

## Quick Start Guide WP29/WP32 Electric Water Pump



This manual is effective for consumer installations of EMP WP29 and WP32 water pumps. OEM Installers must contact EMP for production requirements.

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A	SRS	2/13/17	New Release	ECN4286
B	ME	7/14/20	Revisions	ECN5969

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## Product Overview

The WP29 and WP32 are electrically powered fluid pumps available in 12 volt DC and 24V DC configurations. The pump is standard with carbon steel shafts. 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 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.

### **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](mailto:service@emp-corp.com).

## About This Document

### **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** ..... An enable signal sent to the controller to turn on. This is separate from the 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.

**⚠ 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
<b>Performance</b>		
Operating Temperature Maximum (fluid)	203 F (95 C)	203 F (95 C)
Operating Temperature Minimum (fluid)	-40 F (-40 C)	-40 F (-40 C)
Motor Speed Minimum	750 rpm	1000 rpm
Motor Speed Maximum	4600 rpm	4600 rpm
<b>Mechanical</b>		
Component Construction	Cast Aluminum	Cast Aluminum
Component Weight	6.7lbs (3.03kg)	6.7lbs (3.03kg)
<b>Electrical</b>		
Input Voltage	9 - 16 Vdc (14 nominal)	18 - 32 Vdc (28 nominal)
Operating Current Draw Maximum	25 A	15 A
Thermal Protection	Auto self protect shutdown	Auto self protect shutdown

