

## **EBP<sup>®</sup> 23 INSTALLATION INSTRUCTIONS**

### **DAVIES, CRAIG EBP<sup>®</sup>23 (ELECTRIC BOOSTER PUMP) AND OPTIONS FOR PUMP CONTROL**

Congratulations on your purchase of the Davies, Craig EBP<sup>®</sup>23. The EBP<sup>®</sup>23 is designed to complement your existing Davies, Craig EWP<sup>®</sup> (Electric Water Pump), or belt-driven mechanical water pump, or improve your heater and/or cooling system or assist engine block cooling circulation. The EBP<sup>®</sup> can continually circulate coolant around the engine head, block and by-pass. It has a high flow capacity and has the advantage of running at a speed independent of the engine speed. The EBP<sup>®</sup> can also be set to continue running with a timer or thermal switch (not supplied) after engine shut down to prevent damaging heat soak.

***PLEASE READ THESE INSTRUCTIONS IN THEIR ENTIRETY BEFORE YOU START WORK***

### **EBP<sup>®</sup> 23 KIT CONTENTS:**

Item No.	Description	Qty
1	EBP <sup>®</sup> 23	1
2.	EBP <sup>®</sup> Adaptors	2
3.	Adaptor Hose	2
4.	Hose Clamps	4
5.	Mounting Bracket	1
Not shown	Installation Instructions	1



### **EBP<sup>®</sup> APPLICATION OPTIONS**

The compact EBP<sup>®</sup>23 has been designed for a number of applications;

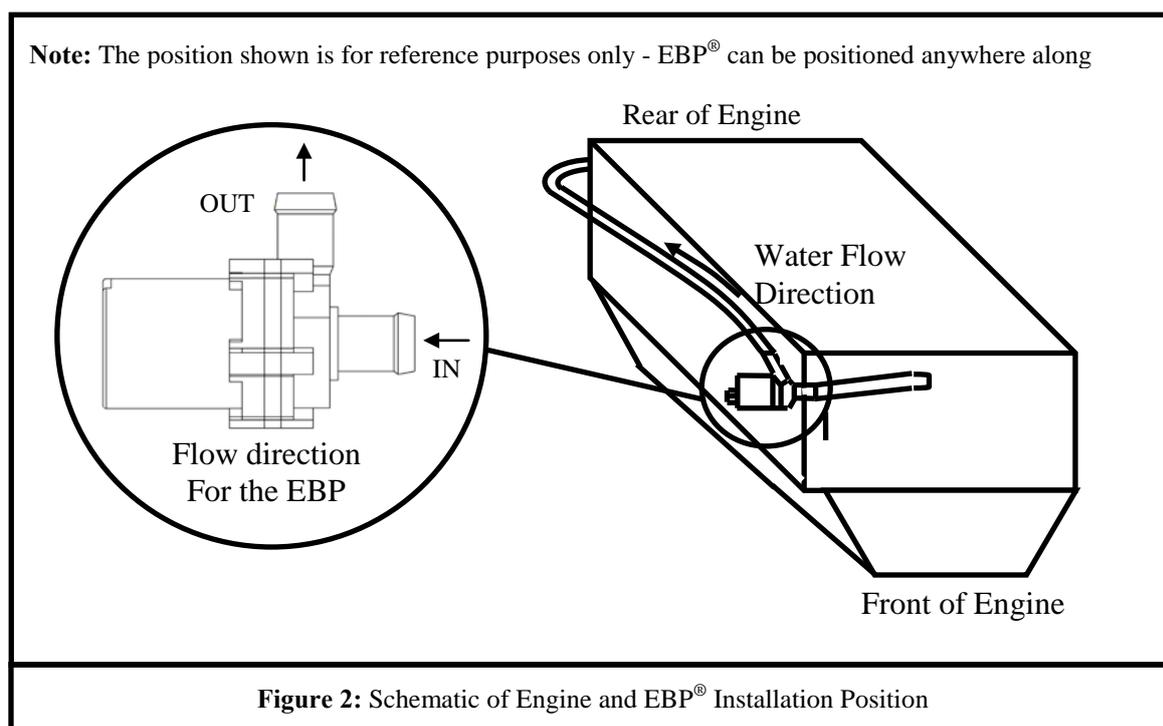
1. Circulation Pump for LPG Vehicles – The EBP<sup>®</sup> improves water circulation through the engine block to prevent LPG injector from icing up. Other advantages include a more even engine temperature and better engine cooling.
2. Heater Booster Pump – The EBP<sup>®</sup> increases heater performance during normal vehicle operation and enables continued heater usage when engine is off (but IGNITION is ON).

