



Component Manual

**Power Steering Manifold
Model: PSM 300**



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This manual is subject to change without prior notice.



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1 INTRODUCTION

1.1 Description

The Power Steering Manifold 300 (PSM 300) is a stand alone, solenoid operated, proportional hydraulic manifold which allows for the interface of electronic steering controls to hydraulic steering systems. The PSM 300 is supplied as part of a hydraulic power unit or on its own for use with an engine or electric motor driven pump.

The maximum output flow for the PSM 300 is described in section 1.2. The load sense is set at 300 psi. When the valve is energized a shuttle valve is used to sense the load from the cylinders. The output flow rate is controlled thru control system.

A built-in lockvalve isolates the PSM 300 from any external loads exerted by the rudder through the steering gear. This lockvalve also ensures the steering gear stays at a fixed position when no rudder command is given. Optional counterbalance valves, in replacement of pilot operated check valves, are for systems where "run away" rudder conditions might occur.

The PSM 300 comes with an optional auto-fill valve that ensures that any air trapped in the helm pump piping is constantly being purged. Auto-fill valve incorporates a spring loaded check valve inducing a constant back-pressure in the return line. A flow control valve is used to set the flow to 0.5 gpm at the factory. Please refer to installation section of this manual for information pertaining to auto-fill settings.



1.2 Specifications

Valve Design Flow	Maximum Output Flow
8 gpm	3 gpm
15 gpm	5.5 gpm
22 gpm	8 gpm

Maximum Air Ambient Temperature:	104°F (40°C)
Oil Maximum Operating Temperature	150°F (65°C)
Output Flow Adjustment:	Zero to Maximum Output Flow thru control system.
Maximum System Pressure:	Set at the pressure compensator of the pump.
Directional Solenoid Valve:	4-Way. Voltage Options 12/24/32 VDC, 110/220 VAC
Recommended Filtration:	10 Micron Nominal. (Filter Not Supplied)
Recommended Oil:	ISO 32 (eg. Shell Tellus 32, Chevron EP32, Gulf 32AW, Exxon Nuto H32).

Part number	Description	Lbs (Kg)
	PSM 300-wxyz	
	w = 1 8L VLV, 2 15L VLV, 3 22L VLV	
	X = 0 NO auto-fill valve, = 1 auto-fill valve	
	Y = 0 lock valves, = 1 c-balance valve	
	Z = 1 12VDC, = 2 24VDC, = 3	
JA-401065-1	PSM 300-1102, auto-fill, lock valve, 24 VDC, 8L valve	16.5(7.5)
JA-401065-2	PSM 300-2102, auto-fill, lock valve, 24 VDC, 15L valve	
JA-401065-3	PSM 300-3102, auto-fill, lock valve, 24 VDC, 22L valve	
JA-401065-4	PSM 300-1002, no auto-fill, lock valve, 24 VDC, 8L valve	16.0 (7.3)
JA-401065-5	PSM 300-2002, no auto-fill, lock valve, 24 VDC, 15L valve	
JA-401065-6	PSM 300-3002, no auto-fill, lock valve, 24 VDC, 22L valve	

CAUTION: All specifications are subject to change without prior notice.



2 INSTALLATION

2.1 Mounting - Hydraulic Installation

Refer to Figure 1 for mounting and connection information.

Refer to Figure 2 for a typical piping layout of an engine driven system.

NOTE: If the PSM 300 is supplied as part of a hydraulic power unit, only the outlet ports (ports C) need to be connected. The inlet port (port C) and return port (port T) will be pre-plumbed.

- a) Connect the hydraulic pump outlet to the PSM 300 inlet port (port P).
- b) Connect the PSM 300 return port (port T) to the inlet port of the return line filter.

IMPORTANT: A filter should be installed in the return line.
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- c) Connect the two outlet ports (ports C) to the steering gear.
- d) If auto-fill option is present, connect the auto-fill line-out to the auto-fill flow control valve, and the return line to the tank while ensuring that fluid is returned to tank below fluid level.

2.2 Wiring

WARNING: ALL WIRES MUST BE SECURELY CONNECTED. A LOOSE WIRE OR SHORT CIRCUIT MAY CAUSE AN ERRONEOUS STEERING COMMAND.
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Refer to Figure 3 for wiring information.

