



Competition EWP Installation instructions



SUPPLIES/TOOLS YOU WILL NEED:

- Black RTV Silicone or other liquid gasket
- Loctite Red
- Teflon pipe thread tape or thread sealant
- New sharp razor blade
- 5mm Allen key
- 10mm socket
- 13mm socket
- 10mm open-ended wrench
- Philips Screwdriver
- Flat blade screwdriver
- Large pliers, Visegrips, or channel locks
- Plenty of fresh water/coolant blend, we recommend running 50/50
- Hack saw or other maneuverable metal cutting tool
- Wire crimping tool and wire stripping tool
- **Optional:** Zip ties to secure wires
- **Optional:** Lisle spill-proof easy bleed funnel system
- **Optional:** External 12V battery or power supply
- **Optional:** New power steering/AC belt (replace if yours is old)

NOTE: Please read through the entire instructions guide before you begin to familiarize yourself with the product and installation.

Features and Benefits

- **Continues cooling** your engine after shutdown to prevent hotspots and boiling; the pump controller will also control as many of your fan relays as you choose to tie in.
- **No wax pellet thermostat** to fail, **no mechanical belt** to fail, and **belt slip** is no longer an issue.
- Coolant flow is **no longer dependent on engine speed**, so the pump is always flowing at optimal rate. Flow speed is now based on temperature, not RPM; efficient in all RPM ranges
- Goodbye **turbo timers**! If you've got one, you may now remove it. The pump continues to circulate coolant through the turbos and engine after shutdown.
- **Low power draw** (8 amps at full speed), frees up horsepower and increases throttle response
- **Programmable setpoints** for maximum temperature and fan control; removes the need for upgraded thermosensor (such as FC thermosensor)
- **Flow optimized and contoured** water pump delete plate redirects coolant flow with minimal turbulence
- **Easy to bleed** the coolant system without the car being on; just connect the pump directly to a 12V battery

Things to Be Aware Of

Because the EWP kit will remain running after key-off, we recommend you have and maintain a healthy battery. EWP or not, this is generally a good practice anyway.

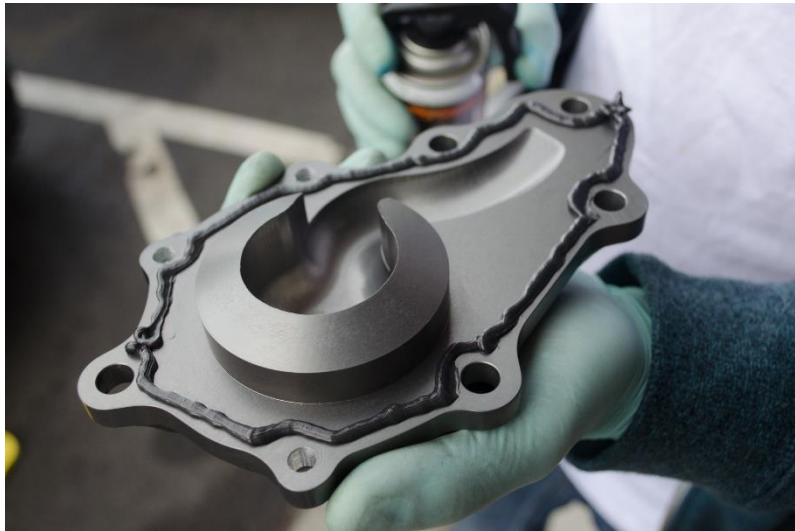
Preparation

1. Safely place your car on jack stands, ramps, or a lift. Please follow all safety procedures for securely raising the front of the car.
2. Remove the under tray, Intake, Intercooler, Battery, & Battery tray. Your engine bay should now look like the picture on the right. Remove the horizontal support bar.
3. Remove your radiator cap. Drain coolant from radiator by removing the bottom drain plug.
4. Remove belts for alternator and power steering/AC. We recommend replacing the power steering/AC belt with a fresh one if yours is old.
5. Looking directly at the water pump housing, the thermostat housing contains the fill cap and downward outlet to the radiator. Remove thermostat housing and thermostat (three M6 bolts, 10mm socket).
6. To gain access to the wiring grommet, you'll need to remove the passenger front wheel and plastic fender liner. To make the job of running wires to the engine bay significantly easier and to prevent bending or damaging the body panel, we HIGHLY recommend removing the passenger front fender completely.