3. Water Pump for Liquid Cooled Motorcycle Engines - The EBP<sup>®</sup> provides liquid circulation independent of the engine speed to provide cooling at all levels. It may be used with the EWP<sup>®</sup> Digital Controller to replace the existing water pump or used with an override switch to compliment the existing system.
4. Multi-Purpose Pump – The EBP<sup>®</sup> may be used in a number of different applications where flow is required, such as irrigation, camping, solar pumps, go-karts or marine operations.

## **INSTALLING THE EBP<sup>®</sup>**

The installation procedure is similar for each vehicle application: the pump is to be installed within the existing hoses. However each application has a different method of use and/or control. These specific differences are described in each application.

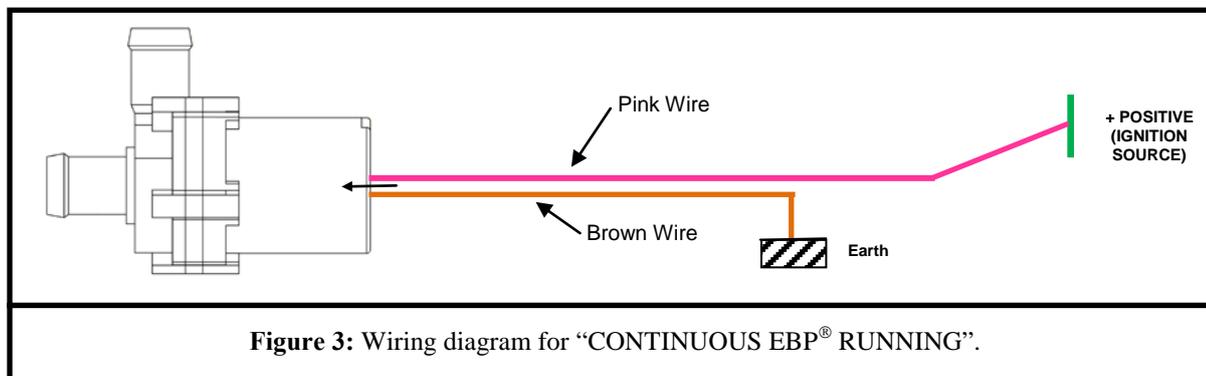
1. The EBP<sup>®</sup> is to be installed in the engine heater hose connecting the thermostat to the back of the engine block. Check the area for available space and shape of the heater hose. The section of the heater hose connected to the front of the block must be connected to the inlet of the EBP<sup>®</sup> and the section of heater hose connected to the back of the engine block must be connected to the outlet of the EBP<sup>®</sup>. "Inlet" and "outlet" of pump may be determined by arrows on the pump or refer to Figure 2 below. The pump inlet and outlet are connected using the hose-clamps provided. Tighten the hose-clamps after a few hours running at temperature and again after 20hrs running.
2. If the existing heater hose diameter does not fit the inlet and outlet of the EBP<sup>®</sup>, the plastic adaptors (Item No: 2) and adaptor hose (Item No: 3), may be used to configure a diameter that best suits your hose. The adaptor is connected to the EBP<sup>®</sup> by clamping the adaptor hose to the appropriate inlet or outlet of the pump and the other end to the largest diameter step on the adaptor. Each adaptor has 2 extra diameters to suit hose diameters from 12mm to 19mm. It is suggested that if the second size step is used on the adaptor, the first step should be sawn off to maximise coolant flow. This may be done with a hacksaw or similar device.
3. Once the EBP<sup>®</sup> is installed within the hose, the wiring harness (Item 5) is to be attached to the pump. The wiring harness can be connected to the pump in only one configuration - the release tab on the wiring harness connector must align with the tab-lock of the connector on pump housing.
4. The EBP<sup>®</sup> is then to be wired up as described in each appropriate application.



