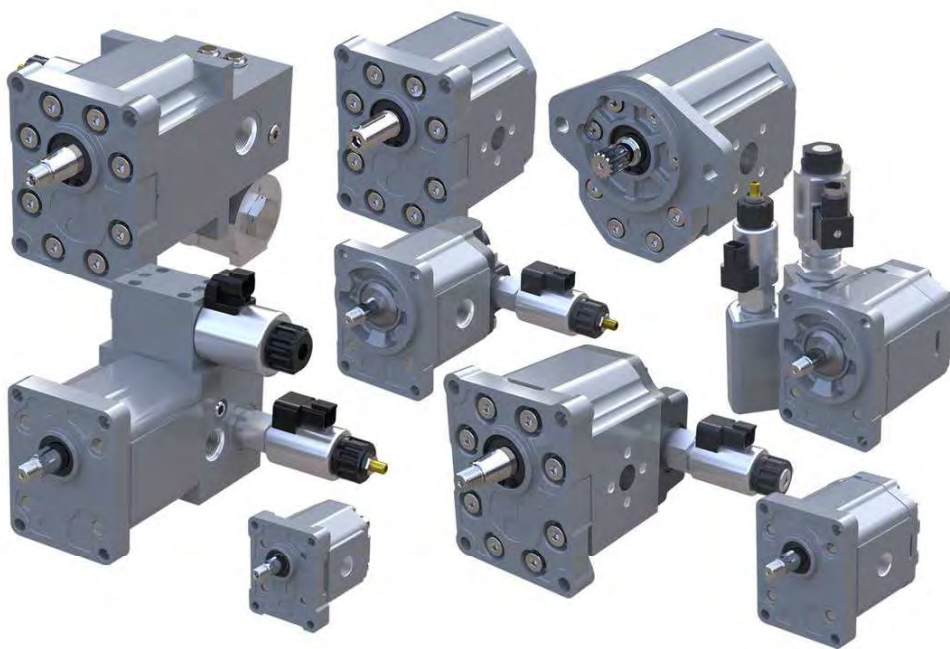


Technical Information

Gear Motors

Group 1, 2, and 3





Hydraulik · Automation



Technical Information

Gear Motors Group 1, 2, and 3

Revision history

Table of revisions

Date	Changed	Rev
July 2021	Minor corrections to data made	0102
October 2019	First edition	0101

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General information

Overview

The Danfoss 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 Danfoss Gear Motors ideal for a wide range of applications sectors including on- and off-highway hydraulic fan drive systems, turf care, road bidge, 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



