EWP® DIGITAL CONTROLLER (P/NO: 8020) INSTALLATION INSTRUCTIONS

FOR INSTALLATION OF DAVIES, CRAIG EWP® DIGITAL CONTROLLER FOR USE WITH THE EWP® (ELECTRIC WATER PUMP) AND EBP (ELECTRIC BOOSTER PUMP).

Congratulations on your purchase of the Davies, Craig EWP® Digital Controller. The EWP® Digital Controller is designed to control the operation of the EWP® by varying the speed of the EWP® in response to the temperature of the engine. The EWP® Digital Controller requires the removal of the engine thermostat.

The controller has a push-button on the control panel face that will adjust the target temperature. Generally, higher engine temperature will give improved fuel efficiency and lower temperature more power --- it is recommended that engine operational temperatures be checked with manufacturer. In combination with a Davies, Craig Thermatic Fan® and adjustable Thermal Switch, the temperature of the whole cooling system can be customised to suit your requirements. The EWP® Digital Controller will run the EWP® after ignition shutdown to reduce heat soak.

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

KIT CONTENTS:

Refer Figure 1:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Part No.</th>
<th>Description</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>8120</td>
<td>EWP Digital Controller</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assembly</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>8410</td>
<td>Wiring Harness</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>8517</td>
<td>Seal – Sensor wire</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>8913</td>
<td>Compression Fitting</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>0613</td>
<td>Self Tapper Screw</td>
<td>4</td>
</tr>
<tr>
<td>6.</td>
<td>0574</td>
<td>Ring Terminal</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>8912</td>
<td>Copper Wire</td>
<td>1</td>
</tr>
<tr>
<td>Not</td>
<td></td>
<td>Installation Instructions</td>
<td>1</td>
</tr>
<tr>
<td>Shown</td>
<td></td>
<td>Sensor Installation Instructions</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure 1: EWP® Digital Controller and hardware components.
INSTALLING THE EWP® DIGITAL CONTROLLER (Refer Figure 2 below)

Do not begin the installation of the EWP® Digital Controller prior to the EWP® being installed. Refer to the EWP® Installation Instructions for details. **Note:** Wiring from EWP® Kit must be discarded, however retain fuse.

1. The controller must be fitted inside the passenger compartment. Locate a hole in the firewall (approx. 20mm in diameter) where the harness wiring (including the sensor & pump “T-connector”) will be able to pass through. If a spot of adequate size cannot be located, then wires may be cut then re-joined as a last resort.
2. Pass the “T-connector of the wiring harness though the firewall into the engine bay and connect to pump.
3. Pass the **black** sensor cable through the firewall and out to the thermostat housing.
4. Connect the wiring harness to the controller and mount the controller (using 2 of the screws provided) in an appropriate position such as near the fuse box so that there is access to the temperature adjustment button --- **avoid mounting the controller where it may be exposed to direct sunlight.** Ensure a good earth connection using the self-tapping screw provided. **NOTE:** The earth lead must be connected to a metal part of the body.
5. An additional screw is provided for mounting controller fuse holder where necessary.
6. 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.
7. Make sure ignition is off and insert fuse (10Amp) from EWP® pump packaging into fuse holder.
8. Mount ‘Remote Test Light’ in a location, which will be visible. The ‘Test Light’ may be fitted by inserting it through a drilled hole in a plastic area of the interior/dashboard or simply with adhesive tape.

**NOTE:** In carrying out the wiring procedure, please bear in mind that it is advantageous to minimise voltage drop and this can be achieved by keeping the wiring as short as possible.

**Figure 2:** Digital Controller Wiring Diagram.
INSTALLING EWP® DIGITAL CONTROLLER SENSOR

There are two installation methods available:

a) IN-HOSE METHOD (Refer Diagrams 3 & 4)

The sensor must be located in the engine thermostat position so that it can sense the engine temperature even when there is no flow.

NB: Wait for the engine coolant to cool down before removing the engine thermostat housing and thermostat.

