DAVIES, CRAIG
World's best auto cooling

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Certified System
Quality
ISO 9001

BRUSHLESS EWP®160 & EWP®180 Combo Installation Instructions

PLEASE READ BEFORE INSTALLATION

Read these instructions completely before starting. Ensure you understand the installation before proceeding.

Important: Digital Installation instructions located here: www.daviescraig.com.au/instructions

Kit Components:

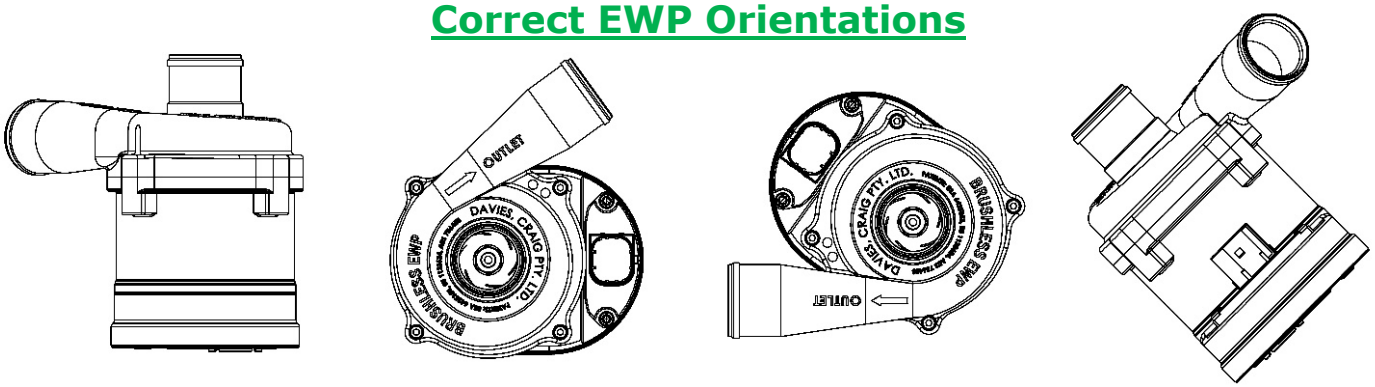
- 1 x Brushless EWP® assembly
- 1 x Brushless EWP® Wiring Harness
- 1 x T bolt Clamps
- 2 x Rubber Isolators
- 1 x Brushless EWP mounting bracket
- 1 x Brushless Thermatic Fan & EWP Variable Speed Controller
- 1 x Inline Adapter with Bung
- 1 x ¼" NPT Thermal Sensor
- 2 x Red 6mm Ring Terminal
- 4 x Red 3.5mm Fork Terminal
- 4 x Red Connectors
- 1 x Self-Tapping Screws
- 4 x Hose Clamps

Brushless EWP® Orientation

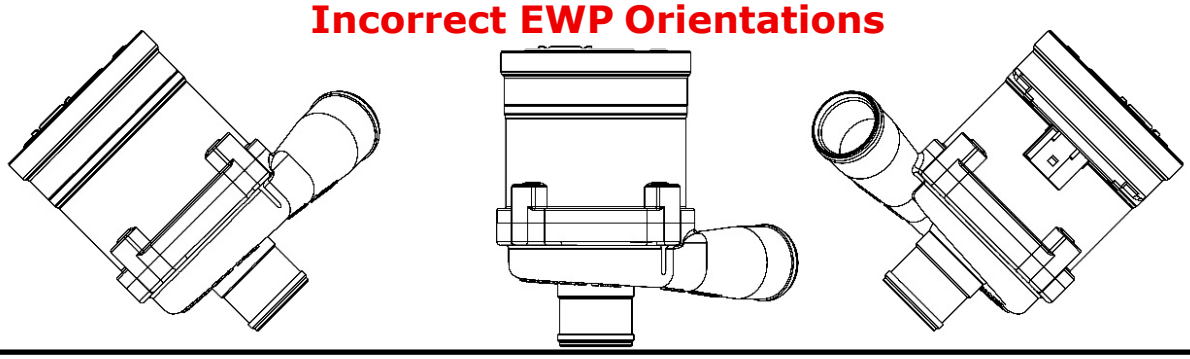
NOTE: The EWP® has built-in dry-run protection. When activated, the pump will run slowly until the pump is completely free of air.