## APPLICATION 1: CIRCULATION PUMP FOR LPG VEHICLES

The EBP<sup>®</sup> improves water circulation through the engine block to improve LPG converter operation. Therefore, it is necessary for the EBP<sup>®</sup> to be functional all times the engine is running; hence the pump is wired directly to ignition. Other advantages include a more even engine temperature and better engine cooling when set to continue running after engine shut down.

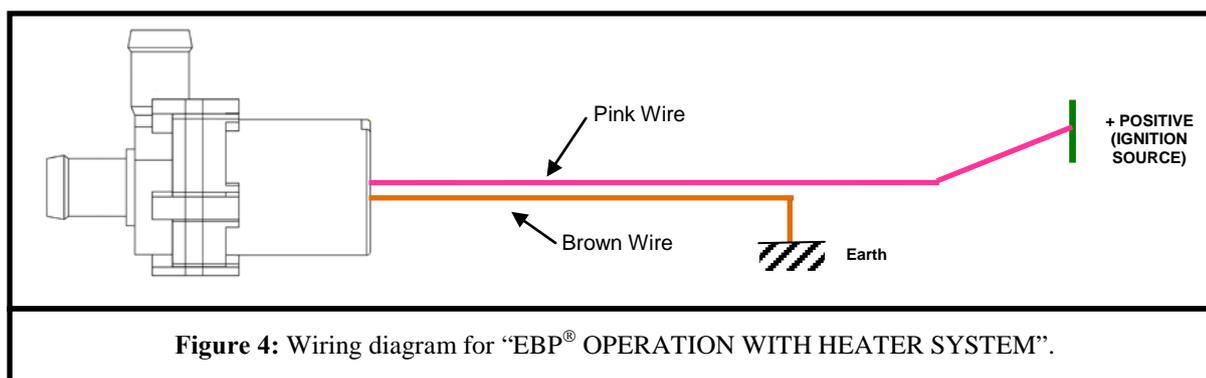
The EBP<sup>®</sup> is wired as shown below. Note: The pump is powered by a direct **ignition** source allowing operation at all times the ignition is on.



## APPLICATION 2: HEATER BOOSTER PUMP

The EBP<sup>®</sup> used in this application increases heater performance during normal vehicle operation and provides continued heater usage when engine is off (but IGNITION is ON). The pump is powered by the heater fan motor, meaning that the EBP<sup>®</sup> is activated only when the heater is in use. The EBP<sup>®</sup> will not restrict flow in the circuit when it is not running.

The EBP<sup>®</sup> is wired as shown below. Note: The pump is powered by a direct **heater** source allowing operation only when the heater is on. The heater fan is a recommended power source.



## **APPLICATION 3: MOTORCYCLE WATERPUMP**

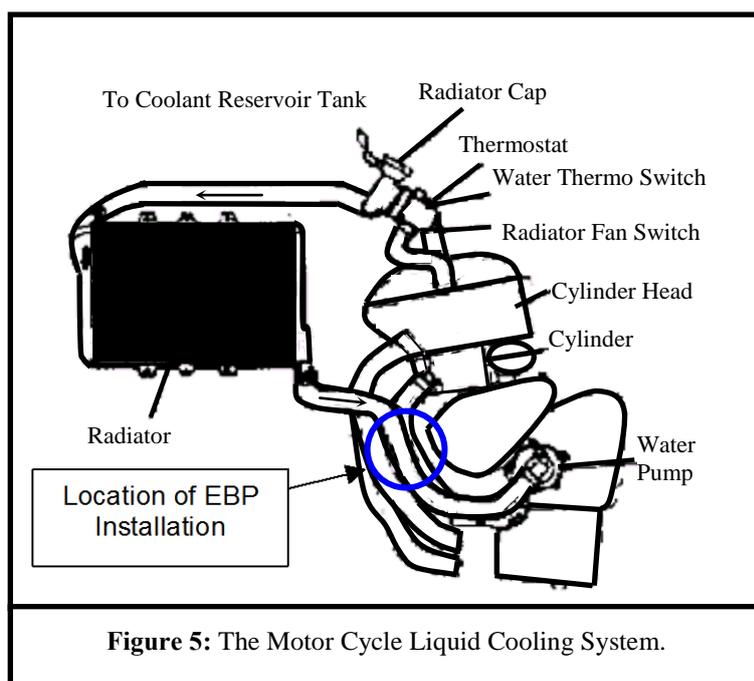
Two options are available for the EBP<sup>®</sup> in liquid cooled motorcycle engines:

