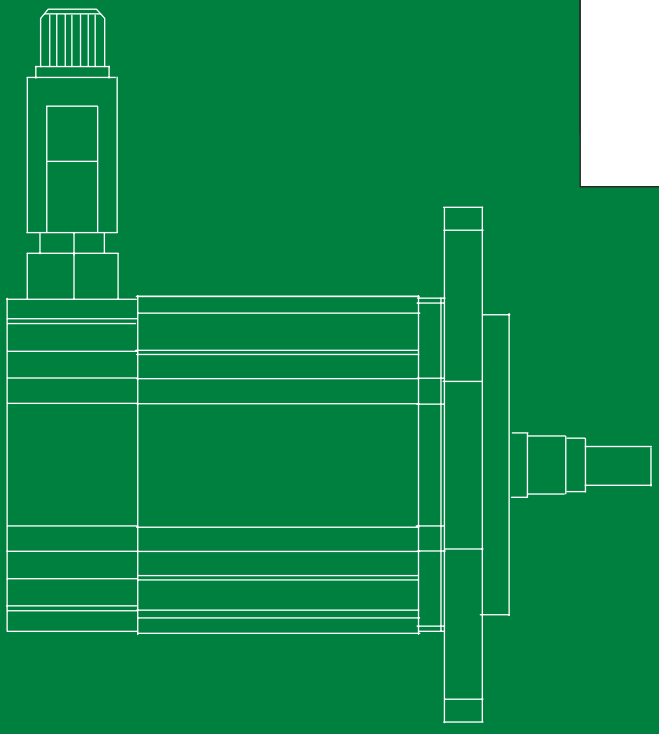
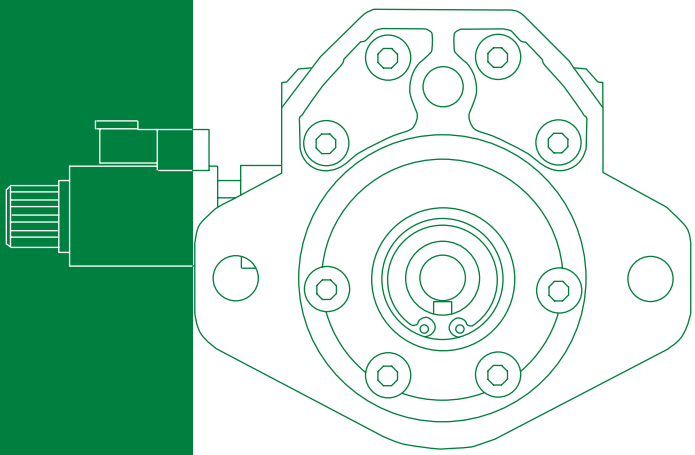
SGM2Y, and SGM3Y Fan Drive Motors

Service and Parts Manual

Turolla OpenCircuitGear
MEMBER OF THE SAUER-DANFOSS GROUP





History of Revisions

Table of Revisions

Date	Page	Changed	Rev.
June 2010	-	First edition	A

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SGM2Y and SGM3Y Fan Drive Motors Service and Parts Manual

Contents

Introduction

Overview

This manual includes information for the installation, maintenance, and minor repair of the SGM2Y and SGM3Y Proportional Fan Drive Motors. The manual includes a description of the units and their individual components, troubleshooting information, and minor repair procedures.

You must remove the unit from the vehicle to perform minor repairs. Thoroughly clean the unit before beginning maintenance, or repair activities. Since dirt and contamination are the greatest enemies of any type of hydraulic equipment, follow cleanliness requirements strictly. This is especially important when changing the system filter and when removing hoses or plumbing.

A worldwide Global Service Partner network is available for major repairs. Turolla OCG Global Service Partners are trained by the factory and certified on a regular basis. You can locate your nearest Global Service Partner using the distributor locator at www.Turolla OCG.com.

Warranty

Performing installation, maintenance, and minor repairs according to the procedures in this manual will not affect your warranty. Major repairs requiring the removal of a unit's rear cover or front flange voids the warranty unless done by a Turolla OCG Global Service Partner.

Safety precautions

Always consider safety precautions before beginning a service procedure. Protect yourself and others from injury. Take the following general precautions whenever servicing a hydraulic system.

Unintended machine movement

⚠ Warning

Unintended movement of the machine or mechanism may cause injury to the technician or bystanders. To protect against unintended movement, secure the machine or disable / disconnect the mechanism while servicing.

Flammable cleaning solvents

⚠ Warning

Some cleaning solvents are flammable. To avoid possible fire, do not use cleaning solvents in an area where a source of ignition may be present.

Fluid under pressure

⚠ Warning

Escaping hydraulic fluid under pressure can have sufficient force to penetrate your skin causing serious injury and/or infection. This fluid may also be hot enough to cause burns. Use caution when dealing with hydraulic fluid under pressure. Relieve pressure in the system before removing hoses, fittings, gauges, or components. Never use your hand or any other body part to check for leaks in a pressurized line. Seek medical attention immediately if you are cut by hydraulic fluid.

Personal safety

⚠ Warning

Protect yourself from injury. Use proper safety equipment, including safety glasses, at all times.