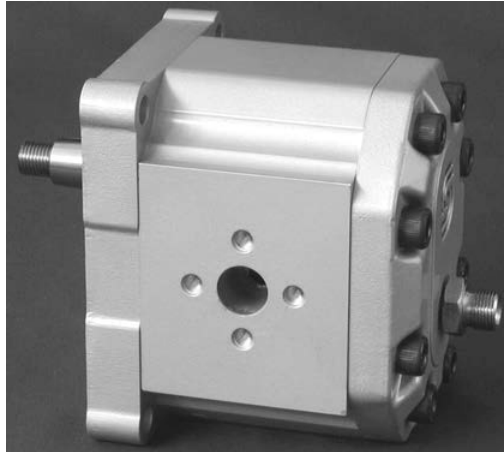
SNM2NN9JDB



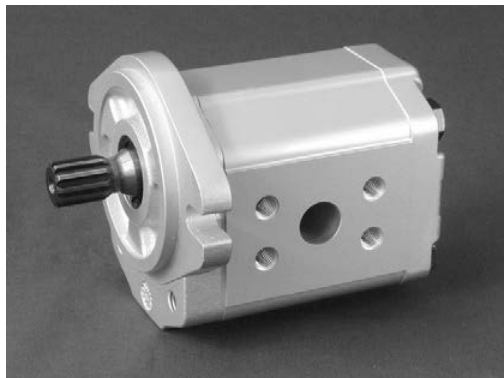


General information

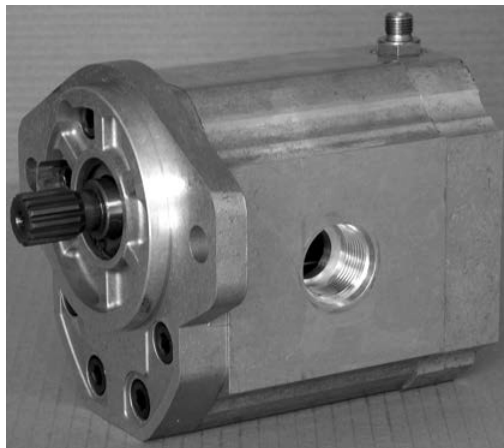
SNM3NN01BA



SNU2NN 06SA

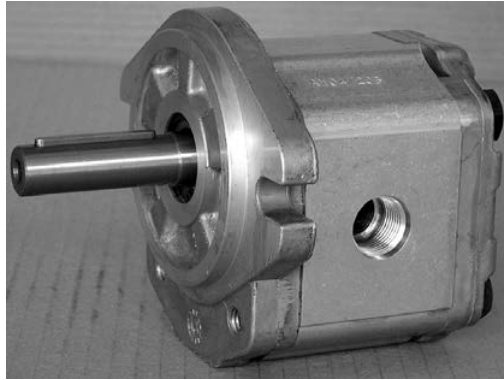


SNM3NL 07SA



General information

SNU2NN 06GB

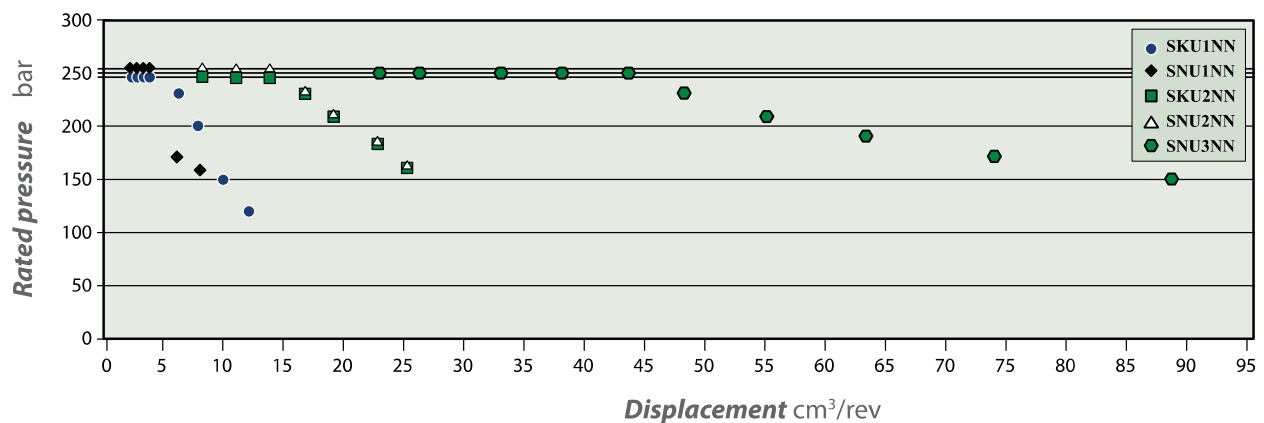


Features and benefits

- 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

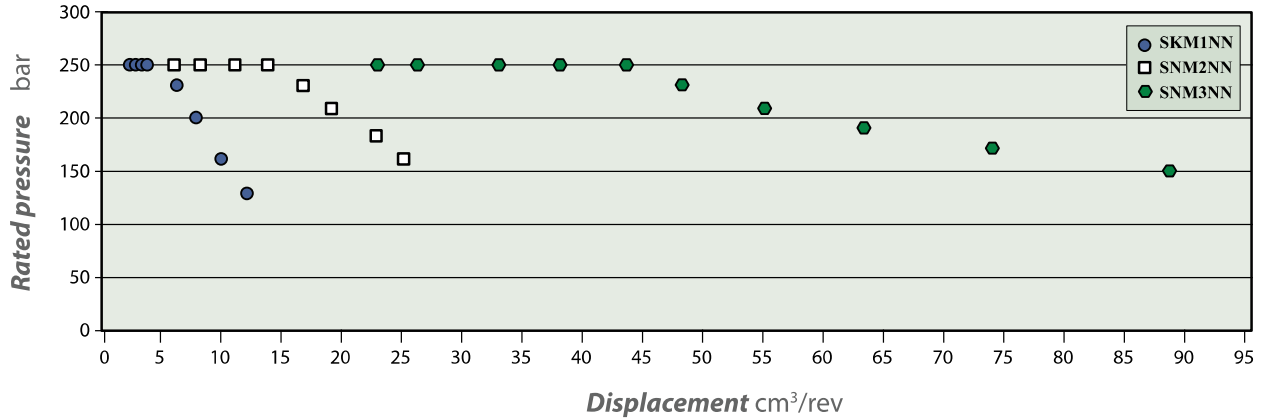
Motor displacements

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



General information

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


Determination of nominal motor size
Based on SI units

$$Q_e = \frac{V_g \cdot n}{1000 \cdot \eta_v}$$

$$M_e = \frac{V_g \cdot \Delta p \cdot \eta_{mh}}{20 \cdot \pi}$$

$$P_e = \frac{M_e \cdot n}{9550} = \frac{Q_e \cdot \Delta p \cdot \eta_t}{600}$$

$$n = \frac{Q_e \cdot 1000 \cdot \eta_v}{V_g}$$

Where:

Q_e	Input flow [l/min]
M_e	Output torque [N·m]
P_e	Output power [kW]
n	Speed [min ⁻¹]
V_g	Motor displacement per rev. (cm ³ /rev)
P_{high}	High pressure (bar)
P_{low}	Low pressure (bar)
Δp	High pressure minus Low pressure (bar)
η_v	Motor volumetric efficiency
η_{mh}	Mechanical-hydraulic efficiency
η_t	Motor total efficiency (η _v · η _{mh})

Based on US units

$$Q_e = \frac{V_g \cdot n}{231 \cdot \eta_v}$$

$$M_e = \frac{V_g \cdot \Delta p \cdot \eta_{mh}}{2 \cdot \pi}$$

$$P_e = \frac{V_g \cdot n \cdot \Delta p \cdot \eta_t}{396\,000}$$

$$n = \frac{Q_e \cdot 231 \cdot \eta_v}{V_g}$$

Where:

Q_e	Input flow [US gal/min]
M_e	Output torque [lb·in]
P_e	Output power [hp]
n	Speed [rpm]
V_g	Motor displacement per rev. [in ³ /rev]
P_{high}	High pressure [psi]
P_{low}	Low pressure [psi]
Δp	High pressure minus Low pressure [psi]
η_v	Motor volumetric efficiency
η_{mh}	Mechanical-hydraulic efficiency
η_t	Motor total efficiency (η _v · η _{mh})

System Requirements

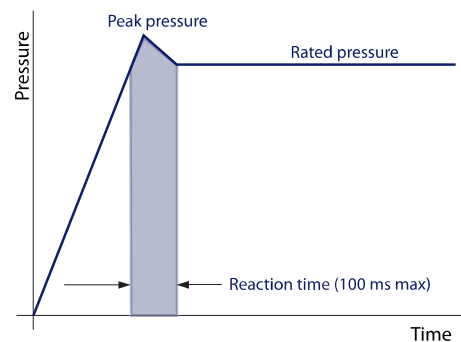
Pressure

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).

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.