1. With override switch to operate EBP<sup>®</sup> when extra cooling is required.
2. With a thermal switch to operate automatically at a set engine temperature.

### **MOTORCYCLE EBP<sup>®</sup> INSTALLATION**

The installation procedure is similar for each motorcycle option: the pump is to be installed within the existing cooling system hose. However each option has a different method of use and/or control, these specific differences are described in each option.

1. The EBP<sup>®</sup> is to be installed in the bottom cooling system hose connecting the radiator to the engine block. Check the area for available space and shape of the cooling hose. The section of the cooling hose connected to the radiator must be connected to the inlet of the EBP<sup>®</sup> and the section of cooling hose connected to the engine block must be connected to the outlet of the EBP<sup>®</sup>. "Inlet" and "outlet" of pump may be determined by arrows on the pump or refer to Figure 2 below. The pump inlets and outlets are connected using the hose-clamps provided. Tighten the hose-clamps after a few hours running at temperature and again after 20hrs running.
2. If the existing cooling hose diameter does not fit the inlet and outlet of the EBP<sup>®</sup>, the plastic adaptors (Item No: 2) and adaptor hose (Item No: 3), may be used to configure a diameter that best suits your hose. The adaptor is connected to the EBP<sup>®</sup> by clamping the adaptor hose to the appropriate inlet or outlet of the pump and the other end to the largest diameter step on the adaptor. Each adaptor has 2 extra diameters to suit hose diameters from 12mm to 19mm. It is suggested that if the second size step is used on the adaptor, the first step should be sawn off to maximise coolant flow. This may be done with a hacksaw or similar device.
3. Once the EBP<sup>®</sup> is installed within the hose, the wiring harness (Item 5) is to be attached to the pump. The wiring harness can be connected to the pump in only one configuration - the release tab on the wiring harness connector must align with the tab-lock of the connector on pump housing.
4. The EBP<sup>®</sup> is then to be wired up as described in each appropriate application.

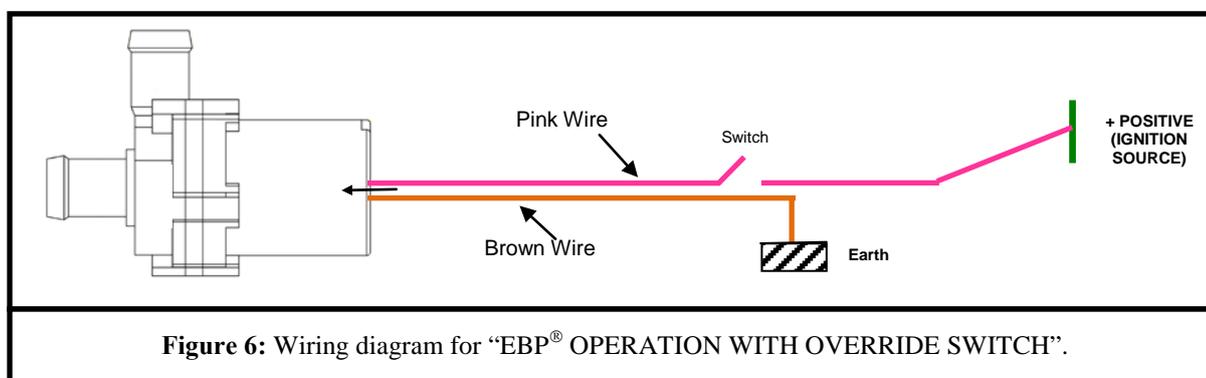


## **OPTION 1: EBP®23 WITH OVERRIDE SWITCH**

The EBP®23 may be used to compliment the existing cooling system and only be operational when additional cooling is necessary.