Symbols used in Turolla OCG literature

- WARNING may result in injury
- CAUTION may result in damage to product or property
- Reusable part
- Non-reusable part, use a new part
- Non-removable item
- Option – either part may exist
- Superseded – parts are not interchangeable
- Measurement required
- Flatness specification
- Parallelism specification
- External hex head
- Internal hex head
- Torx head
- O-ring boss port
- Tip, helpful suggestion
- Lubricate with hydraulic fluid
- Apply grease / petroleum jelly
- Apply locking compound
- Inspect for wear or damage
- Clean area or part
- Be careful not to scratch or damage
- Note correct orientation
- Mark orientation for reinstallation
- Torque specification
- Press in – press fit
- Pull out with tool – press fit
- Cover splines with installation sleeve
- Pressure measurement / gauge location or specification

The symbols above appear in the illustrations and text of this manual. They are intended to communicate helpful information at the point where it is most useful to the reader. In most instances, the appearance of the symbol itself denotes its meaning. The legend above defines each symbol and explains its purpose.

General description

A Turolla OCG electrohydraulic proportional fan drive system consists of a fixed or variable displacement open circuit hydraulic pump and an SGM2Y/SGM3Y gear motor with integral full-flow proportional relief valve to control fan speed. The Engine Control Module (ECM) or Turolla OCG Fan Drive Controller (FDC) drives the proportional relief valve using a Pulse-Width Modulated (PWM) signal. The typical on-highway system also includes a second pump or integral priority flow-divider (PFD) to provide flow for power steering.

The primary on-highway applications for this system are diesel rear engine vehicles that provide a proportional fan drive PWM signal. Turolla OCG fan drives work with engines produced by all the major North American and European engine manufacturers.

Off-highway applications include many other engine options. The ECM may control the fan drive motor directly by PWM signal if the signal is suitable, or you may use an intermediate control such as the Turolla OCG Fan Drive Controller.

The system circuit

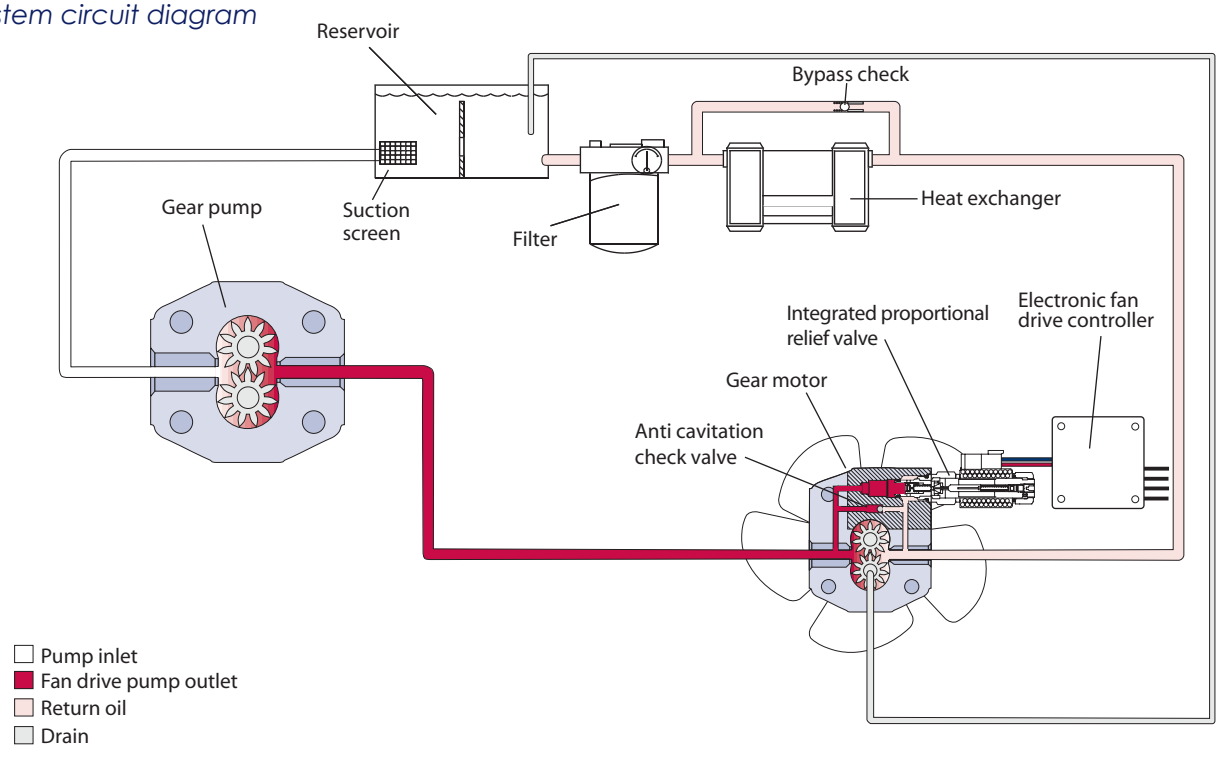
The pump receives fluid directly from the reservoir through the inlet line. A screen placed in the inlet protects the pump from large contaminants. The output of the pump is directed to a fixed displacement gear motor, which has an electrohydraulic proportional valve mounted in the motor's rear cover.

The setting of the valve determines the maximum pressure in the system by bypassing oil around the motor's gear set directly to the return port of the motor. The proportional valve is normally closed and requires the application of an electrical current to reduce the bypass pressure from a pre-determined, customer selected, maximum pressure setting. In a hydraulic fan drive system, the pre-determined maximum pressure setting determines the maximum pressure to the motor, and maximum trim speed of the fan.

Applying an electrical current to the valve allows the fan to run at speeds below its maximum trim speed, regardless of the flow supplied to the pump.