1. Remove engine thermostat from the thermostat housing.
2. Pass sensor down through the thermostat housing ferrule.
3. Wind the length of wire provided around the sensor and up the two wires and bend in to shape to push down through the thermostat housing ferrule and into the engine block. Leave just enough of the two black sensor wires free to pass over the seal. Ensure that only the separate black silicon wire at the end of the sensor cable will be in contact with the coolant.
4. Re-fit the thermostat housing ensuring that there is no damage to the thermostat-housing gasket. A small amount of silicon wiped over the gasket will ensure a good seal.
5. Place the sensor rubber seal just behind the lip on the thermostat housing ferrule and push the two wires from the sensor into position on the seal.
6. Holding the seal in position, push the radiator hose over the thermostat housing ferrule and tighten the hose clamp. NB: It may be necessary to wind electrical tape around the wires, seal and ferrule to hold the seal in place while re-fitting the radiator hose.

b) IN-THERMOSTAT HOUSING METHOD (Refer to separate instruction sheet)

BLEEDING THE COOLING SYSTEM

1. Fill the cooling system with appropriate coolant.
2. Disconnect the controller ‘T’ connector from the pump. Using the wiring harness provided in the pump packaging, cut the blue and black wires close to the relay holder, discard the remainder and connect the ‘T’ connector to the pump. Loosely connect the blue wire to the battery positive and the black to negative. With the radiator cap off, run for 5 - 10 minutes to ensure that there is no air trapped in the cooling system. Continue to fill with coolant as the air is removed from the system. Disconnect the wiring from the battery to the pump and discard. Re-connect the pump to the controller ‘T’ connector. Re-fit the radiator cap before starting the engine.
3. Check hose clamps after a few hours operation of normal temperature and again after 20 hours running. Check for leaks.
OPERATION

CONTROLLER ALGORITHM-PUMP OPERATION

Figure 5 shows the typical operational curve of the pump. The ‘SET POINT’ is the temperature at which full battery/system voltage is supplied to the pump. This can be set to any of the 5 ‘SET POINTS’ available: 75°C, 80°C, 85°C, 90°C, 95°C. Once you have set the ‘SET-POINT’, the Thermatic Fan setting should also be adjusted. It is recommended that fans be set to 5°C above the ‘SET POINT’.

CONTROLLER OPERATION

LED CHECK:
Every time ignition is turned ON, all LED’s will be on for 5 secs before returning to the normal operation mode. This feature allows for checking that all LED’s are operational.

DIAGNOSTICS:
To avoid any premature diagnostic indication during ‘temporary’ events – especially where the engine is OFF for very short periods, the diagnostic functions will be activated 2 minutes after ignition is switched ON.

OVER-RUN MODE:
To reduce heat-soak after ignition shutdown, the controller will continue to run the EWP® for 2 minutes or until the temperature has reduced to 5°C below ‘set-point’ – whichever occurs first. The “Over-Run” feature will reduce heat soak but will be more effective when used in conjunction with a Thermatic Fan.

Figure 5: EWP® Operation Curve.
**LED DISPLAY:**
The following identifies each LED and its operational status:

**TEMP LED (GREEN):**
FLASHING 75°C LED = Sensor temperature is below 75°C.
ON = ACTUAL sensor temperature.

**PWR LED (AMBER):**
ON = The controller has power.

**EWP LED (GREEN):**
FLASHING = EWP operating in ‘pulsing’ mode – Refer Figure 5, areas \(A\) & \(B\).
ON = Electric Water Pump (EWP\(^\circ\)) running between 6V – Battery Voltage: Refer Figure 5, area \(C\).

**TEST LED (RED):**
ON = 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” whenever the TEST LED is on. The purpose of this light is to provide remote indication when the TEST LED has been activated.

**OVER-RUN MODE:**
During “Over-Run” mode:
- Actual sensor temperature will be indicated by GREEN temperature LED.
- PWR LED will flash
- EWP LED will be solid and pump will run at full battery voltage.

