP4NN | 02RA | pilot Ø 127 mm<br>[5.0 in] SAE C, 2-bolt           |  | Splined-SAE<br>J498-14T           |  | Vertical four bolt flanged port |  |
| TAP4NN | 02GA | pilot Ø 127 mm<br>[5.0 in] SAE C, 2-bolt           |  | Parallel Ø31,75-Key<br>7,962x7x36 |  | Vertical four bolt flanged port |  |

### Mounting flanges

Danfoss offers many types of industry standard mounting flanges. This table shows order codes for each available mounting flange and its intended use:

| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   |   |   |   | • | • |   |   |   |   |   |   | / |   |   |

| Code | Description                                        |
|------|----------------------------------------------------|
| 01   | European 4 bolt - PilotØ63,5                       |
| 02   | SAE C 2 bolt - Pilot Ø127                          |
| F1   | European 4 bolt - Pilot Ø63,5 (special FIAT-ALLIS) |

### Shaft options

Direction is viewed facing the shaft. Group 4 pumps are available with a variety of splined, parallel, and tapered shaft ends. Not all shaft styles are available with all flange styles.

| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   |   |   |   |   | • | • |   |   |   |   |   | / |   |   |

## Product Options

| Shaft |                                         | Mounting flange code with maximum torque in Nm [lb-in] |            |
|-------|-----------------------------------------|--------------------------------------------------------|------------|
| Code  | Description                             | 01                                                     | 02         |
| BA    | Taper 1:8-M20x1,5-Key 6,375             | 970 [8585]                                             |            |
| DA    | Spline DIN 5482 B35x31xL44              | 850 [7523]                                             |            |
| FA    | Parallel Ø30-Key 8x7xL50                | 710 [6284]                                             |            |
| GA    | Parallel Ø31,75-Key 7,962x7x36          |                                                        | 750 [6638] |
| RA    | Splined-SAE J498-14T-12/24-SAE C 2 bolt |                                                        | 800 [7080] |

Danfoss recommends mating splines conform to SAE J498 or DIN 5482. Danfoss external SAE splines have a flat root side fit with circular tooth thickness reduced by 0.127 mm [0.005 in] in respect to class 1 fit. Dimensions are modified to assure a clearance fit with the mating spline.

### ! Caution

Shaft torque capability may limit allowable pressure. Torque ratings assume no external radial loading. Applied torque must not exceed these limits, regardless of stated pressure parameters. Maximum torque ratings are based on shaft torsional fatigue strength.

## Port configurations

Various port configurations are available on Group 4 pumps. They include:

- SAE split flange ports
- European standard flanged ports
- Gas threaded ports (BSPP)

For a table of dimensions see [Porting](#) on page 19.

### Available port configurations

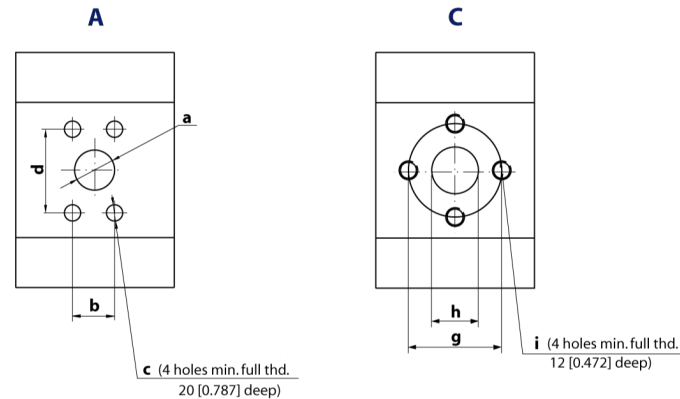
| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| / |   |   |   |   |   |   | • | • | • | • |   | / |   |   |

| Code | Description                |                                          |
|------|----------------------------|------------------------------------------|
| A4   | 31x30,18x58,72x7/16-14UNC  | SAE flanged port                         |
| A5   | 37,5x35,71x69,85x1/2-13UNC |                                          |
| A6   | 50x42,88x77,77x1/2-13UNC   |                                          |
| CB   | 30x56xM10                  | Flanged port with thd holes in + pattern |
| CC   | 32x62xM10                  |                                          |
| CD   | 36x62xM10                  |                                          |
| CE   | 32x62xM12                  |                                          |
| CF   | 38x72,5xM12                |                                          |
| CG   | 40x72,5xM12                |                                          |
| CH   | 45x72,5xM12                |                                          |
| CK   | 48x72,5xM12                |                                          |
| CL   | 56x92xM12                  |                                          |

