



# EMS410, 510 & 560 Series User Manual and Installation Guide

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# **1. INTRODUCTION**

Thank you for purchasing your EngineSafe unit and supporting Australian Made.

**EngineSafe - Ultimate Vehicle Protection** is Australia's leading supplier of Engine Monitoring Systems providing you with the latest technology in protection by utilising state of the art components from leaders in design and manufacture from around the world.

EngineSafe offer two systems, the EMS410 and EMS510 series. The EMS410 range utilizies two bolt on temperature sensors which can be bolted to any suitable location on the vehicle. The EMS510 series includes a Low Coolant sensor, which is the only system that can provide **full protection** agianst overheating. EMS500 series units are designed to work only on negative ground vehicles.

	EMS410 Series		EMS510 Series
•	Block Temperature	•	Engine Coolant Level Sensor
•	Auto Transmission Fluid	•	Engine Coolant Temperature
	Temperature*	•	Auto Transmission Fluid
or			Temperature*
•	2nd Bolt On Temperature	or	
	Sensor*	•	Block Temperature*
	* Additional accessories/parts required		* Additional accessories/parts required

Your EMS unit continually monitors your engines cooling system giving you complete peace of mind at all times whilst driving. If your EMS system detects any irregularities both visual and audible warnings are given, allowing prompt action to be taken by the driver to ensure costly damage and downtime is avoided.

EngineSafe - Ultimate Vehicle Protection is proudly designed, manufactured and owned here in Queensland, Australia.



# 2. PRECAUTION

- For your own safety and the occupants of the vehicle please read and understand the user manual before proceeding with the installation and setup.
- If you are unsure about installation please contact the vehicle manufacturer, your local dealer or a motor mechanic.
- This device is only to be used for the purpose it was attended as setout in this manual.
- This is a stand alone unit and does not plug into or communicate with the vehicle ECU system(s).
- EMS500 series units are designed to work only on 12 volt negative ground vehicles.
- This unit must be mounted so there is no obstruction or interference with the vehicles occupants, air bag system, drivers vision, and/or operation of the vehicle.
- A minimum of 24AWG / 0.20sqmm wire must be used when connecting to a power source.
- A minimum of 18AWG / 0.82sqmm wire must be used for the relay, preferrably double insulated or in a protective sheath.
- Only EngineSafe sensors are to be connected to this unit.
- Opening or tampering with the Control Unit or Sensors will void any manufacturers warranty.
- Cleaning is recommended with a soft damp cloth only, no chemicals or abrasive materials are to be used.

### NOTE:

If any of these precautions are not followed it may result in the failure of the unit and/or the warranty being voided.

# **3. SPECIFICATIONS**

Engine Coolant Temperature Range	-3.0 - 150.0°C / 23 - 302°F
Transmission Fluid Temperature Range	-3.0 - 150.0°C / 23 - 302°F
Block Temperature Range	-3.0 - 150.0°C / 23 - 302°F
Accuracy - Temperature	-3.0 - 125.0°±0.5°C / 23-257°±32.9°F
Relay Driver	200mA max continous
Peizo Buzzer	>80dB @ 10 cms
Control Unit Operating Temperature	-20.0 - 85.0°C / -4.0 - 185°F
Unit Operating Humidity	98%
Control Unit Dimensions	90wx55hx20dmm / 3.5wx2.2hx0.7d"
Control Unit Weight	98 grams / 0.21 lbs
Control Unit Protection Features:	<ul> <li>Reverse battery connection</li> <li>Short circuit</li> <li>60V load dump</li> <li>Thermal overload cutout</li> </ul>



# 4. COMPONENTS

ITEM	DESCRIPTION	QTY	
A	EMS Control Unit		
В	Control Unit Cable - 1m		
	Fuse - 250mA		
C	Cable Ties 5		
D	Double sided tape - Control Unit 1		
E	User Manual	1	
	Option Kits		
G	Sensor Adapter Kit - Engine Low Coolant Level and Temperature Sensor - 4m		
	2x Rubber Sleeves		
2x Hose Clamps - Radiator 33-57mm			
н	H Auto Transmission Temperature Kit - 4m cable		
	2x Hose Clamps - 14-27mm		
	1x Rubber Hose - 50mm		
I	"Bolt-On" Block or Transmission Kit - 4m cable		
	• M10 Lug		













# **5. INSTALLATION**

## **COOLANT LEVEL & TEMPERATURE SENSOR**

NOTE: Only work on a vehicle when the engine cooling system has been allowed to cool to ambient temperature. Warm or hot cooling systems are under pressure and may cause serious burns to anybody nearby if opened or worked on. Always insure the vehicle is in a safe working area.

