GEAR MOTORS

Member of the Danfoss Group
TUROLLA
fast forward thinking

GEAR MOTORS

Group 1, 2 and 3 | Technical Information

History of revisions

Date	Page	Changed	Rev.
28, June 2010	-	First edition	A
24, Feb 2011	1, 2, 12, 44	Covers to blue color, Turolla brand name, Biofluids deleted.	B
30, Sept 2013	ALL	Layout and options lists	C

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General information

Overview

The Turolla Gear Motors is a range of peak performance fixed displacement hydraulic motors available in three different frame sizes: Group 1, Group 2 and Group 3, all as uni- and bidirectional version.

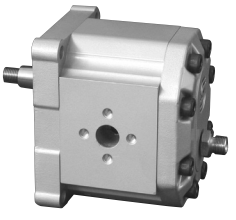
Constructed of a high strength extruded aluminum body with aluminum rear cover and aluminum front flange, all motors are balanced for exceptional efficiency and designed to ensure an excellent starting torque and, in the bidirectional version, to guarantee the ability to work with high back pressure and extremely low system pressure.

The flexibility of the range in each frame size combined with the high efficiency and low starting torque makes the Turolla Gear Motors ideal for a wide range of applications sectors including on- and off-highway hydraulic fan drive systems, turf care, road bildge, fork lifts and municipal.
All the unidirectional motors have the same construction of the correspondent pump as well but, with inlet and outlet positioned at the opposite side for the same rotation.

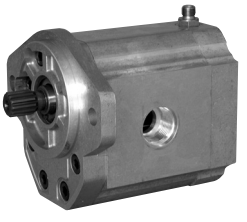
Some representatives of gear motors:

SKM1NN 06SA

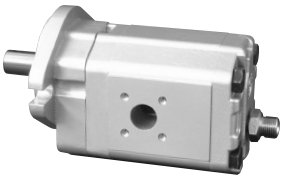
SNM3NN 01BA



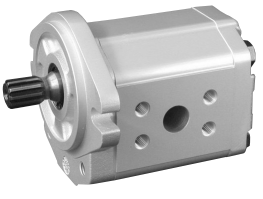
SNM3NL 07SA



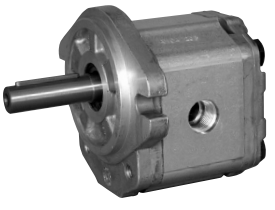
SNM2NN 9JDB



SNU2NN 06SA



SNU2NN 06GA

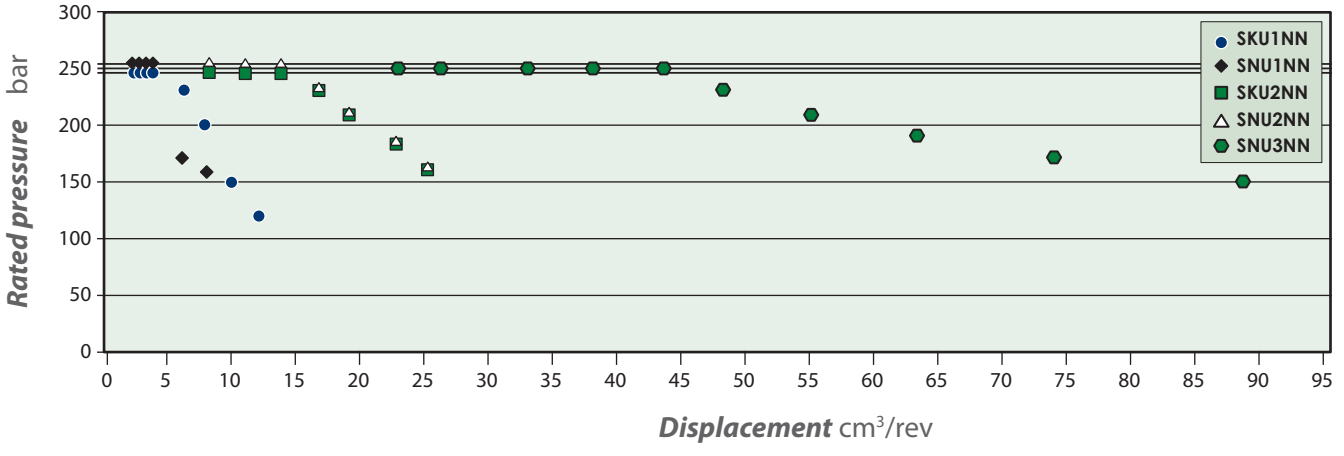


Features and Benefits

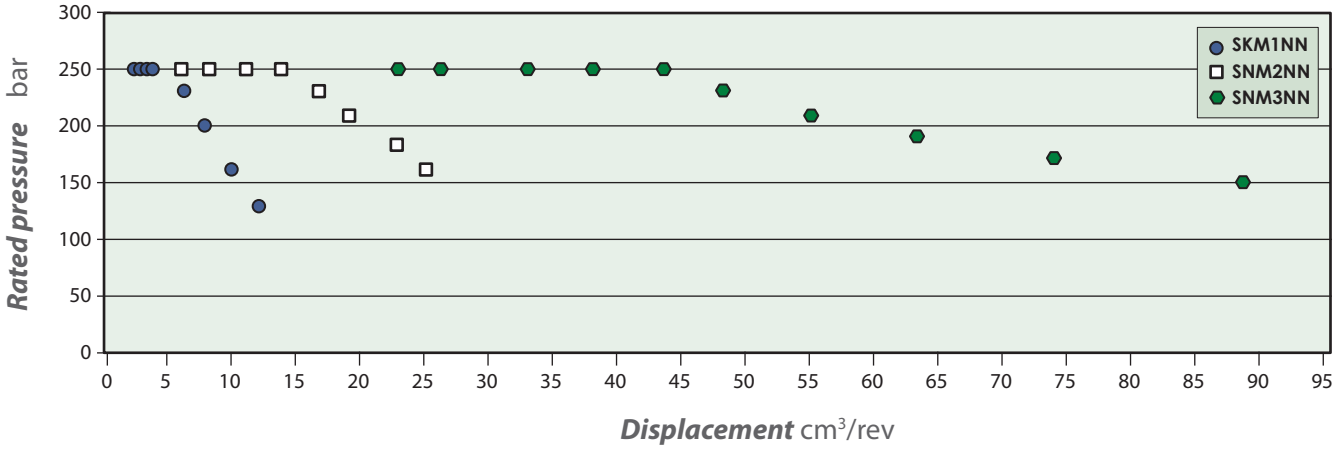
- Three groups of frame sizes (Group 1, 2 and 3)
- Displacements from 2.6 to 90 cm³/rev [from 0.158 to 5.49 in³/rev]
- Available in uni- and bidirectional version for all the frame sizes, displacements and configurations
- Rated pressure up to 250 bar [3625 psi]
- Back pressure capability up to 250 bar [3625 psi]
- Speeds up to 4000 min^{-1} (rpm) for Group 1 and 2, and up to 2500 min^{-1} (rpm) for Group 3
- SAE, ISO and DIN mounting flanges and shafts
- Available with integrated relief valve in the Group 2 frame size and integrated anti-cavitation valve in Group 2 and Group 3 frame sizes.

Motor Displacements

Quick reference chart for unidirectional motor models (Group 1, 2 and 3)



Quick reference chart for bidirectional motor models (Group 1, 2 and 3)



Determination of Nominal Motor Size

Use these formulas to determine the nominal motor size for a specific application.

	Based on SI units		Based on US units	
Input flow:	$Q = \frac{V_g \cdot n}{1000 \cdot \eta_v}$	l/min	$Q = \frac{V_g \cdot n}{231 \cdot \eta_v}$	[US gal/min]
Output torque:	$M = \frac{V_g \cdot \Delta p \cdot \eta_m}{20 \cdot \pi}$	N•m	$M = \frac{V_g \cdot \Delta p \cdot \eta_m}{2 \cdot \pi}$	[lbf•in]
Output power:	$P = \frac{M \cdot n}{9550} = \frac{Q \cdot \Delta p \cdot \eta_t}{600}$	kW	$P = \frac{M \cdot n}{63\,025} = \frac{Q \cdot \Delta p \cdot \eta_t}{1714}$	[hp]

Variables

SI units [US units]

V_g	=	Displacement per revolution	cm^3/rev [in^3/rev]
p_o	=	Outlet pressure	bar [psi]
p_i	=	Inlet pressure	bar [psi]
Δp	=	$p_o - p_i$ (system pressure)	bar [psi]
n	=	Speed	min^{-1} (rpm)
η_v	=	Volumetric efficiency	
η_m	=	Mechanical efficiency	
η_t	=	Overall efficiency ($\eta_v \cdot \eta_m$)	

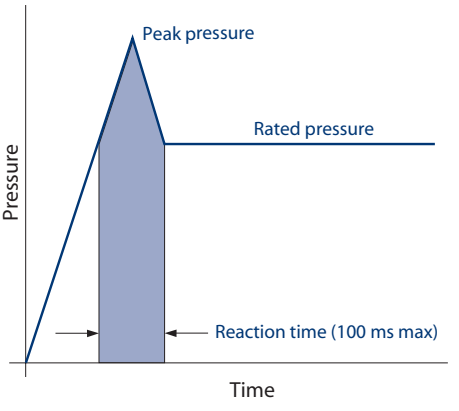
System Requirements

Pressure

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 illustration to the right shows peak pressure in relation to rated pressure and reaction time (100 ms maximum).

Time versus pressure



Rated pressure is the average, regularly occurring operating inlet pressure that should yield satisfactory product life. The maximum machine load at the motor shaft determines rated pressure.

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

Back pressure is the average, regularly occurring operating outlet pressure that should yield satisfactory bidirectional motor life. The hydraulic load demand downstream of the motor determines the back pressure. Unidirectional motors cannot work with back pressure and the maximum back pressure allowed is 5 bar [72 psi] rated and 7 bar [101 psi] as peak.

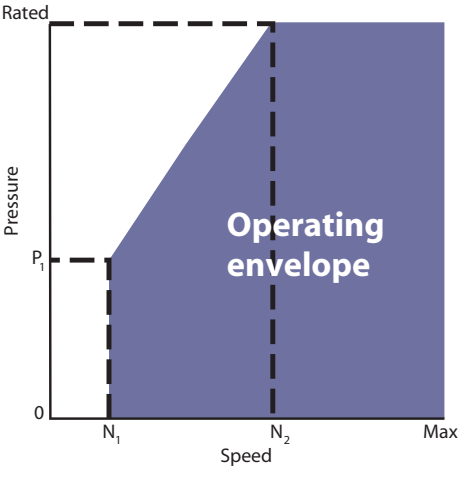
Case Drain Pressure is the regularly occurring case drain line pressure that should yield satisfactory bidirectional motor life. It is recommended to design the case drain piping connecting the case drain direct to the tank in order to keep the case drain pressure as low as possible. The max. continuous case drain pressure allowed is 5 bar [72 psi] rated and 7 bar [101 psi] as peak.

Speed

Maximum speed is the limit recommended by Turolla for a particular gear motor 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 system pressure increases. When operating under higher pressures, a higher minimum speed must be maintained, as illustrated to the right.

Speed versus pressure



N_1 = minimum speed at low pressure
N_2 = minimum speed at rated pressure

Hydraulic Fluids

Ratings and data for gear motors 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 motor and hydraulic circuit.

Caution

Never mix hydraulic fluids.

Please see Turolla publication Hydraulic Fluids and Lubricants Technical Information, **L1021414** for more information. Refer to publication Experience with Biodegradable Hydraulic Fluids Technical Information, **L1021903** for information relating to biodegradable 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 of the motor. The motor 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 motor 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.

Fluid viscosity

Maximum (cold start)	mm^2/s [SUS]	1000 [4600]
Recommended range		12-60 [66-290]
Minimum		10 [60]

Temperature

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

Filtration

Filters

Use a filter that conforms to Class 22/18/13 of ISO 4406 (or better).
It may be on the motor outlet (discharge filtration) or inlet (pressure filtration).

Selecting a filter

When selecting a filter, please consider:

- contaminant ingression 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 (β_x):

- for discharge filtration with controlled reservoir ingression, use a $\beta_{35\text{-}45} = 75$ filter
- for pressure filtration, use a filtration with an efficiency of $\beta_{10} = 75$

β_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 β_x ratio

Fluid cleanliness level (per ISO 4406)	Class 22/18/13 or better
β_x ratio (discharge filtration)	$\beta_{35\text{-}45} = 75$ and $\beta_{10} = 2$
β_x ratio (pressure filtration)	$\beta_{10} = 75$
Recommended inlet screen size	100 – 125 µm [0.0039 – 0.0049 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 for fluid volume changes associated with fluid expansion and during all system operating modes. 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.

Minimum reservoir capacity depends on the volume required to cool and hold the oil, allowing for expansion due to temperature changes. A fluid volume of one to three times the motor output flow (per minute) is satisfactory. The minimum reservoir capacity is 125% of the fluid volume.

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.

The line velocity should not exceed the values in this table:

Maximum line velocity

Inlet	m/s [ft/sec]	2.5 [8.2]
Outlet		5.0 [16.4]
Return		3.0 [9.8]

Most systems use hydraulic oil containing 10% dissolved air by volume. **Over-aeration** is the result of the 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 rated speed requirements are maintained, and reservoir size and location are adequate.

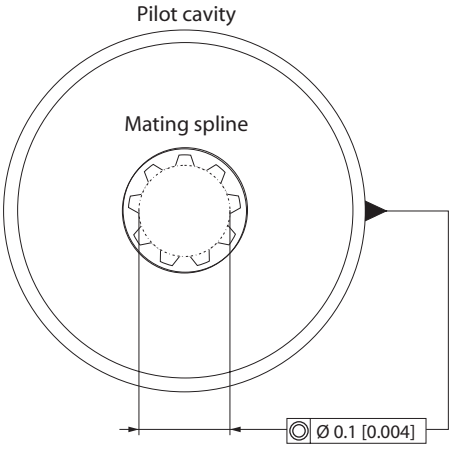
Motor Shaft Connection

Shaft options for gear motors include tapered, splined, parallel or Turolla tang shafts.

Plug-in drives, 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 three-piece coupling minimizes radial or thrust shaft loads.

Motor shaft connection



P101 002E

Caution

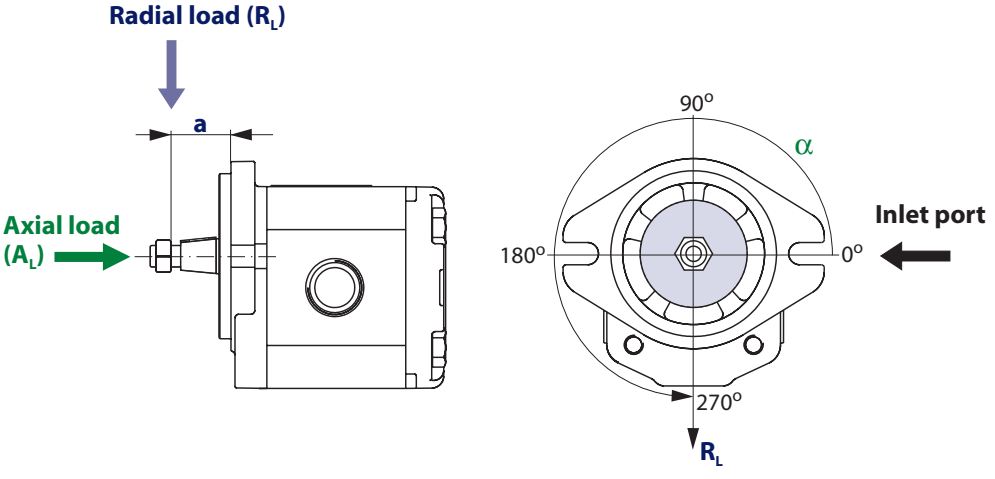
In order to avoid spline shaft damages it is recommended to use carburised and hardened steel couplings with 80-82 HRA surface hardness.

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

In applications where external shaft loads can not be avoided, minimize the impact on the motor by optimizing the orientation and magnitude of the load. Avoid thrust loads in either direction. Please contact Turolla, if continuously applied external radial or thrust loads occur.

Motor Shaft Load Data Form

Photocopy this page and fax the complete form to your Turolla representative for an assistance. This illustration shows a motor with counterclockwise orientation:



Application data

Item		Value	Based on SI or US units	
Motor displacement			❑ cm^3/rev	❑ in^3/rev
Rated system pressure			❑ bar	❑ psi
Peak pressure				
Motor shaft rotation			❑ left	❑ right
Motor minimum speed			min^{-1} (rpm)	
Motor maximum speed				
Radial load	R_L		❑ N	❑ lbf
Angular orientation of radial load to inlet port	α		degree	
Axial load	A_L		❑ N	❑ lbf
Distance from flange to radial load	a		❑ mm	❑ in

Motor Life

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

All Turolla gear motors 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_{10} life expectancy number is generally associated with rolling element bearings. It does not exist for hydrodynamic bearings.

High pressure impacts motor 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.

GROUP 1 GEAR MOTORS

Motor Design

SKM1NN

SKM1NN is the Group 1 bidirectional motor available in the whole displacements range from 2.6 up to 12 cm³/rev [from 0.158 up to 0.732 in³/rev].

Configurations include European and SAE flanges and shafts (Code 01BA, 01DA, 02BB, 02FA, 06GA, 06SA).

SKM1NN 06SA

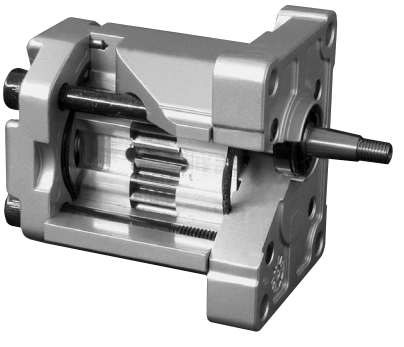
SKU1NN

SKU1NN is a Group 1 unidirectional motor available in the whole displacements range from 2.6 up to 12 cm³/rev [from 0.158 up to 0.732 in³/rev]. The SKU1NN motor construction is derived from the correspondent pump SKP1NN.
Configurations include European and SAE flanges and shafts (Code 01BA, 01DA, 02BB, 02FA, 06GA, 06SA).

SNU1NN

SNU1NN is a Group 1 unidirectional motor available in a limited displacements range from 2.6 up to 7.8 cm³/rev [from 0.158 up to 0.464 in³/rev]. The SNU1NN motor construction is derived from the correspondent pump SNP1NN.
Configurations include European flange and shaft (Code 01BA).

SNU1NN 01BA (cut-away)



Technical Data

Technical data for Group 1 gear motors

		Frame size							
		2,6	**3,2**	**3,8**	**4,3**	**6,0**	**7,8**	**010**	**012**
Displacement	cm^3/rev [in^3/rev]	2.62 [0.158]	3.14 [0.195]	3.66 [0.231]	4.19 [0.262]	5.89 [0.366]	7.59 [0.463]	9.94 [0.607]	12 [0.732]
SKM1NN (a standard, bidirectional motor)									
Peak pressure	bar [psi]	270 [3915]	270 [3915]	270 [3915]	270 [3915]	250 [3625]	220 [3190]	180 [2610]	150 [2175]
Rated pressure	bar [psi]	250 [3625]	250 [3625]	250 [3625]	250 [3625]	230 [3335]	200 [2900]	160 [2320]	130 [1895]
Back pressure	bar [psi]	250 [3625]	250 [3625]	250 [3625]	250 [3625]	230 [3335]	200 [2900]	160 [2320]	130 [1895]
Minimum speed	min^{-1} (rpm)	1000	1000	1000	800	800	800	800	800
Maximum speed	min^{-1} (rpm)	4000	4000	3000	3000	2000	2000	2000	2000
SKU1NN (a standard, unidirectional motor)									
Peak pressure	bar [psi]	270 [3915]	270 [3915]	270 [3915]	270 [3915]	250 [3625]	220 [3190]	170 [2465]	140 [2030]
Rated pressure	bar [psi]	250 [3625]	250 [3625]	250 [3625]	250 [3625]	230 [3335]	200 [2900]	150 [2175]	120 [1740]
Minimum speed	min^{-1} (rpm)	1000	1000	1000	800	800	800	800	800
Maximum speed	min^{-1} (rpm)	4000	4000	3000	3000	2000	2000	2000	2000
SNU1NN (a standard, unidirectional motor)									
Peak pressure	bar [psi]	270 [3915]	270 [3915]	270 [3915]	270 [3915]	190 [2755]	180 [2610]	–	
Rated pressure	bar [psi]	250 [3625]	250 [3625]	250 [3625]	250 [3625]	170 [2465]	160 [2320]		
Minimum speed	min^{-1} (rpm)	1000	1000	1000	800	800	800		
Maximum speed	min^{-1} (rpm)	4000	4000	3000	3000	2000	2000		
All									
Weight	kg [lb]	1.02 [2.26]	1.14 [2.51]	1.18 [2.60]	1.20 [2.65]	1.30 [2.87]	1.39 [3.06]	1.55 [3.42]	1.65 [3.64]
Moment of inertia of rotating components	x 10^{-6} $kg•m^2$ [x 10^{-6} $lbf•ft^2$]	5.1 [121.0]	5.7 [135.2]	6.4 [151.9]	7.1 [168.5]	9.3 [220.7]	11.4 [270.5]	14.6 [339.4]	17.1 [405.8]

1 $kg•m^2$ = 23.68 $lb•ft^2$

Caution

The rated and peak pressure mentioned are for motors with flanged ports only. When threaded ports are required a de-rated performance has to be considered. To verify the compliance of an high pressure application with a threaded ports pump apply to a Turolla representative.

Product Code
Model Code

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

A Family

SNU1NN	Unidirectional gear motor
SKU1NN	High torque unidirectional gear motor
SKM1NN	Standard bidirectional gear motor
SKM1IN	Bidirectional motor with relief valve
SKM1WL	Bidirectional motor+Relief valve;Anti-shock valve;Radial drain

B Displacement

2,6	2.62 cc
3,2	3.14 cc
3,8	3.66 cc
4,3	4.19 cc
5,5	5,23 cc
6,0	5.89 cc
7,8	7.59 cc
010	9.94 cc
012	12.0 cc

C Rotation

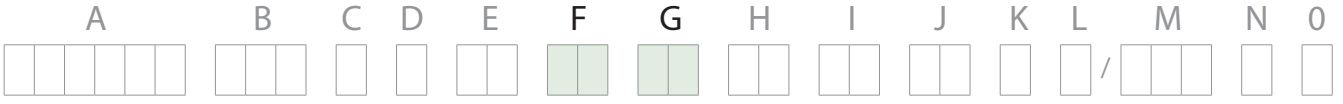
L	Left hand
R	Right hand
B	Bidirectional

D Project version (value representing a change to the initial project)

N	Std Version of Project
6	Short version -Special

E Mounting flange

01	European 4 bolt flange with pilot Ø25,4 mm
02	European 4 bolt flange with pilot Ø30 mm
06	SAE A-A 2 bolt flange with pilot Ø50,8 mm
******	SAE A pilot Ø82,55+2 holes (**Special Option)



F Drive gear

BA	Taper 1:8-M7-Key2,41 SKP1
BB	Taper 1:8-M10x1-Key 3
DB	Splined Z15-m0,75-alfa 30°-L14-Dr60,5
DC	Splined B12x9-L14-flange protrusion sb22-Z6-m1,60-alfa 30°
FA	Parallel Ø12-Thread M10x1-Key 3
GA	Parallel Ø12,7-Key 3,2
SA	SAE spline J498-9T-20/40 Flat Root Side FIT-L15
SG	SAE spline J498-8T-16/32 -shaft version 6

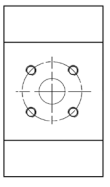
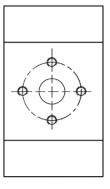
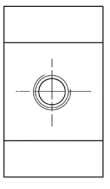
G Rear cover

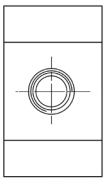
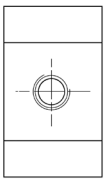
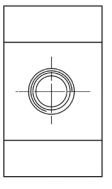
P1	Standard cover for unidirectional motors
M1	Standard cover for motors drain M12x1,5
M2	Cover with drain 1/8" Gas
M3	Cover with drain 1/4" Gas
M6	Cover with drain 7/16-20UNF-2B
MH	Cover with drain M12x1,5 ISO6149
I1	Cover for unidirectional motors with relief valve
L6	Cover motor with side drain in vertical axis 7/16-20UNF-2B
V1	Cover for bidirectional motors with relief valve with drain 1/4 Gas
W6	Cover motor with relief and antishock valve

A B C D E F G H I J K L / M N 0

H Inlet size

I Outlet size

B1	8x30xM6	
B2	13x30xM6	
C1	8x26xM5	
C2	12x26xM5	
C3	13,5x30xM6	
D3	M14x1,5	
D5	M18x1,5	
D7	M22x1,5	

E3	9/16-18UNF	
E4	3/4-16UNF	
E5	7/8-14UNF	
F2	1/4 GAS	
F3	3/8 GAS	
F4	1/2 GAS	
H2	10xM12x1,5-ISO6149	
H4	12xM16x1,5-ISO6149	
H5	12xM18x1,5-ISO6149	
H7	13,5xM22x1,5-ISO6149	

J Ports Pos & Spec Body

N	Std from catalogue

K Seals

N	Standard NBR seal
H	VITON seals + special backing ring-special for SKU1NN

L Screws

N	Std screws
B	GEOMET screws

M Set valves

NNN	No valve
V * *	Integral relief valve pressure setting

**For details go to page 23

N Type of mark

N	Standard Turolla Marking
A	Standard Turolla Marking+Customer Code
Z	Without Marking

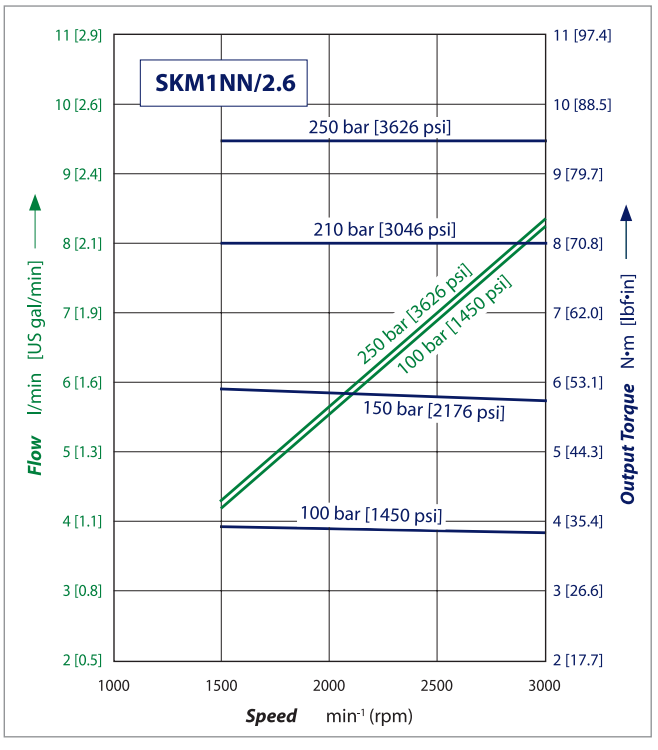
O Mark position

N	Std Marking position (on top)
A	Special Marking position on the bottom

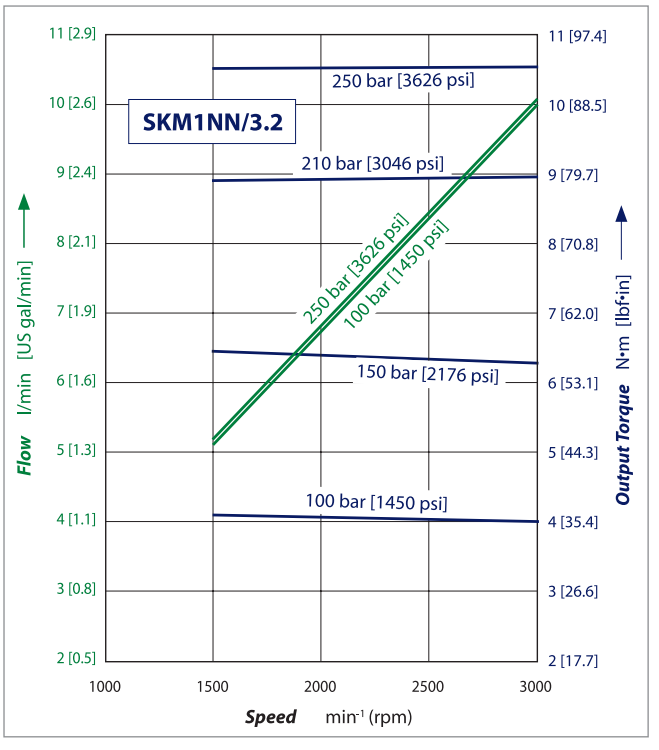
Motor performance graphs

The graphs on the next pages provide typical inlet flow and output power for Group 1 motors at various working pressures. Data were taken using ISO VG46 petroleum /mineral based fluid at 50 °C [122 °F] (viscosity = 28 mm²/s [132 SUS]).