- When installing the EWP® ensure the inlet is positioned horizontally, vertically upward, or on an upward angle.
  - **NOTE:** When the EWP® is pointed downward, this can lead to airlocks within the pump.
  - For the best results, position the outlet at the highest point to aid bleeding of the pump.

Correct EWP Orientations



Incorrect EWP Orientations



Intercooler Pump Installation

Note: The EWP® is not a self-priming water pump.

- Select a suitable installation location for the EWP®.
  - For best results, the EWP® should be located low in the system and close to the outlet of the intercooler heat exchanger, or tank for rear mount systems.
  - The outlet of the EWP® should be no higher than the inlet on the intercooler.
  - To avoid air locks, avoid creating high points in the hose (i.e. having the hose go up and then back down). This will aid with bleeding the pump.
- Install the EWP in the selected location, fill and bleed the system. Run the system and check for leaks.

General Cooling Brushless EWP® Installation

Note: The EWP® is not a self-priming water pump.

- Identify the coolant circulation direction of the system.
  - For engine/battery/motor cooling systems, the EWP® should be installed such that **coolant circulation direction remains unchanged.**
- Select a suitable installation location for the EWP®.
  - For best results, the EWP® should be located low in the system and close to the outlet of the radiator. (i.e. In the lower radiator hose).
  - The outlet of the EWP® should be no higher than the inlet on the engine/battery/motor.
  - To avoid air locks, avoid creating high points in the radiator hose (i.e. having the hose go up and then back down). This will aid with bleeding the pump.
  - To ensure proper heater function, the heater return must be re-routed to the EWP® **INLET**.
  - Systems with an expansion/header tank require the return line routed to the EWP® **INLET**.
  - The thermostat bypass should be blocked or re-routed to the EWP® **INLET**.
  - If applicable, when using a thermostat, you must drill two approx. 3 mm (1/8") holes in the thermostat plate to allow some constant coolant circulation.
- Install the EWP in the selected location, fill and bleed the system. Run the system and check for leaks.

Auxiliary EWP® For Water Cooled Engines

- Leave the mechanical water pump in place and install the EWP® into the bottom hose.

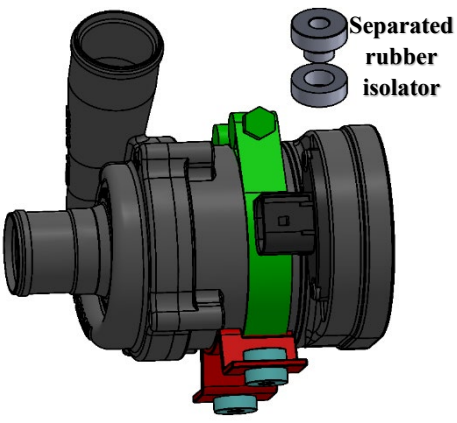
Primary EWP® For Water Cooled Engines

- Remove the mechanical water pump and install suitable Adapter or disengaged water pump.
  - To disengage the water pump, remove the impeller from the shaft and retain the housing. The water pump pulley can be kept as an idler to avoid re-routing the belt.
  - If required, you can also cut down the mechanical water pump housing to increase available clearance for electric fans.

Installing The Mounting Bracket

NOTE: The EWP® must be soft mounted to protect against vibration.

- Before installing the EWP® into the mounting bracket, decide on the final mounting location to ensure there is sufficient space for the assembly in the engine bay.
- Separate the rubber isolators and install into the holes of the steel mounting bracket.
  - The ring sections of the isolator needs to be located on the underside of the bracket.
- Secure the mounting bracket in the desired location, ensuring both rubber isolators are in place.
  - The rubber isolators are designed for use with M6 or 1/4" bolts.
- Remove the nut from the T-bolt clamp and place it over the body of the pump.
  - Ensure the nut and bolt can be accessed once the pump is installed.
- Screw the nut back onto the T-bolt clamp, but do not fully tighten.
- Install the clamp band into the slot in the mounting bracket. Orient the pump to the desired position and fully tighten the nut.