Oil exiting the motor is directed back to the reservoir through a filter and a heat exchanger. Oil returning to the reservoir must enter the reservoir well below the fluid level fluid level to minimize air entrainment. Baffles in the reservoir diffuse the oil to an acceptable level, to mix it with the fluid in the reservoir, and to prevent the oil from flowing immediately back to the pump inlet. The return oil remains in the reservoir long enough to allow any entrained air in the fluid to rise to the surface and dissipate back into the atmosphere.

System circuit diagram



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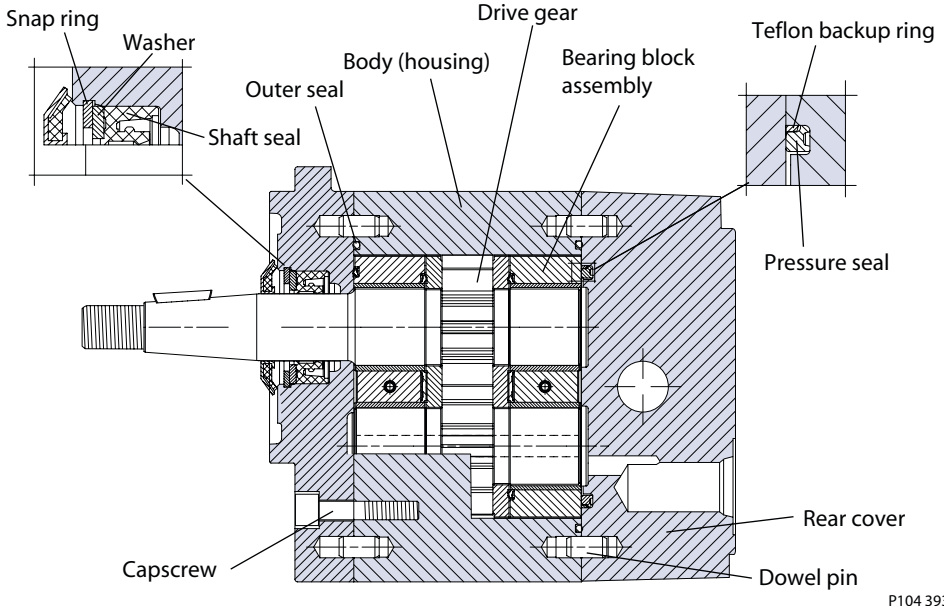
Design

Turolla OCG fixed displacement open circuit gear motors convert hydraulic power into mechanical power. Supply flow determines shaft speed. Load torque results in system pressure between the pump and motor. Bushings at the front and rear of the motor support the shaft. The volume between the gear teeth and the pump body defines the displacement of the motor. A shaft seal at the front of the motor prevents leakage where the shaft exits the motor housing.

Cross section view



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Overview

Specifications and operating parameters for motors are given here for reference.

Features and options

Model	SGM2Y	SGM3Y
Mount	SAE A 2 bolt mounting flange, European flanges	SAE B 2 bolt mounting flange, Eurpoean flanges
Displacement cm³ [in³]	8.4 [0.51], 11 [0.67], 14 [0.85] 17 [1.04], 19 [1.16], 22 [1.34], 25 [1.53]	22 [1.34] 26 [1.59] 33 [2.01] 38 [2.32] 44 [4.69]
Rotation	Unidirectional - direction of rotation is defined in order code	
Porting	SAE O-ring boss, radial, European + , German x	SAE O-ring boss/split flange European + , German x (see page 13)
Output shafts	1:8 taper, 0.625 in., extended cylindrical keyed 0.625 in. cylindrical keyed 1:5 taper, 15.0 mm cylindrical keyed	1:8 taper, 0.875 in. cylindrical keyed shaft
Control options	Proportional relief valve, normally closed, 12 V Dc and 24 V Dc	

Specifications SGM2Y

Parameter	Unit							
Displacement	cm³ [in³]	8.4 [0.51]	11 [0.67]	14 [0.85]	17 [1.04]	19 [1.16]	22 [1.34]	25 [1.53]
Weight (cartridge and SAE-A)	kg [lb]	3.0 [6.6]	3.2 [7.0]	3.4 [7.5]	3.5 [7.7	3.6 [7.9]	3.7 [8.2]	3.8 [8.4]
Mass moment of inertia of rotating components	kg•m² [slug•ft²]	0.0000324 [0.0000239]	0.0000384 [0.0000283]	0.0000473 [0.0000349]	0.0000533 [0.0000393]	0.0000592 [0.0000437]	0.0000681 [0.0000503]	0.0000741 [0.0000547]
Theoretical torque	N•m/bar	0.134 [81.2]	0.175 [106.6]	0.223 [135.3]	0.271 [165.5]	0.302 [184.6]	0.35 [213.3]	0.398 [243.5]

Specifications SGM3Y

Parameter	Unit					
Displacement	cm³ [in³]	22 [1.34]	26 [1.59]	33 [2.01]	38 [2.32]	44 [4.69]
Weight (cartridge and SAE-B)	kg [lb]	7.2 [15.8]	7.2 [15.8]	7.6 [16.6]	7.7 [16.9]	7.9 [17.4]
Mass moment of inertia of rotating components	kg•m² [slug•ft²]	0.00001666 [0.00001229]	0.00001582 [0.00001167]	0.00001530 [0.00001128]	0.00002326 [0.00001716]	0.00002286 [0.00001687]
Theoretical torque	N•m/bar	0.40 [244]	0.48 [293]	0.56 [347]	0.60 [366]	0.72 [439]

Fluid specifications

Ratings and data are based on operation with premium petroleum-based hydraulic fluids containing oxidation, rust, and foam inhibitors.

