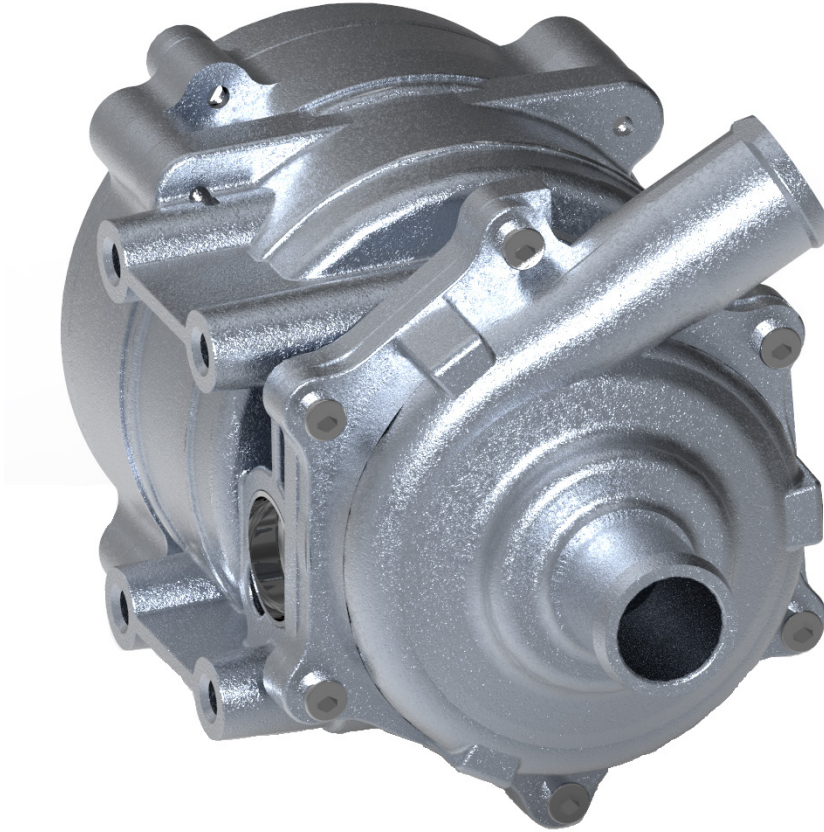


Quick Start Guide WP120 Electric Water Pump



This manual is effective for consumer installations of EMP WP120 water pumps. OEM installers must contact EMP for production requirements.

Rev	Rev By	Date	Description of Change	Approved By
A	ME	5/17/21	New Release	ECN6212
B	ME	12/8/22	Revisions	ECN7798

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Product Overview

The WP120 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.

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. Knowledge of hazards present and risk of injury to the service technician while working on these systems is critical to personal safety.

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 <https://www.emp-corp.com/account/register/>.

Technical Help

Contact EMP Technical 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.

Ignition Enable.....An enable signal sent to the controller to turn on. This is separate from power and ground and should be tied to a switched source and not tied to the pump power.

rpm Revolutions per minute.

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. Knowledge of hazards present and risk of injury to the service technician while working on these systems is critical to personal safety

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

⚠ WARNING: When working on or near electrical components, ensure that they have been disconnected from their energy source, cannot be accidentally re-energized, and verify the system is in a zero energy state.

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

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

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

⚠ WARNING: Ensure all safety guards, shields, and covers are reinstalled when tasks are completed.

