Silicon Marine

Marine Exhaust Temperature Alarm. Model: SM017G

INTRODUCTION

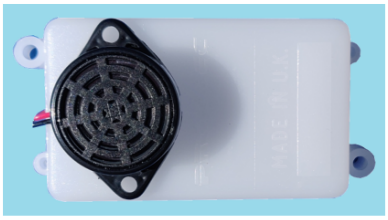
Marine water cooled exhaust systems are designed to withstand temperatures of up to about 120°C. However the exhaust gases from the engine may reach in excess of 450°C. In order to protect the exhaust system it needs a continuous flow of cooling water from the engine, should this flow be interrupted by debris being sucked into the intake or by a problem with the water pump or simply forgetting to open the seacock then the exhaust temperature will start to rise immediately. Depending on the extent of the blockage the increased temperature can cause seriously damage the exhaust system and water lock. The engine water temperature and/or oil temperature alarms will eventually alert you, however there can be a considerable time lag especially if the engine has been started from cold which means that damage may already have be done.

In order to protect the exhaust components and provide the earliest possible warning you need measure the temperature INSIDE the exhaust. Systems which measure the outside temperature will inevitably be delayed as the heat has to make its way through the exhaust components.

This product uses a quality stainless steel in-exhaust probe containing a platinum wire sensor. The control unit allows the exhaust temperature to be monitored and the alarm point set to a temperature appropriate for your engine.

Note: Exhaust temperature alarms protect the exhaust system components not the engine; you will still need the engine water/oil temperature alarm.

COMPONENTS



Kit Components

(Cables not shown)

SENSOR INSTALLATION

The sensor has been designed so that it can be fitted without the need to dismantle any of the exhaust system components.

The clamp is suitable for exhaust hoses up to 6” diameter, cut the steel band to size making sure you leave enough overlap and make sure the cut end has no burrs else it will be difficult to feed through the worm drive.

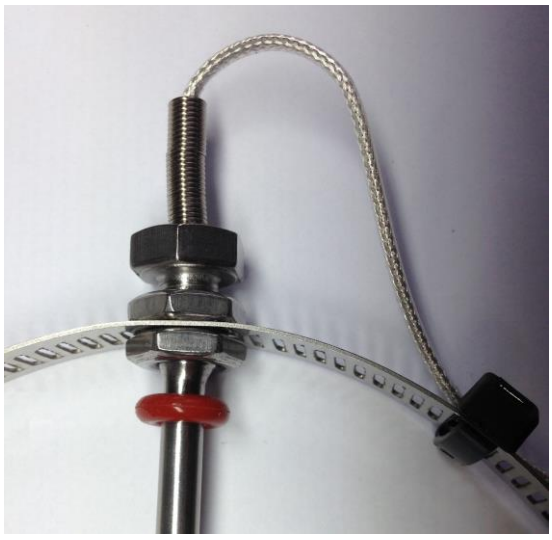
Assemble the sensor as shown, tighten the nuts firmly. No thread should protrude below bottom nut (see picture).

Select a point on the hose about 150mm or more downstream from the water injection point. Drill a 4mm hole avoiding the steel reinforcement rings (If you have a horizontal hose it is preferable to mount the sensor on the top). Push the sensor through the hole into the exhaust pipe and secure firmly.

The sealing O ring should make a good waterproof seal; if in doubt add a little silicon sealant.

Use a cable tie to secure the cable to the hose clamp as shown.

Type ‘A’ (in-Hose)



The sensor has been designed so that it can be fitted without the need to dismantle any of the exhaust system components.

Cut the steel band to size making sure you leave enough overlap, make sure the cut end has no burrs else it will be difficult to feed through the worm drive.

Assemble the sensor as shown in the picture, tighten the nut firmly.

Select a point on the riser about 150mm downstream from the water injection point and tighten the band to secure firmly.

Use a cable tie to secure the cable to the hose clamp for strain relief.

Type ‘B’ External

This sensor is intended for engine block temperature monitoring although it can equally be used for exhaust temperature.

