

WEG Cooler

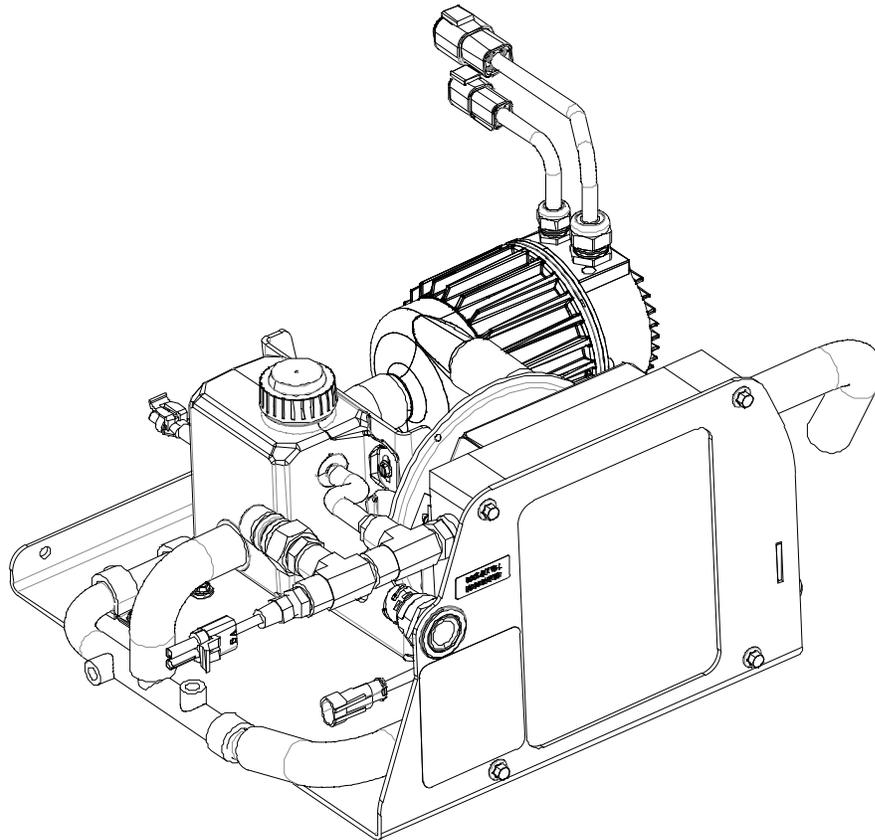


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Introduction

Thank you for purchasing Vanner's *WEG Cooler* assembly. We are confident you will be very pleased with its performance since Vanner products are designed and manufactured by skilled professionals using the highest standards in workmanship. With minimum maintenance and care, you can be assured of many years of trouble free service.

General Description

The Vanner *WEG (Water-Ethylene Glycol) Cooler* assembly is an efficient and highly reliable method of maintaining proper operating temperatures for power electronic components requiring liquid cooling.

It is provisioned with a highly reliable, brushless, seal-less circulating pump that is electro-magnetically coupled to a stainless steel impeller. The pump is also provisioned with J1939 CAN communication to broadcast status messages such as pump speed and power consumption.

In addition to the pump, the cooler is provisioned with a heat exchanger, environmentally protected brushless fan, a thermal switch for fan on/off controls, a degas bottle, quick fill fitting and a coolant fill mode switch. Draining the cooler assembly is achieved with a no-spill systems drain plug. All electrical power and I/O connections are achieved via automotive grade, sealed connectors.