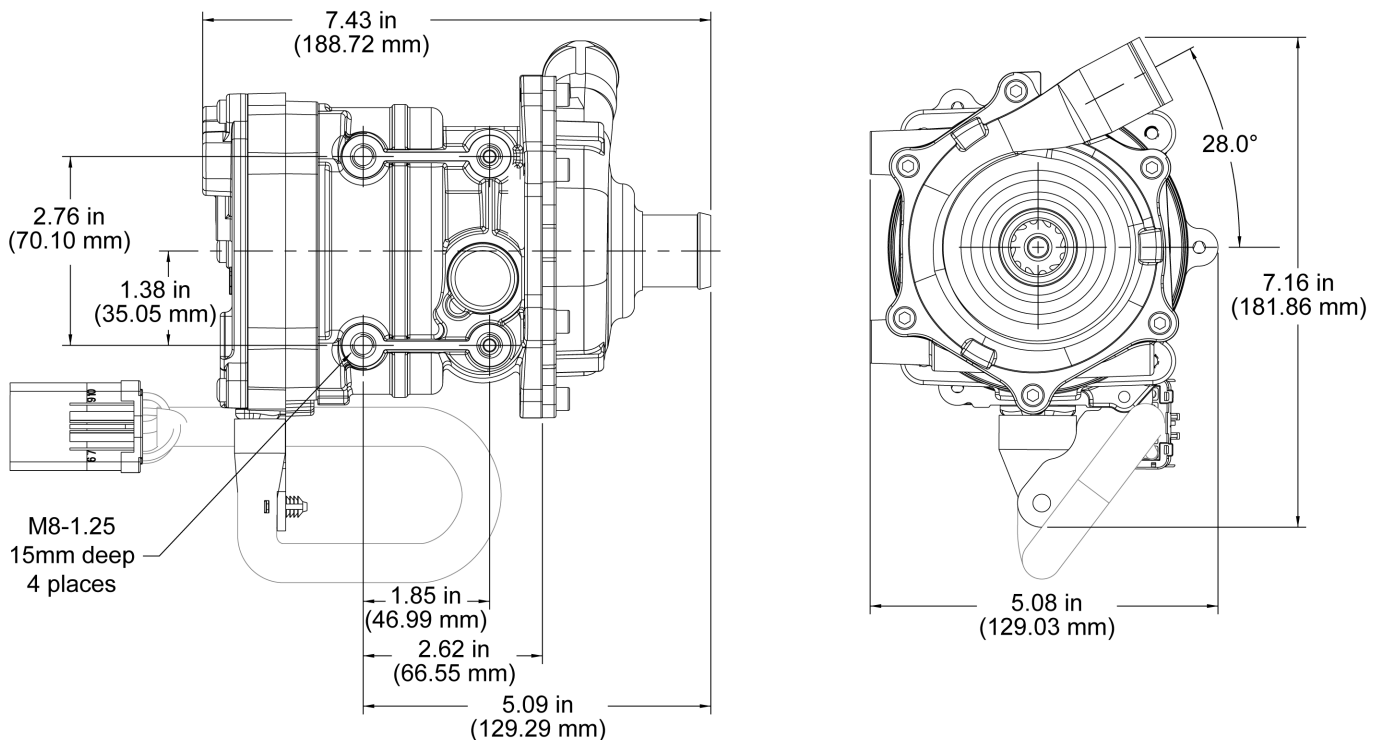
⚠ WARNING: Ensure all tools, parts and service equipment are removed from the work area.

⚠ 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 (95 °C)	203 °F (95 °C)
Operating Temperature Minimum:	-40 °F (-40 °C)	-40 °F (-40 °C)
Motor Speed Maximum:	5500 rpm	5500 rpm
Motor Speed Minimum:	2000 rpm	2000 rpm
Mechanical		
Component Construction	Cast Aluminum	Cast Aluminum
Component Weight	6.2 lbs (2.8 kg)	6.2 lbs (2.8 kg)
Electrical		
Input Voltage	9–16 V DC (14 V Nominal)	18–32 V DC (28 V Nominal)
Operating Current Draw Maximum	27.5 A	22 A
Thermal Protection	Auto self-protect rpm rollback	Auto self-protect rpm rollback

Dimensions and Hole Locations/Bolt Spacing



NOTE: 1 inch (25.4 mm) inside diameter hose for inlet and outlet connections.

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	HS6 AlSi10Mg	Yes
3	3	Controller Cover Bolts	18-8 Stainless Steel	
4	1	Volute	HS6 AlSi10Mg	Yes
5	1	Impeller (Internal)	304 Stainless Steel	Yes
6	1	Shaft	SAE 440 Stainless Steel	Yes
7	1	Product Label	M-714	
8	1	Connector	Nylon	
9	6	Volute Bolts	18-8 Stainless Steel	
10	1	Bracket Bolt	18-8 Stainless 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

Maximum Fluid and Ambient Operating Temp	203 °F (95 °C)
Minimum Fluid and Ambient Operating Temp	-40 °F (-40 °C)
Maximum Ambient Storage Temp	257 °F (125 °C)
Minimum Ambient Storage Temp	-40 °F (-40 °C)

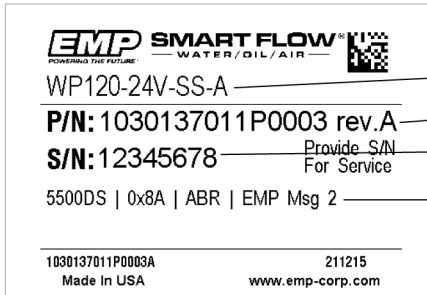
* If the intended application fluid temperature exceeds 95 °C, the pump may not perform as expected.

