

Quick Start Guide WP150 Electric Water Pump



This manual is effective for consumer installations of EMP WP150 water pumps. OEM installers must contact EMP for production requirements.

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A	ME	8/6/20	New Release	ECN6006

Engineered Machined Products Inc.

2701 North 30th Street
Escanaba, MI, USA 49829
Phone: +1 (906) 789-7497
www.emp-corp.com
Service@emp-corp.com

Product Overview

The WP150 is an electrically powered fluid pump available in 12 volt DC and 24 volt DC configurations. The pump uses a stainless steel shaft for fluid compatibility. Proper installation of the pump will help ensure the performance and reliability of the electric pump while reducing the risk of damage to other components in the system.

The information contained in this manual is updated periodically. While great care is taken in compiling the information contained in this manual, Engineered Machined Products, Inc. cannot assume liability for losses of any nature arising from any errors and/or omissions.

The information and specifications contained throughout this manual are up to date at the time of publication. Engineered Machined Products, Inc. reserves the right to change the content of this manual at any time without notice.

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Introduction

Purpose

The purpose of this quick start guide is to present information related to the pump’s dimensions, electrical specifications, coolant guidelines, recommended plumbing, mounting orientation, and routine maintenance.

NOTE: For production applications of this product, the full installation specifications must be met. Contact EMP to request documentation.

NOTE: Orders up to 10 units total can be placed upon completion of the EMP Water Pump Requirements Form. Orders over 10 units total require a mutually agreed upon 9890085150 Installation Review Checklist.

Service Technician Responsibilities

Ensure that all safety messages and information messages are read and understood before installation, maintenance, or repairs are performed. It is important to use caution when service work is performed. Knowledge of impacted systems and their operation are important before the removal or disassembly of any component.

Liability Disclaimer

EMP cannot anticipate every possible circumstance that might involve a potential hazard. The safety messages in this document, in related manuals, and on the product are therefore not all inclusive. If a tool, procedure, work method, or operating technique that is not specifically recommended by EMP is used, you must satisfy yourself that it is safe for you and for others. You should ensure that the product will not be damaged or be made unsafe by the operation, maintenance, or repair procedures that you choose.



Additional Information

Access <https://www.emp-corp.com/support/> for service software, service bulletins, service manuals, service drawings, and other documents related to your installed EMP systems and components. First time users may create a free customer login at <http://www.emp-corp.com/account/register/>.

Technical Help

Contact EMP Customer Service for technical help at +1 (906) 789-7497 or service@emp-corp.com.

Warnings, Cautions and Notes

Two headings are used in this document to stress your safety and safe operation of the system. They are styled with a graphic bullet and bold, uppercase text:  **WARNING** and  **CAUTION**. Warnings highlight risks to personnel – hazards, unsafe conditions and practices that can result in personal injury or death. Cautions indicate conditions or practices that can cause damage to components, systems or other equipment.

A third heading, styled as **NOTE**, calls attention to additional information about components and procedures discussed in the document.

Definition of Terms

CAN.....Controller area network.

EMPower Connect™ service tool.....EMP service tool for diagnostics via PC.

Product Safety Warnings

⚠ WARNING: EMP cannot anticipate every possible circumstance that might involve a potential hazard. The safety messages in this document, in related manuals, and on the product are therefore not all inclusive. If a tool, procedure, work method, or operating technique that is not specifically recommended by EMP is used, you must satisfy yourself that it is safe for you and for others. You should ensure that the product will not be damaged or be made unsafe by the operation, maintenance, or repair procedures that you choose.

⚠ WARNING: Ensure that all safety messages and information messages are read and understood before installation, maintenance, or repairs are performed. It is important to use caution when service work is performed. Knowledge of impacted systems and their operation are important before the removal or disassembly of any component.

⚠ WARNING: Make sure the equipment cannot move before doing any work or diagnostic procedures on the EMP component, system, or vehicle.

⚠ WARNING: When working near electric components, ensure they cannot activate unexpectedly. Remove power or utilize lock out switches.

