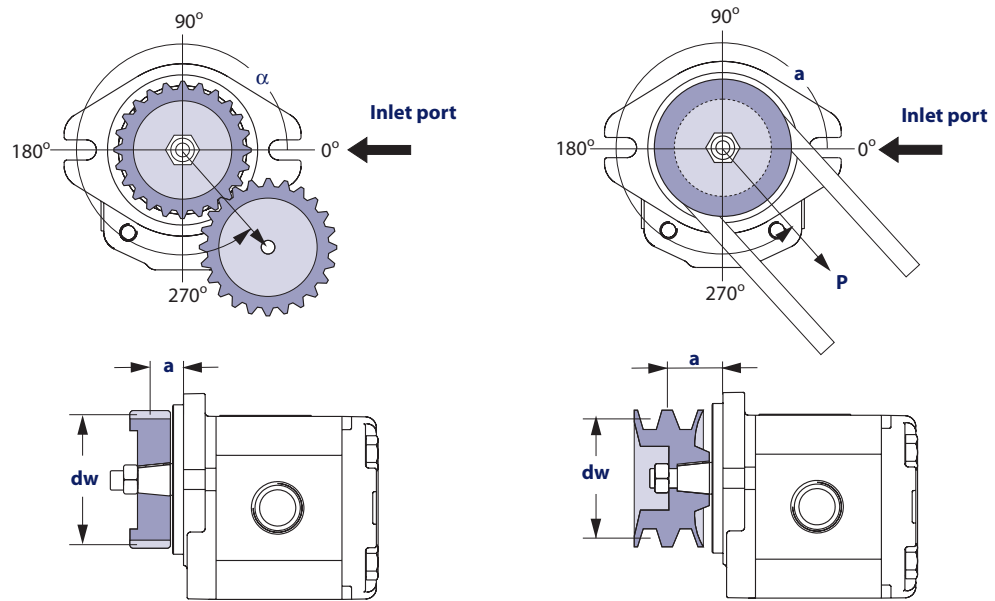




### Pump drive data form

Photocopy this page and fax the complete form to your Turolla 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			<input type="checkbox"/> bar <input type="checkbox"/> psi
Relief valve setting			<input type="checkbox"/> left <input type="checkbox"/> right
Pump shaft rotation			<input type="checkbox"/> left <input type="checkbox"/> 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)			<input type="checkbox"/> V <input type="checkbox"/> notch
Belt tension (gear drive only)	<b>P</b>		<input type="checkbox"/> N <input type="checkbox"/> lbf
Angular orientation of gear or belt to inlet port	$\alpha$		degree
Pitch diameter of gear or pulley	<b>d<sub>w</sub></b>		<input type="checkbox"/> mm <input type="checkbox"/> in
Distance from flange to center of gear or pulley	<b>a</b>		



## Pump life

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

All Turolla 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.

---

**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.

## Sound levels

Noise is unwanted sound. Fluid power systems create noise. There are many techniques available to minimize noise. Understanding how it's generated and transmitted is necessary to apply these methods effectively.

Noise energy is transmitted as fluid borne noise (pressure ripple) or structure borne noise.

**Pressure ripple** is the result of the number of pumping elements (gear teeth) delivering oil to the outlet and the pump's ability to gradually change the volume of each pumping element from low to high pressure. Pressure ripple is affected by the compressibility of the oil as each pumping element discharges into the outlet of the pump. Pressure pulsations travel along hydraulic lines at the speed of sound (about 1400 m/s in oil) until there is a change in the system (as with an elbow fitting). Thus, the pressure pulsation amplitude varies with overall line length and position.

**Structure borne noise** may be transmitted wherever the pump casing is connected to the rest of the system.

The way circuit components respond to excitation depends on their size, form, and mounting. Because of this, a system line may actually have a greater noise level than the pump. To minimize noise, use:

- flexible hoses (if you must use steel plumbing, clamp the lines).
- flexible (rubber) mounts to minimize other structure borne noise.

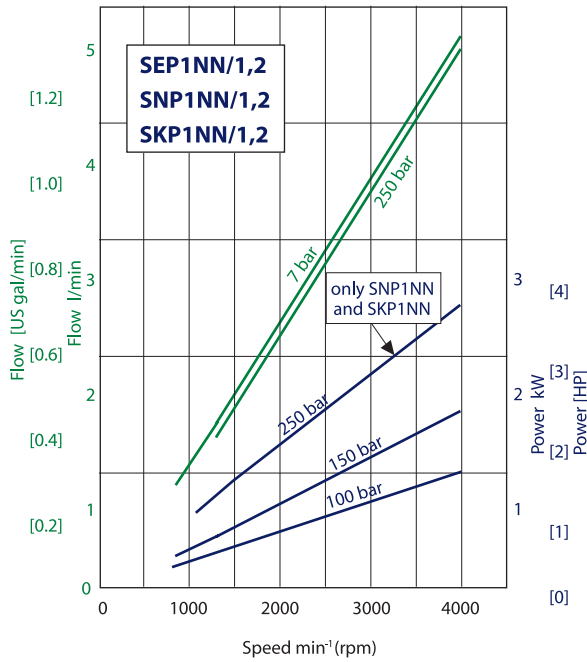


# Pump Performance

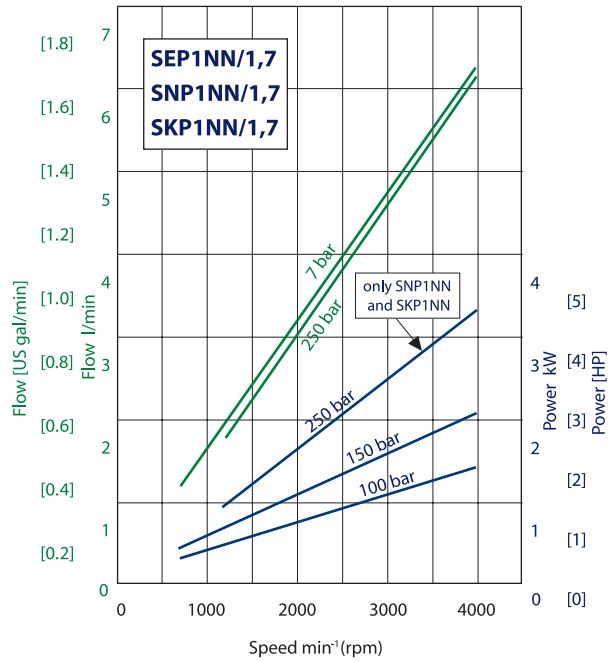
## Pump performance graphs

The graphs on the next few pages provide typical output flow and input power for Group 1 pumps at various working pressures. Data were taken using ISO VG46 petroleum / mineral based fluid at 50°C (viscosity at 28 mm<sup>2</sup>/s [cSt]).