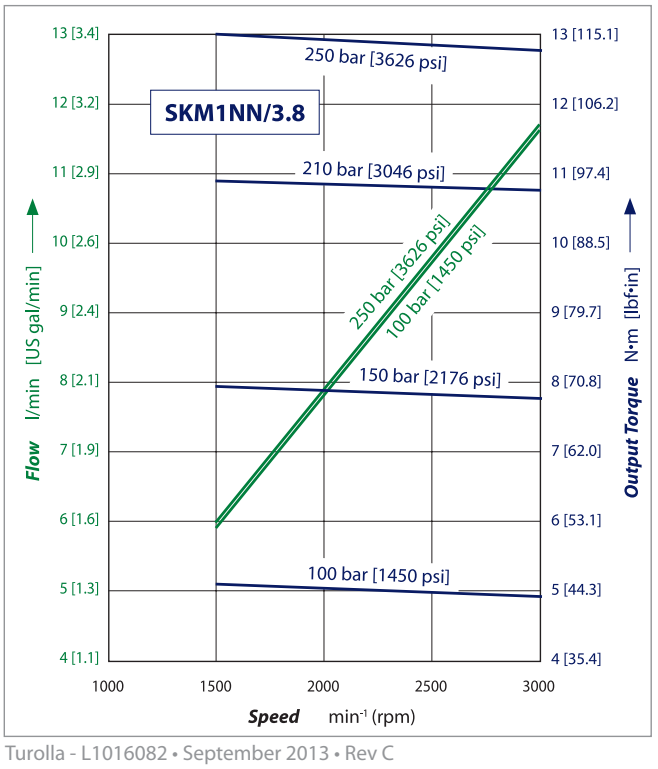
SKM1NN/2,6 motor performance graph



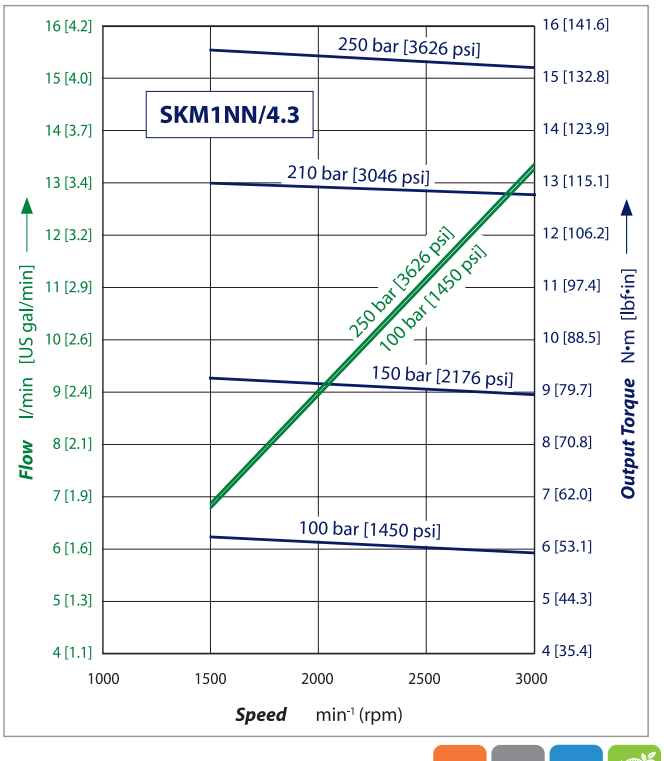
SKM1NN/3,2 motor performance graph



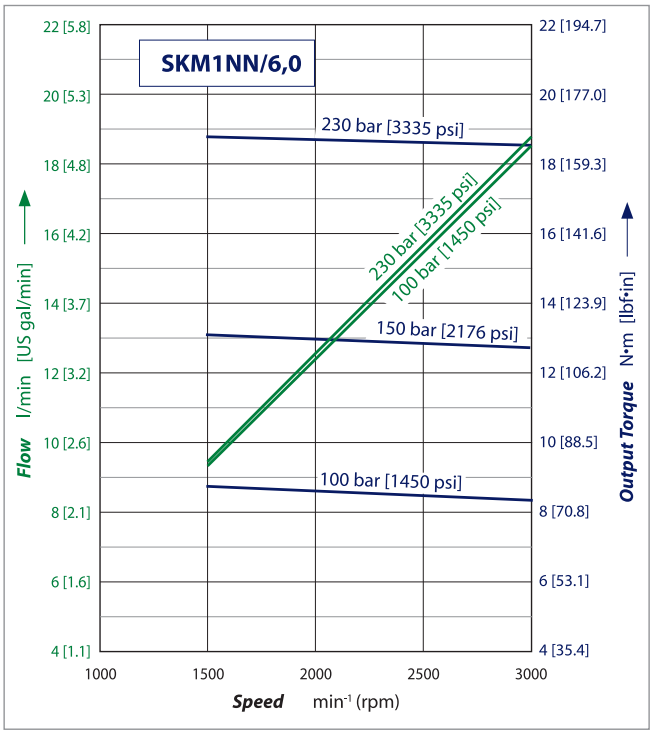
SKM1NN/3,8 motor performance graph



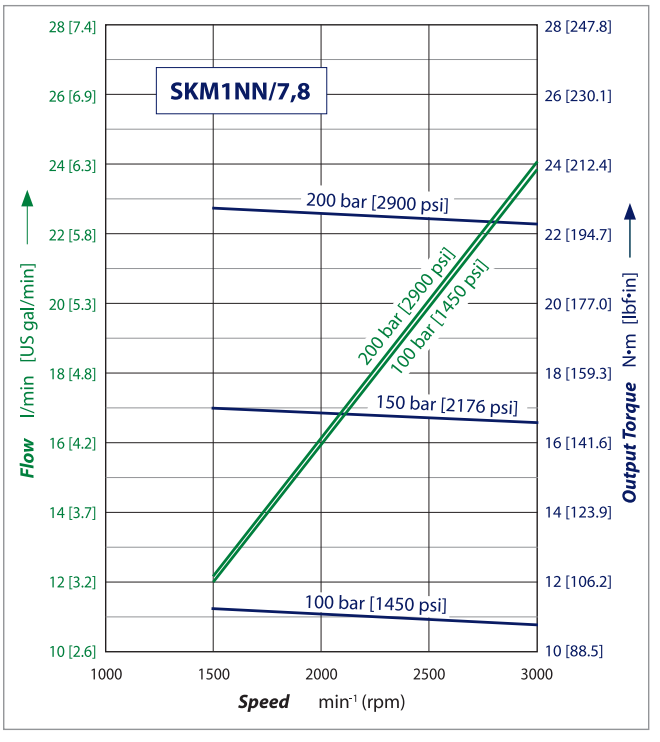
SKM1NN/4,3 motor performance graph



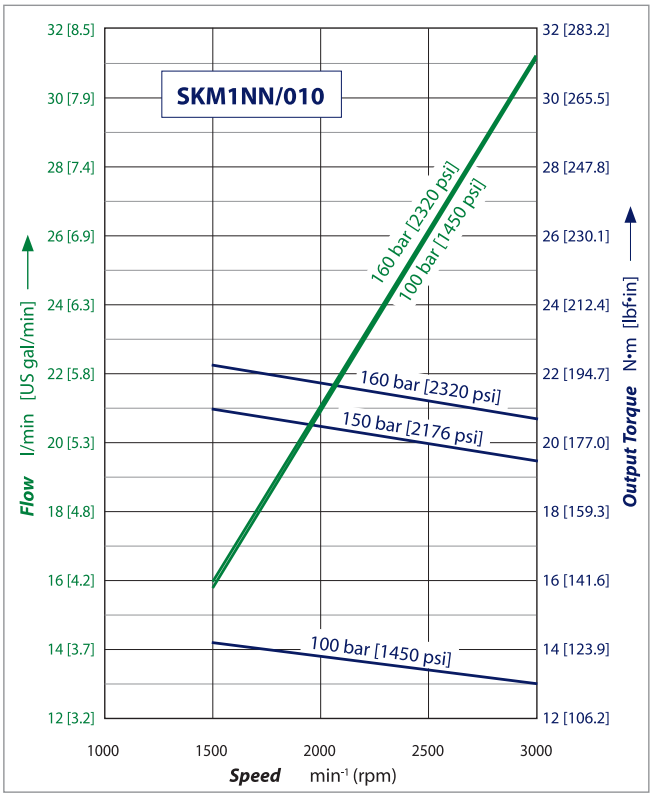
SKM1NN/6,0 motor performance graph



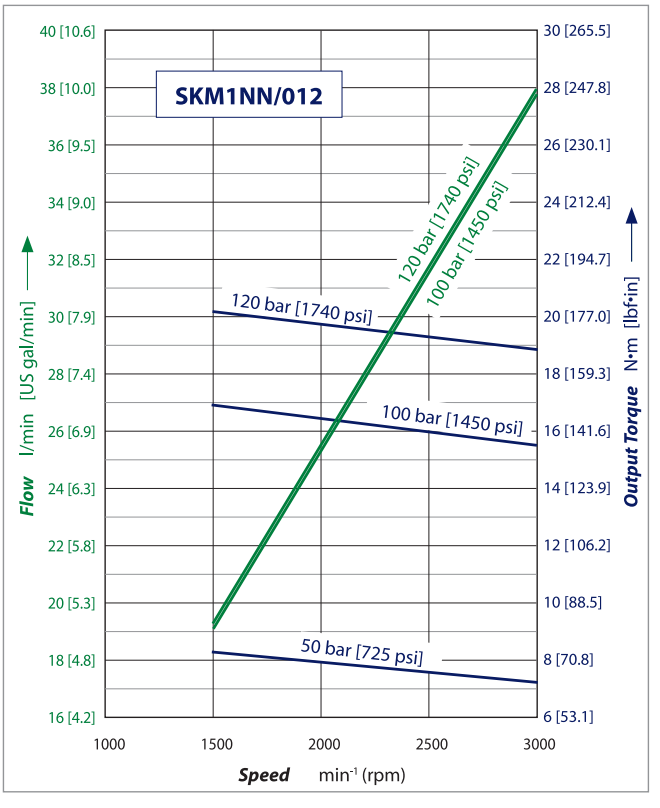
SKM1NN/7,8 motor performance graph



SKM1NN/010 motor performance graph

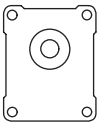
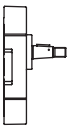
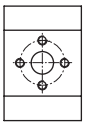
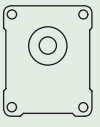
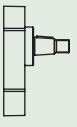
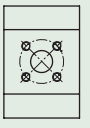
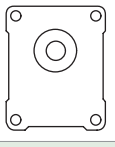
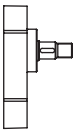
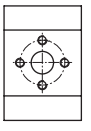
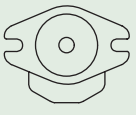
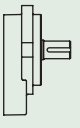
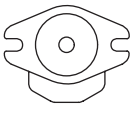
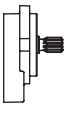
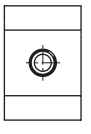


SKM1NN/012 motor performance graph

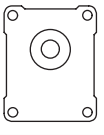
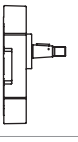
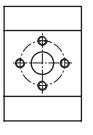


Flange, shaft and port configurations

Flange, shaft and port configurations for SKM1NN and SKU1NN motors

Code	Flange		Shaft		Port	
01BA	European 01, 4-bolts pilot Ø 25.4 mm [1.0 in]		Taper 1:8		European in **+** pattern	
02BB	European 02, 4-bolts pilot Ø 30 mm [1.181]		Taper 1:8		German standard in **X** pattern	
02FA	European 02, 4-bolts pilot Ø 30 mm [1.181]		Parallel 12 mm [0.472 in]		European in **+** pattern	
06GA	SAE A-A 2-bolts		Parallel 12.7 mm [0.5 in]		Threaded SAE O-ring boss	
06SA	SAE A-A 2-bolts		SAE A-A 9-teeth splined		Threaded SAE O-ring boss	

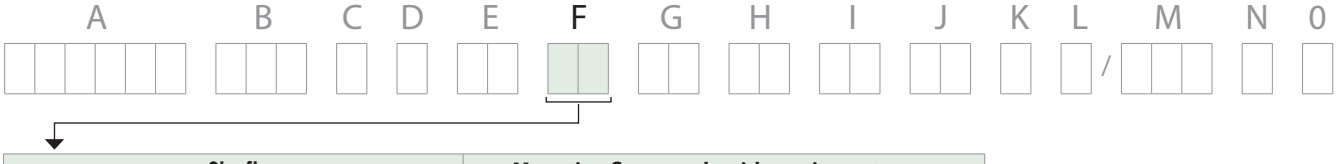
Flange, shaft and port configuration for SNU1NN motor

Code	Flange		Shaft		Port	
01BA	European 01, 4-bolts pilot Ø 25.4 mm [1.0 in]		Taper 1:8		European in **+** pattern	

Shaft options

Group 1 motors are available with a variety of 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		
Code	**Description**	**01**	**02**	**06**
BA	Taper 1:8	25 [221]	-	-
BB	Taper 1:8	-	50 [442]	-
DB	Splined Z15-m0,75-alfa 30°-L14	-	35 [309]	-
DC	Splined B12x9-L14-Z6-m1,60	30 [265]	-	-
FA	Parallel 12 mm [0.47 in]	-	24 [212]	-
GA	Parallel 12.7 mm [0.50 in]	-	-	32 [283]
SA	SAE spline J 498-9T-20/40DP	-	-	34 [301]
SG	SAE spline J498-8T-16/32 (version 6 only)	-	-	34 [301]

Recommended mating splines for Group 1 splined output shafts should be in accordance with SAE J498 or DIN 5482. Turolla external SAE splines are flat root side fit with circular tooth thickness reduced by 0.127 mm [0.005 in] in respect to class 1 fit. The external DIN splines have an offset increased by 0.1 mm [0.004 in]. These dimensions are modified in order to assure a clearance fit with the mating spline.

Other shaft options may exist. Contact your Turolla representative for availability.

Caution

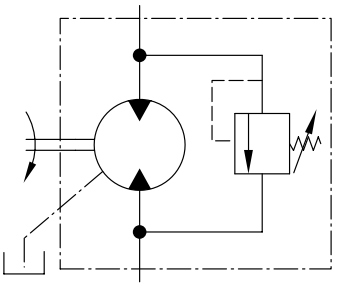
Shaft torque capability may limit allowable pressure. Torque ratings assume no external radial loading. Applied torque must not exceed these limits, regardless of stated pressure parameters. Maximum torque ratings are based on shaft torsional fatigue strength.

Integral relief valve – SKM1IN

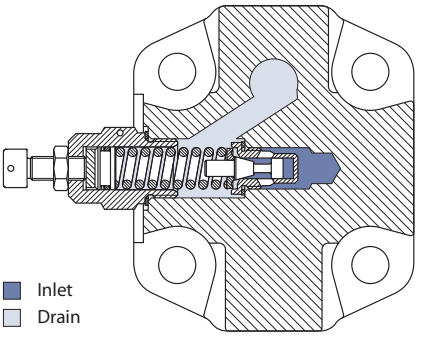
Turolla offers an optional **integral relief valve** integrated in the Group 1 motors rear cover. It is drained internally and directs all the flow from the motor inlet to the outlet when the inlet pressure reaches the valve setting.

The tables below show applicable variant codes for ordering motors with integral relief valve. Refer to Model Code, page 18 for more information.

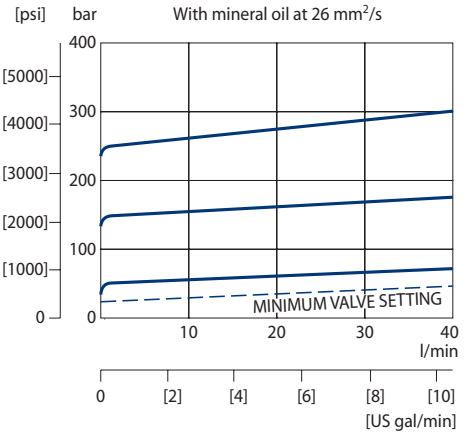
Valve schematic diagram



Integral relief valve rear cover cross section



Pressure vs flow



Variant codes for ordering integral relief valve

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

M Variant code (left part)

Code	*Motor speed for RV setting min⁻¹ (rpm)*
A	not defined
C	500
E	1000
F	1250
G	1500
K	2000
I	2250
L	2500
M	2800
N	3000
O	3250

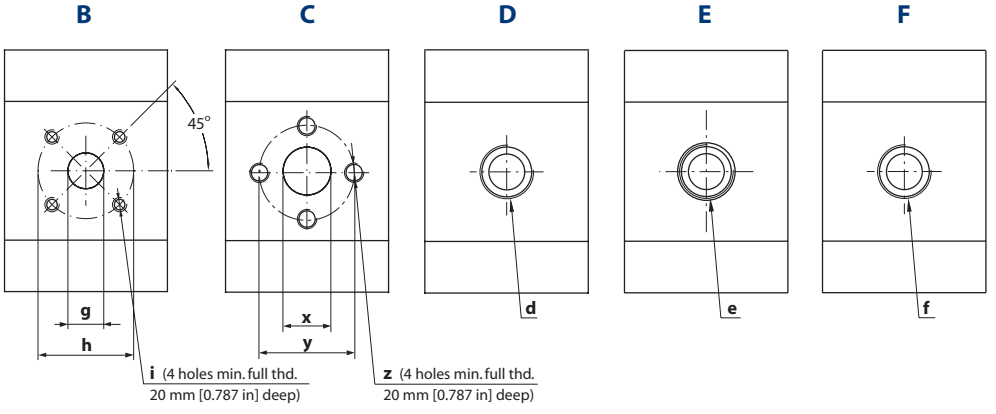
M Variant code (right part)

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]
J	150 [2175]
K	50 [725]
L	60 [870]
M	70 [1015]
N	80 [1160]

Code	*Pressure setting bar [psi]*
O	90 [1305]
P	100 [1450]
Q	110 [1595]
R	120 [1740]
S	130 [1885]
T	140 [2030]
U	160 [2321]
V	170 [2466]
W	180 [2611]
X	210 [3046]
Z	250 [3626]

Ports dimensions

Available ports for Group 1 motors



Bidirectional motor ports

SKM1NN bidirectional motor ports dimensions (all frame sizes)

Port type	B			C			D	E	F
Port dimensions	g	h	i	x	y	z	d	e	f
Inlet/Outlet	13 [0.512]	30 [1.181]	M6	12 [0.472]	26 [1.024]	M5	M18x1.5	¾–16UNF–2B	⅜ Gas (BSPP)
Drain	M12x1.5			M12x1.5			M12x1.5	7/16–20UNF–2B	⅛ Gas (BSPP)

Unidirectional motor ports

SNU1NN, SKU1NN unidirectional motor ports dimensions

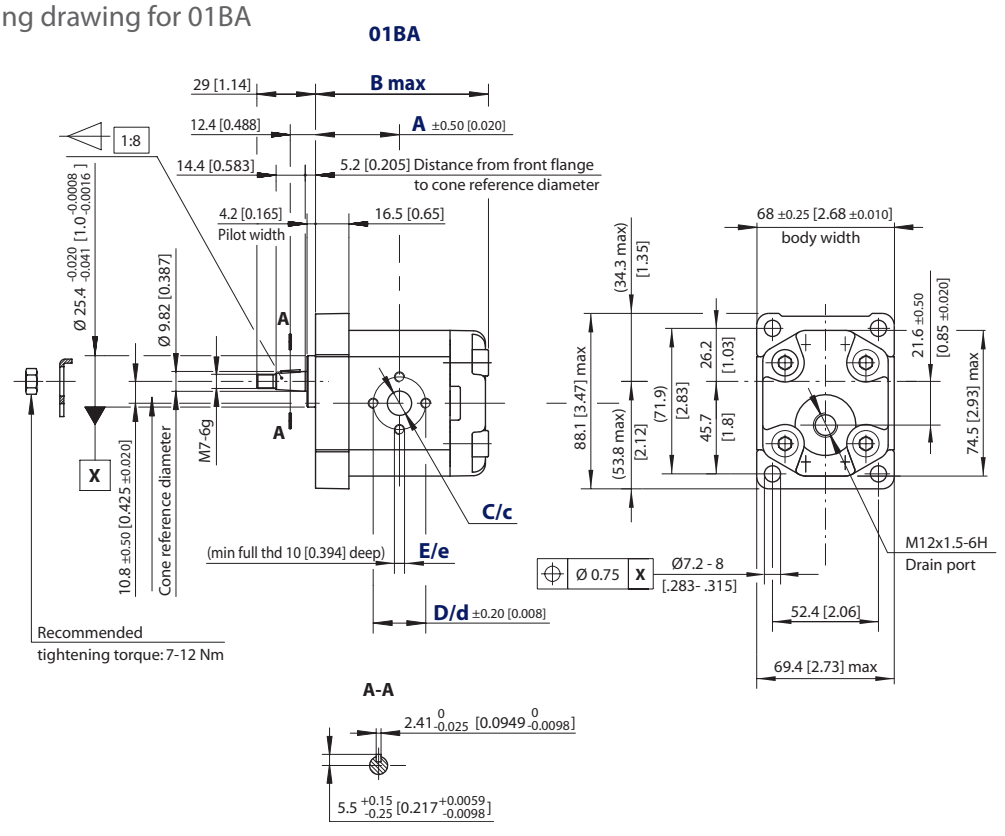
Port type			B			C			D	E	F
Port dimensions			g	h	i	x	y	z	d	e	f
Frame size	2,6	Inlet	8 [0.315]	30 [1.181]	M6	12 [0.472]	26 [1.024]	M5	M14x1.5	9/16–18UNF–2B	⅜ Gas (BSPP)
		Outlet	13 [0.512]						M18x1.5	¾–16UNF–2B	
	3,2	Inlet	8 [0.315]						M14x1.5	9/16–18UNF–2B	
		Outlet	13 [0.512]						M18x1.5	¾–16UNF–2B	
	3,8	Inlet	8 [0.315]						M14x1.5	9/16–18UNF–2B	
		Outlet	13 [0.512]						M18x1.5	¾–16UNF–2B	
	4,3	Inlet	8 [0.315]						M14x1.5	9/16–18UNF–2B	
		Outlet	13 [0.512]						M18x1.5	¾–16UNF–2B	
	6,0	Inlet	13 [0.512]						M18x1.5	9/16–18UNF–2B	
		Outlet	13 [0.512]						M18x1.5	¾–16UNF–2B	
	7,8	Inlet	13 [0.512]						M18x1.5	9/16–18UNF–2B	
		Outlet	13 [0.512]						M18x1.5	¾–16UNF–2B	
	010	Inlet	13 [0.512]						M18x1.5	9/16–18UNF–2B	
		Outlet	13 [0.512]						M18x1.5	¾–16UNF–2B	
	012	Inlet	13 [0.512]						M18x1.5	9/16–18UNF–2B	
		Outlet	13 [0.512]						M18x1.5	¾–16UNF–2B	

Dimensions

SKM1NN, SKU1NN, SNU1NN – 01BA

Standard porting drawing for 01BA

mm
[in]



For unidirectional motors no case drain hole into the rear cover.

SKM1NN – 01BA dimensions

Type (displacement)		2,6	3,2	3,8	4,3	6,0	7,8	010	012
Dimension	A	40.5 [1.594]	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	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							

For unidirectional SNU1NN, SKU1NN dimensions, see Ports dimensions, page 24.

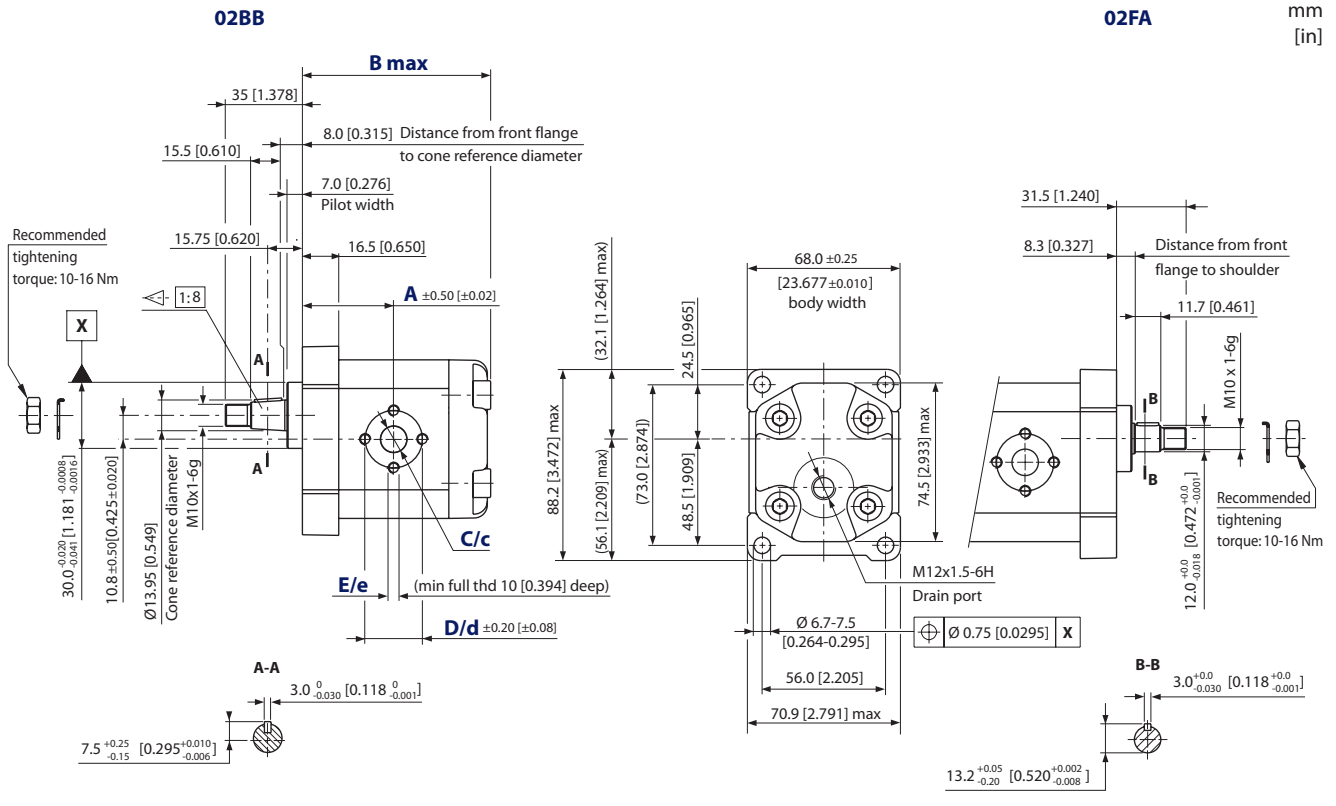
Model code examples and maximum shaft torque

Flange/drive gear	Model code example	Maximum shaft torque
01BA	SKM1NN/3,2BN01BAM1C2C2NNNN/NNNNN SKU1NN/4,3LN01BAP1C2C2NNNN/NNNNN SNU1NN/3,8RN01BAP1F3F3NNNN/NNNNN	25 N•m [221 lb•in]

For further details on ordering, see Model Code, pages 15-18.

SKM1NN, SKU1NN – 02BB, 02FA

Standard porting drawing for 02BB and 02FA



For unidirectional motors no case drain hole into the rear cover.

