

ELECTRIC WATER PUMP (EWP®) & LCD EWP®/FAN CONTROLLER INSTRUCTIONS

SUITABLE FOR: EWP80, EWP115, EWP130, & EWP150 COMBO PACKS

**PLEASE READ ALL THESE INSTRUCTIONS THOROUGHLY BEFORE YOU START WORK.
DON'T RUSH - ENSURE YOU HAVE FULL UNDERSTANDING OF THE WORK AHEAD BEFORE YOU COMMENCE. ENSURE YOU HAVE ALL TOOLS AND COMPONENTS REQUIRED.**

Congratulations on your purchase of the Davies, Craig EWP® LCD, EWP/Fan Controller Combo Pack. Your Combo Pack is designed to replace or complement the existing belt driven mechanical water pump and thermostat, and control your Thematic® Fan.

The major benefits of an Electric Water Pump (EWP®) are, prevention of overheating, removal of the parasitic power lost operating a mechanical water pump, reduction of engine warm-up time and elimination of heat soak by running the EWP after a hot engine shut down. Your new EWP® Combo Pack has the advantage of providing the best coolant flow rate independent of engine speed.

The LCD EWP® & Fan Controller is scientifically calibrated to manage the flow rate of engine coolant to lock onto a set engine temperature. From start-up, the EWP® & Fan Digital Controller will 'system check' the EWP® and will operate the pump for approximately 10 seconds. Low flow (10 secs -on/30 secs -off PWM) reduces engine warm-up time, arriving at your set temperature quicker. As the engine warms up the EWP® will increase coolant flow rate. Electric Thematic® Fan/s will be deployed at +3°C above the set temp. On engine shutdown, the EWP® & Fan Digital Controller will continue operating for three minutes or until the engine temperature is reduced to 10C below the set temperature to prevent damaging heat soak.

Optional Accessories

Part #	Description	Suitable for	No.
1025	Flanged Adaptor	EWP115, EWP150, EWP80, EWP130	1
1129	AN-16 Adaptor	EWP115 (Alloy Only), EWP150	2
1024	90 Degree Adaptor	EWP115 (Alloy Only), EWP150	3
8700	EWP Mounting Bracket	EWP115, EWP115, EWP130	4



COMBO PACK CONTENTS –**EWP80 Nylon (12V)**

EWP Components			Hardware Bag Components		
Item #	Description	Qty.	Item #	Description	Qty.
1.	EWP Pump Short Kit	1	1.	Scotch Lock	1
2.	EWP & Fan Digital Controller	1	2.	Ring Terminal	1
3.	Inline Adaptor	1	3.	Ring Terminal (Yellow)	1
4.	Wiring Harness w/ 10A Fuse	1	4.	Self-Tapping Screw	1
5.	Elbow Adaptor 35mm (Nylon)	1	5.	Temp Sensor Assembly	1
6.	Straight Adaptor 35mm (Nylon)	1	6.	Adaptor M5 Bolt	6
7.	O-Ring	2	7.	Adaptor M5 Nut	6
8.	Rubber Sleeve 3mm	4	8.	M5 Cap Screw Long	6
9.	Hose Clamps	4	9.	Mount Pad Hook & Loop	1
10.	EWP Hardware Bag	1			

EWP150 (12V), EWP115 Alloy (12V), EWP115 Nylon (12V)

EWP Components			Hardware Bag Components		
Item #	Description	Qty.	Item #	Description	Qty.
1.	EWP150 Pump Short Kit or EWP115 Alloy Pump Short Kit or EWP115 Nylon Pump Short Kit	1	1.	Scotch Lock	1
2.	EWP Digital Controller	1	2.	Ring Terminal	1
3.	Inline Adaptor	1	3.	Ring Terminal (Yellow)	1
4.	Wiring Harness w/ 10A Fuse	1	4.	Self-Tapping Screw	1
5.	Rubber Sleeve 3mm	4	5.	Temp Sensor Assembly	1
6.	Hose Clamps	4	6.	Mount Pad Hook & Loop	1
7.	EWP Hardware Bag	1			

EWP130 (12V/24V)

EWP Components			Hardware Bag Components		
Item #	Description	Qty.	Item #	Description	Qty.
1.	EWP Pump Short Kit (12V) EWP Pump Short Kit (24V)	1	1.	Scotch Lock	1
2.	EWP Digital Controller	1	2.	Ring Terminal	1
3.	Inline Adaptor	1	3.	Ring Terminal (Yellow)	1
4.	Wiring Harness w/ 10A Fuse	1	4.	Self-Tapping Screw	1
5.	L Adaptor 35mm (Alloy)	1	5.	Temp Sensor Assembly	1
6.	Straight Adaptor 35mm (Alloy)	1	6.	Adaptor M5 Bolt	12
7.	O-Ring	2	7.	Mount Pad Hook & Loop	1
8.	Rubber Sleeve 3mm	4			
9.	Hose Clamps	4			
10.	Hardware Bag	1			

SECTION 1: INSTALLING YOUR EWP®

1. Your EWP® Electric Water Pump is best fitted in the lower radiator hose which connects the radiator to the existing mechanical water pump housing. Remove lower radiator hose. The hose will carry the weight of your EWP® and insulate the EWP® from engine vibration. Check the area for available space. Further radiator hose may be required. Position the EWP® in the lower hose so the inlet, in the centre of the pump is connected to the radiator side and the outlet (**marked with an arrow**) is connected to the engine's mechanical water pump housing or your EWP® Adaptor (not supplied). The EWP® should be positioned as low as possible to maximise the gravity feed from the radiator and to avoid air entering and remaining in the pump. If you wish to remote mount your EWP 115/130/150, purchase Mounting Bracket part No 8700.