Thermal Sensor Installation Options

A Davies, Craig Thermal Sensor MUST be used. The use of any other sensor will result in errors and incorrect operation.

Option 1: Inline Adapter Installation

- Install the Thermal Sensor into the Inline Adapter, be sure not to over tighten or damage the sensor.
  - You may require some thread tape or sealant to achieve a watertight seal (Not Supplied).
- Remove top radiator hose and confirm the inside diameter (ID) of your hose prior to cutting.
  - Rubber sleeves may be required to accommodate larger ID hose sizes.
    - **Part #18510** – 3mm {1/8"} Rubber Sleeve increases adapter OD by 6mm (Not Supplied).
    - **Part #18511** – 6mm {1/4"} Rubber Sleeve increases adapter OD by 12mm (Not Supplied).
- If the parts supplied are suitable, cut approximately 20mm out of the top radiator hose and install the Inline Adapter Assembly and secure with the hose clamps.

Option 2: Threaded Port Installation

If you would prefer the Thermal Sensor may be installed into an existing port, such as the thermostat housing, Engine block, intake manifold, Radiator or Aftermarket hose adapters.

NOTE: The Thermal sensor should be installed in the **HOT** side of the cooling system

- Install the Thermal Sensor into the port, making sure not to over tighten or damage the Thermal Sensor.
  - Thread adapter fittings (not supplied) may be required when using existing ports.
  - You need to be mindful that the location of the Thermal Sensor can affect the temperature reading and adjustments may be needed when setting the target temperature.
  - When a port is not available, it is possible to drill and tap a hole for locating the Thermal Sensor.
  - You may require some thread tape or sealant to achieve a watertight seal.

Davies, Craig has a range of alternative Inline adapters and thermal sensors available to assist with installation of the thermal sensor into factory and aftermarket sensor ports.

Optional Thermal Sensors Part No.

- **18415** – ¼" NPT Thermal Sensor (supplied)
- **18418** – ⅛" NPT Thermal Sensor
- **18419** – M12 x 1.5 Thermal Sensor
- **18420** - M14 x 1.5 Thermal Sensor
- **18460** – Thermal sensor probe

Optional Inline Adapters Part No.

- **0416** – 38mm (1-1/2 in) Inline adapter
- **0419** – 35mm (1-3/8 in) Inline adapter

Brushless Thermatic® Fan Installation and Wiring

Brushless Thermatic® Fan wiring and installation hardware not included.

The Variable speed Fan Controller is ONLY able to control Brushless DC fans.
The Controller can control multiple Brushless fans on the fan 2 channel.

Thermatic® Fan Installation

- Install your fan/s as per the instructions included with your fan/s.
- To wire your fan/s to the controller follow wiring instructions provided below.
  - For Davies Craig Fans, ensure fan is rotating in direction indicated by the arrows on the fan hub.

Controller Mounting

Mount the Controller in the engine bay, in a convenient location using the self-tapping screws provided.

- **Temperature Sensor wire MUST NOT be cut in ANY circumstances.**
- Ensure the mounting location allows easy access to the set button.
- Keep unit away from high heat sources, such as exhaust manifolds etc.

Wiring Connections

- Connect the **RED** **"BATTERY +VE"** wire to battery positive.
  - The **RED** Battery wire **does not** need require a fuse as each fan is individually fused.
- Connect the **BLACK** **"EARTH"** wire to the chassis or negative Earth.
  - **For positive earth systems, wire 'Earth' to battery negative not the chassis**
- Connect the **YELLOW** **"IGNITION"** wire to a Positive ignition or accessories source.
  - DO NOT wire to the ECU or the ignition coils as this can cause operational issues
- Connect the **BLUE** **"FAN 1 POS"** wire to the Speed wire for the EWP (**GREEN**).
- Connect the **BROWN** **"Enable 1"** wire to the Enable wire for EWP (**BROWN**).
- Connect the **ORANGE** **"FAN 2 POS"** wire to the Speed wire for Fan 2(**GREEN** **OR** **WHITE**).
- Connect the **WHITE** **"Enable 2"** wire to the Enable wire for Fan 2(**THIN BLACK**).