Parameter	Unit	Minimum	Continuous	Maximum
Viscosity	mm²/sec (cSt) [SUS]	7-10 [47-60]	12-60 [70-278]	1600 [7500]
Temperature	°C [°F]	-20 [-4]	80 [176]	90 [194]
Cleanliness		ISO 4406 Class 18/13 or better		
Filtration efficiency	charge filtration	$\beta_{15\text{-}20}$=75 ($\beta_{10}\geq$10)		

For detailed filtration information, see Turolla OCG publication **520L0463** *Fluids and Filtration*. For information on biodegradable fluids see Turolla OCG publication **520L0465** *Biodegradable Hydraulic Fluids* .

Operating parameters SGM2Y

Parameter		Unit							
Displacement		cm^3 [in^3]	8.4 [0.51]	11 [0.67]	14 [0.85]	17 [1.04]	19 [1.16]	22 [1.34	25 [1.53]
System pressure	continuous	bar [psi]	250 [3626]			230 [3336]	210 [3045]	180 [2611]	160 [2320]
	maximum		270 [3916]			250 [3626]	230 [3336]	200 [2901]	180 [2611]
Speed limit	maximum	min^{-1} (rpm)	3500				3200		
Case pressure	continuous	bar [psi]	5 [70]						
	maximum		8 [115]						

Operating parameters SGM3Y

Parameter		Unit					
Displacement		cm^3 [in^3]	22 [1.34]	26 [1.59]	33 [2.32]	38 [2.32]	44.0 [4.69]
System pressure	continuous	bar [psi]	210 [3046]				
	maximum		230 [3336]				
Speed limit	maximum	min^{-1} (rpm)	2500				2300
Case pressure	continuous	bar [psi]	5 [70]				
	maximum		8 [115]				

Pressure measurements

Required tools

You can perform the service procedures described in this manual using common mechanic's hand tools. Special tools, if required are shown. When testing system pressures, calibrate pressure gauges frequently to ensure accuracy. Use snubbers to protect gauges.

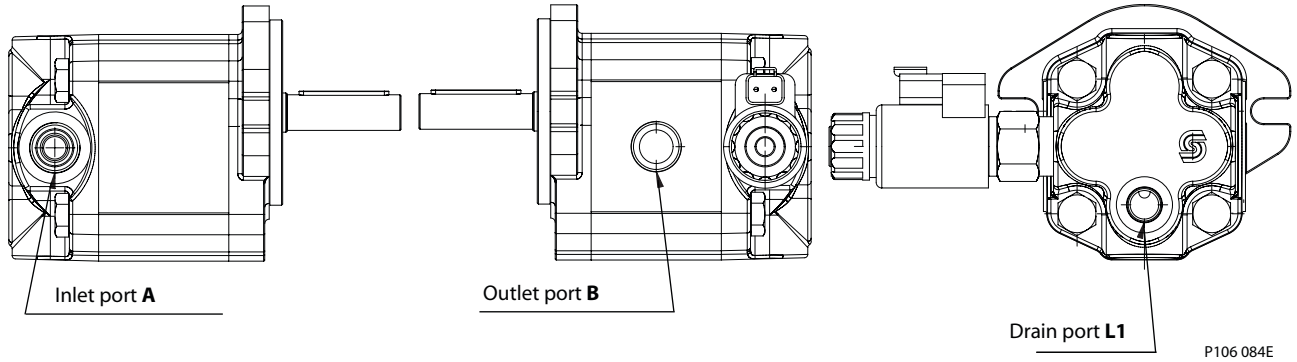
Port locations and gauge installation

For economical reasons, the motors do not contain any designated gauge installation ports. Use tee fittings to obtain pressure measurements. The table lists locations and gauge sizes.

SGM2Y Port locations

Port information

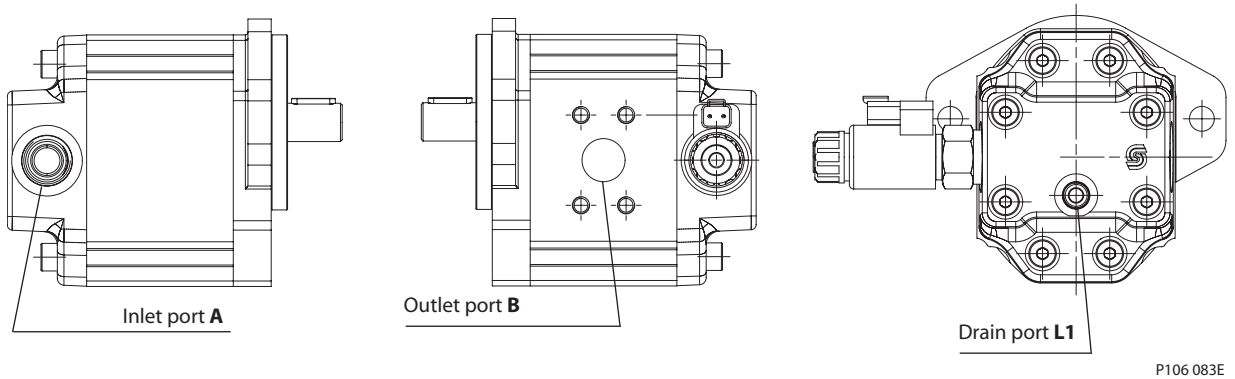
Port identifier	Size	Pressure obtained	Gauge size, bar [psi]
Drain port L1	9/16-18 UNF-2B	Case drain	10 [100]
Inlet port A	7/8-14 UNF SAE J 1926/1 O-ring boss	System pressure	600 [10 000]
Outlet port B	7/8-14 UNF SAE J 1926/1 O-ring boss	Return pressure	600 [10 000]



SGM3Y Port locations

Port information

Port identifier	Size	Pressure obtained	Gauge size, bar [psi]
Drain port L1	9/16-18 UNF-2B	Case drain	10 [100]
Inlet port A	1-1/16-12 UN SAE J 1926/1 O-ring boss	System pressure	600 [10 000]
Outlet port B	25.4mm +0/-1.5 [1.0in +0/-0.06]	Return pressure	600 [10 000]



General

Follow this procedure when starting-up a new motor installation or when restarting an installation in which the motor has been removed.