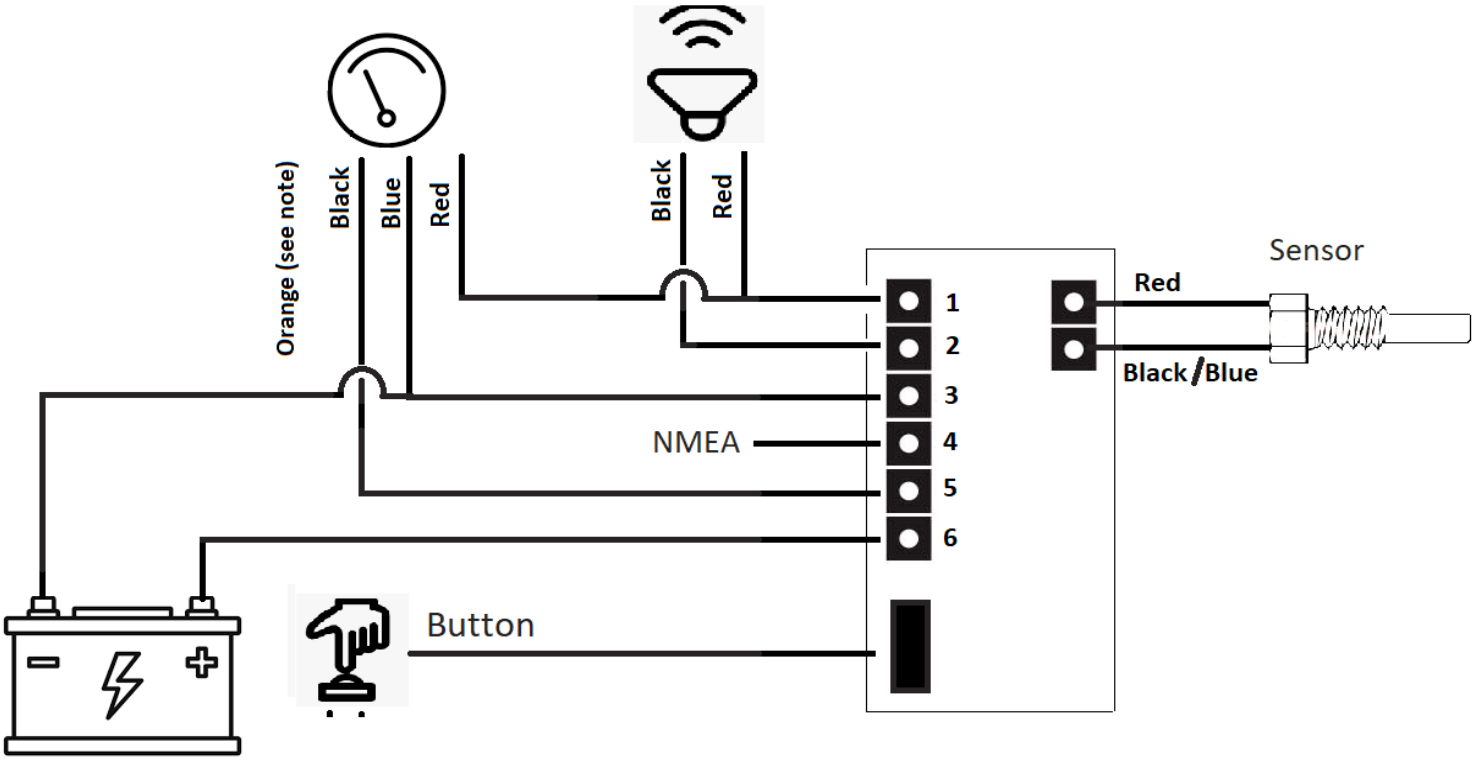
When choosing a position for the sensor you should find a location associated with the water circulation, i.e. thermostat, heat-exchanger, pipes, water-pump (not the sea water pump), these contain coolant water and therefore when the engine is running normally should remain well under the 200c display limit else the water would have already turned to steam and the alarm should be sounding. The sensor is an M8 ring that is designed to be held in place by an existing engine bolt.

Use a cable tie to secure the cable for strain relief.

Note:
The maximum temperature that the displays can read is 200c although this is not the maximum that the sensors can withstand. There are parts of the engine which during normal operation can exceed these temperatures, for instance the exhaust manifold. The sensor must not be attached to any of these areas.

Type ‘C’ Engine Bolt-on

INSTALLATION



Notes:

- Fit the connector into the back of the gauge before mounting it as this will make it easier later.
- The gauge orange wire controls the gauge backlight which is can be permanently connected to +Battery or via an instrument panel lighting switch.
- If NMEA is unused leave disconnected.
- Both the gauge and button are suitable for outside mounting, however the buzzer should be mounted behind the panel in the dry. The buzzer is often attached to the top of the junction box using the adhesive pad on the back.
- The gauge power must come from the same source as the control unit (as shown) so that they are both powered up at the same time, this is because the software looks for the gauge when power is first applied.
- The Pin 6 on the connector board is marked +12v however it can be connected to a 24v supply.

The gauge is standard size and requires a 2" (51mm) hole, the external button requires a 22mm hole.