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.

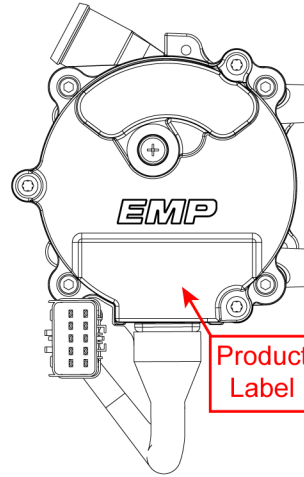
Identification

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.

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

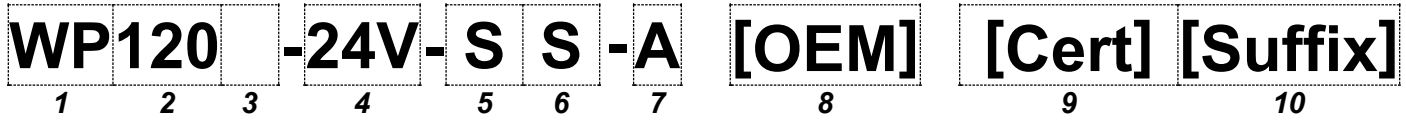


Model Code
 Part Number
 Serial Number
 Programmed Control Parameters



EMP Water Pump Model Decoder

Example: WP120-24V-SS-A [OEM] [Cert] [Suffix]



<p>1</p> <p>Component WP = Water Pump</p>	<p>5</p> <p>Shaft C = Carbon S = Stainless</p>	<p>9</p> <p>Certifications Omit if n/a E = E-Mark C = CSA U = UL</p>
<p>2</p> <p>Model 29 32 120 150</p>	<p>6</p> <p>Orientation S = Standard See manual for definition</p>	<p>10</p> <p>Suffix Denotes model variation</p>
<p>3</p> <p>Communication L = EMP-Link Omit for CAN</p>	<p>7</p> <p>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)</p>	
<p>4</p> <p>Voltage 12V = 12 volt 24V = 24 volt</p>	<p>8</p> <p>OEM Omit if n/a</p>	

WP120-24V-SS-A = Water Pump model 120, 24 volt, CAN communication, Stainless shaft, Standard orientation, addressable via external resistors.

NOTE: Not every option combination is available.

Installation

⚠ WARNING: To avoid serious personal injury, possible death, or damage to the vehicle, disconnect the power supply, main negative battery cable, and/or switch off the battery disconnect switch before installation or servicing. When working on or near the electric components, ensure battery power is off or lock out vehicle ignition, so the system cannot activate unexpectedly.

⚠ WARNING: To avoid burn injuries, allow time for parts to cool to a safe working temperature before removing or installing any components.

⚠ CAUTION: To avoid potential damage to the wiring and/or hoses, route all wires and hoses away from any sharp edges, moving objects, and heat sources.

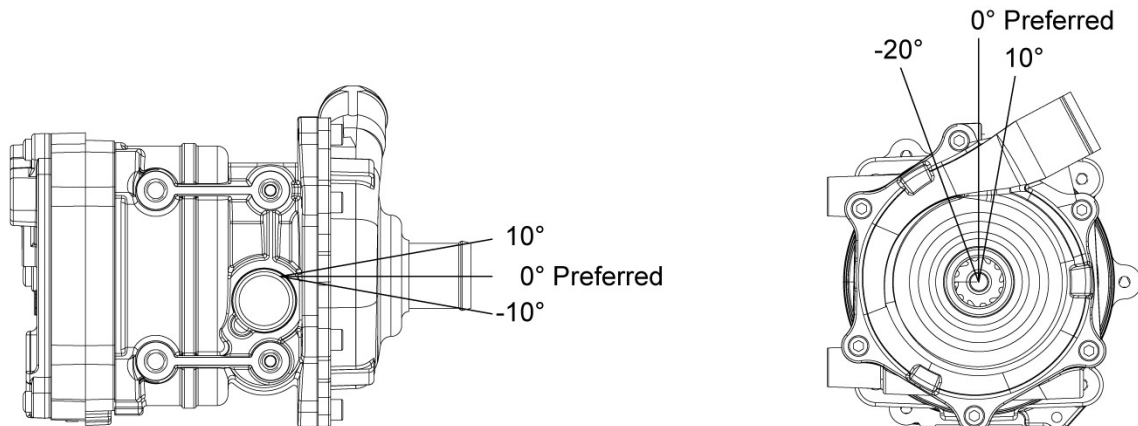
⚠ CAUTION: All wires should be secured every 12–18 inches and anywhere motion could result in wires rubbing against any other surface. All zip ties must be placed over wire loom/convoluted tubing and not over bare wires.