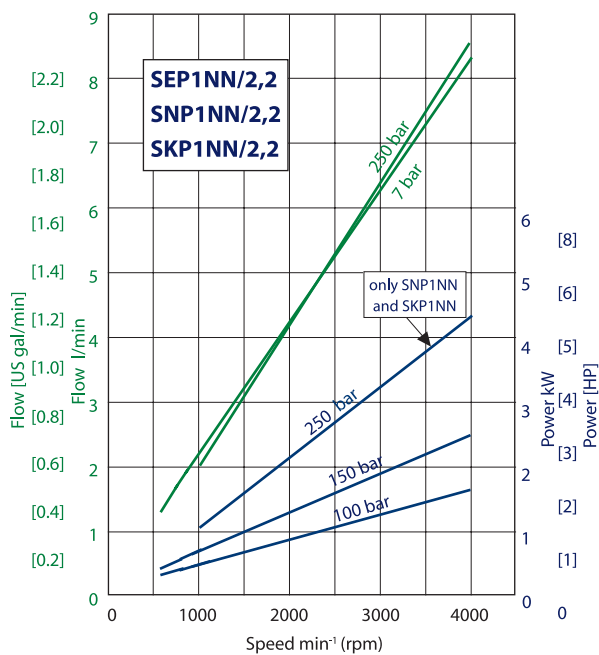
Performance graph for 1.2 frame size



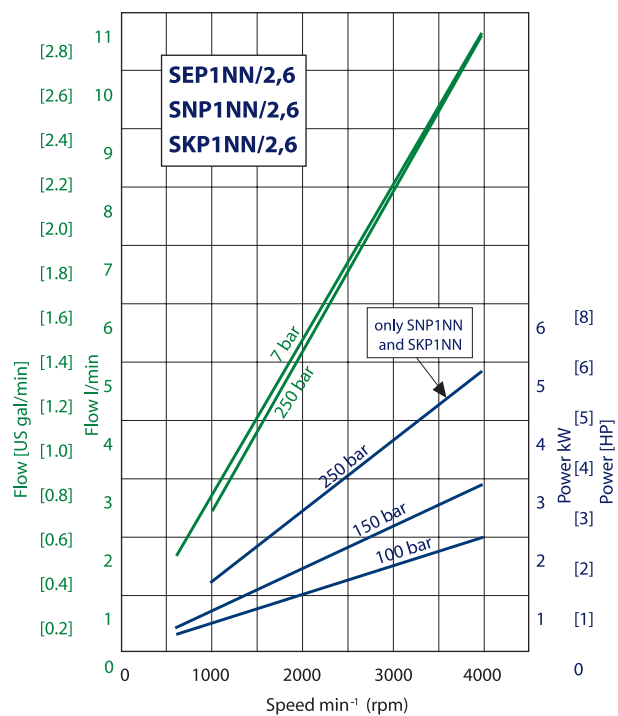
Performance graph for 1.7 frame size



Performance graph for 2.2 frame size

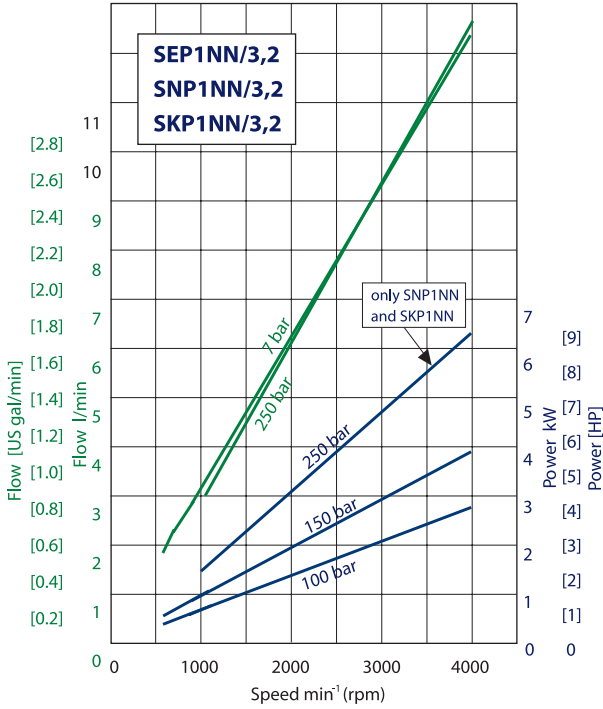


Performance graph for 2.6 frame size

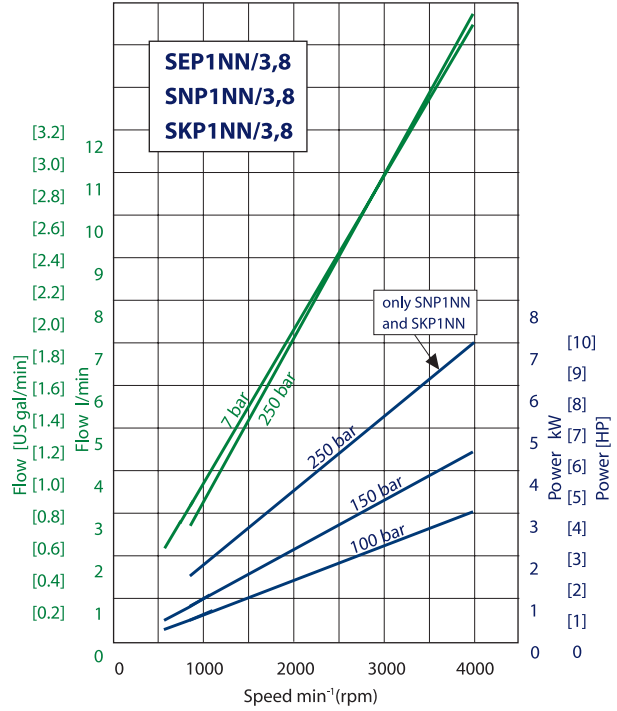




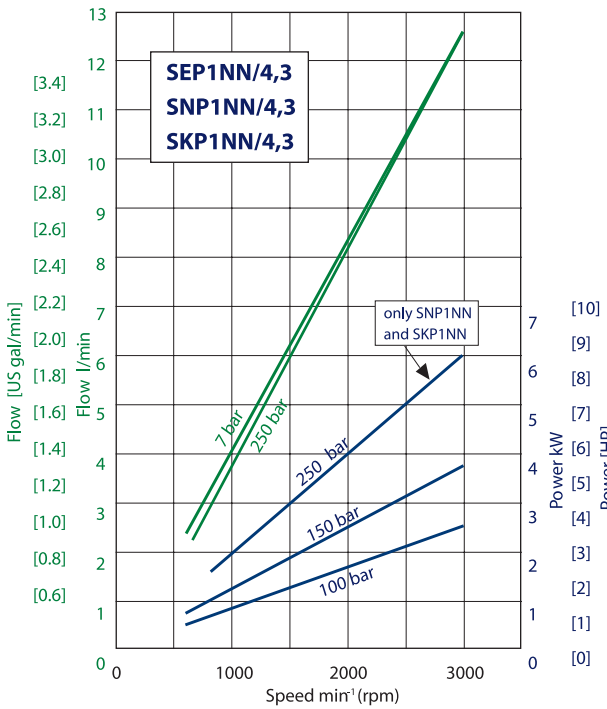
Performance graph for 3.2 frame size



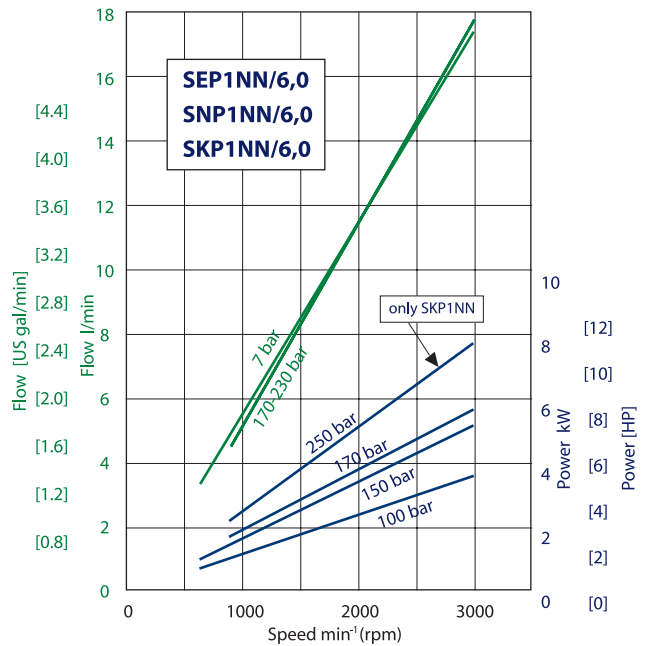
Performance graph for 3.8 frame size



Performance graph for 4.3 frame size

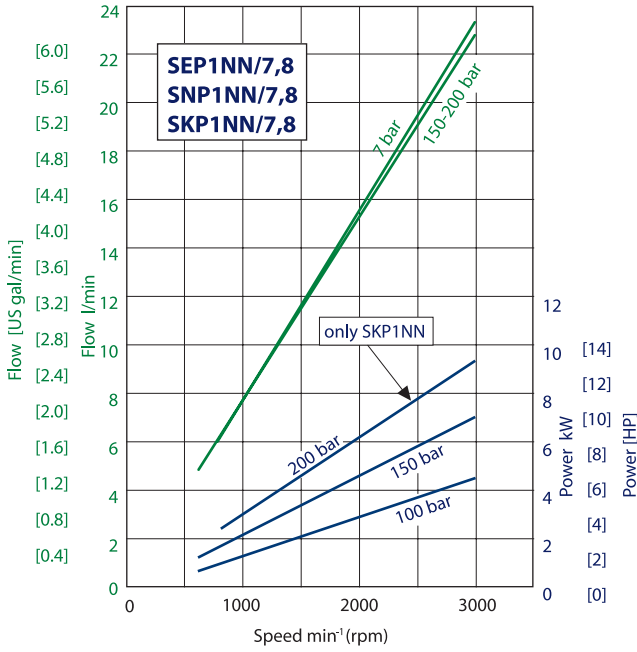


Performance graph for 6.0 frame size

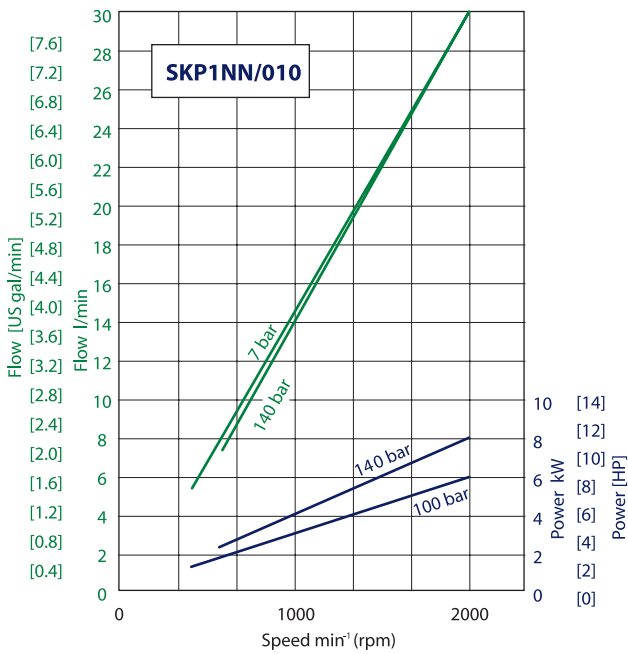




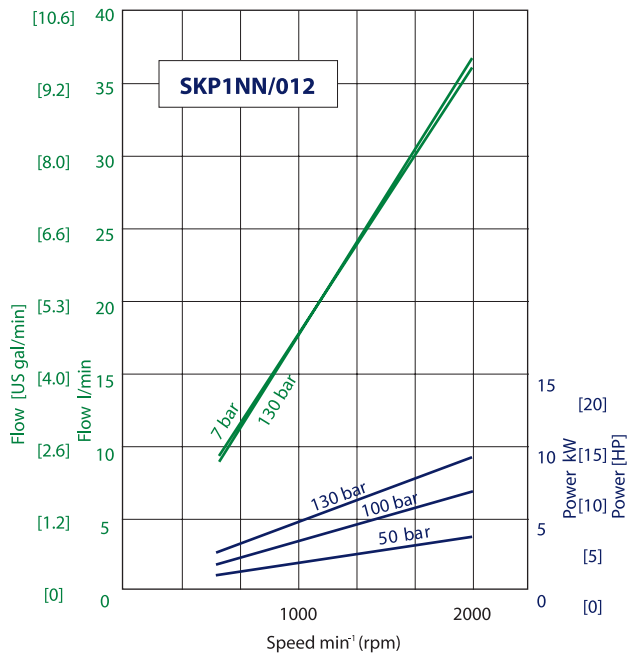
Performance graph for 7.8 frame size



SKP1NN/010 pump performance graph



SKP1NN/012 pump performance graph

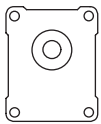
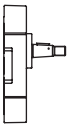
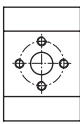
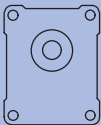
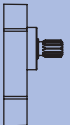
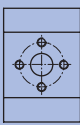
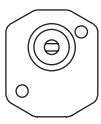
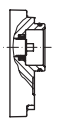
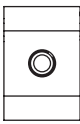




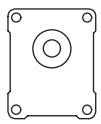
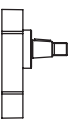
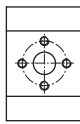
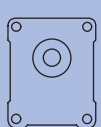
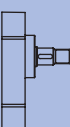

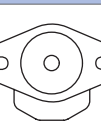
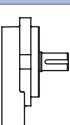
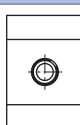
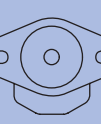
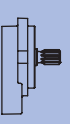