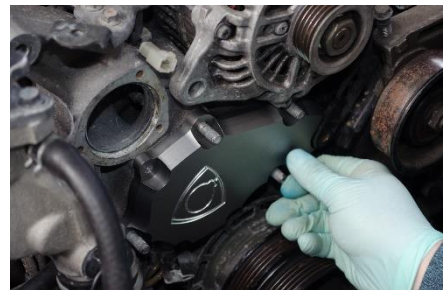
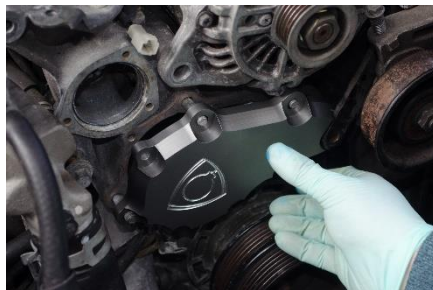
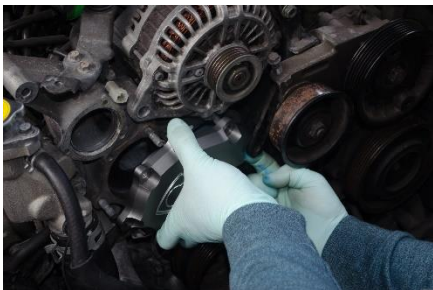


Replacing the Water Pump

1. Remove the three M6 bolts (10mm socket & wrench), the four M8 (13mm socket) nuts, and the long M8 bolt under the alternator from the front face of the mechanical water pump. Gently tuck the oil metering pump lines aside and make sure not to snap or kink them. You'll oil starve your motor if they break.
2. Remove the mechanical water pump and gasket.
3. Gently and carefully clean the sealing surface of the water pump housing; you want to remove any dirt, oils, gasket remnants, RTV residue, or other debris. You can use a razor blade, if kept flat, to scrape the surface clean. Be careful not to gouge or nick the soft aluminum housing. When done, the sealing surface should feel clean and smooth all the way around. We recommend using a bit of degreaser or brake cleaner to remove any oils or residue from the surface before installing the new cap.
4. Apply a bead of RTV around the coolant redirection plate as shown. DO NOT over-apply!



5. Install the coolant redirection plate onto your water pump housing. This is easiest by slipping the right side of the plate underneath the lower alternator bracket before attempting to align it with the housing studs. Press firmly to flatten the RTV to promote a good seal.



6. Using the nut spacers and the included stainless steel hardware (see below), bolt down the coolant redirection plate, making sure it is firmly seated. Follow the instructions on your RTV tube for cure time.



* For those replacing your OEM water pump housing studs with bolts, please disregard the included M8 nuts and aluminum spacers.

** For those relocating your alternator, you can use a shorter bolt to replace the existing OEM bolt, and we've provided a recessed hole for the bolt head. In this situation, remove and disregard the tensioner bracket.

Replacing the thermostat



1. With the thermostat housing and thermostat removed, clean up any residue, dirt, or oils.
2. Remove the C-clip on the bottom of your OEM thermostat. You'll be using the spring and spring plate from the OEM thermostat.



3. Assemble the recirculation plug as shown to the right. Apply Loctite Red to the end of the bolt where the nut will sit before threading on the nut.
4. Test fit the recirculation plug in the water pump housing where the OEM thermostat is installed. The spring should have enough tension on it to push the plug plate against the thermostat housing; adjust the nut so that the plug plate sits out of the housing by roughly 1mm.
5. Reinstall the thermostat housing using a bead of RTV around outside of the plug plate similar to installing the coolant redirection plate.



Thermosensor install and upper radiator hose modification

NOTE: Do NOT turn the thermosensor by grabbing the black plastic connector. Twisting the black connector relative to the thermosensor WILL ruin the thermosensor. Use only a wrench to tighten the thermosensor.

There are two ways to install the thermosensor. One way is simple and easy but not as “clean,” and the other way is much cleaner looking but more difficult and time intensive.

Included in your kit is a stainless steel spring, you may be wondering what it’s for. Since your new electric water pump can move significantly more coolant than the mechanical one, it’s powerful enough at full speed to collapse the long straight section of the upper radiator hose. Shorter sections of hose, 90° bends, and smaller hoses don’t have an issue with the higher flow rate.