OPTIONAL: Manual Overrides

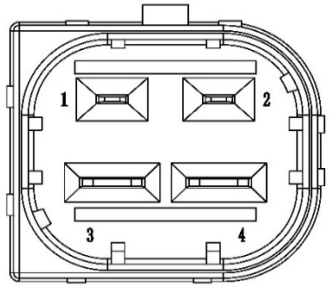
The controller has 4 optional override terminals to manually force the fans to turn on and off. The polarity (negative or positive) for the manual on and off override connection can be selected using the slide switch. **NOTE: the override signals for Fan 1 and Fan 2 will use the selected polarity.**

The **Manual ON** Override is design to activate the fan for vehicles with A/C or manually using a switch when additional cooling is needed

The **Manual OFF** Override is designed to allow the fans to be shut down for situation where you do not want the fans to activate, like when performing water crossings or working on the vehicle.

- For Air Conditioner overrides, using the provided fork terminals, wire the '**Fan 2 ON**' terminal to a positive/negative source controlled by the A/C system.
  - For A/C system with a Trinary switch selecting a Negative override signal allows for direct connection to most trinary switches.
- For manual on/off overrides, using the provided fork terminals, wire the Fan1/Fan2 overrides to switches located in the vehicle cabin.

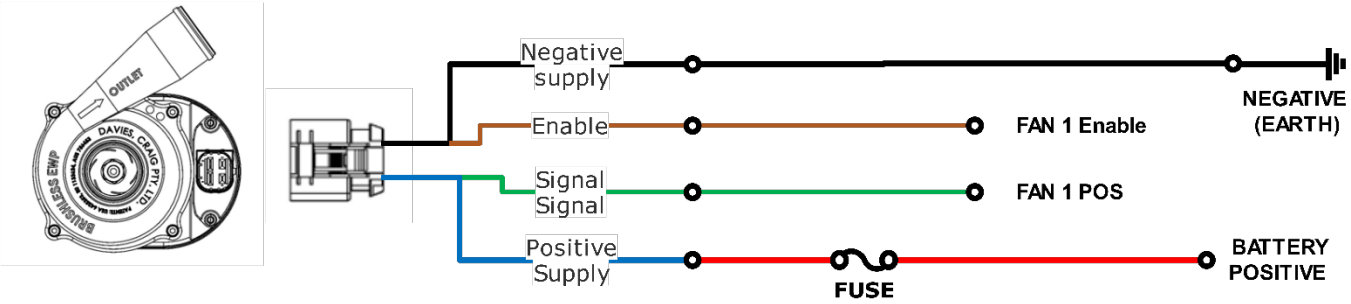
Brushless EWP® Wiring



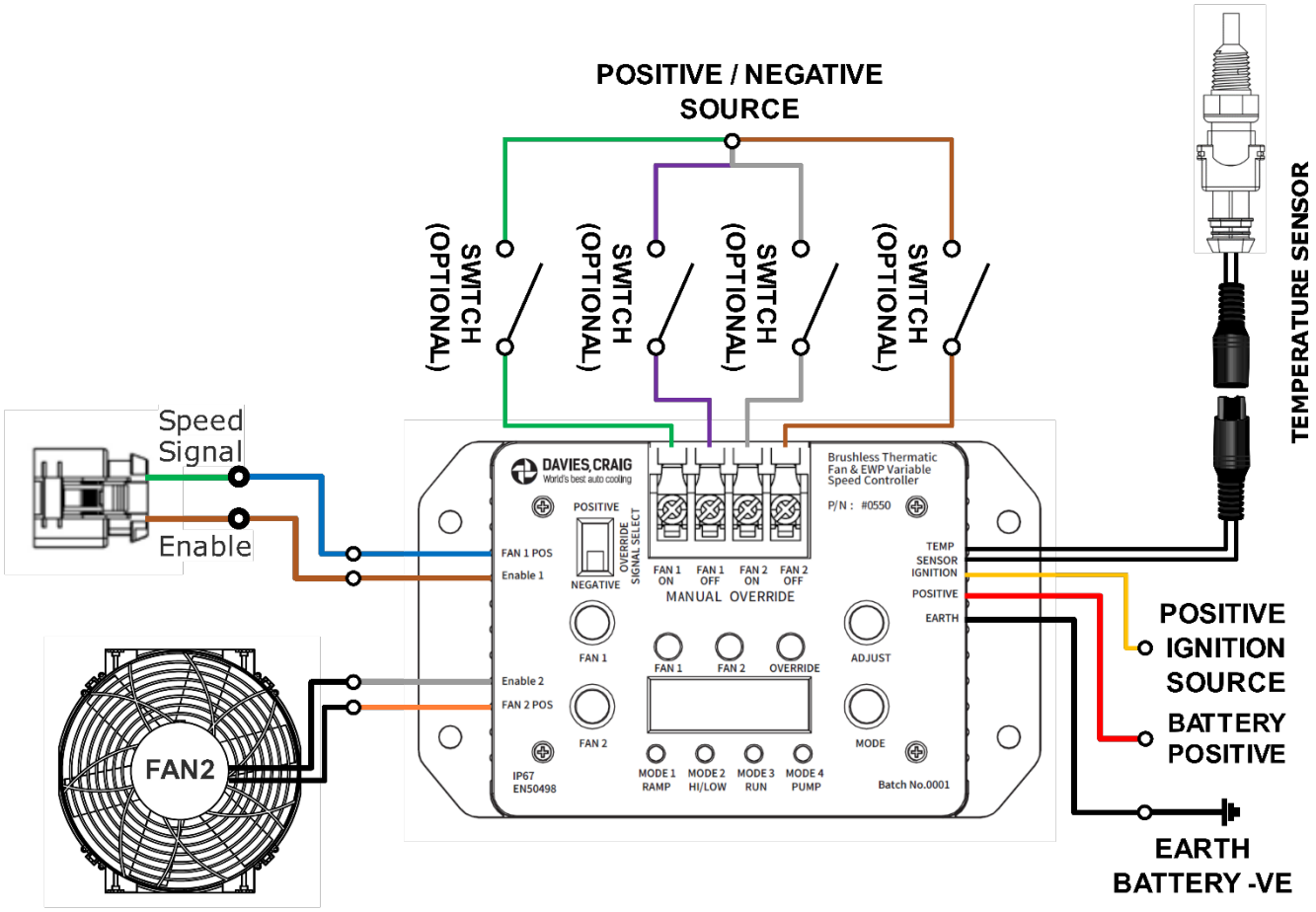
Pin Number	Wire Colour	Description
1	GREEN	Speed Signal (+VE)
2	BROWN	Enable (-VE)
3	HEAVY BLUE	Positive Supply
4	HEAVY BLACK	Negative Supply

***NOTE: Wire colours are based on Davies, Craig's Brushless EWP wiring harness.**

Full Speed Operation Wiring Diagram



Controller Wiring



Programming The Controller

Change Temperature units

Change the Temperature units between °C and °F

- Press and Hold Fan1 or Fan 2 button for 3 seconds

Base Temperature Setting

The temperature setting for when the fan reaches full (100%) speed.

Setting Fan 1 Base Temperature

- Press **'Fan1 button'** once to show current setting for Fan 1
- Press the **'Fan 1 button'** again to increment the Fan 1 set temperature by 1 degree.
  - Press and hold down the **Fan 1 button'** to scroll through the temperature range. 5°C (41°F) to 110°C (230°F)
  - We recommend setting Fan 1 to 5°C (9°F) above the factory thermostat rating.
- Fan 1 can be set to 'OFF', this means the unit will ignore this output and any errors.