When the alarm sounds the buzzer (Connector 2) is pulled to ground via an internal 350mA self-resetting fuse. If you add your own buzzer or an addition buzzer then please ensure that it is **piezo buzzer and not a mechanical buzzer** and that it draws less than 350mA.

The sensor wires are not polarity sensitive and therefore may be connected either way round. If you extend the sensor wires then it is important that the joints are soldered as a poor joint will affect the temperature reading.

The control unit contains two internal self-resetting fuses on the power input and alarm/gauge output. If you wish to include your own in-line fuse then this should be 1A

If you connect a gauge other than the one supplied there is no guarantee that it will read correctly, unfortunately there is no standard where water temperature gauges are concerned.

INITIAL SYSTEM TESTING

When you power up the unit the button will illuminate and the gauge will read the current alarm temperature, after a few seconds the button light will go out and the gauge will start to display the current exhaust temperature.

During normal operation the button light should remain off, if the button shows a steady red then this indicates a sensor error and you need to check the sensor wiring. A sensor error is also indicated by the gauge needle pulsing between 40°C and 60°C. To check the sensor use an ohm meter, the resistance should be about 1100 ohms at 25°C and there should be no continuity between the sensor wires and the sensor housing. If you want to check the sensor operation by heating it use hot water never use a flame.

To test the alarm hold the button down *immediately after powering up*. To cancel the alarm press the button again after waiting at least 5 seconds.

You can see the current alarm temperature by pressing the button for about 5 seconds, the buzzer will make a short beep and the gauge will display the current alarm temperature. Release the button immediately after you hear the beep or you may accidentally enter the alarm setting mode. After a few seconds the gauge will return to normal operation.

People are often surprised at how low the exhaust temperature is when the cooling system is working effectively, especially in cold northern waters, It is not uncommon for the gauge to barely move.

ADJUSTING THE ALARM TEMPERATURE

Determining the alarm point for an engine that gives the fastest response whilst eliminating false alarms can be difficult. Most exhaust temperature alarms don't attempt to do it and simply use a 'one size fits all' approach. These will normally sound the alarm when the temperature is about to reach critical, normally requiring you to switch the engine off immediately.

Being able to set the alarm temperature lower gives you more time to respond and warns you well before exhaust damage has started to occur. The gauge is supplied with the alarm temperature set to 95°C which is ok for most engines, however setting the temperature closer to the actual maximum running temperature is preferred as this will give a quicker response and it can also detect small changes in temperature such as losing an impeller blade. It is recommended that you set the alarm temperature at least 20°C above the engines normal working temperature to prevent false alarms.

When setting the temperature first run the engine until you believe that it is up to its normal working temperature and make a note of the gauge reading, the alarm temperature should then be set to 20°C above this.

To set the alarm temperature press and hold the button, after about 5 seconds the gauge will display the current alarm temperature and the buzzer will beep. (If you don't want to change the value release the button at this stage). Keep holding the button down and after a few more seconds the gauge will start to increment in 5°C steps, when the gauge reaches maximum it will reset to 40°C and then start to increment again. When the gauge is displaying the required alarm temperature release the button. After a few seconds the button will flash rapidly to indicate that the new alarm temperature has been set and the gauge will then return to normal operation.

Note:

- When the alarm sounds the temperature must fall 5°c below the alarm setting for the alarm to turn off.
- You can suppress an alarm by pressing the button, if after 2 minutes the temperature is still too high the alarm will sound again.

NMEA

The alarm outputs NMEA 0183 data containing the current exhaust temperature in centigrade.
It also includes the MTW format as you may wish to substitute sea water temperature for exhaust temperature on your instrumentation as not many displays can use the XDR format.

$IIXDR,C,25.0,C,SM014,*xx <CR> <LF> where 25.0 is the temperature, C is Centigrade and xx is the checksum.

$--MTW,25.0%d.0,C, *xx <CR> <LF> where 25.0 is the temperature, C is Centigrade and xx is the checksum.

Baud rate: 4800,N,8,1

Note: If there is a sensor error then no data is output.

Specifications

Supply Voltage: 8 – 28v DC, 55mA (no alarm)

Two internal self-resetting fuse

Sensor Temperature range: -50 - + 250°C

Gauge Range: 40-120°C

Alarm Range: 40-120°C

Temperature probe: A4 Marine grade stainless steel with PT1000
Platinum wire sensor 5.0mtr cable.

NMEA Calibration: +/- 1°C
Gauge Movement +/- 5°C

NMEA: NMEA 0183, 4800,N,8,1

Alarm Output: Ground connection, 350mA max, internal self-resetting fuse

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