## Product options

### Flange, shaft and port configurations

Flange, shaft and port configurations for SEP1NN and SNP1NN

Code	Flange	Shaft	Port
<b>01BA</b>	25.4 mm [1.0 in] pilot Ø European 4-bolt 	1:8 tapered 	European flanged in + pattern 
<b>01DA</b>	25.4 mm [1.0 in] pilot Ø European 4-bolt 	15-teeth splined $m = 0.75$ $\alpha = 30^\circ$ 	European flanged in + pattern 
<b>03CA</b>	Turolla tang 	Turolla tang 	Threaded metric port 

Flange, shaft and port configurations for SKP1NN

Code	Flange	Shaft	Port
<b>02BB</b>	30 mm [1.181] pilot Ø European 4-bolt 	1:8 tapered 	European flanged in + pattern 
<b>02FA</b>	30 mm [1.181] pilot Ø European 4-bolt 	12 mm [0.472 in] parallel 	European flanged in + pattern 
<b>06GA</b>	SAE A-A 2-bolt 	12.7 mm [0.5 in] parallel 	Threaded SAE O-Ring boss 
<b>06SA</b>	SAE A-A 2-bolt 	9-teeth splined SAE spline J 498-9T-20/40DP 	Threaded SAE O-Ring boss 



### Mounting flanges

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



Flange	
Code	Description
01	pilot Ø25,4+4 holes
02	pilot Ø30+4 holes
03	pilot Ø32+O-ring+2 holes through body
04	pilot Ø32+2 holes through body

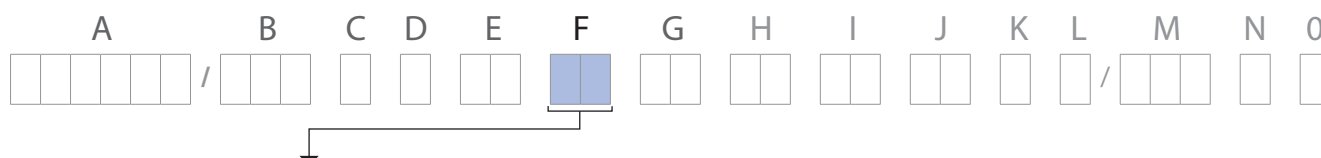
06	SAE A-A pilot Ø50,8+ 2 holes
08	pilot Ø32+O-ring Outlet port+2 holes through body
B1	pilot Ø25,4+4 holes -special shaft seal slot
V6	SAE A-A pilot Ø45+ 2 holes



## Shaft options

Direction is viewed facing the shaft. Group 1 pumps are available with a variety of tang, splined, parallel, and tapered shaft ends. Not all shaft styles are available with all flange styles.

Shaft availability and nominal torque capability



Shaft		Mounting flange code with maximum torque in Nm [lb-in]							
Code	Description	01	02	03	04	06	08	B1	V6
AA	Taper 1:5-M6				25 [221]				
BA	Taper 1:8-M7	25 [221]							
BB	Taper 1:8-M10		50 [442]						
BG	Taper 1:8-M7-shaft for short version							25 [221]	
CA	Tang 5x Ø10			14 [124]					
CD	Tang 5x Ø11,5 distance from gear face 47,5						17 [150]		
CE	Tang 6,63x Ø11					21 [186]			
CF	Tang 5x Ø11,5 distance from gear face 35	21 [186]							
CM	Tang 5x Ø10-type 03 + w/o coupling			14 [124]					
DA	Splined Z15-m0,75-alfa 30°-L14	35 [309]							
DB	Splined Z15-m0,75-alfa 30°-L14		35 [309]						
DC	Splined B12x9-L14-flange protrusion sb22-Z6-m1,60-alfa 30°	30 [265]							
DD	Splined B12x9-L20-flange protrusion sb40-Z6-m1,75-alfa 30°		30 [265]						
FA	Parallel Ø12-Thread M10x1		24 [212]						
GA	Parallel Ø12,7-Key 3.2					32 [283]			
SA	SAE spline J498-9T-20/40					34 [301]			34 [301]
SG	SAE spline J498-8T-16/32-shaft for short version					34 [301]			

Turolla recommends mating splines conform to SAE J498 or DIN 5482.

Turolla 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.





Various port configurations are available on Group 1 pumps. They include:

- European standard flanged ports
- German standard flanged ports
- Gas threaded ports (BSPP)
- O-Ring boss (following SAE J1926/1 [ISO 11926-1] UNF threads, standard)

A table of dimensions is on the next page.

## H – Inlet port configuration codes and I – Outlet port configuration codes

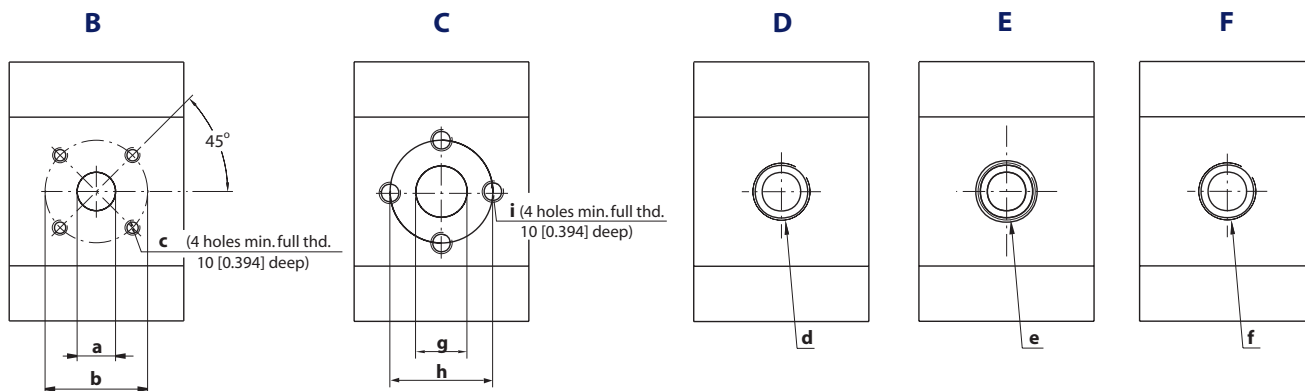


<b>B1</b>	8x30xM6	Flanged port with threaded holes in X pattern, in center of body
<b>B2</b>	13x30xM6	
<b>C1</b>	8x26xM5	Flanged port with threaded holes in + pattern (European standard ports)
<b>C2</b>	12x26xM5	
<b>C3</b>	13,5x30xM6	
<b>D3</b>	M14x1,5	Threaded metric port
<b>D5</b>	M18x1,5	
<b>D7</b>	M22x1,5	
<b>E3</b>	$\frac{9}{16}$ -18UNF	Threaded SAE, O-Ring boss port
<b>E4</b>	$\frac{3}{4}$ -16UNF	
<b>E5</b>	$\frac{7}{8}$ -14UNF	
<b>F2</b>	$\frac{1}{4}$ GAS	Threaded GAS (BSPP) port
<b>F3</b>	$\frac{3}{8}$ GAS	
<b>F4</b>	$\frac{1}{2}$ GAS	
<b>H5</b>	M18x1,5	Threaded metric port ISO 6149
<b>H7</b>	M22x1,5	