We have included an anti-collapse spring to insert into the long section of hose, which prevents collapsing at full pump speed. This is a required safety precaution, as the hose becomes softer as the temperature increases, but this is when high flow is needed most. A collapsed hose can result in an overheating cooling system, blocking coolant flow and causing your motor to overheat.



First method: Inline on upper radiator hose – “easy way”

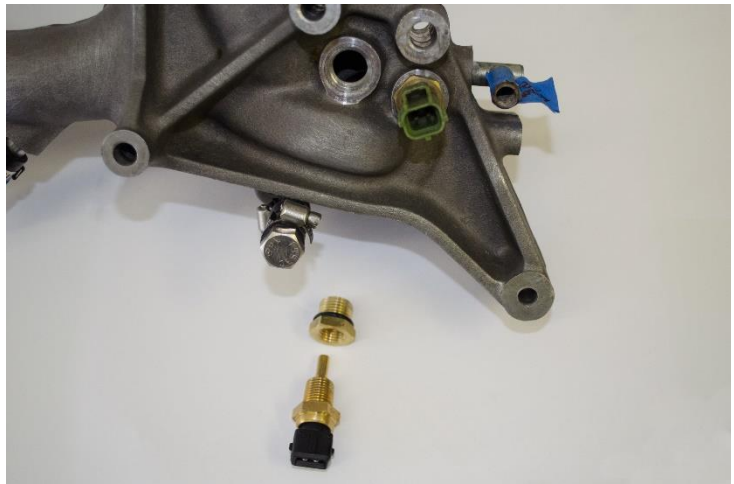
1. Apply Teflon tape or thread sealant to the thermosensor threads. Lightly oil or grease the thermosensor o-ring. Insert the thermosensor into the thermosensor sleeve and, using a wrench on the brass hex fitting, turn until firmly seated. **DO NOT** turn the thermosensor using the black plastic electrical connector; this **WILL** ruin the thermosensor.
2. Remove the upper radiator hose. This can be done with the hose in the car, but it’s significantly easier if the hose isn’t installed.
3. Using either your OEM hose or the silicone hose upgrade, mark two lines on the hose where you’ll be cutting it to insert the thermosensor sleeve. Use the thermosensor sleeve as a guide for how wide and where to place the marks. Also draw a line along the length of the hose for a few inches across the cut lines to allow you to realign the hose halves.



4. Cut the hose using a new razor along the dotted line.
5. Slide the band clamps over each side of the hose.
6. Lightly grease or oil the inside of the rubber caps and slide them on to the thermosensor sleeve. The rubber caps are used to increase the diameter so that it fits the stock hose. Grease/oil the outside of the rubber caps and install in the hose. Realign the hose and make sure that the thermosensor port faces towards the front of the car once installed. Secure the thermosensor sleeve in place with the band clamps.
7. Insert the anti-collapse spring into the long section of the upper radiator hose, and reinstall the hose.

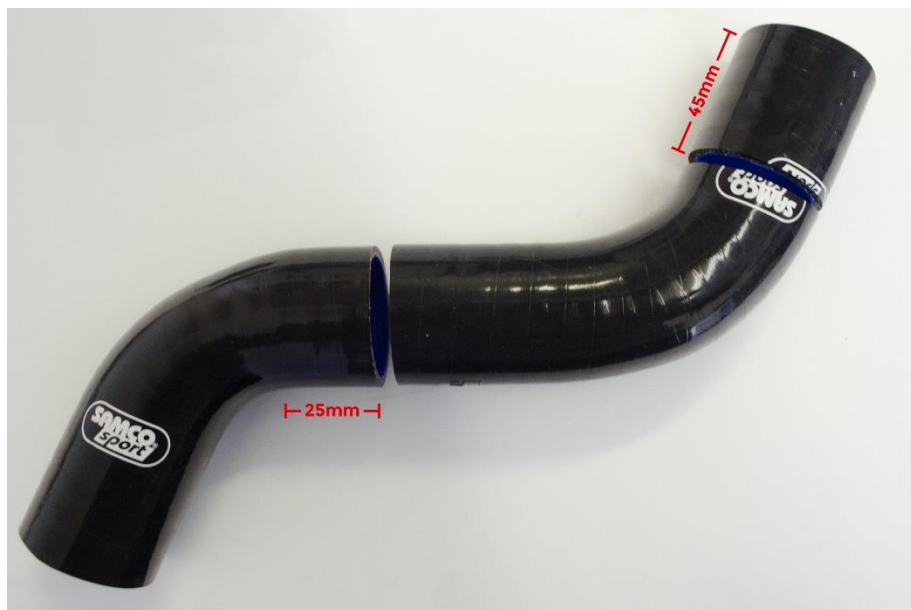
Second method: Replace OEM thermosensor – “clean way”

