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EWP®115 ALLOY PUMP KIT INSTALLATION INSTRUCTIONS

DAVIES, CRAIG EWP® (ELECTRIC WATER PUMP) AND OPTIONS FOR PUMP CONTROL

Congratulations on your purchase of the Davies, Craig alloy EWP® which is designed to replace or supplement the existing belt driven mechanical water pump of your engine. Your EWP has very high flow capacity and has the advantage of running at a speed independent of the engine speed. The EWP® can also be set to continue running after a hot engine shut down to prevent damaging heat soak. When your EWP® is used to replace the mechanical pump, you will notice an increase in engine power and torque, especially at high engine speeds. Automatic gear changes, both up and down, will be smoother.

PLEASE READ THESE INSTRUCTIONS IN THEIR ENTIRETY BEFORE YOU START WORK

ALSO NOTE THAT THE EWP IS A 'CIRCULATION' PUMP IDEAL FOR 'CLOSED CIRCUIT' OPERATION SIMILAR TO AN AUTOMOTIVE COOLING SYSTEM. IT IS NOT A 'SELF-PRIMING' PUMP AND THEREFORE WILL NOT OPERATE WITHOUT A POSITIVE 'HEAD' IN AN 'OPEN' SYSTEM.

EWP® COMPONENTS:

No.	Description	Qty.
1.	EWP alloy Pump Assy.	1
2.	Wiring harness with 10Afuse	1
3.	Rubber Sleeves	2
4.	Hose Clamps	2

HARDWARE COMPONENTS:

No.	Description	Qty.
5.	Hardware bag	
	--Relay	1
	--Scotch lock	1
	--Ring Terminal	1
	--Self Tapper	1

SECTION ONE: INSTALLING THE EWP® 115

1. The EWP® 115 Alloy is best fitted in the lower radiator hose which connects the radiator to the existing mechanical water pump housing. The hose takes the weight of the pump and insulates the EWP from engine vibration. Check the area for available space and shape of the hose. Now position the EWP in the lower hose so that the inlet (marked on the pump) is connected to the radiator and the outlet is connected to the engine. The pump inlet is in the centre of the pump. The EWP® should be positioned as low as possible to maximise the gravity feed from the radiator and prevent air entering the pump. Alternatively, it can be fitted in the upper hose, but in this case the coolant level must be

maintained, and the section of the top radiator hose from engine block must be connected to the inlet of the electric pump and the section of radiator hose connected to the radiator must be connected to the outlet of the electric water pump. The pump can be installed in any orientation but to assist air bleeding try to mount the outlet pointing upwards.

2. Add the rubber sleeves if necessary (Item No 3) to the inlet and outlet, to suit your particular hose diameter. If you need more thickness still, contact Davies, Craig and we will ship, free of charge same day, sleeves to suit 2" (50mm) internal diameter hose.

3. Cut out the required section of the radiator hose. Connect the pump inlet and outlet to the appropriate hoses ensuring that the pump is oriented in the BEST CORRECT ORIENTATION as shown in Fig 4, page 7 **"BLEEDING THE EWP®"** during bleeding. Ensure hose clamps are tight.

Do not bleed the EWP until you install the pump control option and disable the mechanical pump

Assembly of flanged adaptors (Optional)

The Davies Craig Alloy pump offers you an alternative option for mounting the pump.
EWP115 Alloy pump is manufactured with 1"NPT internal thread at both the inlet and outlet. This enable you to conveniently screw in the various Davies, Craig flanged adaptors or use the appropriate dash fittings to suit your individual requirements or attach with hose using clips in the usual way.