⚠ WARNING: Use extreme caution when working on systems under pressure (i.e. coolant, hydraulic fluids, air, fire suppression, etc.).

⚠ WARNING: Make sure the work area is ventilated and well lit.

⚠ WARNING: Make sure charged fire extinguishers are in the work area.

⚠ WARNING: Reinstall all safety guards, shields and covers.

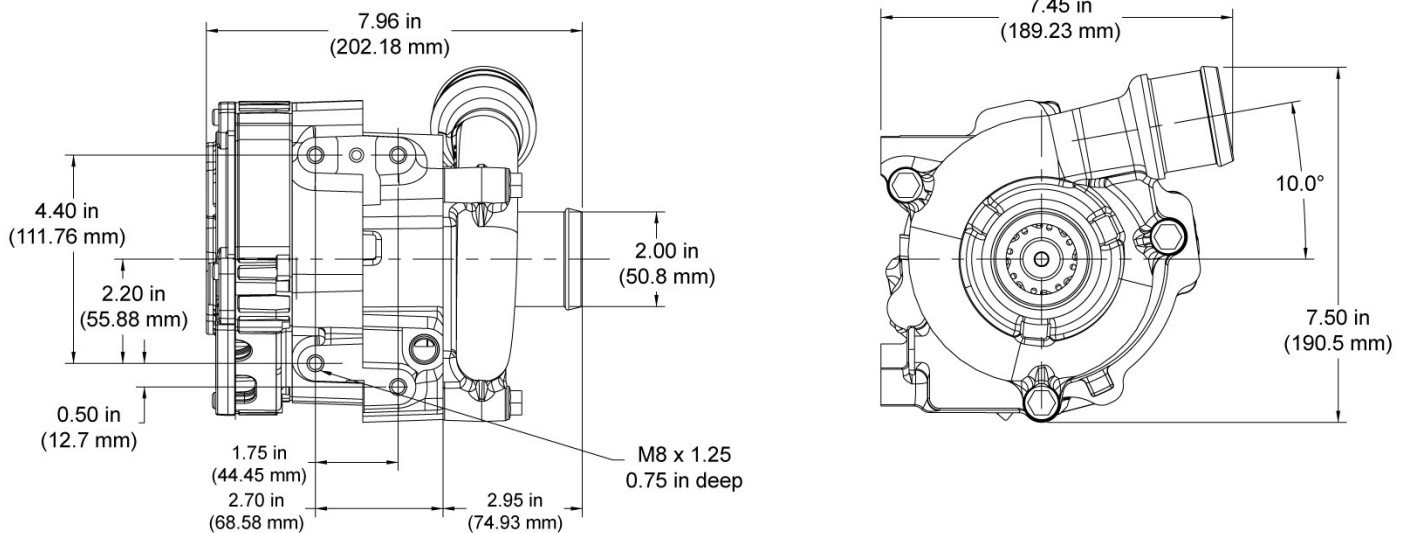
⚠ WARNING: Make sure all tools, parts and service equipment are removed from the work area.

⚠ WARNING: Ensure that all system power and ground connection points are torqued to EMP and/or OEM specifications to prevent system damage. Failure to follow specified torque requirements can result in loose connections which can damage electronic components and will void EMP warranty.

Specifications

Model	12V	24V
Performance		
Operating Temperature Maximum	203 F (95C)	203 F (95C)
Operating Temperature Minimum	-40 F (-40C)	-40 F (-40C)
Motor Speed Maximum	4200 rpm	4200 rpm
Motor Speed Minimum	1000 rpm	1000 rpm
Mechanical		
Component Construction	Cast Aluminum	Cast Aluminum
Component Weight	15.4 lbs (7.0 kg)	15.4 lbs (7.0 kg)
Electrical		
Input Voltage	9-16 V DC (14 V Nominal)	18-32 V DC (28V Nominal)
Operating Current Draw Maximum	65 amps	65 amps
Thermal Protection	Auto self protect RPM rollback	Auto self protect RPM rollback