## Operating Limits

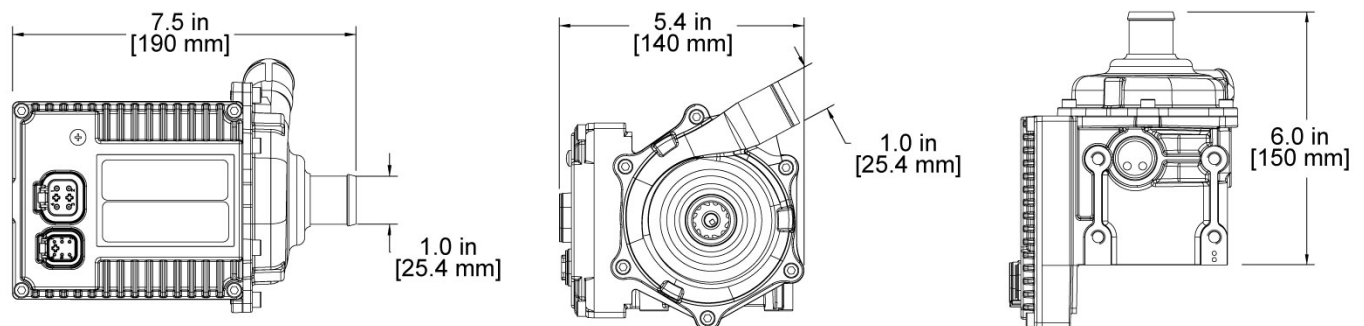
### Temperature Limitations

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

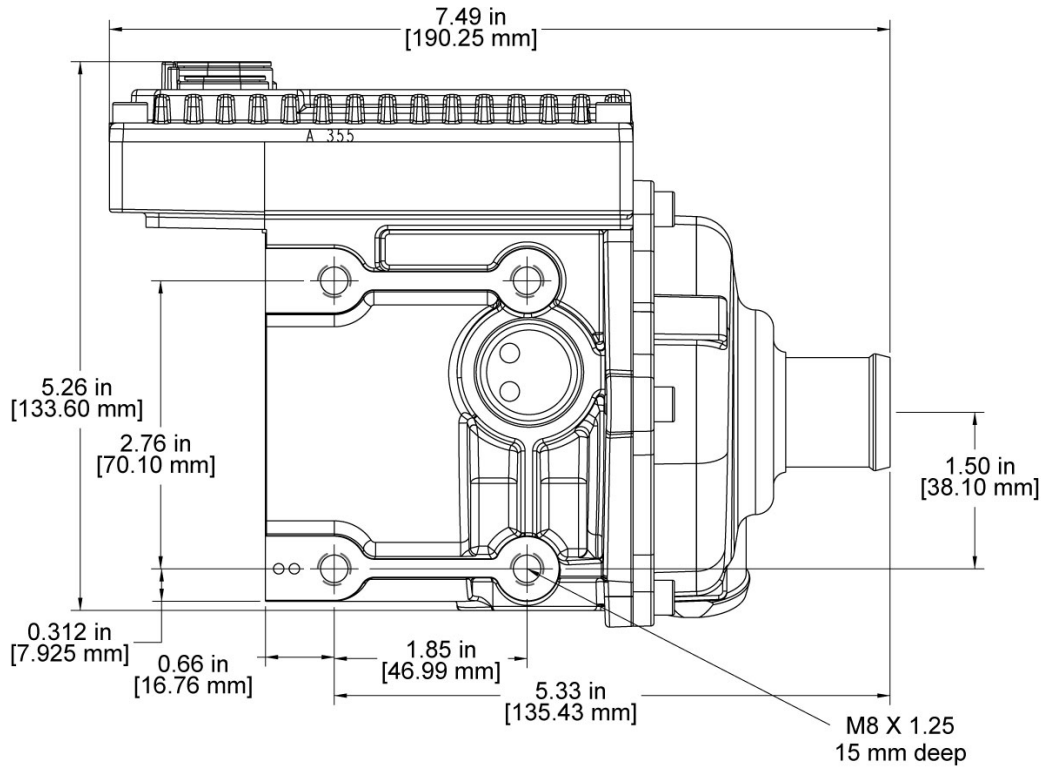
\* If the intended application fluid temperature exceeds 95°C, installation must be reviewed and approved by EMP to ensure warranty coverage See the Installation Review Checklist.

## Dimensions

**Note:** Images do not represent acceptable mounting positions. They are for dimensional reference only.



**Hole Locations/Bolt Spacing**



**Identification**

The product identification label is attached to the controller housing next to the electrical interface of the pump. The product label contains model information and serial number. The serial number can be used to trace the component hardware configuration, software calibration, the date of manufacture, and manufacturing data.

WP29-24V-CD-AE		Model Number
P/N: 1030002228P0014 rev.B		Part Number
S/N: 12345678		Serial Number
Provide S/N for service.	<b>DO NOT RUN PUMP DRY</b>	
4600DS   0x96   250K   EMP Msgs		Programmed Control Parameters
10R-04 8853	<b>SMART FLOW®</b> WATER/OIL/AIR	
1030002228P0014B	Made in USA   www.emp-corp.com	190708

Product labels may not match the example but will have the part number and serial number for the pump.

### EMP Water Pump Model Codes

Example: WP32-24V-CH-A



1	<b>Component</b> WP = Water Pump	4	<b>Shaft</b> C = Carbon S = Stainless	7	<b>OEM</b> Omit if n/a
2	<b>Model</b> 29 32 120 150	5	<b>Orientation</b> H = Horizontal V = Vertical D = Dual C = Cartridge See manual for definition	8	<b>Certifications</b> Omit if n/a
3	<b>Voltage</b>	6	<b>I/O</b> 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	<b>Suffix</b> Denotes model variation

**WP32-24V-CH-A** = Water Pump model 32, 24 Volt, Carbon shaft, Horizontal orientation, addressable via external resistors.

**NOTE:** All EMP water pumps use CAN communication.



## Installation

### Environment

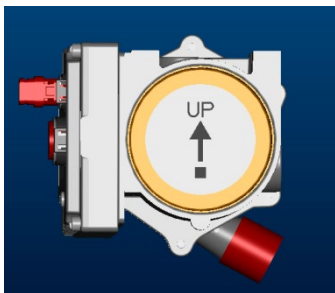
Environment cleanliness is crucial to pump life. The WP29 and WP32 are certified with an IP67 rating but debris collection in the weep pocket can lead to premature seal failure. Shielding may be required to ensure debris does not enter the weep hole. If you have any questions regarding your installation contact EMP to ensure warranty coverage.

**CAUTION:** Blocked weep holes will cause pump damage due to blocked vent allowing fluid to accumulate inside the pump.

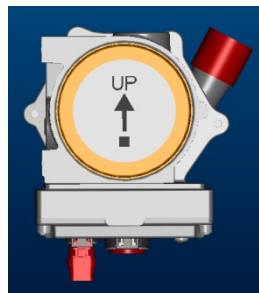
### Orientation

Each pump part number has a specified and approved orientation. If the pump is not properly installed several failure modes could potentially result. Orientation is noted on the component label.