1. Remove the OEM fan thermoswitch from the back of the water pump housing. This is the one closer to the driver's side. If you're having trouble getting to it, try removing the alternator for better access. If it still proves difficult to access you must remove the water pump housing.
2. Lightly grease or oil the o-ring from the included thermosensor and move it to the thermosensor adapter bushing. Thread the bushing into the back of the water pump housing and tighten until firmly snug.
3. Apply Teflon tape or thread sealant to the thermosensor threads. Insert the thermosensor into the water pump housing and turn until firmly seated. **DO NOT** turn the thermosensor using the black plastic electrical connector; this **WILL** ruin the thermosensor.
4. If you removed your alternator, reinstall it.
5. Insert the anti-collapse spring into the long section of the upper radiator hose, and reinstall the hose.



Installing the Electric Water Pump

1. Remove the OEM lower radiator hose.
2. If you opted for the silicone hose upgrade, your lower radiator hose comes precut to the correct dimensions, skip to step 3. If you'd like to keep your OEM hose, cut a 45mm segment off of one end, and cut the hose again about 25mm from the inside of the "elbow" on the other side. The center section of hose may be discarded.



3. Slide two band clamps over each hose segment. Insert the water pump in place of the middle section of hose as pictured above. The smaller segment goes on the center of the water pump, and the longer fitting pointing to the side goes to the longer hose segment. Don't tighten the band clamps yet.
4. Install the new hose and pump assembly with the short section going to the fitting on the bottom of the radiator. The long hose goes to the water pump housing. This results in the silver front of the water pump facing down and the black side with wiring facing the hood of the car. To gain maximum clearance, you will want to push the metal center fitting on the water pump up against the metal lower radiator fitting. Once these are as close as possible, you may tighten those band clamps. You may need to rotate the upper hose to align it properly. Once you're satisfied with the fitment, tighten down the remaining band clamps. Your pump installation should look like the picture to the right.



5. In order for the horizontal battery support bar to be reinstalled, you'll need to cut it. Draw a rectangle on the bar as shown, and test fit it against the pump to verify placement before cutting. Once you've confirmed placement, cut out the rectangle and file down the rough edges. Reinstall the modified support bar.

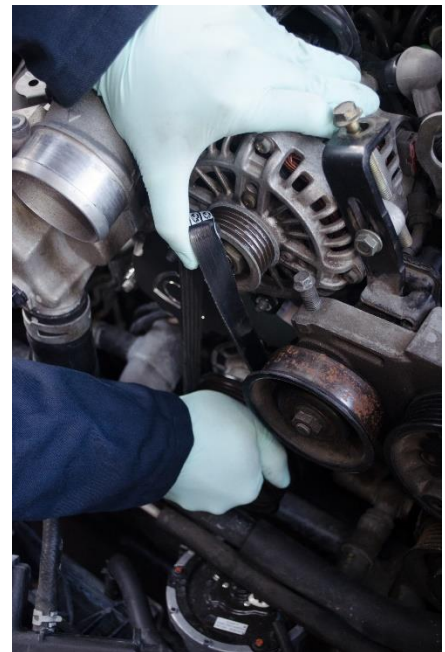


Air pump removal and alternator belt installation

1. You can either simply disconnect the electrical connector coming off the back of the air pump, or remove the air pump entirely. To remove the air pump, you'll need to remove three bolts: one on top of the air pump, one on the bottom on the water pump housing, and one on an adjuster bracket on the air box side of the air pump. These all take a 12mm socket.
2. Without the air pump and water pump pulleys, you'll now need to use a significantly shorter alternator belt, included with your EWP kit. The replacement part number is Gates brand #K050290 (replacements available on our website). These belts are an exact fit for the application but require some finesse to install. Start by fully bottoming out your alternator adjustment bolt so that the alternator sits as far down as possible. You might need to "persuade" your alternator if it doesn't want to rotate down fully with a rubber mallet or a couple of wine coolers.
3. Put the belt over the bottom of the crank pulley. Make sure that all the ribs line up properly. Then, work the belt over the alternator pulley as much as you can.



