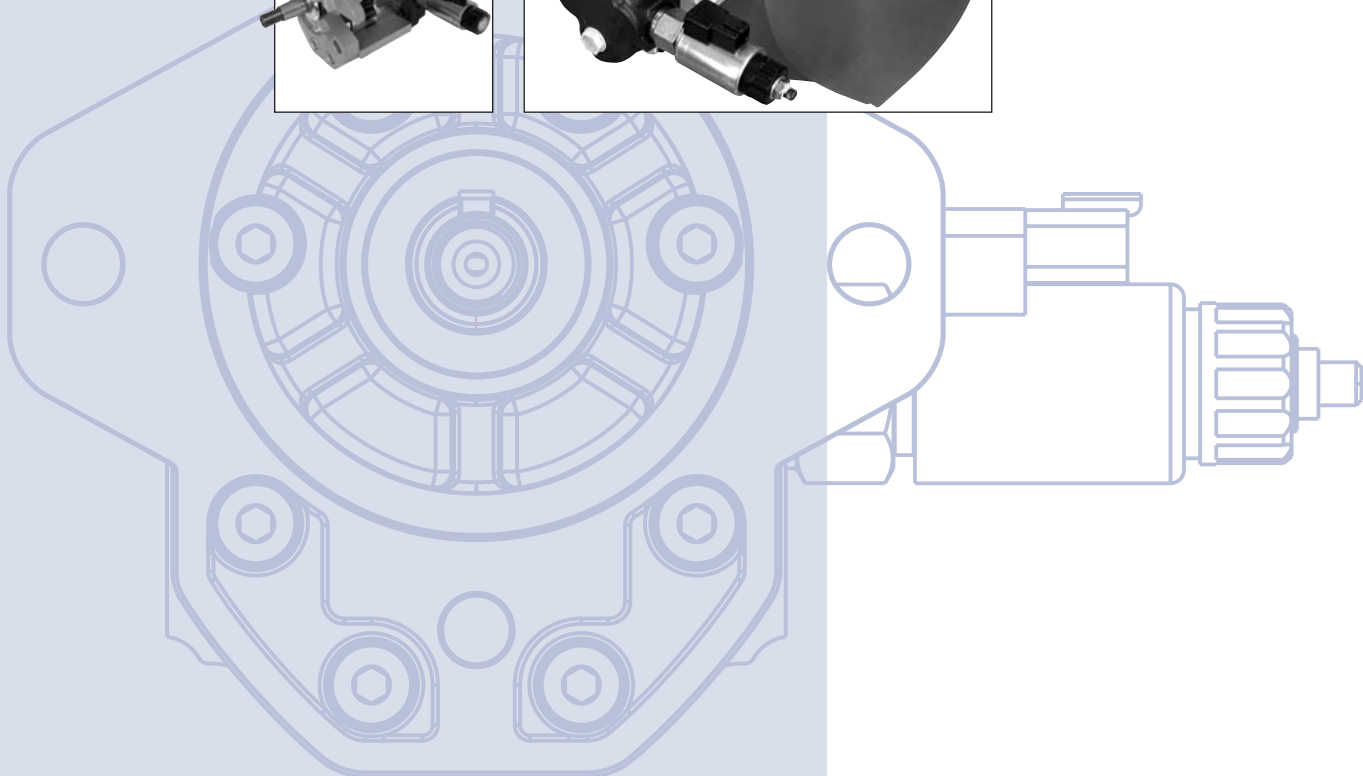
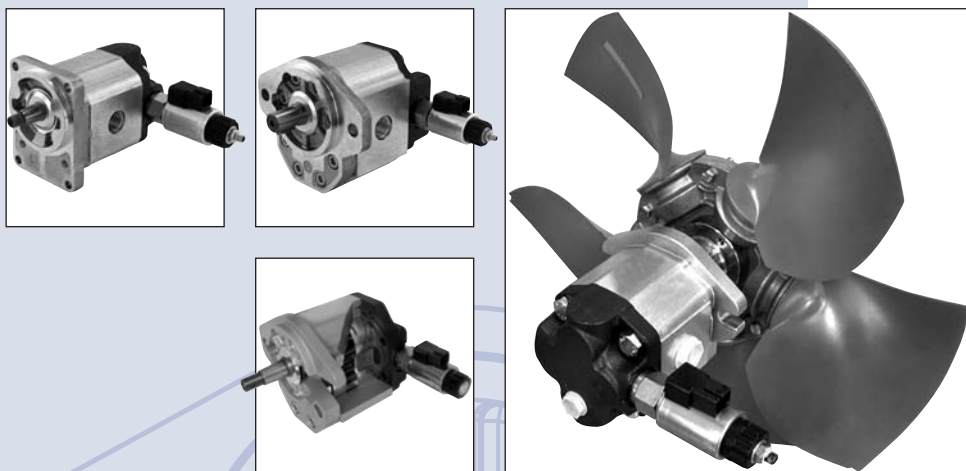




SGM2Y and SGM3Y Fan Drive Gear Motors

Technical Information



Overview

Sauer-Danfoss has over many years built up a wealth of experience with its hydraulic and electro-hydraulic fan drive systems for vehicles and machines operating both on and off highway. Modern fan drives require proportional electronic control to meet new emissions legislation. SGM2Y and SGM3Y fan drive unidirectional motors are based on the proven high performance Sauer-Danfoss gear motors.

A proportional pressure relief valve with pilot operated spool (normally closed) is integrated in the cast-iron rear cover of the motor. A gear pump supplies oil to the fan drive motor. The PWM signal to the solenoid pressure relief valve controls the oil flow through the motor which determines the fan speed. The fan speed is controlled to maintain optimum engine and hydraulic system temperatures.

Due to the versatility, flexibility and reliability of Sauer-Danfoss fan drive systems, they may be applied in numerous applications, such as:

- Agriculture machinery
- Construction machinery
- Material handling vehicles
- Road building vehicles
- Forestry machinery
- On-Highway vehicles



F005 250

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Front cover illustrations: F101 897, F101 898, F005 251, F005 250 and P005 393.

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Product Options

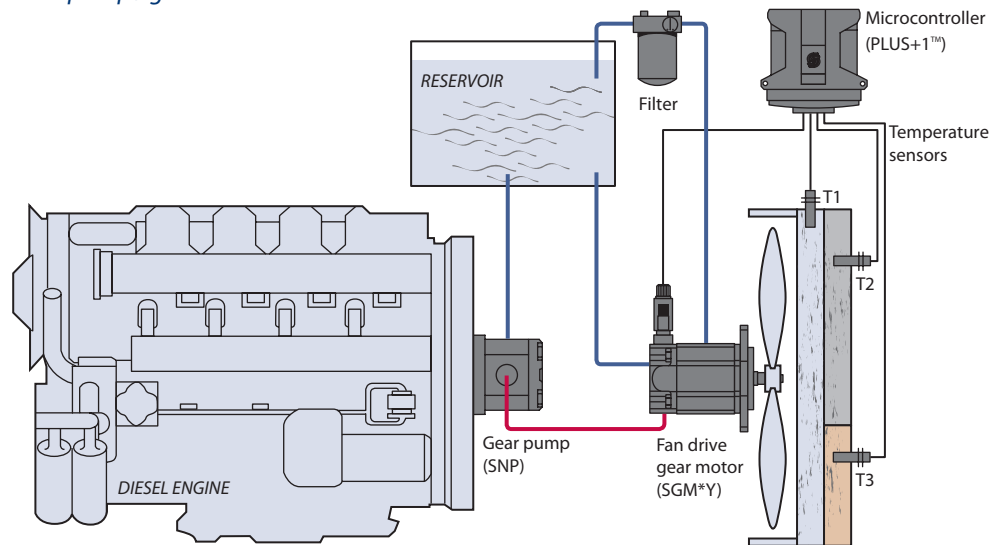
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Features and benefits

- Two groups of frame size (Group 2 and 3)
- Displacement from 8 to 44 cm³/rev [from 0.51 to 2.69 in³/rev]
- Maximum speed 3500 rpm for Group 2 and 2500 rpm for Group 3
- Rated pressure up to 250 bar [3626 psi] for Group 2 and 190 bar [2756 psi] for Group 3
- Peak pressure up to 270 bar [3916 psi] for Group 2 and 210 bar [3046 psi] for Group 3
- Operating temperatures up to 110 °C [230 °F]
- Proportional pressure relief valve with pilot operated spool, normally closed
- Deutsch connector DT 04-2P (Protection rate IP69K EN 60529)
- 12 V DC and 24 V DC
- Fail safe function - full fan speed if electrical signal fails
- Pressure settings factory pre-set for individual system performance
- Production run-in available to suit OEM application conditions and to provide optimized volumetric efficiencies
- Integrated and compact design
- Integrated anti-cavitation check valve
- Dust cover to protect the shaft seal

Fan drive motor circuit schematic

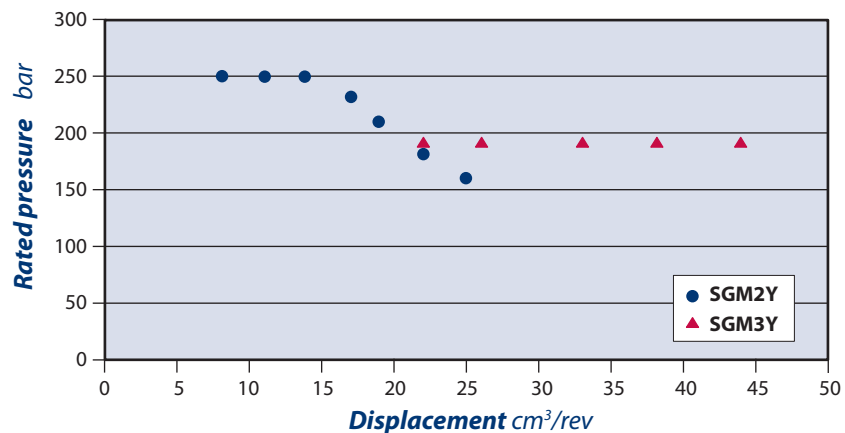
Gear pump / gear motor with electrical control



P005 390E

Fan drive motor displacements

Quick reference chart for fan drive motor models



P005 391E

Determination of nominal motor sizes

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

Based on SI units

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

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

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

Based on US units

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

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

$P = \frac{M \cdot n}{63\,025} = \frac{Q \cdot \Delta p \cdot \eta_t}{1714} \quad [\text{hp}]$

Variables SI units [US units]

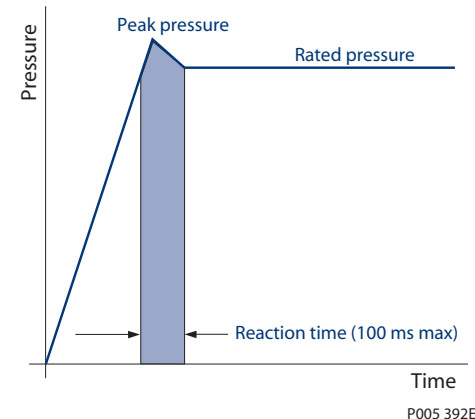
V_g	= Displacement per revolution	$\text{cm}^3/\text{rev} [\text{in}^3/\text{rev}]$
p_o	= Outlet pressure	bar [psi]
p_i	= Inlet pressure	bar [psi]
Δp	= $p_o - p_i$ (system pressure)	bar [psi]
n	= Speed	min^{-1} (rpm)
η_v	= Volumetric efficiency	
η_m	= Mechanical efficiency	
η_t	= Overall efficiency ($\eta_v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

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.