Alternatively, the EWP® may be fitted in the upper radiator hose. **In this case, coolant level is critical and bleeding of all air from the cooling system essential.** Follow instructions above for correct EWP® fitment ensuring the pump outlet is connected to the hose going into the top of the radiator. The pump can be installed in any orientation but to assist air bleeding try to mount the outlet pointing upwards. (See Section 8 for bleeding instructions).

2. If you have either a EWP130 or EWP80, assemble the provided EWP Straight and L Adaptors to suit the configuration and space available. Ensure that the Straight and L Adaptors have the O-Ring fit securely between them and the flange faces on the EWP body. Six of the shorter Adaptor M5 Bolts (Part # 8507) should be used to attach the Adaptor to the EWP outlet. The remainder M5 bolts (Part # 8507 for EWP130) or (Part # 8514 for EWP80) can be used to attach the Adaptor to the EWP Inlet.

If necessary, add the rubber sleeves to the inlet and outlet of the EWP® to suit your particular hose diameter. If you need thicker sleeves, contact Davies, Craig and we can assist you with your installation.

3. Cut out the section of the radiator hose not required. Connect the pump inlet and outlets to the appropriate hose ensuring hose clamps are very firmly tightened.

***Do not bleed EWP® until you install the digital controller and disable the mechanical pump.**



INSTALLING THE LCD EWP[®]/FAN DIGITAL CONTROLLER

- 1.** The Controller should be installed inside the passenger compartment to minimise its ambient temperature. Also minimise exposure to direct sunlight. Locate a hole in the firewall (approx. 20mm in diameter) and pass the wiring harness (including the sensor & pump "T-connector") through. If a hole of adequate size cannot be located, then wires may be cut then re-joined as a last resort. Connect T-Plug in wiring loom to the pump.
- 2.** Connect black **Sensor Plug** to the thermal sensor located in the thermostat housing/inline adaptor (Refer to Digital Controller Wiring diagram, **Page 3**).
- 3.** Connect the white plug in the wiring harness to the controller then mount the controller with Velcro supplied. Ensure it is mounted where access to the temperature adjustment button is easy. **NOTE:** Ensure a good earth connection using the self-tapping screw provided. The earth lead must be connected to a metal part of the car body.
- 4.** Connect the **Red** wire from the wiring harness to the battery positive using the ring terminal provided. Connect the **Green** wire from the wiring harness to an ignition source, the wires may be spliced then soldered if necessary. Ensure no wire is exposed, by insulating the join with electrical tape.
- 5.** Connect the **Green** and **Black** striped wire to the fan relay if you wish to control the Thematic[®] Fan 3°C above the set temperature. **NOTE: The Controller will earth the fan relay, not power it.**
- 6.** Mount 'Remote Test Light' in a location where it will be visible. The 'Test Light' may be fitted by inserting it through a 4.6mm diameter drilled hole in a plastic area of the interior/dashboard or simply with adhesive tape. The 'Remote Test Light' has a two pin connections. Heat shrink or insulation tape can be applied to these pin connections once the test light is mounted. This will ensure the connection points are insulated and secure.

NOTE:

- In carrying out the wiring procedure, please bear in mind that it is advantageous to minimise voltage drop by keeping the wiring as short as possible.
- Remove the engine thermostat from the thermostat housing and install the sensor using Method 1 or 2 as shown below.
- If you often operate in very cold climates, drill 2 x 5mm holes in the thermostat plate before reinstalling.
 - Ensure there is no damage to the thermostat-housing gasket, and re-fit the thermostat housing without the thermostat.