Environment

Environment cleanliness is crucial to pump life. The WP120 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.

Orientation

The WP120 is shown below in the standard orientation. The pump is orientation specific and must be installed per EMP guidelines. If you have any questions regarding pump orientation please contact EMP.



Pump Orientation

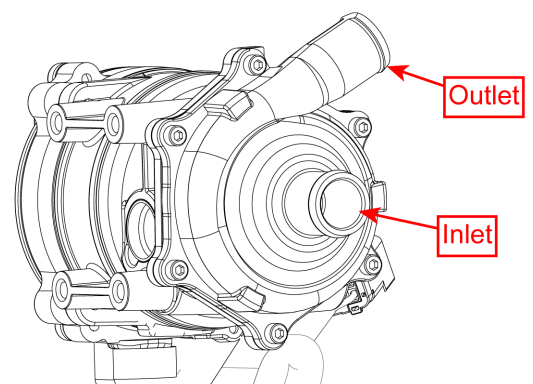
Plumbing

Pump Inlet must be plumbed using 25.4mm (1.0 inch) diameter hose and/or thin-walled tubing from the fluid supply to the pump inlet.

Deviations from the recommended plumbing must meet the inlet requirements specified in the installation manual.

⚠ 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 recommended to use SAE20CT worm drive type hose clamps. Torque worm drive clamps to 45 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 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 WP120 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 4600 rpm, 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 4600 rpm, the input power must be above 200W (28V and 7A or 14V and 14A). If the pump is below 200W within 1 minute, turn off pump, purge system air and restart the procedure.

Wiring

Recommended Wiring Practices

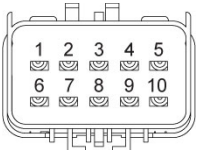
- Wiring or electrical harness must not rub on sharp edges.
- The electrical harness should not be stressed at connections.
- The voltage drop between the battery and the pump should not exceed 5% of the rated battery voltage. This should be verified at the pump’s maximum current draw.
- Wiring or electrical 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 every 12–18 inches.
- To avoid possible fire or shock, do not pinch any wiring or electrical harnesses.

Electrical Connections

The power input is a 12V or 24V DC (nominal) source depending on the component model. The ignition enable is a switched power source which is sent from the vehicle or 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.

10-way Component Connector

Male Apex 2.8mm Sealed



Pin	Wire Size and Color
1	10 AWG Black/Red
2	Plugged
3	16 AWG Black/White
4	16 AWG Black/Tan
5	16 AWG Black/Yellow
6	16 AWG Black/Purple
7	Plugged
8	10 AWG Black
9	Plugged
10	16 AWG Black/Green

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

10-way Mating Connector

Female Apex 2.8mm Sealed

NOTE: EMP service kit 1370106076 contains all parts needed for one mating connector.



Detail	Apex Part Number	Alternative Part Number
Connector	54201009	15316895
Terminal, Apex 2.8mm, Socket, 10–12 AWG	54001000	10762802
Terminal, Apex 2.8mm, Socket, 14–16 AWG	54001400	10762803
Terminal, Apex 2.8mm, Socket, 18–20 AWG	54001800	10757690
Apex 2.8mm Grey Plug	54200005	N/A

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

10-way On/Off Single Speed Control

Example On/Off Mating Connection

Pin	Description
1	Fused power connection
2	Plugged
3	Plugged
4	Plugged
5	Plugged
6	Switched, fused, ignition enable source
7	Plugged
8	Ground
9	Plugged
10	Plugged

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

NOTE: Ensure wires are sized appropriately for the application. Wire gauges and circuit protection shown in this document are suggestions.

NOTE: EMP parts kit 1370056018 includes a mini-fuse holder, cover, fuses, and the wiring parts required for installation of the holder.

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: For assistance with component calibrations and settings, please contact EMP Technical Service at service@emp-corp.com and provide a serial number for the part in question.

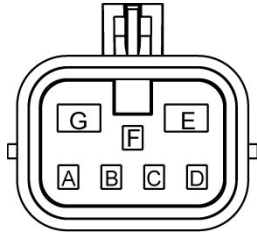
NOTE: See *Installation Manual WP120 Electric Water Pump*, EMP document 9970137000, for additional operation information including installation for use on a CAN bus.