Time versus 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 motor life. The hydraulic load demand downstream of the motor determines the back pressure. The fan drive gear motor can work with back pressure and the maximum back pressure allowed is 60% of the maximum rated pressure.

Case drain pressure is the regularly occurring case drain line pressure that should yield satisfactory 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. Max. continuous case drain pressure allowed is 5 bar [72.5 psi] with a peak of 7 bar [101.5 psi].

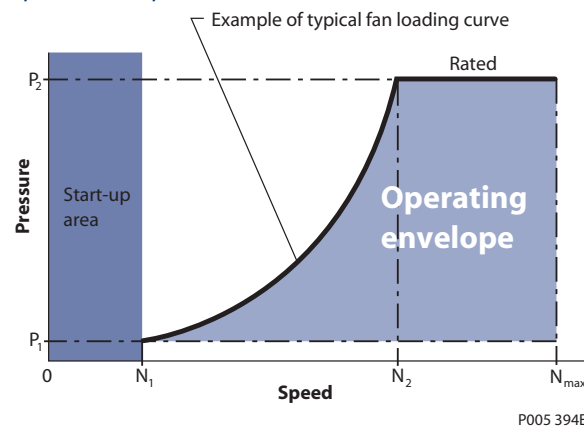
Speed

Maximum speed is the limit recommended by Sauer-Danfoss for a particular gear motor when operating at rated pressure. It is the highest speed at which normal life can be expected. N_2 is max speed related to the RV valve setting (p_2) and type of fan.

The lower limit of operating speed is the **minimum speed**. It is the lowest speed at low pressure.

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



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.

Please see Sauer-Danfoss publication *Hydraulic Fluids and Lubricants Technical Information*, **520L0463** for more information. Refer to publication *Experience with Biodegradable Hydraulic Fluids Technical Information*, **520L0465** for information relating to biodegradable fluids.

Use only clean fluid in the motor and hydraulic circuit.

⚠ Caution

Never mix hydraulic fluids.

Temperature and viscosity

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

Temperature

High temperature limits apply at the inlet port of the motor. The motor should run at or below the maximum continuous temperature.

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.

Temperature

Minimum (cold start)	°C [°F]	-20 [-4]
Maximum continuous		95 [203]
Peak (intermittent)		110 [230]

Maximum continuous temperature allowed at which normal life can be expected.

Peak (intermittent) temperature: the overheating temperature that is tolerable by the machine for a transient/limited time.

Viscosity

Minimum viscosity occurs only during brief occasions of maximum ambient temperature and severe duty cycle operation. It's the minimum acceptable viscosity to allow normal motor life.

Maximum viscosity occurs only during cold start at very low ambient temperatures. It's the upper limit of viscosity that allows the motor to start.

Fluid viscosity

Maximum (cold start)	mm ² /s [SUS]	1600 [7273]
Recommended range		12–100 [66–456]
Minimum		10 [60]
Recommended range for high efficiency		20–50 [97–231]

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):

- for discharge filtration with controlled reservoir ingress rate, use a $\beta_{35-45} = 75$ 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)	$\beta_{35-45} = 75$ 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 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, 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 recommended 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 de-aeration. A baffle (or baffles) between the return and suction lines promotes de-aeration and reduces fluid surges.

Line sizing

Choose pipe sizes that accommodate minimum fluid velocity to reduce system noise, pressure drops and overheating in order to maximize system life and performance. Line velocity should not exceed 5.0 m/s [16.4 ft/s]:

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 solution, or when air is allowed to leak into the hydraulic circuit. 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 these circuit recommendations are followed, rated speed requirements are maintained, and reservoir size and location are adequate.

Motor shaft connection

Shaft options for fan drive gear motors include tapered (1:5 and 1:8) and parallel.

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. Sauer-Danfoss fan drive gear motors are capable of carrying most manufacturer's plastic fans up to 91 cm [35.8 in] in diameter providing the fan is well balanced. An axial flow fan will subject the motor to an axial load. This load should be kept at or below 500 N [112 lbf] for Group 2 motors and 1050 N [236 lbf] for Group 3 motors.

Motor life

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

All Sauer-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.

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.

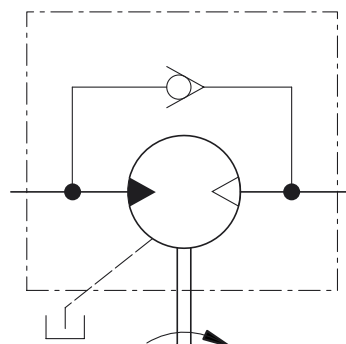
Anti-cavitation check valve

SGM2Y and SGM3Y

Sauer-Danfoss includes **integral anti-cavitation check valve** in fan drive motors bearing blocks.

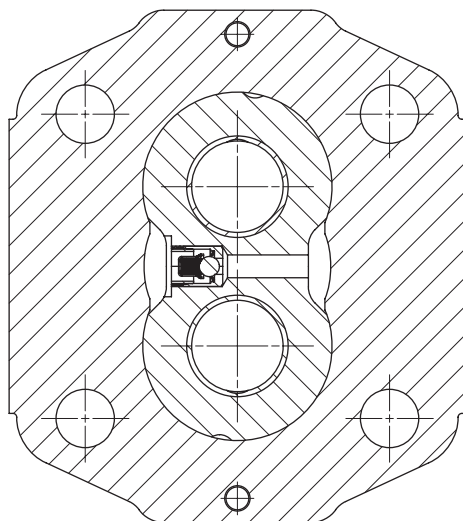
The valve directs internally the flow from the motor outlet to the inlet, when the outlet pressure gets higher than the inlet pressure.

Valve schematic example



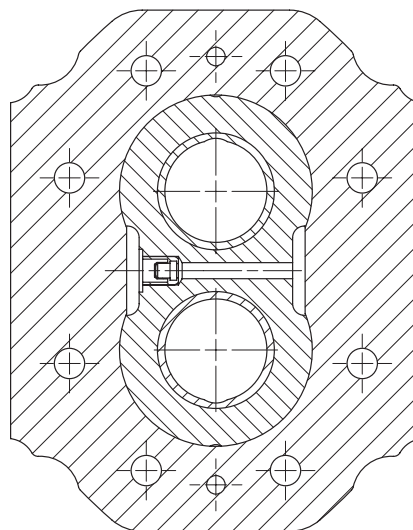
P005 384

Anticavitation check valve cross section for Group 2



P005 385

Anticavitation check valve cross section for Group 3



P005 386

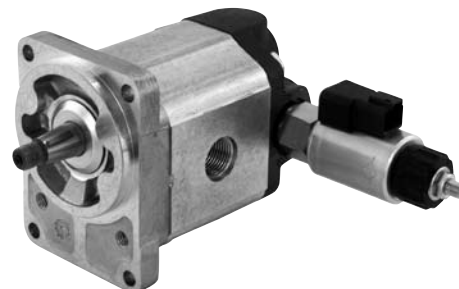
Motor design

SGM2Y

SGM2Y is the Group 2 fan drive motor available in the displacement range from 8.4 cm³/rev up to 25.2 cm³/rev [from 0.51 up to 1.54 in³/rev].

Configurations include European and SAE flanges; taper 1:8, taper 1:5 and parallel Ø15.875 mm [Dia 0.62 in] shafts.

SGM2Y



F101 897

Technical data

Technical data for SGM2Y standard fan drive gear motors

		Frame size						
		8,0	011	014	017	019	022	025
Displacement	cm ³ /rev [in ³ /rev]	8.4 [0.51]	10.8 [0.66]	14.4 [0.88]	16.8 [1.03]	19.2 [1.17]	22.8 [1.39]	25.2 [1.54]
Peak pressure	bar [psi]	270 [3916]	270 [3916]	270 [3916]	250 [3626]	230 [3336]	200 [2900]	180 [2610]
Rated pressure		250 [3626]	250 [3626]	250 [3626]	230 [3336]	210 [3046]	180 [2610]	160 [2320]
Back pressure		150 [2176]	150 [2176]	150 [2176]	150 [2176]	130 [1885]	100 [1450]	100 [1450]
Maximum speed	min ⁻¹ (rpm)	3500	3500	3500	3500	3200	3200	3200
Weight	kg [lb]	4.73 [10.43]	4.83 [10.65]	5.03 [11.1]	5.18 [11.42]	5.23 [11.53]	5.33 [11.75]	5.53 [12.2]
Moment of inertia of rotating components	x 10 ⁻⁶ kg·m ² [x 10 ⁻⁶ lbf·ft ²]	32.4 [769]	38.4 [911]	47.3 [1122]	53.3 [1265]	59.2 [1405]	68.1 [1616]	74.1 [1758]
Electrical connector	model	Deutsch DT 04-2P connectors (Protection rate IP 69K DIN 40050)						
Electrical current signal	A	0 to 1.1 A @ 12 V DC, with coil resistance of 7.2 Ω @ 20 °C [68 °F]						
		0 to 0.55 A @ 24 V DC, with coil resistance of 28.8 Ω @ 20 °C [68 °F]						
PWM frequency	Hz	from 100 to 200						

SGM2Y and SGM3Y Fan Drive Gear Motors

Technical Information

Fan Drive Gear Motors Group 2

Model code

A	B	C	D	E	F	G	H	I	J	K	L	M	N
S	G	M	2	Y	/								

A Type

SGM2YN	S = Sauer-Danfoss product; G = cast iron cover with inlet port 7/8-14UNF; M = motor; 2 = Group 2; Y = PRV10-IS2 valve, internal drain + anti-cavitation check valve on bearings; N = standard drain (axial position, driven side)
SGM2YL	S = Sauer-Danfoss product; G = cast iron cover with inlet port 7/8-14UNF; M = motor; 2 = Group 2; Y = PRV10-IS2 valve, internal drain + anti-cavitation check valve on bearings; L = drain on cover (radial position)

B Displacement

8,0	8.4 cm ³ /rev [0.51 in ³ /rev]
011	10.8 cm ³ /rev [0.66 in ³ /rev]
014	14.4 cm ³ /rev [0.88 in ³ /rev]
017	16.8 cm ³ /rev [1.02 in ³ /rev]
019	19.2 cm ³ /rev [1.12 in ³ /rev]
022	22.8 cm ³ /rev [1.39 in ³ /rev]
025	25.2 cm ³ /rev [1.54 in ³ /rev]

C Sense of rotation

R	right hand (clockwise)
L	left hand (counterclockwise)

D Version

A	Standard version
----------	------------------

E Mounting flange and shaft

02AA	Flange	European 02, pilot Ø 80 mm [Dia 3.15 in], 4-bolts
	Shaft	Taper 1:5, Key 3 – M12 x 1.25
06BA	Flange	SAE A, pilot Ø 82.55 mm [Dia 3.25 in], 2-bolts
	Shaft	Taper 1:8, Key 4 – M12 x 1.25
06GB	Flange	SAE A, pilot Ø 82.55 mm [Dia 3.25 in], 2-bolts
	Shaft	Parallel Ø 15.875 mm [Dia 0.625 in], L = 50.8 mm [2 in], with threaded hole M6 Key 4 x 40 mm [1.57 in] (extended length)