- a) Connect the directional solenoid wires to the electronic steering control device as specified in the control devices manual (ie, Jog Lever Manual, Amplifier Unit Manual or Autopilot Manual).

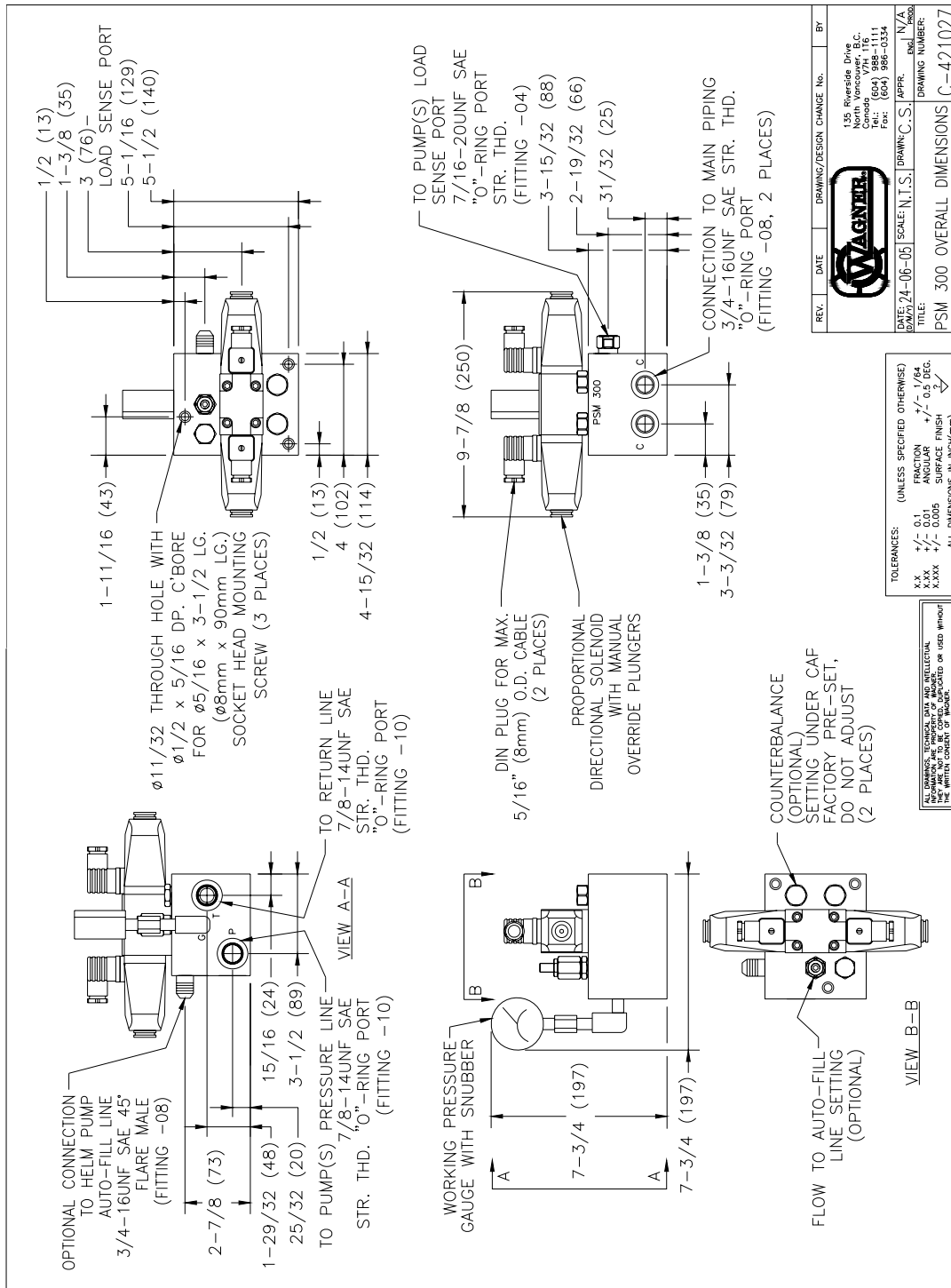


Figure 1 – Power Steering Manifold Overall Dimensions

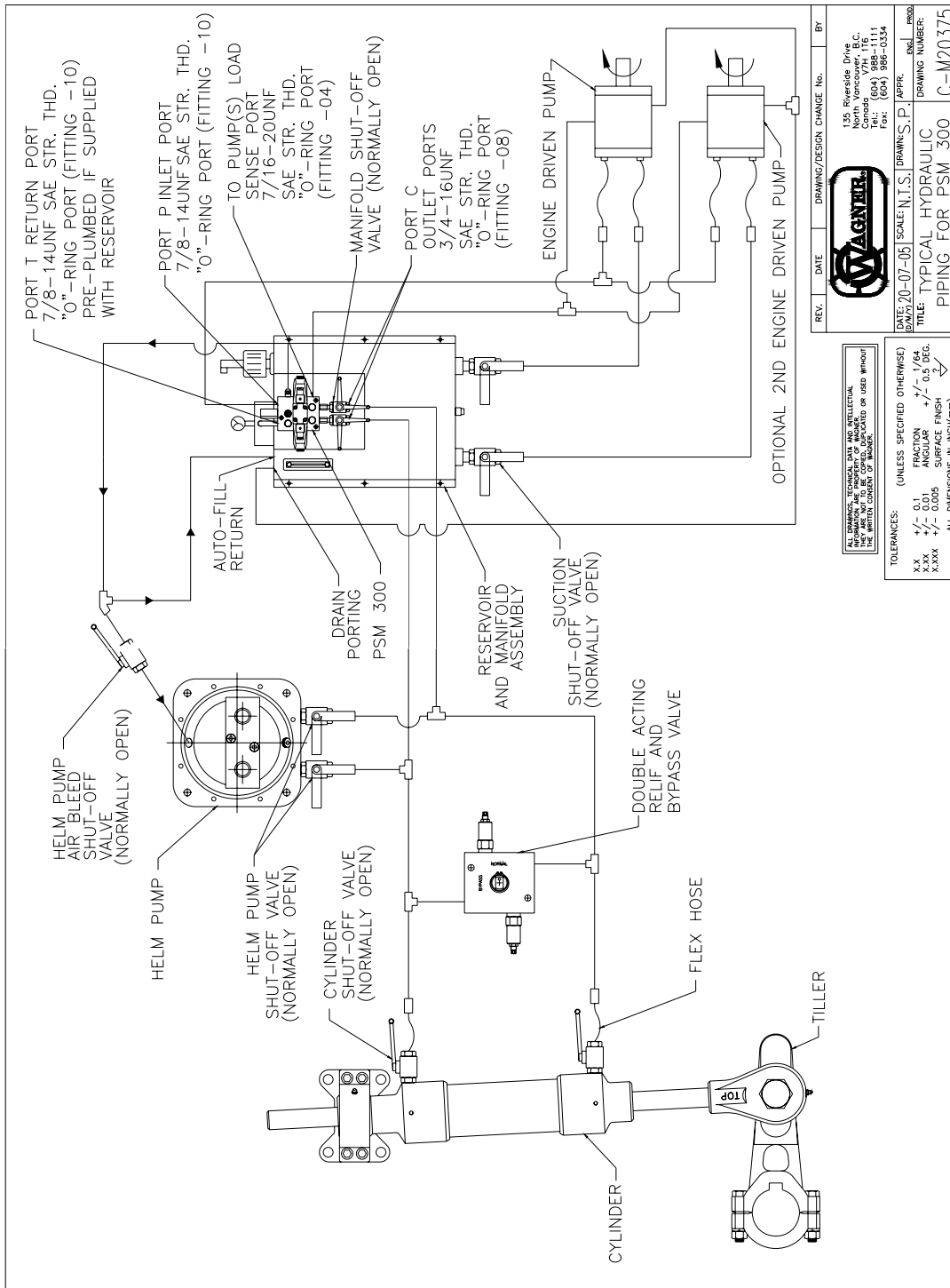


Figure 2 – Typical Helm Pump Piping Arrangement with Auto-fill