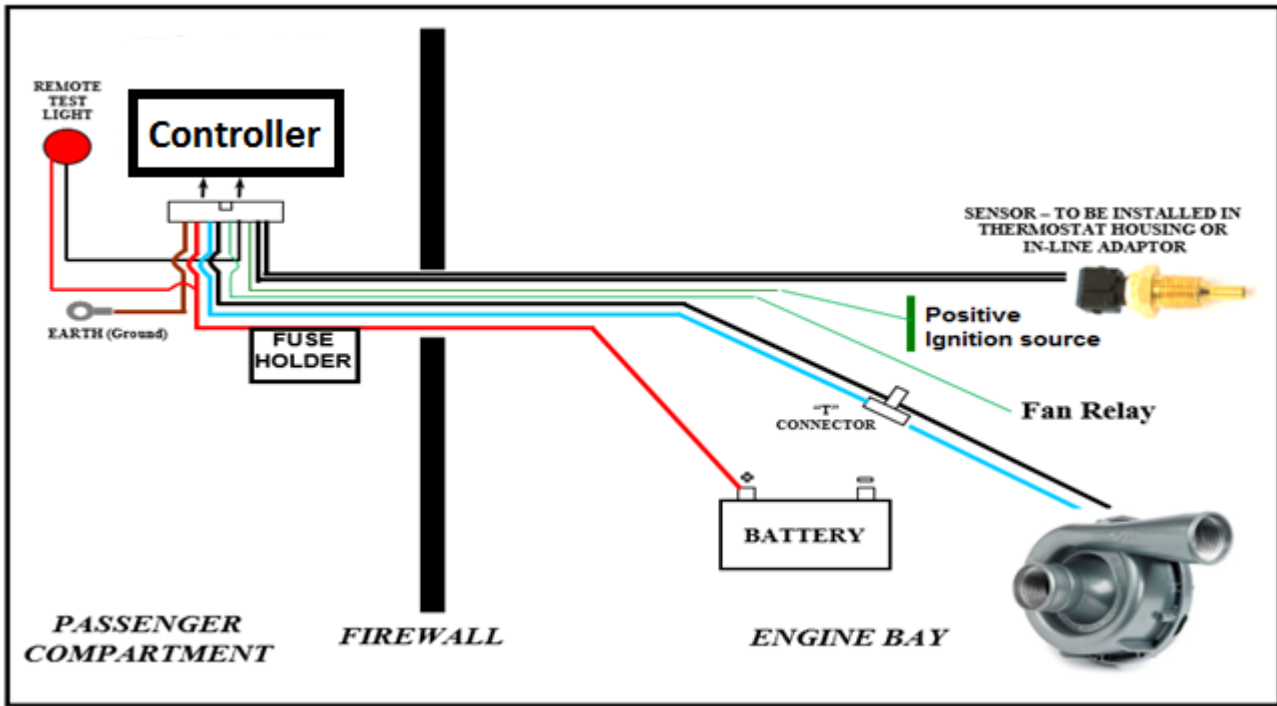
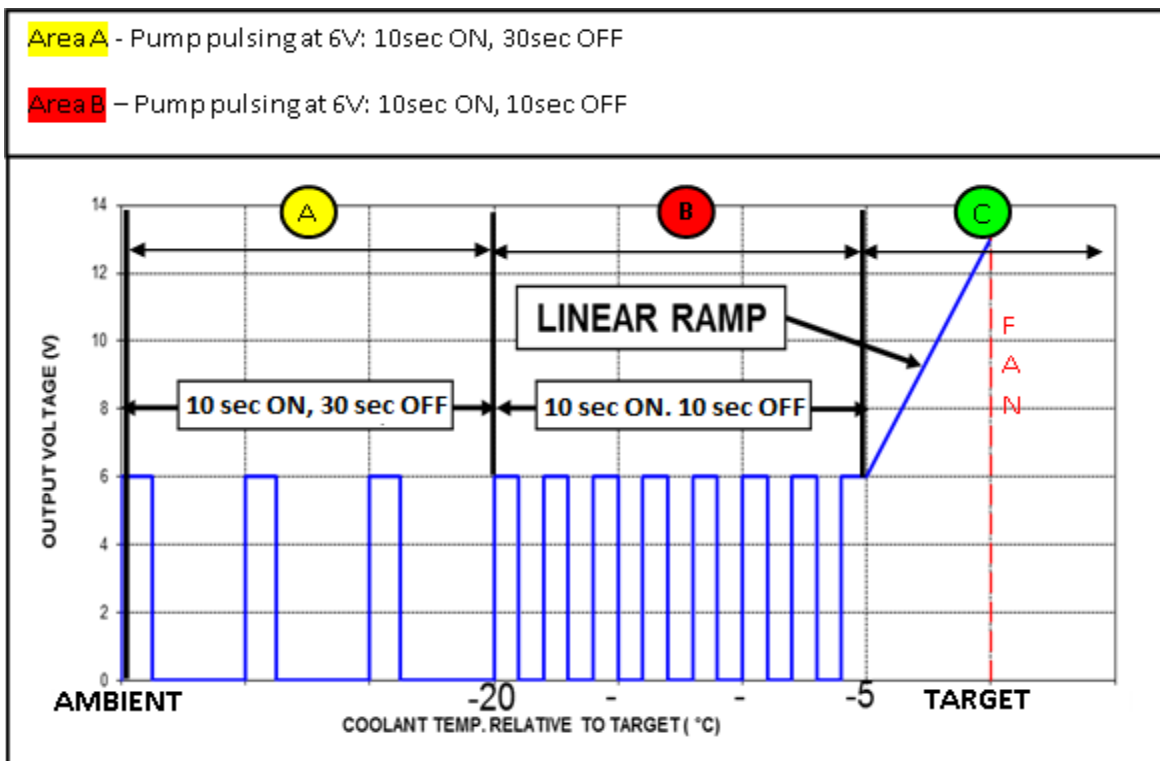


Figure 2: Digital Controller Wiring Diagram

OPERATION OF DIGITAL CONTROLLER

CONTROLLER ALGORITHM-PUMP OPERATION

The 'set point' can be programmed to any setting between 60°C (140°F) to 100°C (212°F).