## Ports

Available ports



Dimensions of Group 1 pump ports

Port type		B			C			D	E	F	
Port dimension		a	b	c	g	h	i	d	e	f	
Type (displacement)	1,2	Inlet	13 [0.512]	30 [1.181]	M6	12 [0.462]	26 [1.024]	M5	M18x1.5	3/4-16UNF-2B	3/8 Gas (BSPP)
		Outlet	8 [0.315]	30 [1.181]	M6	12 [0.462]	26 [1.024]	M5	M14x1.5	9/16-18UNF-2B	3/8 Gas (BSPP)
	1,7	Inlet	13 [0.512]	30 [1.181]	M6	12 [0.462]	26 [1.024]	M5	M18x1.5	3/4-16UNF-2B	3/8 Gas (BSPP)
		Outlet	8 [0.315]	30 [1.181]	M6	12 [0.462]	26 [1.024]	M5	M14x1.5	9/16-18UNF-2B	3/8 Gas (BSPP)
	2,2	Inlet	13 [0.512]	30 [1.181]	M6	12 [0.462]	26 [1.024]	M5	M18x1.5	3/4-16UNF-2B	3/8 Gas (BSPP)
		Outlet	8 [0.315]	30 [1.181]	M6	12 [0.462]	26 [1.024]	M5	M14x1.5	9/16-18UNF-2B	3/8 Gas (BSPP)
	2,6	Inlet	13 [0.512]	30 [1.181]	M6	12 [0.462]	26 [1.024]	M5	M18x1.5	3/4-16UNF-2B	3/8 Gas (BSPP)
		Outlet	8 [0.315]	30 [1.181]	M6	12 [0.462]	26 [1.024]	M5	M14x1.5	9/16-18UNF-2B	3/8 Gas (BSPP)
	3,2	Inlet	13 [0.512]	30 [1.181]	M6	12 [0.462]	26 [1.024]	M5	M18x1.5	3/4-16UNF-2B	3/8 Gas (BSPP)
		Outlet	8 [0.315]	30 [1.181]	M6	12 [0.462]	26 [1.024]	M5	M14x1.5	9/16-18UNF-2B	3/8 Gas (BSPP)
	3,8	Inlet	13 [0.512]	30 [1.181]	M6	12 [0.462]	26 [1.024]	M5	M18x1.5	3/4-16UNF-2B	3/8 Gas (BSPP)
		Outlet	8 [0.315]	30 [1.181]	M6	12 [0.462]	26 [1.024]	M5	M18x1.5	9/16-18UNF-2B	3/8 Gas (BSPP)
	4,3	Inlet	13 [0.512]	30 [1.181]	M6	12 [0.462]	26 [1.024]	M5	M18x1.5	3/4-16UNF-2B	3/8 Gas (BSPP)
		Outlet	8 [0.315]	30 [1.181]	M6	12 [0.462]	26 [1.024]	M5	M18x1.5	9/16-18UNF-2B	3/8 Gas (BSPP)
	6,0	Inlet	13 [0.512]	30 [1.181]	M6	12 [0.462]	26 [1.024]	M5	M18x1.5	3/4-16UNF-2B	3/8 Gas (BSPP)
		Outlet	13 [0.512]	30 [1.181]	M6	12 [0.462]	26 [1.024]	M5	M18x1.5	9/16-18UNF-2B	3/8 Gas (BSPP)
	7,8	Inlet	13 [0.512]	30 [1.181]	M6	12 [0.462]	26 [1.024]	M5	M18x1.5	3/4-16UNF-2B	3/8 Gas (BSPP)
		Outlet	13 [0.512]	30 [1.181]	M6	12 [0.462]	26 [1.024]	M5	M18x1.5	9/16-18UNF-2B	3/8 Gas (BSPP)
	010	Inlet	13 [0.512]	30 [1.181]	M6	12 [0.462]	26 [1.024]	M5	M18x1.5	3/4-16UNF-2B	3/8 Gas (BSPP)
		Outlet	13 [0.512]	30 [1.181]	M6	12 [0.462]	26 [1.024]	M5	M18x1.5	9/16-18UNF-2B	3/8 Gas (BSPP)
012	Inlet	13 [0.512]	30 [1.181]	M6	12 [0.462]	26 [1.024]	M5	M18x1.5	3/4-16UNF-2B	3/8 Gas (BSPP)	
	Outlet	13 [0.512]	30 [1.181]	M6	12 [0.462]	26 [1.024]	M5	M18x1.5	9/16-18UNF-2B	3/8 Gas (BSPP)	



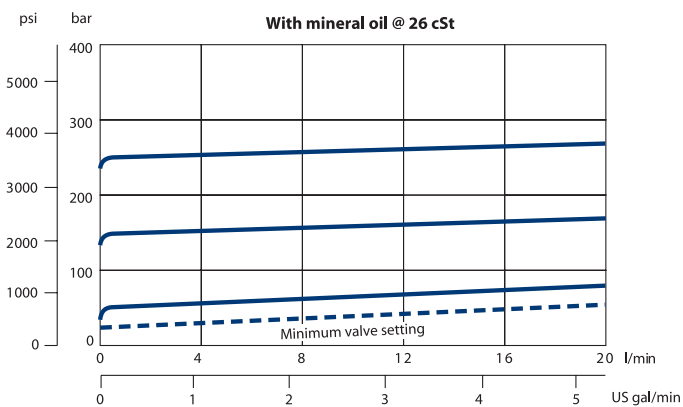
## SNP11N

Turolla offers an optional integral relief valve integrated in the rear cover. It is drained internally and directs all flow from the pump outlet to the inlet when the outlet pressure reaches the valve setting.

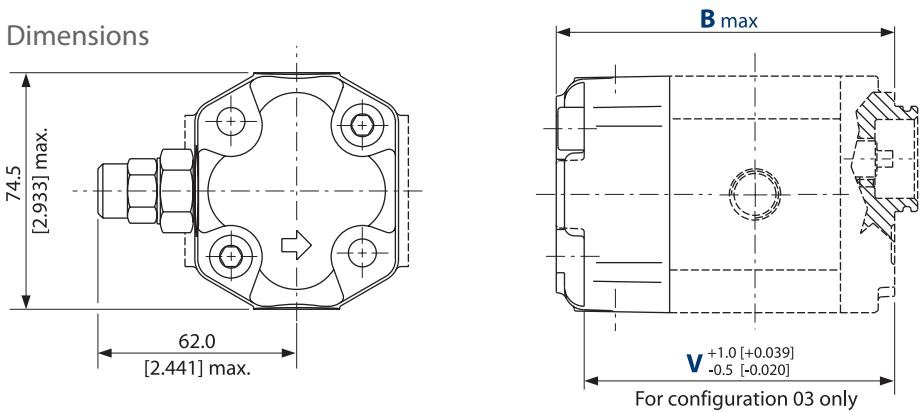
### ⚠ Caution

When the relief valve is operating in bypass condition, rapid heat generation occurs. If this bypass condition continues, the pump prematurely fails. The reason for this is that it is a rule, not an exception.