SKM1NN – 02BB and 02FA dimensions

Type (displacement)		2,6	3,2	3,8	4,3	6,0	7,8	010	012
Dimension	A	40.5 [1.594]	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	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							

For unidirectional SKU1NN dimensions, see Ports dimensions, page 24.

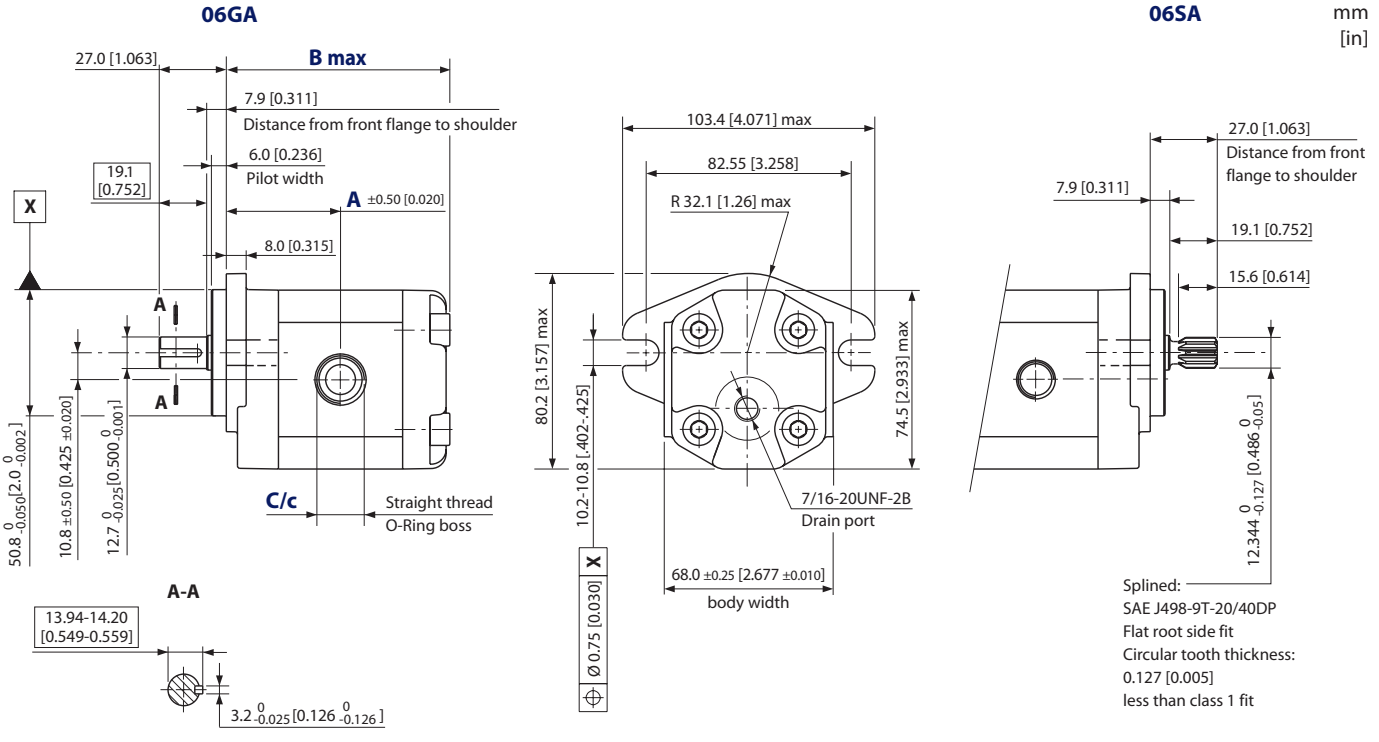
Model code examples and maximum shaft torque

Flange/drive gear	Model code example	Maximum shaft torque
02BB	SKM1NN/010BN02BBM1C2C2NNNN/NNNNN SKU1NN/6,0LN02BBM1C2C2NNNN/NNNNN	50 N•m [442 lb•in]
02FA	SKM1NN/6,0BN02FAM1C2C2NNNN/NNNNN SKU1NN/6,0LN02FAM1C2C2NNNN/NNNNN	24 N•m [212 lb•in]

For further details on ordering, see Model Code, pages 15-18.

SKM1NN, SKU1NN – 06GA and 06SA

Standard porting drawing for 06GA and 06SA



For unidirectional motors no case drain hole into the rear cover.

SKM1NN – 06GA and 06SA dimensions

Type (displacement)		2,6	3,2	3,8	4,3	6,0	7,8	010	012
Dimension	A	45 [1.771]	46 [1.811]	47 [1.850]	48 [1.889]	51.25 [2.017]	54.5 [2.145]	59 [2.322]	63.5 [2.500]
	B	89.5 [3.523]	91.5 [3.602]	93.5 [3.681]	95.5 [3.759]	102 [4.015]	108.5 [4.271]	117.5 [4.625]	125.5 [4.940]
Inlet/Outlet	C/c	¾–16UNF–2B, THD 14.3 [0.563] deep							

For unidirectional SKU1NN dimensions, see Ports dimensions, page 24.

Model code examples and maximum shaft torque

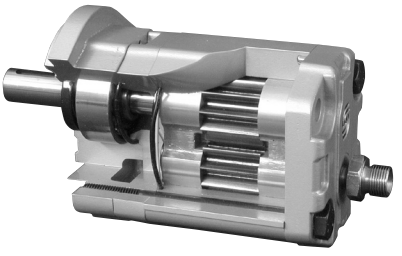
Flange/drive gear	Model code example	Maximum shaft torque
06GA	SKM1NN/6,0BN06GAM6E4E4NNNN/NNNNN SKU1NN/4,3RN06GAP1E3E4NNNN/NNNNN	32 N•m [283 lb•in]
06SA	SKM1NN/012BN06SAM6E4E4NNNN/NNNNN SKU1NN/3,2LN06SAP1E3E4NNNN/NNNNN	34 N•m [301 lb•in]

For further details on ordering, see Model Code, pages 15-18.

GROUP 2 GEAR MOTORS

Motor Design

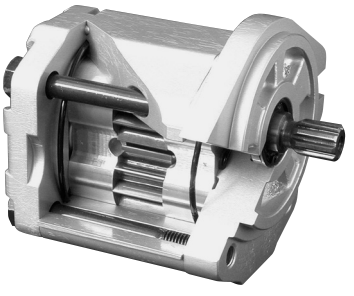
SNM2NN 9JDB (cut-away)



SNM2NN

SNM2NN is the group 2 bidirectional motor available in the whole displacements range from 6 up to 25 cm^3/rev [from 0.37 up to 1.538 in^3/rev].
Configurations include European and SAE flanges and shafts (Code 01BA, 01FA, 01DA, 02AA, 02DB, 03CA, 04AA/05AA, 04DB/05DB, 06GA, 06SA).

SNU2NN 06SA (cut away)



SNU2NN

SNU2NN is the group 2 unidirectional motor available in the displacements range from 8 up to 25 cm^3/rev [from 0.513 up to 1.538 in^3/rev]. The SNU2NN motor construction is derived from the correspondent pump SNP2NN.
Configurations include European and SAE flanges and shafts (Code 01BA, 01FA, 01DA, 02AA, 02DB, 03CA, 04AA/05AA, 04DB/05DB, 06GA, 06SA).

SKU2NN

SKU2NN is the Group 2 unidirectional motor available in the displacements range from 8 up to 25 cm^3/rev [from 0.513 up to 1.538 in^3/rev]. The SKU2NN motor construction is derived from the correspondent pump SKP2NN. Configuration includes SAE flange and shaft only (Code 06SA).

Technical data

The table below details the technical data for Group 2 gear motors based on the model and displacement configuration.

Technical data for Group 2 gear motors

		Frame size							
		6,0*	**8,0**	**011**	**014**	**017**	**019**	**022**	**025**
Displacement	cm^3/rev [in^3/rev]	6.0 [0.36]	8.4 [0.513]	10.8 [0.659]	14.4 [0.879]	16.8 [1.025]	19.2 [1.171]	22.8 [1.391]	25.2 [1.538]
SNM2NN (bidirectional motor)									
Peak pressure	bar [psi]	280 [4060]	280 [4060]	280 [4060]	280 [4060]	260 [3770]	230 [3335]	200 [2900]	180 [2610]
Rated pressure	bar [psi]	250 [3625]	250 [3625]	250 [3625]	250 [3625]	230 [3335]	210 [3045]	180 [2610]	160 [2320]
Outlet back pressure	bar [psi]	250 [3625]	250 [3625]	250 [3625]	250 [3625]	230 [3335]	210 [3045]	180 [2610]	160 [2320]
Minimum speed	min^{-1} (rpm)	700	700	700	700	500	500	500	500
Maximum speed	min^{-1} (rpm)	4000	4000	4000	4000	4000	3500	3500	3500
SNU2NN (unidirectional motor)									
Peak pressure	bar [psi]	–	280 [4060]	280 [4060]	280 [4060]	260 [3770]	230 [3335]	200 [2900]	180 [2610]
Rated pressure	bar [psi]	–	250 [3625]	250 [3625]	250 [3625]	230 [3335]	210 [3045]	180 [2610]	160 [2320]
Minimum speed	min^{-1} (rpm)	–	600	600	600	500	500	500	500
Maximum speed	min^{-1} (rpm)	–	3500	3500	3500	3000	3000	3000	2500
SKU2NN (unidirectional motor)									
Peak pressure	bar [psi]	–	280 [4060]	280 [4060]	280 [4060]	260 [3770]	230 [3335]	200 [2900]	175 [2815]
Rated pressure	bar [psi]	–	250 [3625]	250 [3625]	250 [3625]	230 [3335]	210 [3045]	180 [2610]	160 [2320]
Minimum speed	min^{-1} (rpm)	–	600	600	600	500	500	500	500
Maximum speed	min^{-1} (rpm)	–	3500	3500	3500	3000	3000	3000	2500
All (SNM2NN, SNU2NN, SKU2NN)									
Weight	kg [lb]	2.4 [5.3]	2.5 [5.5]	2.7 [5.5]	2.9 [6.3]	3.0 [6.5]	3.1 [6.7]	3.2 [7.0]	3.3 [7.3]
Moment of inertia of rotating components	x 10^{-6} $kg•m^2$ [x 10^{-6} $lb•ft^2$]	26.5 [629]	32.4 [769]	38.4 [911]	47.3 [1122]	53.3 [1265]	59.2 [1405]	68.1 [1616]	74.1 [1758]
Theoretical flow at maximum speed	l/min [US gal/min]	24 [6.3]	33.6 [8.9]	43.2 [11.4]	50.4 [13.3]	50.4 [13.3]	57.6 [15.2]	68.4 [18.0]	75.6 [20.0]

1 $kg•m^2$ = 23.68 $lb•ft^2$

* Before chosing this frame size, please apply to Turolla technical department.

Caution

The rated and peak pressure mentioned are for motors with flanged ports only. When threaded ports are required a de-rated performance has to be considered. To verify the compliance of an high pressure application with a threaded ports pump apply to a Turolla representative.

Product Code
Model Code

A						B		C	D	E		F		G		H		I		J		K	L		M			N	0
																								/					

A Family

SEM2DN	Low Cost Gr2 Bidir.Motor-int.drain
SEM2NL	Low Cost Gr2 Bidirec.Motor-vert.drain
SEM2NN	Low Cost Gr2 Bidirec.Motor
SHM2GL	Hi.Press.Gr2 Bid.Mot.+Antic.Check Val-Vert.drain
SHM2IN	Hi.Press.Gr2 Bidir.Motor+Int.drain RV
SHM2NL	Hi.Press.Gr2 Bidirec.Motor-Vert.drain
SHM2NN	Hi.Press. Gr2 Bidirec.Motor
SHU2GN	Hi.Press. Gr2 Unidir.Motor+Anticav.Check valve
SHU2NN	High Press. Gr2 Unidir.Motor
SKU2NN	Big shaft GR2 Unidir.Motor
SNM2DN	Gr2 Bidir.Motor-Int.Drain
SNM2FL	Gr2 Bidir.Motor+Break.Valve-Vert.drain-Special
SNM2FN	Gr2 Bidir.Motor+Break.Valve-Special
SNM2GC	Gr2 Bidir.Motor+Anticav.Check Val.-Ax.drain
SNM2GL	Gr2 Bidir.Motor-Anticav.Check Val.-vert.drain
SNM2GN	Gr2 Bidir.Motor-Anticav.Check Valve
SNM2IL	Gr2 Bidir.Motor+Int.drain RV-Vert.drain

SNM2IN	Gr2 Bidir.Motor+Int.drain RV
SNM2JN	Gr2 Bid.Motor+Int.drain RV+Anticav.Check Valve
SNM2NC	Gr2 Bidir.Motor-Cover Ports-Ax.drain
SNM2NL	Gr2 Bidir.Motor-Vert.drain
SNM2NN	Gr2 Bidir.Motor
SNM2SN	Gr2 Bidir.Motor+by-pass electric valve-Special
SNU2EN	Gr2 Unidir.Motor+Ext.drain RV
SNU2GN	Gr2 Unidir.Motor+Anticav.Check Valve
SNU2GC	Gr2 Unidir.Motor-In./Out. on Cover+Anticav.Check Valve
SNU2IN	Gr2 Unidir.Motor+Int.drain RV
SNU2JN	Gr2 Unidir.Motor+Int.drain RV+Anticav.Check Valve
SNU2NC	Gr2 Unidir.Motor-In.-Out.on cover
SNU2NN	Gr2 Unidir.Motor
SNU2QN	Gr2 Unid.Motor-Ext.drain RV+Anticav.Check Valve
SNU2TN	Gr2 Unidir.Motor-Break.Valve as Anticav.Valve-Special

B Displacement

5,5	5,5 cc -Special
6,0	6,0 cc -Special
8,0	8,4 cc
9,0	9,0 cc -Special
9,5	9,5 cc -Special

011	10,8 cc
012	12,0 cc -Special
014	14,4 cc
017	16,8 cc
019	19,2 cc

021	21,0 cc -Special
022	22,8 cc
025	25,2 cc

A B C D E F G H I J K L / M N 0

C Rotation

B	Bidirectional
L	Unidirectional Left hand
R	Unidirectional Right hand

D Project version (value representing a change to the initial project)

N	Std Version of Project
2	Std Big-Shaft - Special Unbalanced
4	Precharged seal on cover-Special heavy-duty applications
6	Short version - Special

E Mounting flange

01	pilot Ø36,5+4 holes
02	pilot Ø80+4 holes
03	pilot Ø52+O-ring+4 holes through body
04	pilot Ø50+2 holes through body
05	pilot Ø50+2 holes through body
06	SAE A pilot Ø82,55+2 holes
B2	pilot Ø80+4 holes+special shaft seal slot - Special
L5	pilot Ø52 spigot Diameter+O-Ring+4 holes through body - Special
Q2	pilot Ø80+4 holes+fastening holes Ø10,5mm- Special
91	Outriger Bearing Type 01+taper shaft 1:8-M12x1,25-Key4
92	Outriger Bearing Type 02+taper shaft 1:5-M12x1,25-Key3
94	Outriger Bearing Type 04+taper shaft 1:5-M12x1,25-Key3
9A	Outriger Bearing Type 01+taper shaft 1:8-M12x1,25-Key3.2
9D	Outriger Bearing Type 01+parallel shaft Ø15-Key4
9F	Outriger Bearing Type 02+taper shaft 1:5-M14x1,5-Key4+special shaft seal RZB
9G	Outriger Bearing Type 04+taper shaft 1:5-M12x1,25-Key3 + 4 M10 assembly thd holes "HELI-COIL- Special
9H	Outriger Bearing Type 06+taper shaft 1:8-M12x1,25-Key4
9J	Outriger Bearing Type 06 with parallel shaft Ø3/4 (Ø19.05 mm)
9L	Outriger Bearing Type 01 parallel shaft Ø22 pilot Ø50,8
9M	Outriger Bearing Type 01 parallel shaft Ø18 pilot Ø36,5

A B C D E F G H I J K L / M N 0

F Drive gear

AA	Taper 1:5-M12x1,25-Key 3
AC	Taper 1:5-M14x1,5-Key 4
AD	Taper 1:5-M12X1,25-Key 3-Drive - Special for Version 6
B1	Taper 1:8-M12x1,25-Key 4/6 lowered
BA	Taper 1:8-M12x1,25-Key 4
BB	Taper 1:8-M12x1,25-Key 4/3,2
BJ	Taper 1:8-M12x1,25-Key 4/3 black steel
CA	Tang 8x17,8xL6,5 FR03
CF	Tang 8x Ø17,46xL9,6-Special
DA	Spline DIN 5482 B17x14-L10
DB	Spline DIN 5482 B17x14-L14
DL	Spline DIN 5482 B17x14-L14+rear spline DIN 5482 17x14-L14 SC32…_2 - Special
EC	Spline DIN 5480 W20x1,25xz14-9g - Special
FA	Parallel Ø15-L30+Key 4x25
GA	Parallel SAE Ø15,875-L23,8-Key 4x18
GB	Parallel SAE Ø15,875-L50,8-Key 4x40
GC	Parallel SAE Ø17,46-L24,4-Key 3/16x3/16xL20 - Special
SA	Spline SAE J498-9T-16/32
SB	Spline SAE J498-11T-16/32 -Special only for Version 2
SE	Spline SAE J498-9T-16/32+M6 thd hole
SF	Spline SAE J498-9T-16/32-reinforced fillet
SG	Spline SAE J498-11T-16/32-Special only for Version 2
SI	Spline SAE J498-11T-16/32-Special only for Version 2
TC	Spline SAE 13T-20/40-Special

A B C D E F G H I J K L / M N 0

G Rear cover

C7	Cover for unidirec. motors front SAE ports: Inlet 3/4-16UNF-2B;Outlet 3/4-16UNF-2B
E1	Cover for unidirectional motors with relief valve - external drain 3/8 Gas
E6	Cover for unidirectional motors with Relief Valve ext.drain 3/4-16UNF-2B
F1	Cover motor per braking valve and drain 1/4 Gas
F6	Cover motor per braking valve and drain 9/16-18UNF-2B
G1	Cover motor front ports:Inlet 1/2 G;Outlet 1/2 G;Drain 1/4 G
G6	Cover motor front ports:Inlet 7/8-14UNF;Outlet 7/8-14UNF;Drain 9/16-18UNF
I1	Cover for unidirectional motors with RV
J1	Cover motor per braking valve with drain in vertical axis 1/4 G
J6	Cover motor per braking valve with side drain in vertical axis 9/16-18UNF-2B
L1	Cover motor-drain in vertical axis 1/4 Gas
L3	Cover motor-drain in vertical axis 1/4 Gas for flange typo 03
L6	Cover motor-drain in vertical axis 9/16-18UNF-2B
L7	Cover motor-drain at 22° left 7/16-20UNF-2B
L8	Cover motor-drain in horizontal axis 9/16-18UNF-2B drain left
LC	Cover motor-drain in horizontal axis 1/4 Gas right side
LD	Cover motor-drain in horizontal axis 1/4 Gas left side
LE	Cover motor-drain in horizontal axis M12x1,25 ISO 6149
LF	Cover motor-drain in horizontal axis M12x1,5 right side
LH	Cover motor-drain in horizontal axis 9/16-18UNF-2B drain right
LS	Cover motor-drain at 22° left 7/16-20UNF-2B drive gear side
LT	Cover motor-drain in vertical axis 1/4 Gas for flange typo 03 drive gear side
LX	Cover motor-drain in vertical axis 9/16-18UNF-2B drive gear side
LZ	Cover motor-drain in vertical axis 1/4 Gas drive gear side
M1	Std cover motor drain 1/4 Gas driven side
M3	Std cover motor drain 1/4 Gas for flange typo 03
M4	Std cover motor drain 9/16-18UNF-2B for flange typo 03
M6	Std cover motor drain 9/16-18UNF-2B
M7	Std cover motor-drain 1/4 Gas drive side
M8	Special intermediate motor flange tipo 01-drain 1/4 Gas - Special
P1	Std cover for unidirectional motors
P3	Std cover for unidirectional motors for flange typo 03
S1	Cover motor-Electric-piloted distributor+by-pass-drain vert.1/4 G-In-Out 1/2 G - Special
T1	Cover motor per braking valve used as anti-cavitation valve internal drain - Special
V1	Cover motor per RV with drain 1/4 Gas
V2	Cover motor per RV with drain vertical axis 1/4 Gas driven side
V6	Cover motor per RV with drain 9/16-18UNF-2B
V7	Cover motor per RV with drain vertical axis 9/16-18UNF-2B driven side

A B C D E F G H I J K L / M N 0

H Inlet size

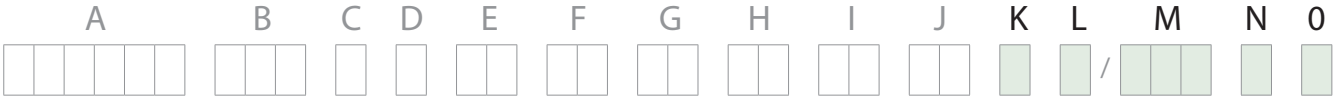
NN	Without inlet
B3	13,5x30xM6 in X
B5	15x35xM6
B6	15x40xM6
B7	20x40xM6
BB	27x55xM8
C2	12x26xM5
C3	13,5x30xM6
C4	15x35xM6 DXK(+)
C5	13,5x40xM8
C6	20x40xM6 DXK(+)
C7	20x40xM8
C8	23,5x40xM8
CS	13,5x30xM6 (2 holes)
CV	20x40xM8 (2 holes at 30°)
CX	20x40xM8 (2 holes)
CY	20x40xM8 (3 holes)
D4	M16x1,5
D5	M18x1,5
D7	M22x1,5
D9	M26x1,5
E3	9/16-18UNF
E4	3/4-16UNF
E5	7/8-14UNF
E6	1-1/16-12UN
E8	1-5/16-12UN

I Outlet size

F3	3/8 GAS
F4	1/2 GAS
F5	3/4 GAS
F6	1 GAS
H5	M18x1,5-ISO6149
H7	M22x1,5-ISO6149
H8	M27x2-ISO6149
H9	M33x2-ISO6149
M1	12x17,48x38,1xM6
M2	12x17,48x38,1xM8
M3	18,5x17,48x38,1xM8
M5	25/20x52,37x26,19xM10
MB	12x38,1x17,48xM8(=)
MC	18,5x47,63x22,23xM6(=)
MD	18,5x47,63x22,23xM8(=)
ME	18,5x47,63x22,23xM10(=)
MG	25/20x52,37x26,19xM10(=)
MH	31/25x58,72x30,18xM10(=)

J Ports Pos & Spec Body

NN	Std from catalogue
YY	Port Bx-Bx with flange SAE-A;off-set to rear cover
EU	Dist. from front flange=58,5 - Special
F9	Dist. from front flange=69 - Special
PL	Inlet port Left position looking gear drive from front flange
PR	Inlet port Right position looking gear drive from front flange
TD	Nr.4 milling D.27 tigh.16 flange side - Special
TE	Nr.4 milling D.27 tigh.20 flange side - Special
ZZ	Port Bx-Bx in the center of the body - Option



K Seals

N	Standard NBR seals
B	VITON seals (only for unidirectional motors)
D	VITON shaft seal with dust lip (type BABSL)
F	VITON seals except for shaft seal - Special
X	NBR seals+Dust Cover
Y	VITON seals + Dust Cover
Z	VITON shaft seal + Dust Cover

L Screws

N	Std burnished screws
A	Zinc plated screws
C	Galvanized nuts - Special

M Set valves

NNN	No valve
V**	not defined-pressure no setting :oil ISO VG68-45°

N Type of mark

N	Standard Turolla Marking
A	Standard Turolla Marking+Customer Code-Special
Z	Without Marking

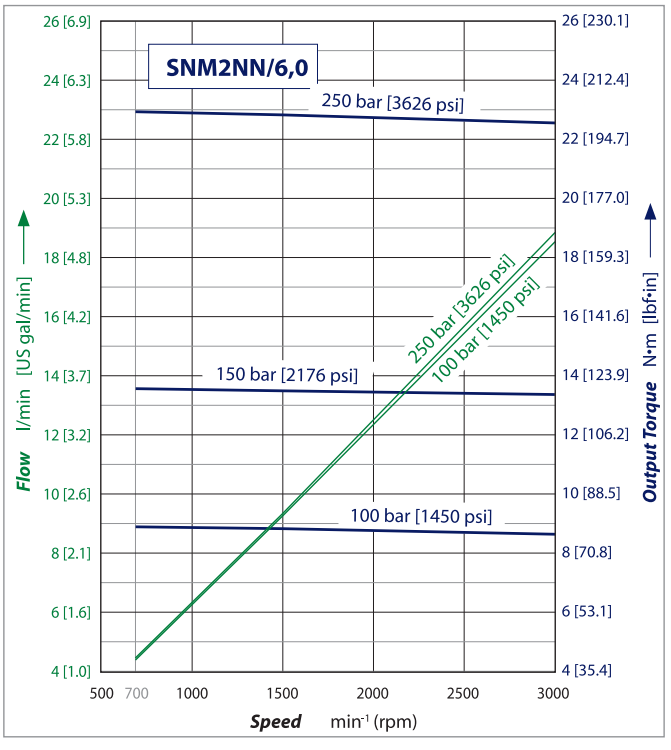
O Mark position

N	Std Marking position (on top)
A	Special Marking position on the bottom

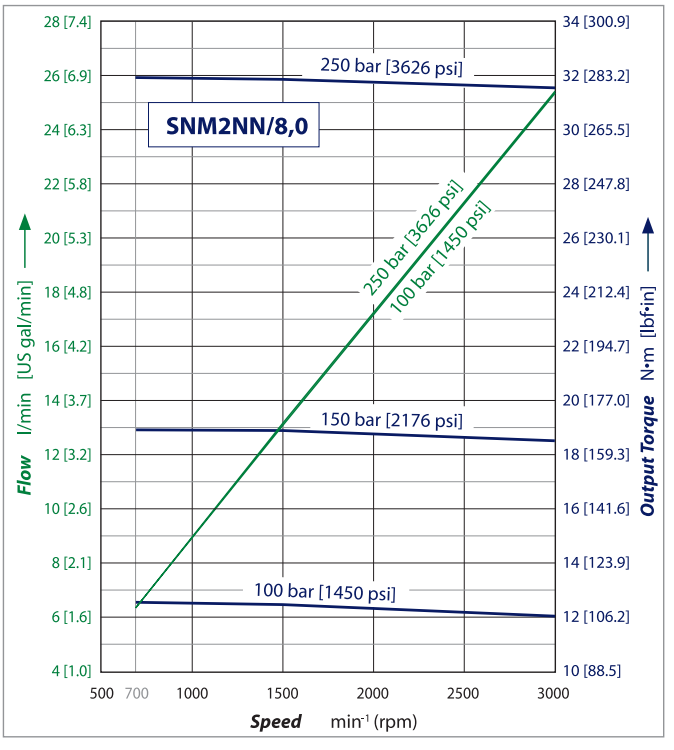
Motor performance graphs

The graphs on the next few pages provide typical output flow and input power for Group 2 motors at various working pressures. Data were taken using ISO VG46 petroleum /mineral based fluid at 50 °C [122 °F] (viscosity = 28 mm²/s [132 SUS]).