**SETTING THE DIGITAL EWP\(^\circ\) CONTROLLER**
The Digital EWP Controller can be set in accordance with your requirements. The factory ‘set-point’ on the controller is 85°C. This setting can be changed by using the ‘set-point’ adjustment button on the control panel as follows:

i. Pushing the ‘SET’ button once will indicate the present setting with an amber LED.

ii. When ‘SET’ button is held down, the ‘set-point’ settings will be scrolled through. Button should be released when desired ‘set-point’ is reached.

iii. The LED will then flash and the setting must be confirmed (‘locked in’) by holding button down for 2 sec. If setting is not confirmed within 5 sec, controller will revert to previous setting.

iv. To check ‘SET’ point, see (i) above.

It is recommended that initially the ‘set-point’ be set to approximately the mechanical thermostat opening temperature. Use a lower ‘set-point’ to run the engine colder or a higher ‘set-point’ to run the engine hotter. Generally, running the engine slightly colder will increase the power and running the engine slightly hotter will improve the fuel efficiency.

To verify ‘SET’ temperature, run the engine and monitor engine temperature.

**CONTROLLER INSTRUCTIONS**
For your convenience, brief operating instructions are available on the reverse side of the controller.
## COOLING SYSTEM DIAGNOSTIC CHART

The following table lists the Digital EWP® Controller diagnostic capability for your cooling system and the LED diagnosis sequence.

**NOTE:** In all instances where the TEST light is ON, the EWP is running at full battery voltage.

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>LED SEQUENCE</th>
<th>TROUBLESHOOTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TEST</strong></td>
<td><strong>PWR</strong></td>
<td><strong>EWP</strong></td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
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<td>ON</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>FLASH</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>

**NOTE:** When a temperature related error has occurred, this may not necessarily be associated with the pump but could be associated with the overall cooling system. e.g Fans, fan thermal switch, coolant level. Therefore, inspection should not be limited to the pump alone in trying to isolate the cause.

PLEASE RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE
These installation instructions will suit most situations. However, many conditions of engine design, environment and driving conditions or styles may call for other arrangements not described here. Advice is available from Davies, Craig and we would very much appreciate your feedback.

CAUTIONS

- Engine temperature must be monitored closely at all times but especially immediately after installation and until pump operation and capacity have been proved.
- 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 12-14VDC.

INSTALLATION RECOMMENDATIONS

- For improved heater performance on vehicles which have the heater inlet (return) and outlet ports in the mechanical pump housing, Davies, Craig has developed the Electric Booster Pump, EBP®, which fits into the heater hose and boosts flow through the heater circuit and/or cylinder heads. There is more information on our web page www.daviescraig.com.au

- LPG (Liquid Petroleum Gas) vehicles require constant flow through the LPG converter and if the EWP® is used in conjunction with the Controller, we recommend the installation of an EBP® (Electric Booster Pump) to overcome freezing of the converter body at start up.

WARRANTY

We warrant that for a period of two years or 2000 hours operation (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 Electric Water Pump Controller 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.

If you encounter any difficulties during the installation and require further assistance, please contact Davies, Craig on +61 (0)3 9369-1234.
## EWP DIGITAL CONTROLLER P/NO: 8020

### Technical Specifications:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Voltage</td>
<td>12V DC to 13.5V DC</td>
</tr>
<tr>
<td>Output Voltage</td>
<td>6V to 13.5V</td>
</tr>
<tr>
<td>Max. Current</td>
<td>12A</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-20°C to 60°C (-5°F to 140°F)</td>
</tr>
<tr>
<td>Controller Type</td>
<td>PCB with Micro Processor</td>
</tr>
<tr>
<td>Sensor Type</td>
<td>Thermistor in waterproof housing</td>
</tr>
<tr>
<td>Time Out</td>
<td>2 Min. (or Set –5°C) after ignition OFF</td>
</tr>
<tr>
<td>Indicator LED’s</td>
<td>Temp., Power ON, Pump mode and Test</td>
</tr>
<tr>
<td>Weight</td>
<td>90 grams (3.2 oz.)</td>
</tr>
<tr>
<td>Dimensions</td>
<td>101mm (L) X 95mm (W) X 35mm (D) [4” (L) X 3-3/4” (W) X 1-3/8” (D)]</td>
</tr>
</tbody>
</table>