### Valve performance graph



### Dimensions



For configuration 06 (SAE A-A) dimension **B** and **V** have to be increased 4.5 mm [0.177 in].

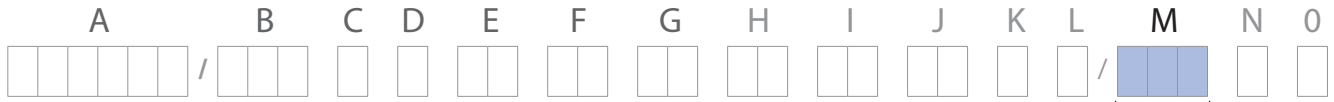
### Integral relief valve and covers dimensions

Type (displacement)	1,2	1,7	2,2	2,6	3,2	3,8	4,3	6,0	7,8	010	012	
Dimensions mm [in]	<b>B</b>	95.5 [3.760]	97 [3.819]	99 [3.989]	101 [3.976]	103 [4.055]	105 [4.134]	107 [4.213]	113.5 [4.468]	120 [4.724]	129 [5.079]	137 [5.394]
	<b>V</b>	85.0 [3.346]	86.5 [3.406]	88.5 [3.484]	90.5 [3.563]	92.5 [3.642]	94.5 [3.720]	96.5 [3.799]	103.0 [4.055]	109.5 [4.311]	118.5 [4.665]	126.5 [4.980]



## Variant codes for ordering integral relief valves

These tables detail the various codes for ordering integral relief valves:

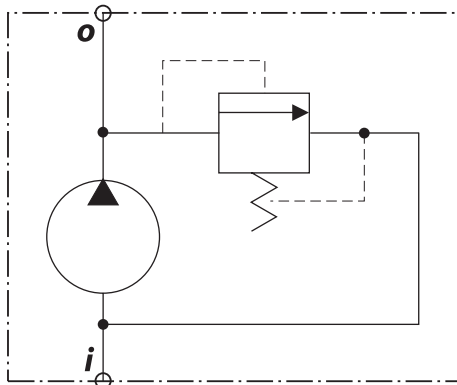


Code	Pump speed for RV setting min <sup>-1</sup> (rpm)
A	Not defined
C	500
E	1000
F	1250
G	1500
K	2000
I	2250
L	2500
M	2800
N	3000
O	3250

Code	Pressure setting bar [psi]
A	No setting
B	No valve
C	18 [261]
D	25 [363]
E	30 [435]
F	35 [508]
G	40 [580]
K	50 [725]
L	60 [870]
M	70 [1015]
N	80 [1160]
O	90 [1305]
P	100 [1450]
Q	110 [1595]
R	120 [1740]
S	130 [1885]
T	140 [2030]
U	160 [2320]
V	170 [2465]
W	180 [2611]
X	210 [3045]
Y	240 [3480]
Z	250 [3626]

## Integral relief valve schematic

Valve schematic

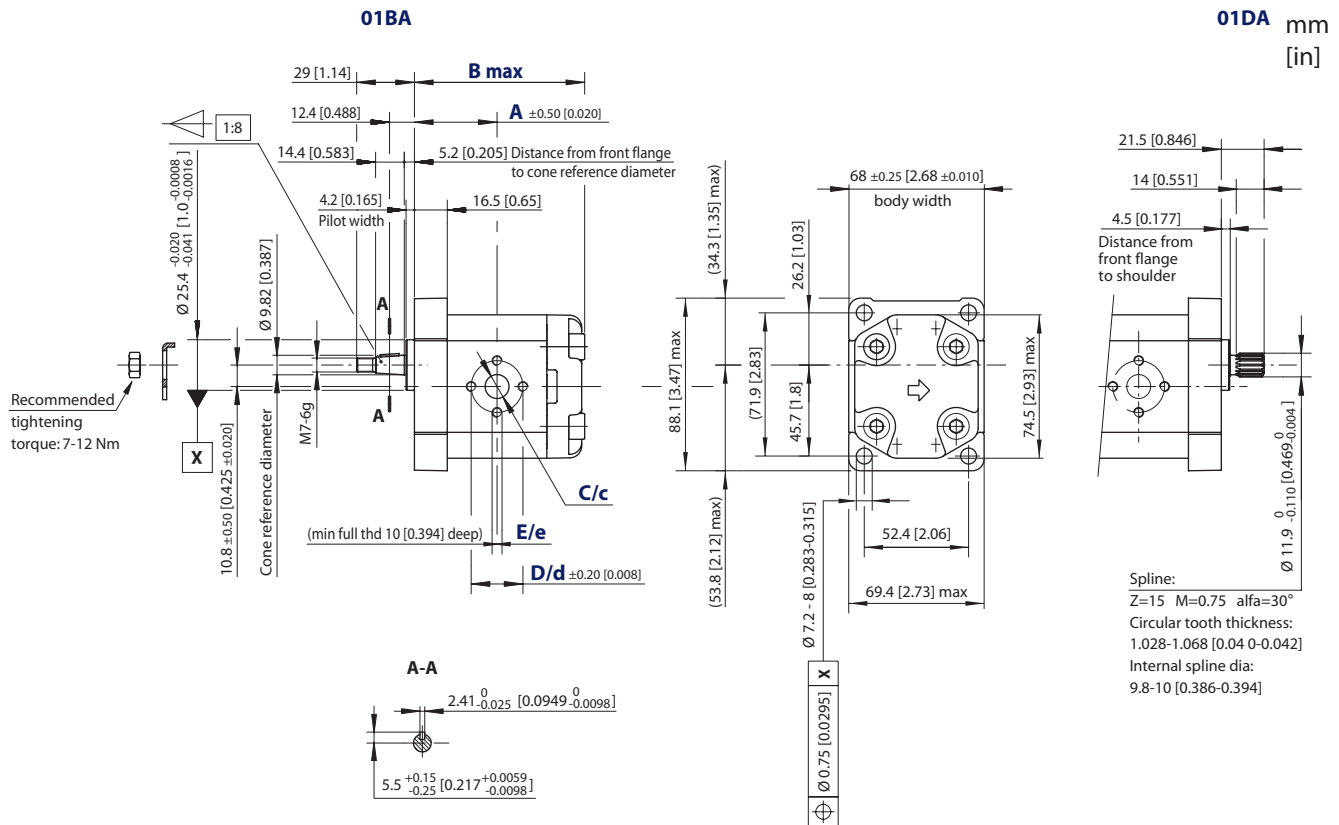


*i* = inlet  
*o* = outlet



# Dimensions

**SNP1NN – 01BA and 01DA** This drawing shows the standard porting for 01BA and 01DA. Available in Series SNP1NN only.



SNP1NN – 01BA and 01DA dimensions

Frame size	1,2	1,7	2,2	2,6	3,2	3,8	4,3	6,0	7,8	
Dimension	A	37.75 [1.486]	38.5 [1.516]	39.5 [1.555]	40.5 [1.634]	41.5 [1.634]	42.5 [1.673]	43.5 [1.713]	46.75 [1.841]	50.0 [1.969]
	B	79.5 [3.130]	81.0 [3.189]	83.0 [3.268]	85.0 [3.346]	87.0 [3.425]	89.0 [3.504]	91.0 [3.583]	97.5 [3.839]	104.0 [4.094]
Inlet/Outlet	C/c	12 [0.472]								
	D/d	26 [1.024]								
	E/e	M5								

