

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 been 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



SENSOR INSTALLATION

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.

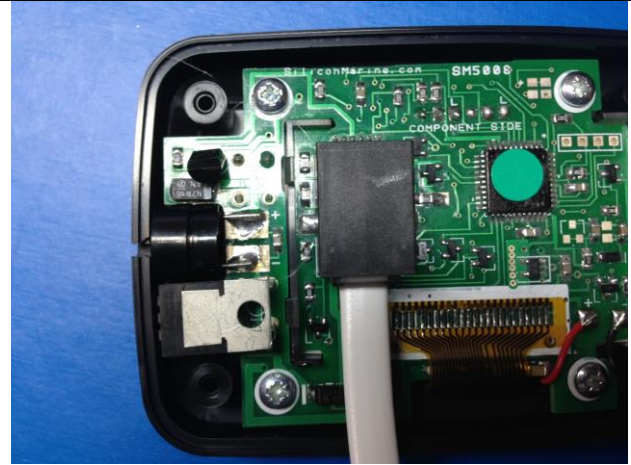
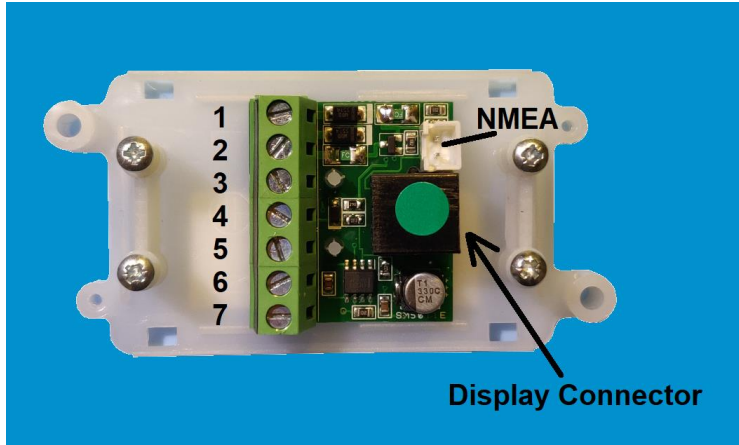
Assemble the sensor as shown, the shake proof washer should go above the steel band, tighten the nuts firmly. No thread should protrude below bottom nut (see picture).

Select a point on the hose about 150mm 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.





The Sensors, power and external alarm connect via a junction box which then connects via a single cable to the display unit. The junction box would be situated close to the engines.

Dual engine wiring is as follows

1. +12v from port engine ignition
2. +12v from starboard engine ignition
3. External alarm (positive)
4. Ground wire
5. Sensor 1 (port)
6. Sensor 1 / Sensor 2 common
7. Sensor 2 (Stbd)

Single engine wiring is as follows

1. +12v from engine ignition
2. No connection
3. External alarm (positive)
4. Ground wire
5. Sensor 1
6. Sensor 1
7. No Connection

2pin Connector, NMEA Output

Display Cable

The display is connected to the junction box with the cable that is supplied with the kit.

A 50cm and 5m cable are included, select whichever is most suitable.

To connect the cable to the display unit; open the back of the display and plug the cable in as shown in the picture below.

Make sure you push the cables in **until they click**, test by pulling gently on the cable that they are locked in position.

Should you require a longer length cable then these are available from Silicon Marine or from a local electrical store.

The cable is a standard RJ12 6 core **UN-CROSSED** cable which is often used for telephone extensions and should be available locally.

External Alarm

The external alarm is connected between pin 3 (+) and pin 4 (-)

An additional external is supplied with the kit for mounting at any convenient location and is often mounted on the outside of the junction box.

If you wish to add your own alarm (or even a third alarm) then please observe the following; use a 12v piezo self-resonating sounder with a current consumption of less than 300mA, do not use electro mechanical buzzers as these often cause electrical interference. A low power relay may be connected to the alarm output if required.

Fuses; the control unit contains internal self-resetting fuses on the supply and alarm output, therefore it does not require external fuses. Should the internal fuse fail it will be automatically reset when the overload is removed or the power turned off.

INITIAL SYSTEM TESTING

Apply power to the unit by switching on the ignition, the display should light up and the screen display the exhaust temperature as shown in the pictures below). There is no on/off button so the unit will be on whenever the ignition is on.

If one of the sensors displays the message 'Sensor Error' then check the connections going to the sensor are correct. Sensor 1 (port) is between connector pins 5 & 6 and Sensor 2 (stbd) is between 6 and 7. If this looks correct check the resistance of the sensors, it should read between 1000 and 2000 ohms.

Check that the alarms sound by selecting the 'Alarm Test' option from the menu. To access this hold down the UP Arrow for 3 seconds then release the button, the screen will then display a menu. Scroll down the menu using short presses on the Down Arrow key to select 'Alarm Test' then press the Up Key for about 1 second (a longer press on the key acts like an 'ENTER' key) . The alarm will now sound, check that both the displays internal alarm and external alarms sound. To turn off the alarm press any key.

The Exhaust alarm is now ready to be used, the initial alarm temperature is set to 95°C (203°F) which is probably higher than it needs to be and this can be adjusted after the first trial with the engine running.