Dimensions and Hole Locations/Bolt Spacing



Material Listing of Major External and Fluid Contacting Parts

Item	Quantity	Description	Material	Fluid Contact
1	1	Controller Cover	Cast Aluminum (413)	
2	1	Housing	A 356 T6	Yes
3	4	Controller Cover Bolts	18 – 8 Stainless Steel	
4	1	Volute	A 356 T6	Yes
5	1	Impeller (Internal)	304 Stainless Steel	Yes
6	1	Shaft	SAE 440 Stainless Steel	Yes
7	1	Product Label	M - 714	
8	2	Connector	Nylon	
9	3	Volute Bolts	Zinc Coated Steel	
10	1	Bracket Bolt	Zinc Coated Steel	
11	1	Bracket	5052 Aluminum	
12	1	Water Seal Faces	Carbon /Silicon Carbide	Yes
13	1	Water Seal Stamping	AISI 304	Yes
14	1	Bellows/Cup	HNBR	Yes
15	1	Spring	AISI 302	Yes

Operating Limits

Temperature Limitations

<u>Maximum Fluid and Ambient Operating Temp</u>	<u>203F (95C)</u>
<u>Minimum Fluid and Ambient Operating Temp</u>	<u>-40F (-40C)</u>
<u>Maximum Ambient Storage Temp</u>	<u>257F (125C)</u>
<u>Minimum Ambient Storage Temp</u>	<u>-40F (-40C)</u>

* If the intended application fluid temperature exceeds 95°C, installation must be reviewed and approved by EMP to ensure warranty coverage See the Installation Review Checklist.

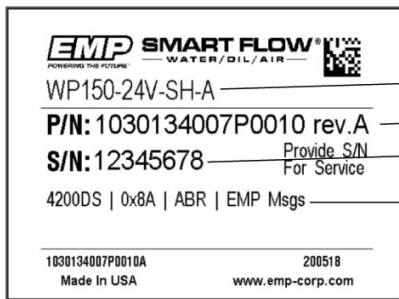
NOTE: Over-temperature Protection - To protect the controller, the motor speed begins to derate when the internal controller temperature reaches a calibrated threshold. Derated motor operation will continue until the internal controller temperature drops below a safe value.

Identification

The component serial information is located on the product label, which is attached to the component. The serial number can be used to trace the component hardware configuration, software calibration, the date of manufacture, and manufacturing data.

Product Label

The product identification label is attached to the controller housing next to the electrical interface of the pump. The product label contains model information.



Model Code
Part Number
Serial Number
Programmed
Control Parameters



EMP Water Pump Model Codes

Example: WP150-24V-SH-A



1	Component WP = Water Pump	4	Shaft C = Carbon S = Stainless	7	OEM Omit if n/a
2	Model 29 32 120 150	5	Orientation H = Horizontal V = Vertical D = Dual C = Cartridge See manual for definition	8	Certifications Omit if n/a
3	Voltage	6	I/O A = Address Input C = Temperature Input B = Address or Temp Input (Specified in Calibration) P = Pressure M = PWM High (modulated) L = PWM Low (modulated)	9	Suffix Denotes model variation

WP150-24V-SH-A = Water Pump model 150, 24 Volt, Stainless shaft, Horizontal orientation, addressable via external resistors.

NOTE: All EMP water pumps use CAN communication.