1. As described above, the EBP® is to be installed in the cooling system hose between the radiator and the existing water pump. The EBP® itself will not restrict flow in the circuit.
2. The EBP® may be wired with an override switch (not supplied in EBP® kit) as outlined in the wiring diagram below. With this option the switch would be located at an accessible position on the instrument panel.
3. Before the engine overheats close the switch to activate the pump. This will increase the flow within the cooling system and improve cooling.
4. If the ignition is left on or with the introduction of a timer switch or thermal switch (not supplied), the EBP® can be set to continue running after engine shut down to prevent damaging heat soak.

## **WIRING DIAGRAM: EBP®23 WITH OVERRIDE SWITCH**



## **OPTION 2: EBP® WITH THERMAL SWITCHES**

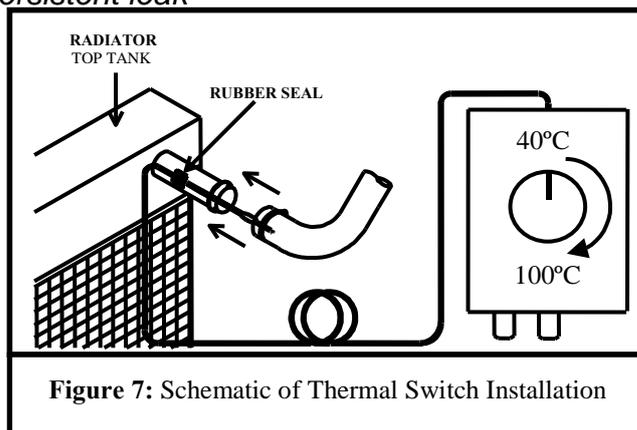
This option when combined with a Davies, Craig Thermal Switches (P/No: 0401 or 0444) will turn EBP®23 on at the temperature you wish to boost engine cooling. The pump will turn off when engine temperature has reduced by 4°C. Wire the EBP directly to the battery.

The EBP®23 is to be installed in the cooling system hose as described above between the radiator and the existing water pump. The EBP®23 itself will not restrict flow in the circuit.