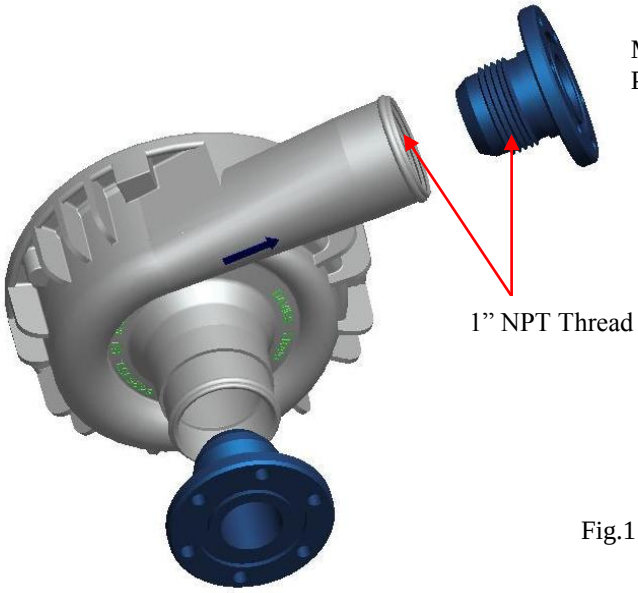


Fig.1

SECTION TWO: OPTIONS FOR PUMP CONTROL

1. With EWP® Digital Controller, P/No - 8020:

We highly recommend the use of the EWP/Fan Digital controller for maximum cooling efficiency. The EWP/Fan controller will vary the EWP speed in relation to the coolant temperature. You set the temperature desired for maximum power or fuel efficiency. The Digital controller has an in built function that allows the EWP to run on after hot engine shutdown to help eliminating the heat soak. We further recommend the removal of engine's thermostat and disabling mechanical water pump. The pump belt can either be removed or left as an idler pulley. The vehicles heater may take a little longer to warm up and to improve the heating; we recommend the fitment of an Electric Booster Pump (EBP) Part No.9002 to the heater line

OR

2. With Davies, Craig Thermal Switch, P/No: 0401 or P/No: 0402

Combine the EWP® with either of the approved Davies, Craig thermal switches listed here when the EWP is used as a booster pump to assist the existing mechanical water pump cool an overheating engine. Connect the thermal switch directly to the battery and your EWP will run on to eliminate heat soak. You may leave the thermostat in place , but ensure the EWP operates only when the thermostat is open.

OR

3. Continuous running:

Wire the EWP® direct to the ignition for maximum cooling (race vehicles, very hot climates). This option requires the removal of the Engine thermostat and the mechanical pump impeller or pump belt. This option may also be used for road cars with the thermostat in place with a small hole (suggest 5mm), allowing a small amount of flow to circulate even when the thermostat is closed.

WARNING: When using the Electric Water Pump (EWP) on vehicles using LPG, it is recommended that an Electric Booster Pump (EBP - Davies, Craig part no 9001)) be fitted to the heater circuit to increase the flow through the heater line and therefore eliminate the risk of freezing LPG in the converter.

OPTION 1: REPLACING THE MECHANICAL PUMP WITH THE EWP® AND EWP® DIGITAL CONTROLLER.

This option will allow adjustment of the engine operating temperature. Lower engine temperature for an increase in power or raise it for better fuel efficiency.

MODIFYING EXISTING PUMP

1. Remove the engine thermostat from the thermostat housing.
2. Refer to the Controller Instructions for details of the controller sensor installation.
3. Re-fit the thermostat housing without the thermostat ensuring that there is no damage to the thermostat housing gasket.

Then either:

1. Remove the existing belt driven water pump.
2. Pull the pump impeller off the belt driven pump shaft. (NOTE: You may need to drill holes through the impeller close to the drive shaft to make it easier to remove.) Be careful not to damage the seal or bearing when removing the impeller. Alternatively, remove vanes from impeller in situ.
3. Re-fit the belt driven 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.

Or:

By-pass the belt-drive on the water-pump, if possible, by installing a shorter belt that omits the pump pulley. This option is not possible if the pulley drives a belt-driven fan unless you replace the fan with a Davies, Craig Thermatic Fan®. For example:

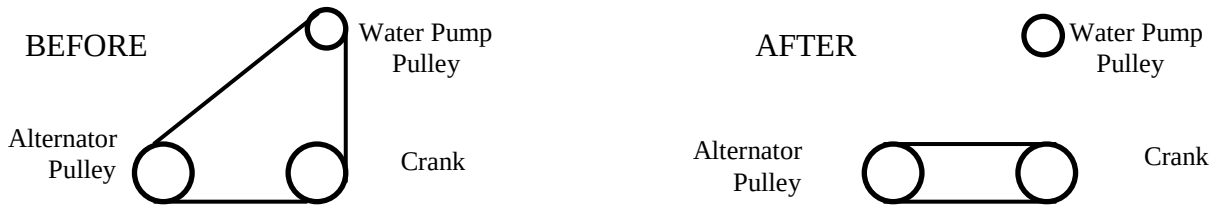


Fig.2

INSTALLING EWP® DIGITAL CONTROLLER--Part # 8020

REFER TO EWP DIGITAL CONTROLLER INSTRUCTION SHEETS FOR DETAILED INSTALLATION INSTRUCTIONS.
Do not begin the installation of the EWP Digital Controller prior to the EWP being installed.
NOTE: Wiring from EWP kit will not be required however retain for hard wiring the EWP during bleeding.