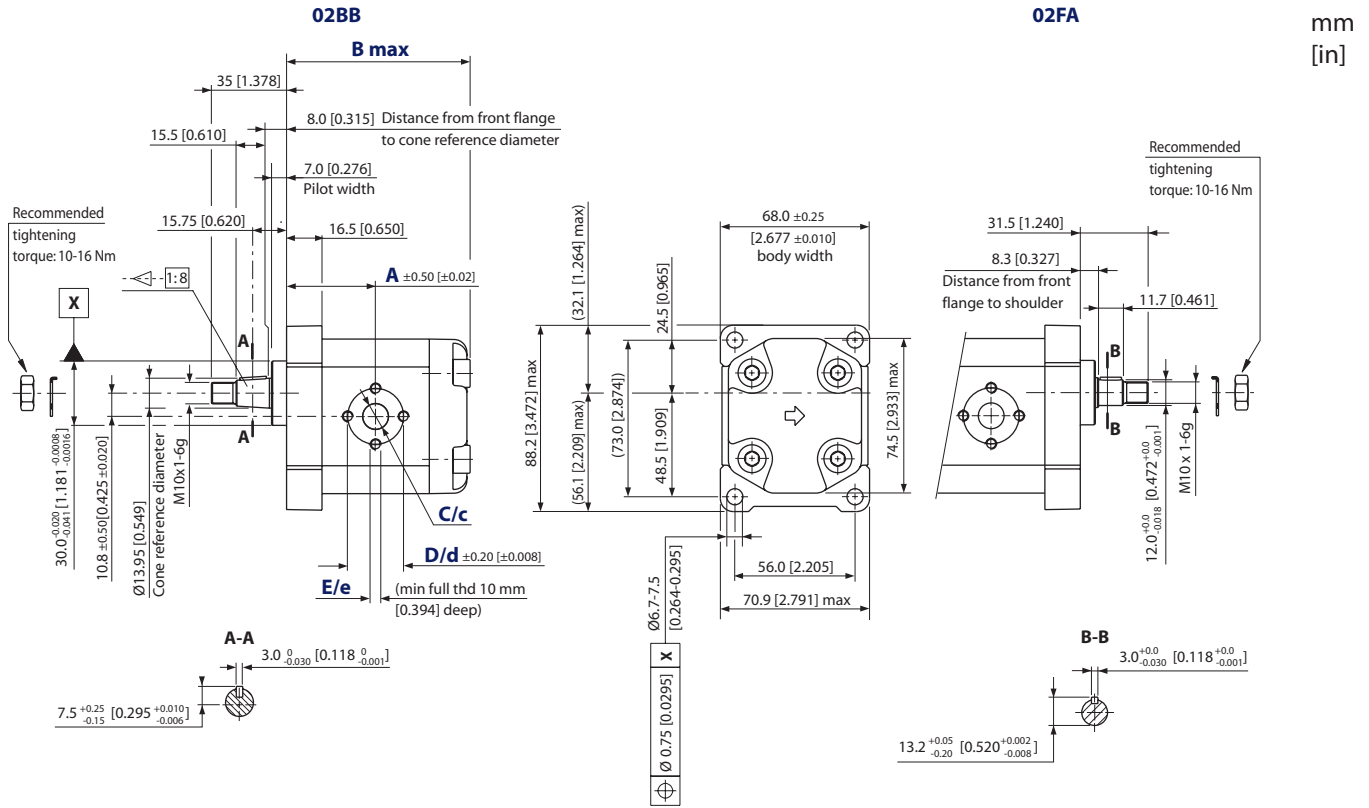
## Model code examples and maximum shaft torque

Flange/drive gear	Model code example	Maximum shaft torque
<b>01BA</b>	SNP1NN/3,8RN01BAP1C2C2NNNN/NNNNN	25 N·m [221 lb·in]
<b>01DA</b>	SNP1NN/6,0LN01DAP1C2C2NNNN/NNNNN	35 N·m [310 lb·in]

For further details on ordering, see [Model Code](#), pages 12-15.



**SKP1NN – 02BB and 02FA** This drawing shows the standard porting for 02BB and 02FA.  
Available in Series SKP1NN only.



SKP1NN – 02BB and 02FA dimensions

Frame size		1,2	1,7	2,2	2,6	3,2	3,8	4,3	6,0	7,8	010	012
Dimension	A	37.75 [1.486]	38.5 [1.516]	39.5 [1.555]	40.5 [1.634]	41.5 [1.634]	42.5 [1.673]	43.5 [1.713]	46.75 [1.841]	50.0 [1.969]	54.5 [2.146]	58.5 [2.303]
	B	79.5 [3.130]	81.0 [3.189]	83.0 [3.268]	85.0 [3.346]	87.0 [3.425]	89.0 [3.504]	91.0 [3.583]	97.5 [3.839]	104.0 [4.094]	113.0 [4.449]	121.0 [4.764]
Inlet/Outlet	C/c	12 [0.472]										
	D/d	26 [1.024]										
	E/e	M5										

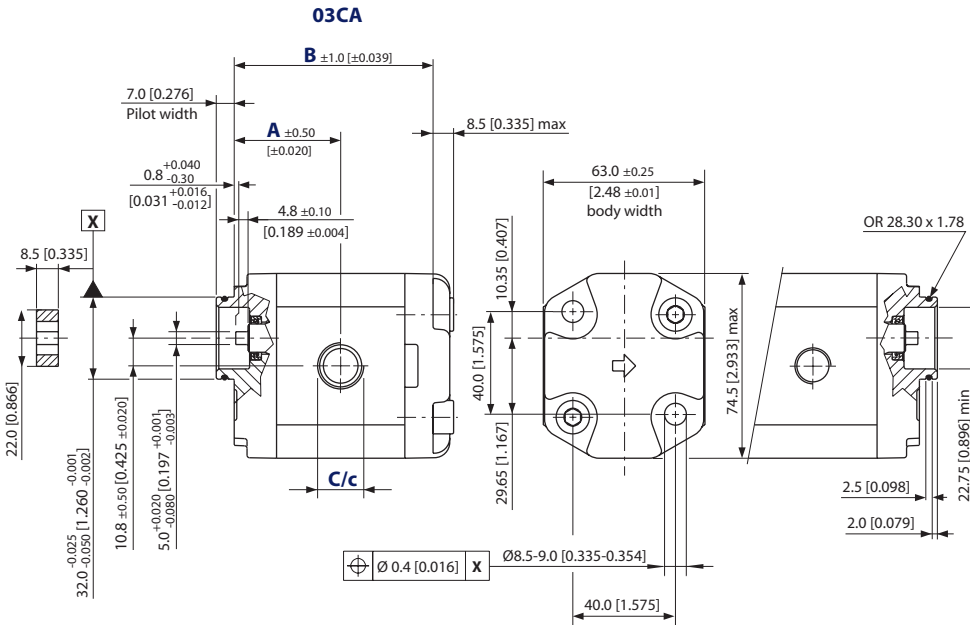
Model code examples and maximum shaft torque

Flange/drive gear	Model code example	Maximum shaft torque
02BB	SKP1NN/6,0RN02BBP1C2C2NNNNN/NNNNN	50 N•m [442 lb•in]
02FA	SKP1NN/ 2,2LN02FAP1C2C2NNNNN/NNNNN	24 N•m [212 lb•in]

For further details on ordering, see [Model Code](#), pages 12-15.