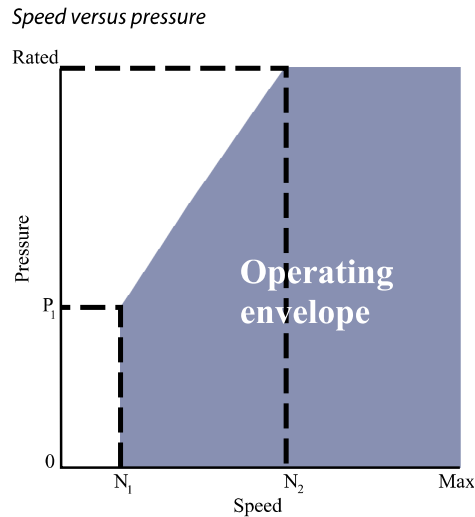
Speed

Maximum speed is the limit recommended by Danfoss 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 below.

System Requirements



Where:

N_1 = Minimum speed at 100 bar

N_2 = Minimum speed at rated pressure

Hydraulic Fluids

Ratings and data for gear motors are guaranteed when the hydraulic system operates with premium hydraulic fluids without containing oxidation, rust, or foam inhibitors.

These fluids have to work with good thermal and hydrolytic stability to prevent wear, erosion, or 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

Caution

Use only clean fluid in the gear motors and hydraulic circuit. Never mix hydraulic fluids.

Temperature and Viscosity

Temperature and viscosity requirements must be concurrently met. Use of petroleum/mineral-based fluids is highly recommended.

High temperature limits apply at the inlet port of the motors. The motors should operate at or below the maximum continuous temperature. The peak temperature is based on material properties.

Don't exceed it.

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

Cold oil, generally, doesn't affect the durability of motors 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.

System Requirements

Temperature limits (with standard NBR seals)

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

Minimum viscosity occurs only during brief occasions of maximum ambient temperature and severe duty cycle operation.

Maximum viscosity occurs at cold start only. 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
- Keep the fluid viscosity in the recommended viscosity range for maximum unit efficiency and bearing life

Fluid viscosity limits, in mm²/s [SUS]

Maximum (cold start)	Recommended range	Range for high efficiency	Minimum
1600 [7273]	12-100 [66-456]	20-50 [97-231]	10 [60]

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 ingress rate (determined by factors such as the number of actuators used in the system)
- Generation of contaminants in the system
- Required fluid cleanliness
- Desired maintenance interval
- Filtration requirements of other system components

Measure filter efficiency with a Beta ratio (β_x). 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 (in microns) upstream of the filter to the number of these particles downstream of the filter.

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

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

Fluid cleanliness level and β_x ratio

Fluid cleanliness level (per ISO 4406)	Class 22/18/13 or better
β_x ratio (discharge filtration)	$\beta_{35-45} = 75$ and $\beta_{10} = 2$
β_x ratio (pressure or return filtration)	$\beta_{10} = 75$
Recommended inlet screen size	100 – 125 μm [0.004 – 0.005 in]

Reservoir

The **reservoir** provides clean fluid, dissipates heat, removes entrained air, and allows fluid volume changes associated with fluid expansion and cylinder differential volumes. A correctly sized reservoir

System Requirements

accommodates maximum volume changes during all system operating modes. It promotes de-aeration 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 from all retracted cylinders, allowing for expansion due to temperature changes. A fluid volume of 1 to 3 times the pump output flow (per minute) is satisfactory. The minimum reservoir capacity is 125% of the fluid volume.

Install the suction line above the bottom of the reservoir to take advantage of gravity separation and prevent large foreign particles from entering the line. Cover the line with a 100-125 micron screen. The pump should be below the lowest expected fluid level.

Put the return-line below the lowest expected fluid level to allow discharge into the reservoir for maximum dwell and efficient deaeration. A baffle (or baffles) between the return and suction lines promotes deaeration and reduces fluid surges.

Line sizing-x

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

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

Maximum line speed

Inlet	Outlet	Return
5 m/s [16.4 ft/sec]	2.5 m/s [8.2 ft/sec]	3 m/s [9.8 ft/sec]

Most systems use hydraulic oil containing 10% dissolved air by volume.

Over-aeration, or entrained air is the result of flow line restrictions, where the dissolved air comes out of solutions, or when air is allowed to leak into the hydraulic circuit. These include inadequate pipes size, sharp bends, or elbow fittings causing a reduction of flow-line cross-sectional area. This problem will not occur if these circuit recommendations are followed, rated speed requirements are maintained, and reservoir size and location are adequate.

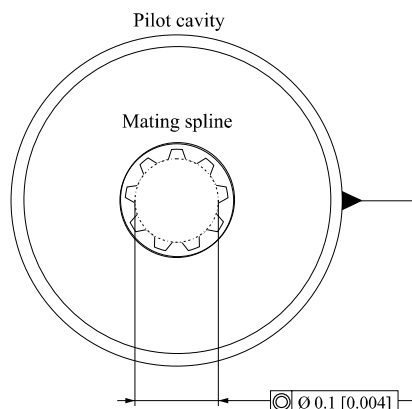
Motor shaft connection

Shaft options for gear motors include tapered, splined, and parallel 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 only if the concentricity between the mating spline and pilot diameter is within 0.1 mm [0.004 in]. Lubricate the drive by flooding with oil. A three-piece coupling minimizes radial or thrust shaft loads.

Motor shaft connection

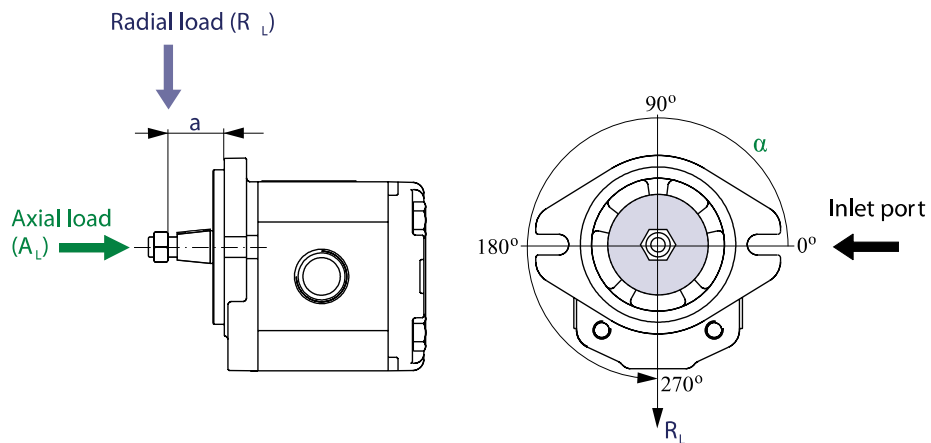


System Requirements

To avoid spline shaft damage, use carburized and hardened steel couplings with 80-82 HRA surface hardness.