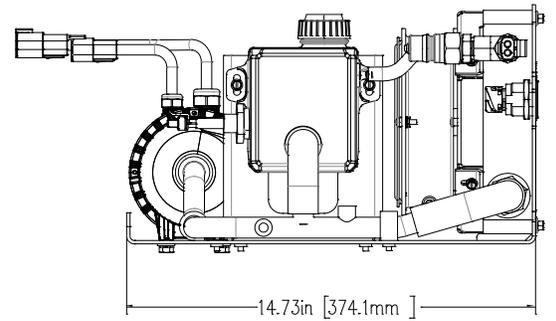
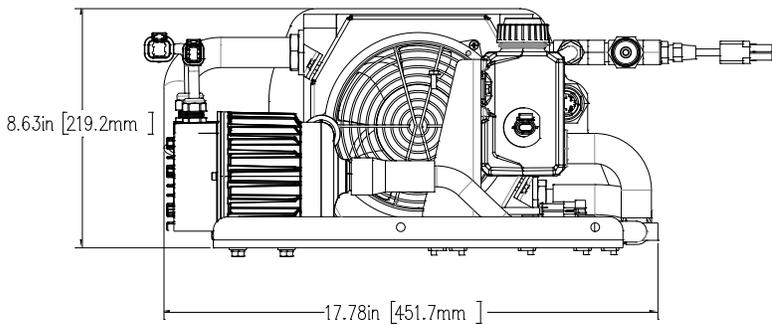
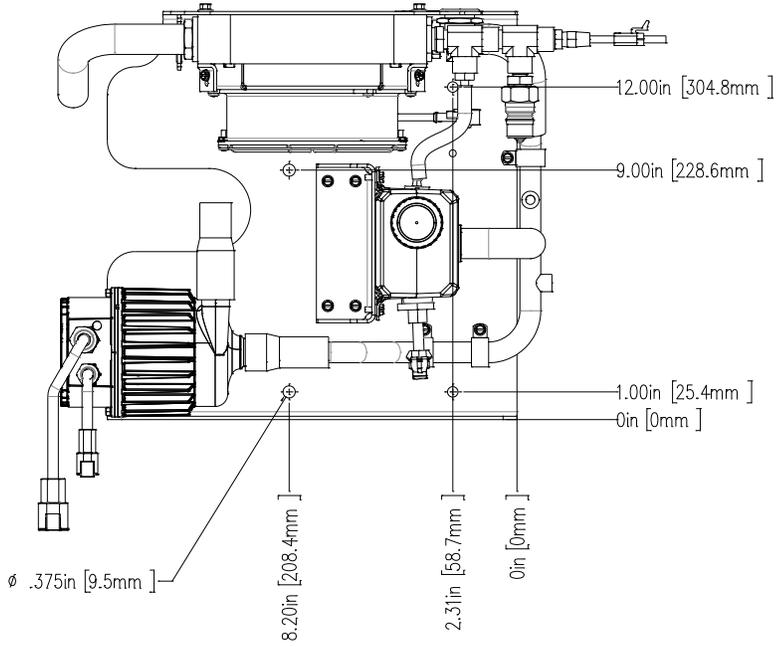
Operational Specifications