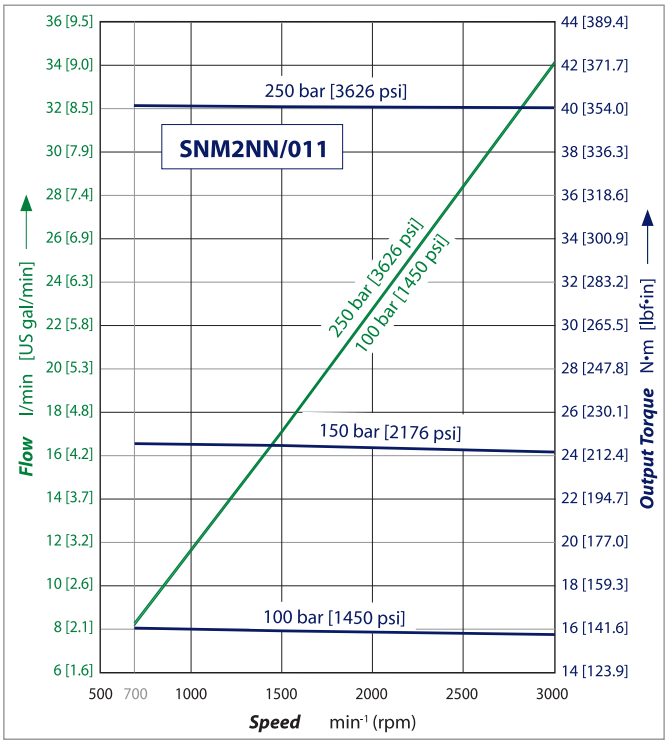
SNM2NN/6,0 motor performance graph



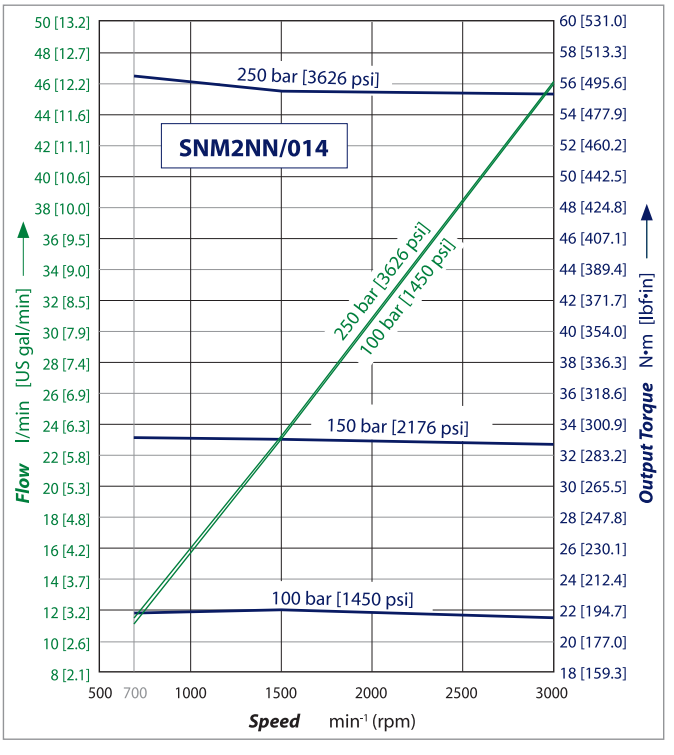
SNM2NN/8,0 motor performance graph



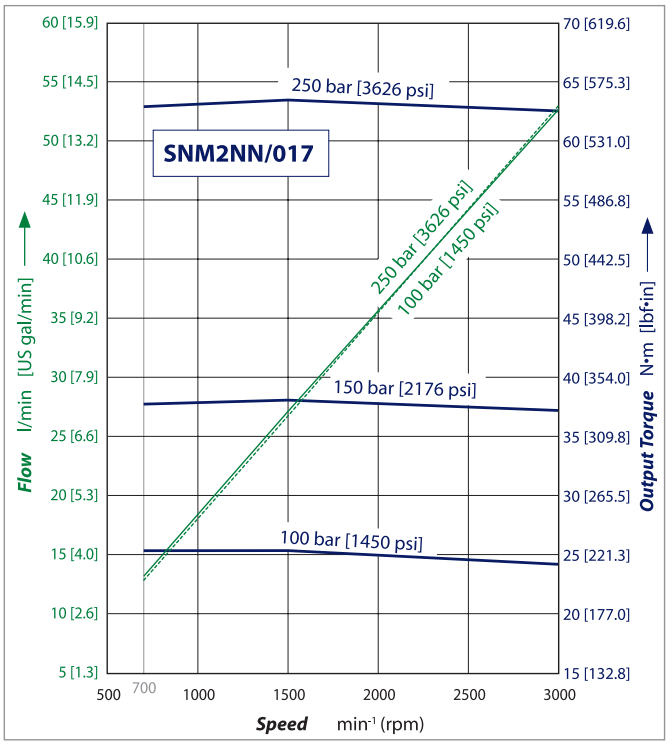
SNM2NN/011 motor performance graph



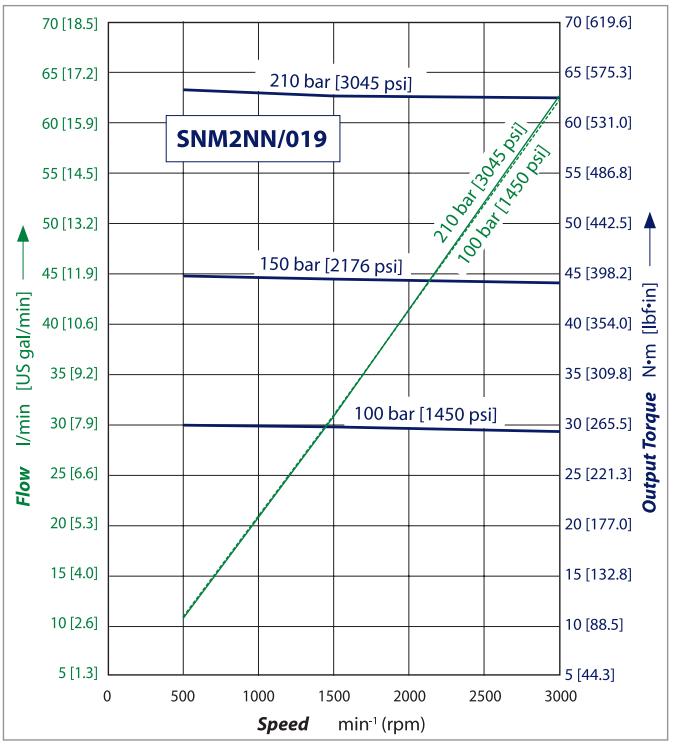
SNM2NN/014 motor performance graph



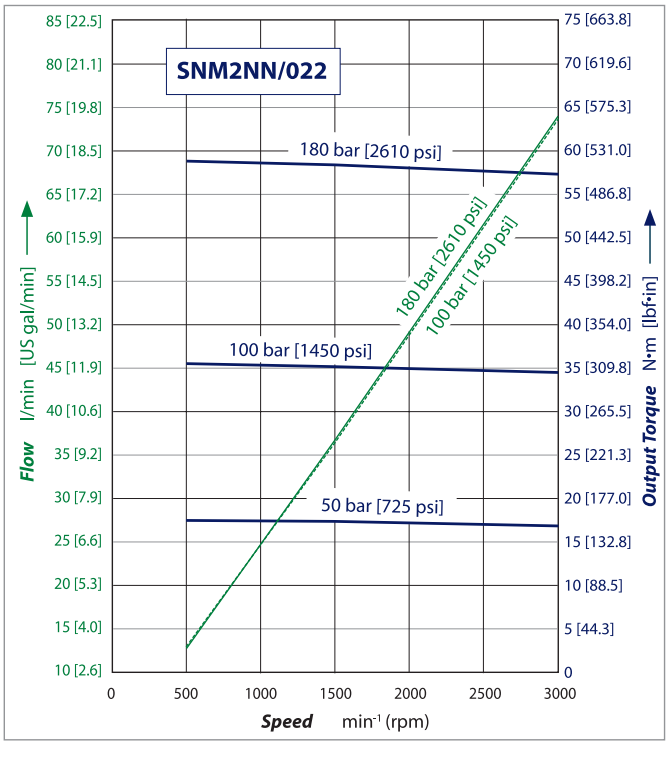
SNM2NN/017 motor performance graph



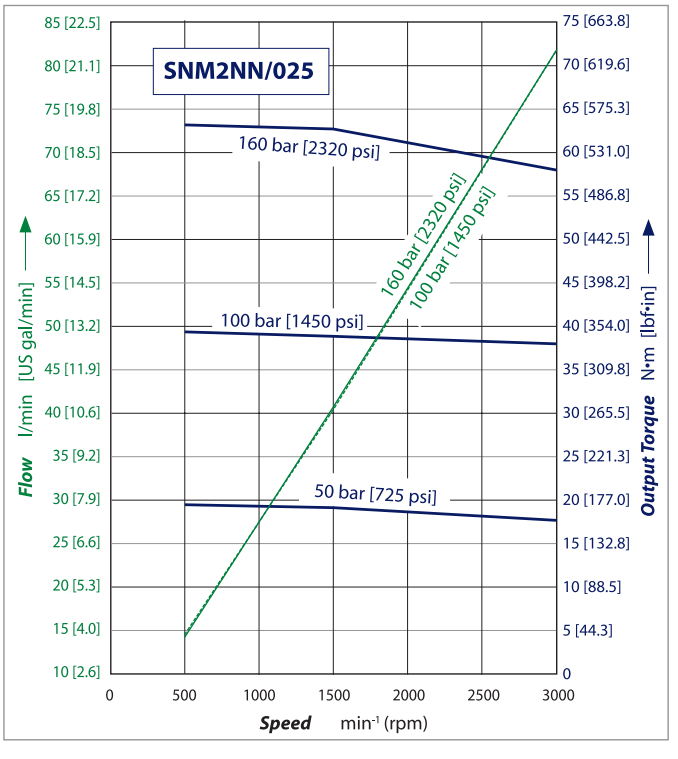
SNM2NN/019 motor performance graph



SNM2NN/022 motor performance graph

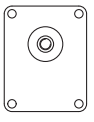
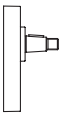
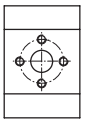
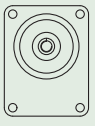
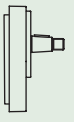
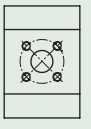
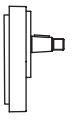
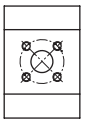
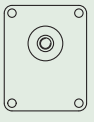
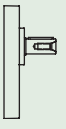
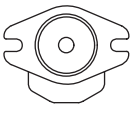
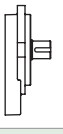
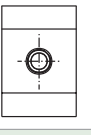
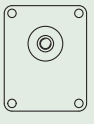
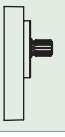
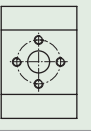
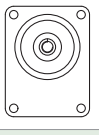
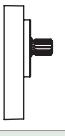
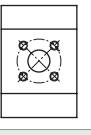
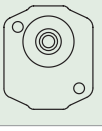
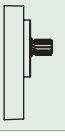
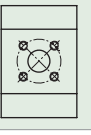
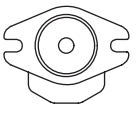
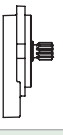
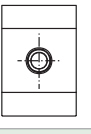
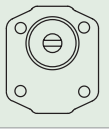
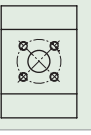


SNM2NN/025 motor performance graph



Flange, shaft and port configurations

Flange, shaft and port configurations for SNM2NN and SNU2NN motors

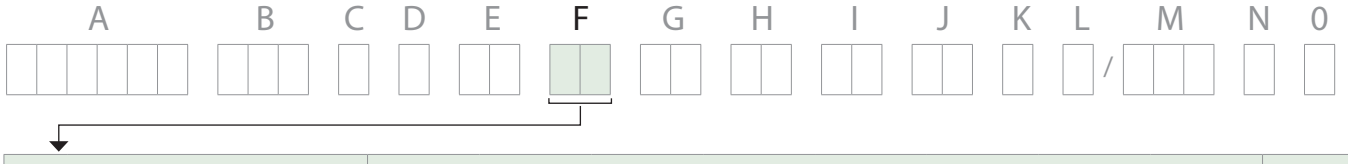
Code	Flange		Shaft		Port	
01BA	European 01, 4-bolts pilot Ø 36.5 mm [1.44 in]		1:8 tapered		European in **+** pattern	
02AA	European 02, 4-bolts pilot Ø 80 mm [3.15 in]		1:5 tapered		German standard in **X** pattern	
04AA/ **05AA**	German PTO 2-bolts pilot Ø 50 mm [1.97 in]		1:5 tapered		German standard in **X** pattern	
01FA	European 01, 4-bolts pilot Ø 36.5 mm [1.44 in]		Ø 15 mm [0.59 in] parallel		European in **+** pattern	
06GA	SAE A pilot Ø 82.55 mm [3.25 in]		Ø 15.7 mm [0.625 in] parallel		Threaded SAE O-ring boss port	
01DA	European 01, 4-bolts pilot Ø 36.5 mm [1.44 in]		9-teeth splined m = 1.60, α = 30° DIN 5482-B17x14		European in **+** pattern	
02DB	European 02, 4-bolts pilot Ø 80 mm [3.15 in]		9-teeth splined m = 1.60, α = 30° DIN 5482-B17x14		German standard in **X** pattern	
04DB/ **05DB**	German PTO 2-bolts pilot Ø 50 mm [1.97 in]		9-teeth splined m = 1.60, α = 30° DIN 5482-B17x14		German standard in **X** pattern	
06SA	SAE A pilot Ø 82.55 mm [3.25 in]		SAE 9-teeth splined		Threaded SAE O-ring boss port	
03CA	Turolla tang pilot Ø 52 mm [2.066 in]		Turolla standard tang		German standard in **X** pattern	

Shaft options

Group 2 motors are available with a variety of splined, parallel, and tapered shaft ends. Not all shaft styles are available with all flange styles.

Valid combinations and nominal torque ratings are shown in the table below. Torque ratings assume no external radial loading. Applied torque must not exceed these limits regardless of pressure parameters stated earlier. Maximum torque ratings are based on shaft torsional fatigue strength.

Shaft availability and nominal torque capability



Shaft		Mounting flange code with maximum torque in N•m [lb•in]								
Code	Description	01	02	B2	Q2	03	04	05	L5	06
AA	Taper 1:5-M12x1,25-Key 3		140 [1239]	140 [1239]			140 [1239]	140 [1239]		
AC	Taper 1:5-M14x1,5-Key 4				140 [1239]					
AD	Taper 1:5-M12X1,25-Key 3-Drive (Version 6 only)		140 [1239]					140 [1239]	140 [1239]	
B1	Taper 1:8-M12x1,25-Key 4/6 lowered	150 [1328]								
BA	Taper 1:8-M12x1,25-Key 4	150 [1328]					150 [1328]	150 [1328]		150 [1328]
BB	Taper 1:8-M12x1,25-Key 4/3,2	150 [1328]								150 [1328]
BJ	Taper 1:8-M12x1,25-Key 4/3 black steel							150 [1328]		
CA	Tang 8x17,8xL6,5 FR03					70 [620]				
CF	Tang 8x Ø17,46xL9,6-Special									
DA	Spline DIN 5482 B17x14-L10	90 [797]								
DB	Spline DIN 5482 B17x14-L14		130 [1151]	130 [1151]			130 [1151]	130 [1151]		
FA	Parallel Ø15-L30+Key 4x25	90 [797]								
GA	Parallel SAE Ø15,875-L23,8-Key 4x18									80 [708]
GB	Parallel SAE Ø15,875-L50,8-Key 4x40									80 [708]
SA	Spline SAE J498-9T-16/32									75 [646]
SB	Spline SAE J498-11T-16/32 (Version 2 only)									150 [1328]
SE	Spline SAE J498-9T-16/32+M6 thd hole									75 [646]
SF	Spline SAE J498-9T-16/32-reinforced fillet									90 [797]
SG	Spline SAE J498-11T-16/32 (Version 2 only)									150 [1328]
SI	Spline SAE J498-11T-16/32 (Version 2 only)									150 [1328]

Recommended mating splines for Group 2 splined output shafts should be in accordance with SAE J498 or DIN 5482. Turolla external SAE splines are flat root side fit with circular tooth thickness reduced by 0.127 mm [0.005 in] in respect to class 1 fit. The external DIN splines have an offset increased by 0.1 mm [0.004 in.] These dimensions are modified in order to assure a clearance fit with the mating spline.

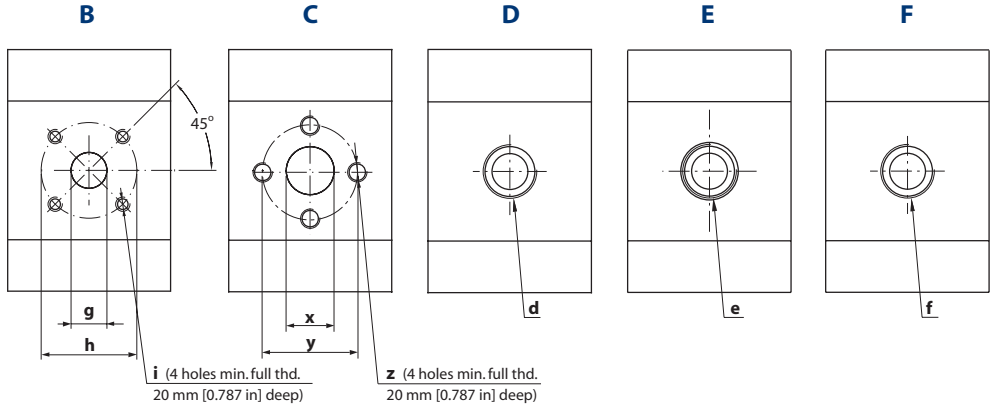
Other shaft options may exist. Contact your Turolla representative for availability.

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 dimensions

Available ports for Group 2 motors



Bidirectional motor ports dimensions

SNM2NN bidirectional motors and SNM2GN, SNM2JN, SNM2IN motors made unidirectional only by the valve

Port type			B			C			D	E	F
Port dimensions			g	h	i	x	y	z	d	e	f
Frame size	6,0	Inlet/Outlet	15 [0.59]	35 [1.38]	M6	13.5 [0.53]	30 [1.18]	M6	M22x1.5	7/8–14UNF–2B	½ Gas (BSPP)
	8,0	Inlet/Outlet	15 [0.59]	35 [1.38]	M6	13.5 [0.53]	30 [1.18]	M6	M22x1.5	7/8–14UNF–2B	½ Gas (BSPP)
	011	Inlet/Outlet	15 [0.59]	35 [1.38]	M6	13.5 [0.53]	30 [1.18]	M6	M22x1.5	7/8–14UNF–2B	½ Gas (BSPP)
	014	Inlet/Outlet	15 [0.59]	35 [1.38]	M6	20 [0.79]	40 [1.58]	M8	M22x1.5	7/8–14UNF–2B	½ Gas (BSPP)
	017	Inlet/Outlet	15 [0.59]	35 [1.38]	M6	20 [0.79]	40 [1.58]	M8	M22x1.5	7/8–14UNF–2B	½ Gas (BSPP)
	019	Inlet/Outlet	20 [0.79]	40 [1.58]	M6	20 [0.79]	40 [1.58]	M8	M26x1.5	1-1/16–12UNF–2B	¾ Gas (BSPP)
	022	Inlet/Outlet	20 [0.79]	40 [1.58]	M6	20 [0.79]	40 [1.58]	M8	M26x1.5	1-1/16–12UNF–2B	¾ Gas (BSPP)
	025	Inlet/Outlet	20 [0.79]	40 [1.58]	M6	23.5 [0.92]	40 [1.58]	M8	M26x1.5	1-1/16–12UNF–2B	¾ Gas (BSPP)
Drain			¼ Gas (BSPP)							9/16–18UNF–2B	¼ Gas (BSPP)

Unidirectional motor ports dimensions

SNU2NN and SKU2NN ports dimensions

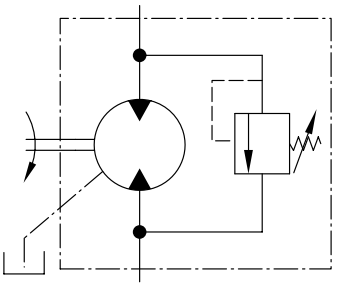
Port type			B			C			D	E	F
Port dimensions			g	h	i	x	y	z	d	e	f
Frame size	8,0	Inlet	15 [0.59]	35 [1.38]	M6	13.5 [0.53]	30 [1.18]	M6	M18x1.5	1-1/16–12UNF–2B	½ Gas (BSPP)
		Outlet	20 [0.79]	40 [1.58]	M6	13.5 [0.53]	30 [1.18]	M6	M16x1.5	7/8–14UNF–2B	½ Gas (BSPP)
	011	Inlet	15 [0.591]	35 [1.38]	M6	13.5 [0.53]	30 [1.18]	M6	M18x1.5	1-1/16–12UNF–2B	¾ Gas (BSPP)
		Outlet	20 [0.79]	40 [1.58]	M6	13.5 [0.53]	30 [1.18]	M6	M16x1.5	7/8–14UNF–2B	½ Gas (BSPP)
	014	Inlet	15 [0.59]	35 [1.38]	M6	13.5 [0.53]	30 [1.18]	M6	M18x1.5	1-1/16–12UNF–2B	¾ Gas (BSPP)
		Outlet	20 [0.79]	40 [1.58]	M6	20 [0.79]	40 [1.58]	M8	M16x1.5	7/8–14UNF–2B	½ Gas (BSPP)
	017	Inlet	15 [0.59]	35 [1.38]	M6	13.5 [0.53]	30 [1.18]	M6	M18x1.5	1-1/16–12UNF–2B	¾ Gas (BSPP)
		Outlet	20 [0.79]	40 [1.58]	M6	20 [0.79]	40 [1.58]	M8	M18x1.5	7/8–14UNF–2B	½ Gas (BSPP)
	019	Inlet	15 [0.59]	35 [1.38]	M6	13.5 [0.53]	30 [1.18]	M6	M18x1.5	1-1/16–12UNF–2B	¾ Gas (BSPP)
		Outlet	20 [0.79]	40 [1.58]	M6	20 [0.79]	40 [1.58]	M8	M18x1.5	7/8–14UNF–2B	½ Gas (BSPP)
	022	Inlet	15 [0.59]	35 [1.38]	M6	13.5 [0.53]	30 [1.18]	M6	M18x1.5	1-1/16–12UNF–2B	¾ Gas (BSPP)
		Outlet	20 [0.79]	40 [1.58]	M6	20 [0.79]	40 [1.58]	M8	M18x1.5	7/8–14UNF–2B	½ Gas (BSPP)
	025	Inlet	15 [0.59]	35 [1.38]	M6	13.5 [0.53]	30 [1.18]	M6	M18x1.5	1-1/16–12UNF–2B	1 Gas (BSPP)
		Outlet	20 [0.79]	40 [1.58]	M6	20 [0.79]	40 [1.58]	M8	M18x1.5	7/8–14UNF–2B	¾ Gas (BSPP)

Integral relief valve – SNM2IN

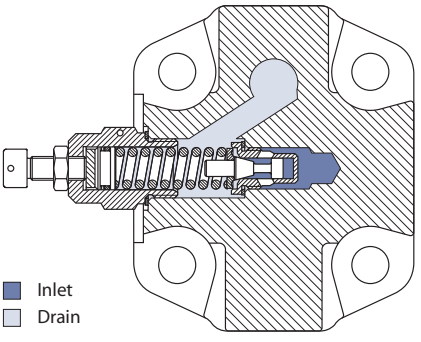
Turolla offers an optional **integral relief valve** integrated in the Group 2 motors rear cover. It is drained internally and directs all the flow from the motor inlet to the outlet when the inlet pressure reaches the valve setting.

The tables below show applicable variant codes for ordering motors with integral relief valve. Refer to Model Code, page 35 for more information.

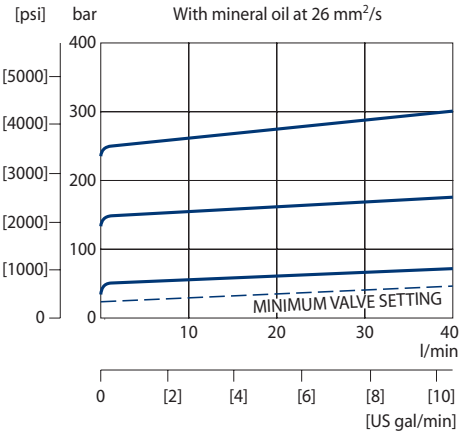
Valve schematic diagram



Integral relief valve rear cover cross section



Pressure vs flow



Variant codes for ordering integral relief valve

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

M Variant code (left part)

Code	*Motor speed for RV setting min⁻¹ (rpm)*
A	not defined
C	500
E	1000
F	1250
G	1500
K	2000
I	2250
L	2500
M	2800
N	3000
O	3250

M Variant code (right part)

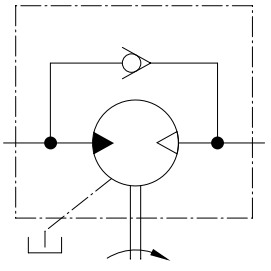
Code	*Pressure setting bar [psi]*
A	no setting
B	no valve
C	18 [261]
D	25 [363]
E	30 [435]
F	35 [508]
G	40 [580]
J	150 [2175]
K	50 [725]
L	60 [870]
M	70 [1015]
N	80 [1160]

Code	*Pressure setting bar [psi]*
O	90 [1305]
P	100 [1450]
Q	110 [1595]
R	120 [1740]
S	130 [1885]
T	140 [2030]
U	160 [2321]
V	170 [2466]
W	180 [2611]
X	210 [3046]
Z	250 [3626]

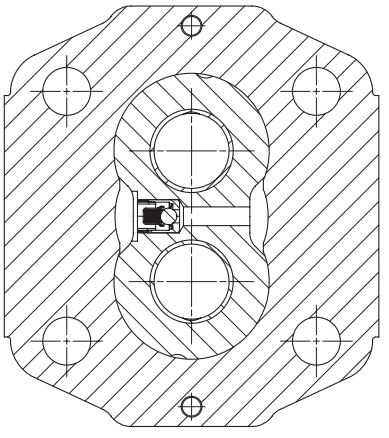
Anti-cavitation check valve – SNM2GN

Turolla offers an optional **integral anti-cavitation check valve** integrated in Group 2 motors bearing blocks. Available for all the displacements, the valve directs internally the flow from the motor outlet to the inlet, when the outlet pressure gets higher then the inlet one.

Valve schematic diagram



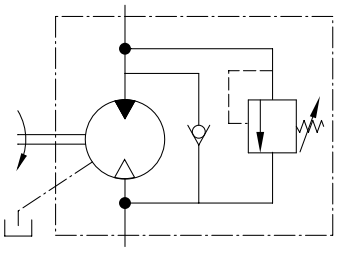
Anticavitation check valve cross section



Integral relief valve and Anti-cavitation check valve – SNM2JN

Turolla offers the Group 2 motors with an optional **integral relief valve** integrated in the rear cover and **anti-cavitation check valve** integrated in the bearing block. The integral relief valve is drained internally and directs all the flow from the motor inlet to the outlet when the inlet pressure reaches the valve setting. The anti-cavitation check valve directs internally the flow from the motor outlet to the inlet, when the outlet pressure gets higher then the inlet one.

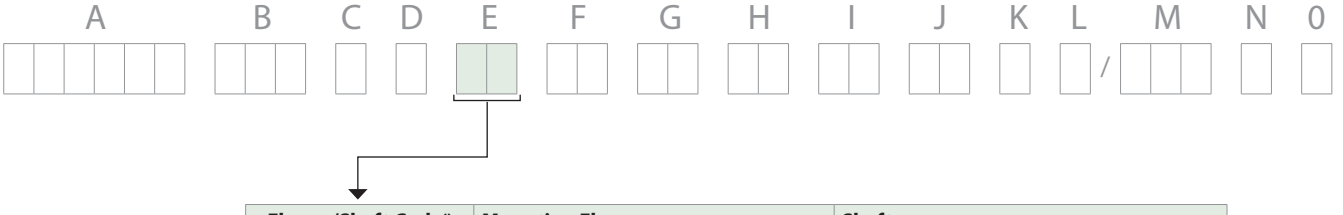
Valve schematic diagram



Outrigger bearing assembly – SNM2NN

An **outrigger bearing** is available for applications with high radial or thrust loads on the shaft. This option is used primarily for applications with high shaft loads. The design utilizes roller bearings in the front mounting flange. These bearings absorb the radial and thrust loads on the shaft so that the life of the motor is not affected. The use of roller bearings allows life to be described in B_{10} hours.

Available configurations



Flange/Shaft Code*	Mounting Flange	Shaft
9A	European 4-bolt	Taper 1:8
9F	German PTO	Taper 1:5
94	German 4-bolt	Taper 1:5
9H	SAE A	Taper 1:8
9J	SAE A	Parallel

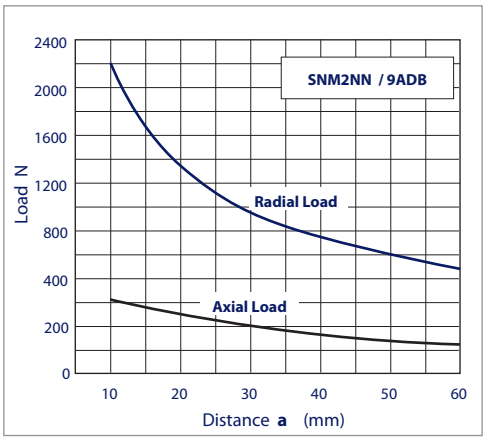
* Codes represent assembly (complete motor with outrigger bearing).