1. The controller should be fitted inside the passenger compartment.
2. Connect the wiring harness to the controller and mount the controller (using 2 of the screws provided) in an appropriate position **--- *avoid mounting the controller where it may be exposed to direct sunlight***.
3. An additional screw is provided for mounting controller fuse holder where necessary.
4. Mount 'Remote Test Light' in a location, which will be visible. The 'Test Light' may be fitted by inserting it through a 4.6mm drilled hole in a plastic area of the interior/dashboard or simply with adhesive tape.
5. For installation of the sensor in the position of the thermostat refer to the Digital Controller instruction sheets.
6. Bleed the EWP®. Refer to **"BLEEDING THE EWP®"** on page 7. After bleeding the EWP® continue on with the next stage.

RUNNING THE EWP®

Start engine to confirm no leakage at radiator hose or sensor and re-torque radiator hose clamps. Monitor the engine temperature, which should take slightly longer than usual to reach steady state.

Using EWP Digital Controller instructions digitally SET the temperature of the engine. It is recommended that initially the 'set point' be set to approximately the mechanical thermostat opening temperature. Generally, running the engine slightly colder will increase the power and running the engine slightly hotter will improve the fuel efficiency. NOTE: Should you wish to run a colder temperature than specified, and then it may be necessary to reduce the temperature setting of electric fan/s operation. Electric fans should not switch on until the EWP is running at full speed and is not holding the target temperature. The EWP Digital Controller has an in-built function to run the EWP after ignition OFF and prevent engine heat soak.

Re-tighten hose clamps after a few hours operation at normal temperature and again after 20 hours running. Check for leaks. The cabin heater may take longer than normal to warm up.

OPTION 2:

USING THE EWP® TO BOOST THE COOLING SYSTEM WHEN REQUIRED WITH AN ON/OFF THERMAL SWITCH.

This option when combined with a Davies, Craig Thermal Switch, P/No: 0401 or P/No:0402 will turn the EWP® on at the temperature you set, to give an added boost to an overheating cooling system.

INSTALLING THERMAL SWITCH (Refer wiring diagram 2a & 2b)

USE DAVIES, CRAIG PART NO 0409 TO INSTALL THE SENSOR OR

1. When the engine is cold remove the top radiator hose at the radiator end.
2. Mount the thermal switch on the right angle bracket (for P.No.0401) with the two small self-tapping screws provided. Mount the bracket beside the radiator with the two large self-tapping screws so that the copper bulb will reach the top radiator ferrule (pipe) and so that the switch is available for adjustment.