F Rear cover

Y4	Cover with proportional valve, radial drain 1/16-18UNF (driven side)
Y6	Cover with proportional valve, axial drain 1/16-18UNF (driven side)
YX	Cover with proportional valve, radial drain 1/16-18UNF (drive side)

G Inlet body port

NN	Inlet is in rear cover
-----------	------------------------

H Outlet body port

B5	15 x 35 x M6	Flanged port, 4-threaded holes in X pattern, (German standard)
B7	20 x 40 x M6	
C3	13.5 x 30 x M6	Flanged port, 4-threaded holes in + pattern, (European standard)
C7	20 x 40 x M8	
C8	23.5 x 40 x M8	
D7	M22 x 1.5	Threaded metric
D9	M26 x 1.5	
E5	7/8-14UNF	Threaded SAE, O-ring boss
E6	1-1/16-12UN	
F4	1/2 GAS	Threaded GAS (BSPP)
F5	3/4 GAS	

Model code (continued)

A	B	C	D	E	F	G	H	I	J	K	L	M	N
S	G	M	2	Y	/								
			A			Y		N	N				

Outlet port position and variant body

NN	Standard motor from catalogue
YY	B5 or B7 with SAE-A flange off-set to rear cover
ZZ	B5 or B7 in the center of the body

J Sealing

N	Standard BUNA seals and Viton shaft seal
----------	--

K Screws

N	Standard screws (galvanized)
----------	------------------------------

L Valve set at: Flow = 43 l/min [11.36 US gal/min], Oil viscosity = 26 cSt [121 SUS], $T_{oil} = 50\text{ }^{\circ}\text{C}$ [122 $^{\circ}\text{F}$]

X**	Relief valve
XA*	Voltage 12 V DC, DT connector
XB*	Voltage 24 V DC, DT connector
X*F	<p>Select Pressure vs. Bypass flow requirements using the graph below.</p> <p>Curves A, B, C represent three types of valves.</p> <p>Each valve is characterized by different nominal spring ranges.</p>
X*I	
X*M	
X*O	
X*Q	
X*S	
X*U	
X*W	<p>Pressure vs. Bypass flow graph</p> <p>The graph shows pressure (psi and bar) on the y-axis versus bypass flow (l/min and US gal/min) on the x-axis. Three sets of curves are plotted, representing different valve types: A (black), B (blue), and C (red). Each set includes curves for different nominal spring ranges: F, I, M, O, Q, S, U, W, and Y. The pressure increases linearly with bypass flow for all curves.</p>
X*Y	

M Marking

N	Standard marking
A	Standard + customer code
Z	Without marking
*	Special customer marking

N *Mark position*

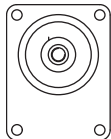
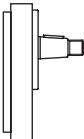

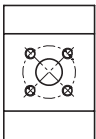
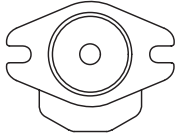
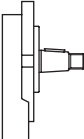

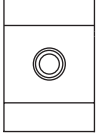
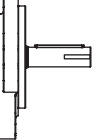
N	Standard marking position
A	On the bottom/driven gear side position

Examples of Model Code for Group 2:

- SGM2YN/014LA02AAY6NNE5NNNN/XNXAF
- SGM2YN/025RA06BAY6NNE6NNNN/XNXAQ
- SGM2YN/022L406GBY6NNE6NNNN/XNXBU

Flange, shaft and port configurations

Flange, shaft and port configurations for SGM2Y motors

Code	Flange	Shaft	Port
02AA	<p>European O2 pilot Ø 80 mm [Dia 3.15 in] 4-bolts</p> 	<p>Taper 1:5 Key 3 – M12x1.25</p> 	<p>Inlet: Threaded 7/8-14UNF on the rear cover side</p>  <p>Outlet: German standard in X pattern</p> 
06BA	<p>SAE A pilot Ø 82.55 mm [Dia 3.25 in] 2-bolts</p> 	<p>Taper 1:8, Key 4 – M12x1.25</p> 	<p>Inlet: Threaded 7/8-14UNF on the rear cover side</p>  <p>Outlet: Threaded SAE O-Ring boss</p> 
06GB		<p>Parallel Ø 15.875 mm [Dia 0.625 in] L= 50.8 mm [2 in] with threaded hole M6 Key 4 x 40 mm [1.57 in]</p> 	

Mounting flange options

Sauer-Danfoss offers two types of industry standard mounting flanges. *The table below* shows order codes for each available mounting flange and its intended use

Flange availability

A	B	C	D	E	F	G	H	I	J	K	L	M	N
S	G	M	2	Y	/								

Code	Intended use
02	European, pilot Ø 80 mm [Dia 3.15 in], 4-bolts
06	SAE A, pilot Ø 82.55 mm [Dia 3.25 in], 2-bolts

Shaft options

Shaft availability and maximum torque capability

A	B	C	D	E	F	G	H	I	J	K	L	M	N
S	G	M	2	Y	/								

Shaft		Maximum torque	
Code	Description	Code 02 flange	Code 06 flange
AA	Taper 1:5, M12 x 1.25, Key 3 [0.118]	140 Nm [1239 lb·in]	–
BA	Taper 1:8, M12 x 1.25, Key 4 [0.16]	–	150 Nm [1328 lb·in]
GB	Parallel Ø 15.875 [Dia 0.625], L 50.8 [2]	–	80 Nm [708 lb·in]

Spline configuration is not available for Group 2 fan drive motors. Other shaft options may exist. Contact your Sauer-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.

Port configurations

Standard outlet body port configurations

This table lists standard porting offered with each mounting flange:

Standard port configurations availability



Code	Description	Standard on
B5	Flanged 15 x 35 x M6 in X pattern (German standard ports)	02 flange
B7	Flanged 20 x 40 x M6 in X pattern (German standard ports)	
E5	SAE O-Ring boss 7/8-14 UNF	06 flange
E6	SAE O-Ring boss 1-1/16-12 UN	

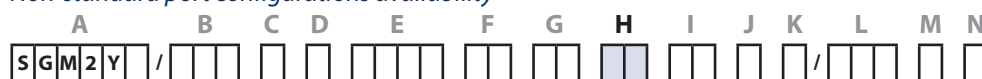
Non-standard port configurations

Various outlet port configurations are available on SGM2Y. They include:

- European standard flanged ports
- Gas threaded ports (BSPP)
- Metric threaded ports

A table of dimensions is on the next page. Here are a few non-standard port configuration codes:

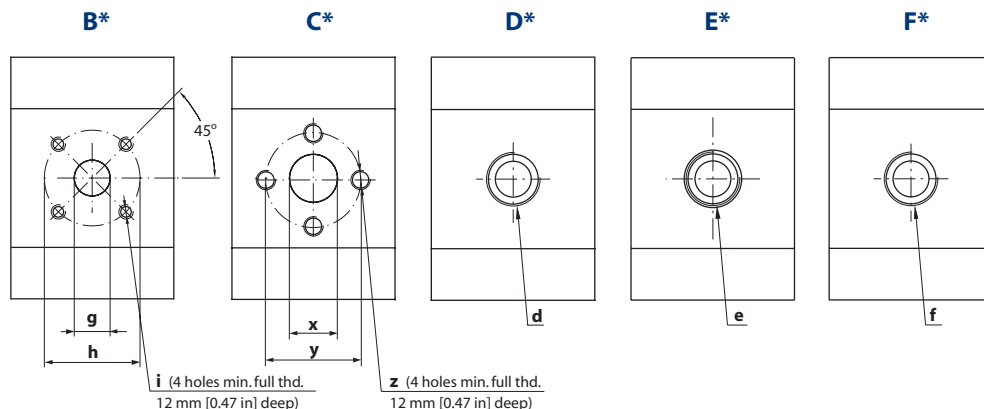
Non-standard port configurations availability



Code	Description
C*	Flanged port with threaded holes in + pattern (European standard)
D*	Threaded metric port
F*	Threaded Gas (BSPP)

Outlet body port dimensions

Available ports for Group 2 fan drive motors



P005 387E

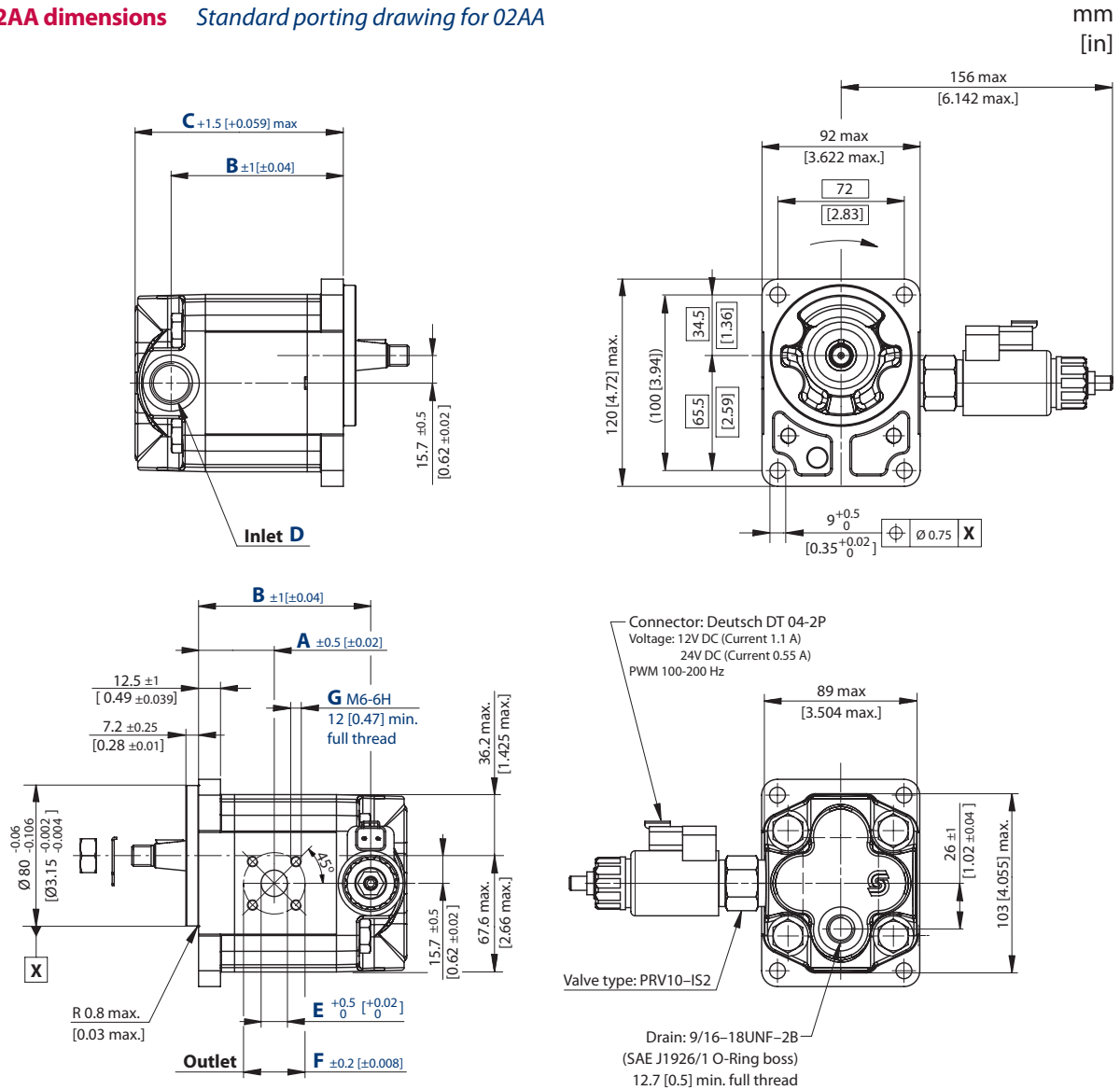
Group 2 fan drive motors ports dimensions (standard)