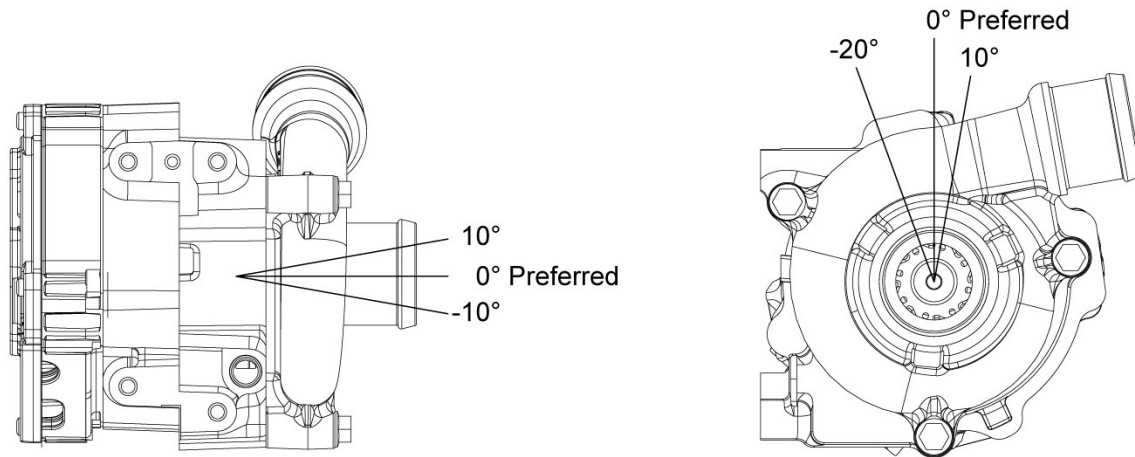
Installation

Environment

Environment cleanliness is crucial to pump life. The WP150 is fully submersible. Shielding may be required to ensure debris does not enter the weep hole. If you have any questions regarding your installation contact EMP to ensure warranty coverage.

Orientation

WP150 pump is orientation specific and must be installed per EMP guidelines. If you have any questions regarding pump orientation please contact EMP to ensure warranty coverage.



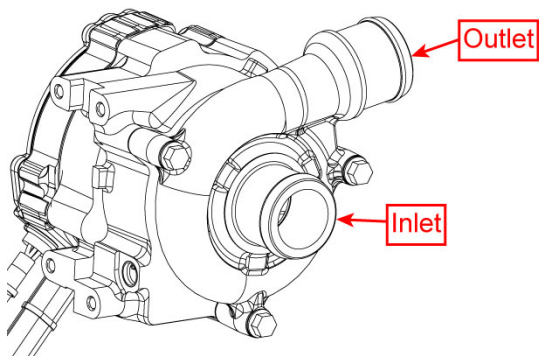
Pump Orientation

Plumbing

Pump Inlet must be plumbed using 50mm (2.0 inch) diameter hose and/or thin walled tubing from the fluid supply to the pump inlet.

⚠ CAUTION: Localized high spots in the plumbing may cause air to be trapped in the pump causing the pump to be air locked. The result of air trapped in the pump is loss of prime and no fluid moving resulting in water seal damage or potential system component damage.

⚠ CAUTION: EMP warranty does not cover seal damage due to low lubrication.



Hose Clamps

When making the inlet and outlet hose connections to the pump it is strongly recommended to use SAE312CT worm drive type hose clamps. Torque worm drive clamps to 90 in-lbs per SAE J1508. Spring type clamps are not recommended.

System Fill Procedure

⚠ CAUTION: Do not run the pump without fluid present. If run dry even for a short period the seal will be damaged.

⚠ CAUTION: Pump may start running upon connection of power, ground and ignition. Do not make electrical connections until pump and system are filled with fluid.

⚠ CAUTION: Systems that are not properly filled may leave air in the pump, creating a condition that may damage the seal due to low lubrication.

⚠ CAUTION: When air becomes trapped in the pump, the pump will not circulate fluid with the potential to cause damage to components in the system.

⚠ CAUTION: EMP warranty does not cover seal damage due to low lubrication.

Approved Fluids

1. Fluids must conform to ASTM D6210-10 or ASTM D3306 for quality and maintenance.
2. Use of coolants containing silicates and phosphates can lead to reduced pump seal life and gel formation in cooling system components.
3. Use of organic acid technology (OAT) coolants that are silicate and phosphate free will maximize pump seal life.
4. Customer must verify all WP150 fluid contacting parts are compatible with system components and the coolant selected for the application.
5. For best results cooling system materials, coolant working life, operating temperature range and other system details should be reviewed with coolant manufacturer to ensure the proper coolant selection.