Setting Fan 2 Base Temperature

- Press **'Fan2 button'** once to show current setting for Fan 2
- Press the **'Fan 2 button'** again to increment the Fan 2 set temperature by 1 degree.
  - Press and hold down the **Fan 2 button'** to scroll through the temperature range. 5°C (41°F) to 110°C (230°F)
  - We recommend setting Fan 1 to 5°C (9°F) above the Fan 1 setting.
- Fan 2 can be set to 'OFF', this means the unit will ignore this output and any errors.

Setting Operation Mode

The Fan 1 and Fan 2 can independently operate in 1 of 4 different control modes

Setting Fan 1 Operation Mode

- Hold **'Fan1 button'** and press the **'Mode Button'** to cycle through the Fan 1 operating modes
  - **For controlling the brushless EWP, we recommend using Mode 4**

Setting Fan 2 Operation Mode

- Hold **'Fan2 button'** and press the **'Mode Button'** to cycle between the 4 operating modes

Advanced Controller Settings

The Controller has Several Advanced settings that provide further customisation to the fan control for better optimisation cooling performance.

Setting the Temperature difference

The temperature Difference from the base setting for when the fan starts to ramp to full speed

Setting Fan 1 Temperature Difference

- Hold **'Fan1 button'** and press the **'Adjust Button'** once to show current setting for Fan 1
- Press the **'Adjust button'** again to increment the Fan 1 temperature difference by 1 degree.

Setting Fan 2 Temperature Difference

- Hold **'Fan2 button'** and press the **'Adjust Button'** once to show current setting for Fan 2.
- Press the **'Adjust button'** again to increment the Fan 2 temperature difference by 1 degree.

Setting Start speed

The speed at which the fan will start running.

Setting Fan 1 Start Speed

- Hold Both the **'Adjust button'** and **'Mode Button' then** Press **'Fan1 button'** to change the start speed for Fan 1

Setting Fan 2 Start Speed

- Hold Both the **'Adjust button'** and **'Mode Button' then** Press **'Fan2 button'** to change the start speed for Fan 2

Setting the Shutdown Time

The amount of time the unit will stay powered after the ignition is turned off.

- Hold **'Adjust button'** and press the **'Fan1 Button'** to increase the Shutdown time by 5 second.
- Hold **'Adjust button'** and press the **'Fan2 Button'** to decrease the Shutdown time by 5 second.

Setting the Shutdown temperature

The Temperature difference between the lowest base temperature setting that the temperature needs to be reduced to before the controller turns off.

- Hold **'Adjust button'** and press the **'Mode Button'** to increment the shutdown temperature by 1 degree.
- The Shutdown temperature can be set to 'OFF', this means the unit will not run after shutdown.

Adjust the Temperature Sensor Offset

A temperature offset to allow calibration of the senor to match the OEM/other sensors in the system.

- Hold **'Mode button'** and press the **'Adjust Button'** to increment the temperature sensor offset 1 degree

Adjust the PWM Frequency

The Frequency for which the PWM signal is driven. Needs to be set to suit the Pump/fan being controlled.

- Hold **'Mode button'** and press the **'Fan1 Button'** to increase the Frequency (+ 1Hz).
  - Hold Both **'Mode button'** and **'Fan1 Button'** to Fast increase the Frequency (+10Hz).
- Hold **'Mode button'** and press the **'Fan2 Button'** to decrease the Frequency (-1Hz).
  - Hold Both **'Mode button'** and **'Fan2 Button'** to Fast decrease the Frequency (-10Hz).

Perform Factory Reset

Resets all settings for FAN1 and FAN2 back to default value.