Motor shaft load data form

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



Application data

Item	Value	Based on SI or US units	
Motor displacement		<input type="checkbox"/> cm ³ /rev	<input type="checkbox"/> in ³ /rev
Rated system pressure		<input type="checkbox"/> bar	<input type="checkbox"/> psi
Peak pressure			
Motor shaft rotation		<input type="checkbox"/> left	<input type="checkbox"/> right
Motor minimum speed		min ⁻¹ (rpm)	
Motor maximum speed			
Radial load	R₁	<input type="checkbox"/> N	<input type="checkbox"/> lbf
Angular orientation of radial load to inlet port	α	degree	
Axial load	A₁	<input type="checkbox"/> N	<input type="checkbox"/> lbf
Distance from flange to radial load	a	<input type="checkbox"/> mm	<input type="checkbox"/> in

Motor Life

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

All Danfoss 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.

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.

B₁₀ life expectancy number is generally associated with rolling element bearings. It does not exist for hydrodynamic bearings.

Danfoss strongly recommends 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, 02BB, 02FA, 06GA, 06SA).

SKM1NN 06SA



SKU1NN

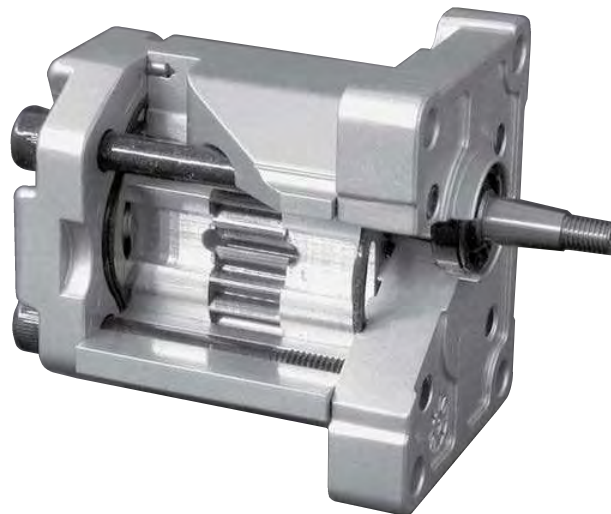
SKU1NN is a Group 1 unidirectional motor available in the whole displacements range from 2.6 up to 12 cm³/rev [from 0.158 up to 0.732 in³/rev]. The SKU1NN motor construction is derived from the correspondent pump SKP1NN.

Configurations include European and SAE flanges and shafts (Code 01BA, 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 Information
Gear Motors Group 1, 2, and 3
Group 1 Gear motors
Technical data

		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		250 [3625]	250 [3625]	250 [3625]	250 [3625]	230 [3335]	200 [2900]	160 [2320]	130 [1895]
Back pressure		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		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		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		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		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		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]

$$1 \text{ kg}\cdot\text{m}^2 = 23.68 \text{ lb}\cdot\text{ft}^2$$

 **Caution**

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

Model code
A Family

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

Group 1 Gear motors

SNU1NN	Unidirectional gear motor
SKU1NN	High torque unidirectional gear motor
SKM1NN	Bidirectional gear motor
SKM1IN	Bidirectional gear motor with relief valve

B Displacement

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

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

C Rotation

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

L	Left (Counterclockwise)
R	Right (Clockwise)
B	Bidirectional

D Project version

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

N	Std Version of Project
----------	------------------------

E Mounting flange

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

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

F Drive Gear

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

Technical Information
Gear Motors Group 1, 2, and 3
Group 1 Gear motors

BA	Taper 1:8-M7-Key2,41 SKP1
BB	Taper 1:8-M10x1-Key 3
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

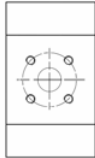
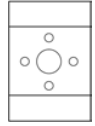

G Rear cover

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

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




H Inlet size; I Outlet size

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

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

Technical Information

Gear Motors Group 1, 2, and 3
Group 1 Gear motors

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

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

N	Std from catalog
----------	------------------

K Seals

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

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

L Screws

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

N	Std screws
B	GEOMET screws - Anticorrosion screws

M Set valves

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

NNN	No valve
V*	Integralrelief valve pressure setting

* For details, see [Variant codes for ordering intergral relief valve](#) on page 24.