NOTE: Use distilled water to dilute coolant or use pre-mix coolant.

⚠ CAUTION: Use of "Stop Leak" or radiator cleaner style system additives is not approved.

Each time the cooling system is drained

Caution must be taken to ensure the system is refilled properly to prevent running the pump in a dry state.

1. Install pump and piping according to installation instructions.
2. Ensure flow path is open through the entire system.
3. Fill the system with fluid such that the pump is full of fluid and there are no air pockets in the piping leading to the pump.
4. Run the pump at 4000RPM, ensuring fluid levels are topped off as air is pushed out of the system.

⚠ CAUTION: Do not allow the pump fluid supply to become empty. The fluid level in the surge tank will drop rapidly at top speed.

5. Verify the pump is moving fluid by observing the input power of the pump during the fill process using EMPower Connect service tool or a quality amp meter. With the pump operating at 4000 rpm, the input power must be above 400W (28V and 14A or 14V and 28A). If the pump is below 400W within 1 minute, turn off pump, purge system air and restart the procedure.

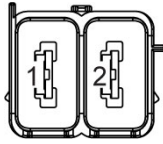
Wiring

Recommended Wiring Practices

- Wiring or electrical harness must not rub on sharp edges.
- The electrical harness should not be stressed at connections.
- The voltage drop between the battery and the pump should not exceed 5% of the rated battery voltage. This should be verified at the pump's maximum current draw.
- Wiring or electrical harness must not rub or make contact with a hot surface. There should be 5" minimum clearance from the exhaust.
- Wiring or electrical harness should be supported at least every 18" to 20".
- To avoid possible fire or shock, do not pinch any wiring or electrical harnesses.

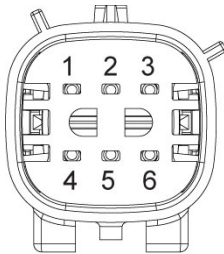
Component Connector Information

**Power/Ground Connector: 2-Way Male
Delphi Power Pack 1000 Sealed**



Pin	Wire Size and Color
1	8 AWG Black/Red
2	8 AWG Black

**Communication Connector: 6-Way Male
Molex MX150 Sealed Key B**



Pin	Wire Size and Color
1	16 AWG Black with stamped "PPL" (Purple)
2	16 AWG Black with stamped "TAN" (Tan)
3	16 AWG Black with stamped "WHT" (White)
4	16 AWG Black with stamped "YEL" (Yellow)
5	16 AWG Black with stamped "GRN" (Green)
6	Unused

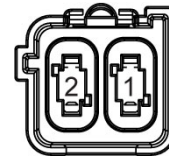
Mating Connector Information

The following notes apply to all connectors:

NOTE: All cavities in the mating connector must either be terminated or plugged to prevent moisture from entering the component.

NOTE: Do not disconnect the component while it is running. Stop running the component prior to disconnecting the connector.

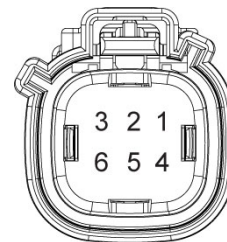
**Power/Ground Connector: 2-Way
Female Delphi Power Pack 1000 Sealed
– (Delphi 13849756)**



Detail	Delphi Part Number
Connector	13849756
Seal	13675511
TPA	13849786
Power Pack 1000 Terminal	13675583

**Communication Connector: 6-Way
Female Molex MX150 Sealed Key B -
(Molex P/N 33472-0607)**

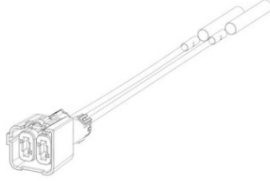
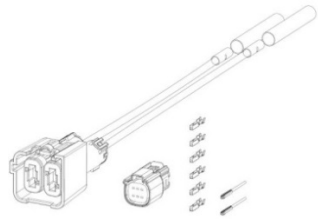
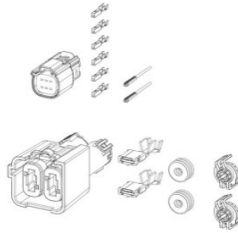
NOTE: Refer to the appropriate schematic section to determine the parts needed for assembling the mating connector for your application.