EMP has found the most robust installations make use of horizontal orientation pumps. For new applications, EMP is encouraging the use of horizontal orientation pumps. EMP pumps must be attached to a vertical or horizontal mount. Pumps labeled with orientation “up” arrows must be installed with the arrow pointing upward, no other orientation is acceptable.

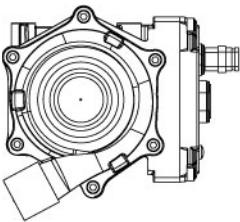


Vertical Pump Orientation Label

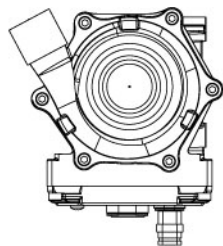


Horizontal Pump Orientation Label

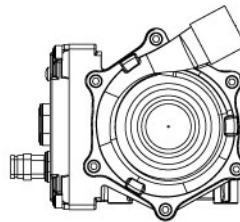
Pumps that do not have an orientation label must still be installed in a specific orientation. Specific part numbers may require a mounting in a specific orientation or support both “Vertical” and “Horizontal” orientations.



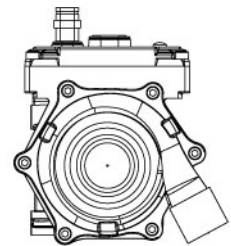
Valid Mounting,  
control board  
“Vertical”



Valid Mounting,  
control board  
“Horizontal”