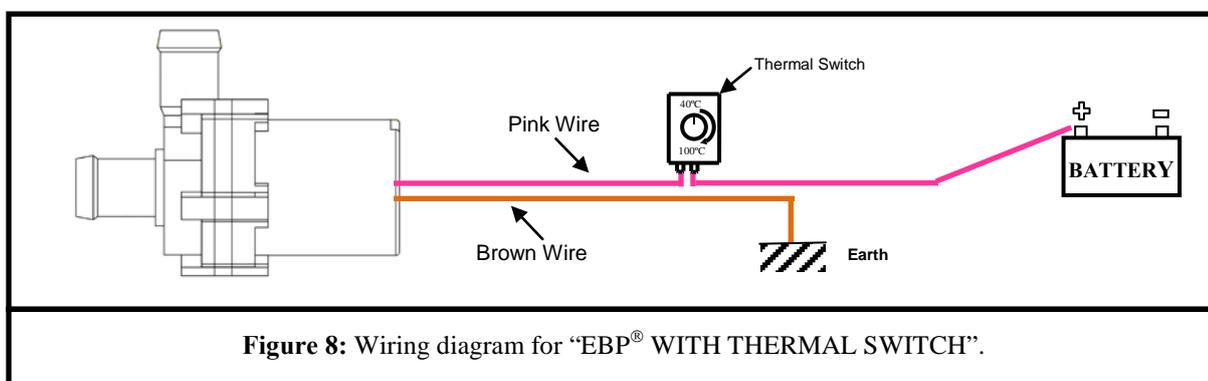
## **INSTALLING THERMAL SWITCH**

1. When the engine is cold remove the top radiator hose at the radiator end. (Refer to the Diagram next page.)  
Mount the Thermatic Switch (P/No: 0401) to the bracket with the two small screws provided. Mount the bracket onto a panel near the radiator so that the stainless steel capillary with temperature probe will easily reach into the top radiator hose. Ensure that adjustment shaft is accessible. Fix the bracket in place with the two large self-tapping screws provided.
2. Lay the rubber seal along the radiator ferrule and place a section of the stainless steel capillary of the Thermatic Switch down the groove in the rubber seal. Keep the capillary loosely coiled and avoid sharp bends. Do not pass the probe further down the hose than is necessary as the constant movement of the engine in relation to the radiator may cause fatigue of the capillary. The seal and tube may be held in place with insulation tape.

- Fit the hose and clamp so that the clamp is over the centre of the rubber seal and the clamp screw is in the opposite side of the tube to the capillary and seal. *A good silastic type sealant may be used if there is a persistent leak*



- The EBP<sup>®</sup>23 has a built-in wiring loom with a female plug. You may wish to purchase the equivalent male plug to suit or you can dispose of this plug and crimp spade terminals on each end. Connect spade terminals to each pin of Thermatic switch. Refer to the #0401 Installation Instructions to ensure the EBP<sup>®</sup>23 is installed correctly



### **OPERATION OF THE EBP<sup>®</sup>23**

Run the engine and monitor the engine temperature, pushing the button to adjust the Digital Thermatic Switch (#0444) to start the EBP<sup>®</sup>23 on at the desired temperature. With the Thermatic Switch connected directly to the battery, after a hot shut down, the pump will continue to run on to prevent heat soak. Generally, running the engine slightly colder will increase the power and running the engine slightly hotter will improve the fuel efficiency.

Check and retighten hose clamps after a few hours of operation at temperature and again, as a precaution after 20 hours operation. Check for leaks.

The EBP<sup>®</sup>23 can also be used in conjunction part #0401 and may replace your existing mechanical motorcycle water pump in certain situations if the existing motorcycle flow is 23L/min or less. Refer to the Thermatic Switch part #0401 instructions for detailed installation procedures.

**Warning:** Motorcycles may require special bleeding procedures (not described here) to remove air from the cooling system. The EBP<sup>®</sup>23 must be completely flooded with coolant at all times to achieve the life specification of the EBP<sup>®</sup>23 and to preserve warranty.

## **APPLICATION 4: MULTI-PURPOSE PUMP**

The unique and robust design of the EBP<sup>®</sup>23 allows the pump to be used in a number of different applications as to those described above. The EBP<sup>®</sup>23 is a centrifugal pump with an impeller driven by an electronically commutated motor. This totally removes the problem of brush wear encountered on conventional motors with their mechanical commutation systems. The design ensures a hermetic seal between the pump and the electronic motor without the need for a shaft seal. Through the elimination of the mechanical commutator the durability of the pump is only practically limited by the mechanical life of the rotor bearings. In addition the noise emissions are reduced by the small amount of moving parts. The pump has an axially orientated inlet and perpendicular outlet.

The EBP<sup>®</sup>23 in fact may be used in all situations that require a water flow-rate of up to 23L/min and where a positive-head is available. Such applications may include:

- ◆ Go-Kart Water Pump – The EBP<sup>®</sup>23 may replace an existing non-pumped thermosiphon circulation system or compliment the existing system. This is on the condition the system requires 15 L/min or less flow rate.
- ◆ Camping/Caravan/Recreation- the EBP<sup>®</sup>23 could be used in a variety of arrangements where pumping is necessary: outdoor showers, sinks, toilets, taps etc.
- ◆ Marine – The EBP<sup>®</sup>23 may be used to compliment the existing water pump on inboard motors similar to the automotive needs described earlier, increased cooling and the prevention of heat soak after engine shut down. Warning: The EBP<sup>®</sup>23 is only splash resistant, therefore to preserve warranty at no point should the EBP<sup>®</sup>23 be fully submerged.
- ◆ Solar Heating – The EBP<sup>®</sup>23 may be used to circulate water through 12V solar hot water systems.
- ◆ Irrigation – The EBP<sup>®</sup>23 may be used to pump water through irrigation systems, which require water flow of less than 23L/min.