Detail	Molex Part Number
Connector	33472-0607
Plug	34345-0001
Terminal, MX150, Socket, 18 – 20 AWG	33012-2002
Terminal, MX150, Socket, 14 – 16 AWG	33012-3001

Service kits are available from EMP. The service kit parts are listed on the next page.

Mating Connector Kits Available from EMP

Mating Connector Kits Available from EMP	
3170073073 – 12” Power and Ground Connector Replacement Harness	
1370073182 – 12” Power and Ground Connector Replacement Harness and Communication Connector Parts	
1370073183 – Connector parts only for Communication and Power and Ground Connectors	

NOTE: Prior to mating component Power/Ground connectors, ensure the two seals (green) and the two seal retainers (white) are in place as shown below.



On/Off Single Speed Control

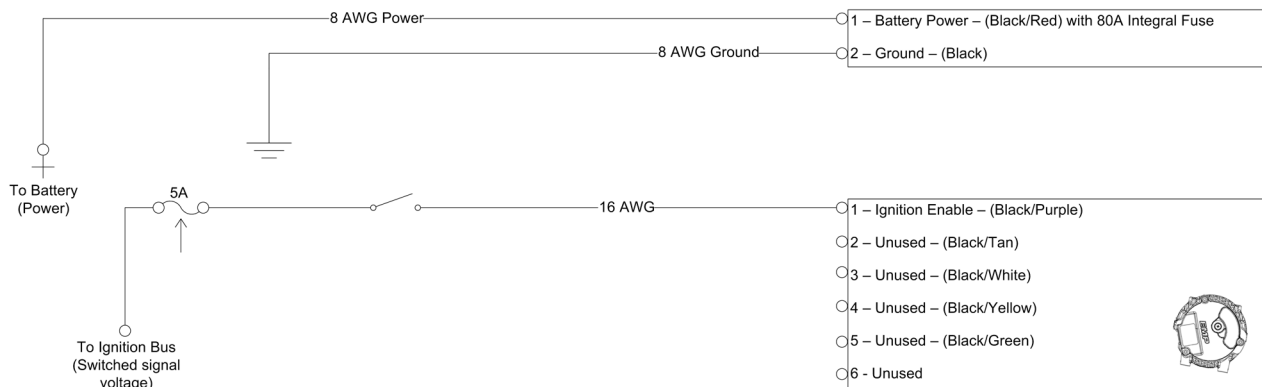
NOTE: All cavities in the mating connector(s) must either be terminated or plugged to prevent moisture from entering the component.

Pin Usage - On/Off Single Speed Control

Connector	Pin	Purpose
Power/Ground	1	Battery Power
	2	Ground
Communication	1	Ignition Enable
	2	Unused
	3	Unused
	4	Unused
	5	Unused
	6	Unused

Example On/Off Application Schematic

NOTE: EMP recommends fusing the 8 AWG battery conductor near the power source.



(1) 18 AWG wire can be used for the communication connections.

Electrical Connections

Power is supplied from a 12V or 24V DC (nominal) source depending on component model type and is received through the 2 way connector (Reference [Component Connector Information](#) and the example on/off application schematic). The ignition enable is a switched power source which is sent from your system to initiate operation of the component. This can be wired directly to a vehicle ignition, to a PLC output, through a manual switch or through a thermal switch. This line will draw less than 10 mA of current. All switches on this line can be sized based on this amperage requirement. This input should be fused close to the source to protect the vehicle or system wiring.

Operation

When power is on and ignition enable is on, the component will run in an on/off, single speed manner. The speed at which the component will run will be the pre-configured default speed. EMP also provides a “Power Hold” option which can keep the controller running for a specified amount of time after the ignition enable has been removed. This allows for post-shutdown cooling.