Digital Controller Operation Chart.

OPERATION of LCD

TEMPERATURE INDICATOR

Rises with increased engine temperature

EWP SYMBOL

FLASHING = EWP[®] operating in 'pulsing' mode – Refer **Digital Controller Operations Curve**, areas (A) (B) & (C)

ON = Electric Water Pump (EWP[®]) working at full speed.

FAN SYMBOL Circulating = fan operating

DIAGNOSTIC CHECK

System warning has been triggered. Therefore, refer to "Diagnostic Chart" in order to determine possible cause, and take measures to correct the problem.

REMOTE TEST LIGHT (RED)

This light will "flash" when the system works in the diagnostic check mode.

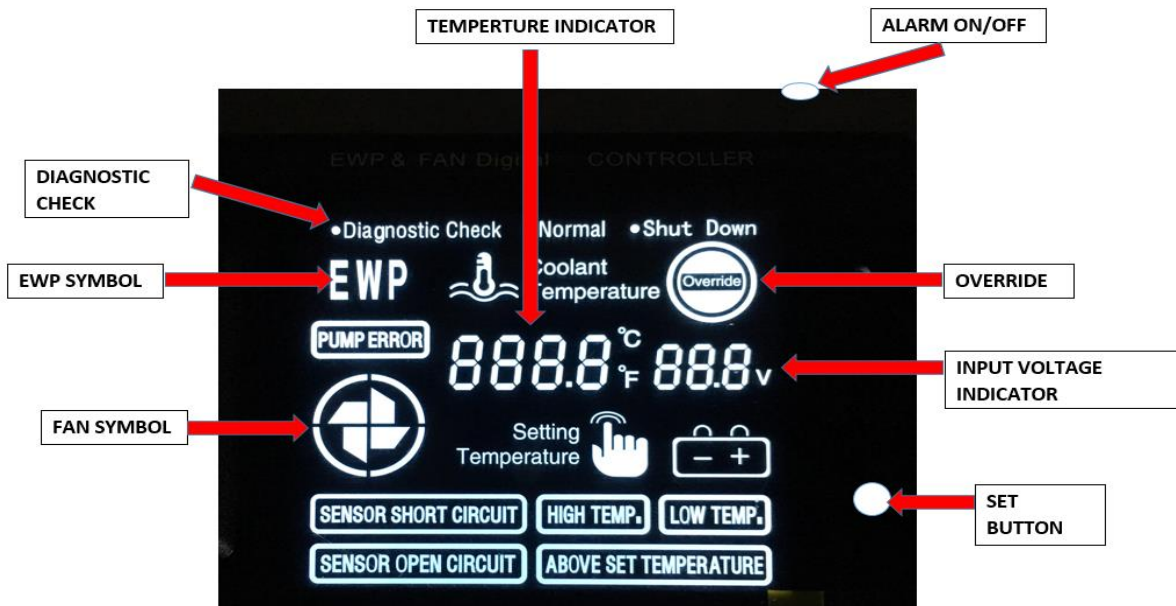


Figure 1: LCD EWP[®]/Fan Digital Controller.

SYSTEM CHECK:

Every time the ignition is turned ON, all symbols will illuminate. This feature allows you to check all functions are operational.

SHUT DOWN MODE:

Your Controller will continue to operate your EWP[®] for three (3) minutes or until the coolant temperature has reduced -10°C/-14°F below your set point – whichever occurs first. The "Shut Down" feature will eliminate heat soak and reduce engine temperature evenly. The feature protects your engine against gasket damage due to hot spots. This cooling efficiency can be improved further with the use of high performance Davies Craig Thermatic[®] Fan/s.

VOLTAGE DISPLAY:

Indicates the controller input voltage for user information.

OVERRIDE:

When controller is at "Normal" mode, by pressing & holding the "Set Button" for 7 seconds the EWP[®] will override. This feature benefits for drive the EWP[®] at full speed similar as hot wire the pump.

°C to °F change:

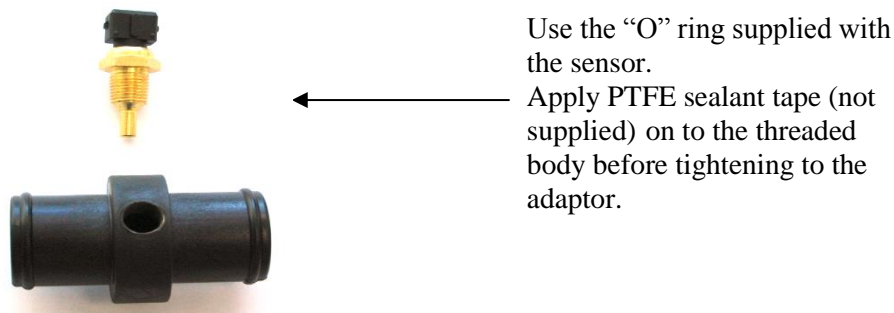
When controller is at "Normal" mode, by pressing & holding the "Set Button" for 3 seconds the controller will change to °C to °F or °F to °C.