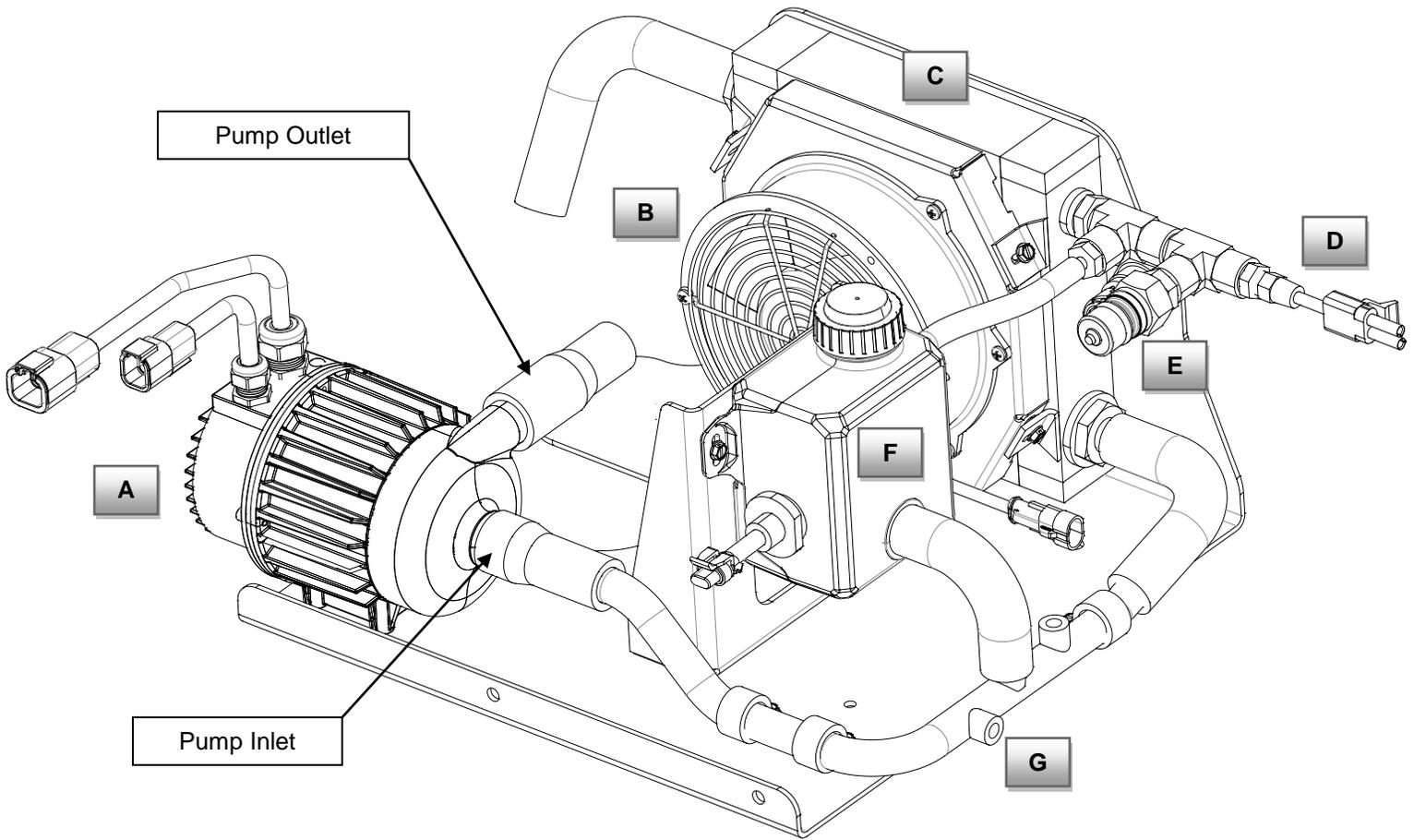
WEG Cooler Assembly		Units
Model Number (250kbps)	D017549	
Model Number (500kbps)	D018679	
Input Voltage Min	18	VDC
Input Voltage Max	30	VDC
Pump Enable Voltage Range	5 - 32	VDC
Pump Max Continuous Current	15 (See Note 1 below table)	A
Pump Max Continuous Current IAPII	5 (See Note 2 below table)	A
Fan Max Continuous Current	2	A
Coolant Flow Rate	4 (15)	Gal/min (L/min)
Pump Design Life	40,000	Hours
Fan L10 Service Life	70,000 @ 40°C	Hours
Ambient Operating Temperatures	Min: -40° (-40°) Max: 70° (158°)	°C (°F)
Ambient Storage Temperatures	-40° to +80° (-40° to 221°)	°C (°F)
Serviceability	All major components, i.e., pump, heat exchanger, fan, fill mode switch and fan switch are serviceable/replaceable.	
Maintenance (Daily)	Inspect cooling system for leaks. Add coolant to degas bottle as needed.	
Maintenance (Monthly)	Check fan inlet and heat exchanger for debris that may affect cooling efficiency of system.	
Mounting Location	Mount on a flat, horizontal surface near the power conversion module being cooled. Ensure ease of access for coolant fill/top off operations.	
Weight	36lbs (16.3kg)	

Notes:

1. This is current rating of pump running at a full speed of 5,000 RPM.
2. This is current rating of pump running at a speed of 2,000 RPM. It was determined 2,000 rpm is the ideal speed for the IAPII application with a VEPI (Vanner Exportable Power Inverter).