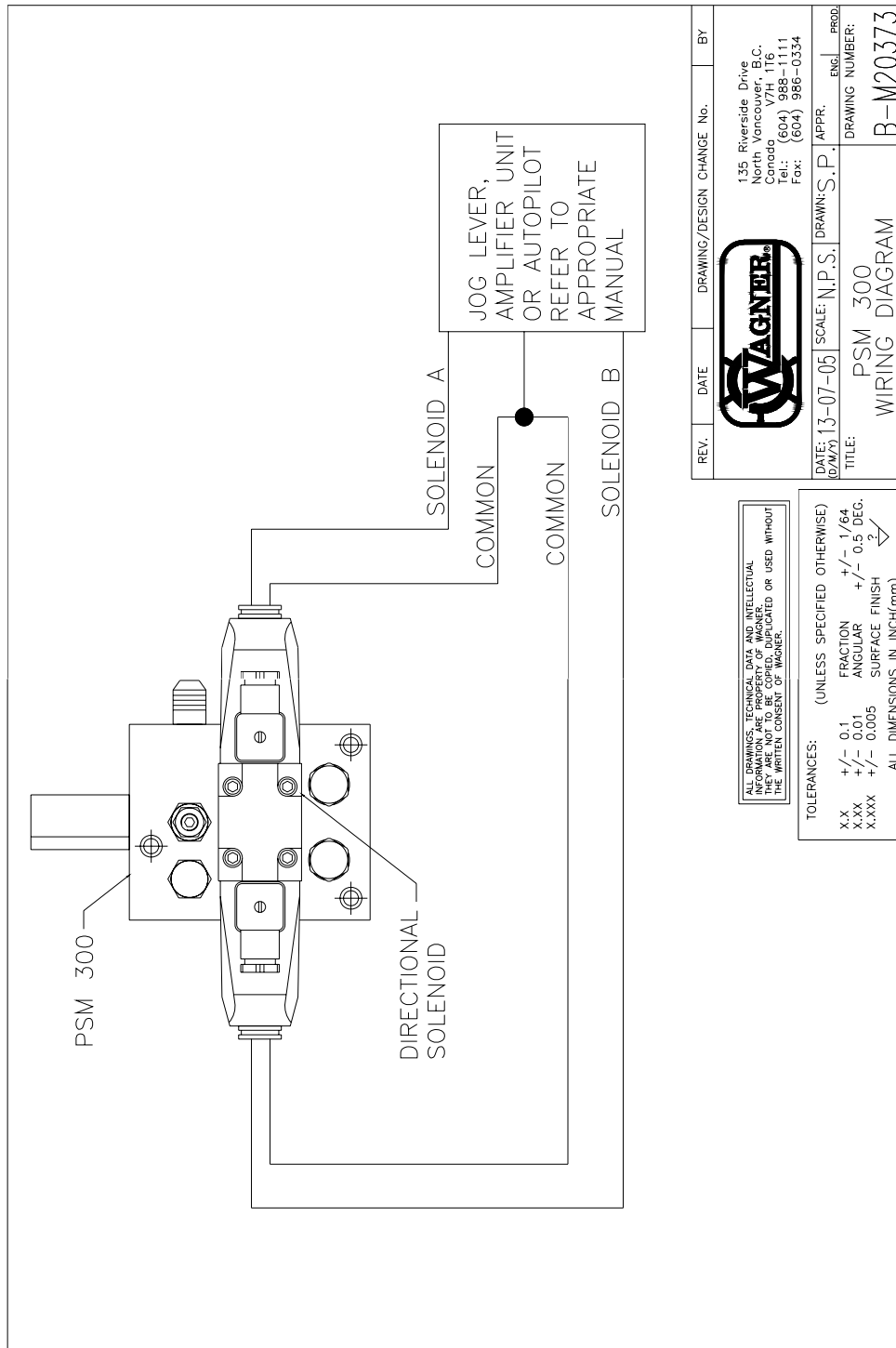


Figure 3- PSM 300 Wiring Diagram



3 SETUP AND TESTING

WARNING: ALL SET UP AND TESTING PROCEDURES MUST BE PERFORMED WHILE THE VESSEL IS STATIONARY AND NOT UNDERWAY.