The Sensor Adaptor Kit allows for the installation of the Low Coolant / Temperature Sensor into the top radiator hose by cutting out a small 17mm section. This adaptor fits all hose sizes with a 30-42mm ID(Inside Diameter).

• Release and remove the top radiator hose clamp from the radiator inlet connection.

### NOTE: Proceed only if your top radiator hose is either:

**30-35mm ID** – install without the sleeves **36-42mm ID** – install with 2x sleeves included in the kit

- Simply cut out a 17mm section of the top radiator hose in an unobscured area, in a straight section of top hose at the highest point, see Table 1.
- Place the hose clamps over the remaining two sections of hose. Refit the hoses back onto the Sensor Adaptor and use the rubber sleeves if required. If fitment is tight petroluem jelly can be used to aid fitment.
- Ensure the coolant sensor is positioned upright within the 90° range as indicated.



- Tighten both hose clamps.
- Turn the vehicles heater switch to the on position and refill radiator coolant to correct level, and bleed cooling system of trapper air as per the manufacturer's specifications.
- Run sensor wiring to Control Unit and connect as per the User Manual, ensuring cable is clamped securely along route.
- · Start engine and check for leaks, retighten if required.

Recheck for leaks after vehicle has been running, retighten if required.



Table 1.

NOTE: EngineSafe uses small AC signals to detect the presence of coolant through the sensor located in the coolant system back to ground(-).

The Low Coolant Sensor must be installed so that in the event of a coolant leak or loss it is not effected by a top hose closed thermostat. The sensor must be in mounted in a position where the coolant can freely drain away from the sensor and it is not kept in contact with any coolant, ie Table 1 - Fig 4.

### **BLOCK TEMPERATURE SENSOR**

This is a simple to install "Bolt On" temperature sensor to monitor the engines operating temperature.

• Find a suitable M8-10 size bolt or nut were the sensor lug can be fixed under on the engine block.

For best results when mounting the Block Temperature Sensor:

### DO's

- Mount the sensor on or near a metal coolant pipe
- Mount the sensor and/or cables so there is no interference with any moving parts of the engine, especially accelerator cables.



## TRANSMISSION FLUID SENSOR

For the most accurate transmission readings the sensor needs to be mounted on the Transmission Fluid outlet line(like the Engine Coolant). If you are unsure which line this is please contact your vehicle manufacturer or mechanic.



### NOTE:

For protection place all the cable(s) in a flexible conduit sleeve, and clamp in place along the route to where the Control Unit is mounted. 10

### **EMS CONTROL UNIT MOUNTING & WIRING**

NOTE: The Contorl Unit and wiring must be mounted so there is no obstructions or interference with the vehicles occupants, air bag system, drivers vision, and/or operation of the vehicle.

### DO NOT INSTALL THE FUSE(S) UNTIL ALL THE WIRING IS COMPLETE.

- Avoid mounting the Control Unit in direct sunlinght, use double sided tape.
- This unit is designed to be connected to the Vehicles Ignition Switch only.
- Only use the appropriate size fuses, ie 250mA for your Control Unit.
- For best results we recommend soldering ALL connections, any bare connections **MUST** be covered in electrical insulation tape or its equivalent.
- Place all cable(s) in flexible protective conduit and cable tie in place.



# 7. FRONT PANEL INTRODUCTION



**LCD SCREEN** - Large 16x2 backlight LCD for easy visual reading.

### LED WARNINGS

#### Low Coolant

- Illuminates when the sensor detects Low Coolant.
- A buzzer will also be operating, the buzzer can be silenced holding down the • SET button for 3 seconds.

#### Temperature

- Illuminates when the programmable value has been reached or exceeded.
- A buzzer will also be operating, the buzzer can be silenced holding down the • SET button for 3 seconds.

#### Relay

- Illuminates when the programmable value has been reached or exceeded.
- Relay lead(wire) is activated to allow external relay to energise.

#### Engine

Illuminates when a programmable temperature value has been reached or exceeded or a Low Coolant condition has occured. This can only be cleared by entering a service PIN number - Only Available on some models, models ending in H, ie EMS560H

### **MENU BUTTONS - Some buttons have multiple functions.**

#### Menu

Press once to enter **Program Mode**.