- Press and Hold All 4 buttons for 5 seconds

Led Display Diagnostic Chart

Condition		FAN 1 LED	FAN 2 LED	Override LED	Temperature Display
MODE 1 Ramp	Full Speed	GREEN	GREEN	Off	Temperature
	Ramp	GREEN FLASH	GREEN FLASH	Off	Temperature
	Fans Off	OFF	OFF	Off	Temperature
MODE 2 High / low	High Speed	GREEN	GREEN	Off	Temperature
	Low Speed	BLUE	BLUE	Off	Temperature
	Fans Off	OFF	OFF	Off	Temperature
MODE 3 RUN	Full Speed	GREEN	GREEN	Off	Temperature
	Ramp	GREEN FLASH	GREEN FLASH	Off	Temperature
	Low Speed	BLUE	BLUE	Off	Temperature
MODE 4 PUMP	Full Speed	GREEN	GREEN	Off	Temperature
	Ramp	GREEN FLASH	GREEN FLASH	Off	Temperature
	10 Sec On 10 Sec Off	BLUE & GREEN FLASH	BLUE & GREEN FLASH	Off	Temperature
	11 Sec On 30 Sec Off	BLUE	BLUE	Off	Temperature
Errors and warnings	Low Temperature (First 30s)	RED FLASH	RED FLASH	RED FLASH	Temperature
	Over Set Temperature Highest Setting + 10C	RED & GREEN FLASH	RED & GREEN FLASH	N/A	Temperature
	Over Set Temperature Highest Setting + 10C	RED & GREEN & BLUE FLASH	RED & GREEN & BLUE FLASH	N/A	Temperature
	Sensor Short Circuit	RED FLASH	Off	RED	Err1
	Sensor Open Circuit	Off	RED FLASH	RED	Err2

Factory Default Setting

Condition	FAN 1	FAN 2	Setting Range
Base Set Temperature	85°C (185°F)	90°C (194°F)	5°C to 110°C (41°F to 230°F) In single degree increments
Operation Mode	MODE 1	MODE 1	Mode 1 – Mode 4
Temperature difference	5C (9°F)	5C (9°F)	1°C to 40°C (1.8°F to 72°F) In single degree increments
Start Speed	50%	50%	0% to 100% In 5% increments
Shutdown Time	3 minutes		0 to 5 minutes In 5 second, increments
Shutdown Temperature	10C (18°F)		0 to 40°C (0 to 72°F) In single degree increments
Temperature Offset	0C (0F)		+/- 5°C (+/- 9°F)
PWM Frequency	300Hz		10Hz to 1000Hz

Installation Recommendations

- It is highly recommended the EWP® is operated for at least ***5 minutes of continuous running***. This will minimise the build-up of any sediment in the EWP® and lubricate internal pump components.
- In cold climates or when running the EWP® continuously you may require the use of a thermostat to help control coolant temperature. In these instances, you will need to drill 2 x 3 mm (1/8") holes in the thermostat.
- The installation of an EWP® may affect coolant flow through auxiliary coolant loops and the heater core. This change in flow may affect the performance of these loops unless the return line is relocated to the EWP® Inlet.
- Block the thermostat bypass passage to prevent flow from the EWP® passing directly back to the radiator without circulating through the engine.

WARNINGS

- **DO NOT ATTEMPT to tamper with the EWP® including loosening or removing any bolts or screws as this will void the warranty. If you suspect a fault or defective product please contact Davies, Craig.**
- **Do not operate your EWP® dry, as damage may occur, and your warranty will be void. Ensure the EWP is always completely full of coolant to achieve the expected life and performance.**
- **Do not use and leak or crack repair additives, as pump damage may occur and your warranty will be void.**
- **Avoid mounting your EWP® close to high heat sources, like exhaust manifolds.**
- **The EWP® is not rated for submersible use. (i.e. submerged in an intercooler tank). Temporarily submerging to pump in water (i.e. water crossing) is acceptable.**

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

WARRANTY

Davies, Craig Pty Ltd warrants for a period of three years or 2000 hours continuous running (whichever is the lesser) from the date of purchase. Davies, Craig 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). This warranty is void if the product is misused, altered, tampered with, or is installed or used in a manner that is inconsistent with Davies, Craig's written recommendations and/or installation instructions. Labour and consequential costs are excluded. **DAVIES, CRAIG PTY. LTD.**

To make a warranty claim, go to: daviescraig.com.au/warranty