Digital Marine Exhaust Temperature Alarm Model: SM007B D/S B2

INTRODUCTION

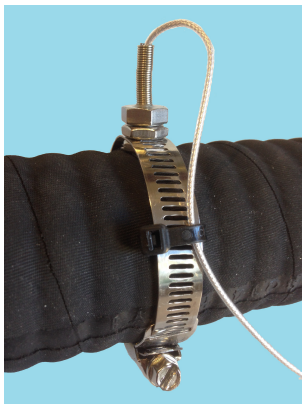
Marine water cooled exhaust systems are designed to withstand temperatures of up to about 120°C. However the exhaust gases from the engine may reach in excess of 450°C. In order to protect the exhaust system it needs a continuous flow of cooling water from the engine, should this flow be interrupted 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



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.

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.

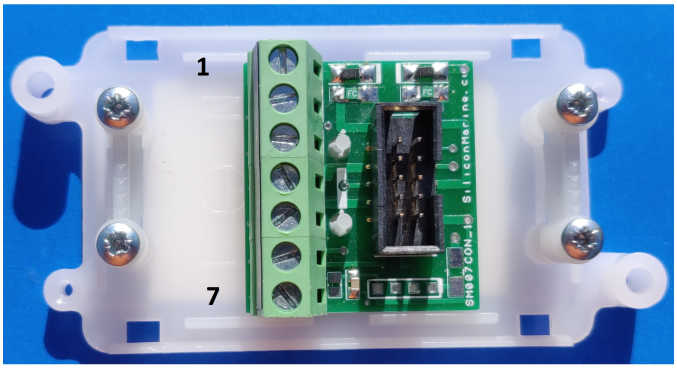
When choosing a position for the sensor you should find a location associated with the water circulation, i.e. thermostat, heat-exchanger, pipes, water-pump (not the sea water pump), these contain coolant water and therefore when the engine is running normally should remain well under the 200c display 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.

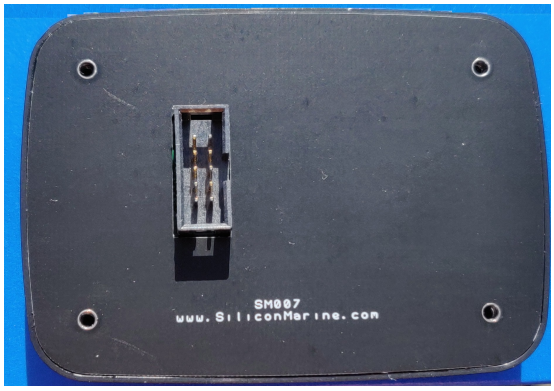
Use a cable tie to secure the cable for strain relief.

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





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

Dual engine wiring is as follows

1. +12v Battery supply (also alarm positive)
2. External alarm negative
3. Battery negative
4. NMEA output
5. Sensor 1 (port)
6. Sensor 1 / Sensor 2 common
7. Sensor 2 (Stbd)

Single engine wiring is as follows

1. +12v Battery supply (also alarm positive)
2. External alarm negative
3. Battery negative
4. NMEA output
5. Sensor 1
6. Sensor 1
7. No Connection

External alarm connects between pins 1 and 2

The sensor wires are not polarity sensitive, therefore the sensor wires may be connected either way round.

Display Cable

The display is connected to the junction box using the cable supplied with the kit.
It does not matter which end of the cable is connected to the display, they will only go one way.

Should you require a longer length cable then these are available from Silicon Marine.

External Alarm

The external alarm is connected between pin 1 (+) and pin 2 (-)
The alarm comes with a self-adhesive pad and can be mounted on top of the connector box or brought out to just behind the display panel.
If you wish to add your own alarm (or additional alarm) then please observe the following; use a 12v/24v 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 is 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.

Mounting
The display is designed to be panel mounted with the cable out of sight and extending to the rear.
A cutting template has been supplied to help when drilling the holes.

The display is waterproof from the front, but if water is likely to get behind the unit and possibly to the connector then it is advisable to smear some sealant on the rear before mounting.

Mounting screws have been supplied which may need to be cut to length.
To make a 'blind' installation easier where it's difficult to get behind and tighten the screws, wing nuts have been provided.
Insert the thread containing the washer and wing nut until it is finger tight, then use the wing nut to hold the unit firmly in place.

INITIAL SYSTEM TESTING

Apply power to the unit and 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 power is on.

If any 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 about 3 seconds until the menu is displayed. 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 long press on the key acts like an '*ENTER'* key) . The alarm will now 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, this can be displayed by a short press on the *'UP'* key. After running the engine for sufficient time to bring it up to its normal working temperature, add 20°c (68f) to the maximum recorded 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.

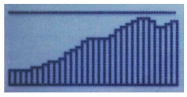
When the alarm sounds it can me momentarily silenced by pressing any key. If the temperature is still high after 2 minutes then the alarm will sound again. The temperature must fall 5° (9°f) below the alarm temperature for the alarm to turn off.

Display symbols

Dual Display

Single Display

70 Alarm temperature, audible alarm enabled



Temperature graph displaying temperature over time.

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

X 70 Alarm temperature, audible alarm disabled

Led indicators show status for each engine sensor

Green indicates = OK, Steady Red = Sensor Error

↑ 67 Maximum recorded temperature

Flashing red = Temperature Alarm

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 alarm and the leds should show RED, press any key to cancel)

The displays output NMEA data containing the current exhaust temperature in centigrade.

The data format is as follows:-

Port:-

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

Starboard:-

$IIXDR,C,25.0,C,SM007B,*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

Specifications

Supply Voltage: 8 – 28v DC, 28mA (no alarm) 80mA alarm sounding.

Sensor Temperature range: -20 - + 250°C (display will only show 0- 200°C)
Temperature probe: Marine grade stainless steel with platinum wire sensor with 5.0m cable

Calibration: +/- 1°C self-calibrating.
Alarm range: 0 - 199°C user adjustable in 2°C steps.
Alarm Output: Connected to ground when alarm sounds, 0.3A max.
Fuse: Internally fused with self-resetting fuses

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