DIGITAL CONTROLLER THERMAL SENSOR INSTALLATION

There are two installation methods available.

METHOD 1: IN-LINE ADAPTOR METHOD (supplied & recommended)

As with other Davies Craig products the In-line Adaptor has universal application.



Use the "O" ring supplied with the sensor.

Apply PTFE sealant tape (not supplied) on to the threaded body before tightening to the adaptor.

Figure 2: Thermal Sensor and In-line Adaptor Installation

NOTE: Top Radiator Hose Measurements to Sleeve.

30 to 35 mm inside diameter (ID) – use adaptor without sleeves.

36 to 42 mm ID – use 2 sleeves included in the kit

42+mm ID – contact Davies, Craig for 6mm sleeves (Part #8511)

1. Thermal Sensor Fitting

Apply a couple of layers of Teflon sealant tape around the threaded body of the sensor, Fit the sensor assembly into the threaded black In-line Adaptor and tighten.

Do not over tighten, which may damage the sensor body or adaptor.

2. Hose Fitting



- When the cooling system is cold, remove top radiator hose and confirm that the inside diameter of your top radiator hose is between 30 to 42 mm prior to cutting hose. If the hose is more than 42mm, call Davies Craig and await 6mm sleeves.
- If the parts supplied (adaptor and/or sleeves) are suitable, select an appropriate location in a straight section of the hose then cut the radiator hose.
- Temporarily slide radiator hose clamps on each end of the hose. Fit both cut ends of hose onto the In-line Adaptor (with or without sleeves as appropriate). If fitting is tight, use silicon base grease or petroleum jelly to assist fitment of adaptor to hoses.
- Refit top radiator hose, ensure no twisting of hose and tighten all clamps.

METHOD 2 - IN THERMOSTAT HOUSING OR RADIATOR

Please check wall thickness of thermostat housing/radiator as it is recommended that the Thermal Sensor only be installed if there is a wall thickness of at least 3mm.

If the thickness is less than 3mm, please proceed with installation Method '1'.

We suggest removal of the thermostat housing before beginning the installation process so that metal shavings do not enter the cooling system.

	<p>1. Mark location on thermostat housing where sensor assembly is to be fitted – “top of dome is recommended”.</p>
	<p>2. Drill an 11.0mm (7/16”) hole through the marked area. For your safety and to avoid drilling on an angle, please ensure thermostat housing is well secured before beginning the drilling process.</p>

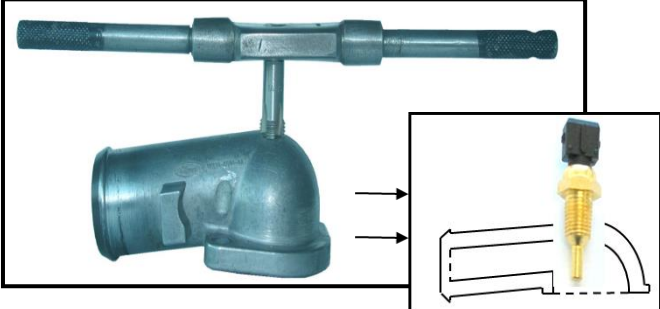

	<p>3. Using a 1/4" NPT tap, tap the hole to allow the sensor assembly to "just" protrude the thickness of the thermostat housing. It is recommended that the fitment of the sensor assembly be checked regularly to achieve the condition in the diagram.</p>
	<p>4. Once the tapping process is completed, apply a couple of layers of PTFE sealant tape (not supplied) to the thread on the brass body, then screw it into the thermostat housing.</p>

Figure 3: Sensor Installation in to Thermostat Diagram

SETTING THE LCD EWP®/FAN DIGITAL CONTROLLER

It's recommended as a minimum the Digital Controller's set-point is fixed to that of the engine manufacturer's mechanical thermostat opening temperature. You may use a lower 'set-point' to run the engine colder or a higher 'set-point' to run the engine hotter if appropriate. Generally, running the engine slightly colder will increase the power and running the engine slightly hotter will improve the fuel efficiency.

The LCD EWP & Fan Digital Controller has been set at the factory at 85°C/185°F. This setting can be altered up or down by using the 'set-point' adjustment button on the right hand side as follows:

- 1.** Pushing the 'set' button once will indicate the present setting.
- 2.** Push set button repeatedly until the desired set temperature displays. Hold set button down 2 seconds until Controller beeps. The 'set' temperature will then illuminate
- 3.** If the new setting is not confirmed within 2 sec, the Digital Controller will revert to previous 'set' temperature.
- 4.** To check 'set' temperature, repeat Step **1** above.

Note: Controller will keep the last state of "Set Temp" memory, when disconnected from the power source.

NOTE: Monitor the existing engine temperature gauge to check that your set engine temperature is similar to the actual engine temperature. The engine temperature sender unit may be located in a different position than your Thermal Sensor and may display a temperature variation.

THERMATIC® FAN WIRING TO THE DIGITAL CONTROLLER

Please follow the instructions 1&2 below if you are using the Davies Craig Universal Fan Fitting Kit (Parts #1000, 12V; #1001, 24V).