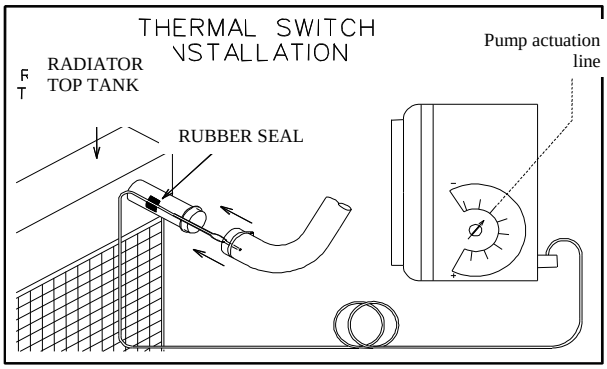


Fig.3

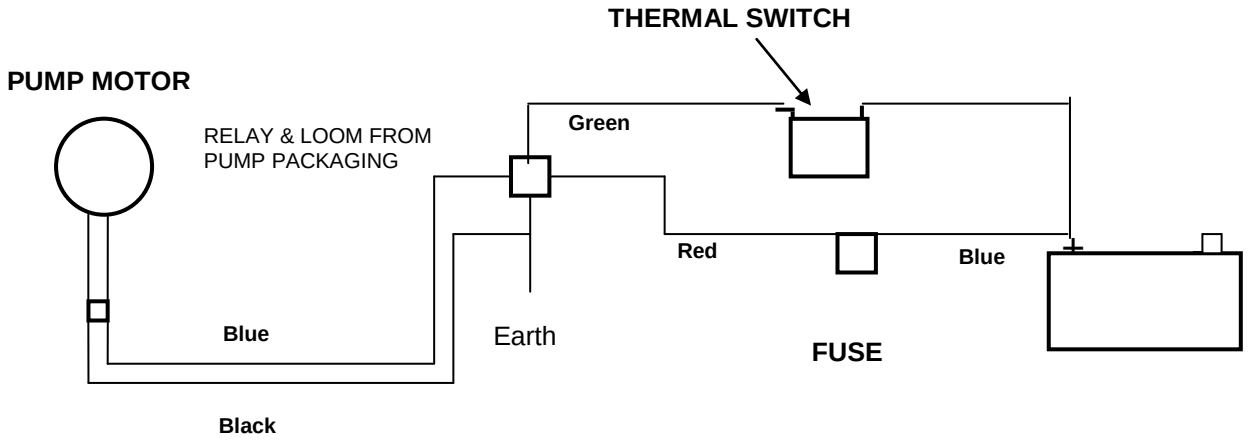
3. Lay the rubber seal along the radiator ferrule and place a section of the copper capillary of the thermal switch down the groove in the rubber seal. Keep the copper capillary loosely coiled and prevent sharp bends. Pass the copper bulb at the end of the capillary down over the radiator inlet ferrule so that it protrudes no more than a few inches into the radiator hose. You may choose to use insulation tape to hold the seal in place while the hose is refitted. Replace radiator hose; position hose clamp across centre of seal with the clamp screw on the opposite side to the capillary. A good silicon type sealant may be used if there is a persistent leak.
4. Connect the pump wiring harness to the pump. Connect the green wire from the relay to the thermal switch. Connect the grey wire provided with the thermal switch to battery positive.
5. Bleed the EWP®. Refer to **"BLEEDING THE EWP®"** on page 7. After bleeding the EWP® continue on with the next stage.

RUNNING THE EWP®

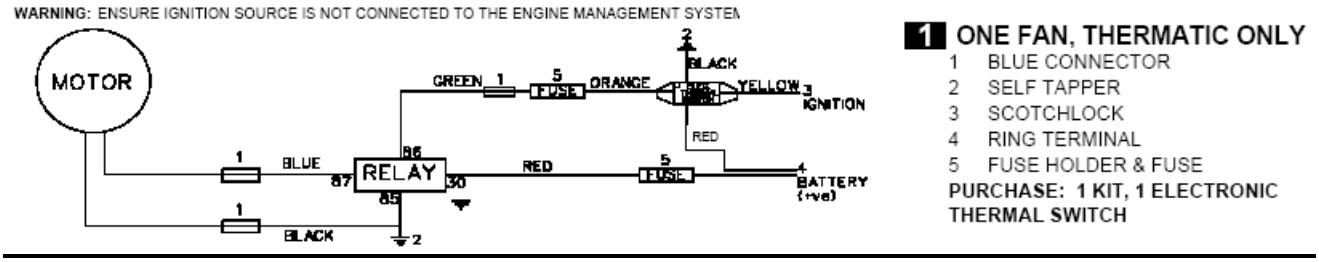
Start engine to confirm no leakage at radiator hose or sensor and re-torque radiator hose clamps. Monitor the engine temperature, which should take slightly longer than usual to reach steady state. Adjust the thermal switch dial to turn the EWP® on at the temperature desired. With the thermal switch connected directly to the battery, after a hot shut down, the pump will continue to run and prevent engine heat soak.

Re-tighten the clamps after a few hours running at temperature and again after 20 hours running. Check for leaks.

WIRING DIAGRAM 2a: EWP® WITH THERMAL SWITCH - P/NO: 0401:



WIRING DIAGRAM 2b: EWP® WITH THERMAL SWITCH - P/NO: 0402



OPTION 3: CONTINUOUS RUNNING (Recommended for race vehicles, very hot climates, and cars running on LPG.)