4. Make sure your FD is in neutral before proceeding. While holding the belt on to the alternator pulley with one hand, rotate the crank pulley with the other to feed the belt on. This may take some time, just be patient and don't rush it or you risk damaging the belt. It's better to feed it gradually than too quickly. Be careful not to pinch your fingers in between the pulley and belt as you spin the crank pulley. Gradually push the belt further onto the alternator pulley with each rotation until it fully seats into the grooves.
5. Tighten the alternator adjustment bolt to the proper belt tension.
6. Install the accessory belt; we recommend replacing this belt at the same time as the alternator belt.



Installing the EWP and Fan controller

Our method of installation puts the EWP and fan controller in the glovebox. You don't have to put it there; the only limitations are that it needs to be in the passenger cabin, and it can't be exposed to direct sunlight as that may harm the controller.

1. If you haven't already removed your fender liner or fender, please do so now. It's possible to access the grommet without removing the fender completely but it's a bit tricky to get to that way. If you don't want to remove the fender completely you may be able to remove just a few of the rear fender bolts, but be careful not to bend the body panel if you flex it outwards. The grommet you're looking for is the big one just behind the fender liner.



2. Pull the grommet out; this may take a bit of force.
3. Push the large white connector on the EWP wiring harness through the hole the grommet was in. Try to push in around 12" of wire. Now go to your passenger footwell, you should be able to see the white connector up in the back among the rest of the wires. Pull it through so that you have enough wire in the footwell to comfortably route it into the glovebox and connect it to the controller.
4. Cut the grommet so that you can slide the EWP wiring into it, be careful not to slice any of the other wires. Reinstall the grommet as securely as possible.



5. Feed the engine bay side of the wiring harness up through the wheel well and through the firewall into the engine bay. The firewall passthrough is in the bottom corner, underneath the windshield wiper motor.



6. Run the wiring down the passenger side of the engine bay. Connect the harness to the pump and thermosensor; route wiring in such a way that it won't be pinched or damaged by heat, vibration, or impact. Don't zip tie the wiring down yet in case you need to make adjustments later on.
7. Route the BATTERY + wire, with the ring terminal, across the engine bay to the battery. We recommend routing it underneath the front bumper support.
8. Leave the green wire for fans alone for now, we'll get to that in the next section.
9. Back in the passenger footwell, connect the ground wire ring terminal to any grounding point. We recommend the grounding point used for the ECU in the passenger footwell.
10. Your EWP controller requires a switched ignition signal to tell the pump when to turn on and when to enter the cool down sequence. For the switched ignition signal, run the light green wire with spade connector underneath the dashboard to the driver's footwell. Ensure that the wire cannot become tangled, pinched by a pedal, snagged by your foot, etc. as this wire is essential to the operation of the pump. If this wire becomes disconnected, your pump will enter the shutdown sequence whether or not your car is running. Please take precautions to secure it out of the way with zip ties and protect from interference such as pedals or potential to be pulled down by your feet.
11. In the driver's footwell, next to the fuse box, plug the spade connector for the green ignition signal wire into the spot shown in the picture to the right. This provides a switched ignition signal to the EWP controller.



12. The remote light (the small red LED) can be installed at any location you choose; however, you may need to extend the wires. We've included 30" of spare wires for this reason; simply clip the D-Sub connections, butt-crimp in the wire extensions, and place your LED. This light will turn on when the EWP controller's alarm function is triggered – more information on this in the Operation section later on. To mount the LED in your dashboard, drill a 4.6mm hole, thread the LED wires through from the front, firmly seat the LED, and connect it to the controller.
13. Place the EWP controller in the glovebox, feed the wiring through the back of the glovebox, and connect the white connector to the controller. Please note that installing the controller in the engine bay may damage it and will void the warranty.

Controlling the fans

The OEM fan thermost switch controls Fan Relay #3. This is a mechanical trigger which activates any time the coolant temperature is above 226°F/117°C, providing a ground to the relay which triggers the fans. Depending on the method of EWP thermosensor installation you chose, you may have removed the stock thermost switch. This is actually a good thing as the stock thermost switch waits until the motor is unreasonably hot before triggering – Mazda set these temperature points to make the motor run extremely hot for emissions purposes but in the long run these high temperatures are detrimental to the longevity of motors, seals, under-hood wiring, and hoses. With the EWP controller, you can control the setpoint of any or all fan relays to trigger at a temperature you set. We recommend 190°F/85°C.