- 1.** Cut the ring terminal off the black wire (85) from the Fan wiring loom to a sufficient length, this wire (with relay) to be joined with the black/green wire from the Digital Controller.
- 2.** Cut the green wire, then join sufficient length of wire to connect to battery positive as shown in the diagram below (86).

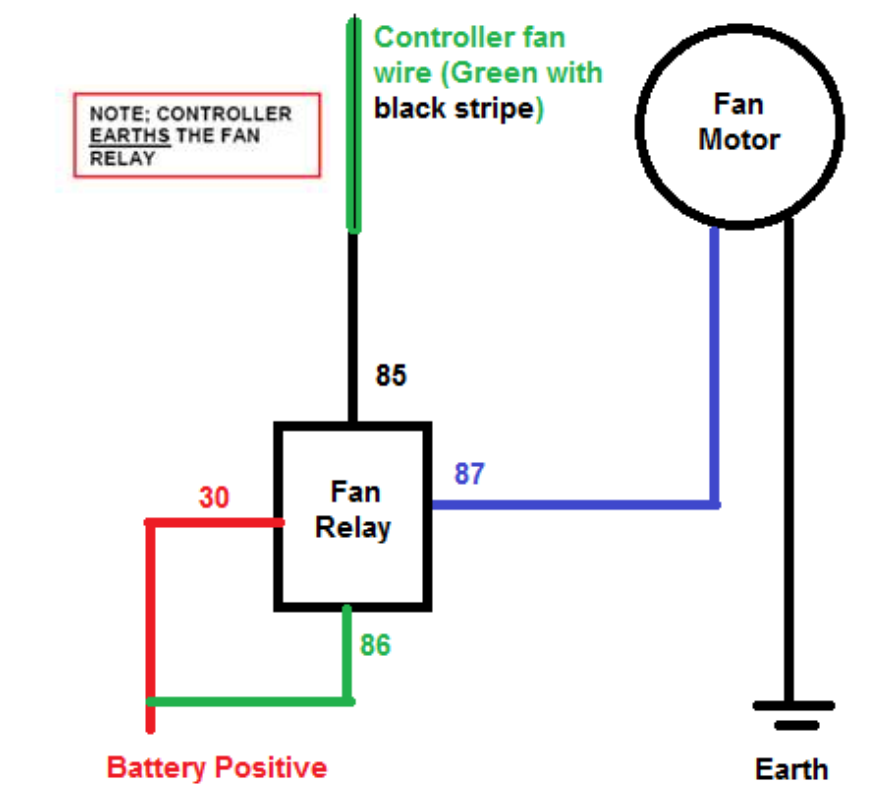


Figure 4: Fan Controller Wiring Diagram

EWP & FAN DIGITAL CONTROLLER TECHNICAL SPECIFICATION

Input Voltage	12VDC to 29VDC
Output Voltage	6V to 29V
Max. Current	12A
Setting Temperatures	C 60° to 100°
	F 140° to 212°
Fan Cut in Temperature	+3°C/5.4°F above the set temperature
Sensor Type	Thermistor
Time Out	3 Min. (or Set -10°C/14°F) after ignition OFF
Weight	100 grams (3.5 oz.)
Dimensions	110mm (L) X 90mm (W) X 30mm (D) [4 1/3" (L) x 3 1/2" (W) x 1.1" (D)]

CONTROLLER DIAGNOSTIC CHART

<u>Condition</u>	<u>Troubleshooting</u>
Controller does not operate / No display	<ul style="list-style-type: none"> • Blown fuse • Check all the wire connections
12V voltage indicator flashing	<ul style="list-style-type: none"> • Controller receiving low voltage < 10.5V • Controller receiving high voltage > 17.5V
24V voltage indicator flashing	<ul style="list-style-type: none"> • Controller receiving low voltage < 21.5V • Controller receiving high voltage > 27.5V
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 <40°C (104°F) after 5 Minutes High Temp >100°C (212°F)	<ul style="list-style-type: none"> • Check engine temperature
Above Set Temperature	<ul style="list-style-type: none"> • Sensor temperature is at least 10°C (18°F) above the set temperature.
Pump Error	<ul style="list-style-type: none"> • Check pump wiring for open/short circuits
Override ON	<ul style="list-style-type: none"> • EWP manually override by the user. • To turn OFF, Press & hold the set button for 7 seconds or switch OFF & ON the IGN.
ERR	<ul style="list-style-type: none"> • Temp sensor Open or Short circuit

MODIFYING EXISTING MECHANICAL WATER PUMP

Davies Craig engine specific EWP Header-Adaptor Kits – visit the website for details.