#### Set

- In **Program Mode**, press to save a selected value.
- During an Alarm when in Normal Operation press and hold for 3 seonds to . mute the buzzer, Alarm LED and LCD warnings are still displayed.

#### Up

- Increases a units value.
- During Normal Operation press to increase the LCD Backlight brightness.

#### Down

- Decreases a units value. •
- During Normal Operation press to decrease the LCD Backlight brightness. •

# 8. POWER ON AND INITIALISATION

During POST - Power On Self Test your unit performs several checks in the following order:

 Test and confirm the Low Coolant circuit is working correctly - every unit has been designed and engineered with the most advanced Low Coolant Level monitoring system available on the market. Everytime the ignition is switched on the Low Coolant System is retested and checked for circuit faults and coolant status ensuring complete piece of mind before you start the engine.



- Confirm which Temperature sensors are connected, ie Engine, Block or Transmission.
- Load users previous saved settings and display temperature readings..

If you do not see all your connected sensors displayed now, please turn off the unit and recheck your sensor wiring connections before switching the unit back on.

During normal operation your unit will constantly monitor the detected sensors and alert the user should one become faulty or damaged by means of a display message and buzzer. After initialisation has been completed the unit will display the current readings.



# 9. PROGRAM MODE

The EMS500 has several user programmable functions accessed by using the Menu Buttons. **Programmable Temperature range -5.0 to 150°C.** 

**DO NOT** enter **PROGRAM MODE** whilst driving as this is a dangerous distraction to the driver.



Automatic Transmission or Block Temperature Alarm(if installed)

- Use the **UP** or **DOWN** buttons to increase or decrease the temperature level that the alarm will come on.
- Press SET when finished to proceed.



Automatic Transmission or Block Temperature Relay(if installed)
Use the UP or DOWN buttons to increase or decrease the temperature level that

- Use the **UP** or **DOWN** buttons to increase or decrease the temperature level that the relay will come on.
- Press SET when finished to proceed.





**NOTE:** These new settings will not be lost when the unit is powered off, and will be automatically reloaded when the unit is switched back on.

# 10. ALERTS

<ul> <li>Low Coolant Alarm</li> <li>Low Coolant Level has been detected, this can only be stopped by rectifying the problem.</li> <li>Press and hold the SET button to mute the buzzer.</li> </ul>	LOW COOLANT
<ul> <li>Engine Coolant Alarm</li> <li>Engine coolant temperature has exceeded Alarm Level set, ie 95.0°C.</li> <li>Press and hold SET to mute the buzzer.</li> <li>Alarm will automatically stop when temperature drops 1°C below the Alarm Level set.</li> </ul>	Image: Constraint of the second se
Transmission Temperature Alarm	
<ul> <li>Transmission temperature has exceeded Alarm Level set, ie 75.0°C.</li> <li>Press and hold SET to mute the buzzer.</li> <li>Alarm will automatically stop when temperature drops 1°C below the Alarm Level set.</li> </ul>	Image: Constraint of the second se



#### NOTE:

EngineSafe Monitoring Systems are intended to be used as a valuable tool in addition to the factory gauges/warning systems supplied with the vehicle. Therefore it should not be relied upon as the only means of engine monitoring protection.

# **11. FACTORY SETTINGS**

The EMSxxx has default factory settings stored for immediate use, these are user re programmable at any time. If you wish to restore them for any reason they can be entered and saved in **Menu Mode**.

Sensor	Alarm Level	Relay Level
Engine Coolant Temperature	92.0°C / 198.0°F	92.0°C / 194.0°F
Auto Transmission Temperature	100.0°C / 212.0°F	80.0°C / 176.0°F
Block Temperature	92.0°C / 198.0°F	92.0°C / 194.0°F

# **12. COOLANT & FLUID SPECIFICATIONS**

Engine Coolant*			
Fluid Ratio % Anti Freeze / Water	Freezing Point	<b>Boiling Point</b>	
0 / 100	0°C / 32°F	100°C / 212°F	
50 / 50	-37°C / -35°F	106°C / 223°F	
70 / 30	-55°C / -67°F	113°C / 235°F	

Pressurising a vehicles cooling system elevates the boiling point of the coolant even further. Most modern vehicles have a pressurised radiator cap fitted, this system allows the boiling point to be raised approximately another  $25^{\circ}$ C /  $45^{\circ}$ F.