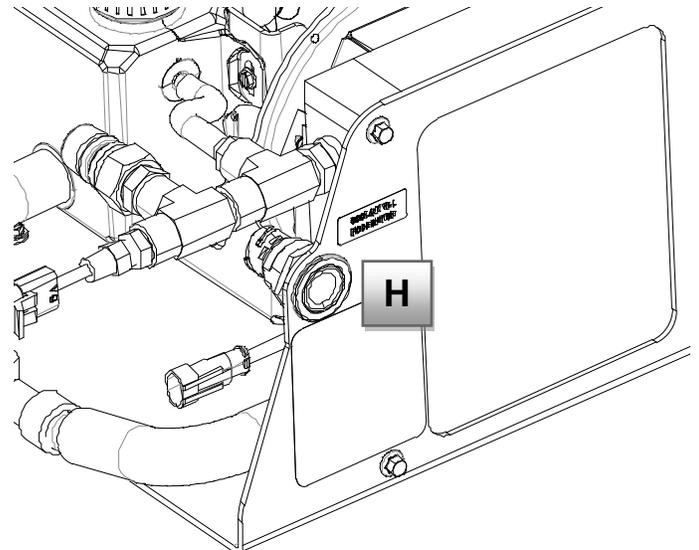
Dimensional Specifications





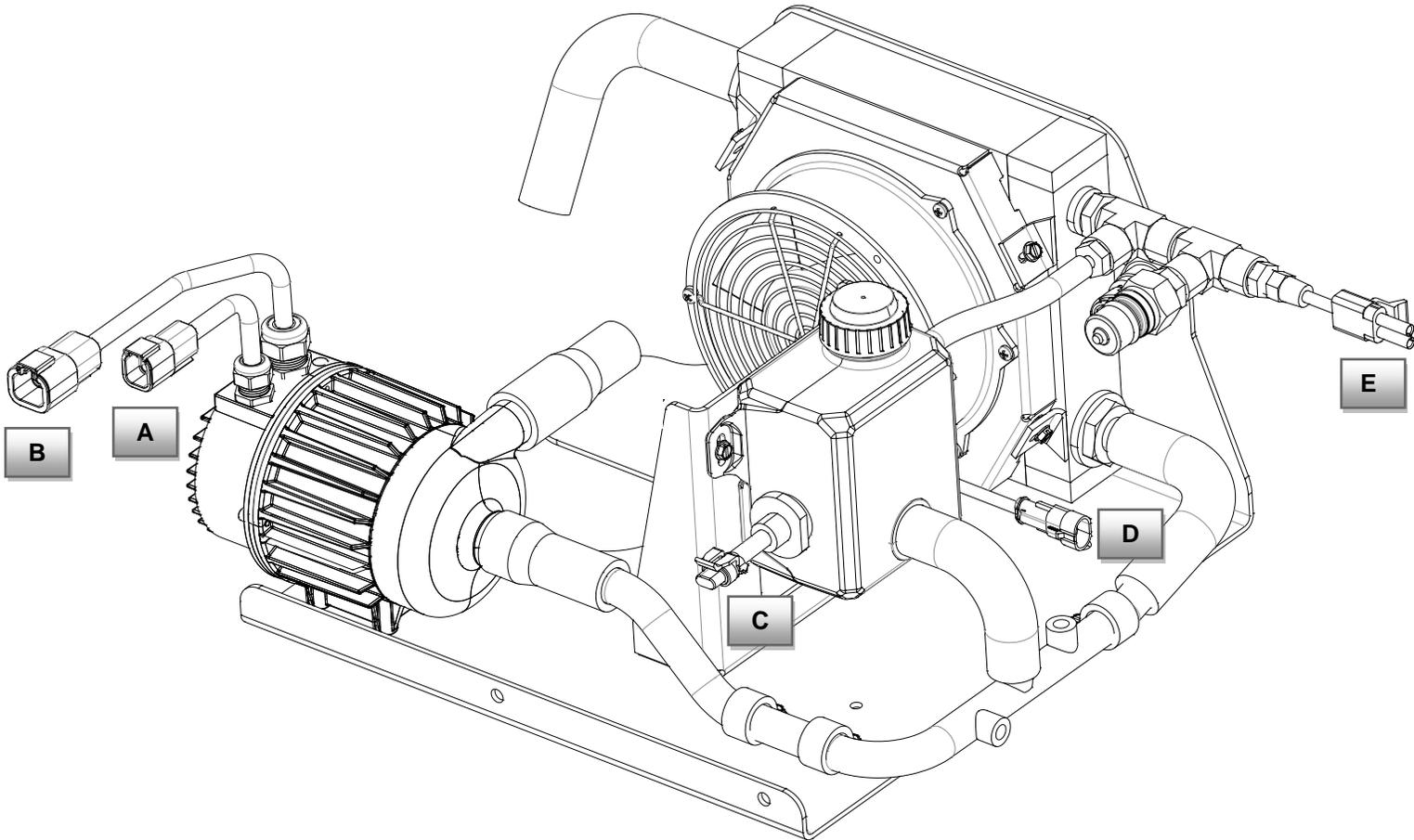
Major WEG Cooler Major Component Identification