### Product Options

|           |                   |                                                    |
|-----------|-------------------|----------------------------------------------------|
| <b>F7</b> | 1-1/4 GAS         | Threaded GAS (BSPP)                                |
| <b>F8</b> | 1-1/2 GAS         |                                                    |
| <b>F9</b> | 1-3/4 GAS         |                                                    |
| <b>GE</b> | 32x62x7/16-14UNC  | Flanged port with the holes in + pattern UN thread |
| <b>GF</b> | 38x72,5x1/2-13UNC |                                                    |
| <b>GK</b> | 48x72,5x1/2-13UNC |                                                    |

### Porting



## Product Options

### Ports dimensions

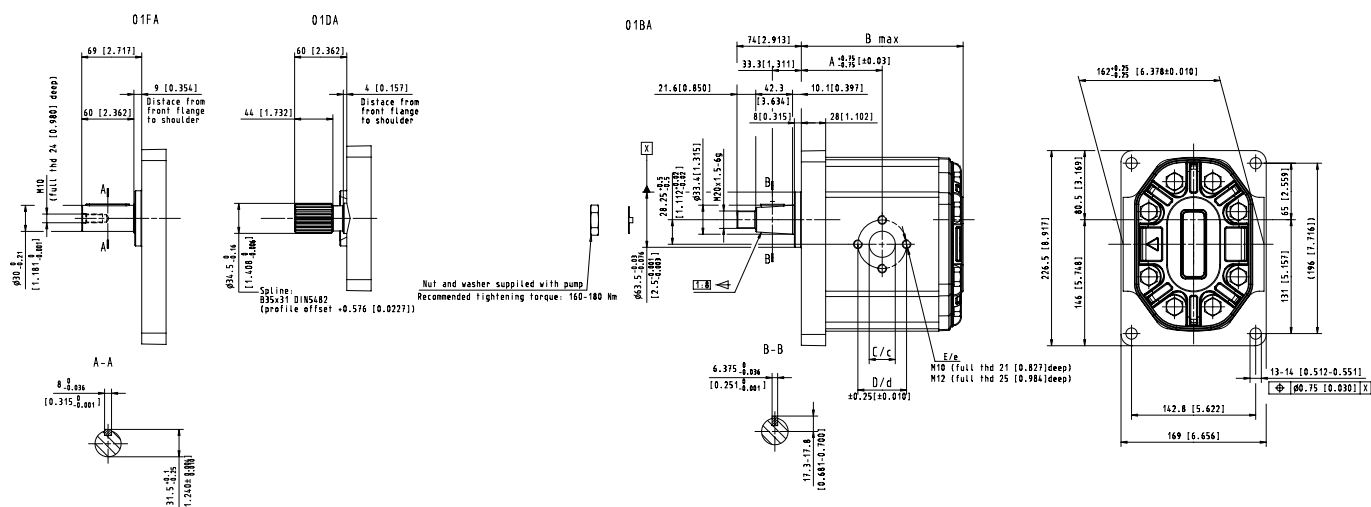
| Port type           |     |        | A              |                 |                 |              | C              |           |     | E                |
|---------------------|-----|--------|----------------|-----------------|-----------------|--------------|----------------|-----------|-----|------------------|
| Dimensions          |     |        | a              | b               | d               | c            | g              | h         | i   | f                |
| Type (displacement) | 060 | Inlet  | 38.1<br>[1.5]  | 35.71<br>[1.4]  | 69.85<br>[2.75] | 1/2 -13 UNC  | 62<br>[2.44]   | 36 [1.42] | M10 | 1-1/2 Gas (BSPP) |
|                     |     | Outlet | 31.8<br>[1.25] | 30.18<br>[1.19] | 58.72<br>[2.31] | 7/16 - 14UNC | 56 [2.2]       | 30 [1.18] | M10 | 1-1/4 Gas (BSPP) |
|                     | 085 | Inlet  | 38.1<br>[1.5]  | 35.71<br>[1.4]  | 69.85<br>[2.75] | 1/2 -13 UNC  | 62<br>[2.44]   | 36 [1.42] | M10 | 1-1/2 Gas (BSPP) |
|                     |     | Outlet | 31.8<br>[1.25] | 30.18<br>[1.19] | 58.72<br>[2.31] | 7/16 - 14UNC | 56 [2.2]       | 30 [1.18] | M10 | 1-1/4 Gas (BSPP) |
|                     | 106 | Inlet  | 50.8<br>[2.0]  | 42.88<br>[1.69] | 77.77<br>[3.06] | 1/2 -13 UNC  | 62<br>[2.44]   | 36 [1.42] | M10 | 1-1/2 Gas (BSPP) |
|                     |     | Outlet | 38.1<br>[1.5]  | 35.71<br>[1.4]  | 69.85<br>[2.75] | 1/2 -13 UNC  | 56 [2.2]       | 30 [1.18] | M10 | 1-1/4 Gas (BSPP) |
|                     | 130 | Inlet  | 50.8<br>[2.0]  | 42.88<br>[1.69] | 77.77<br>[3.06] | 1/2 -13 UNC  | 72.5<br>[2.85] | 45 [1.77] | M12 | 1-3/4 Gas (BSPP) |
|                     |     | Outlet | 38.1<br>[1.5]  | 35.71<br>[1.4]  | 69.85<br>[2.75] | 1/2 -13 UNC  | 62<br>[2.44]   | 36 [1.42] | M10 | 1-1/2 Gas (BSPP) |
|                     | 148 | Inlet  | 50.8<br>[2.0]  | 42.88<br>[1.69] | 77.77<br>[3.06] | 1/2 -13 UNC  | 72.5<br>[2.85] | 45 [1.77] | M12 | 1-3/4 Gas (BSPP) |
|                     |     | Outlet | 38.1<br>[1.5]  | 35.71<br>[1.4]  | 69.85<br>[2.75] | 1/2 -13 UNC  | 62<br>[2.44]   | 36 [1.42] | M10 | 1-1/2 Gas (BSPP) |
|                     | 180 | Inlet  | 50.8<br>[2.0]  | 42.88<br>[1.69] | 77.77<br>[3.06] | 1/2 -13 UNC  | 92<br>[3.62]   | 56 [2.2]  | M12 | N/A              |
|                     |     | Outlet | 38.1<br>[1.5]  | 35.71<br>[1.4]  | 69.85<br>[2.75] | 1/2 -13 UNC  | 72.5<br>[2.85] | 45 [1.77] | M12 | N/A              |
|                     | 200 | Inlet  | 50.8<br>[2.0]  | 42.88<br>[1.69] | 77.77<br>[3.06] | 1/2 -13 UNC  | 92<br>[3.62]   | 56 [2.2]  | M12 | N/A              |
|                     |     | Outlet | 38.1<br>[1.5]  | 35.71<br>[1.4]  | 69.85<br>[2.75] | 1/2 -13 UNC  | 72.5<br>[2.85] | 45 [1.77] | M12 | N/A              |