The ECU controls Relays #2 and #4. With the stock ECU, the temperature setpoint is still quite high at 220°F/105°C. Power FC or aftermarket ECU users can adjust this temperature. However, by using the fan control wire and tapping into these relays, you can share fan control between the ECU and the EWP controller. With a stock ECU this comes in handy as you can artificially trigger the fans at a much lower temperature. One of these two relays must be triggered in order for the thermost switch to be able to trigger Relay #3.

Lastly, Relay #1 is controlled only by the AC circuit. We recommend against tapping into this relay because it'll trigger the AC compressor as well whenever your EWP controller triggers the fans.

While there are only two fans in the FD system, each fan contains a low speed and high speed coil; there are actually two motors in each fan. By activating the various relays, each fan can spin at one of three speeds: low (low speed coil), medium (high speed coil), or high (low speed + high speed).

Condition	Elec. load	AC	Relays				Fan speed
			1 (AC)	2 (ECU)	3 (Sen.)	4 (ECU)	
Temp below 212°F/100°C	-	Off	Off	Off	Off	Off	Off
	-	On	On	Off	Off	Off	Low
Temp between 212°F-219°F/100°C-104°C	No	Off	Off	Off	Off	Off	Off
	Yes	Off	On	Off	Off	Off	Low
	-	On	On	Off	Off	Off	Low
Temp between 221°F-226°F/105°C-108°C	-	Off	Off	On	Off	On	Low
	-	On	On	On	Off	On	Medium
Temp between 226°F-243°F/108°C-117°C	-	Off	Off	On	On	On	Medium
	-	On	On	On	On	On	High
Temp above 243°F/117°C	-	Off	Off	On	On	On	Medium
	-	On	On	On	On	On	High
Thermosensor malfunction	-	-	Off	On	Off	On	Low
	-	-	Off	On	On	On	Medium

The fan relays are laid out in the car as seen in the picture to the right. Depending on how you want your cooling system to behave, select the relay(s) that you want to tap into.

We recommend tapping the EWP kit thermosensor into Relays #2 and #3, that way the fan behavior is identical to OEM with the exception of a lower trigger temperature. You will need to tap into either Relay #2 or 4 to allow Relay #3 to be triggered. You can use either relay (2 or 4) since one will trigger the other.



Relay tap wires:

2. Green with black stripe
 3. Yellow with pink stripe
 4. Green with black stripe
-
1. Cut the green EWP fan control to length, strip $\frac{1}{4}$ "/5mm of the wire, and crimp on the red female spade connector.
 2. Install the t-taps on the desired wires with the included short tap wires, and crimp both tap wires into the blue male spade connector. If you're only tapping into one relay, use the red male spade connector. To make a more secure connection with the t-taps, clamp the tap plate down using a pair of pliers.
 3. Plug the male and female spade connectors together to provide fan signal from the controller.

Note: adding fan control with t-taps does not negate the OEM fan control settings. It only allows you to manually set the fan relays to trigger at a lower temperature. If for some reason your controller gets disconnected from the fans, the OEM fan control will still function as normal.

Bleeding the Coolant System

The electric water pump offers a few unique capabilities that a mechanical water pump does not; for example, the ability to more quickly and effectively bleed or “burp” a cooling system. Bleeding the coolant system is extremely simple with the EWP kit – just turn your key to ON, undo the thermostat housing cap, and let it sit. The pump will pulse, circulating coolant, and allowing bubbles to rise up to the surface. Top up coolant as needed, since bubbles leaving the system will lower the overall coolant level.

We recommend using a Lisle spill-proof easy bleed funnel system or something similar since this allows you to refill the coolant system easier, and also lets you see the size and quantity of bubbles coming out easier as well. Basically it serves as a reservoir that automatically tops up your cooling system; this is especially useful if bleeding the system for an extended period of time.



If you plan to leave the car in this mode for an extended period of time, we recommend hooking your car up to a battery charger to avoid draining your battery. We recommend using the Lisle funnel as well if you’re doing this to prevent having to manually fill the coolant neck as the level drops.

Alternatively, you can manually pulse the pump by connecting and disconnecting it from an external power source. Use alligator clips and/or spade connectors to connect to the pump. Blue is positive, black is negative. Using an external power source isn’t any more or less effective than allowing the controller to pulse the pump, it just gives you more control over the pulse cycles.