Item	Component Description
A	Circulation Pump
B	Cooling Fan
C	Heat Exchanger
D	Temp Sensor Switch for Fan Control
E	Quick Fill Fitting
F	Degas Bottle
G	No-Spill Drain Fitting
H	Coolant Fill Mode Switch

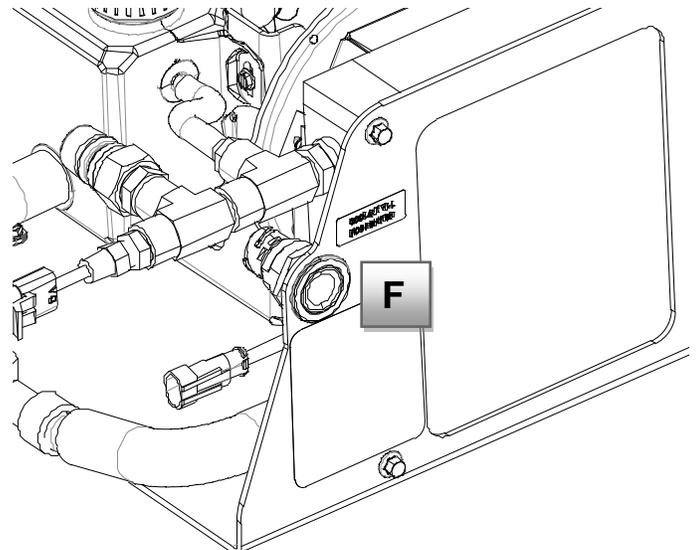


WEG Cooler Connector Identification

Note: For mating connector and contact part numbers and pin-out definitions, reference Vanner Outline Drawing D918046-*.



Item	Connector Description
A	Circulation Pump – CAN
B	Circulation Pump – Power and Enable
C	Float Switch
D	Fan Power
E	Temperature Sensor Switch
F	Coolant Fill Mode Switch



Connector Definitions and Functionality

A. Circulation Pump - CAN

The circulation pump CAN connection is integrated into the vehicle CAN network. Motor status messages such as speed and power consumption are communicated via J1939 CAN messaging structure. Motor controller status messages are also communicated such as motor controller over current, over voltage, under voltage, etc. The source address for the CAN status messages is 0x90. Contact Vanner for a full list of available CAN status messages.

B. Circulation Pump – Power and Enable

This connection is for 24VDC power and a 24VDC enable signal. Once the power and the enable signal is present, the pump will start after a 5 second delay. The pump will run continuously at a speed of 2,000 rpm while powered up.