## Dimensions

### TAP4NN - 01FA, 01DA, and 01BA

The drawing shows the TAP4NN standard porting for 01FA, 01DA and 01BA.

mm  
[in]



TAP4NN – 01FA, 01DA, 01BA dimensions

| Frame size |   | 060           | 085          | 106           | 130            | 148           | 180           | 200           |
|------------|---|---------------|--------------|---------------|----------------|---------------|---------------|---------------|
| Dimension  | A | 84<br>[3.3]   | 89<br>[3.5]  | 93<br>[3.66]  | 97.5<br>[3.84] | 101<br>[3.98] | 107<br>[4.21] | 111<br>[4.37] |
|            | B | 168<br>[6.61] | 178<br>[7.0] | 186<br>[7.32] | 195<br>[7.68]  | 202<br>[7.95] | 214<br>[8.42] | 222<br>[8.74] |
| Inlet      | C | 36 [1.42]     |              |               | 45 [1.77]      |               | 56 [2.2]      |               |
|            | D | 62 [2.44]     |              |               | 72.5 [2.85]    |               | 92 [3.62]     |               |
|            | E | M10           |              |               | M12            |               | M12           |               |
| Outlet     | c | 30 [1.18]     |              |               | 36 [1.42]      |               | 45 [1.77]     |               |
|            | d | 56 [2.2]      |              |               | 62 [2.44]      |               | 72.5 [2.85]   |               |
|            | e | M10           |              |               | M10            |               | M12           |               |