Other situations not described above may be suitable for the EBP<sup>®</sup>23. The technical specifications for the EBP<sup>®</sup>23 as well as the performance curve of the EBP<sup>®</sup>23 have been detailed below to help with any decisions on other applications. Advice is available from Davies, Craig HQ and we welcome your feedback on your experiences.

### **Technical Specifications**

<b>Motor</b>	<b>12V Brushless</b>
<b>Operating Voltage</b>	<b>9V to 15V DC</b>
<b>Max Current Draw</b>	<b>1.3 Amps</b>
<b>Pump Design</b>	<b>Recirculating * Centrifugal</b>
<b>Drive</b>	<b>Magnetic – No seals</b>
<b>Operating Temperature</b>	<b>-40C to +120C (-10F to +248F)</b>
<b>Burst Pressure</b>	<b>250Kpa (36PSI)</b>
<b>Flow Rate</b>	<b>23 L/min (6 gal/min) at 0.2Bar</b>
<b>Weight</b>	<b>364g (0.8 lbs)</b>
<b>Max Head</b>	<b>2.2M</b>

**Note, a recirculating pump requires a positive head of coolant at all times do not run dry.**

## WARNINGS

Engine temperature must be monitored very closely at all times but especially immediately after installation.

The EBP<sup>®</sup>23 can manage some small rust particles and sludge found in some cooling systems. The vehicle's radiator should be flushed out completely before the EBP<sup>®</sup>23 is installed.

Some vehicles require special bleeding procedures to remove air from the cooling system not described here. The EBP<sup>®</sup> 23 is a recirculating pump and must be completely flooded with coolant at all times to achieve the life specification of the EBP<sup>®</sup> 23 and to preserve warranty.

Do not use the vehicle's engine management system or wiring connected to the vehicle's engine management system as an ignition source because it may cause failure of the management system and/or the electrical system. The ignition source must be a steady positive supply of up to 15VDC.