7-way Component Connector

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

Male Delphi Metripack 150/480 Sealed

NOTE: Service kit 1370036077 has the parts needed to replace one 7-way component connector.



Pin	Wire Size and Color
A	16 AWG Black/Tan
B	16 AWG Black/Yellow
C	16 AWG Black/Purple
D	16 AWG Black/Green
E	10 AWG Black/Red
F	16 AWG Black/White
G	10 AWG Black

7-way Connector Greasing

NOTE: See *Service Bulletin Approved Grease*, document 9910039075, for a list of dielectric grease products that have been approved for use in maintenance and service. The document can be obtained on the EMP website by searching for the document number.

NOTE: Only use clean dielectric grease.

1. Apply dielectric grease to each harness side electrical connector. See the table below for specified grease amounts.

Reference Quantities

Grease	Description
1.25 g	Delphi 7-Way Connector

7-way Mating Connector

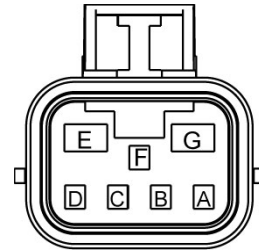
NOTE: All cavities in the mating connector must either be terminated or plugged to prevent moisture from entering the component.

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

Female Delphi Metripack 150/480 Sealed

The connector on the component is a sealed Delphi 480/150 Metripack mixed connector with male terminals.

NOTE: A service kit containing all parts needed for one mating connector is available from EMP. The service kit part number is 1370036093, and the service kit drawing is available on the EMP website and can be obtained at www.emp-corp.com/support/documents by searching for the service kit part number.



Item	Delphi Part Number
Connector	12059472
TPA	12052486
480 Terminal	12052139
150 Terminal	12048074
480 Seal	15324990
150 Seal	15324973
150 Plug	12059168

7-way On/Off Single Speed Control

Example On/Off Mating Connection

Pin	Description
A	Plugged
B	Plugged
C	Switched, fused, ignition enable source
D	Plugged
E	Fused power connection
F	Plugged
G	Ground

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

NOTE: 10 AWG wire can be used for power and ground. Use Delphi 480 cable seal #15324990.

NOTE: TACH_OUT is available during On/Off operation but not implemented in this example configuration.

NOTE: EMP parts kit 1370056018 includes a mini-fuse holder, cover, fuses, and the wiring parts required for installation of the holder.

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.

NOTE: For assistance with component calibrations and 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 WP120 Electric Water Pump*, EMP document 9970137000, for additional operation information including installation for use with PWM input or TACH_OUT.

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/major vehicle service interval	Inspect cooling system for leaks. Sample coolant and check to ensure coolant meets minimum coolant quality requirements. Before removing the pump, reference <i>Service Bulletin Electric Water Pump Inspection and Diagnostic Procedures</i> , EMP document 9910085143.
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.

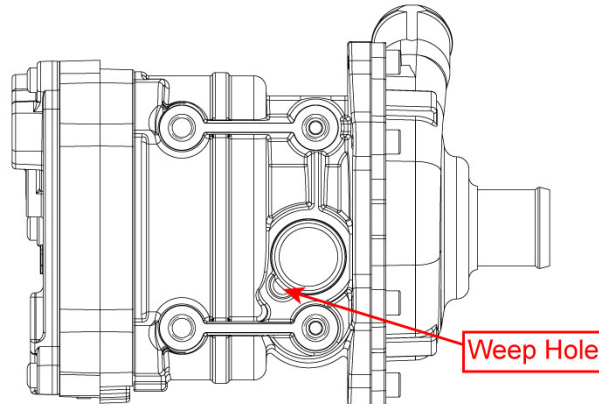
+ Inspections should also be conducted after any service to the unit.

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.