Standard outlet body port									
Port dimensions		B*			E*				
		for 02AA flange/shaft code			for 06BA, 06GB flange/shaft code				
		g		h	i	e			
Frame size	8,0	Outlet port options	B5	15 [0.591]	35 [1.378]	M6	Outlet port options	E5	7/8-14 UNF
	011		B5	15 [0.591]	35 [1.378]			E5	7/8-14 UNF
	014		B5	15 [0.591]	35 [1.378]			E5	7/8-14 UNF
	017		B5	15 [0.591]	35 [1.378]			E5	7/8-14 UNF
	019		B7	20 [0.787]	40 [1.575]			E6	1-1/16-12 UN
	022		B7	20 [0.787]	40 [1.575]			E6	1-1/16-12 UN
	025		B7	20 [0.787]	40 [1.575]			E6	1-1/16-12 UN

Group 2 fan drive motors ports dimensions (non-standard)

Non-standard outlet port									
Port dimensions		C*			D*		F*		
		x	y	z	d		f		
Frame size	8,0	Outlet port options	C3	13.5 [0.531]	30 [1.181]	M6	Outlet port options	F4	1/2 Gas (BSPP)
	011		C3	13.5 [0.531]	30 [1.181]	M6		F4	1/2 Gas (BSPP)
	014		C7	20 [0.787]	40 [1.575]	M8		F4	1/2 Gas (BSPP)
	017		C7	20 [0.787]	40 [1.575]	M8		F4	1/2 Gas (BSPP)
	019		C7	20 [0.787]	40 [1.575]	M8		F5	3/4 Gas (BSPP)
	022		C7	20 [0.787]	40 [1.575]	M8		F5	3/4 Gas (BSPP)
	025		C8	23.5 [0.925]	40 [1.575]	M8		F5	3/4 Gas (BSPP)

SGM2Y • 02AA dimensions *Standard porting drawing for 02AA*



P005 400E

SGM2Y – 02AA dimensions

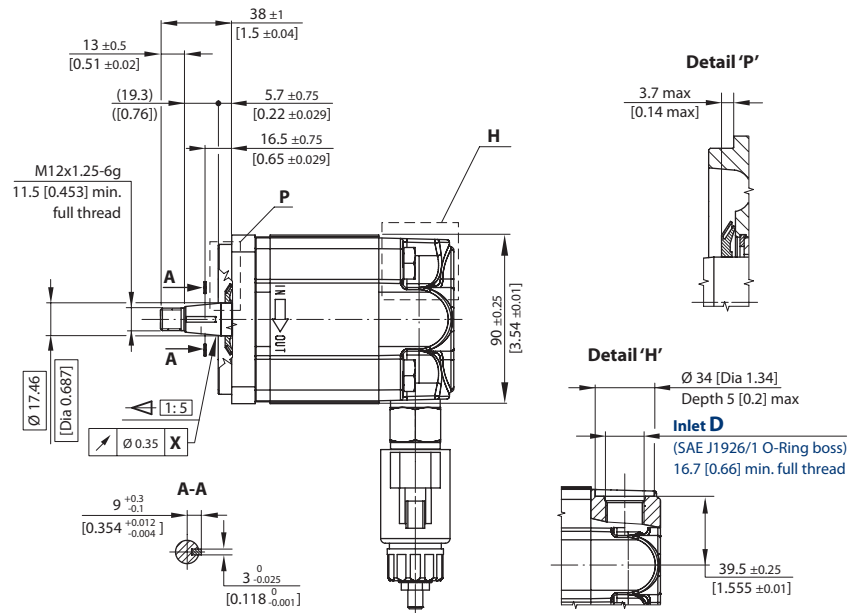
Frame size		8,0	011	014	017	019	022	025
Dimension	A	43.1 [1.70]	47.5 [1.87]	47.5 [1.87]	47.5 [1.87]	47.5 [1.87]	55.0 [2.17]	64.5 [2.54]
	B	98 [3.86]	102 [4.01]	108 [4.25]	112 [4.41]	116 [4.57]	122 [4.80]	126 [4.96]
	C	118.5 [4.66]	122.5 [4.83]	128.5 [5.05]	132.5 [5.22]	136.5 [5.37]	142.5 [5.61]	146.5 [5.77]
Inlet*	D	7/8–14UNF–2B (SAE J1926/1 O-Ring boss); 16.7 [0.66] min. full thread						
Outlet	E	15 [0.59]			20 [0.79]			
	F	35 [0.38]			40 [0.57]			
	G	M6–6H; 12 [0.47] min. full thread						
Drain port		9/16–18UNF–2B (SAE J1926/1 O-Ring boss); 12.7 [0.5] min. full thread						

* Inlet is always the same.

SGM2Y • 02AA dimensions (continued)

Standard porting drawing for 02AA

mm
[in]



P005 401E

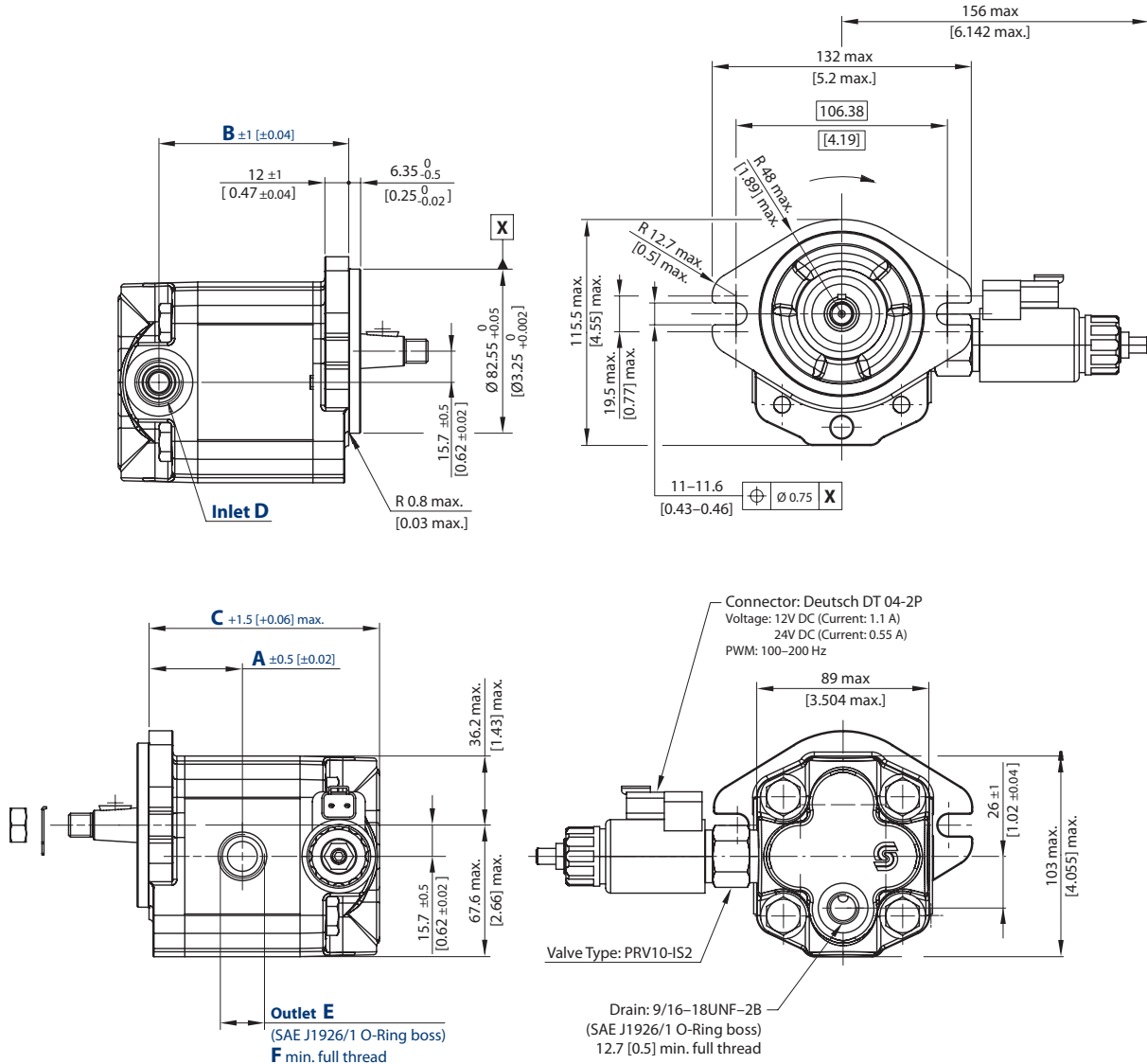
Model code example and maximum shaft torque

Flange/shaft	Model code example	Maximum shaft torque
02AA	SGM2YN/014LA02AAY6NNE5NNNN/XNNNN	140 N·m [1239 lb·in]

For further details on ordering, see [Model Code](#), pages 14 and 15.

SGM2Y • 06BA dimensions *Standard porting drawing for 06BA*

mm
[in]



P005 402E

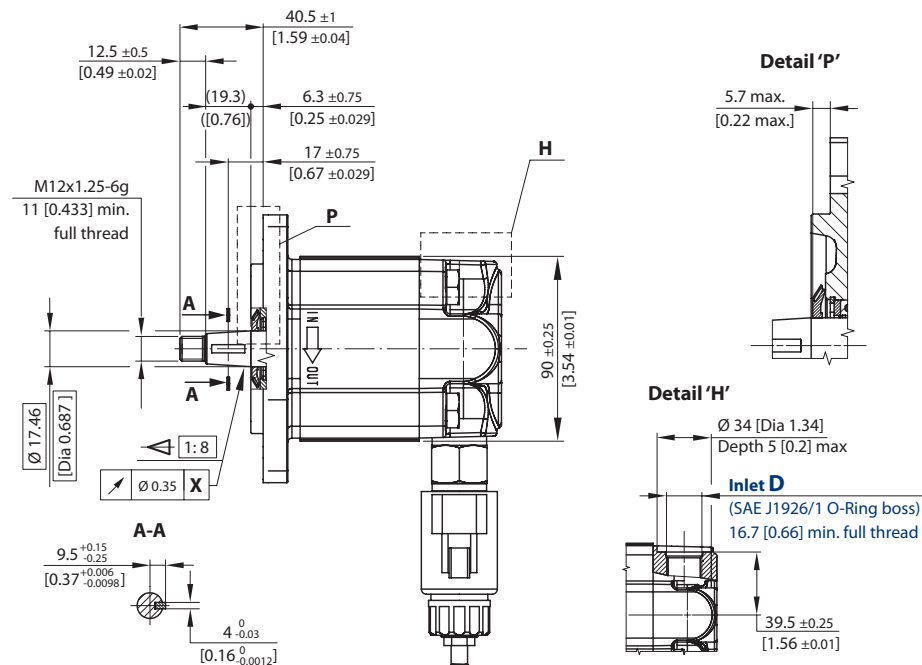
SGM2Y – 06BA dimensions

Frame size		8,0	011	014	017	019	022	025
Dimension	A	47 [1.85]	49 [1.93]	52 [2.05]	54 [2.13]	56 [2.21]	59 [2.32]	61 [2.40]
	B	95.5 [3.76]	99.5 [3.92]	105.5 [4.15]	109.5 [4.31]	113.5 [4.47]	119.5 [4.70]	123.5 [4.86]
	C	116 [4.57]	120 [4.72]	126 [4.96]	130 [5.11]	134 [5.28]	140 [5.51]	144 [5.67]
Inlet	D	7/8-14UNF-2B (SAE J1926/1 O-Ring boss); 16.7 [0.66] min. full thread						
Outlet	E	7/8-14UNF-2B				1-1/16-12UN-2B		
	F	16.7 [0.66] min. full thread				19 [0.75] min. full thread		
Drain port		9/16-18UNF-2B (SAE J1926/1 O-Ring boss); 12.7 [0.5] min. full thread						

* Inlet is always the same.