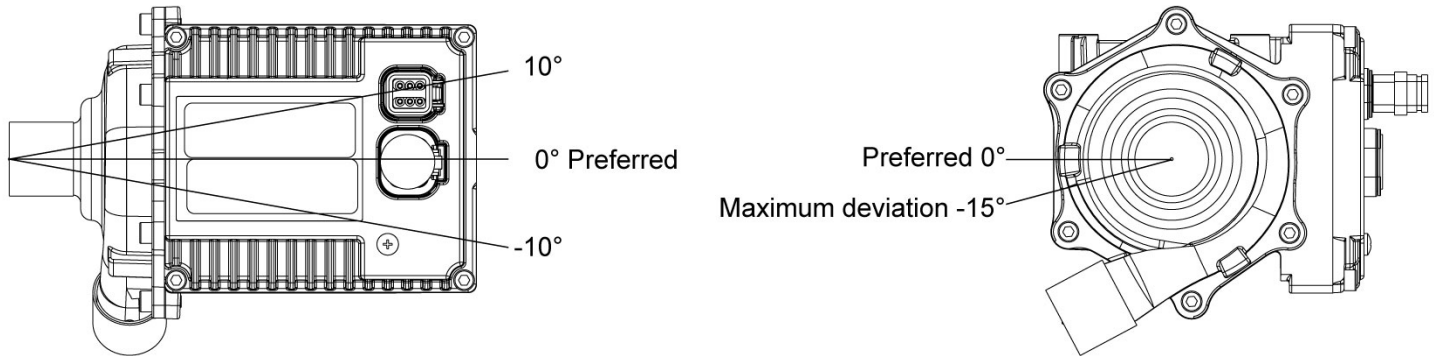


Invalid Mounting



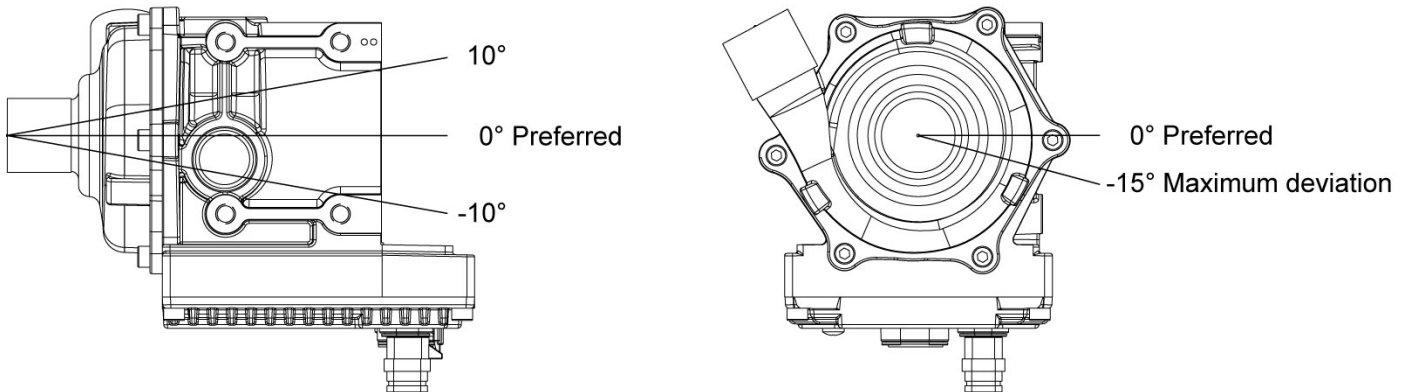
Invalid Mounting

EMP pumps are designed to operate with the shaft horizontal but will function well if the shaft is between  $-10^{\circ}$  and  $10^{\circ}$  of horizontal. Pumps must not be mounted more than  $-15^{\circ}$  degrees from the design orientation. Weep collection is maximized at  $0^{\circ}$  from the design orientation.



**Vertical Pump Orientation**

**NOTE:** Weep collection is maximized at 0 degrees and minimized at  $-15^{\circ}$  degree orientation.

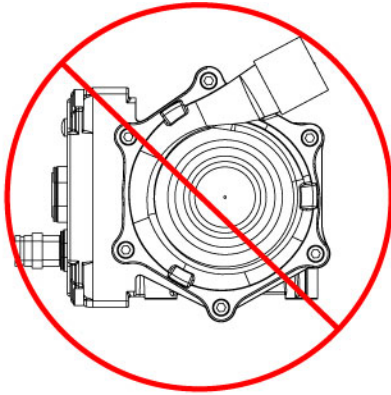


**Horizontal Pump Orientation**

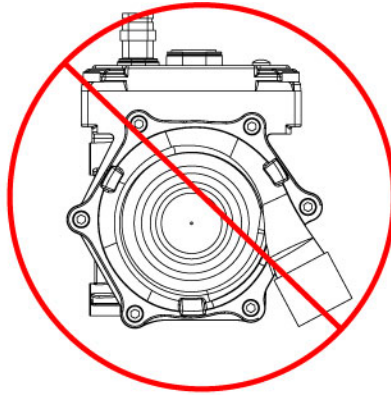
### Incorrect Pump Orientation and Reasons

The WP29 and WP32 contain a mechanical seal; 0.1cubic centimeters per hour may weep past the seal as a part of normal operation. To properly collect the weepage pump orientation is important. Too steep of an angle will not allow the fluid to collect in the weep pocket and evaporate off and the pump may appear to be leaking when in fact it is operating as designed. An incorrect mounting angle may also result in too much fluid being retained in the weep pocket resulting in bearing contamination and reduced service life.

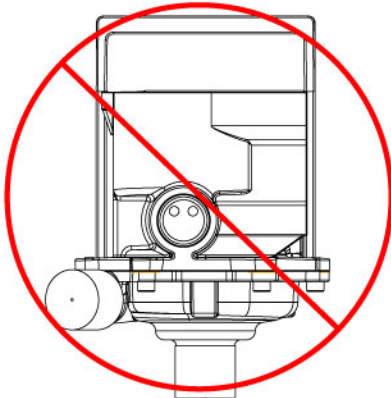
Orientation Not Acceptable  
No Weep Collection



Orientation Not Acceptable  
Water in Connectors



Orientation Not Acceptable  
Seal Life

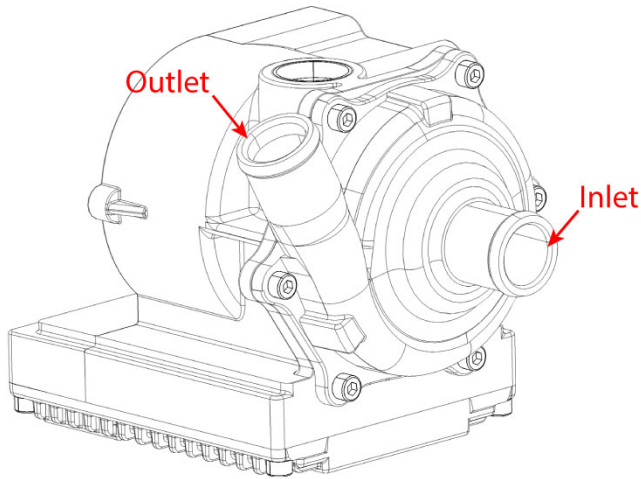


Orientation Not Acceptable  
Bearing Life



## 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. A restriction in the inlet plumbing is allowed as long as the flow diameter is not less than 17mm (0.75 inch) and does not exceed 25mm (1.0 inch) in length.