Setting the alarm temperature

It is important that you adjust the alarm temperature following the first trial with the engine running. If the temperature is set too high then the response to a cooling water loss will be slower than it needs to be and if set too low will possibly give false alarms when the engine is running hard.

The display keeps track of the maximum recorded temperature for each engine, after running the engine for sufficient time to bring it up to its normal working temperature, add 20°C (68°F) to the maximum temperature and use this for setting the alarm temperature. (Each engine has its own alarm setting).

See the section below for how to navigate the menus and set the alarm temperature.

When the alarm sounds it can be momentarily silenced by pressing any key. If the temperature is still high after 2 minutes then the alarm will sound again. The temperature must fall 5° (9°F) below the alarm temperature for the alarm to turn off.

Display symbols



Dual Display



Single Display



Alarm temperature, audible alarm enabled

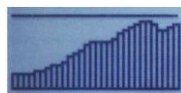
70



Alarm temperature, audible alarm disabled

↑ 67

Maximum recorded temperature



Temperature graph displaying temperature over time.

The line represents the alarm point above which the alarm will sound.



Led indicators show status for each engine sensor
Green indicates = OK, Steady Red = Sensor Error

Flashing red = Temperature Alarm

Function key operation

The display unit has two function keys '**UP**' and '**Down**' and depending on how long the key is pressed determines its function. With a short press (less than a second) the keys performs like up/down buttons for selecting items from a menu. A longer press (1 second or more) on the '**UP**' key acts like an '**ENTER**' key for selecting an item, whilst a long press on the '**DOWN**' key acts like an '**ESC**' key for exiting.

In addition to this when the unit is in its normal operation mode and displaying temperatures, a three second press on the '**UP**' key is required to enter the setup menu and a long press on the '**DOWN**' key is a short-cut to the backlight control.

On the dual display unit a short press on the '**UP**' key momentarily displays the maximum recorded temperate in place of the PORT and STBD text.

Menu options

When the unit is in its normal operation mode and displaying temperatures the *System Menu* can be accessed by pressing the '**UP**' button for three seconds. To exit the menu or return to a previous menu press the down button for at least 3 second this acts like an '**ESC**' key.

The menu structure is as shown below. Example; to select Sensor 1 alarm temperature first select '*Sensor 1*' which will then display a sub menu, then select '*Alarm Temp*'.

Main Menu

- Sensor 1
 - Alarm Temp (Temperature at which the alarm will sound)
 - Alarm Enable (Disables/enables the audible alarm)
 - Name (Change the displayed name for the sensor, i.e. Main/Aux/Gen etc.)
- Sensor 2
 - Alarm Temp
 - Alarm Enable
 - Name
- System Config
 - Backlight (Maximum backlight brilliance, it will auto-dim at night)
 - Night Threshold (Determines when unit dims display for night mode)
 - Contrast (Display contrast setting)
 - Update Rate (Update rate for the graph, 15/30/60 seconds per division)
 - Units (Centigrade / Fahrenheit)
 - NMEA (Enable / Disable \$MWT sentence)
 - Info (Displays software/firmware versions)
 - Sensor Enable (Disable a sensor, the display will no longer show the sensor nor will the alarm sound)
(Not available on single sensor model SM007S)
- Reset Stats (Resets the maximum sensor temperature display to current temperature also resets the graph)
- Alarm Test (Tests the internal and external alarm, press any key to cancel)

**** 12v version only ****

The displays output NMEA data containing the current exhaust temperature in centigrade from the 2pin connector in the sensor connector box.

A cable has been supplied for this purpose.

The data format is as follows:-

\$IIXDR,C,25.0,C,SM007A,*xx <CR> <LF> where 25.0 is the temperature, C is centigrade, xx is the checksum

4800 baud, No parity, 1 stop

In addition to the above the unit can also output the temperature as meteorological data as some systems are able to display this.

On the dual engine unit this will only be for the port engine as this standard does not allow for two separate sources.

\$--MTW,25.0,C,*xx <CR> <LF> where 25.0 is the temperature, C is centigrade, xx is the checksum

4800 baud, No parity, 1 stop

Spares

Part Number	Description
SM007/D	Complete Dual Marine Exhaust Temperature Alarm Kit
SM007/S	Complete Single Marine Exhaust Temperature Alarm Kit
SM5002	Temperature Sensor
SM5006	Temperature Sensor Retaining Clip
SM5016	10m Extension cable

Specifications

Supply Voltage: 9 – 16v DC, 28mA (no alarm) 80mA internal alarm sounding.
9 – 28v DC (24v Version)

Sensor Temperature range: -20 - + 250°C (display will only show 0- 200°C)

Temperature probe: Marine grade stainless steel with platinum wire sensor
3.0m cable rated at 260°C

Calibration: +/- 1°C self-calibrating.

Alarm range: 0 - 199°C user adjustable in 2°C steps.

Alarm Output: +12v out when alarm sounds, 0.5A max.

Fuse: Internally fused with self-resetting fuses

Designed and Manufactured in the United Kingdom

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