Group 1 Gear motors
N Type of mark

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

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

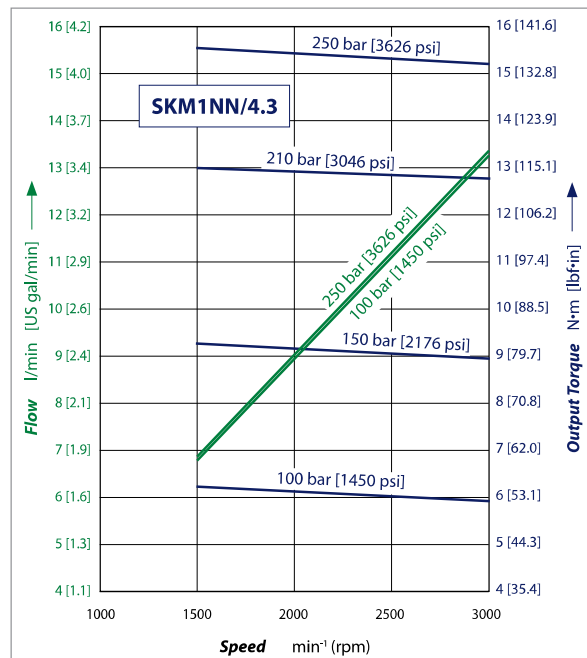
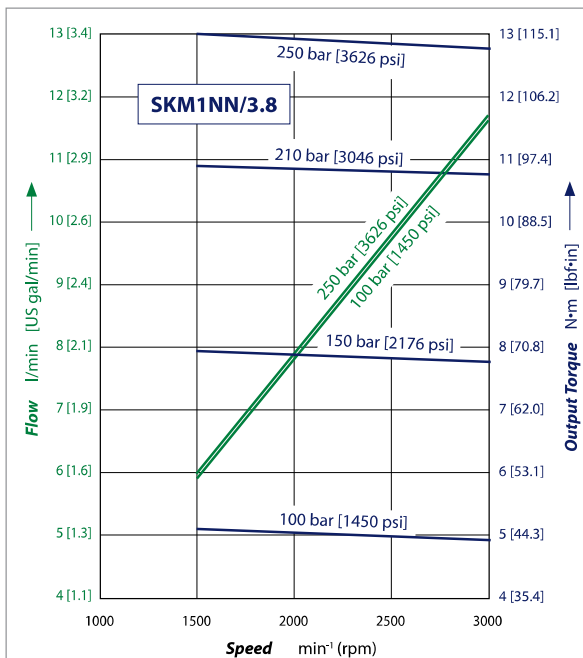
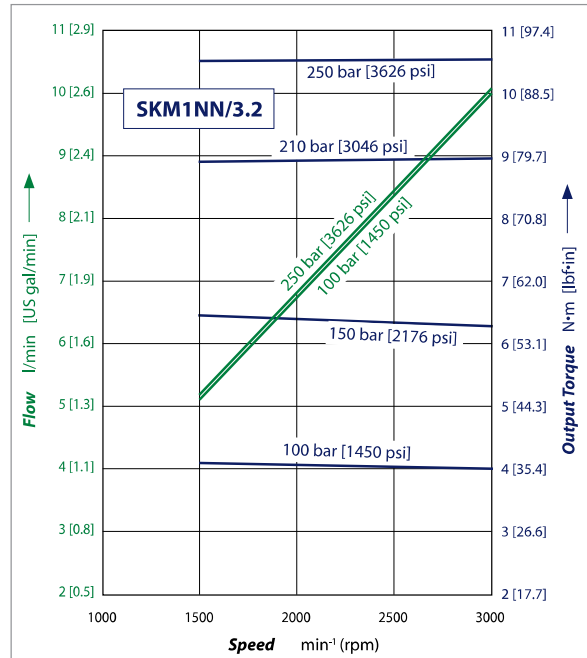
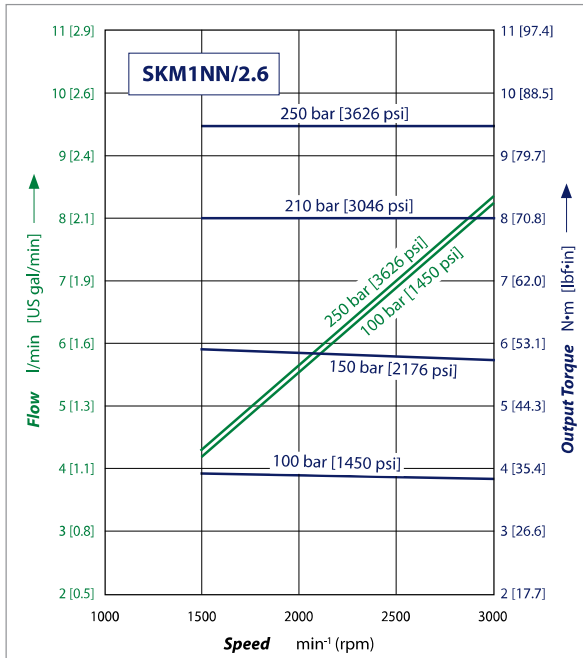
O Mark position