SGM2Y • 06BA dimensions (continued)

Standard porting drawing for 06BA

mm
[in]

P005 403E

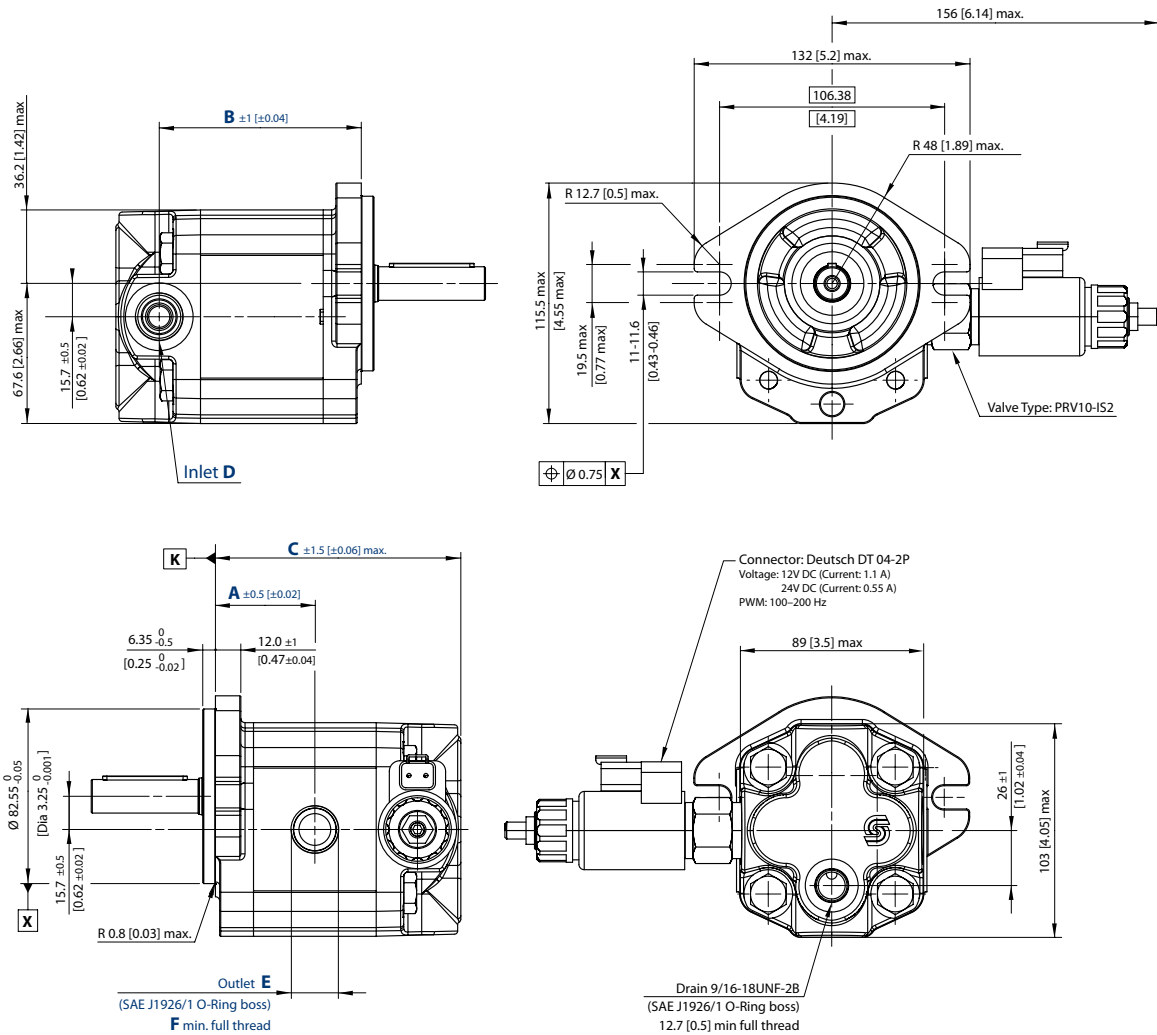
Model code example and maximum shaft torque

Flange/shaft	Model code example	Maximum shaft torque
06BA	SGM2YN/025RA06BAY6NNE6NNNN/XNNNN	150 N·m [1328 lb·in]

For further details on ordering, see [Model Code](#), pages 14 and 15.

SGM2Y • 06GB dimensions *Standard porting drawing for 06GB*

mm
[in]



P005 404E

SGM2Y – 06GB dimensions

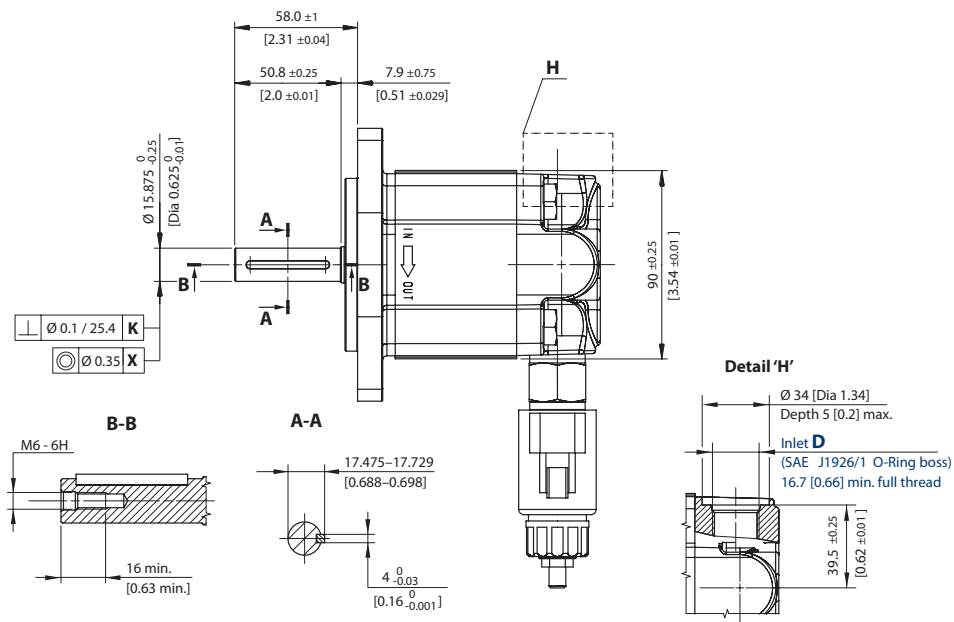
Frame size		8,0	011	014	017	019	022	025
Dimension	A	47 [1.85]	49 [1.93]	52 [2.05]	54 [2.13]	56 [2.21]	59 [2.32]	61 [2.40]
	B	95.5 [3.76]	99.5 [3.92]	105.5 [4.15]	109.5 [4.31]	113.5 [4.47]	119.5 [4.70]	123.5 [4.86]
	C	116 [4.57]	120 [4.72]	126 [4.96]	130 [5.11]	134 [5.28]	140 [5.51]	144 [5.67]
Inlet	D	7/8–14UNF–2B (SAE J1926/1 O-Ring boss); 16.7 [0.66] min. full thread						
Outlet	E	7/8–14UNF–2B				1–1/16–12UN–2B		
	F	16.7 [0.66] min. full thread				19 [0.75] min. full thread		
Drain port		9/16–18UNF–2B (SAE J1926/1 O-Ring boss); 12.7 [0.5] min. full thread						

* Inlet is always the same.

**SGM2Y • 06GB dimensions
(continued)**

Standard porting drawing for 06GB

mm
[in]



P005 405E

Model code example and maximum shaft torque

Flange/shaft	Model code example	Maximum shaft torque
06GB	SGM2YN/022L406GBY6NNE6NNNN/XNNNN	80 N·m [708 lb·in]

For further details on ordering, see [Model Code](#), pages 14 and 15.

SGM2Y and SGM3Y Fan Drive Gear Motors

Technical Information

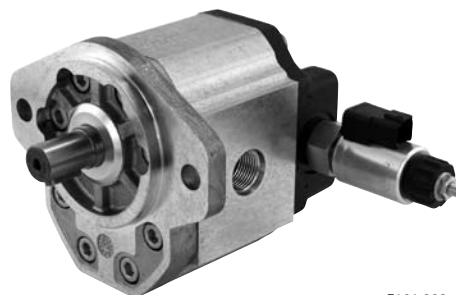
Fan Drive Gear Motors Group 3

Motor design

SGM3Y

SGM3Y is the Group 3 fan drive motor available in the displacement range from 22.1 cm³/rev up to 44.1 cm³/rev [from 1.34 in³/rev up to 2.69 in³/rev].