**SNP1NN, SEP1NN – 03CA** This drawing shows the standard porting for 03CA.



mm  
[in]

**SNP1NN, SEP1NN – 03CA dimensions**

Frame size		1,2	1,7	2,2	2,6	3,2	3,8	4,3	6,0	7,8
<b>Dimension</b>	<b>A</b>	37.75 [1.486]	38.5 [1.516]	39.5 [1.555]	40.5 [1.634]	41.5 [1.634]	42.5 [1.673]	43.5 [1.713]	46.75 [1.841]	50 [1.969]
	<b>B</b>	70 [2.756]	71.5 [2.815]	73.5 [2.894]	75.5 [2.972]	77.5 [3.051]	79.5 [3.130]	81.5 [3.209]	88.0 [3.465]	94.5 [3.720]
<b>Inlet</b>	<b>C</b>	M18 x 1.5 THD 12 [0.472] deep								
<b>Outlet</b>	<b>c</b>	M14 x 1.5, THD 12 [0.472] deep				M18 x 1.5, THD 12 [0.472] deep				

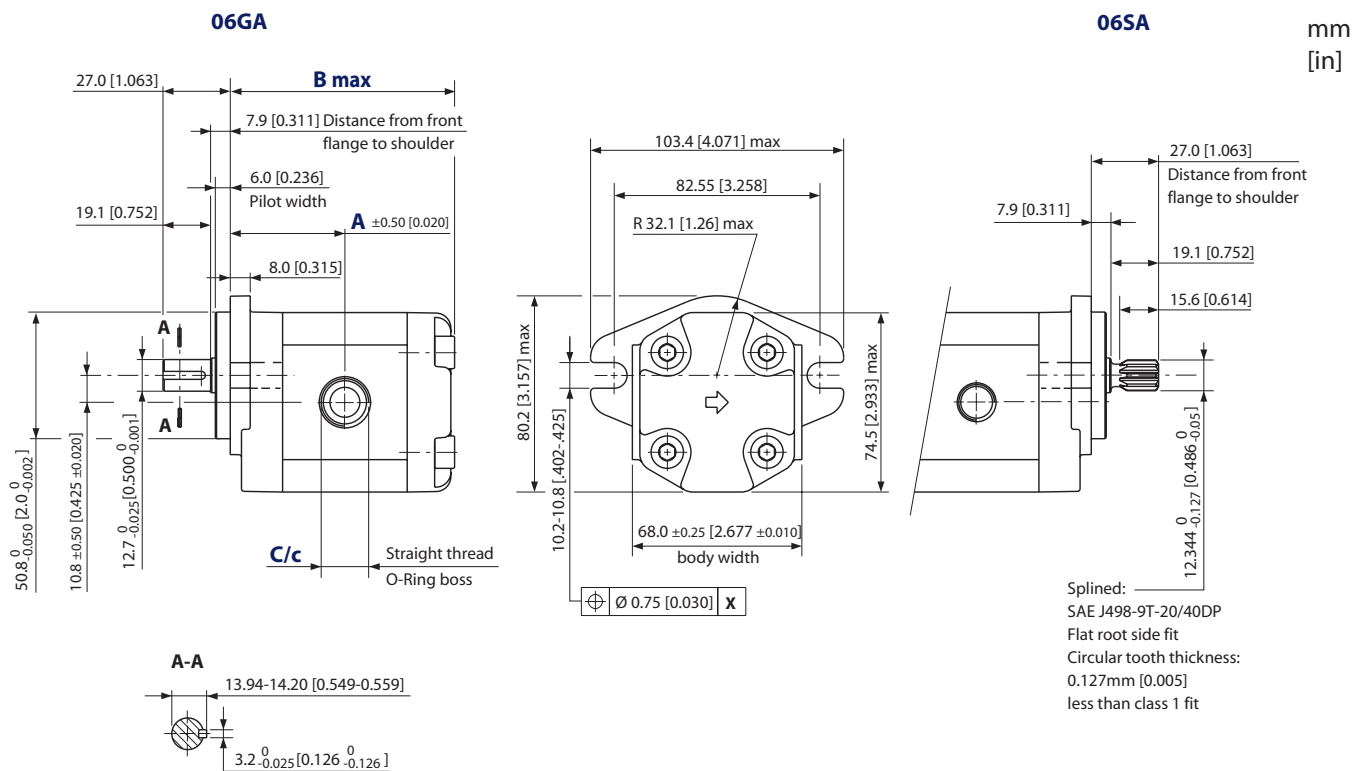
**Model code examples and maximum shaft torque**

Flange/drive gear	Model code example	Maximum shaft torque
<b>03CA</b>	SNP1NN/1,7RN03CA03D5D3NNNNN/NNNNN	14 N•m [124 lb•in]
	SEP1NN/2,2LN03CA03D5D3NNNNN/NNNNN	

For further details on ordering, see [Model Code](#), pages 12-15.



**SKP1NN – 06GA and 06SA** This drawing shows the standard porting for 06GA and 06SA. Available in Series SKP1NN only.



SKP1NN – 06GA and 06SA dimensions

Frame size		1,2	1,7	2,2	2,6	3,2	3,8	4,3	6,0	7,8	010	012
Dimension	A	42.25 [1.663]	43 [1.693]	44 [1.732]	45.0 [1.772]	46.0 [1.811]	47 [1.850]	48 [1.890]	51.25 [2.018]	54.5 [2.146]	59 [2.323]	63.5 [2.50]
	B	84 [3.307]	85.5 [3.366]	87.5 [3.445]	89.5 [3.524]	91.5 [3.602]	93.5 [3.681]	95.5 [3.760]	102 [4.016]	108.5 [4.272]	117.5 [4.626]	125.5 [4.941]
Inlet	C	3/4-16UNF-2B, THD 14.3 [0.563] deep										
Outlet	c	9/16-18UNF-2B, THD 12.7 [0.500] deep										

Model code examples and maximum shaft torque

Flange/drive gear	Model code example	Maximum shaft torque
06GA	SKP1NN/3,2RN06GAP1E4E3NNNN/NNNN	32 N·m [283 lb·in]
06SA	SKP1NN/012LN06SAP1E4E3NNNN/NNNN	34 N·m [301 lb·in]

For further details on ordering, see [Model Code](#), pages 12-15.





# Notes



## Notes



# Notes



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