Prior to installing the motor, inspect for damage incurred during shipping. Make certain all system components (reservoir, hoses, valves, fittings, heat exchanger, etc.) are clean prior to filling with fluid.

Start-up procedure

1. Ensure that the machine hydraulic oil and system components (reservoir, hoses, valves, fittings, and heat exchanger) are clean and free of any foreign material.

2. Install new system filter element(s) if necessary.

3. Install the gear motor.

4. Fill the reservoir with hydraulic fluid of the recommended type and viscosity. Use a 10-micron reservoir filler filter.

After start-up the oil level in the reservoir may drop due to filling of the system components. Check the oil level in the reservoir to maintain the full level throughout the start-up.

Caution

Damage to hydraulic components may occur. Maintain sufficient oil in the reservoir at all times.

5. Use a common method to disable the engine to prevent the engine from starting. Crank the engine starter for several seconds. Do not to exceed the engine manufacturer's recommendation. Wait 30 seconds and then crank the engine a second time as stated above. This operation helps remove unwanted air from the pump outlet line and lubricates the gear motor prior to engine start up. Refill the reservoir to recommended full oil level.

6. Enable engine to start. Start the engine. Let the engine run for a minimum of 30 seconds at low idle to allow the air to work itself out of the system. Check for leaks at all line connections and listen for cavitation.

Caution

Cavitation damages hydraulic components. Take steps to avoid air entrapment in the system.

7. After initial air removal and ensuring the hydraulic reservoir oil level is correct, raise the engine speed enough to increase fan speed to a moderate rpm but not enough to open the bypass relief valve.

8. With the engine at high rpm disconnect the PWM wire or a sensor to ensure the fan motor is going to full speed.

9. Check that the reservoir is full. The motor is now ready for operation.

Recommendations

Fan drive motors are manufactured using a process known as cut-in, during which the gears, motor body, and bearing blocks are allowed to establish a unique relationship to each other. Opening a motor and replacing components is not recommended. Removal or replacement of some internal components will modify their critical dimensions. Because motors are cut-in at a specific pressure to ensure maximum efficiency, removal or replacement of internal components may be detrimental to motor efficiency. Motor conversions are not allowed.

To ensure optimum life, perform regular maintenance of the fluid and filter. Contaminated fluid is the main cause of unit failure. Take care to maintain fluid cleanliness when servicing.

Check the reservoir daily for proper fluid level, the presence of water, and rancid fluid odor. Fluid contaminated by water may appear cloudy or milky or free water may settle in the bottom of the reservoir. Rancid odor indicates the fluid has been exposed to excessive heat. Change the fluid immediately if these conditions occur. Correct the problem immediately.

Inspect vehicle for leaks daily.

Change the fluid and filter per the vehicle / machine manufacturer's recommendations or at these intervals:

Fluid and filter change interval

Reservoir type	Recommended oil change interval
Sealed	2000 hours
Breather	500 hours

Change the fluid more frequently if it becomes contaminated with foreign matter (dirt, water, grease, etc.) or if the fluid is subjected to temperature levels greater than the recommended maximum.

Dispose of used hydraulic fluid properly. Never reuse hydraulic fluid.

Change filters whenever the fluid is changed or when the filter indicator shows that it is necessary to change the filter. Replace all fluid lost during filter change.

Fan speed locked high at high engine speed (cold conditions)

To determine minimum fan speed at high engine rpm, connect coil to battery voltage to lock coil in open position. Follow steps 1 - 3. If fan is still not operating properly, follow steps 4 - 5.

Item	Description	Action
Wire disconnected or shorted	Any wire on the FDC, switches, or temperature sensors that is disconnected, cut,or shorted will lock the fan to full speed.	Re-connect wires or re-wire the wiring harness.
Faulty electronics (FDC)	The FDC or ECM is not sending a current signal to the solenoid. No feel of magnetics on proportional relief valve coil.	Replace the FDC. Consult engine repair manual; verify 12 or 24 VDC is going to the coil.
Faulty input signal to FDC (sensors, switches, PWM signal)	Sensors either not functioning properly or not properly engaged in mounting. Improper or No PWM signal from engine.	Replace or re-mount sensor. Determine why engine is sending faulty signal and fix. Verify 12 or 24V going to FDC. Check for 5V across sensors.
Faulty valve	Valve is stuck in closed position.	Replace valve or complete motor assembly.
Faulty solenoid coil.	Coil is either shorted or open. No feel of magnetics on coil	Replace coil, o-rings, and coil nut.Torque coil nut to 4 to 6 Nm [3 to 4.5 lbf•ft].