Note: It was determined 2,000 rpm is the ideal pump speed to deliver the optimal flow rate for the IAPII application. If the pump is being used for an application other than IAPII, Vanner recommends comprehensive testing to determine the ideal pump speed.

C. Float Switch

The degas bottle is provisioned with a float switch to monitor the coolant level within it. With a normal amount of coolant within the degas bottle, the float is in an elevated position and the switch status will be open. If the coolant level drops, thereby lowering the float to a horizontal position, the switch will close.

D. Fan Power

24V power is delivered to the fan via the temperature sensor switch that is threaded into the brass fitting stackup extending from the heat exchanger.

E. Temperature Sensor Switch

The sensor threaded into the brass fitting stackup monitors the temperature of the coolant circulating through the heat exchanger. The switch is normally open and will close upon the fluid temperature reaching approximately 145°F/63°C. Once closed, power is delivered to the fan to turn it on. The switch will re-open when the fluid temperature reaches approximately 108°F/42°C.

F. Coolant Fill Mode Switch

The WEG cooler assembly is provisioned with a coolant fill mode switch. Once depressed, a timer circuit is enabled powering the pump for a specified interval. Coolant fill mode instructions are provided on a decal near the fill switch.

CAUTION: Do not run the coolant pump without fluid in the system! Running the pump without coolant in the system will permanently damage it and will void the manufacturer's warranty.

Installation Instructions

Mounting Location

The following items are guidelines for determining the ideal mounting location for the WEG Cooler assembly.

- The WEG Cooler assembly must be mounted on a flat horizontal surface suitable for support during application.
- Locate the WEG Cooler so there are no obstructions affecting airflow into the fan or through the heat exchanger.
- Do not mount in a zero-clearance compartment that may result in overheating and compromised performance of the component being cooled.
- Locate the WEG cooler so the fill mode switch, quick fill fitting and degas bottle are easily accessed.

Attachment

- Attach WEG Cooler assembly to rack or vehicle structure utilizing the four .375" (9.5mm) holes in the main base plate. Isolation mounts are not required.
- Connect vehicle wire harnesses to appropriate connectors on the assembly. See page 12 for typical wiring diagram.
- See page 10 for coolant fill mode instructions.

Environmental Protection

Your WEG Cooler has been designed to withstand intermittent exposure to rain, moisture and direct pressure spray. However, continual exposure to rain and/or direct pressure spray may reduce the serviceable life of the unit. Any damage due to water contamination is covered by Vanner only through the terms of the factory warranty.

Coolant Fill Mode Instructions

Initial Filling and Startup of the WEG Cooling System

After the WEG cooler assembly is installed and the silicone right angle hoses are connected to the component being cooled, it can be filled with coolant.

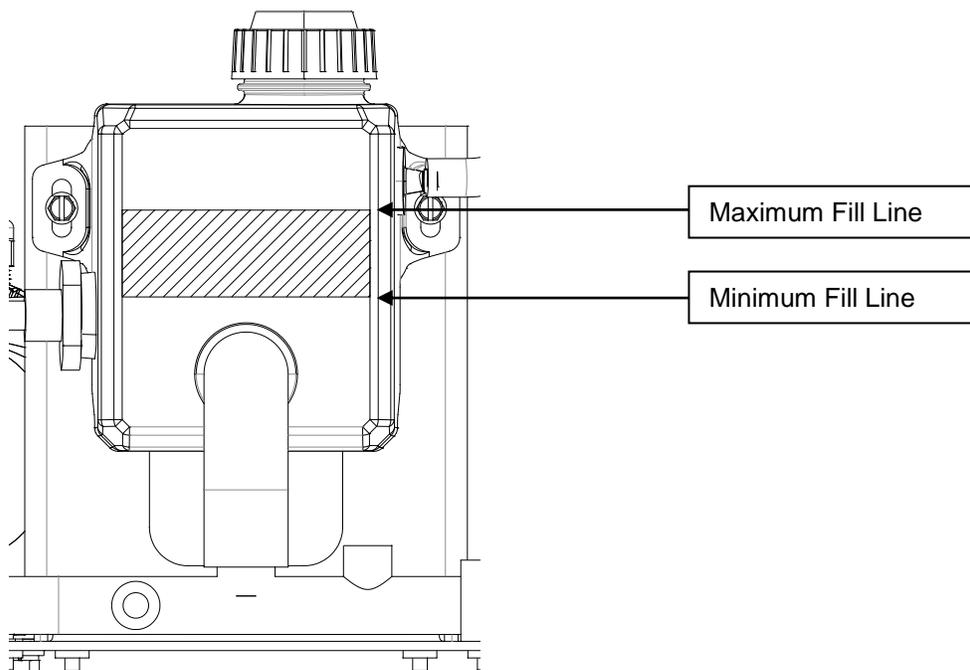
The following instructions outline the sequence of events to properly fill the WEG cooling system with coolant.