SGM3Y



F101 898

Technical data

Technical data for SGM3Y standard fan drive gear motors

		Frame size				
		022	026	033	038	044
Displacement	cm ³ /rev [in ³ /rev]	22.1 [1.34]	26.2 [1.60]	33.1 [2.02]	37.9 [2.31]	44.1 [2.69]
Peak pressure	bar [psi]	210 [3046]	210 [3046]	210 [3046]	210 [3046]	210 [3046]
Rated pressure		190 [2756]	190 [2756]	190 [2756]	190 [2756]	190 [2756]
Back pressure		120 [1740]	120 [1740]	120 [1740]	120 [1740]	120 [1740]
Maximum speed	min ⁻¹ (rpm)	2500	2500	2500	2500	2300
Weight	kg [lb]	9.12 [20.11]	9.22 [20.33]	9.32 [20.55]	9.38 [20.68]	9.52 [21.0]
Moment of inertia of rotating components	x 10 ⁻⁶ kg·m ² [x 10 ⁻⁶ lbf·ft ²]	198 [4699]	216 [5126]	246 [5838]	267.2 [6341]	294.2 [6981]
Electrical connector	model	Deutsch DT 04-2P connectors (Protection rate IP 69K DIN 40050)				
Electrical current signal	A	0 to 1.1 A @ 12 V DC, with coil resistance of 7.2 Ω @ 20 °C [68 °F]				
		0 to 0.55 A @ 24 V DC, with coil resistance of 28.8 Ω @ 20 °C [68 °F]				
PWM frequency	Hz	from 100 to 200				

Model code

A	B	C	D	E	F	G	H	I	J	K	L	M	N
S	G	M	3	Y	/								

A Type

SGM3YN	S = Sauer-Danfoss product; G = cast iron cover with inlet port 7/8-14UNF; M = motor, 3 = Group 3; Y = PRV12-IS2 valve, internal drain + anti-cavitation check valve on bearings, N = standard drain (axial position, driven side)
SGM3YL	S = Sauer-Danfoss product; G = cast iron cover with inlet port 1-1/16-12UN-2B; M = motor, 3 = Group 3; Y = PRV12-IS2 valve, internal drain + anti-cavitation check valve on bearings, L = drain on cover (radial position)

B Displacement

022	22.1 cm³/rev [1.34 in³/rev]
026	26.2 cm³/rev [1.60 in³/rev]
033	33.1 cm³/rev [2.02 in³/rev]
038	37.9 cm³/rev [2.31 in³/rev]
044	44.1 cm³/rev [2.69 in³/rev]

C Sense of rotation

R	Right hand (clockwise)
L	Left hand (counterclockwise)

D Version

A	Standard version.
----------	-------------------

E Mounting flange and shaft

07BC	Flange	SAE B pilot Ø 101.6 mm [Dia 4 in], 2-bolts
	Shaft	Taper 1:8, 7/8-18UNF-2A, Key 6.375 mm [0.25 in]
07GB	Flange	SAE B pilot Ø 101.6 mm [Dia 4 in], 2-bolts
	Shaft	Parallel Ø 22.225 mm [Dia 0.875 in], L 25.4 mm [1 in], Key 6.375 mm [0.25 in], threaded hole 1/4-20UNC-2B

F Rear cover

Y6	Cover with proportional valve, axial drain 9/16-18UNF (driven side)
YL	Cover with proportional valve, radial drain 9/16-18UNF (driven side)

G Inlet body port

NN	No inlet in side of body (inlet is in rear cover)
-----------	---

H Outlet body port

A3	25 x 26.19 x 52.37 x 3/8-16UNC	Flanged SAE port
C7	20 x 40 x M8	Flanged port, 4-threaded holes in + pattern, (European standard ports)
CA	27 x 51 x M10	
E6	1-1/16-12UN	Threaded SAE, O-ring boss port
F5	3/4 Gas	Threaded Gas, (BSPP)
F6	1 Gas	

I Port position and variant body

NN	Standard motor from catalogue
-----------	-------------------------------

J Sealing

N	Standard BUNA seals and Viton shaft seal
----------	--

K Screws

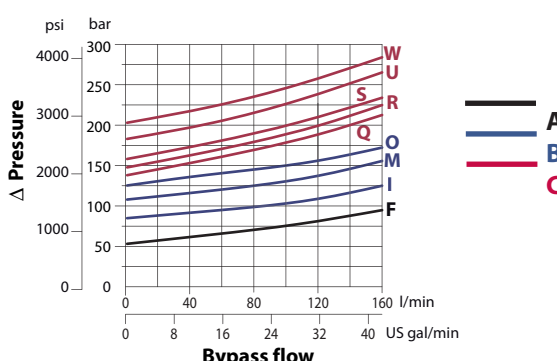
N	Standard screws (geomet)
----------	--------------------------

Model code (continued)

A	B	C	D	E	F	G	H	I	J	K	L	M	N
S	G	M	3	Y	/								

L Valve set at: Flow = 53 l/min [14 US gal/min], Oil viscosity = 26 cSt [121 SUS], $T_{oil} = 50\text{ °C}$ [122 °F]

X**	Relief valve
XA*	Voltage 12 V DC, DT connector
XB*	Voltage 24 V DC, DT connector
X*F	Select Pressure vs. Bypass flow requirements using the graph below.
X*I	Curves A, B, C represent three types of valves.
X*M	Each valve is characterized by different nominal spring ranges.
X*O	
X*Q	
X*R	
X*S	
X*U	
X*W	



P005 399E

⚠ Caution

Maximum pressure setting will vary depending on pressure vs. Bypass flow requirements.

M Marking

N	Standard marking
A	Standard + customer code
Z	Without marking
*	Special customer marking

N Mark position

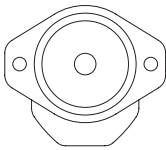
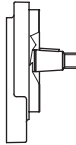

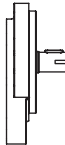
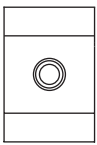
N	Standard marking position
A	On the bottom/driven side position

Examples of Model Code for Group 3:

- SGM3YN/033LA07BCYENNE6NNNN/XNXAR
- SGM3YN/033LA07GBYENNE6NNNN/XNXBO

Flange, shaft and port configurations

Flange, shaft and port configurations for SGM3Y motors

Code	Flange	Shaft	Port
07BC	SAE B pilot Ø 101.6 mm [Dia 4 in] 2-bolts 	Taper 1:8 5/8–18UNF Key 6.375 [0.25 in] 	Inlet: Threaded 1–1/16–12UN on the rear cover side 
07GB		Parallel Ø 22.225 mm [Dia 0.875 in] L 25.4 mm [1 in] Key 6.375 [0.25 in] 	Outlet: Threaded SAE O-Ring boss 

Mounting flange options

Sauer-Danfoss offers many types of industry standard mounting flanges. *The table below* shows order codes for each available mounting flange and its intended use

Flange availability

A	B	C	D	E	F	G	H	I	J	K	L	M	N
S	G	M	3	Y	/								
				0	7								

Code	Description
07	SAE B, pilot Ø 101.6 mm [Dia 4 in], 2-bolts

Shaft options

Shaft availability and nominal torque capability

A	B	C	D	E	F	G	H	I	J	K	L	M	N
S	G	M	3	Y	/								

Shaft		Maximum torque code 07 flange
Code	Description	
BC	Taper 1:8, 5/8–18UNF, Key 6.375 [0.25]	300 Nm [2655 lb·in]
GB	Parallel drive Ø 22.225 [Dia 0.875], L = 25.4 [1], Key 6.375 [0.25]	230 Nm [2036 lb·in]

Spline configuration is not available for Group 3 fan drive gear motors. Other shaft options may exist. Contact your Sauer-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.

Port configurations

Standard outlet body port configurations

Standard port for Group 3 fan drive motors has a code E6, see *the illustration and table below*.

A	B	C	D	E	F	G	H	I	J	K	L	M	N
S	G	M	3	Y	/								

Code	Description	Standard on
E6	SAE O-Ring boss port 1-1/16-12UN	07 flange

Non-standard outlet body port configurations

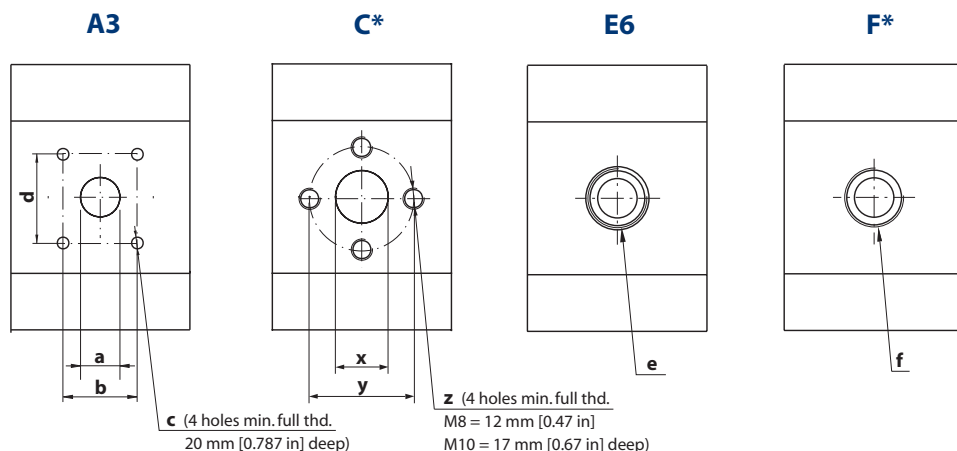
Non-standard port codes are A3, CA, C7, F5 and F6, see *the illustration and tables below*.

A	B	C	D	E	F	G	H	I	J	K	L	M	N
S	G	M	3	Y	/								

Code	Description
A3	Flanged SAE port
C*	Flanged port with threaded holes in + pattern (European standard)
F*	Threaded Gas (BSPP)

Outlet body port dimensions

Available ports for Group 3 fan drive motors



P005 388E

Group 3 fan drive motor port dimension (standard)

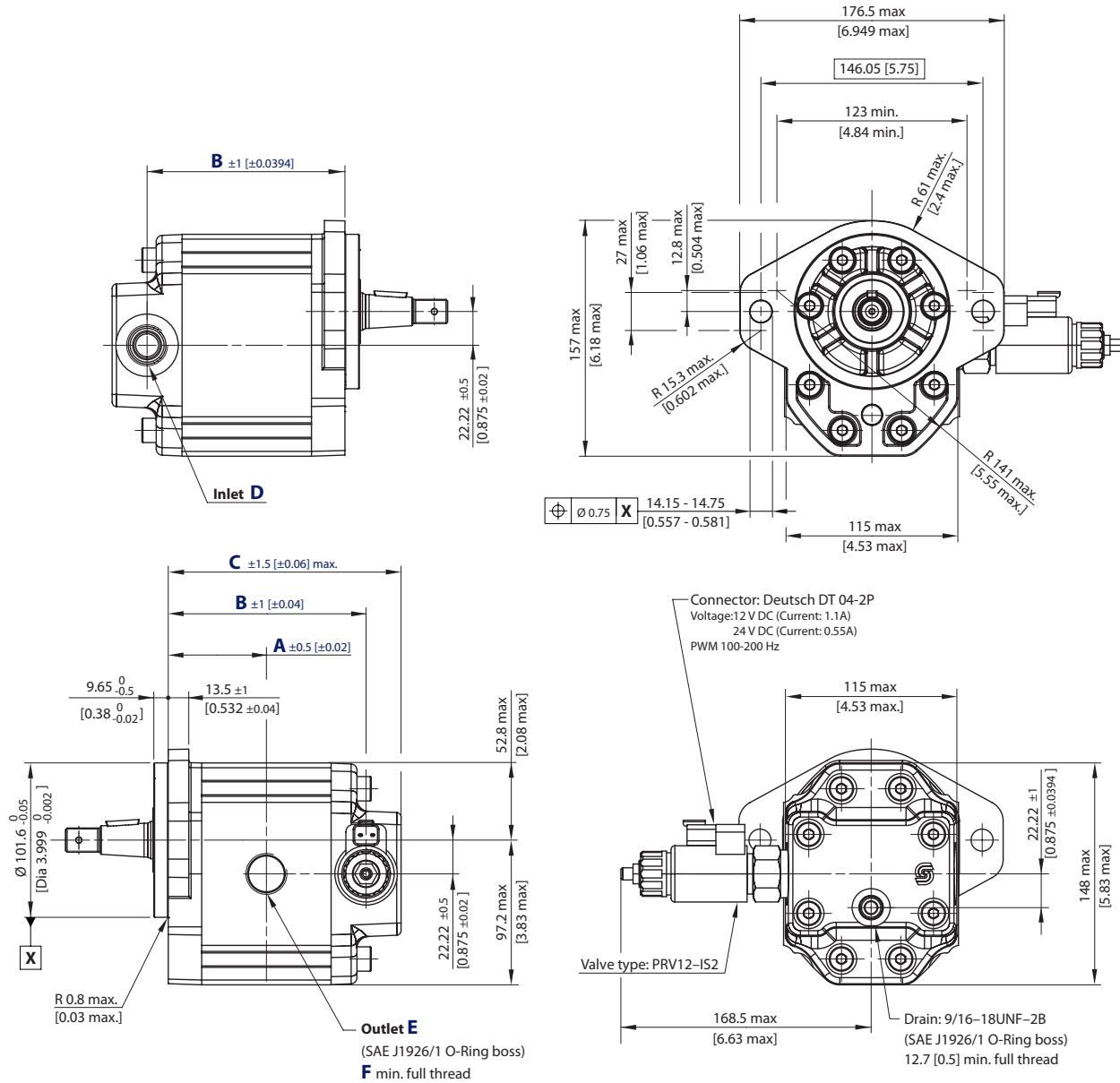
Standard outlet port		
Outlet port code		E6
Port dimensions		e
Frame size	022	1-1/16-12UN
	026	1-1/16-12UN
	033	1-1/16-12UN
	038	1-1/16-12UN
	044	1-1/16-12UN