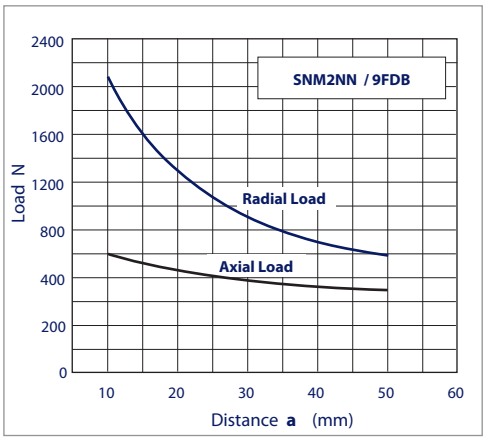
The table above shows applicable variant codes for ordering motors with outrigger bearing. Refer to Model Code, page 31 for more information.

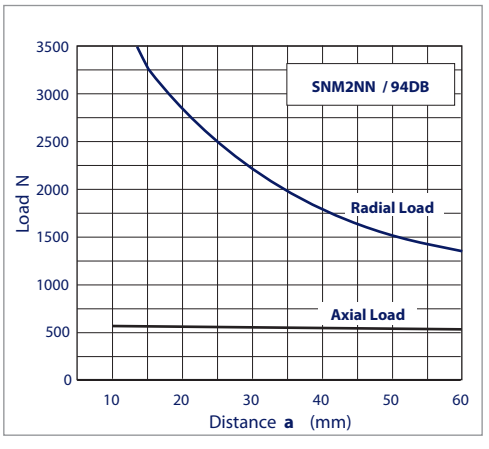
Outrigger bearing assembly – SNM2NN

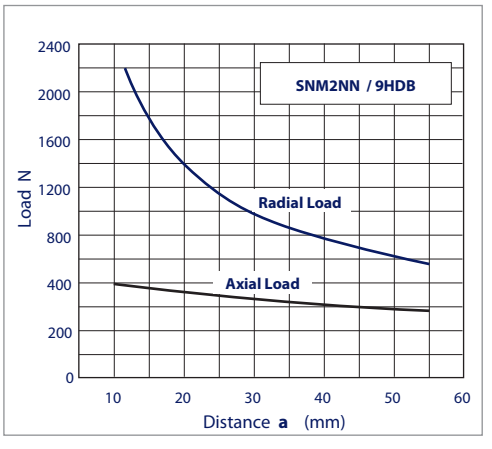
The graphs below show allowable shaft loads for 1000 hour life at 1500 min^{-1} (rpm) versus distance from flange face to center of radial load.

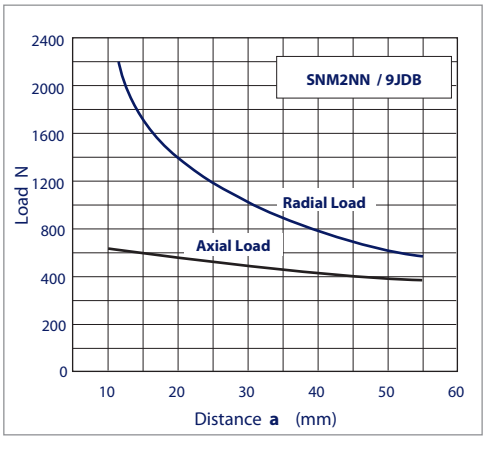
Radial load vs distance from flange

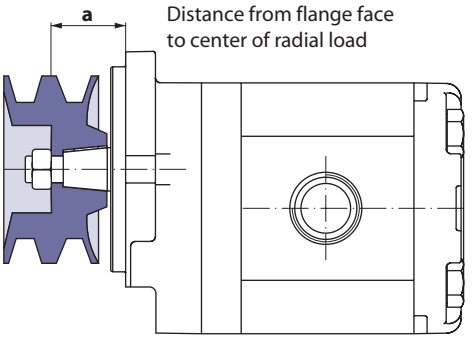






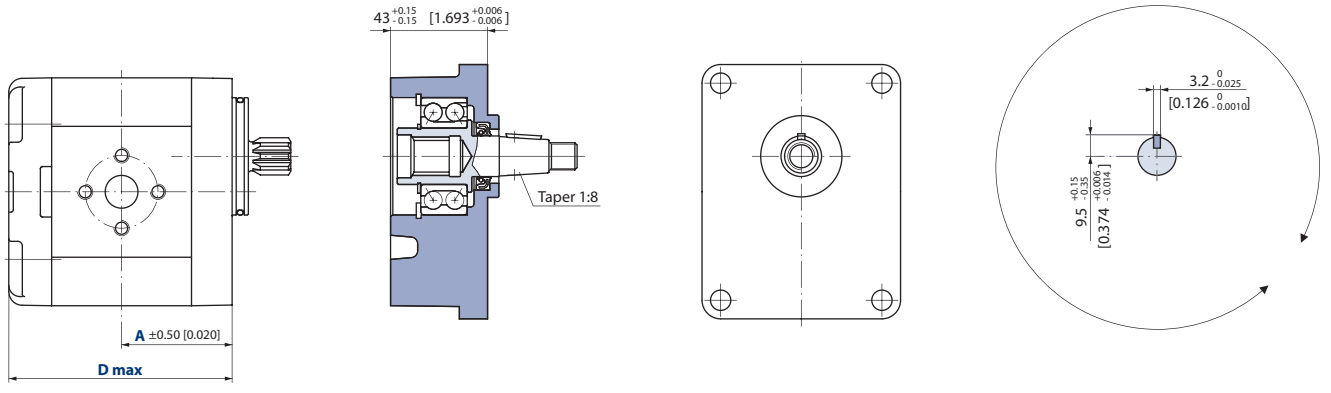




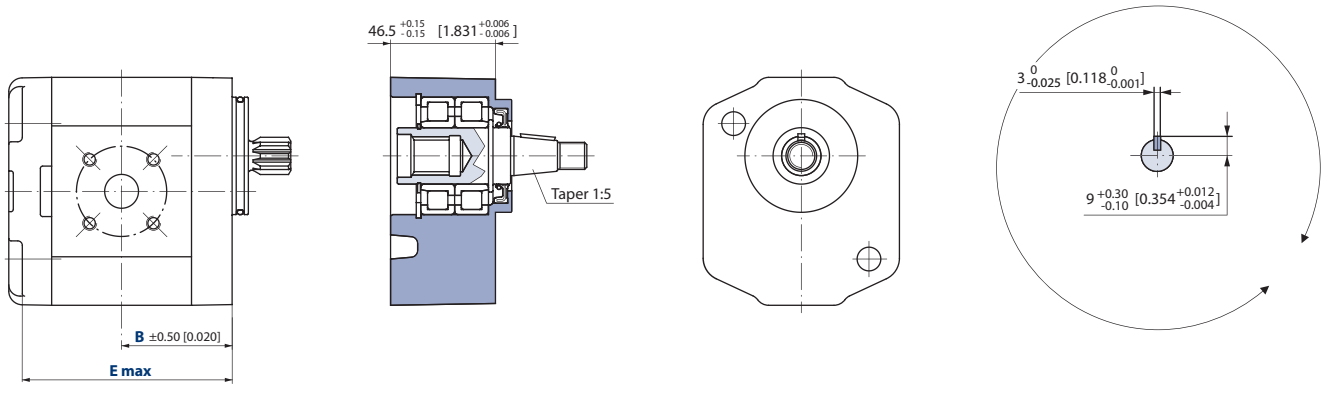


Outrigger bearing 9A

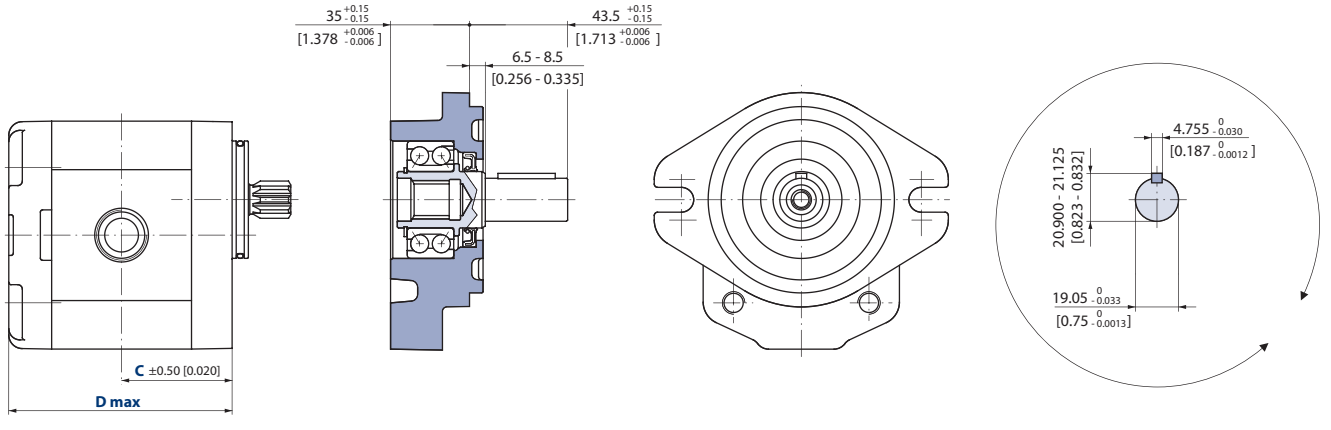
mm
[in]



Outrigger bearing 94

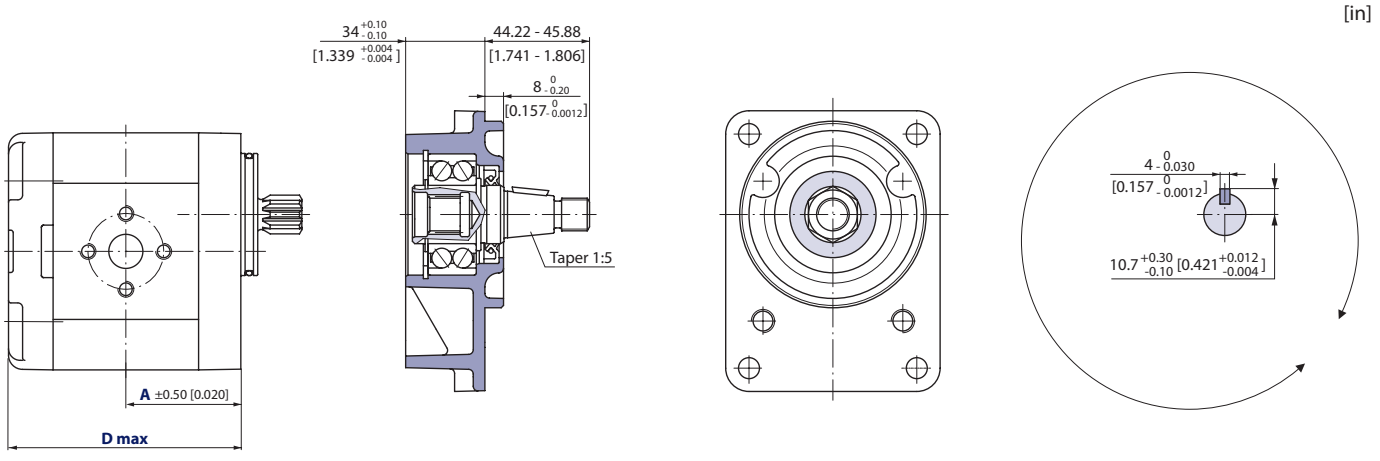


Outrigger bearing 9J

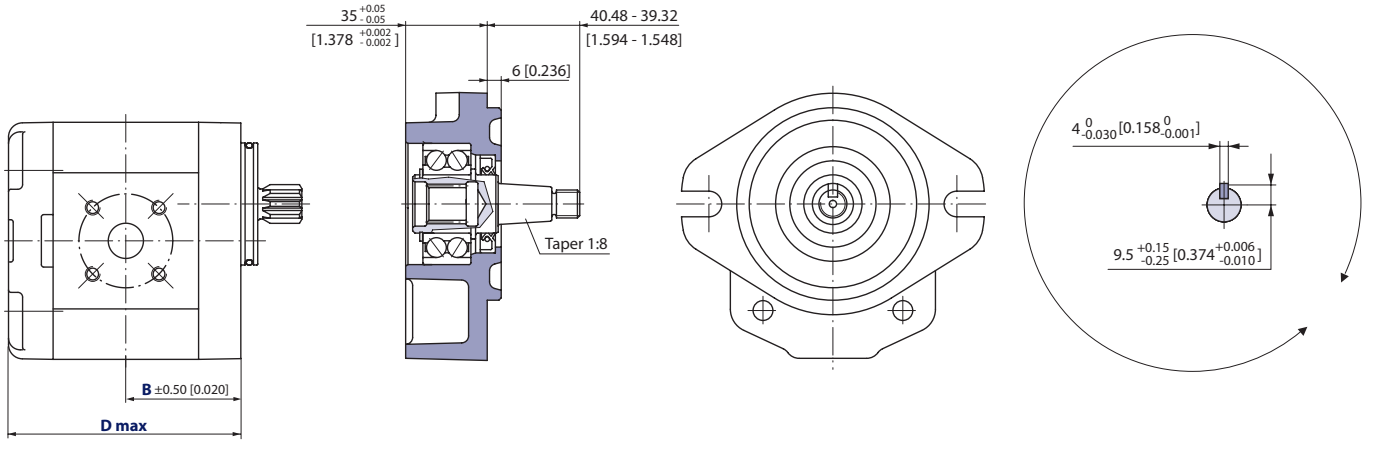


Outrigger bearing 9F

mm
[in]



Outrigger bearing 9H



Dimensions

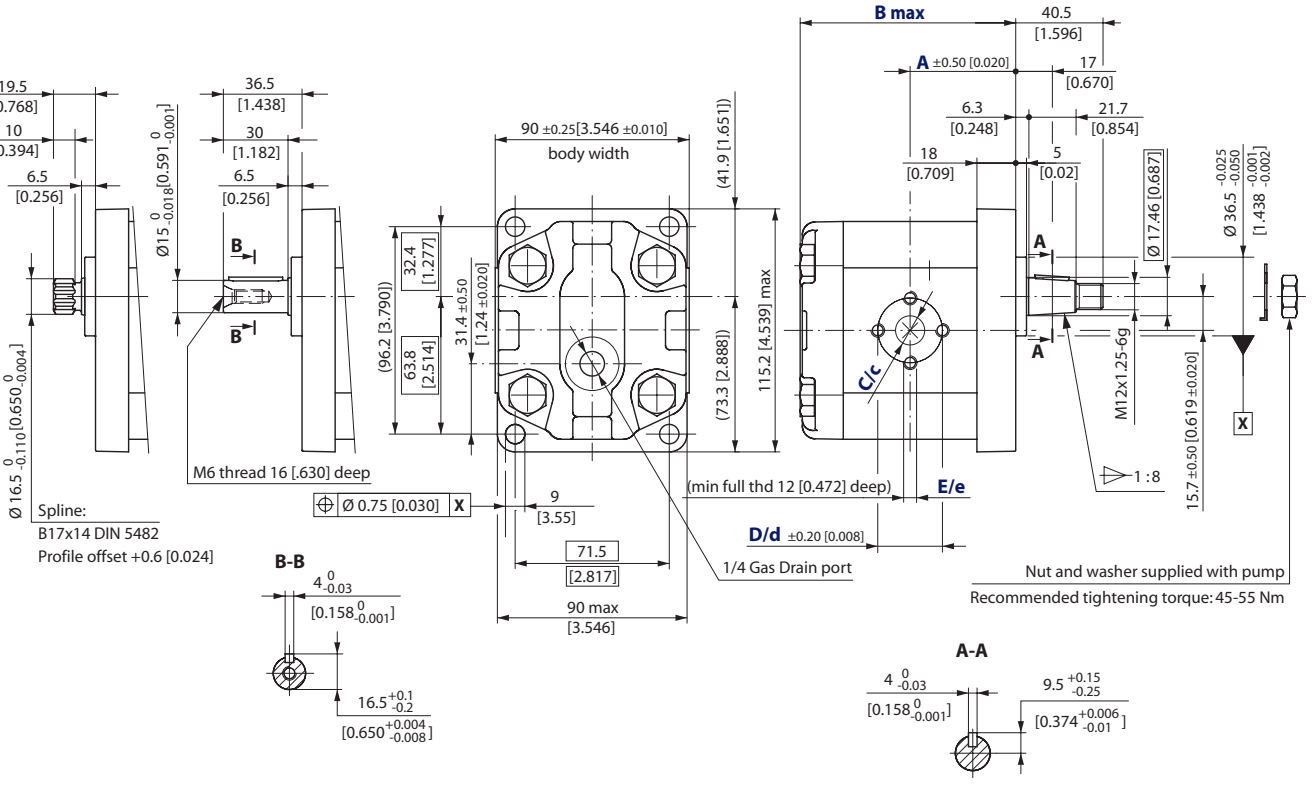
Frame size		6,0*	8,0	011	014	017	019	022	025
Dimension	A	45 [1.772]	45 [1.772]	49 [1.929]	52 [2.047]	52 [2.047]	56 [2.205]	59 [2.323]	59 [2.323]
	B	38.6 [1.520]	40.6 [1.598]	45 [1.772]	45 [1.772]	45 [1.772]	45 [1.772]	52.5 [2.067]	62 [2.441]
	C	45 [1.772]	47 [1.850]	49 [1.929]	52 [2.047]	54 [2.126]	56 [2.205]	59 [2.323]	61 [2.402]
	D	93.5 [3.681]	97.5 [3.839]	101.5 [3.996]	107.5 [4.232]	111.5 [4.390]	115.5 [4.574]	121.5 [4.783]	125.5 [4.941]
	E	85 [3.346]	89 [3.504]	93 [3.661]	99 [3.897]	103 [4.055]	107 [4.212]	113 [4.448]	117 [4.606]

Dimensions

SNM2NN, SNU2NN – 01DA, 01FA and 01BA

Standard porting drawing for 01DA, 01FA and 01BA

mm
[in]



For unidirectional motors no case drain hole into the rear cover.

Bidirectional motors dimensions – 01DA, 01FA and 01BA

Frame size		6,0*	8,0	011	014	017	019	022	025
Dimension	A	45 [1.771]		49 [1.929]	52 [2.047]		56 [2.204]	59 [2.322]	
	B	93.5 [3.681]	97.5 [3.838]	101.5 [3.996]	107.5 [4.232]	111.5 [4.389]		121.5 [4.783]	125.5 [4.940]
Inlet/Outlet	C/c	13.5 [0.531]			20 [0.787]				23.5 [0.925]
	D/d	30 [1.181]			40 [1.58]				
	E/e	M6			M8				

* Before chosing this frame size, please apply to Turolla technical department.

For unidirectional SNU2NN dimensions, see SNU2NN ports, page 40.

Model code examples and maximum shaft torque

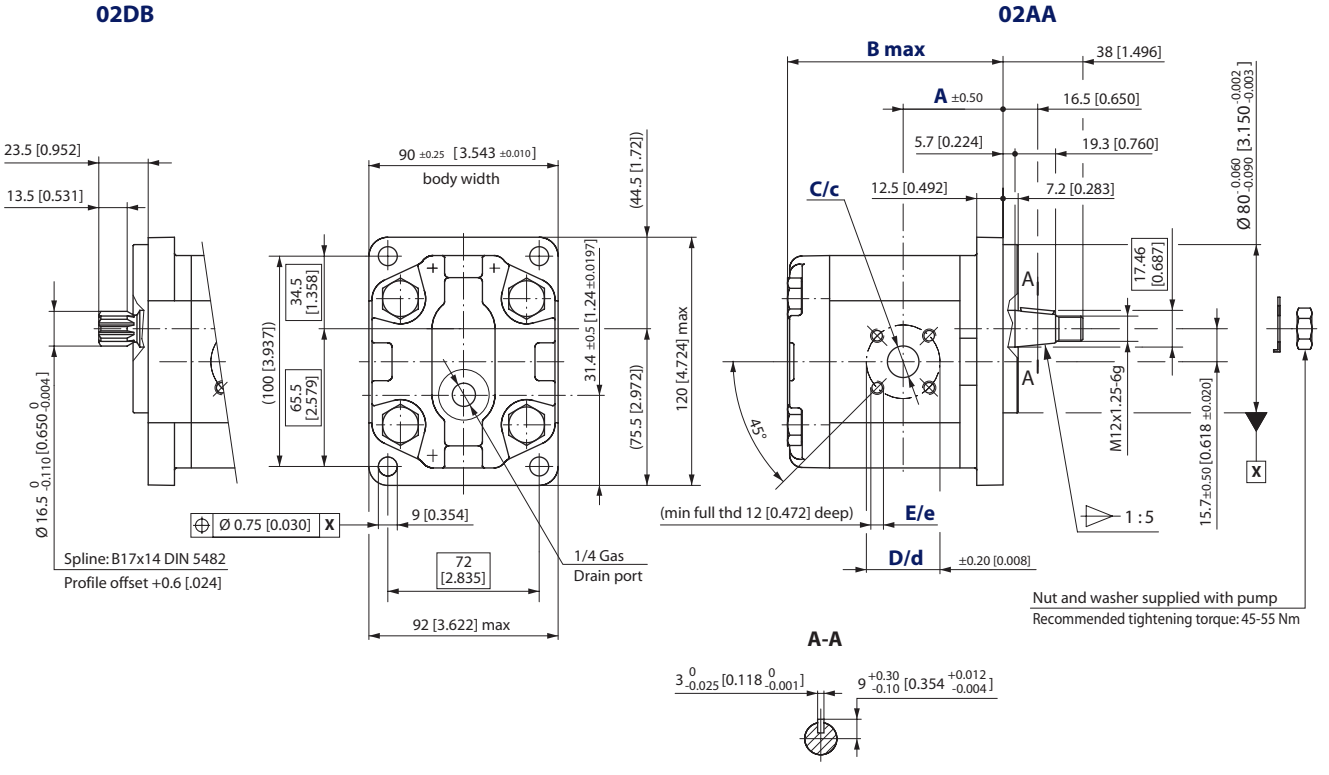
Flange/drive gear	Model code example	Maximum shaft torque
01DA	SNM2NN/8,0BN01DAM1C3C3NNNN/NNNNN	90 N•m [797 lb•in]
01FA	SNM2NN/022BN01FAM1C7C7NNNN/NNNNN	90 N•m [797 lb•in]
01BA	SNM2NN/017BN01BAM1C7C7NNNN/NNNNN	150 N•m [1328 lb•in]

For further details on ordering, see Model Code, pages 30-35.

SNM2NN, SNU2NN – 02DB and 02AA

Standard porting drawing for 02DB and 02AA

mm
[in]



For unidirectional motors no case drain hole into the rear cover.

Bidirectional motors dimensions – 02DB and 02AA

Frame size		6,0*	8,0	011	014	017	019	022	025
Dimension	A	41.1 [1.618]	43.1 [1.697]	47.5 [1.870]	47.5 [1.870]	47.5 [1.870]	47.5 [1.870]	55 [2.165]	64.5 [2.539]
	B	96 [3.780]	100 [3.937]	104 [4.094]	110 [4.331]	114 [4.488]	118 [4.646]	124 [4.882]	128 [5.039]
Inlet/Outlet	C/c	15 [0.591]					20 [0.79]		
	D/d	35 [1.38]					40 [1.58]		
	E/e	M6							

* Before chosing this frame size, please apply to Turolla technical department.

For unidirectional SNU2NN dimensions, see SNU2NN ports, page 40.

Model code examples and maximum shaft torque

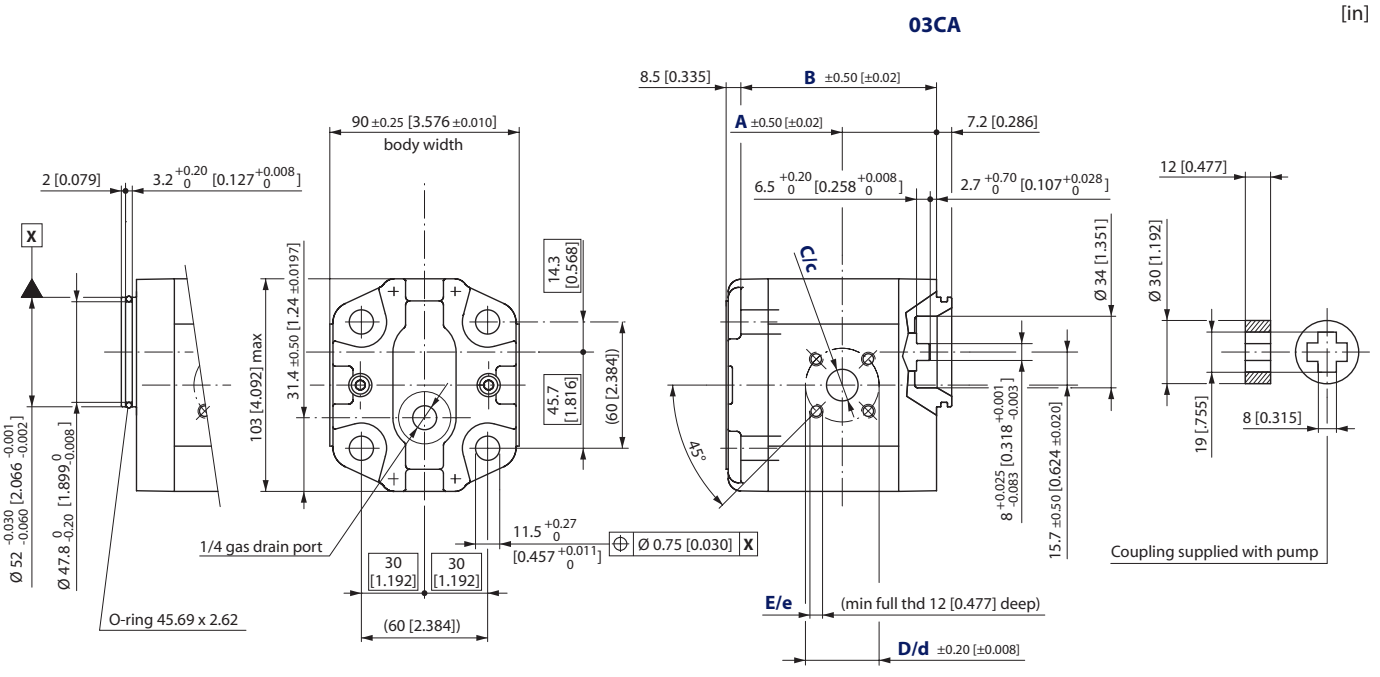
Flange/drive gear	Model code example	Maximum shaft torque
02DB	SNM2NN/025BN02DBM1B7B7NNNN/NNNNN	90 N•m [797 lb•in]
02AA	SNM2NN/8,0BN02AAM1B5B5NNNN/NNNNN	140 N•m [1239 lb•in]

For further details on ordering, see Model Code, pages 30-35.

SNM2NN, SNU2NN – 03CA

Standard porting drawing for 03CA

mm
[in]



For unidirectional motors no case drain hole into the rear cover.

Bidirectional motors dimensions – 03CA

Frame size		6,0*	8,0	011	014	017	019	022	025
Dimension	A	38.6 [1.520]	40.6 [1.598]	45 [1.772]				52.5 [2.067]	62 [2.441]
	B	85 [3.364]	89 [3.503]	93 [3.661]	99 [3.897]	103 [4.055]	107 [4.212]	113 [4.448]	117 [4.606]
Inlet/Outlet	C/c	15 [0.591]					20 [0.79]		
	D/d	35 [1.38]					40 [1.58]		
	E/e	M6							

* Before chosing this frame size, please apply to Turolla technical department.

For unidirectional SNU2NN dimensions, see SNU2NN ports, page 40.