IMPORTANT! A 50/50 mix of aqueous automotive anti-freeze shall be used.

- Remove cap on coolant reservoir.
- Connect pressure fill fitting to mating fitting to fill system.
- Continue filling system until coolant begins to fill reservoir.
- Press coolant fill mode switch.
- Coolant level will drop. Maintain coolant level just below the ¼" fitting.
- Verify there is a steady, continuous stream of coolant flowing into the degas bottle from the ¼" hose.
- Replace cap on coolant reservoir.
- Check coolant level in reservoir daily and top up as required.

Coolant Level Range for Degas Bottle

Note: Bottle does not have max/min fill line markings on it.



WEG Cooler Operation

WEG Cooler Normal Conditions

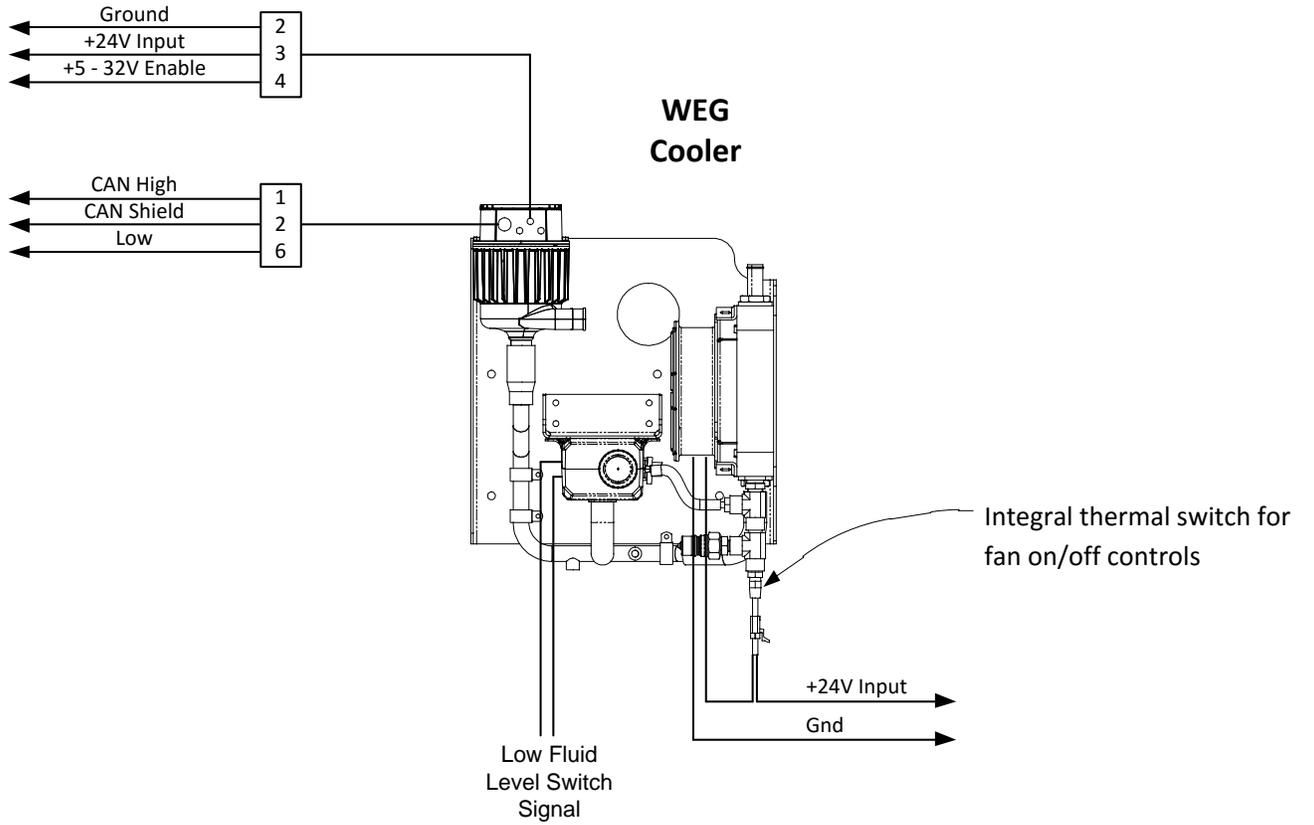
Under normal operating conditions, the WEG cooler assembly continually transports heat (during the current key cycle) from the connected component via the water-ethylene glycol mixture to the heat exchanger. The heated fluid is then cooled in the heat exchanger/fan assembly and transported back to the connected component.