High stand-by fan speed (cold conditions)

Item	Description	Action
Blockage in main valve flow passages	Blockage in valve flow passages will increase fan speed and system pressure.	Replace valve. SGM2Y (PRV 10) torque to 45 N•m to 50 N•m [33 to 36 lbf•ft]. SGM3Y (PRV 12) torque to 70 N•m to 75 N•m [51 to 55 lbf•ft]. Torque coil nut to 4 Nm to 6 Nm [3 to 4.5 lbf•ft].
Faulty electronics (FDC), sensor bad or disconnected, PWM signal missing.	FDC is not sending full current signal to the solenoid. Sensor bad or disconnected, PWM signal missing	Replace bad sensor or connect wire. Determine reason for missing PWM signal. Replace the FDC.
Faulty solenoid coil.	Coil is either shorted or open. No feel of magnetics on coil	Replace coil, o-rings, and coil nut.Torque coil nut to 4 to 6 Nm [3 to 4.5 lbf•ft].

Fan speed not controlled by current to coil

Item	Description	Action
Fan speed proportional to engine speed at all times	Blocked or stuck valve causes fan speed to be proportional to engine speed at all times.	Replace valve. SGM2Y (PRV 10) torque to 45 N•m to 50 N•m [33 to 36 lbf•ft]. SGM3Y (PRV 12) torque to 70 N•m to 75 N•m [51 to 55 lbf•ft]. Torque coil nut to 4 Nm to 6 Nm [3 to 4.5 lbf•ft]

Fan does not turn

Item	Description	Action
Not enough flow through motor.	If engine is left at idle at start-up of machine, there is not enough flow or pressure to turn fan motor.	Rev engine a couple times to get flow through motor. If the fan begins to turn, and continues to turn when the engine returns to idle, the pump and motor are OK.
Delta pressure across proportional valve too low	Delta pressure across motor ports should measure approximately 50 psi minimum at engine idle.	Measure delta pressure across motor ports. If it is greater than 150 psi and the motor does not turn, replace motor. If the delta pressure is between 50 psi and 150 psi and the motor does not turn, rev the engine a couple of times to get flow through the motor and check current to the solenoid. If current is greater than recommended maximum, adjust controller parameters to reduce the current. If increasing the engine rpm makes the fan turn, adjust controller parameters to reduce the current. Consult Turolla OCG FDC Tool Box. Consult engine service manual.
	Check motor case drain flow	Is motor case drain flow greater than 1.2 l/min [US 0.3 gal/min] **YES** - Replace motor. **NO** - Check proportional relief valve
	Check proportional relief valve	Is there 12 or 24 VDC to coil. **NO** - Find out why and repair. **YES** - Disconnect coil.
	Check fan speed	Did fan speed increase? **NO** - Replace proportional relief valve. **YES** - Check FDC and ECM
	Replace proportional relief valve	After replacing proportional relief valve, is there adequate fan speed?
	Check pump	**YES** - System is OK. **NO** - With solenoid disconnected, measure and record system pressure and fan speed at increasing engine speed (i.e.700, 1200, 1500, 1800, full throttle).
	Check fan speed and system pressure	Is the fan speed and system pressure increasing with engine speed? **NO** - Replace pump.
Inadequate fan system flow coming from pump	If pump or motor lose efficiency, there may not be enough flow to move the motor	Disconnect a sensor wire or battery wire to controller, if the fan does not turn, check motor bearing flow out of motor case drain line (maximum 1.2 l/min [US 0.3 g/min]) and / or with the solenoid disconnected verify system pressures and fan speed while increasing engine speed. If the fan does not turn replace the pump, if it does turn, Repeat troubleshooting chart from the top of this chart. Check engine idle.
	System with Priority Flow Divider (PFD) for steering may be sending too much flow to steering	Check flow to steering unit. Replace pump.
Fan system flow coming from pump is bypassing the motor	Proportional relief valve in motor is stuck in open position	Disconnect solenoid coil. Fan should go to full speed. If fan does not go to full speed, replace relief valve.
	Proportional valve installed into end cover supply port.	Install valve into endcover port on return side of motor

Fan too slow at high engine rpm

Disconnect coil to send fan to maximum speed at high engine rpm. If problem remains, follow steps 1 thru 8. If fan attains maximum speed, follow step 9 .

Item	Description	Action
Low oil level in reservoir	Not enough oil to maintain full system flow.	Fill reservoir to recommended level. Consult operator's manual.
PRV set to wrong crack pressure	PRV may be holding pressure below specifications. The PRV controls the maximum speed of the motor.	Replace PRV with one set to appropriate crack pressure. Pressure setting is not externally adjustable.
Faulty PRV	Fan runs at low engine speed at all times	Replace valve. S_M2Y (PRV 10) torque to 45 N•m to 50 N•m [33 to 36 lbf•ft] S_M3Y (PRV 12) torque to 70 N•m to 75 N•m [51 to 55 lbf•ft] Torque coil nut to 4 Nm to 6 Nm [3 to 4.5 lbf•ft]
Hydraulic oil temperature too high	High oil temperature decreases viscosity and affects efficiency.	Maintain hydraulic oil at normal operating temperatures (85°C [185°F] max). Ensure cooler is operating properly. High oil temperature can also be caused by aeration (see below).
Aeration of oil	Air in system decreases efficiency of units and controls. Noise, foaming, and hot oil are signs of aeration.	Find location where air is entering into the system and fix. Check inlet line to pump and repair any leaks. Fill reservoir to recommended level. Consult operator's manual.
Damaged motor, low system pressure	Proportional relief valve spool sticking open may prevent full flow from going through motor. Not enough flow from pump.	Measure system pressure between pump and motor. Vary engine speed low to high. Does system pressure change? Check motor case drain flow. Should be maximum 1.2 l/min [US 0.3 gal/min]. If case drain flow exceeds limits, replace motor.
Inadequate fan system flow coming from pump.	If pump loses efficiency, it may not produce enough flow to turn the motor. A damaged pump may provide flow when oil is cold and viscous but may not when oil warms up. Systems equipped with steering PFD may be sending too much flow to steering. May be sending too much flow to steering.	Compare performance when oil is hot and cold. Measure flow entering motor. Measure steering flow. Replace pump if flow is insufficient.
Inadequate flow coming from the reservoir due to restrictions	Restriction in inlet of the pump, Strainer or filter in the reservoir plugged.	Clean strainer or replace filter in reservoir. Check inlet vacuum at pump inlet. Maximum Inlet vacuum 0.7 bar absolute [10 inches Mercury vacuum]
Faulty electronics (FDC or ECM).	The FDC or ECM is sending too high of a current signal to the solenoid.	Readjust or replace the FDC. Verify ECM is working properly. Troubleshoot ECM according to manufacturers instructions. Replace ECM if necessary.