Model code examples and maximum shaft torque

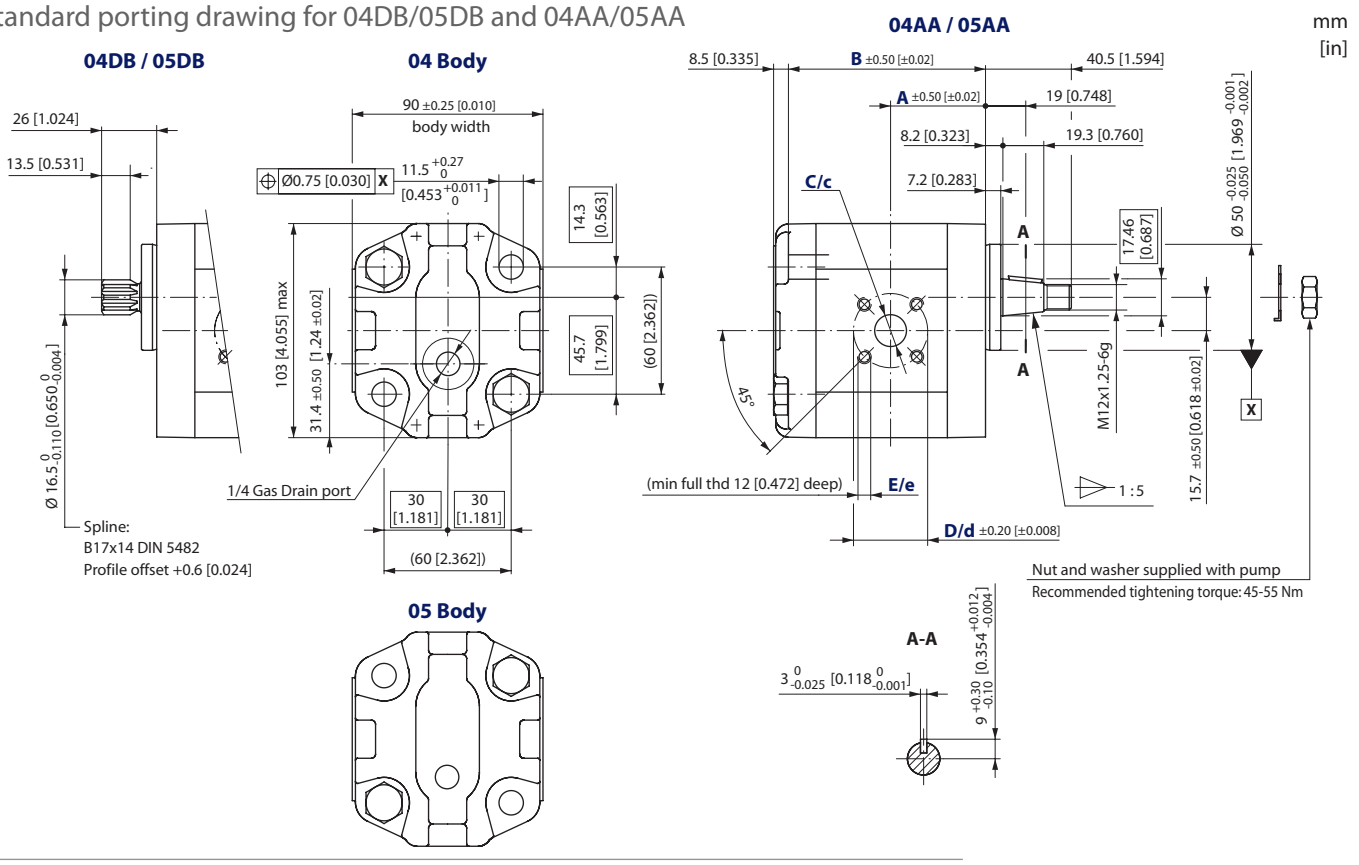
Flange/drive gear	Model code example	Maximum shaft torque
03CA	SNM2NN/014BN03CAM3B5B5NNNN/NNNNN	70 N•m [620 lb•in]

For further details on ordering, see Model Code, pages 30-35.

SNM2NN, SNU2NN–04DB/05DB and 04AA/05AA

Standard porting drawing for 04DB/05DB and 04AA/05AA

mm
[in]



For unidirectional motors no case drain hole into the rear cover.

Bidirectional motors dimensions – 04/05DB and 04/05AA

Frame size		6,0*	8,0	011	014	017	019	022	025
Dimension	A	38.6 [1.520]	40.6 [1.598]	45 [1.772]				52.5 [2.067]	62 [2.441]
	B	85 [3.364]	89 [3.503]	93 [3.661]	99 [3.897]	103 [4.055]	107 [4.212]	113 [4.448]	117 [4.606]
Inlet/Outlet	C/c	15 [0.591]					20 [0.79]		
	D/d	35 [1.38]					40 [1.58]		
	E/e	M6							

* Before chosing this frame size, please apply to Turolla technical department.

For unidirectional SNU2NN dimensions, see SNU2NN ports, page 40.

Model code examples and maximum shaft torque

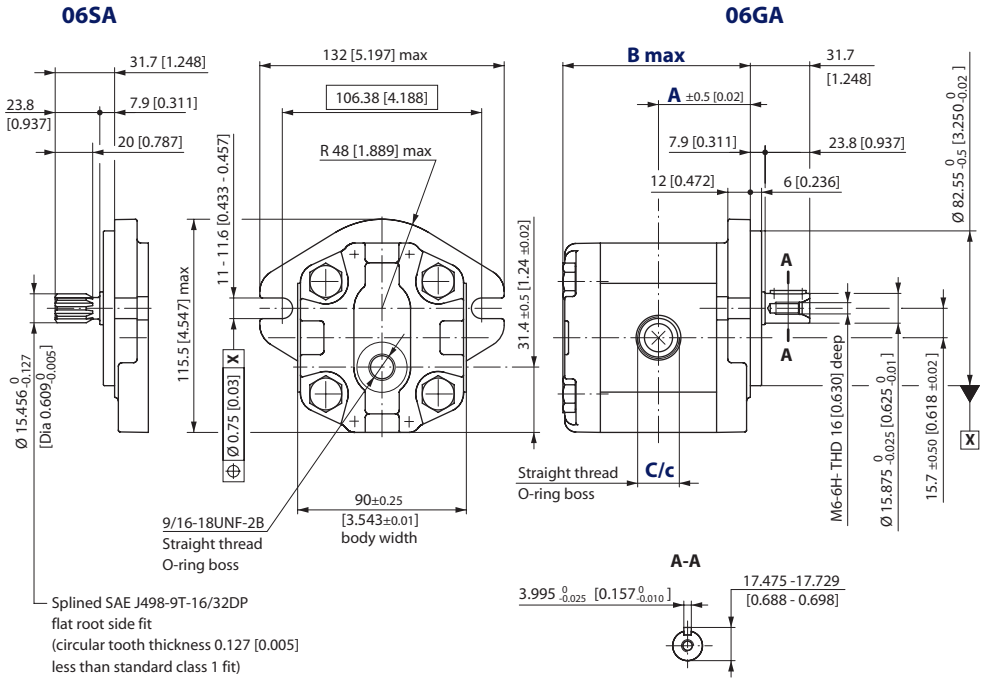
Flange/drive gear	Model code example	Maximum shaft torque
04DB	SNM2NN/8,0BN04DBAM1B5B5NNNN/NNNNN	130 N•m [1151 lb•in]
05DB	SNM2NN/017BN05DBM1B5B5NNNN/NNNNN	
04AA	SNM2NN/8,0BN04AAM1B5B5NNNN/NNNNN	140 N•m [1239 lb•in]
05AA	SNM2NN/017BN05AAM1B5B5NNNN/NNNNN	

For further details on ordering, see Model Code, pages 30-35.

SNM2NN, SNU2NN, SKU2NN – 06SA, 06GA

Standard porting drawing for 06SA and 06GA

mm
[in]



For unidirectional motors no case drain hole into the rear cover.

Bidirectional motors dimensions – 06SA and 06GA

Frame size		6,0*	8,0	011	014	017	019	022	025
Dimension	A	45 [1.772]	47 [1.850]	49 [1.920]	52 [2.047]	54 [2.205]	56 [2.205]	59 [2.323]	61 [2.402]
	B	93.5 [3.681]	97.5 [3.839]	101.5 [3.996]	107.5 [4.232]	111.5 [4.390]	115.5 [4.547]	121.5 [4.783]	125.5 [4.941]
Inlet/Outlet	C/c	7/8–14UNF–2B, 16.7 [0.658] deep					1 1/16–12UNF–2B, 18.0 [0.709] deep		

* Before chosing this frame size, please apply to Turolla technical department.

For unidirectional SNU2NN dimensions, see SNU2NN ports, page 40.

Model code examples and maximum shaft torque

Flange/drive gear	Model code example	Maximum shaft torque
06SA	SNM2NN/8,0BN06SAM1E5E5NNNN/NNNNN	75 N•m [664 lb•in]
06GA	SNM2NN/017BN06GAM6E5E5NNNN/NNNNN	80 N•m [708 lb•in]

For further details on ordering, see Model Code, pages 30-35.

GROUP 3 GEAR MOTORS

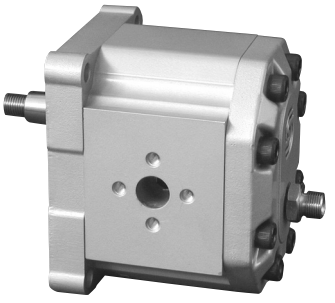
Motor design

SNM3NN

SNM3NN is the Group 3 bidirectional motor available in the whole displace-ments range from 22 up to 90 cm³/rev [1.35 up to 5.38 in³/rev].

Configurations include European and SAE flanges and shafts (01BA, 01FA, 01DA, 02AA, 02FA, 02DB, 03BB, 03FB, 06AA, 06DD, 07BC, 07GA, 07SA).

SNM3NN 01BA



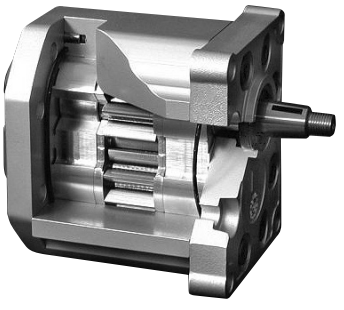
SNU3NN

SNU3NN is the Group 3 unidirectional motor available in the whole displace-ments range from 22 up to 90 cm³/rev [1.35 up to 5.38 in³/rev].

The SNU3NN motor construction is derived from the correspondent pump SNP3.

Configurations include European and SAE flanges and shafts (01BA, 01FA, 01DA, 02AA, 02FA, 02DB, 03BB, 03FB, 03DB, 06AA, 06SA, 07BC, 07GA, 07SA).

SNU3NN 01BA (cut away)



Technical data

This table details the technical data for Group 3 gear motors based on the model and displacement configuration.

Technical data for Group 3 gear motors

		Frame size									
		022	**026**	**033**	**038**	**044**	**048**	**055**	**063**	**075**	**090**
Displacement	cm^3/rev [in^3/rev]	22.1 [1.35]	26.2 [1.60]	33.1 [2.02]	37.9 [2.32]	44.1 [2.69]	48.3 [2.93]	55.2 [3.36]	63.4 [3.87]	74.4 [4.54]	88.2 [5.38]
SNU3NN (unidirectional)											
Peak pressure	bar [psi]	270 [3915]	270 [3915]	270 [3915]	270 [3915]	270 [3915]	250 [3625]	230 [3336]	210 [3045]	190 [2755]	170 [2465]
Rated pressure		250 [3625]	250 [3625]	250 [3625]	250 [3625]	250 [3625]	230 [3336]	210 [3045]	190 [2755]	170 [2465]	150 [2175]
Minimum speed	min^{-1} (rpm)	800	800	800	800	800	800	800	600	600	600
Maximum speed		2500	2500	2500	2500	2300	2300	2300	2300	2100	2100
SNM3NN (bidirectional) motor in parallel											
Peak pressure	bar [psi]	270 [3915]	270 [3915]	270 [3915]	270 [3915]	270 [3915]	250 [3625]	230 [3336]	210 [3045]	190 [2755]	170 [2465]
Rated pressure		250 [3625]	250 [3625]	250 [3625]	250 [3625]	250 [3625]	230 [3336]	210 [3045]	190 [2755]	170 [2465]	150 [2175]
Minimum speed	min^{-1} (rpm)	800	800	800	800	800	800	800	800	800	800
Maximum speed		2500	2500	2500	2500	2300	2300	2300	2300	2100	2100
SNM3NN (bidirectional) motor in series											
Peak pressure	bar [psi]	250 [3625]	250 [3625]	250 [3625]	250 [3625]	250 [3625]	230 [3336]	210 [3045]	190 [2755]	170 [2465]	150 [2175]
Rated pressure		250 [3625]	250 [3625]	250 [3625]	250 [3625]	250 [3625]	230 [3336]	210 [3045]	190 [2755]	170 [2465]	150 [2175]
Minimum speed	min^{-1} (rpm)	800	800	800	800	800	800	800	800	800	800
Maximum speed		2500	2500	2500	2500	2300	2300	2200	2100	2100	2100
All (SNU3NN, SNM3NN)											
Weight	kg [lb]	6.8 [15.0]	6.8 [15.0]	7.2 [15.8]	7.3 [16.1]	7.5 [16.5]	7.6 [16.8]	7.8 [17.3]	8.1 [17.9]	8.5 [18.7]	8.9 [19.6]
Moment of inertia of rotating components	x 10^{-6} $kg•m^2$ [x 10^{-6} $lb•ft^2$]	198 [4698]	216 [5126]	246 [5837]	267.2 [6341]	294.2 [6981]	312.2 [7408]	342.3 [8123]	378.3 [8977]	426.4 [10 118]	486.5 [11 545]

1 $kg•m^2$ = 23.68 $lb•ft^2$

Caution

The rated and peak pressure mentioned are for motors with flanged ports only. When threaded ports are required a de-rated performance has to be considered. To verify the compliance of an high pressure application with a threaded ports pump apply to a Turolla representative.

Product Code
Model Code

A	B	C	D	E	F	G	H	I	J	K	L	/	M	N	0

A Family

SEU3NN	Low Cost Gr3 Unidirecional Motor
SNU3NN	Gr3 Unidirectional Motor
SNU3GN	Gr3 Unidirectional Motor+Anticav.Check Valve
SNM3NN	Gr3 Bidirectional Motor - Axial drain on cover
SNM3NL	Gr3 Bidirectional Motor-Vert.drain on rear cover
SNM3GN	Gr3 Bidirectional Motor-Anticav.Check Valve - Axial drain on cover
SNM3GL	Gr3 Bidirectional Motor-Anticav.Check Valve - Vert.drain on rear cover
SNM3CN	Gr3 Bidirectional Motor-Anticav.Check valve on Cover
SNM3DN	Gr3 Bidirectional Motor-Internal drain valve

B Displacement

022	22,1 cc
026	26,2 cc
033	33,1 cc
038	37,9 cc
044	44,1 cc
048	48,3 cc
055	55,2 cc
063	63,4 cc
075	74,4 cc
090	88,2 cc

C Rotation

B	Bidirectional
L	Left rotation
R	Right rotation

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

D Project version (value representing a change to the initial project)

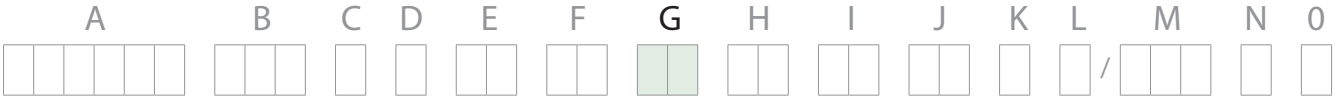
N	Std Version of Project

E Mounting flange

Code	Description (Type of flange • Type of drive gear • Preferred ports for configuration)
01	Pilot Ø50,8+4 holes (98,4x128,1)
02	Pilot Ø50,8+4 holes (98,4x137)
03	Pilot Ø60,3+4 holes (114,3x149,5)
06	Pilot Ø105+4 holes (102,0x145,0)
07	SAE B-pilot Ø101,6 -2 holes
08	SAE C-pilot Ø127 -4 holes
09	SAE A-pilot Ø82,55 -2 holes
91	Outrigger bearing typo 01 -Taper 1:8 M14x1,5 key 4x7,5
9Y	Outrigger bearing type 07 -taper shaft 1:8-5/8-18UNF-Key6,375 with Dust Cover
B1	Pilot Ø50,8+4 holes special shaft seal slot - Special 01
D6	Pilot Ø105+4 holes + shaft seal D40 per shaft spline - Special 06
D7	Pilot Ø101,6+2 holes + double shaft seal - Special 07
P1	Pilot Ø50,8+4 holes Ø12-12,5 - Special 01
P7	Pilot Ø101,6+2 fixed holes slot - Special 07

F Drive gear

AA	Taper 1:5-M16x1,5-Key 5
BA	Taper 1:8-M14x1,5-Key 4
BB	Taper 1:8-M16x1,5-Key 4,79
BC	Taper 1:8-5/8-18UNF-2A-Key 6,375
BD	Taper 1:8-M14x1,5-Key 4 + thd hole M8 - Special
BP	Taper 1:8-5/8-18UNF-2A-Key 6,375 with NUT & WASHER (for flange 07)
CA	Tang 8xØ22,2 - Special
CB	Tang 12xØ24-shaft flange protrusion sb17.5-dr72.5-Special
DA	DIN 5482 B22x19 L=24 (for flange typo 01)
DD	DIN 5482 B28x25 L28 (for flange typo 06)
FA	Parallel Ø20-Key 5x5 L30 (for flange typo 01-02)
FB	Parallel Ø22-Key 5x5 L40 (for flange typo 03)
GA	Parallel Ø22,225 x L25,4-Key 6,375x6,375 L25,4
GB	Parallel Ø22,225xL25,4-Key 6,375x6,375x25,4+thd hole:1/4-20UNC-2B
GC	Parallel Ø22,225xL25,4-Key 6,375x6,375x25,4+thd hole:5/16-18UNC-2B - Special
SA	SAE J498-13T-16/32-SAE B
SB	SAE J498-13T-16/32-SAE A (for flange typo 09)
RA	SAE J498-14T-12/24-SAE C-4 bolt (for flange typo 08)
SH	SAE J498-15T-16/32-(for flange typo 07)

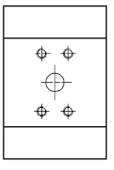
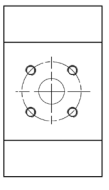
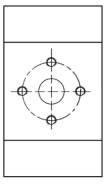
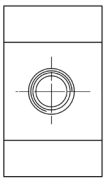
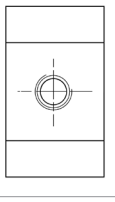


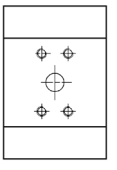
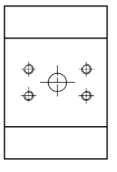
G Rear cover

P1	Std cover for unidirectional motors
M1	Std cover motor axial drain on cover M14x1,5
M2	Std cover motor axial drain on cover M12x1,5 ISO6149
M6	Std cover motor axial drain on cover 9/16-18UNF-2B
MF	Std cover motor axial drain on cover drain 3/8 Gas
L1	Cover motor with radial drain on cover - Vertical M14x1,5
L2	Cover motor with radial drain on cover - Horizontal M14x1,5
L6	Cover motor with radial drain on cover - Vertical 9/16-18UNF-2B
LT	Cover motor with radial drain on cover - Vertical 9/16-18UNF-2B drain up
C1	Cover motor with front metric ports : M22x1,5 - for SNM3CN series
D1	Cover motor without drain (internal drained) - for SNM3DN series

A B C D E F G H I J K L / M N 0

H Inlet size I Outlet size

A2	18,5x22,23x47,63x3/8-16UNC	
A3	25x26,19x52,37x3/8-16UNC	
A4	31x30,18x58,72x7/16-14UNC	
A5	37,5/27x35,71x69,85x1/2-13UNC	
B7	20x40xM6	
BA	18x55xM8	
BB	27x55xM8	
BC	36/27x55xM8	
C3	13,5x30xM6	
C7	20x40xM8	
CA	27x51xM10	
CD	36x62xM10	
CZ	27x51xM10(2 Vert.Holes)	
G7	20x40x5/16-18UNC - Special	
GA	27x51x3/8-16UNC - Special	
E5	7/8-14UNF	
E6	1-1/16-12UN	
E8	1-5/16-12UN	
E9	1-5/8-12UN	
EA	1-7/8-12UN	
H8	M27x2-ISO6149	
H9	M33x2-ISO6149	
F5	BSP 3/4 GAS	
F6	BSP 1 GAS	
F7	BSP 1-1/4 GAS	

M5	25x52,37x26,19xM10	
M6	31x30,18x58,72xM10	
M7	37,5x35,71x69,85xM12	
MF	25x52,37x26,19xM8 deep12 Horiz	
MG	25/20x52,37x26,19xM10(=) - Special	
MH	31x30,18x58,72xM10 deep18 (=)	
MN	31x30,18x58,72xM10 deep12 (=)	
MR	37,5x35,71x69,85xM12 deep20 (=)	

A B C D E F G H I J K L / M N 0

J Ports Pos & Spec Body

NN	Std from catalogue
*PL	Inlet port Left position looking gear drive from front flange
*PR	Inlet port Right position looking gear drive from front flange
ZZ	Port Bx-Bx in the center of the body - Option

* to be used if inlet-outlet are different

K Seals

N	Standard NBR seals
B	VITON seals - Option
D	NBR seals + VITON shaft seal with dust lip
X	NBR seals + Dust Cover - Option
Y	VITON seals + Dust Cover - Option
Z	VITON shaft seal + Dust Cover - Option

L Screws

N	Std burnished screws
B	Dacromet/Geomer - Anticorrosion screws

M Set valves

NNN	No valve

N Type of mark

N	Standard Turolla Marking
A	Standard Turolla Marking+Customer Code-Special
Z	Without Marking

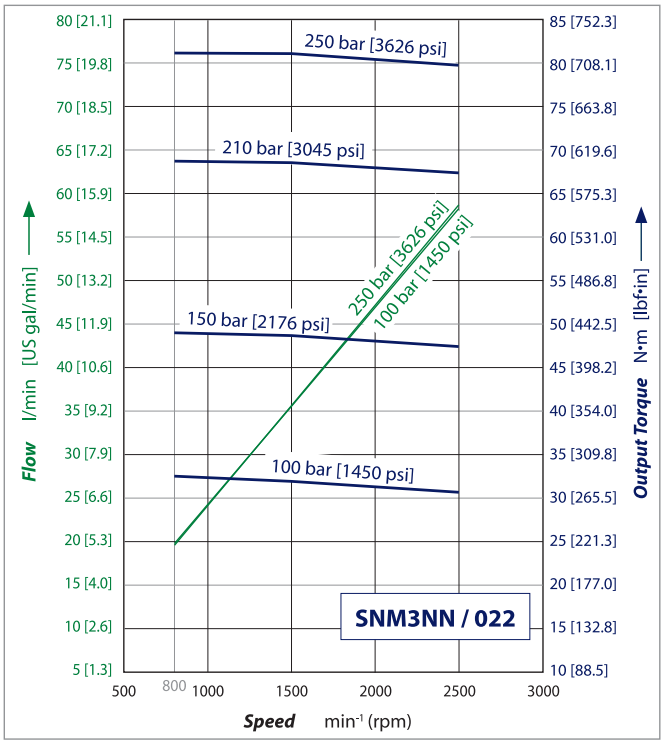
O Mark position

N	Std Marking position (on top)
A	Special Marking position on the bottom

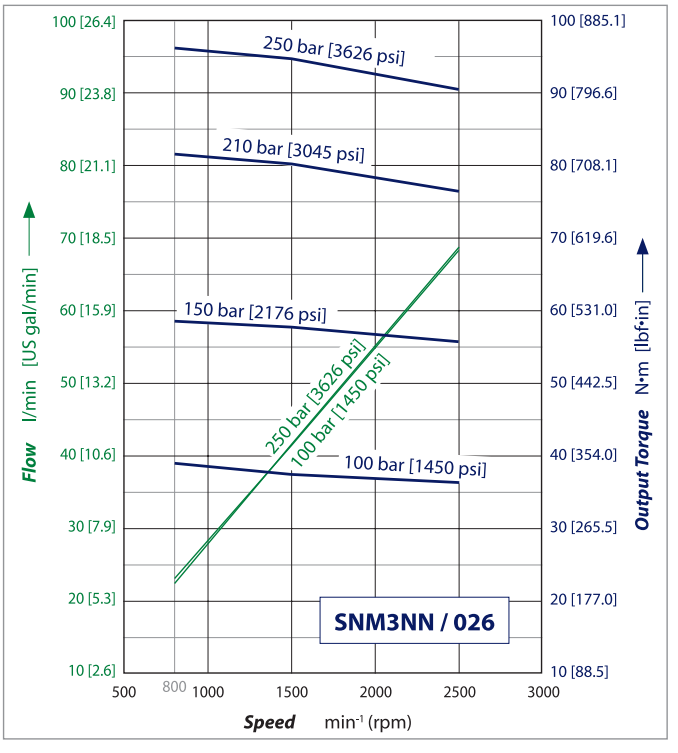
Motor performance graphs

The graphs on the next pages provide typical inlet flow and output power for Group 3 motors at various working pressures. Data were taken using ISO VG46 petroleum /mineral based fluid at 50 °C [122 °F] (viscosity = 28 mm²/s [132 SUS]).