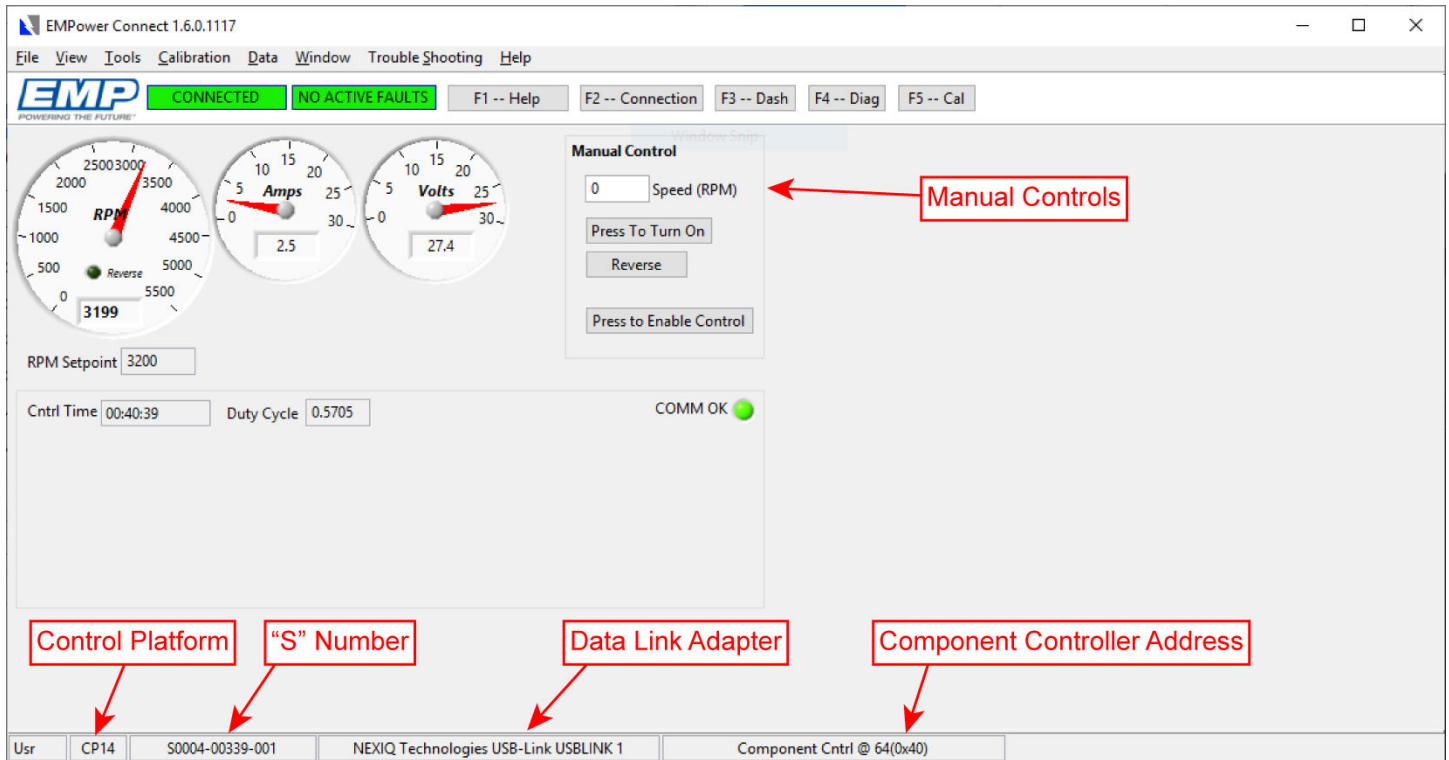
1. Make sure the weep hole port is not clogged with debris. If the weep holes is plugged then open it up.



Weep Hole Port

EMPower Connect™ Service Tool

EMP 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.



For model WP120 pumps (CAN), use breakout harness 3170073176 and an RP1210 compatible data link adapter.

For model WP120L pumps (PWM) use breakout harness 3180036020 and EMP TTL/EMP-Link data link adapter 3640036049 (available together in diagnostic kit 7500038004).

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 (WP120)

Operational and diagnostic information can be gathered using EMPower Connect service tool via an RP1210 compatible data link adapter. Status messages will be broadcast over CAN as defined in 9980001068.

Diagnostic Outputs (WP120L)

The EMPower Connect service tool can be used with the PWM version of the component via the EMP-Link communication protocol to view performance information. Installations using the TACH_OUT signal can compare the output to the commanded speed for diagnostic purposes.

Troubleshooting

Symptom	Check
Pump not running	<ul style="list-style-type: none"> • Check electrical connections. • Check ignition enable wire. • Check if ignition enable wire is “on”. • Verify ignition enable 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, <i>Fill D&D Test and Acceptance Criteria</i>). • Check for cavitation or low inlet pressure.
Pump producing excessive noise	<ul style="list-style-type: none"> • Check for cavitation or low inlet pressure. • Check pump inlet for trapped debris. • Check plumbing around pump for valves or components where cavitation may be occurring. • Check for collapsed inlet hose.