This option will provide maximum cooling from the pump under all conditions without controller or switch.This method may be used for road vehicles that are not suited to the EWP® Digital Controller and engines that run on LPG. Road vehicles choosing this method should retain the thermostat in position with a hole in it (suggest 5mm) to ensure a small amount of flow through the cooling and heating systems at all times.

MODIFYING EXISTING PUMP

1. **Either:**
   1. Remove the existing belt driven water pump.
   2. Pull the pump impeller off the pump shaft. (NOTE: You may need to drill holes through the impeller close to the drive shaft to make it easier to remove.) Alternatively, remove vanes from impeller.
   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.

   Or:

   1. By-pass the belt drives on the water-pump (if possible) by installing a shorter belt that omits the pump pulley. (Refer example diagram in option 1 fig.2, page 3.)

   And:

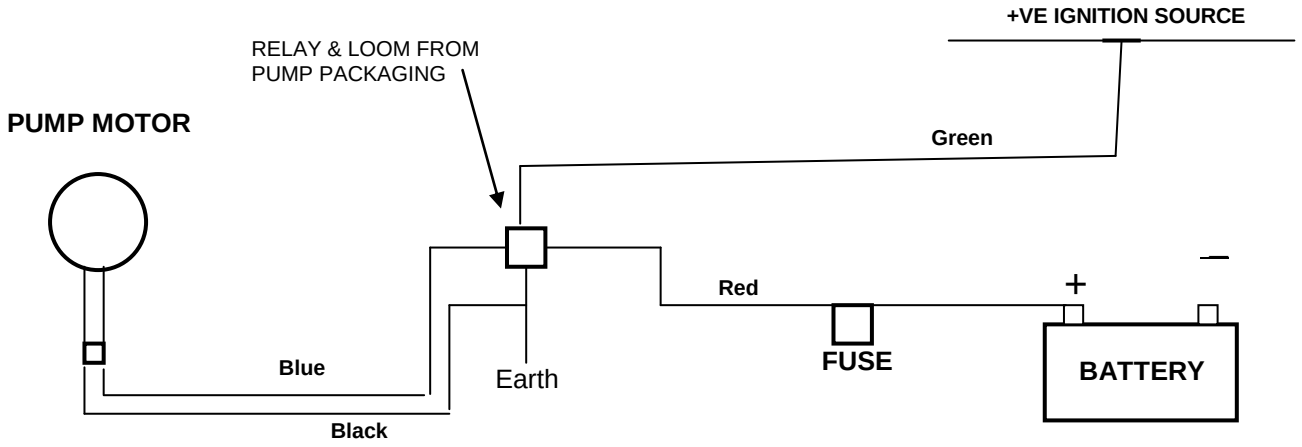
   a. Remove the thermostat from the thermostat housing.

   b. Re-fit the thermostat housing ensuring that there is no damage to the thermostat-housing gasket.
2. Connect the Pump wiring harness and relay. **(Refer wiring diagram 3)**
3. Bleed the EWP®. Refer to **"BLEEDING THE EWP®"** on page 7. After bleeding the EWP® continue on with the next stage.

RUNNING THE EWP®

Start engine to confirm no leakage at radiator hose and re-torque radiator hose clamps. Monitor the engine temperature, which should take longer than usual to reach steady state. If the ignition is left on (or if a turbo timer is connected) after a hot shut down, the pump will continue to run and stop engine heat soak. Re-tighten the hose clamps after a few hours running at temperature and again after 20 hours running. Check for leaks. NB: The heater circuit may take longer than normal to warm up.

WIRING DIAGRAM 3: EWP® CONTINUOUS RUNNING:



BLEEDING THE EWP®

Ensure the EWP® is orientated correctly as shown below before continuing and hose clamps are tight.

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.