Improper modulation of FDC or ECM

Item	Description	Action
Faulty input signal to FDC or ECM (sensors, switches, PWM signal)	Sensors either not functioning properly or not engaged into mounting properly. Improper PWM signal from engine.	Replace or re-mount sensor. Determine why engine is sending faulty PWM signal and fix.
Faulty electronics (FDC or ECM).	FDC or ECM sending improper current to solenoid.	Consult engine service manual. Replace the FDC.
Faulty PRV	Valve not shifting properly with current signal from FDC. Verify proper current signal to valve.	Replace valve assembly. SGM2Y (PRV 10) torque to 45 N•m to 50 N•m [33 to 36 lbf•ft]. SGM3Y (PRV 12) torque to 70 N•m to 75 N•m [51 to 55 lbf•ft]. Torque coil nut to 4 Nm to 6 Nm [3 to 4.5 lbf•ft].

System noise

Item	Description	Action
Aeration of the oil	Low oil in reservoir Air in system decreases efficiency of units and controls. Air in system is indicated by excessive noise in pump, foaming in oil, and hot oil.	Find location where air is entering into the system and fix. Problem is often found in inlet line to pump. Fill reservoir
Cold oil	Low oil temperature increases viscosity and can cause cavitation, resulting in system noise.	Allow the oil to warm up to its normal operating temperature with engine at idle speed.
Fan hitting shroud.	Check fan shroud and hydraulic motor mountings.	Consult owner's manual for proper fastener torques.

System operating hot

Item	Description	Action
Low oil level in reservoir and low supply to pump.	Insufficient amount of hydraulic fluid will not meet the cooling demands of the system.	Fill the reservoir to the proper level.
Faulty or blocked heat exchanger (if equipped).	If the heat exchanger fails, or becomes obstructed, it may not meet the cooling demands of the system.	Ensure that heat exchanger is receiving adequate air flow and that the heat exchanger is in good operating condition. Repair or replace as necessary.
Faulty PRV	If a system relief valve becomes unseated for an extended period of time or fails for any other reason, the system could become overheated.	Replace malfunctioning relief valves and verify that the loads on the machine are not excessive. SGM2Y (PRV 10) torque to 45 N•m to 50 N•m [33 to 36 lbf•ft] SGM3Y (PRV 12) torque to 70 N•m to 75 N•m [51 to 55 lbf•ft] Torque coil nut to 4 Nm to 6 Nm [3 to 4.5 lbf•ft]
Fan system flow coming from pump is bypassing the motor	Proportional relief valve in motor is stuck in open position	Disconnect solenoid coil. Fan should go to full speed. If fan does not go to full speed, replace relief valve.
	Proportional valve installed into end cover supply port.	Install valve into endcover port on return side of motor

Leaking motor shaft seal

Item	Description	Action
Excessive pressure in case drain line.	Case drain line (from rear of motor) restricted. No other return lines are tied into motor case drain.	Verify case drain line is routed directly to reservoir with no restrictions. Maximum case pressure limit is 3 bar [45 psi]. Replace motor.

Safety precautions

Caution

High inlet vacuum causes cavitation which can damage internal pump components.

Warning

Escaping hydraulic fluid under pressure can have sufficient force to penetrate your skin causing serious injury and/or infection. Relieve pressure in the system before removing hoses, fittings, gauges, or components.
Unintended movement of the machine or mechanism may cause injury to the technician or bystanders. To protect against unintended movement, secure the machine or disable / disconnect the mechanism while servicing.

Caution

Contamination can damage internal components and void the manufacturer's warranty. Take precautions to ensure system cleanliness when removing and reinstalling system lines

Solenoid replacement

Refer to the valve drawings on the following page for wrench sizes and torque specifications.

Remove the coil

1. Disconnect the electrical connection from the coil.
2. Remove the plastic nut holding the coil to the valve.
3. Remove the coil and O-ring.

Install the coil

1. Place a new O-ring on the valve stem. Install the coil.
2. Install another new O-ring onto the valve stem.
3. Install the plastic nut. Torque coil nut to 4 Nm to 6 Nm (3 to 4.5 lbf ft)
4. Install the wire connector to the coil.

⚠ Warning

Do not overtorque plastic nut.

Valve replacement

Remove the valve

Remove the valve from the motor.