3.1 Preparation

To ensure SAFE and EFFICIENT operation of the PSM 300 manifold the following conditions **must be met prior** to starting up the steering gear system:

- All tubing, flexible hose and fitting connections are tight and thoroughly cleaned as per manufacturer's recommendations.
- Rags, plastic caps, etc. have not been left inside tubing or hoses.
- The PSM 300 manifold is properly mounted and secured.
- All adjustable screws are in a locked position.
- All mechanical components in the steering system are free to move as required.
- Oil is available at the pump inlet. If uncertain loosen the inlet fitting slightly to allow oil to escape. Re-tighten fitting when finished.
- Pump rotation is correct (motor rotation if the PSM 300 is supplied as part of a hydraulic power unit).
- All electrical connections are correct according to electronic control device's manual.
- All electrical connections are secure and insulated.
- All personnel are clear from any moving machinery.

3.2 Start Up

- a) Start the hydraulic pump.

WARNING: WHEN TURNING THE STEERING HARDOVER TO HARDOVER DO NOT EXCEED THE MAXIMUM PRESSURE RATING OR LOADS OF THE STEERING SYSTEM.

- b) While monitoring the system pressure, shift the directional solenoid valve by manually inserting a slender rod in one end. Keep the rod inserted until the steering gear reaches hard over. Repeat for the opposite side of directional solenoid valve. This will indicate that the hydraulic system is functioning properly.



- c) Energize the directional solenoid valve by giving a command at the electronic control device. Observe the steering gear movement. A port or starboard command should give the corresponding steering direction. Wires at the directional solenoid can be changed if the steering direction is wrong.
- d) Turn the steering gear from hardover to hardover with the steering control device until the steering gear responds instantly to a command. This will ensure that any trapped air has been removed from the system.

3.3 Adjustments

Refer to Figure 1 for the location of the auto-fill valve flow control settings.

- NOTE:
- Wagner brass cylinders are designed to operate at a maximum pressure of 1000 psi (69 bar).
 - Wagner steel cylinders are designed to operate at a maximum pressure of 1500 psi (103 bar).
 - Wagner K-Rams are designed to operate at a maximum pressure of 1000 psi (69 bar) or 1200 psi (83 bar) depending on steering angle.

WARNING: SECURE THE RELIEF VALVE AND FLOW CONTROL ADJUSTMENTS ONCE THEY ARE SET.

Auto-fill valve is factory set to 0.5 gpm of flow. Under most set-ups this will produce less than 15 psi back pressure at the helm shut-off valve. To check the back pressure:

- 1) Connect a low pressure gauge (0-100 psi) to the helm pump side of the helm shut-off valve;
- 2) Ensure pump is on and there is oil flow in the helm pump lines;
- 3) Read the pressure on the gauge;
- 4) If the pressure exceeds 15 psi, reduce Auto-fill flow until the gauge reads 15 psi or below;
- 5) Disconnect the low pressure gauge and reconnect the helm piping to helm pump shut of valve.



4 MAINTENANCE AND PARTS LISTS

WARNING: ALL INSPECTION AND MAINTENANCE MUST BE PERFORMED WHILE THE VESSEL IS STATIONARY AND NOT UNDERWAY.

The PSM 300 should be inspected periodically for the following:

- Mounting bolts and fittings are secure.
- There is no visible leakage at any fittings or PSM 300 components.
- All electrical connections are secure, wires and cables are in good condition.

Seals and mechanical components are subject to wear over time. When internal leakage or steering system performance becomes unacceptable, seal or component replacement is recommended.

Refer to Figure 4 for parts breakdown.