NOTE: If you have any questions with your calibration settings, please contact EMP Technical Service at service@emp-corp.com and provide a serial number for the part in question.

NOTE: See *Installation Manual WP150 Electric Water Pump*, EMP document 9970134020 for additional operation information including installation for use on a CAN bus.

Routine Maintenance

Frequency	Action
When checking/filling vehicle fluids	Ensure fluid levels are correct. Low fluid can cause a pump seal failure.
Every engine oil change	Inspect cooling system for leaks. Sample coolant and check to ensure coolant meets minimum coolant quality requirements. Before removing the pump, evaluate the leak using the methods outlined in the physical inspection of this document.
Every three months or more often if conditions are harsh*	Visually inspect exterior of pump and ensure weep holes are not clogged by debris. Check wires for wear or frayed insulation. Ensure all electrical connections are tight.
Annually+	Ensure connections are tightened to proper torque rating. Ensure all wires and pin connections are intact. Inspect support structure for any damage or loose hardware.

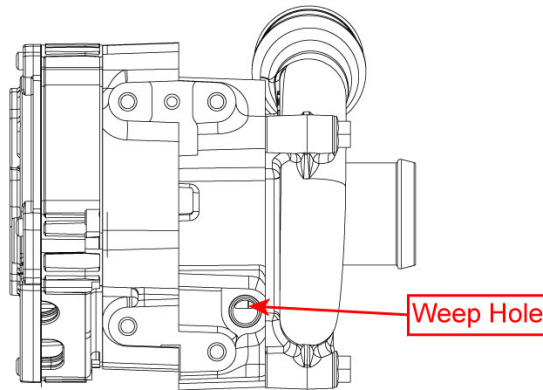
+ Inspections should also be conducted after any service to the unit.

Physical Inspection

CAUTION: Do not run the pump without fluid present. If run dry even for a short period the seal will be damaged.

CAUTION: Pump may start running upon connection of power, ground and ignition. Do not make electrical connections until pump and system are filled with fluid.

1. Make sure the weep hole port is not clogged with debris. If the weep holes is plugged then open it up.



Weep Hole Port

EMPower Connect™ Service Tool

EMPower Service Suite is available at no cost on the [EMP website](#). To use the EMPower Connect service tool, download and install the Service Suite software on your Windows PC. EMPower Connect software allows the user to monitor operation, manually control the component and collect history data from the controller. Use breakout harness 3170073176 to interface with the power and ground and communication connectors and an RP1210 compatible data link adapter.

The Service Suite User Guide and Tutorial, including connection and control instructions, is embedded in the software and available on the [EMP website](#).

Diagnostic Outputs

Operational and diagnostic information can be gathered using EMPower Connect service tool via an RP1210 compatible data link adapter. Components using SAE message formats have diagnostic outputs as defined in section 4.2 of EMP document 9980001068.

Troubleshooting

Symptom	Check
Pump not running	<ul style="list-style-type: none"> • Check electrical connections. • Check ignition wire. • Check if ignition wire is “on”. • Verify pin location.
Pump is running but not pumping fluid	<ul style="list-style-type: none"> • Check system fluid level. • Check for tubing restrictions (kinks). • Make sure pump is primed. • Check for collapsed inlet or outlet hose. • Check pump inlet for trapped debris.
No CAN communication and/or pump not responding to CAN commands	<ul style="list-style-type: none"> • Check communication harness wiring. • Verify that CAN messages are being transmitted in the proper formats. • Verify that the proper component CAN address is being used.
Suspected water pump seal leak	<ul style="list-style-type: none"> • Reference <i>Service Bulletin Electric Water Pump Inspection and Diagnostic Procedures</i>, EMP document 9910085143.
Water pump seal leak	<ul style="list-style-type: none"> • Verify coolant level. • Verify coolant selection (for water seal life OAT, phosphate free, silicate free coolant is recommended). • Sample coolant and review coolant maintenance records. • Verify system is not aerated (Reference document 9910085145, Fill D&D Test and Acceptance Criteria). • Check for cavitation and low inlet pressure.