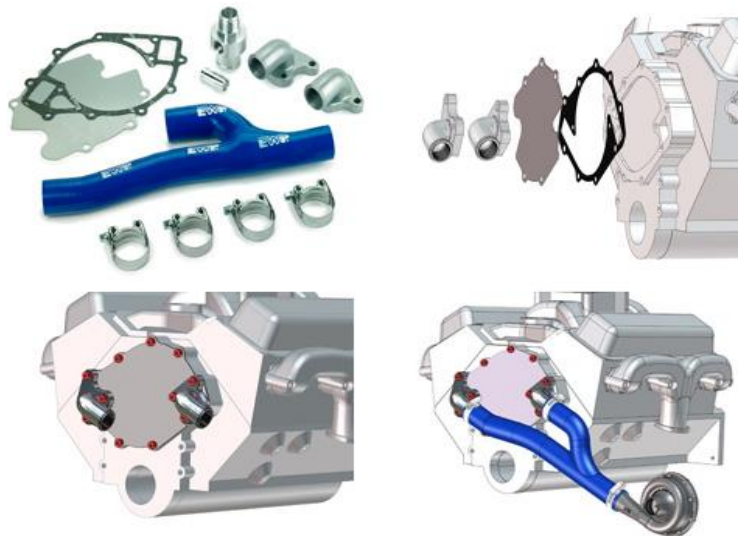
1. You may choose to by-pass the belt-driven water pump pulley by installing a shorter belt. This option may not be possible if the crank pulley drives a belt-driven power steering and fan or unless you replace the mechanical fan with a Davies, Craig Thematic® Fan.
2. Remove the thermostat from the thermostat housing.
3. Re-fit the thermostat housing ensuring that there is no damage to the thermostat-housing gasket.



Belt Orientation Diagram

OR

1. Remove the existing belt-driven water pump housing.
2. Remove the water pump impeller from the pump shaft. (NOTE: You may need to drill holes through the impeller close to the drive shaft.) Alternatively, remove vanes from impeller. Mechanical water pumps differ from engine to engine and you need to take appropriate action that suits the specific water pump to disable the pump.



Part #8630 - EWP Header-Adaptor Kit (Ford Big Block)

3. Re-fit the water pump housing without the impeller ensuring that there is no damage to the water pump gasket and the pump seal is still retained. Re-fit the water pump belt and tighten to manufacturer's specifications.

BLEEDING THE EWP®

For the EWP® 80, ensure it is orientated correctly as shown below before continuing.

NOTE: This orientation is a temporary requirement for the purpose of bleeding the pump and ensuring there is no air entrapped within the seal housing of the pump. The pump can be set-up in another orientation upon completion of the bleeding procedure.

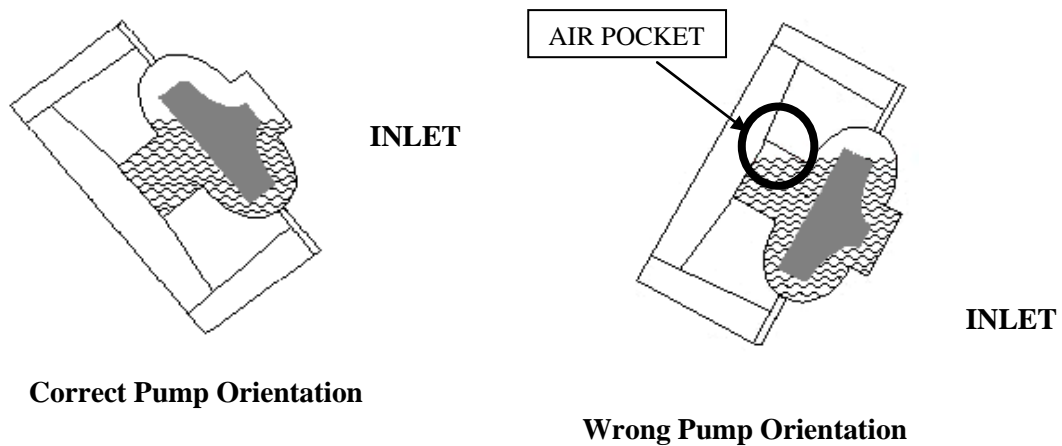


Figure 5: EWP80 Pump Orientation Diagram

FOR ALL EWPS:

- 1.** Fill the engine cooling system with appropriate coolant. Waterless coolants increase the load on a EWP and may reduce pump life.
- 2.** Turn heater on full.
- 3.** With the radiator cap off, hardwire the EWP® directly to the vehicle's battery or a 12v power source. Air trapped in the cooling system will exit at the top of the radiator.
- 4.** Turn on engine and idle.
- 5.** Top up the radiator with coolant with the EWP® running until all air is eliminated. Turn off engine.
- 6.** Replace the radiator cap and reconnect the EWP® to the wiring system supplied.

Continuous EWP® Operation

Continuous Operation may be required for some road or race engine applications, in some very hot climatic conditions, and engines fitted with liquid petroleum/butane gas (LPG) conversions. This will provide maximum flow from your EWP® Alloy Electric Water Pump under all operating conditions without a Digital Controller or a Thematic® Switch fitted. Should you choose this method you should retain the engine thermostat and drill one or two holes (suggest 5mm) in the plate to ensure a small volume of coolant flows through the cooling system during operation. Depending on the operating temperature required in some engines, the centre of the thermostat plate may need to be removed.