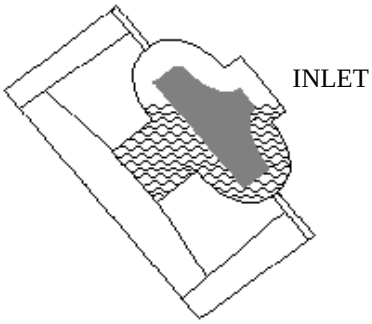


FIGURE 4: BEST ORIENTATION

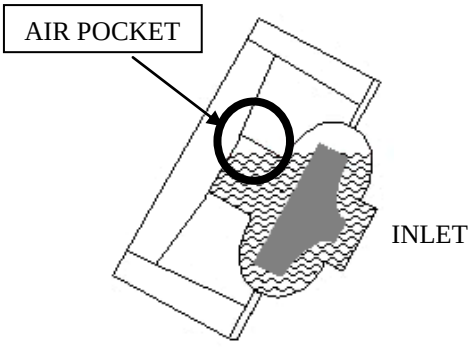


FIGURE 5: INCORRECT ORIENTATION

1. Fill up the cooling system with appropriate coolant.
2. Do not run the engine but hardwire the pump direct to the battery so that the pump runs at full power.
3. With the radiator cap off, run the pump for 5 - 10 minutes to ensure that there is no air trapped in the cooling system. Fill with coolant as the air is removed from the system.
4. Once all air is removed from the cooling system replace the radiator cap and reconnect the pump to your original controlling method.

NOTE: Loosening the hose clamps can change the pump orientation and rotating pump to desired position. If leakage occurs from hoses during re-positioning, the coolant level must be topped up. Ensure that hose clamps are tight.

These installation instructions will suit most situations but there are conditions of engine design, environment, and the kind of motoring involved, which may call for other arrangements not described here. Advice is available from Davies, Craig and we would very much appreciate your feedback.

If you encounter any difficulties during the installation and require further assistance, please contact Davies, Craig on +61 (0)3 9369-1234.

WARNINGS

- 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 speeds than normal may affect other engine components.
- Do not run pump dry as seal damage may occur and your warranty will be void.
- Engine temperature must be monitored closely at all times but especially immediately after installation and until pump operation and capacity have been proved.
- The EWP® can handle most rust particles and sludge found in cooling systems but large rust particles should be flushed from the radiator before the EWP® is installed.
- Some vehicles may require special bleeding procedures to remove air from the cooling system not described here. The EWP must be completely flooded with coolant at all times to achieve the life specification of the EWP 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 12-14V DC.
- Vehicles with both heater circuit inlet (return) and outlet ports in the mechanical pump housing will suffer reduced heater performance unless the heater returns position is relocated (suggest top radiator hose).
- The cooling system should have antifreeze in accordance to the vehicle manufacturer's specification.
- The EWP is a 'circulation' pump ideal for 'closed circuit' operation found in an automotive cooling system. It is not a 'self-priming' pump and therefore will not operate well without a positive 'head' in an 'open' system
- The impeller tip clearance is very tight for maximum efficiency, and may when new actually scrape the pump housing causing a slight noise. The impeller will bed in over time and the noise cease.

EWP® Installation Recommendations

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

- If an EWP® is installed on a vehicle which is kept in storage for more than 3 months, for example. a show or race-car, it is advised that the pump be operated for approximately 5mins constant running every month. This will minimise the build up of any sediment in the EWP® and also lubricate all parts within the pump.

- For improved heater performance on vehicles which have the heater inlet (return) and outlet ports in the mechanical pump housing (referred to in "Warnings"), Davies, Craig has developed the Electric Booster Pump, EBP®, part no 9001, 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.

- It is recommended that the cooling system is flushed every 6 months or 10,000kms to remove any built up sediment in the cooling system.

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 Electric Water Pump 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.

30/03/2010

WARRANTY REGISTRATION

Part number 8040 – Electric Water Pump, EWP 115 Alloy

*Name:*_____

Address:_____

_____*Post Code:*_____

*Purchased From:*_____*Date:*_____

*Fitted to vehicle:*_____*Year:*_____

Comments:_____

_____

_____

Mail to: Davies,Craig Pty Ltd, P O Box 363, Altona North, Victoria, Australia 3025

OR REGISTER ON-LINE AT www.daviescraig.com.au

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.