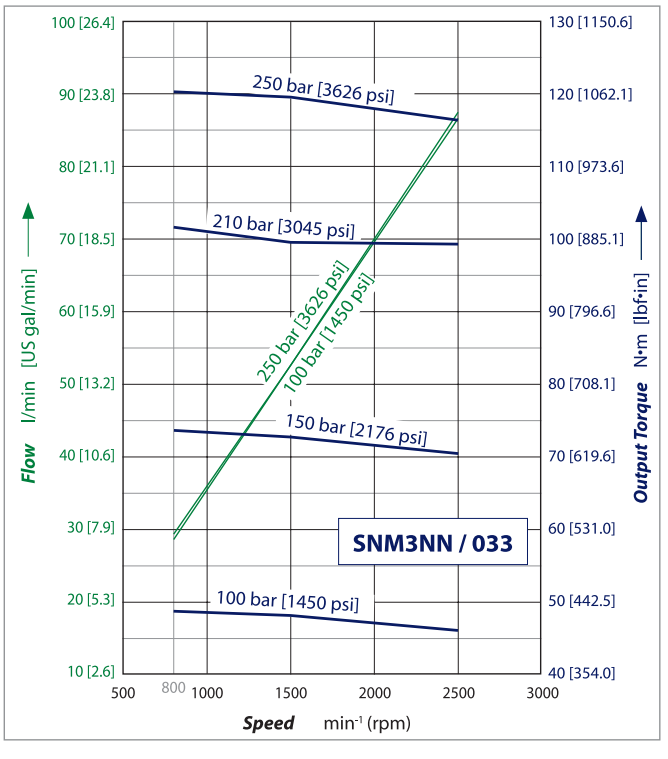
SNM3NN/022 motor performance graph



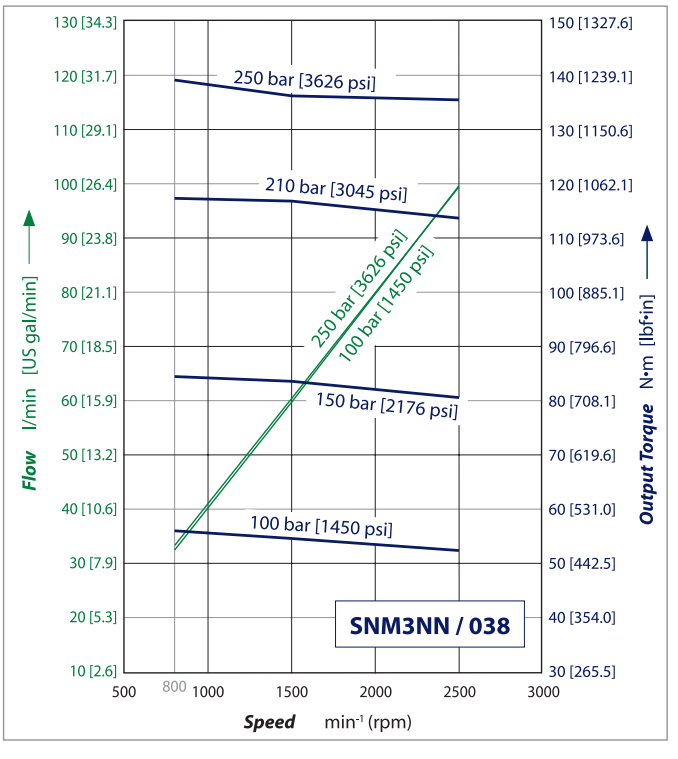
SNM3NN/026 motor performance graph



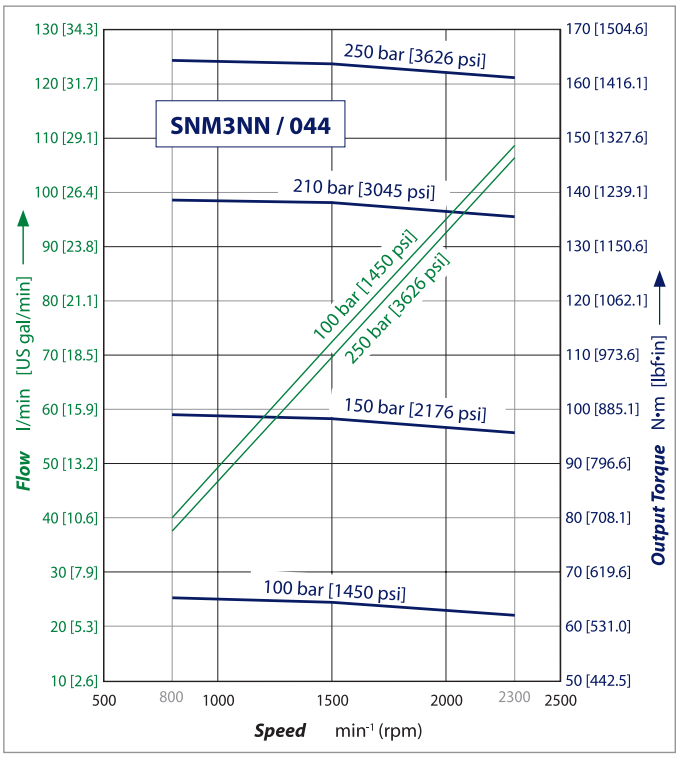
SNM3NN/033 motor performance graph



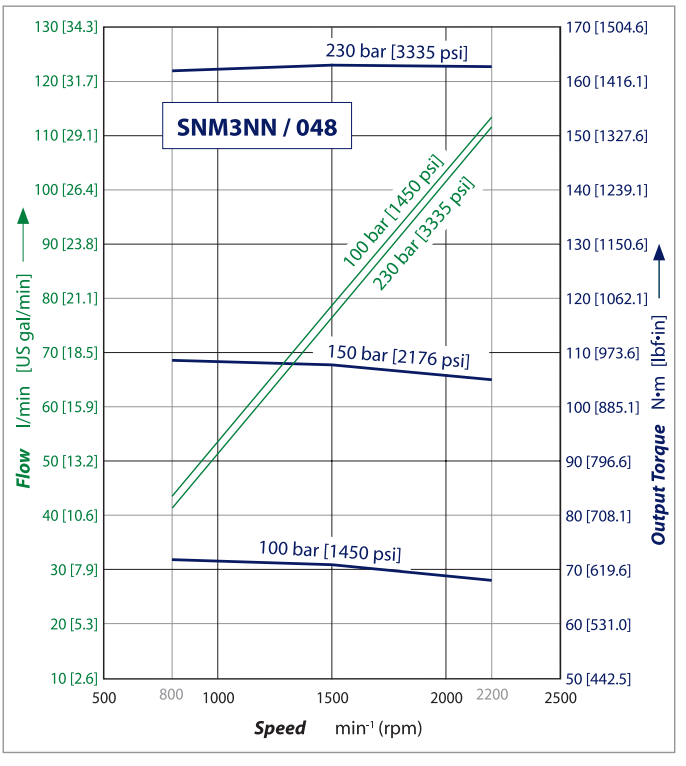
SNM3NN/038 motor performance graph



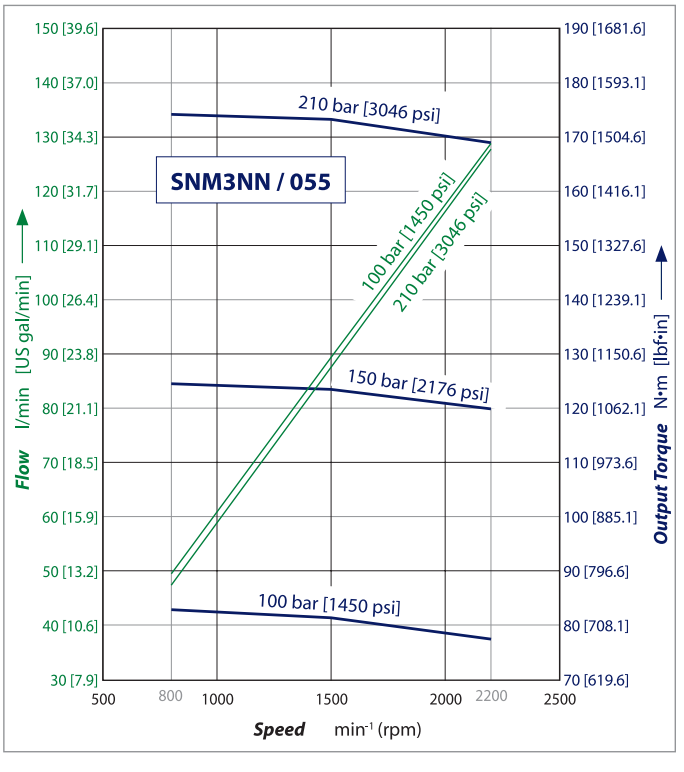
SNM3NN/044 motor performance graph



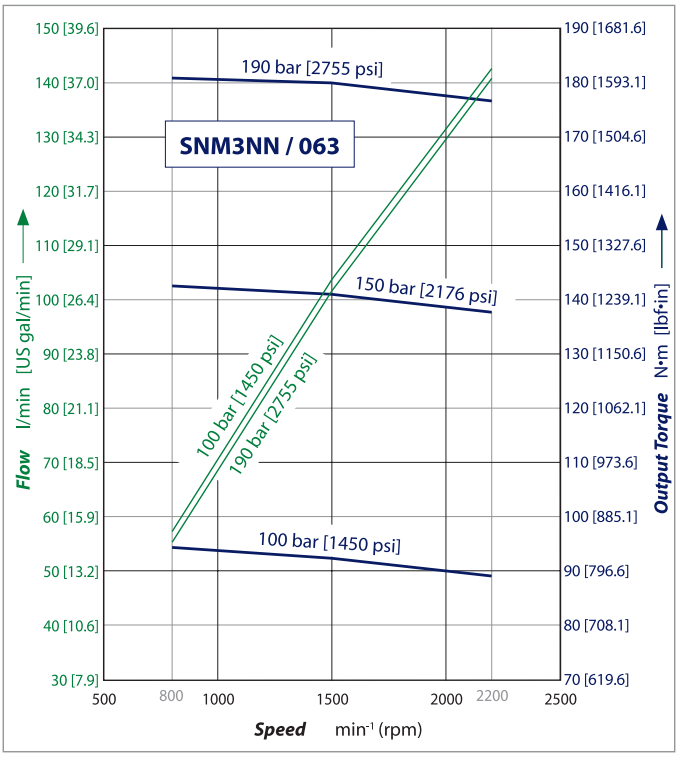
SNM3NN/048 motor performance graph



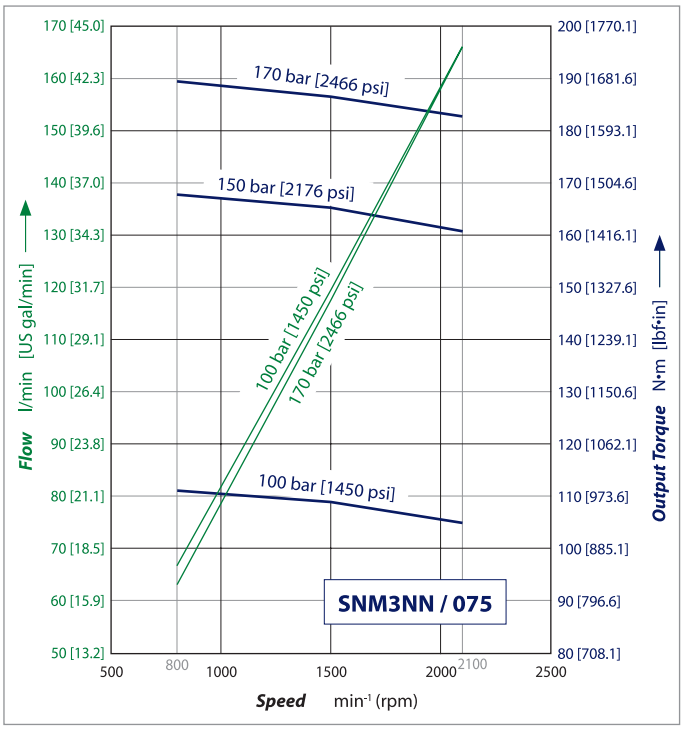
SNM3NN/055 motor performance graph



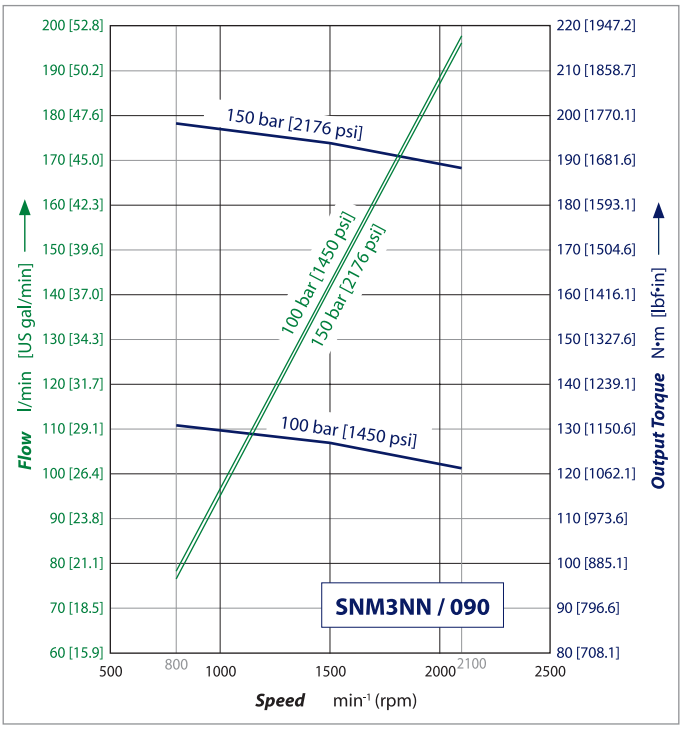
SNM3NN/063 motor performance graph



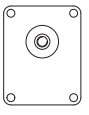
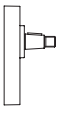
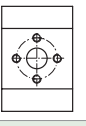
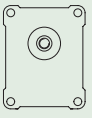
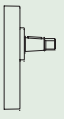
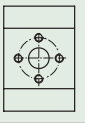
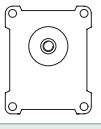
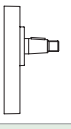
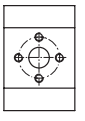
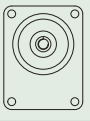
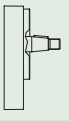
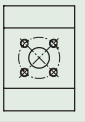
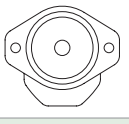
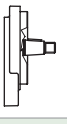
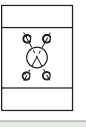
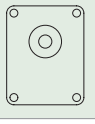
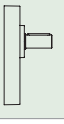
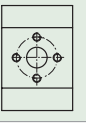
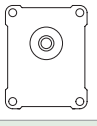
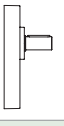
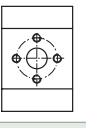
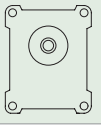
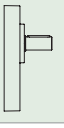
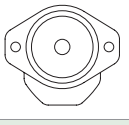
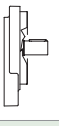
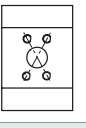
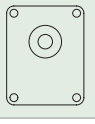
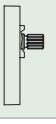
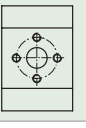
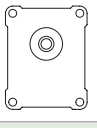
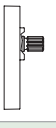
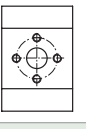
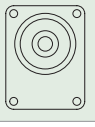
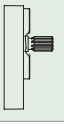
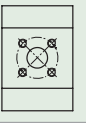
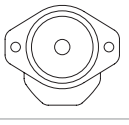
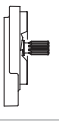
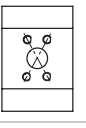
SNM3NN/075 motor performance graph



SNM3NN/090 motor performance graph



Flange, shaft and port configurations

Motor	Code	Flange		Shaft		Port	
SNM3NN SNU3NN SNM3GN	**01BA**	pilot Ø 50.8 mm [2.0 in] European 01 4-bolt		1:8 tapered		European flanged port **+** pattern	
SNM3NN SNU3NN SNM3GN	**02BA**	pilot Ø 50.8 mm [2.0 in] European 02 4-bolt		1:8 tapered		European flanged port **+** pattern	
SNM3NN SNU3NN SNM3GN	**03BB**	pilot Ø 60.3 mm [2.374 in] European 03 4-bolt		1:8 tapered		European flanged port **+** pattern	
SNM3NN SNU3NN SNM3GN	**06AA**	pilot Ø 105 mm [4.133 in] German 4-bolt		1:5 tapered		German std ports port **X** pattern	
SNM3NN SNU3NN SNM3GN	**07BC**	SAE B pilot Ø 101.6 2-bolt		1:8 tapered		Vertical four bolt flanged port	
SNM3NN SNU3NN SNM3GN	**01FA**	pilot Ø 50.8 mm [2.0 in] European 01 4-bolt		Ø 20 mm [0.787 in] parallel		European flanged port **+** pattern	
SNM3NN SNU3NN SNM3GN	**02FA**	pilot Ø 50.8 mm [2.0 in] European 02 4-bolt		Ø 20 mm [0.787 in] parallel		European flanged port **+** pattern	
SNM3NN SNU3NN SNM3GN	**03FB**	pilot Ø 60.3 mm [2.374 in] European 03 4-bolt		Ø 22 mm [0.866 in] parallel		European flanged port **+** pattern	
SNM3NN SNU3NN SNM3GN	**07GA**	SAE B pilot Ø 101.6 mm 2-bolt		Ø 22.225 mm [0.875 in] parallel		Vertical four bolt flanged port	
SNM3NN SNU3NN SNM3GN	**01DA**	pilot Ø 50.8 mm [2.0 in] European 01 4-bolt		Splined shaft 13T – m 1.60 DIN 5482 – B22 x 19		European flanged port **+** pattern	
SNM3NN SNU3NN SNM3GN	**02DB**	pilot Ø 50.8 mm [2.0 in] European 02 4-bolt		Splined shaft 13T – m 1.60 DIN 5482 – B22 x 19		European flanged port **+** pattern	
SNM3NN SNU3NN SNM3GN	**06DD**	pilot Ø 105 mm [4.133 in] German 4-bolt		Splined shaft 15T – m 1.60 DIN 5482 – B28 x 25		German std ports port **X** pattern	
SNM3NN SNU3NN SNM3GN	**07SA**	SAE B pilot Ø 101.6 mm 2-bolt		Splined shaft SAE J498 13T – 16/32DP		Vertical four bolt flanged port	

Shaft and flange availability and torque capability

This table details the standard Group 3 shafts and flange combinations that are currently available with the maximum shaft torque limits.

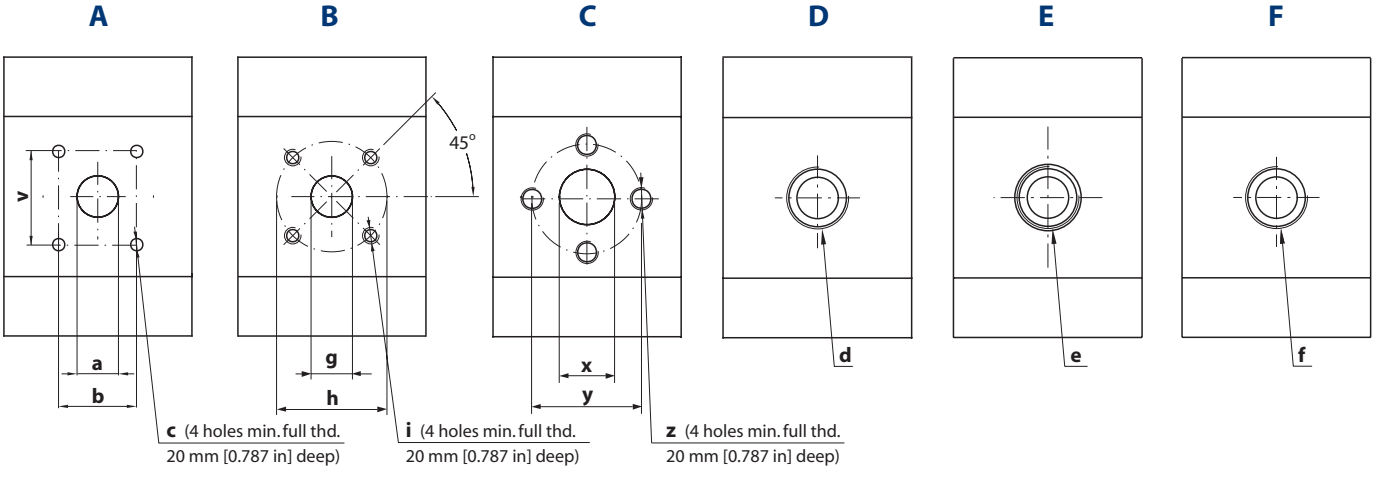
Shaft and flange availability and torque capability

Shaft		Mounting flange code with maximum torque in Nm [lb•in]				
Code	**Description**	**01**	**02**	**03**	**06**	**07**
AA	Taper 1:5-M16x1,5-Key 5				300 [2655]	
BA	Taper 1:8-M14x1,5-Key 4	350 [3097]	350 [3097]			
BB	Taper 1:8-M16x1,5-Key 4,79			500 [4425]		
BC	Taper 1:8-5/8-18UNF-2A-Key 6,375					300 [2655]
BD	Taper 1:8-M14x1,5-Key 4 + thd hole M8 - Special	350 [3097]	350 [3097]			
BP	"Taper 1:8-5/8-18UNF-2A-Key 6,375					300 [2655]
CA	with Nut & Washer (for flange 07)"					**
CB	Tang 8xØ22,2 - Special			**		
DA	Tang 12xØ24 - Special	290 [2566]	290 [2566]			
DD	DIN 5482 B22x19 L24 (for flange typo 01)				450 [3982]	
FA	DIN 5482 B28x25 L28 (for flange typo 06)	210 [1858]	210 [1858]			
FB	Parallel Ø20-Key 5x5 L30 (for flange typo 01-02)			300 [2655]		
GA	Parallel Ø22-Key 5x5 L40 (for flange typo 03)					230 [2035]
GB	Parallel Ø22,225 x L25,4-Key 6,375x6,375 L25,4					230 [2035]
GC	"Parallel Ø22,225xL25,4-Key 6,375x6,375x25,4					230 [2035]
SA	with thd hole:1/4-20UNC-2B "					270 [2389]
SB	"Parallel Ø22,225xL25,4-Key 6,375x6,375x25,4					270 [2389]
RA	with thd hole:5/16-18UNC-2B - Special"					400 [3540]
SH	SAE J498-13T-16/32-SAE B					400 [3540]

Ports dimensions

Bidirectional motor ports

Available ports for Group 3 bidirectional motors

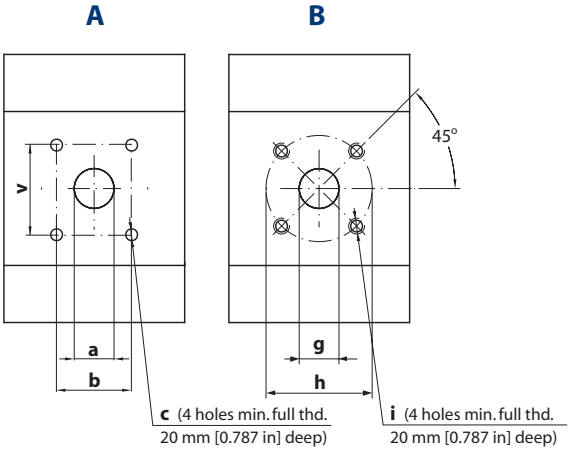


Ports dimensions for bidirectional motors SNM3NN

Port type		A				B			C			D	E	F
Dimensions		a	b	v	c	g	h	i	x	y	z	d	e	f
Frame size	022	25.4 [1.0]	26.19 [1.031]	52.37 [2.061]	3/8–16UNC–2B	27 [1.063]	55 [2.165]	M8	20 [0.79]	40 [1.58]	M8	M26x1.5	1 5/16–12UN–2B	3/4 Gas (BSPP)
	026	25.4 [1.0]	26.19 [1.031]	52.37 [2.061]	3/8–16UNC–2B	27 [1.063]	55 [2.165]	M8	20 [0.79]	40 [1.58]	M8	M26x1.5	1 5/16–12UN–2B	3/4 Gas (BSPP)
	033	31.8 [1.251]	30.18 [1.188]	58.72 [2.311]	7/16–14UNC–2B	27 [1.063]	55 [2.165]	M8	27 [1.063]	51 [2.008]	M10	M33x2	1 5/8– 12UN–2B	1 Gas (BSPP)
	038	31.8 [1.251]	30.18 [1.188]	58.72 [2.311]	7/16–14UNC–2B	27 [1.063]	55 [2.165]	M8	27 [1.063]	51 [2.008]	M10	M33x2	1 5/8–12UN–2B	1 Gas (BSPP)
	044	31.8 [1.251]	30.18 [1.188]	58.72 [2.311]	7/16–14UNC–2B	27 [1.063]	55 [2.165]	M8	27 [1.063]	51 [2.008]	M10	M33x2	1 5/8–12UN–2B	1 Gas (BSPP)
	048	31.8 [1.251]	30.18 [1.188]	58.72 [2.311]	7/16–14UNC–2B	27 [1.063]	55 [2.165]	M8	27 [1.063]	51 [2.008]	M10	M33x2	1 5/8–12UN–2B	1 Gas (BSPP)
	055	31.8 [1.251]	30.18 [1.188]	58.72 [2.311]	7/16–14UNC–2B	27 [1.063]	55 [2.165]	M8	27 [1.063]	51 [2.008]	M10	M33x2	1 5/8–12UN–2B	1 Gas (BSPP)
	063	31.8 [1.251]	30.18 [1.188]	58.72 [2.311]	7/16–14UNC–2B	36 [1.417]	55 [2.165]	M8	36 [1.417]	62 [2.441]	M10	M33x2	1 5/8–12UN–2B	1 1/4 Gas (BSPP)
	075	31.8 [1.251]	30.18 [1.188]	58.72 [2.311]	7/16–14UNC–2B	36 [1.417]	55 [2.165]	M8	36 [1.417]	62 [2.441]	M10	M33x2	1 5/8–12UN–2B	1 1/4 Gas (BSPP)
	090	31.8 [1.251]	30.18 [1.188]	58.72 [2.311]	7/16–14UNC–2B	36 [1.417]	55 [2.165]	M8	36 [1.417]	62 [2.441]	M10	M33x2	1 5/8–12UN–2B	1 1/4 Gas (BSPP)
Drain		M14 x 1.5											9/16–18UNF–2B	

Unidirectional motor ports

Available ports for Group 3 unidirectional motors



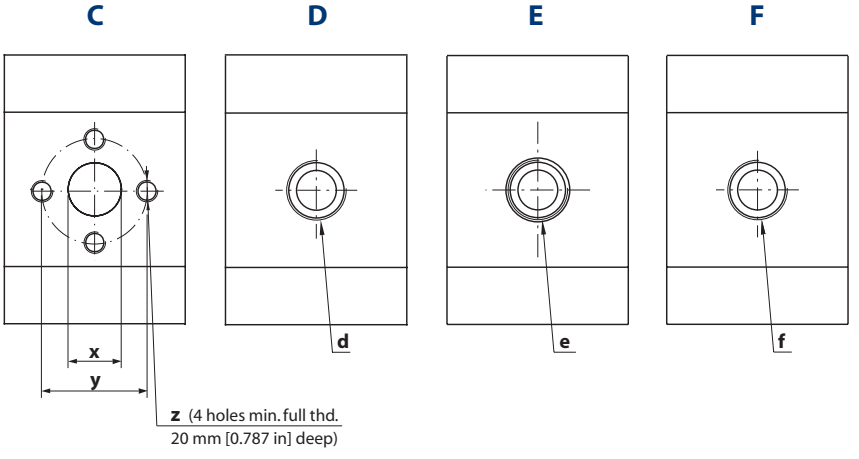
Ports dimensions for unidirectional motors SNU3NN

Port type			A				B		
Dimensions			a	b	c	v	g	h	i
Frame size	022	Outlet	20 [0.79]	40 [1.58]	M8	3/8–16UNC–2B	27 [1.063]	55 [2.165]	M8
		Inlet	20 [0.79]	40 [1.58]	M8	3/8–16UNC–2B	18 [0.709]	55 [2.165]	M8
	026	Outlet	20 [0.79]	40 [1.58]	M8	3/8–16UNC–2B	27 [1.063]	55 [2.165]	M8
		Inlet	20 [0.79]	40 [1.58]	M8	3/8–16UNC–2B	18 [0.709]	55 [2.165]	M8
	033	Outlet	27 [1.063]	51 [2.008]	M10	7/16–14UNC–2B	27 [1.063]	55 [2.165]	M8
		Inlet	20 [0.79]	40 [1.58]	M8	3/8–16UNC–2B	18 [0.709]	55 [2.165]	M8
	038	Outlet	27 [1.063]	51 [2.008]	M10	7/16–14UNC–2B	27 [1.063]	55 [2.165]	M8
		Inlet	20 [0.79]	40 [1.58]	M8	3/8–16UNC–2B	18 [0.709]	55 [2.165]	M8
	044	Outlet	27 [1.063]	51 [2.008]	M10	7/16–14UNC–2B	27 [1.063]	55 [2.165]	M8
		Inlet	27 [1.063]	51 [2.008]	M10	3/8–16UNC–2B	18 [0.709]	55 [2.165]	M8
	048	Outlet	27 [1.063]	51 [2.008]	M10	7/16–14UNC–2B	27 [1.063]	55 [2.165]	M8
		Inlet	27 [1.063]	51 [2.008]	M10	3/8–16UNC–2B	18 [0.709]	55 [2.165]	M8
	055	Outlet	27 [1.063]	51 [2.008]	M10	1/2–13UNC–2B	27 [1.063]	55 [2.165]	M8
		Inlet	27 [1.063]	51 [2.008]	M10	7/16–14UNC–2B	18 [0.709]	55 [2.165]	M8
	063	Outlet	36 [1.417]	62 [2.441]	M10	1/2–13UNC–2B	36 [1.417]	55 [2.165]	M8
		Inlet	27 [1.063]	51 [2.008]	M10	7/16–14UNC–2B	27 [1.063]	55 [2.165]	M8
	075	Outlet	36 [1.417]	62 [2.441]	M10	1/2–13UNC–2B	36 [1.417]	55 [2.165]	M8
		Inlet	27 [1.063]	51 [2.008]	M10	7/16–14UNC–2B	27 [1.063]	55 [2.165]	M8
	090	Outlet	36 [1.417]	62 [2.441]	M10	1/2–13UNC–2B	36 [1.417]	55 [2.165]	M8
		Inlet	27 [1.063]	51 [2.008]	M10	7/16–14UNC–2B	27 [1.063]	55 [2.165]	M8

(the table is continued on the next page)

Unidirectional motor ports

Available ports for Group 3 unidirectional motors



Ports dimensions for unidirectional motors SNU3NN

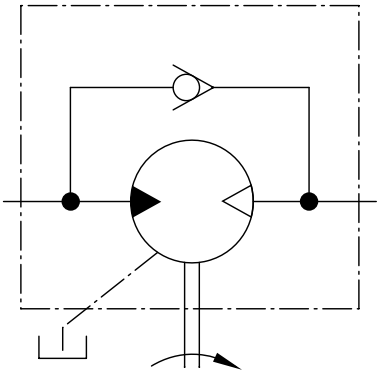
Port type			C			D	E	F
Dimensions			x	y	z	d	e	f
Frame size	022	Outlet	20 [0.79]	40 [1.58]	M8	M26 x 1.5	¾ Gas (BSPP)	15/16–12UN–2B
		Inlet	20 [0.79]	40 [1.58]	M8	M26 x 1.5	¾ Gas (BSPP)	11/16–12UN–2B
	026	Outlet	20 [0.79]	40 [1.58]	M8	M26 x 1.5	¾ Gas (BSPP)	15/16–12UN–2B
		Inlet	20 [0.79]	40 [1.58]	M8	M26 x 1.5	¾ Gas (BSPP)	11/16–12UN–2B
	033	Outlet	27 [1.063]	51 [2.008]	M10	M33x2	1 Gas (BSPP)	15/8–12UN–2B
		Inlet	20 [0.79]	40 [1.58]	M8	M26 x 1.5	¾ Gas (BSPP)	15/16–12UN–2B
	038	Outlet	27 [1.063]	51 [2.008]	M10	M33x2	1 Gas (BSPP)	15/8–12UN–2B
		Inlet	20 [0.79]	40 [1.58]	M8	M26 x 1.5	¾ Gas (BSPP)	15/16–12UN–2B
	044	Outlet	27 [1.063]	51 [2.008]	M10	M33 x 2	1 Gas (BSPP)	15/8–12UN–2B
		Inlet	27 [1.063]	51 [2.008]	M10	M33 x 2	1 Gas (BSPP)	15/16–12UN–2B
	048	Outlet	27 [1.063]	51 [2.008]	M10	M33 x 2	1 Gas (BSPP)	15/8–12UN–2B
		Inlet	27 [1.063]	51 [2.008]	M10	M33 x 2	1 Gas (BSPP)	15/16–12UN–2B
	055	Outlet	27 [1.063]	51 [2.008]	M10	M33 x 2	1 Gas (BSPP)	17/8–12UN–2B
		Inlet	27 [1.063]	51 [2.008]	M10	M33 x 2	1 Gas (BSPP)	15/8–12UN–2B
	063	Outlet	36 [1.417]	62 [2.441]	M10	M42 x 2	1¼ Gas (BSPP)	17/8–12UN–2B
		Inlet	27 [1.063]	51 [2.008]	M10	M33 x 2	1 Gas (BSPP)	15/8–12UN–2B
	075	Outlet	36 [1.417]	62 [2.441]	M10	M42 x 2	1¼ Gas (BSPP)	17/8–12UN–2B
		Inlet	27 [1.063]	51 [2.008]	M10	M33 x 2	1 Gas (BSPP)	15/8–12UN–2B
	090	Outlet	36 [1.417]	62 [2.441]	M10	M42 x 2	1¼ Gas (BSPP)	17/8–12UN–2B
		Inlet	27 [1.063]	51 [2.008]	M10	M33 x 2	1 Gas (BSPP)	15/8–12UN–2B

Anti-cavitation check valve – SNM3GN

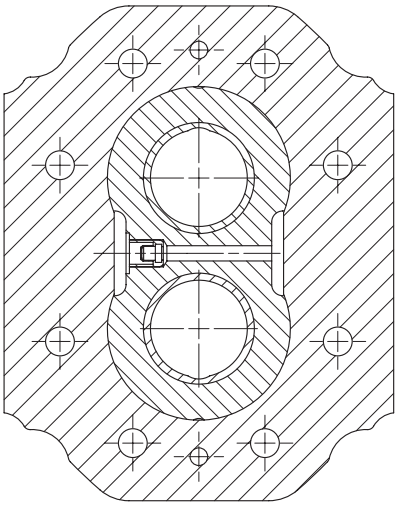
SNM3GN

Turolla offers an optional **integral anti-cavitation check valve** integrated in Group 3 motors bearing blocks. Available for all the displacements, the valve directs internally the flow from the motor outlet to the inlet, when the outlet pressure gets higher then the inlet one.