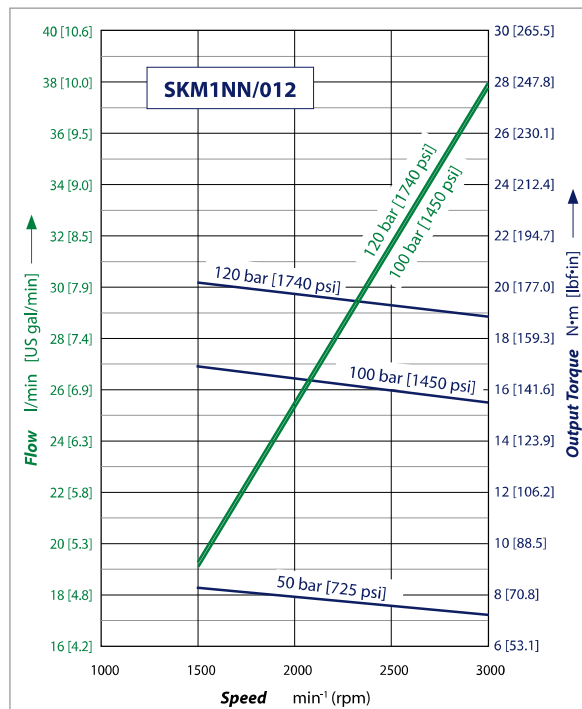
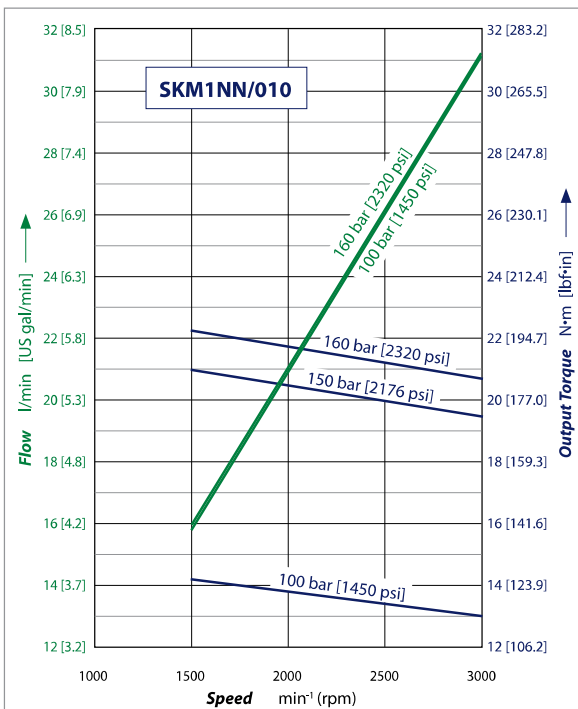
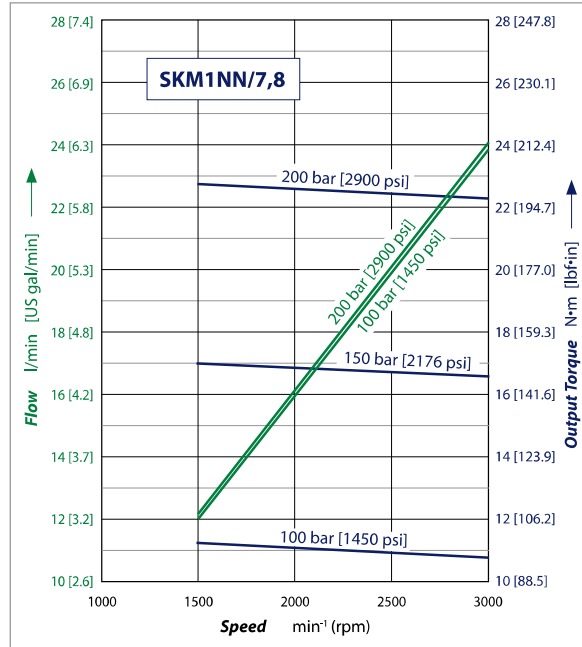
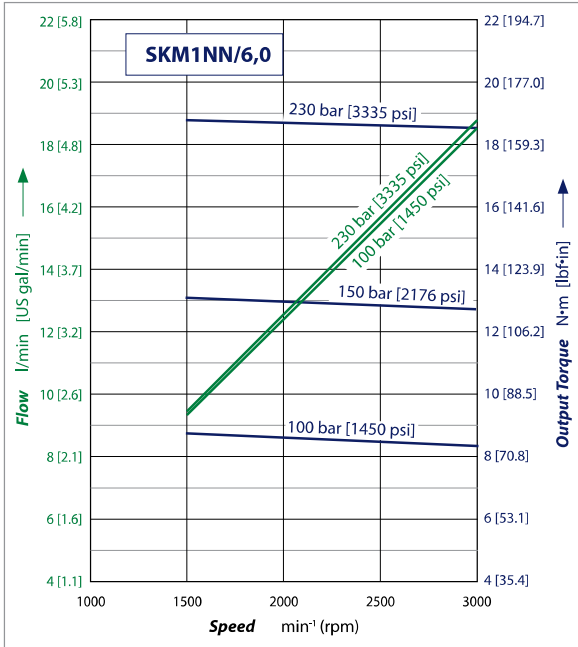
A	B	C	D	E	F	G	H	I	J	K	L		M	N	O
												/			•

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

Motor performance graphs

The following graphs provide typical inlet flow and output torque 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]).

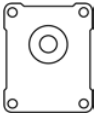
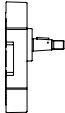
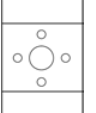
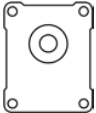
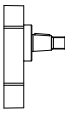
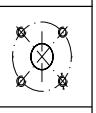
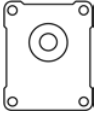
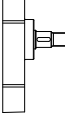
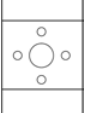
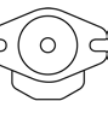
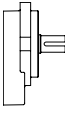
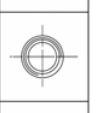

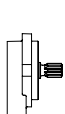
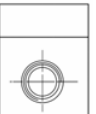
Technical Information
Gear Motors Group 1, 2, and 3
Group 1 Gear motors


Technical Information
Gear Motors Group 1, 2, and 3
Group 1 Gear motors


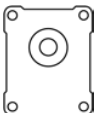
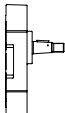
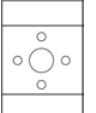
Technical Information

Gear Motors Group 1, 2, and 3
Group 1 Gear motors
Flange, shaft and port configurations

...For SKM1NN and SKU1NN

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	

...For SNU1NN

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.

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

Group 1 Gear motors

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]	-
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]

Recommended mating splines for Group 1 splined output shafts should be in accordance with SAE J498 or DIN 5482. Danfoss 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 Danfoss representative for availability.

⚠ Caution

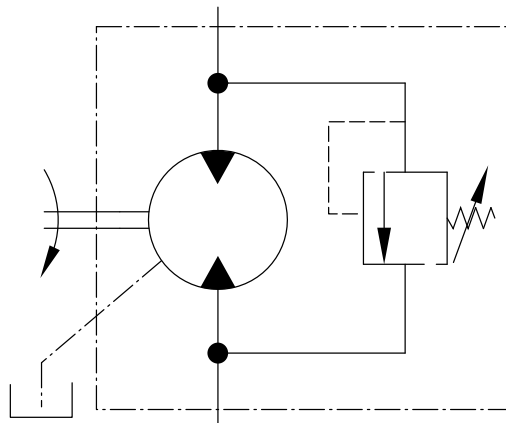
Shaft torque capability may limit allowable pressure. Torque ratings assume no external radial loading. Applied torque must not exceed these limits, regardless of stated pressure parameters. Maximum torque ratings are based on shaft torsional fatigue strength.