		LED SEQUENCE								
	CONDITION	***TEST***	***PWR***	***EWP***	***TEMP (75º)***	***TEMP (80º)***	***TEMP (85º)***	***TEMP (90º)***	***TEMP (95º)***	***TROUBLESHOOTING***
1	***Blown Fuse:*** Controller does not operate.	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Check fuse or connection.
2	***Low Voltage:*** Battery Voltage < 11V.	ON	FLASH	ON	FLASH	ON	ON	ON	ON	Check battery, alternator and/or regulator.
3	***High Voltage:*** Battery Voltage > 15.0V	ON	FLASH	ON	ON	ON	ON	ON	FLASH	Check battery or regulator.
4	***Sensor Read Error 1:*** Open-circuit on sensor lead or thermistor.	ON	ON	ON	FLASH	OFF	OFF	OFF	OFF	Check sensor wiring.
5	***Sensor Read Error 2:*** Short-circuit of sensor leads.	ON	ON	ON	OFF	OFF	OFF	OFF	FLASH	Check sensor wiring.
6	***Low Operating Temp Fault:*** Sensor Temp < 30ºC after two minutes.	ON	ON	ON	FLASH	ON	ON	ON	ON	Check engine temperature.
7	***Over-Temperature:*** Sensor Temperature is at least 10ºC above 'SET' point.	ON	ON	ON	ON	ON	ON	ON	FLASH	Check sensor installation or cooling system. e.g. Fans, fan thermal switch.
8	***Set-Point Error:*** 'SET' point value stored is invalid.	ON	OFF	ON	OFF	OFF	FLASH	OFF	OFF	Re-set; if this fails contact Davies, Craig.
9	***Pump Connection Error:*** Open circuit on pump leads or pump leads not connected.	ON	ON	FLASH	FLASH	FLASH	FLASH	FLASH	FLASH	Check pump wiring and operation.
10	***Microprocessor Error: Controller Programme Invalid.***	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Contact Davies, Craig.

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

Booster Water Pump with Performance

CARS

OFF-ROAD

4 WDS

CARAVANS

GO-KARTS

MOTORCYCLES

BOATS

CAMPING

IRRIGATION

MOTORSPORTS

EBP ELECTRIC BOOSTER PUMP

2 YEAR WARRANTY

High performance, compact and versatile 12v pump for a range of applications

The 12v Davies Craig Electric Booster Pump (EBP) with its high flow capacity and advanced design, makes it ideal for a range of applications including:

- Water to air intercooler cooling on high performance vehicles.
- As a booster for improving cabin comfort in cars, 4WD and recreational vehicles.
- Water cooled motor cycle engines as replacement of mechanical pump
- Water reticulation within boats, caravans, motor homes and for camping.
- Solar heating and irrigation
- Efficient cooling of go-karts
- For LPG vehicles where a constant flow of coolant is essential to ensure the LPG regulator does not freeze-up.

The range of applications is only limited by your imagination.

Easy Installation

The EBP is compact and easy to install – just cut the appropriate hose and fit it directly.

For everything you need for DIY installation, the kit (part no. 9001) includes the pump, hoses, hose clamps, wiring, hose diameter adaptors and easy to follow installation instructions.

The pump and wiring is also available as a short kit (part no. 9002).

Quality Construction

The EBP motor has no brushes to ever wear out and the pump is magnetically driven by the motor, which means that no shaft sealing is required. There is only one moving part, the impeller and it is floating in the coolant.The pump chamber is hermetically sealed for trouble free operation and the EBP is fully backed by a Davies Craig 2 year warranty.

DAVIES, CRAIG PTY. LTD.

INNOVATION - QUALITY - RANGE

P/No: 8927

Customised Chrome Fans

A Davies, Craig Customised Chrome Thermatic® Fan Kit is ideal for the open engine compartment street rods, show cars, custom cars and high performance vehicles. Limited Edition chrome fan kits have been produced for the enthusiast to save you all the necessary time and effort when choosing that bright, stylised, effective fan for your vehicle.

- All Customised Chrome Thermatic® Fan Kits are suitable for both condenser and radiator cooling.
- The Customised Chrome Thermatic® Fans provide; constant powerful air flow which increases air conditioning performance, cooler engine operation, low profile, high performance, increased engine power and lowers fuel consumption.
- All Davies, Craig Thermatic® Fans offer reversible polarity and blades for bi-directional, upstream (pusher) and/or downstream (puller) air flow as standard equipment.
- All Davies, Craig Customised Chrome Thermatic® Fan Kits are packaged complete with relay, wiring loom, mounting hardware and easy-to-follow fitting instructions for a quick and tidy installation.

Part #	**Description**	
#0071	DCSL10	10”
#0072	DCSL12	12”
#0073	DCSL14	14”
#0074	DCSL16	16”