Under light loading and low ambient temperature conditions, the fan may not be required for cooling the WEG mixture. (See temperature switch operation description on page 8 for fan on/off controls.)

The pump and fan run at fixed speeds, they are not dynamically regulated based on thermal loading conditions of the system. The WEG cooler is designed to maintain the coolant temperature below a maximum value of $\approx 70^{\circ}\text{C}$ for proper cooling of the connected component.

The pump motor status, speed, speed % and power consumption, can be monitored via Vanner's dashboard software. Contact Vanner to ensure you have the latest version of Dashboard software.

Typical Wiring Diagram



Troubleshooting

WEG Cooler Abnormal Conditions

In the event the component being cooled isn't operating normally due to over temperature faults, the WEG cooler assembly should be checked for the following;

- Coolant leaks
 - Fix leaks and fill degas bottle to appropriate level.
- Air entrapment in coolant loop.
 - Air entrapped in the coolant loop can result in improper coolant flow through the system. This can be determined by checking the fluid flowing into the degas bottle from the ¼" hose.
 - If there's little or no coolant flowing into the degas bottle, verify proper level, then bleed air trapped in loop via fitting on stainless steel tubing.
- Obstruction(s) restricting air flow through the heat exchanger.
 - Remove obstructions.
- Loss of power to pump motor and/or cooling fan
 - Verify fuses to pump motor and/or cooling fan haven't cleared
 - Verify terminals are fully seated and installed in proper locations

Abnormal Pump Behavior

The following are a few of the abnormal motor and motor controller status conditions communicated via CAN message. Contact Vanner Inc. for a detailed CAN messages specification for the pump.

- Motor Stall
 - The motor has stalled when starting or running.
- Motor Controller Over-Current
 - Excessive current is detected on the motor drive circuit.
- Motor Controller Over-Voltage
 - The motor controller is measuring higher input voltage than the rated specification.
- Motor Controller Under-Voltage
 - The motor controller is measuring lower input voltage than the rated specification.
- Controller Over Temperature
 - The motor controller MOSFET's are over their max allowable operating temperature.
- Motor Controller Under Current (Dry Rotor Detection)
 - The motor controller is measuring lower input current than expected during normal operation.

Vanner Repair Service

Vanner offers a quick turn-around factory repair service. Send the unit to the address on last page with a note instructing us to repair it. Include your name, phone number, shipping address (not a P.O. Box Number), and your purchase order number.

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**Part Number D918200-B
January 2, 2018
Printed in U.S.A.**