WIRING DIAGRAM: EWP® CONTINUOUS RUNNING:

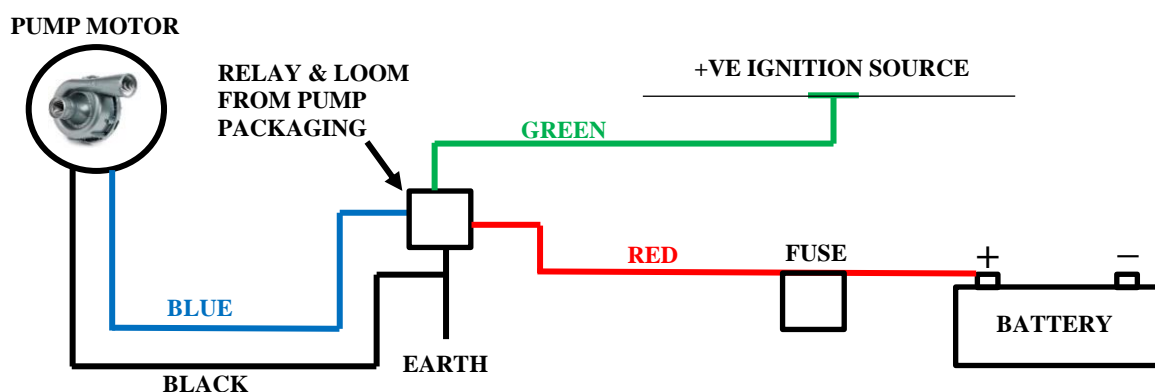


Figure 6: EWP Continuous Running Wiring Diagram.

EWP® INSTALLATION RECOMMENDATIONS

To ensure maximum life and optimum performance from your new EWP®, Davies, Craig recommends:

- **Storage** - The EWP® is operated for approximately 5 minutes constant running every month. This will minimise the build-up of any sediment in the EWP® and also lubricate all parts within the pump.
- **Heater** - For vehicles which have the heater inlet (return) and outlet ports in the mechanical pump housing (referred to in "Cautions"), we suggest the fitment of the Electric Booster Pump, EBP®. This unit boosts coolant flow through the heater circuit and/or cylinder heads.
- **LPG (Liquid Petroleum Gas or Butane)** If the EWP® is used in conjunction with the EWP® & Fan Digital Controller, we recommend the installation of an Electric Booster Pump EBP® to overcome the converter body freezing at start-up. As a preventative measure, we strongly recommended you flush out your engine's cooling system every 6 months or 10,000kms to help remove any built up of sediment.

CAUTIONS

- **Do not operate your EWP[®] dry as seal damage may occur and your warranty may be jeopardised.**
- Use of the EWP[®] after removing the pump impeller or deleting the mechanical pump pulley from the belt system will increase maximum engine speed. Running an engine at higher than normal speeds may affect other engine components.
- Engine temperature must be monitored closely at all times more especially after installation and until your EWP[®] operational procedures have been confirmed.
- The EWP[®] can handle most rust particles, shale, and sludge found in cooling systems but large rust particles should be flushed from the radiator before the EWP[®] is installed.
- Some engines may require special bleeding procedures to remove all air from their cooling system. The EWP[®] must be completely full of coolant at all times to achieve the life expectations of your EWP[®] and to ensure your warranty is not jeopardised.
- Do not use the vehicle's engine management system or wiring connected to the vehicle's engine management system (ECU) as an ignition source as it may cause failure of the management system and/or the electrical system. The ignition source for your EWP[®] and EWP[®]/Fan Digital Controller Combo Kit must be a steady positive supply of 12-14V or 24-27V DC.
- Vehicles with both heater circuit inlets (return) and outlet ports in the mechanical pump housing will suffer reduced heater performance unless the heater returns position is relocated.
- The engine cooling system must use coolant as specified by the vehicle's manufacturer.
- The EWP[®] is a 'circulation' pump ideal for most 'closed circuit' pressurised automotive cooling systems.
- The EWP[®] is not a 'self-priming' water pump and therefore will not produce its full flow without a positive 'head' in an 'open' system.
- The EWP[®] impeller tip clearance has been designed to achieve maximum efficiency and is therefore very close to the housing. When new and bedding in, the impeller may touch the internal wall of the EWP[®] housing causing a slight noise. This sound will cease within a very short time after the impeller has bed-in.
- Waterless coolants increase the load on a EWP and may reduce pump life.

These installation instructions will suit most applications but there are circumstances surrounding some engine designs, environments, and the nature of system involved, which may require other installation arrangements not outlined here. Frequently Asked Questions are listed on our website www.daviescraig.com.au Davies Craig Pty Ltd appreciates customer feedback. Emails can be directed to info@daviescraig.com.au or Telephone +61 (0) 3 9369 1234.

WARRANTY

We warrant that for a period of two years or 2000 hours continuous running (whichever is the lesser) from the date of purchase, we shall carry out, free of cost, any repairs that are reasonably necessary to correct any fault in the operation of your Davies, Craig product provided that such a fault is directly attributable to a defect in the workmanship or materials used in the manufacture of the part(s) and is not due to installation other than described in these instructions. Labour and consequential costs are excluded.

DAVIES, CRAIG PTY. LTD.

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