In order to do this in a mechanical system, you would have to start the motor hundreds of times, but this can be done in a matter of minutes with an electric pump without even turning the car on.

EWP Controller Operation

The EWP controller offers a programmable setpoint for when full system voltage is supplied to the pump. This setpoint can range from 140°F/60°C to 205°F/95°C in increments of 5°C. Change the setpoint by pressing the black button on the face of the controller, and to save the adjusted setpoint, press and hold the black button until the controller beeps.

- **EWP symbol**
 - Flashing: EWP is in “pulse” mode
 - Solid: EWP is fully on
- **Fan symbol:** Fans running
- **Voltage 12V:** Controller receiving too little (<10.5V) or too much (>17.5V) voltage
- **Sensor Open Circuit:** Check the thermosensor wiring for any open circuits
- **Sensor Short Circuit:** Check the thermosensor wiring for any short circuits
- **Low Temp:** The engine is still below 104°F/40°C after five minutes
- **High Temp:** The engine is above 212°F/100°C (water’s boiling point)
- **Above Set Temperature:** Sensor temperature is more than 18°F/10°C above setpoint
- **Pump Error:** Check the pump wiring for any open/short circuits
- **Diagnostic Check:** A system warning has been triggered, check the screen to see the error message. The Remote LED will also light up whenever this is triggered.
- **Alarm on/off:** Turn on or off the optional beep alarm when temperature exceeds setpoint



We recommend keying-off one click at a time, rather than just removing the key in one motion. During testing we noticed that sometimes removing the key too quickly could cause the EWP controller to simply shut off rather than continuing to circulate coolant after shutdown.

Controller Specifications

Input voltage 12VDC to 29VDC
Maximum current 12A

Setpoint options	Fahrenheit	140°	150°	160°	165°	175°	185°	195°	205°	212°
	Celsius	60°	65°	70°	75°	80°	85°	90°	95°	100°

Fan cut-in temperature 5.4°F/3°C above setpoint

Sensor type Thermistor

Time out 3 minutes (or Setpoint - 14°F/10°C) after ignition off

Diagnostics and Troubleshooting

Condition	Troubleshooting
Controller does not operate / no display	<ul style="list-style-type: none">• Blown fuse• Check all the wire connections
12V indicator flashing	<ul style="list-style-type: none">• Controller receiving low voltage < 10.5V• Controller receiving high voltage > 17.5V
Sensor open circuit	<ul style="list-style-type: none">• Check sensor wiring for any open circuits
Sensor short circuit	<ul style="list-style-type: none">• Check sensor wiring for any short circuits
Low temp	<ul style="list-style-type: none">• Check engine temperature; engine isn't warming up properly or the thermosensor is faulty
High temp	<ul style="list-style-type: none">• Something is causing overheating; if your setpoint is too low this may artificially trigger a High Temp warning. Also check all coolant caps, hoses, fittings, etc.
Pump error	<ul style="list-style-type: none">• Check pump wiring for short/open circuits

Cautions

1. Engine temperature must be monitored closely at all times, especially immediately after installation of the EWP kit until you're sure everything works properly.
2. Don't run the pump dry as this may cause pump failure.
3. If you have a weak battery, keep tabs on your charge level since the EWP draws power after shutoff.

Warranties and Disclaimers

This product is intended for off-road use only. By installing this product, you agree to hold SakeBomb Garage LLC not liable for damages, costs, or injury incurred from or related to the installation, use, or failure of this product.

Davies, Craig Pty Ltd warrants their products for a period of two (2) years, 40,000km or 2000 hours continuous running (whichever is the lesser) from the date of purchase. Davies, Craig Pty Ltd shall carry out any repairs/replacement to the Electric Water Pump, LCD EWP®/Fan Digital Controller free of cost provided such fault is directly attributed to a defect in the workmanship or materials used in the manufacture of the Davies, Craig products supplied. Labor and consequential costs excluded.

To register your Davies, Craig product, please go to www.daviescraig.com.au.

For warranty issues please email info@sakebombgarage.com.

Congratulations on your new SakeBomb Garage EWP Setup!

For any questions/comments please feel free to contact us, we're happy to hear from you!

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Email: info@sakebombgarage.com
Facebook: facebook.com/sakebombgarage