Model code examples and maximum shaft torque

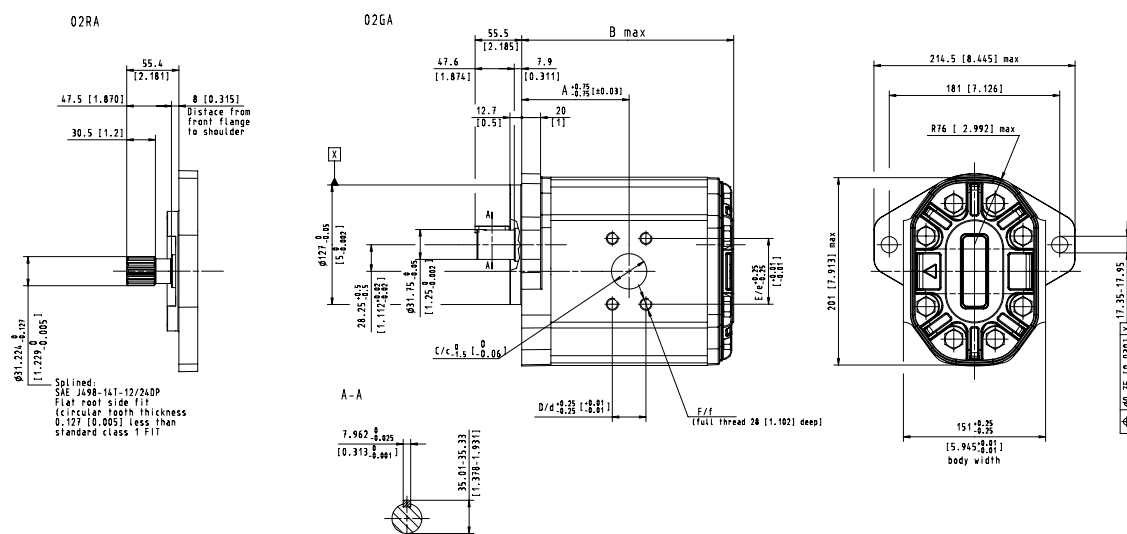
| Flange/drive gear | Model code example                | Maximum shaft torque |
|-------------------|-----------------------------------|----------------------|
| 01DA              | TAP4NN/106LN01DAP1CDCBNNNN/NNNNN  | 850 [7523]           |
| 01FA              | TAP4NN/148RN01FAP1CHCDNNNN/NNNNN  | 710 [6284]           |
| 01BA              | TAP4NN/180RN01BAP1CLCH NNNN/NNNNN | 970 [8585]           |

For further details on ordering, see [Model code](#) on page 7.

## Dimensions

### TAP4NN - 02RA, and 02GA

This drawing shows the standard porting for 02RA and 02GA.

mm  
[in]

*TAP4NN – 02RA, 02GA dimensions*

| Frame size |          | 060           | 085           | 106           | 130             | 148           | 180           | 200           |
|------------|----------|---------------|---------------|---------------|-----------------|---------------|---------------|---------------|
| Dimension  | <b>A</b> | 87<br>[3.42]  | 92<br>[3.62]  | 96<br>[3.78]  | 100.5<br>[3.96] | 104<br>[4.1]  | 110<br>[4.33] | 114<br>[4.49] |
|            | <b>B</b> | 171<br>[6.73] | 181<br>[7.13] | 189<br>[7.44] | 198<br>[7.79]   | 205<br>[8.07] | 217<br>[8.54] | 225<br>[8.86] |
| Inlet      | <b>C</b> | 38.1 [1.5]    |               | 50.8 [2.0]    |                 |               |               |               |
|            | <b>D</b> | 35.71 [1.4]   |               | 42.88 [1.69]  |                 |               |               |               |
|            | <b>E</b> | 69.85 [2.75]  |               | 77.77 [3.06]  |                 |               |               |               |
|            | <b>F</b> | 1/2-13UNC     |               | 1/2-13UNC     |                 |               |               |               |
| Outlet     | <b>c</b> | 31.8 [1.25]   |               | 38.1 [1.5]    |                 |               |               |               |
|            | <b>d</b> | 30.18 [1.19]  |               | 35.71 [1.4]   |                 |               |               |               |
|            | <b>e</b> | 58.72 [2.31]  |               | 69.85 [2.75]  |                 |               |               |               |
|            | <b>f</b> | 7/16-14UNC    |               | 1/2-13UNC     |                 |               |               |               |

| Flange/drive gear configuration | Model code example               | Maximum shaft torque<br>N·m [lb·in] |
|---------------------------------|----------------------------------|-------------------------------------|
| <b>02RA</b>                     | TAP4NN/060RN02RAP1A5A4SDNN/NNNNN | 800 [7080]                          |
| <b>02GA</b>                     | TAP4NN/130LN02GAP1A6A5SDNN/NNNNN | 750 [6638]                          |

For further details on ordering, see [Model code](#) on page 7.

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