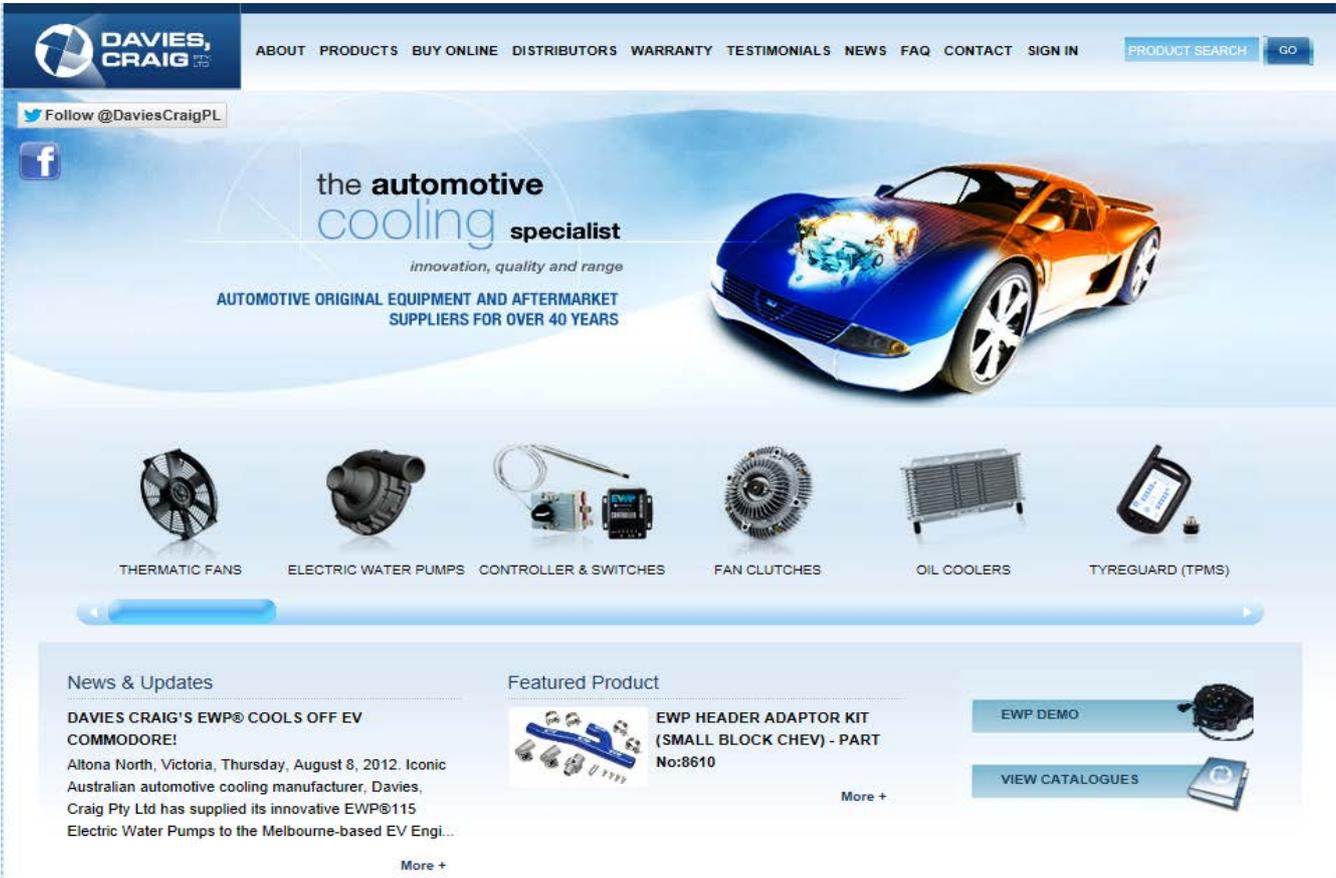
All wiring must be kept away from potential hot spots, such as exhaust manifolds, during installation to ensure proper EBP<sup>®</sup>23 operation and to prevent any subsequent damage caused by wiring failure.

## WARRANTY

Davies, Craig Pty Ltd hereby warrants these 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, EWP<sup>®</sup>/Fan Digital Controller and/or EWP<sup>®</sup> Header-Adaptor Kit free of cost provided that such fault is directly attributable to a defect in the workmanship or materials used in the manufacture of the Davies, Craig products supplied. Labour and consequential costs excluded.

**DAVIES, CRAIG PTY. LTD.**

Warranty registration at: [www.daviescraig.com.au](http://www.daviescraig.com.au)



The screenshot displays the Davies Craig website interface. At the top, there is a navigation menu with links for ABOUT, PRODUCTS, BUY ONLINE, DISTRIBUTORS, WARRANTY, TESTIMONIALS, NEWS, FAQ, CONTACT, and SIGN IN. A search bar is located on the right. Below the navigation, there are social media icons for Twitter and Facebook. The main banner features the text "the automotive cooling specialist" with the tagline "innovation, quality and range" and "AUTOMOTIVE ORIGINAL EQUIPMENT AND AFTERMARKET SUPPLIERS FOR OVER 40 YEARS". A central image shows a car with a glowing engine. Below the banner, there are six product categories: THERMATIC FANS, ELECTRIC WATER PUMPS, CONTROLLER & SWITCHES, FAN CLUTCHES, OIL COOLERS, and TYREGUARD (TPMS). The bottom section includes "News & Updates" with a headline "DAVIES CRAIG'S EWP® COOLS OFF EV COMMODORE!" and a "Featured Product" section for the "EWP HEADER ADAPTOR KIT (SMALL BLOCK CHEV) - PART No:8610". There are also buttons for "EWP DEMO" and "VIEW CATALOGUES".