Group 3 fan drive motor port dimensions (non-standard)

Non-standard outlet port													
Outlet port code		A3				C*				F*			
Port dimensions		a	b	c	d	x		y	z	f			
Frame size	022	25.4 [1]	26.19 [1.03]	⅜-16UNC	52.37 [2.06]	Outlet options	C7	20 [0.787]	40 [1.575]	M8 <th rowspan="5">Outlet options</th> <th>F5</th> <td>¾ Gas (BSPP)</td>	Outlet options	F5	¾ Gas (BSPP)
	026	25.4 [1]	26.19 [1.03]	⅜-16UNC	52.37 [2.06]		C7	20 [0.787]	40 [1.575]	M8		F5	¾ Gas (BSPP)
	033	25.4 [1]	26.19 [1.03]	⅜-16UNC	52.37 [2.06]		CA	27 [1.06]	51 [2]	M10		F6	1 Gas (BSPP)
	038	25.4 [1]	26.19 [1.03]	⅜-16UNC	52.37 [2.06]		CA	27 [1.06]	51 [2]	M10		F6	1 Gas (BSPP)
	044	25.4 [1]	26.19 [1.03]	⅜-16UNC	52.37 [2.06]		CA	27 [1.06]	51 [2]	M10		F6	1 Gas (BSPP)

SGM3Y • 07BC dimensions *Standard porting drawing for 07BC*

mm
[in]



P005 406E

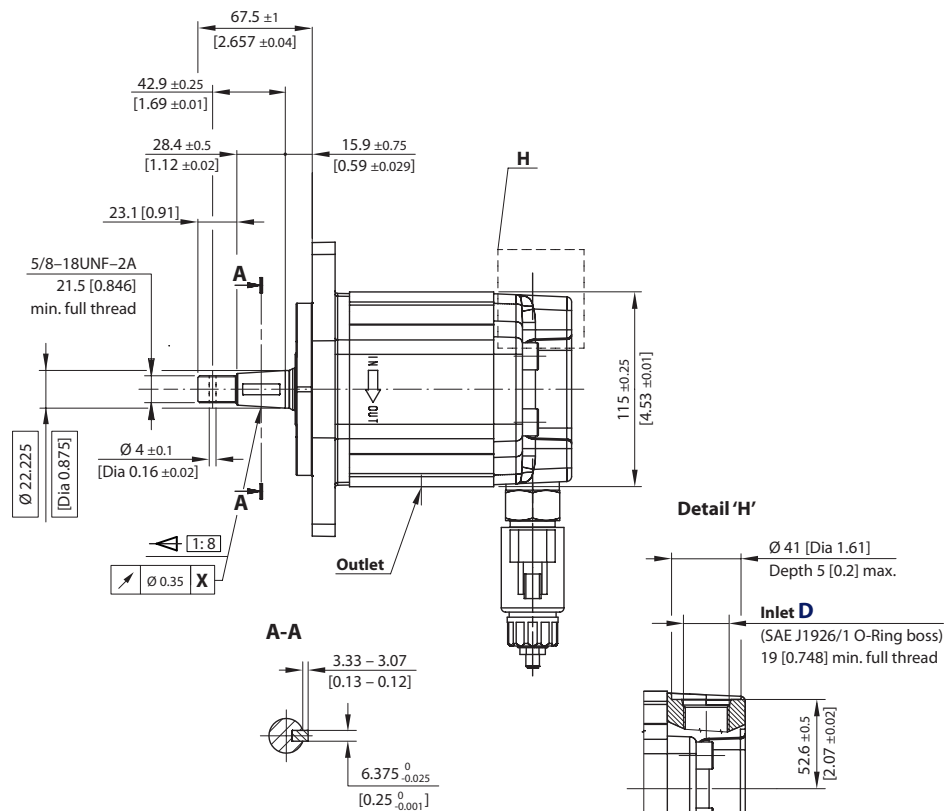
SGM3Y – 07BC dimensions

Frame size		022	026	033	038	044
Dimension	A	63 [2.48]	64.5 [2.54]	67 [2.64]	68.8 [2.71]	71 [2.8]
	B	127.1 [5.04]	130.1 [5.12]	135.1 [5.32]	138.6 [5.46]	143.1 [5.63]
	C	20 [0.787]	20 [0.787]	27 [1.063]	27 [1.063]	27 [1.063]
Inlet*	D	1-1/16-12UN-2B				
Outlet	E	1-1/16-12UN-2B				
	F	19 [0.748] min. full thread				
Drain port		9/16-18UNF-2B (SAE J1925/1, O-Ring boss); 12.7 [0.5] min. full threads				

* Inlet is always the same.

SGM3Y • 07BC dimensions (continued)

Standard porting drawing for 07BC

mm
[in]

P005 407E

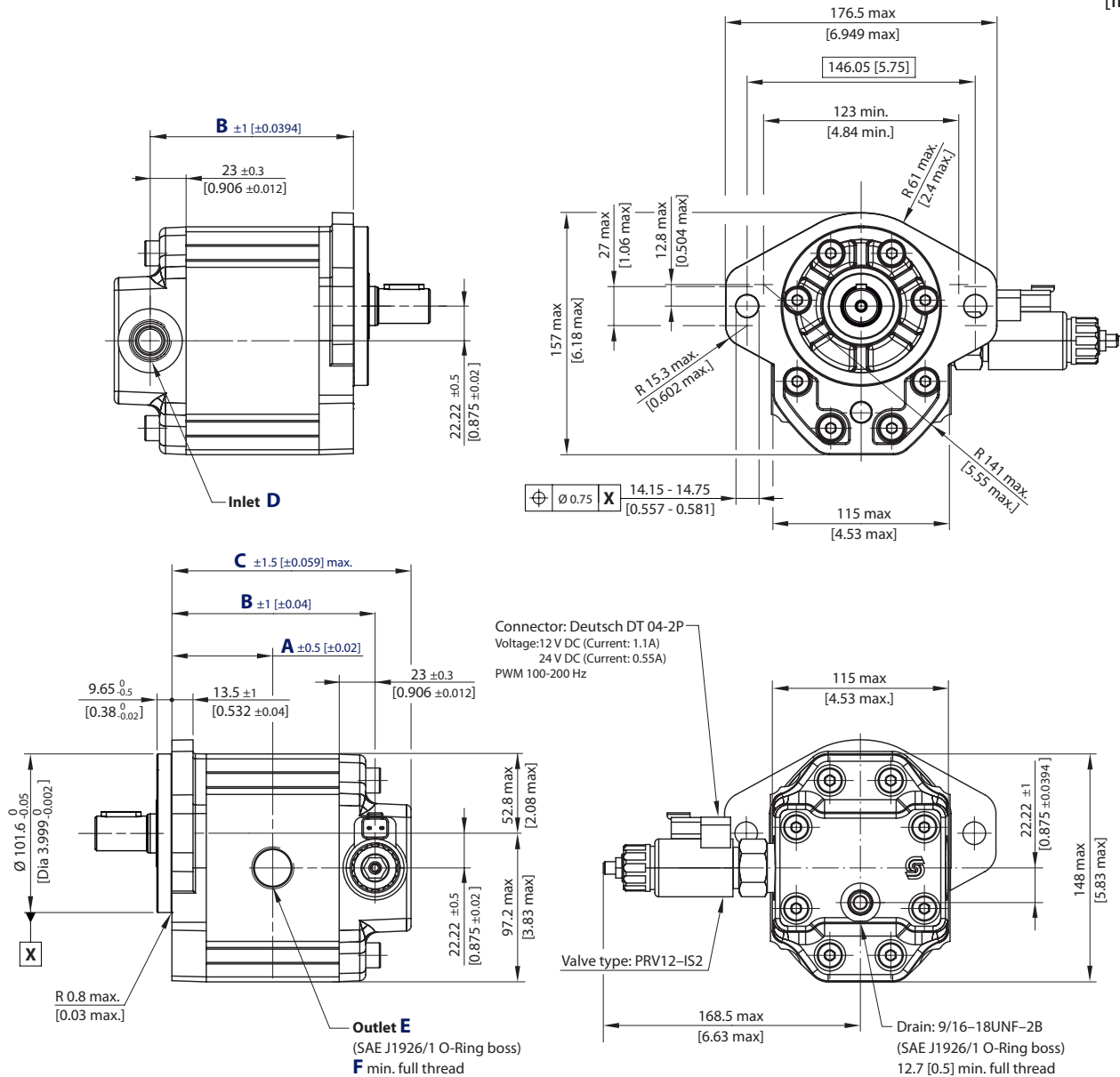
Model code example and maximum shaft torque

Flange/shaft	Model code example	Maximum shaft torque
07BC	SGM3YN/033LA07BCYENNE6NNNN/XNNNN	300 N·m [2655 lb·in]

For further details on ordering, see [Model Code](#), pages 27 and 28.