Install the valve

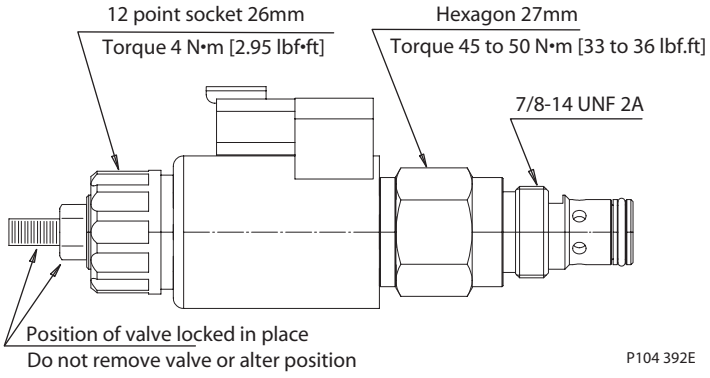
Install valve into motor. Torque to following specifications.

SGM2Y (PRV 10) torque to 45 N•m to 50 N•m [33 to 36 lbf•ft].
SGM3Y (PRV 12) torque to 70 N•m to 75 N•m [51 to 55 lbf•ft].

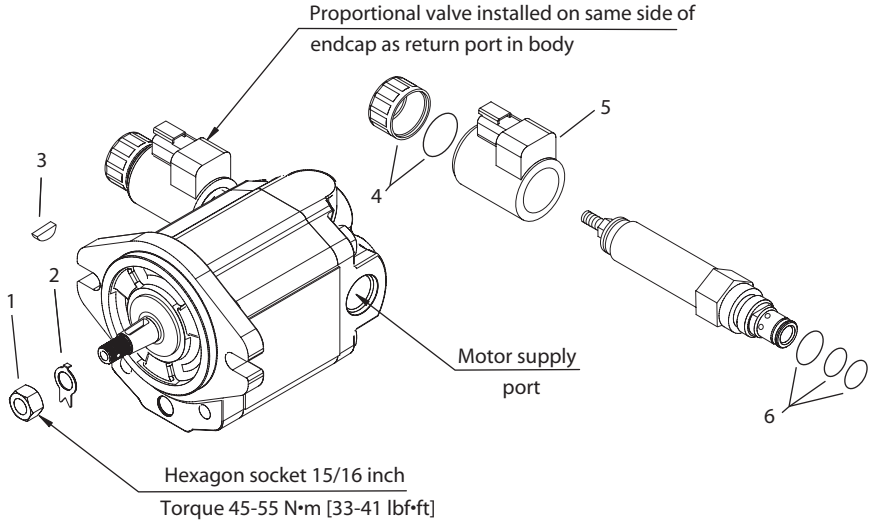
⚠ Warning

Do not overtorque valve.

PRV10 Valve

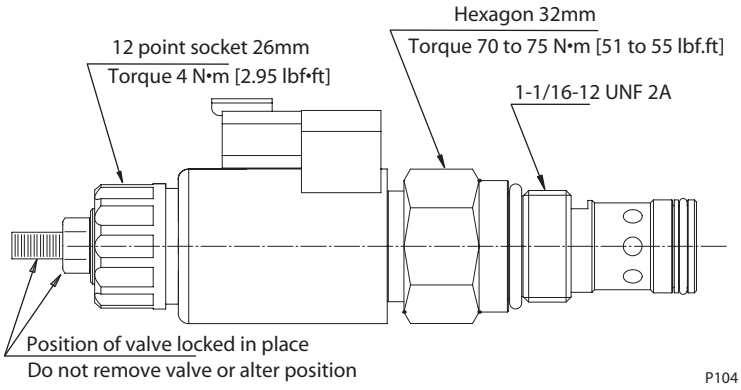


SGM2Y Repair parts

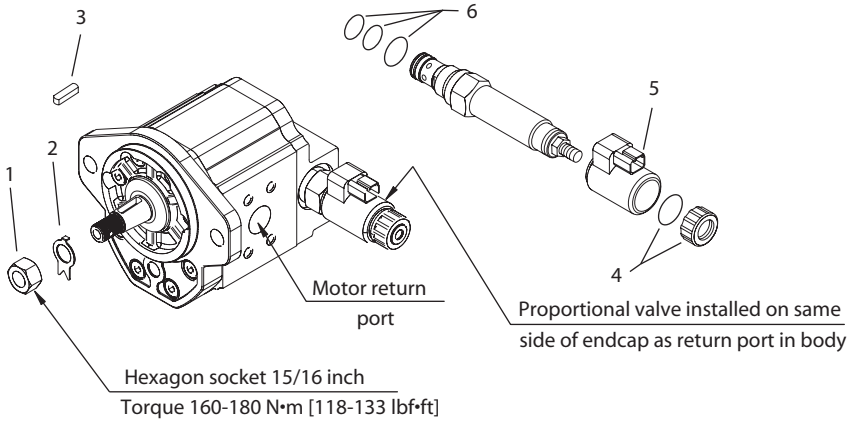


Item	Description	Part number	Qty
1	Shaft nut (1/2-20 UNF)	5722.12.1307	1
2	Locking washer	326.0117.1.00	1
3	Key	5738.03.1005	1
4	Coil nut with O-ring	173803668	1
5	Coil, 12 Volt	171151719	1
5	Coil, 24 Volt	171151819	1
6	Solenoid seal kit	35400071	1

PRV 12 Valve



SGM3Y Repair parts



Item	Description	Part number	Qty
1	Shaft nut (5/8-18 UNF)	5722.01.1629	1
2	Locking washer	326.0009.0.00	1
3	Key	930.0018.0.00	1
4	Coil nut with O-ring	173803668	1
5	Coil, 12 Volt	171151719	1
5	Coil, 24 Volt	171151819	1
6	Solenoid seal kit	35400131	1

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