**CAUTION:** Localized high spots in the plumbing will 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.



**Improper installation with localized high spots**

Deviations from the recommended plumbing must be approved by EMP engineering. Please contact EMP Customer Service at [service@emp-corp.com](mailto:service@emp-corp.com) for installation review.

## Hose Clamps

When making the inlet and outlet hose connections to the pump it is strongly 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 D6210-10 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 WP29/32 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.

## Fill Procedure

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 top speed (4600RPM), 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**

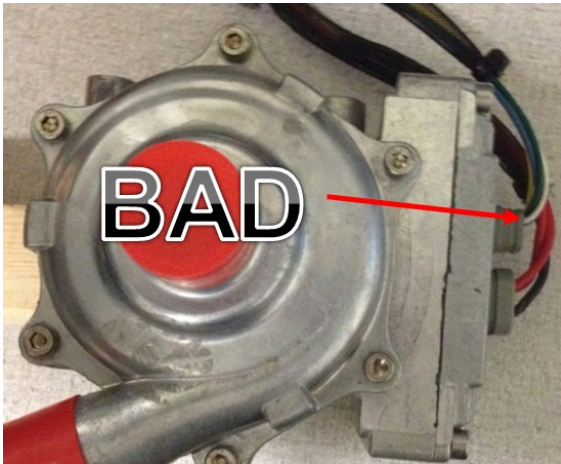
For complete connector body sealing; the ignition, power, and ground wires should be 12ga minimum. Wire jacket diameter must be compatible with seal requirements

**Recommended Wiring Practices**

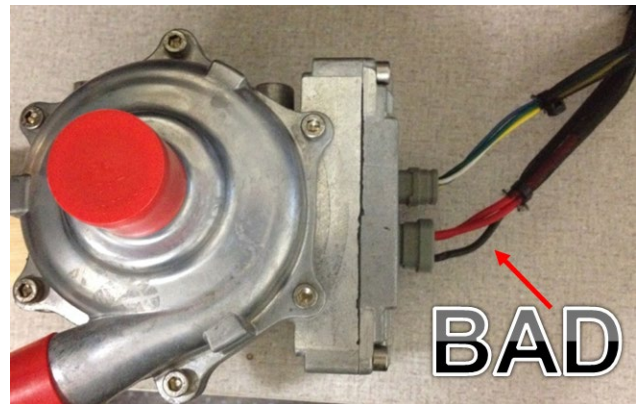
- Wiring or electrical harness must not rub on sharp edges.
- The electrical harness should not be stressed at connections. Wires pulling on connectors can compromise the connector body seal and possibly create a water intrusion event.
- The voltage drop between the battery and the pump should not exceed 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.
- Incorporate Drip Loops into wiring designs. The pump connectors are environmentally sealed. However, good wire management can help ensure a good seal over the life of the product. Drip loops collect water and shed it away from connector.
- The use of Dielectric Grease such as Dow Corning DC-4 is acceptable as long as the connection is mated directly after grease application to prevent dirt from being captured by the grease.

**NOTE:** Wires pulling on connectors can compromise the connector body seal and possibly create a water intrusion event. This is unacceptable wire routing.

**NOTE:** Wire routing can provide a path for water to flow down into the connector. This is unacceptable wire routing.



**Bad Wiring – Harness stressed at connections**



**Bad Wiring – No drop loops**

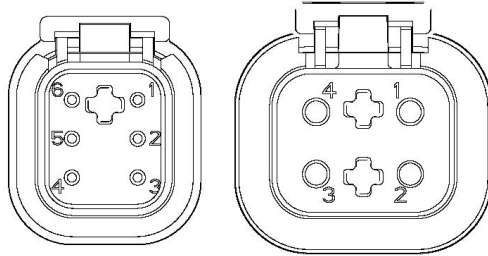
**NOTE:** Drip loops collect water and shed it away from connector. This is acceptable wire routing.