Valve schematic diagram



Anticavitation check valve cross section

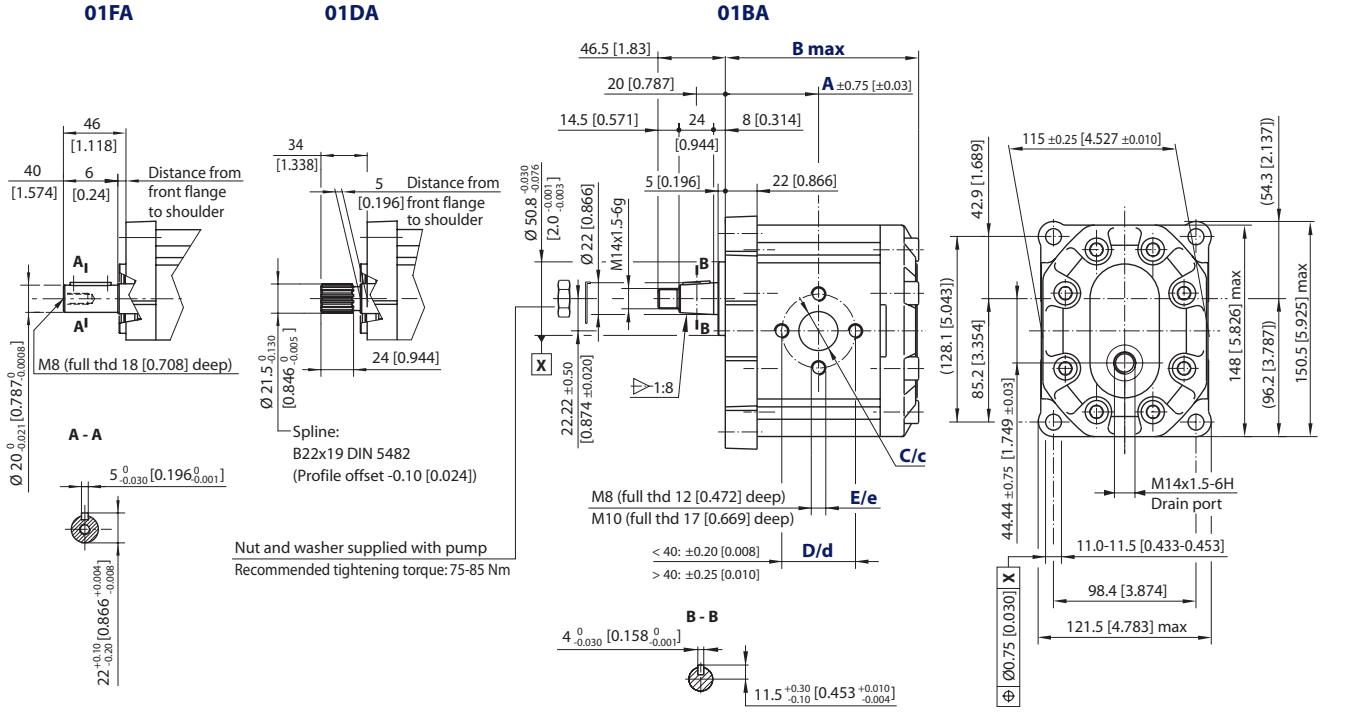


Dimensions

SNM3NN, SNU3NN – 01FA, 01DA and 01BA

Standard porting drawing for 01FA, 01DA and 01BA

mm
[in]



Bidirectional motors dimensions – 01FA, 01DA and 01BA*

Frame size		022	026	033	038	044	048	055	063	075	090
Dimension	A	63.0 [2.480]	64.5 [2.539]	67.0 [2.637]	68.8 [2.708	71.0 [2.795]	72.5 [2.854]	75.0 [2.952]	78.0 [3.070]	82.0 [3.228]	87.0 [3.425]
	B	132.5 [5.216]	135.5 [5.334]	140.5 [5.531]	144.0 [5.669]	148.5 [5.846]	151.5 [5.964]	156.5 [6.161]	162.5 [6.397]	170.5 [6.712]	180.5 [7.106]
Inlet/Outlet	C/c	20 [0.79]		27 [1.063]							
	D/d	40 [1.58]		51 [2.007]							
	E/e	M8		M10							

* For unidirectional SNU3NN dimensions, see SNU3NN ports, pages 65 and 66.

For unidirectional motors no case drain hole into the rear cover.

Model code examples and maximum shaft torque

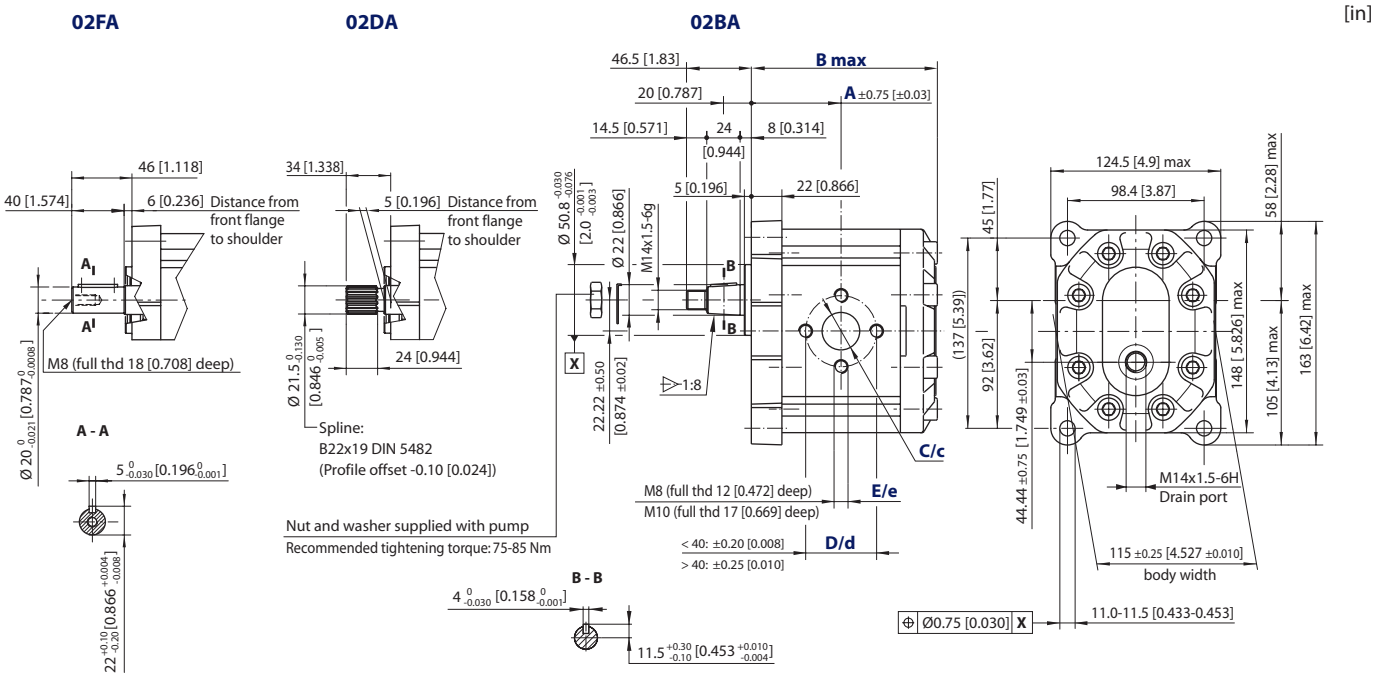
Flange/drive gear	Model code example	Maximum shaft torque
01FA	SNM3NN/075BN01FAM1CACANNNN/NNNNN	210 N•m [1858 lb•in]
01DA	SNM3NN/026BN01DAM1C7C7NNNN/NNNNN	290 N•m [2566 lb•in]
01BA	SNM3NN/044BN01BAM1CACANNNN/NNNNN	350 N•m [3097 lb•in]

For further details on ordering, see Model Code, pages 54-58.

SNM3NN, SNU3NN – 02FA, 02DB and 02AA

Standard porting drawing for 02FA, 02DB and 02AA

mm
[in]



Bidirectional motors dimensions – 02FA, 02DA and 02BA*

Frame size		022	026	033	038	044	048	055	063	075	090
Dimension	A	63.0 [2.480]	64.5 [2.539]	67.0 [2.637]	68.8 [2.708	71.0 [2.795]	72.5 [2.854]	75.0 [2.952]	78.0 [3.070]	82.0 [3.228]	87.0 [3.425]
	B	132.5 [5.216]	135.5 [5.334]	140.5 [5.531]	144.0 [5.669]	148.5 [5.846]	151.5 [5.964]	156.5 [6.161]	162.5 [6.397]	170.5 [6.712]	180.5 [7.106]
Inlet/Outlet	C/c	20 [0.79]		27 [1.063]							
	D/d	40 [1.58]		51 [2.007]							
	E/e	M8		M10							

* For unidirectional SNU3NN dimensions, see SNU3NN ports, pages 65 and 66.

For unidirectional motors no case drain hole into the rear cover.

Model code examples and maximum shaft torque

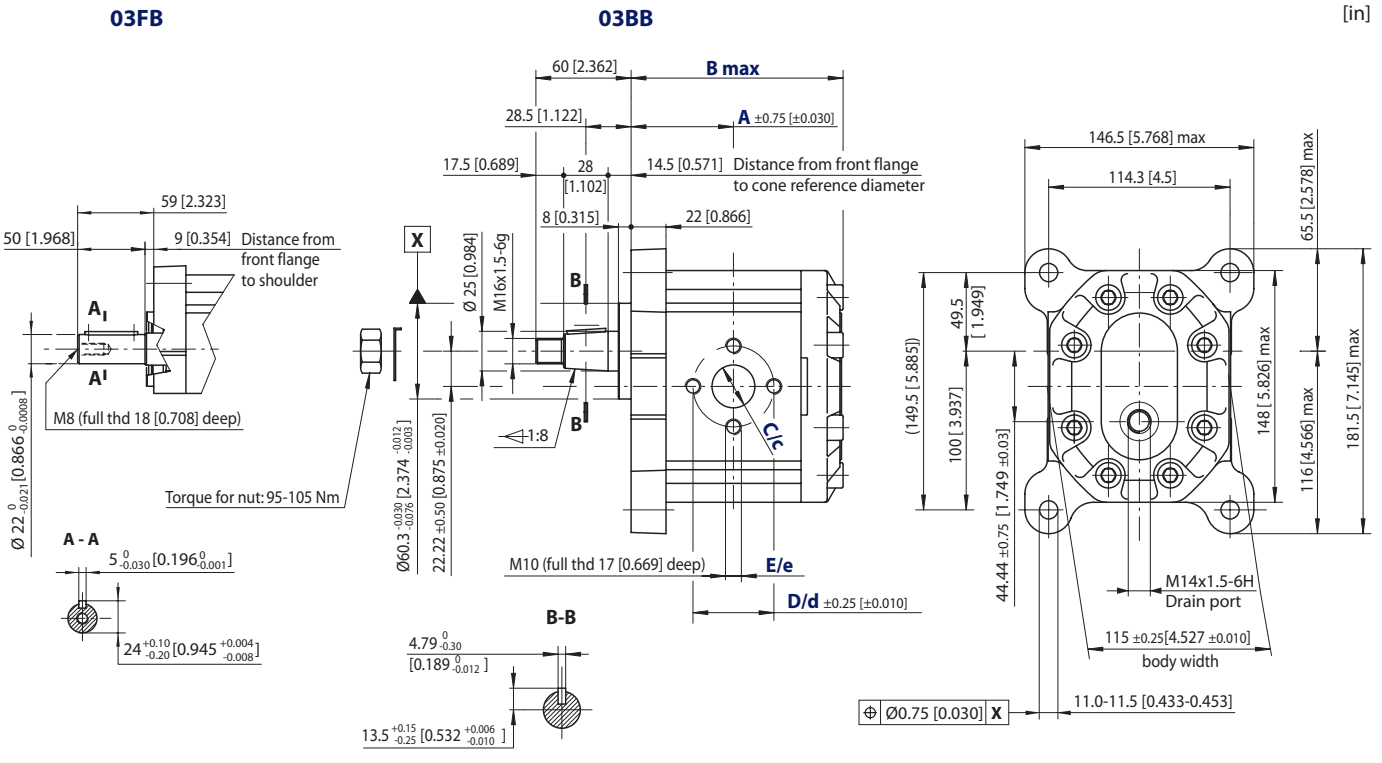
Flange/drive gear	Model code example	Maximum shaft torque
02FA	SNM3NN/044BN02FAM1CACANNNN/NNNNN	210 N•m [1858 lb•in]
02DA	SNM3NN/033BN02DAM1CACANNNN/NNNNN	290 N•m [2566 lb•in]
02BA	SNM3NN/026BN02BAM1C7C7NNNN/NNNNN	350 N•m [3097 lb•in]

For further details on ordering, see Model Code, pages 54-58.

SNM3NN, SNU3NN – 03FB and 03BB

Standard porting drawing for 03FB and 03BB

mm
[in]



Bidirectional motors dimensions – 03FB and 03BB*

Frame size		022	026	033	038	044	048	055	063	075	090
Dimension	A	61 [2.4]	63 [2.48]	64.5 [2.54]	66.5 [2.62]	69.5 [2.74]	72.5 [2.854]	75 [2.95]	78 [3.07]	82 [3.23]	87 [3.43]
	B	132.5 [5.22]	135.5 [5.33]	140.5 [5.53]	144.0 [5.67]	148.5 [5.85]	151.5 [5.96]	156.5 [6.16]	162.5 [6.4]	170.5 [6.71]	180.5 [7.11]
Inlet/Outlet	C/c	18 [0.71]		27 [1.063]							
	D/d	55 [2.16]									
	E/e	M8									

* For unidirectional SNU3NN dimensions, see SNU3NN ports, pages 65 and 66.

For unidirectional motors no case drain hole into the rear cover.

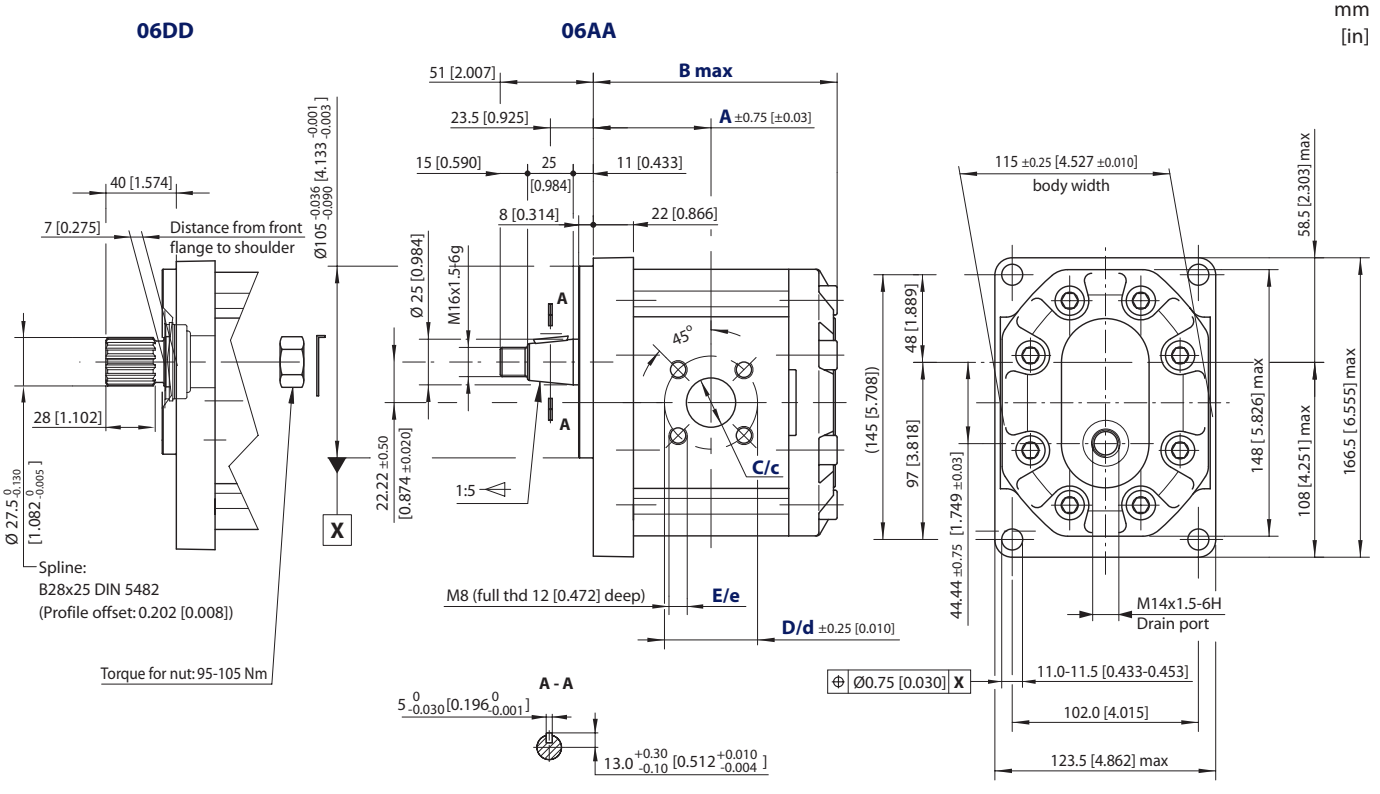
Model code examples and maximum shaft torque

Flange/drive gear	Model code example	Maximum shaft torque
03FB	SNM3NN/063BN03FBM1CACANNNN/NNNNN	300 N•m [2655 lb•in]
03BB	SNM3NN/090BN03BBM1CACANNNN/NNNNN	500 N•m [4425 lb•in]

For further details on ordering, see Model Code, pages 54-58.

SNM3NN, SNU3NN – 06AA

Standard porting drawing for 06AA



Bidirectional motors dimensions – 06DD AND 06AA *

Frame size		022	026	033	038	044	048	055	063	075	090
Dimension	A	63.0 [2.480]	64.5 [2.539]	67.0 [2.637]	68.8 [2.708	71.0 [2.795]	72.5 [2.854]	75.0 [2.952]	78.0 [3.070]	82.0 [3.228]	87.0 [3.425]
	B	132.5 [5.216]	135.5 [5.334]	140.5 [5.531]	144.0 [5.669]	148.5 [5.846]	151.5 [5.964]	156.5 [6.161]	162.5 [6.397]	170.5 [6.712]	180.5 [7.106]
Inlet/Outlet	C/c	20 [0.79]		27 [1.063]							
	D/d	40 [1.58]		51 [2.007]							
	E/e	M8		M10							

* For unidirectional SNU3NN dimensions, see SNU3NN ports, pages 65 and 66.

For unidirectional motors no case drain hole into the rear cover.

Model code examples and maximum shaft torque

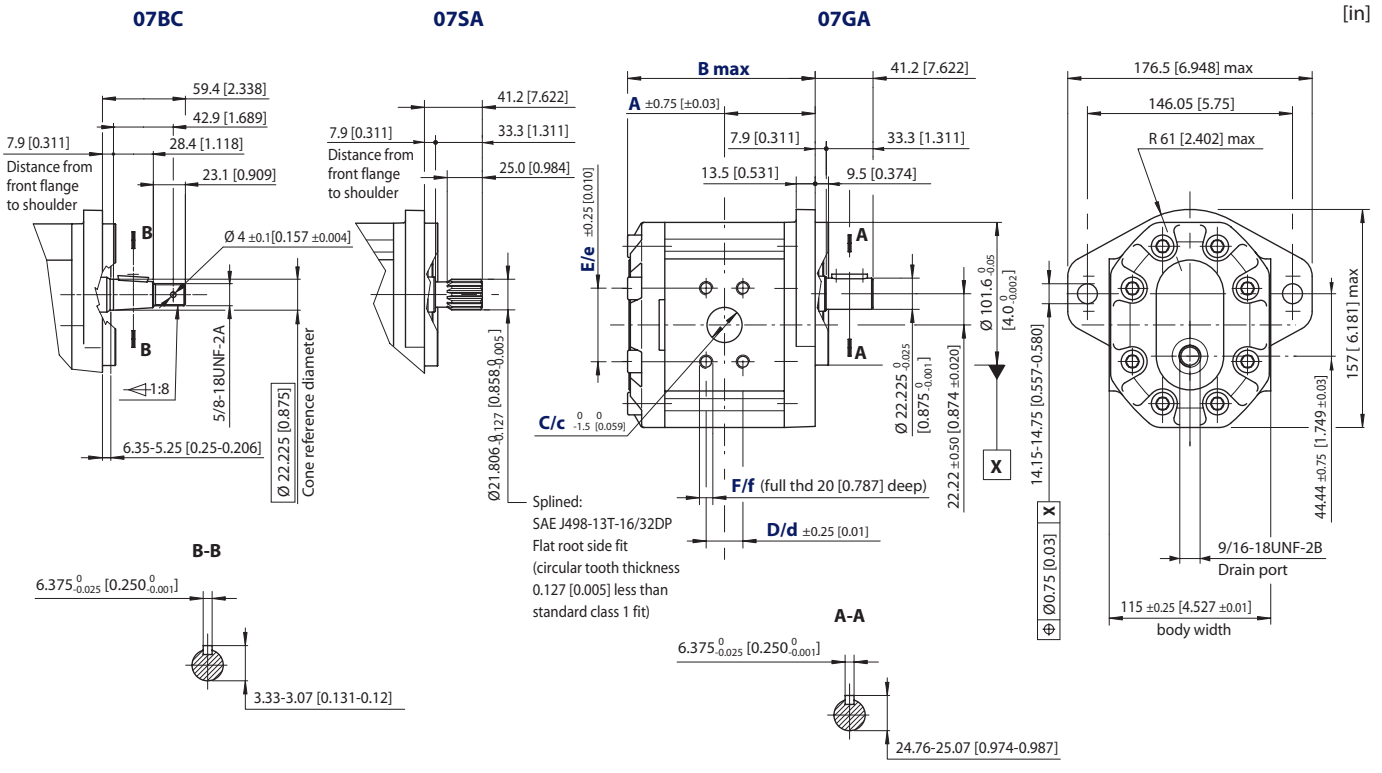
Flange/drive gear	Model code example	Maximum shaft torque
06DD	SNM3NN/044BN06DDM1BBBBNNNN/NNNNN	300 N•m [2655 lb•in]
06AA	SNM3NN/022BN06AAM1BABANNNN/NNNNN	450 N•m [3982 lb•in]

For further details on ordering, see Model Code, pages 54-58.

SNM3NN, SNU3NN – 07BC, 07SA and 07GA

Standard porting drawing for 07BC, 07SA and 07GA

mm
[in]



Bidirectional motors dimensions – 07BC, 07SA and 07GA*

Frame size		022	026	033	038	044	048	055	063	075	090
Dimension	A	63.0 [2.480]	64.5 [2.539]	67.0 [2.637]	68.8 [2.708	71.0 [2.795]	72.5 [2.854]	75.0 [2.952]	78.0 [3.070]	82.0 [3.228]	87.0 [3.425]
	B	132.5 [5.216]	135.5 [5.334]	140.5 [5.531]	144.0 [5.669]	148.5 [5.846]	151.5 [5.964]	156.5 [6.161]	162.5 [6.397]	170.5 [6.712]	180.5 [7.106]
Inlet/Outlet	C/c	25.4 [1]		31.8 [1.251]							
	D/d	26.19 [1.031]		30.18 [1.188]							
	E/e	52.37 [2.061]		58.72 [2.311]							
	F/f	3/8–16UNC–2B		7/16–14UNC–2B							

* For unidirectional SNU3NN dimensions, see SNU3NN ports, pages 65 and 66.

For unidirectional motors no case drain hole into the rear cover.

Model code examples and maximum shaft torque

Flange/drive gear	Model code example	Maximum shaft torque
07BC	SNM3NN/026BN07BCM6A3A3NNNN/NNNNN	300 N•m [2655 lb•in]
07SA	SNM3NN/063BN07SAM6A4A4NNNN/NNNNN	270 N•m [2389 lb•in]
07GA	SNM3NN/090BN07GAM6A4A4NNNN/NNNNN	230 N•m [2035 lb•in]

For further details on ordering, see Model Code, pages 54-58.

Notes

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