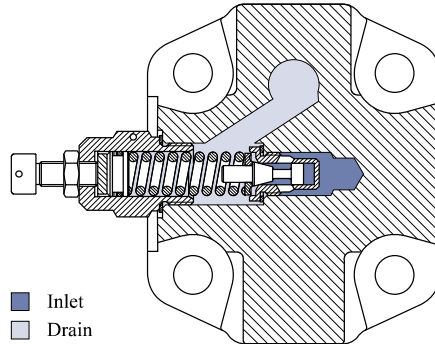
Integral relief valve - SKM1IN

Danfoss 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.

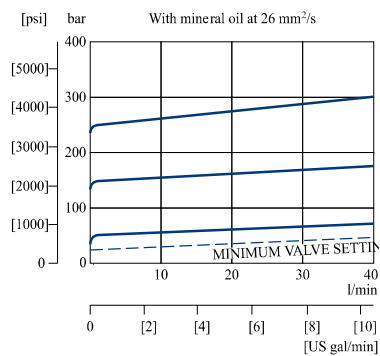
The tables below show applicable variant codes for ordering motors with integral relief valve. Refer to [Model code](#) on page 15 for more information.

Valve schematic diagram



Group 1 Gear motors
Integral relief valve rear cover cross section


P101 016

Pressure vs flow

Variant codes for ordering intergral relief valve
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

Group 1 Gear motors
M Variant code (left part) (continued)

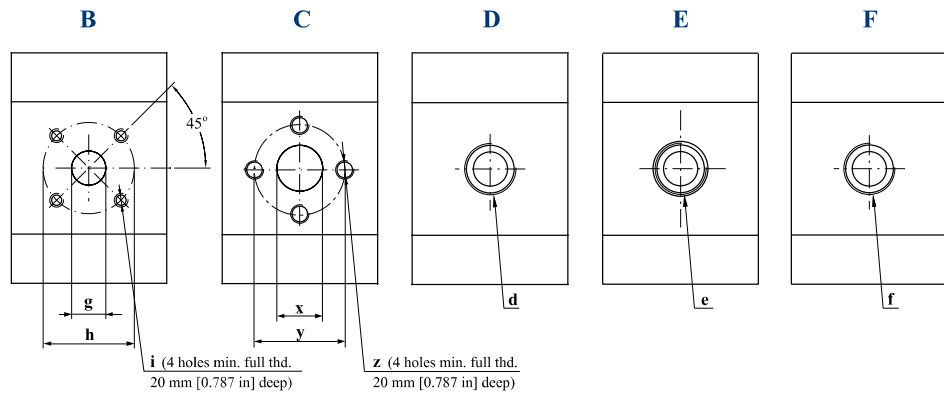
Code	Motor speed for RV setting min ⁻¹ (rpm)
N	3000
O	3250

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]
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]

Technical Information
Gear Motors Group 1, 2, and 3
Group 1 Gear motors
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	3/4-16UNF-2B	3/8 Gas (BSPP)
Drain	M12x1.5			M12x1.5			M12x1.5	7/16-20UNF-2B	1/8 Gas (BSPP)

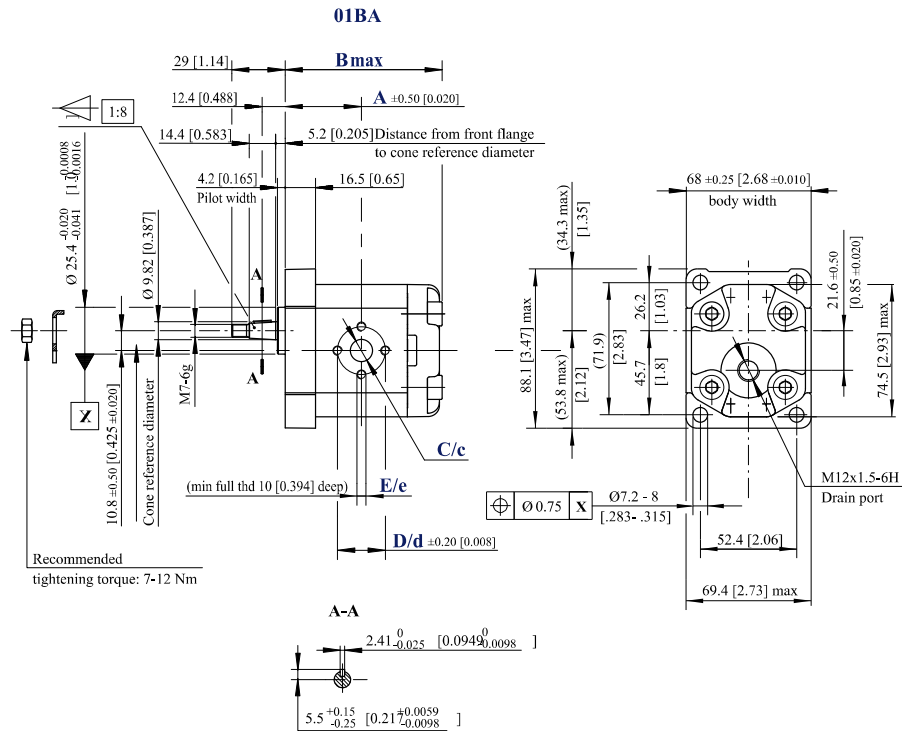
Group 1 Gear motors
Unidirectional motor ports
SKU1NN, SNU1NN unidirectional motor ports dimensions (all frame sizes)