**Good Wiring – Drip loops**

**Connector Information**

- 1 - CAN HI
- 2 - CAN SHIELD
- 3 - SERIAL GND
- 4 - SERIAL TX
- 5 - SERIAL RX
- 6 - CAN LO



- 1 - TEMP INPUT OR CAN ADDRESS
- 2 - GND
- 3 - BATT
- 4 - IGNITION ENABLE

**NOTE:** These represent the controller connectors – not the mating harness connectors.

**NOTE:** Addressing and motor status message information can be found in *Component Controller CAN Communication*, EMP document 9980001068.

**NOTE:** Ignition enable is a wake up signal sent to the controller to turn on. This is separate from the power and ground and should be tied to a switched source and not tied to the component power.

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 controller.

**NOTE:** To operate the component, pin 4 (IGNITION ENABLE) must be connected +9 to 32vdc. This can be wired directly to ignition, to a PLC output, through a manual switch or through a thermal switch. This line will draw less than 10 mA. All switches used on this line can be sized based on this amperage requirement. This input should be fused close to the source to protect the vehicle wiring.

**Mating Connectors**

The mating connectors and pins are available from EMP.

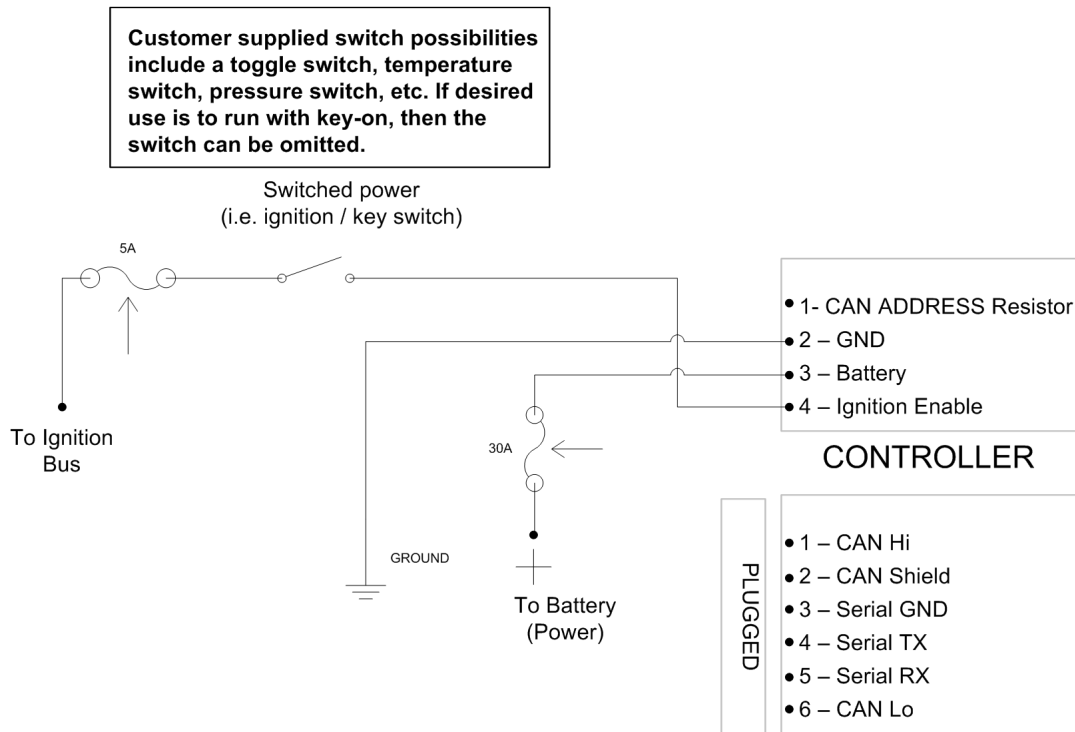
6 Pin Connector Deutsch Part Numbers EMP Kit # 1370001077		4 Pin Connector Deutsch Part Numbers EMP Kit # 1370001078	
Description	Part Number	Description	Part Number
Socket Pins	0462-201-20141	Socket Pins	0462-203-12141
Connector Body	DTM06-6S	Connector Body	DTP06-4S
Wedge Lock	WM-6S	Wedge lock	WP-4S
Plugs	0413-204-2005	Plugs	114017

**NOTE:** If CAN or Serial TTL control is not used the 6 pin DTM connector must be blocked off to prevent entry of water or dirt which will result in damage to the component. All pumps are shipped with this blocked off connector. If lost or damaged, a block off plug, EMP P/N 3250001030 can be purchased.