SGM3Y • 07GB dimensions *Standard porting drawing for 07GB*

mm
[in]



P005 408E

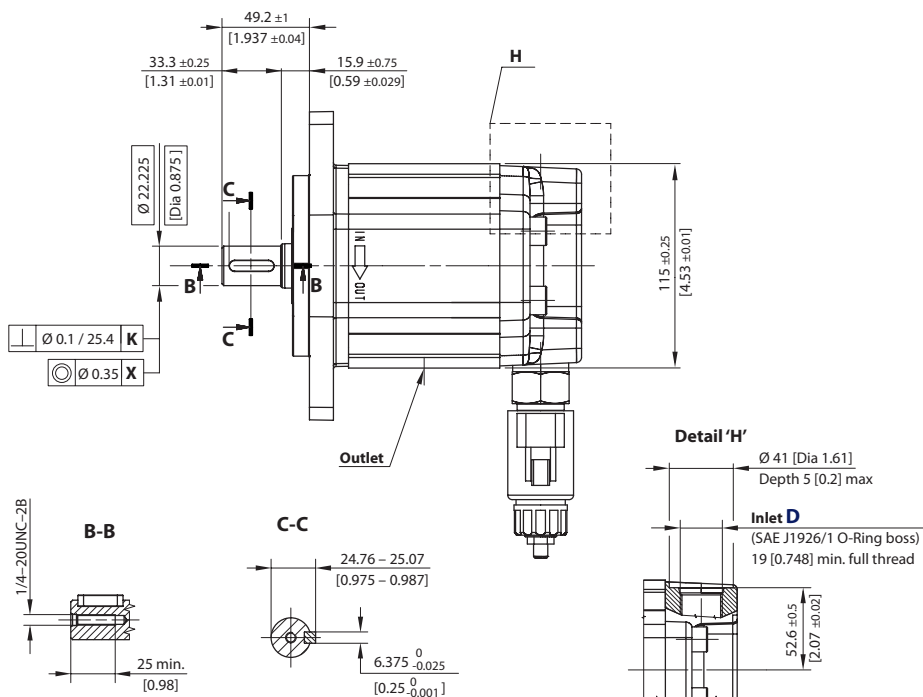
SGM3Y – 07GB dimensions

Frame size		022	026	033	038	044
Dimension	A	61 [2.4]	63 [2.48]	64.5 [2.54]	66.5 [2.62]	69.5 [2.74]
	B	132.5 [5.22]	135.5 [5.33]	140.5 [5.53]	144.0 [5.67]	148.5 [5.85]
	C	20 [0.787]	20 [0.787]	27 [1.063]	27 [1.063]	27 [1.063]
Inlet*	D	1-1/16-12UN-2B				
Outlet	E	1-1/16-12UN-2B				
	F	19 [0.748] min. full thread				
Drain port		9/16-18UNF-2B (SAE J1925/1, O-Ring boss); 12.7 [0.5] min. full threads				

* Inlet is always the same.

SGM3Y • 07GB dimensions *Standard porting drawing for 07GB*
(continued)

mm
[in]



P005 409E

Model code example and maximum shaft torque

Flange/drive gear	Model code example	Maximum shaft torque
07GB	SGM3YN/033LA07GBYENNE6NNNN/XNNNN	230 N·m [2036 lb·in]

For further details on ordering, see [Model Code](#), pages 27 and 28.

Integral relief valves

The valves PRV10-IS2 and PRV12-IS2 should preferably be mounted below the tank oil level. This will keep oil in the tube to avoid instability problem due to trapped air. Otherwise, at least, mount the valves in horizontal position.

ⓘ Caution

For a correct operation the hydraulic circuit must be carefully air bled. Trapped air can cause irregular operation.



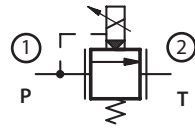
After 1 million cycles at 80 +30 °C/-0 °C a 4% decrease in standard setting is permitted. The valves PRV10-IS2 and PRV12-IS2 are PLUS+1 compliant.

Technical parameters for Group 2 and Group 3 fan drive motor relief valves

	Group 2	Group 3
Maximum pressure	250 bar [3626 psi]	250 bar [3626 psi]
Maximum flow at rated pressure	80 l/min [21 US gal/min]	140 l/min [37 US gal/min]
Maximum pilot flow	0.15 l/min [0.04 US gal/min]	0.76 l/min [0.2 US gal/min]
Weight including coil	0.53 kg [1.17 lb]	0.62 kg [1.37 lb]
Cavity	SDC10-2	SDC12-2
Connector	Deutsch DT04-2P, IP69K	
Coil	M19P20W	
Coil voltage	12 or 24 V DC	
Oil temperature range	from -25 to 110 °C [from -13 to 230 °F]	
Oil viscosity range	10 to 280 cSt [60/1300 SUS]	
Hysteresis at standard pressure setting with PWM 200 Hz	10 % maximum of setting pressure	
Fluids	mineral and/or biodegradable hydraulic fluids	
Minimum flow	2 l/min. [0.53 US gal/min]	
Minimum filtration for operating pressure	above 210 bar	16/13 ISO 4406 or better
	up to 210 bar	18/14 ISO 4406 or better

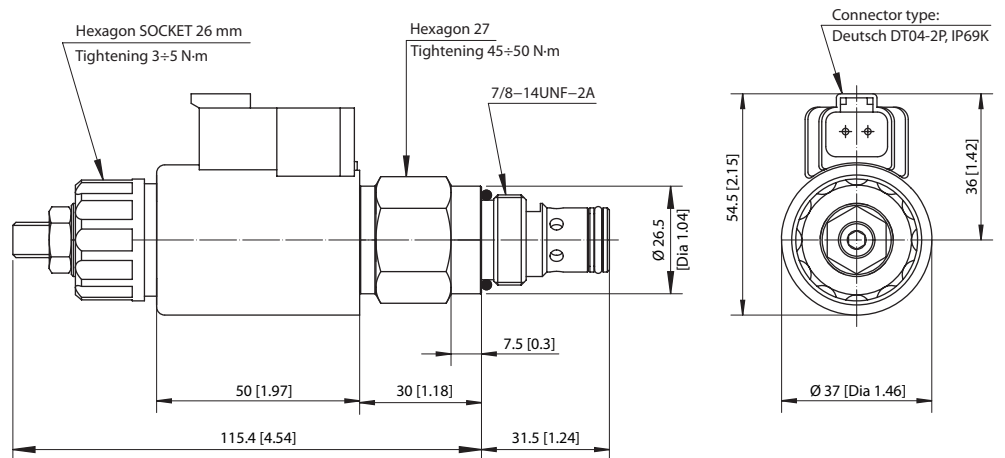
Integral relief valve PRV10-IS2 for Group 2

Relief valve schematic



P005 412

Relief valve dimensions

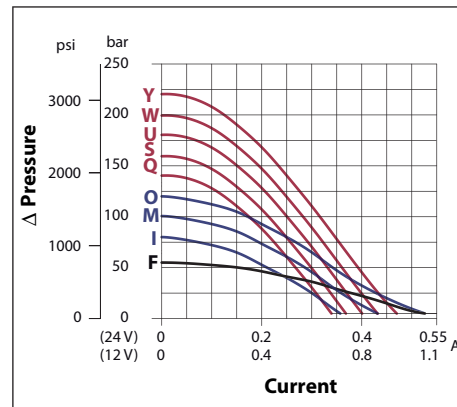


P005 396E

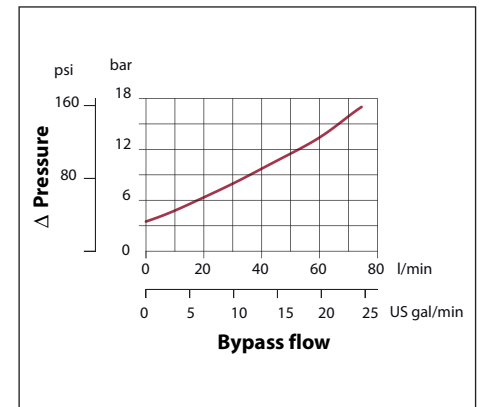
Performance graphs

Conditions: $T_{oil} = 50\text{ °C}$ [122 °F], Oil viscosity = 26 cSt [121 SUS]

Relief pressure vs. current at flow 43 l/min [11.35 US gal/min]



Pressure Drop with coil energized, valve only (Flow from P to T, see RV schematic above)



P005 410E

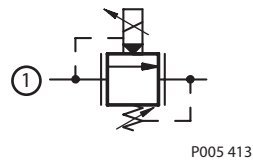
Curves **A, B, C** represent three types of valves. Each valve is characterized by different nominal spring ranges.

⚠ Caution

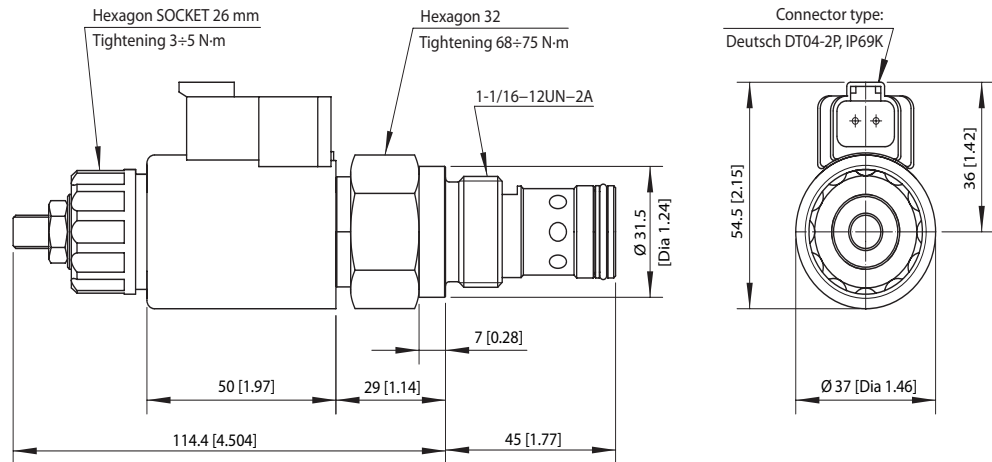
Any modification of the valve to change the factory setting will void the product warranty.

Integral relief valve PRV12-IS2 for Group 3

Relief valve schematic example



Relief valve dimensions

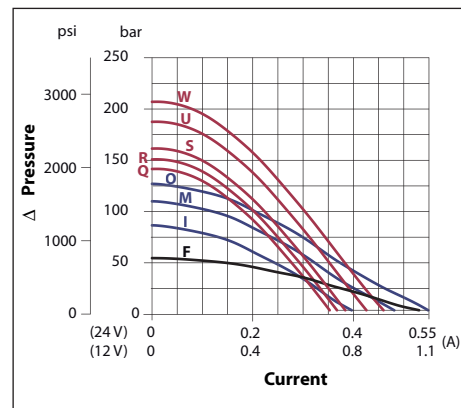


P005 397E

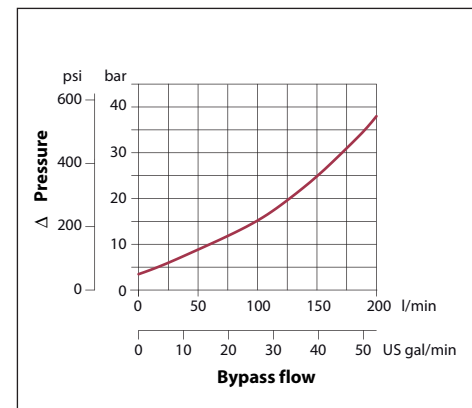
Performance graphs

Conditions: $T_{oil} = 50\text{ }^{\circ}\text{C}$ [122 $^{\circ}\text{F}$], Oil viscosity = 26 cSt [121 SUS]

Relief pressure vs. current at flow 53 l/min [14 US gal/min]



Pressure Drop with coil energized, valve only Flow from P to T (see RV schematic above)



P005 411E

Curves **A, B, C** represent three types of valves. Each valve is characterized by different nominal spring ranges.

⚠ Caution

Any modification of the valve to change the factory setting will void the product warranty.

**SD literature reference
for fan drive system**

Fan drive system

System component	Title	Type and order number
Pump	Cast Iron Hydraulic Gear Pumps Series D	Technical Information 520L0781
	Aluminium Gear Pumps Group 2	Technical Information 520L0560
	Aluminium Gear Pumps Group 3	Technical Information 520L0569
Valve	Proportional Solenoid Valves	Tech Note 11022746
	Solenoid Valves Product Electrical Installation	Tech Note 11022768
Fan drive control	Fan Drive Control	Technical Information 11005336
	Fan Drive Control Temperature Sensors	BLN-95-9063
	PLUS+1™	Datasheet 520L0719

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