Transmission Fluid*		
Normal Operating Temperature	70°C - 110°C / 160°F - 230°F	
Max Temperature for short periods	135°C / 275°F	
Danger Level, stop, idle engine and let fluid cool down. Never exceed this temperature	148°C / 300°F	

# \* This is a guide only, see your vehicle manufacturer or the supplier for further details.

# **13. TROUBLESHOOTING**

Control Unit not turning on.	<ul> <li>Check all wiring - The Control Unit has additional in built PTC(thermal cutout) fuses for its own protection. It will reset to normal operation when problem has been fixed and unit allowed to cool.</li> </ul>
Sensor not Displayed	<ul> <li>On POST Control Unit will check which sensors are connected, if a sensor isn't detected then it will not be displayed. Turn Control Unit off and recheck sensor wiring and turn unit back on.</li> </ul>
Low Coolant Alarm	<ul> <li>On POST Control Unit automatically checks circuit for faults, if the Low Coolant Alarm stays on then check:</li> <li>Coolant Level - sensor must be in coolant to work</li> <li>Check wiring - if wiring broken Test will fail and Alarm will activate</li> </ul>
LCD membrane window is curving inwards.	<ul> <li>A small amount of deformation(curving) may occur on the LCD Membrane window when exposed to heat, this is perfectly normal and not a defect.</li> </ul>
LCD faint or blurred	<ul> <li>May occur if Control Unit has been exposed to a high heat environment or left in direct sunlight for a prolonged period of time. Will rectifiy when allowed to cool.</li> </ul>

# 14. WARRANTY

### I. Warranty Coverage and Application

EngineSafe – Ultimate Vehicle Protection ("EngineSafe") warrants that your product:

- Is of acceptable quality;
- Free of defects in design, materials and workmanship.

### II. Warranty Period

In all cases the commencement date for the warranty period is the actual day of purchase, as reflected on the Authorised Reseller's or Distributor's invoice / receipt provided to you. The Warranty period during which each EngineSafe product is covered is 24 months.

### III. Warranty Claim

If you make any claim under this Warranty it is essential that you:

- Cease using the goods, contact EngineSafe or your supplier and advise of the defect.
- Provide a copy of your proof of purchase. A claim under this Warranty is not formally
  made unless and until that proof of purchase is provided. You will not be able to gain
  the benefit of this Warranty without making a claim. This does not detract from your
  statutory rights.
- A claim must be made within the Warranty Period.
- Consumers are responsible for postage/shipping expenses associated with the return of goods under a warranty claim.

Warranty Claims should be directed to: EngineSafe –Ultimate Vehicle Protection 1300 76 44 76 sales@enginesafe.com.au

If, following receipt of a claim under this Warranty, EngineSafe or its agent(s) determine that your claim in respect of a product defect is valid (having regard to the terms of Part III of this Warranty), and:

- If the goods can be repaired EngineSafe or its agent will either repair the product or, replace the product with the same or similar product or refund you the cost of a replacement, in each case depending upon what is reasonable in the circumstances. Goods presented for repair may be replaced by goods of the same type rather than being repaired.
- If the goods cannot be repaired or replaced a full refund will be issued.

#### **IV. Warranty Exclusions:**

- This Warranty does not extend to loss caused by normal wear and tear, fire, water (liquid spillage or ingression), theft, vermin or insect infestation.
- This Warranty does not cover damage caused by:
  - · Cosmetic damage such as to the exterior finish;
  - Minor imperfections within design specification that do not materially alter functionality;
  - Use of products, equipment, accessories, installations, repairs, external wiring or connectors not supplied or authorised by EngineSafe or any defects not notified to EngineSafe within the Warranty Period.
  - Misuse or abusive use of the consumer product, including breakage of the liquid crystal display (LCD);
  - Incorrect operation or not following the operation instructions (as stated in the Product Manual or manufacturer's instructions provided with their product)
  - Improper shipment, delivery or installation;
  - Incorrect or improper maintenance or failure to maintain the product;
  - · Failure to clean or improper cleaning of the product;
  - Incorrect voltage or non-authorised electrical connections;
  - Exposure to excessive heat, moisture or dampness;
  - Exposure to abnormally corrosive conditions;
  - Use of non authorised/non-standard, defective or incompatible parts;
  - Repair, modification or other work carried out on the product other than by Authorised EngineSafe Service Personnel.

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WARR	ANTY	FORM
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### **CONTACT DETAILS**

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Name:

Address:

City:

State:

Phone:

Email:

**Purchase Date:** 

Fault Description:

\*Must include copy of purchase receipt

Postcode: Mobile:

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