## On/Off – Single Speed Control

### Example On/Off Application Schematic

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



### Accessories available for purchase

Power/ground/ignition enable harness (6' long) 1370005038 comes with a plug for the communication connector. This harness has a 30 amp mini-fuse for the power line. Ignition enable must be fused separately. All vehicle side wires are not terminated.

Switched power/ground/ignition enable harness (6' long) 3170002241 includes a toggle switch and 5 amp mini-fuse on the ignition enable line and a 30 amp mini fuse on the power line. All vehicle side wires are terminated with ring terminals. 3/8" for power and ground, #10 for ignition enable.

Also see [Mating Connectors](#).

### Operation

**CAUTION:** For pumps, ignition enable should not be supplied if the component is dry or if the flow path is restricted or if flow relies on another source (such as an engine component) which is not running. In these cases, be sure

ignition enable is sourced from a supply that is active only when the flow will not be restricted.

**NOTE:** In all cases, the ignition enable pin (pin 4 on the 4-pin connector) must **not** be tied to battery power to allow for controller shut down. Ignition enable should not be shut down at the same time power is cut off. The ignition input must be used to turn the component "on" and "off". This is to ensure that the controller shuts down properly.

Components wired for on/off operation will go to default speed after the CAN TIMEOUT period. This time may be calibrated and is usually between 0.1 and 5 seconds.

For exact controller parameters, contact [service@emp-corp.com](mailto:service@emp-corp.com) with the serial number of the component.

**NOTE:** See *Installation Manual WP29 and WP32 Electric Water Pump*, EMP document 9970002273 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 or every three months, whichever is shorter	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.

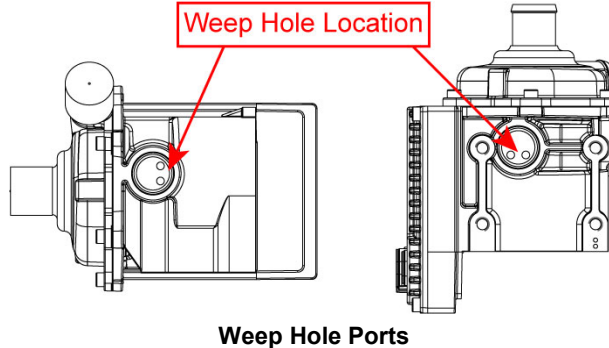
+ Inspections should also be conducted after any service to the unit.

### 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 ports are not clogged with debris. If weep holes are plugged then open them up.



**NOTE:** Images do not represent acceptable mounting positions. They are for reference only.

## EMPower Connect™ Service Tool

Monitoring operation and manual control of the pump can be accomplished using the service tool EMPower Connect service tool which is part of the EMP Service Suite available at no cost on the [EMP website](#).

To use EMPower Connect service tool, download and install the Service Suite software on a Windows PC. An interface device will be needed between the computer and the pump. If the pump is being run without J1939 CAN, use an interface cable from the 6 pin Deutsch connector on the pump and an EMP USB/TTL converter. The harness and converter are available as a kit (P/N 7500038001). If the pump is on a J1939 CAN bus EMPower Connect service tool can be connected using an RP1210 compatible Data Link Adapter (DLA) to interface to the CAN bus.

## Troubleshooting

Symptom	Check
Pump not running	<ul style="list-style-type: none"> <li>• Check electrical connections.</li> <li>• Check ignition wire.</li> <li>• Check if ignition wire is “on”.</li> <li>• Verify pin location.</li> </ul>
Pump is running but not pumping fluid	<ul style="list-style-type: none"> <li>• Check system fluid level.</li> <li>• Check for tubing restrictions (kinks).</li> <li>• Make sure pump is primed.</li> <li>• Check for collapsed inlet or outlet hose.</li> <li>• Check pump inlet for trapped debris.</li> </ul>
No CAN communication and/or pump not responding to CAN commands	<ul style="list-style-type: none"> <li>• Check communication harness wiring.</li> <li>• Verify that CAN messages are being transmitted in the proper formats.</li> <li>• Verify that the proper component CAN address is being used.</li> </ul>
Pump is leaking excessively while running	<ul style="list-style-type: none"> <li>• Replace pump. No action is required for pumps exhibiting slow leakage at weep holes.</li> </ul>