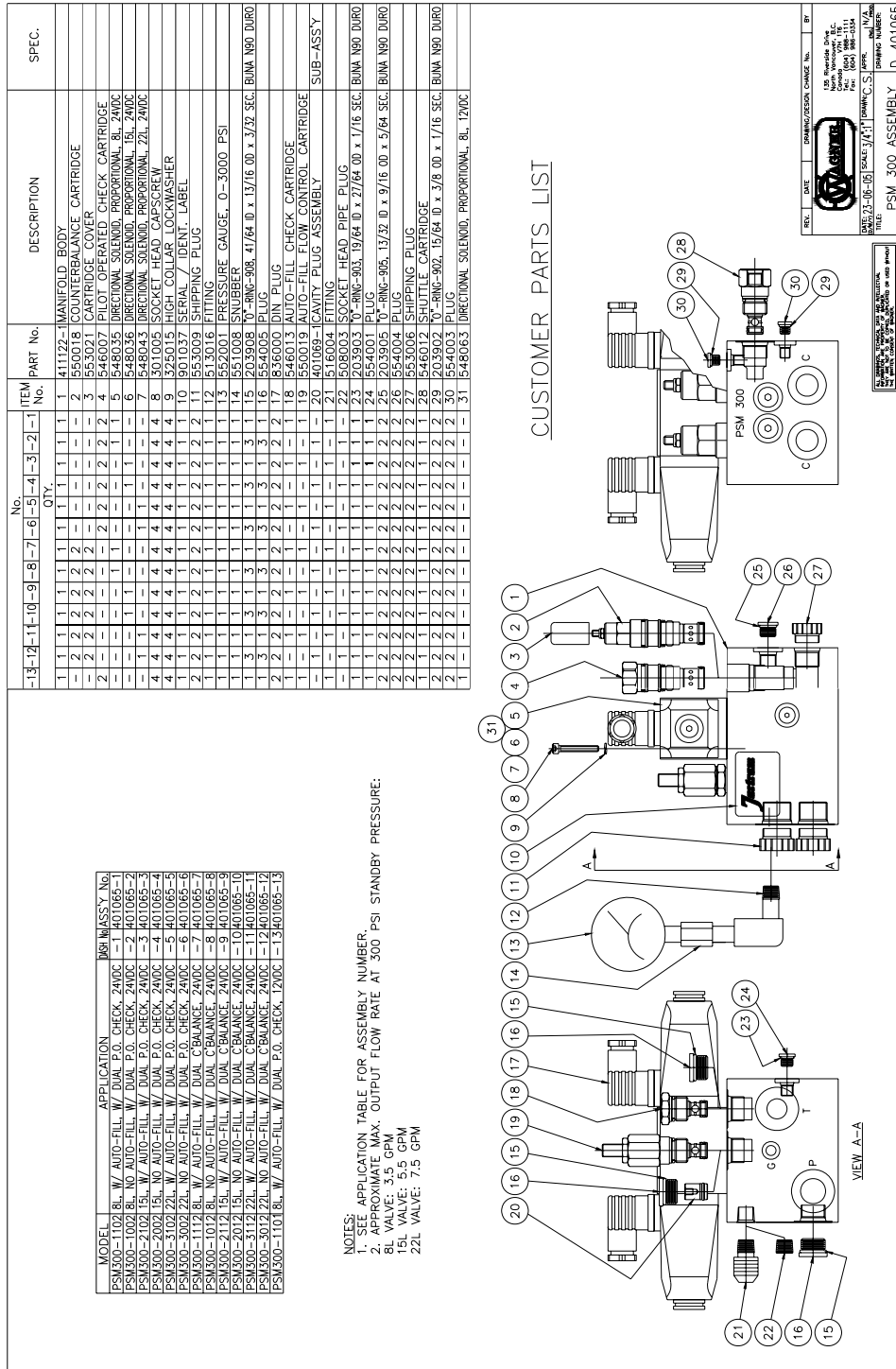


Figure 4 – PSM 300 Assembly

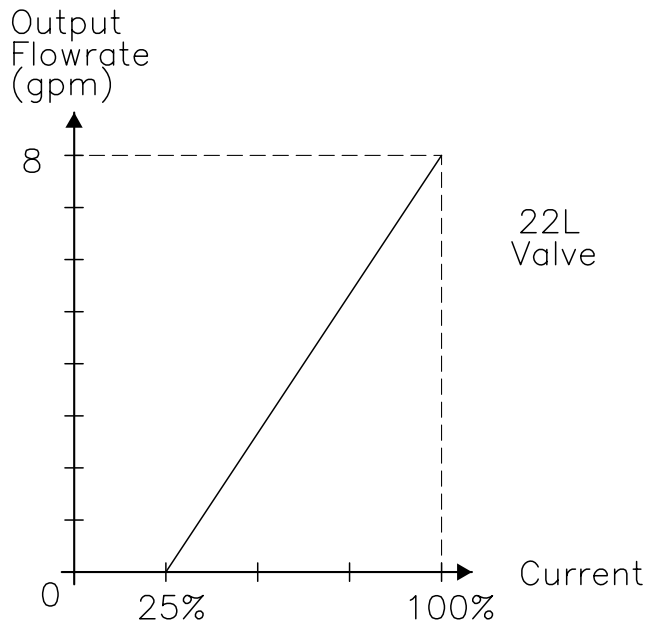
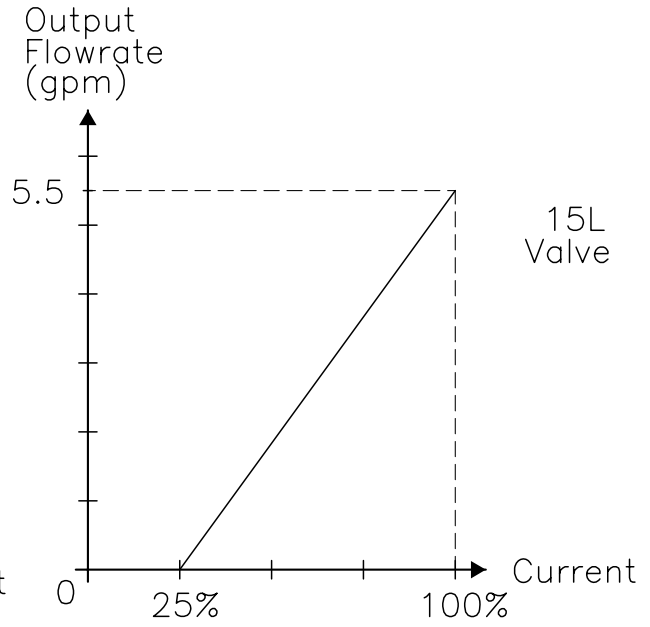
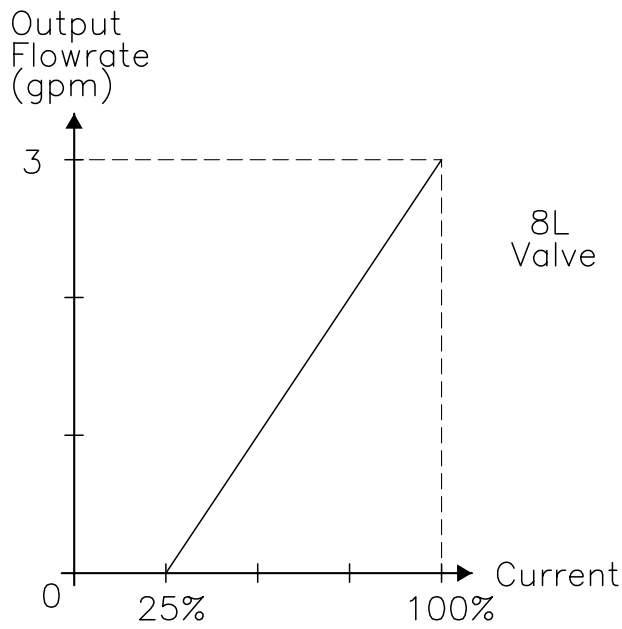


5 TROUBLESHOOTING

WARNING: FAILURE TO CORRECT ANY PROBLEM CAN CAUSE SUDDEN LOSS OF STEERING.

The chart below gives some general solutions for simple problems. If a problem cannot be resolved, contact the factory.

SYMPTOM	CAUSE	CORRECTION
Pump running, steering gear does not respond when given a command.	Inlet and return lines are reversed at the PSM 300.	Correct the lines. Refer to Figure 1 and Figure 2.
	Wires are loose or incorrect wiring.	Refer to Figure 3 – Wiring Diagram or appropriate control device manual.
	No power to directional solenoid.	Check power source.
	Optional DARB valve is in the bypass position.	Select normal position on DARB valve.
Steering gear goes hard over on its own.	Faulty wiring or short circuit.	Check wiring connections. Refer to Figure 3 or appropriate control device manual.
Noisy hydraulic pump or hydraulic system.	Excessive air trapped in the system.	Check the oil level in header tank, fill if installed. Check that all hoses and fittings are tight. Ensure air can be bled from system, and re-bleed.
Oil temperature too high.	Filter plugged.	Service filter.





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