Port type		B			C			D	E	F
Port dimensions		g	h	i	x	y	z	d	e	f
2.6	Inlet	8 [0.315]	30 [1.181]	M6	12 [0.472]	26 [1.024]	M5	M14x1 .5	9/16-18UNF- 2B	3/8 Gas (BSPP)
	Outlet	13 [0.512]						M18x1 .5	3/4-16UNF-2B	
3.2	Inlet	8 [0.315]						M14x1 .5	9/16-18UNF- 2B	
	Outlet	13 [0.512]						M18x1 .5	3/4-16UNF-2B	
3.8	Inlet	8 [0.315]						M14x1 .5	9/16-18UNF- 2B	
	Outlet	13 [0.512]						M18x1 .5	3/4-16UNF-2B	
4.3	Inlet	8 [0.315]						M14x1 .5	9/16-18UNF- 2B	
	Outlet	13 [0.512]						M18x1 .5	3/4-16UNF-2B	
6.0	Inlet	13 [0.512]						M18x1 .5	9/16-18UNF- 2B	
	Outlet	13 [0.512]						M18x1 .5	3/4-16UNF-2B	
7.8	Inlet	13 [0.512]						M18x1 .5	9/16-18UNF- 2B	
	Outlet	13 [0.512]						M18x1 .5	3/4-16UNF-2B	
010	Inlet	13 [0.512]	M18x1 .5	9/16-18UNF- 2B						
	Outlet	13 [0.512]	M18x1 .5	3/4-16UNF-2B						
012	Inlet	13 [0.512]	M18x1 .5	9/16-18UNF- 2B						
	Outlet	13 [0.512]	M18x1 .5	3/4-16UNF-2B						

Dimensions

Group 1 Gear motors
SKM1NN, SKU1NN, SNU1NN – 01BA

Standard porting drawing for 01BA



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](#) on page 26.

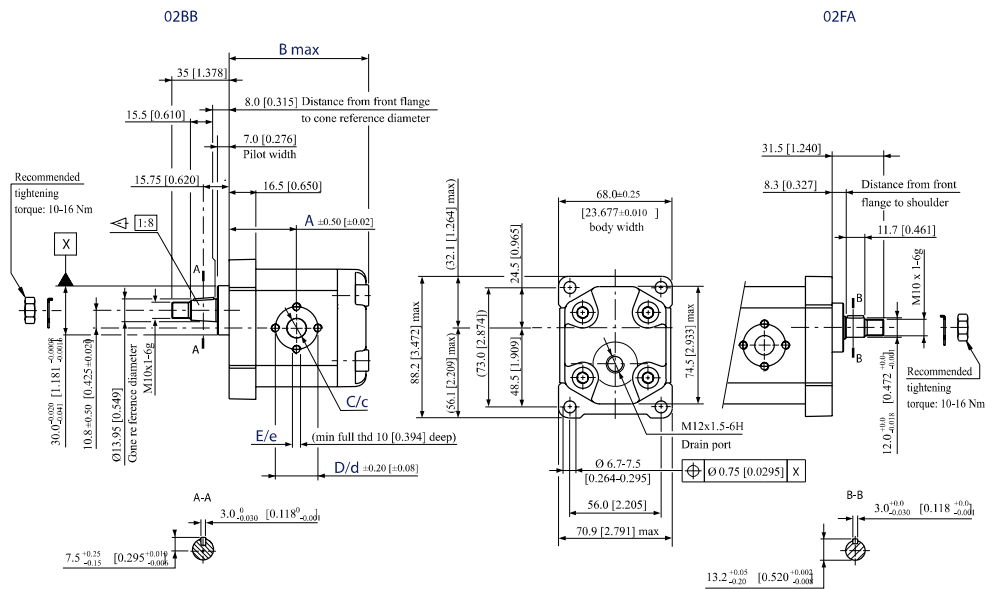
Model code examples and maximum shaft torque

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](#) on page 15.

Technical Information
Gear Motors Group 1, 2, and 3
Group 1 Gear motors
SKM1NN, SKU1NN – 02BB, 02FA

Standard porting drawing for 02BB, 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](#) on page 26.

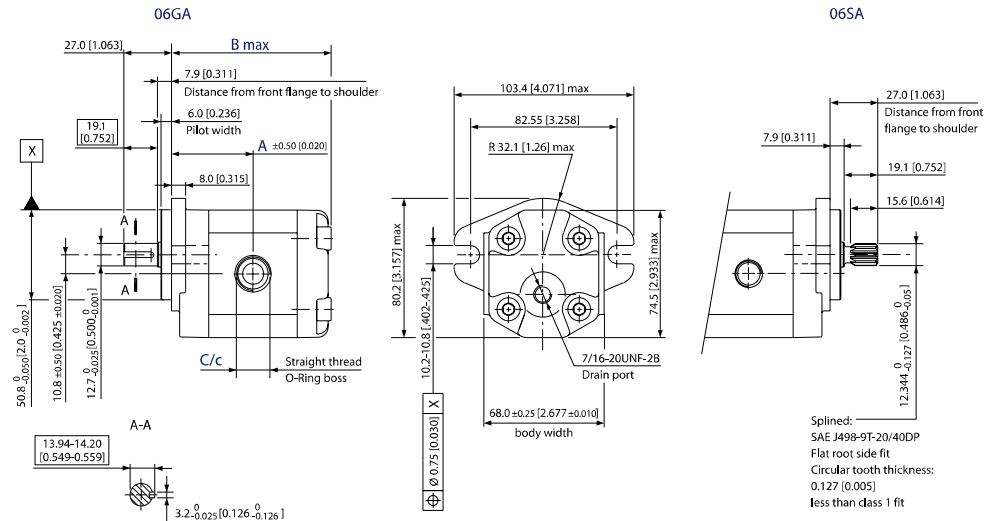
Model code examples and maximum shaft torque

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](#) on page 15.

Group 1 Gear motors
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 [3.839]	108.5 [4.015]	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](#) on page 26.

Model code examples and maximum shaft torque

Flange/drive gear	Model code example	Maximum shaft torque
06GA	SKM1NN/6,0BN06GAM6E4ENNNN/NNNNN SKU1NN/4,3RN06GAP1E3E4NNNN/NNNNN	32 N·m [283 lb·in]
06SA	SKM1NN/012BN06SAM6E4ENNNN/NNNNN SKU1NN/3,2LN06SAP1E3E4NNNN/NNNNN	34 N·m [301 lb·in]

 For further details on ordering, see [Model code](#) on page 15.