Marine Exhaust Temperature Alarm. (Dual Engine) Model: SM013

INTRODUCTION

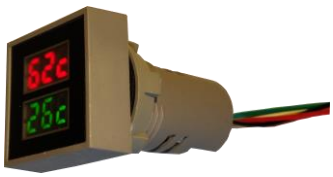
Marine water cooled exhaust systems are designed to withstand temperatures of up to about 150°C. However the exhaust gases from the engine may reach in excess of 450°C. In order to protect the exhaust system it needs a continuous flow of cooling water from the engine, should this flow be interrupted 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 each engine.

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

COMPONENTS



Hole size 22mm

Alarm buzzer

Kit Components

(Cables and connectors 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.

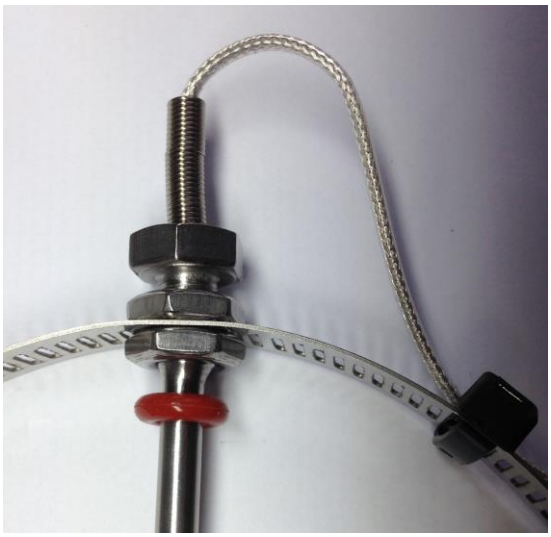
The clamp is suitable for exhaust hoses up to 6” diameter, cut the steel band to size making sure you leave enough overlap. Make sure the cut end has no burrs else it will be difficult to feed through the worm drive.

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

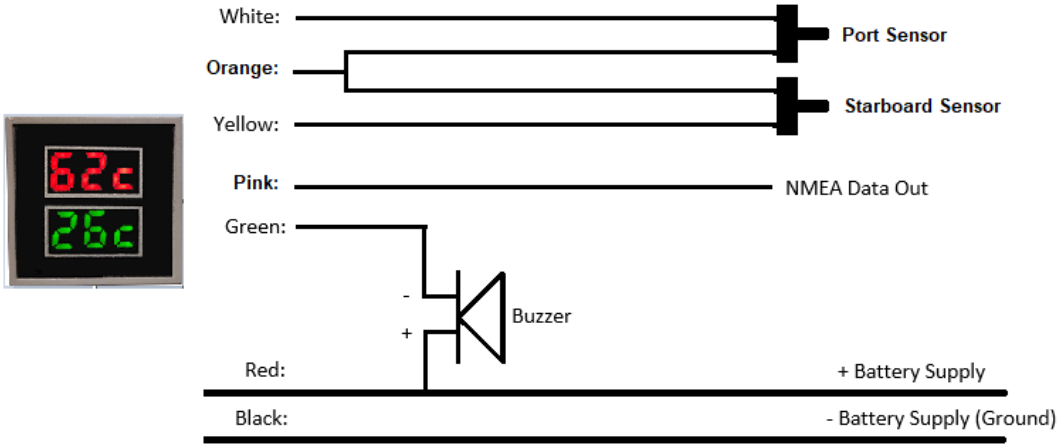
Select a point on the hose about 150mm or more downstream from the water injection point. Drill a 4mm hole avoiding the steel reinforcement rings (If you have a horizontal hose it is preferable to mount the sensor on the top). Push the sensor through the hole into the exhaust pipe and secure firmly.

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.



INSTALLATION



7 way cable connections

Red:	+ Battery Supply (+12v)
Black:	- Battery Supply (Ground)
White / Orange:	Port Temperature Sensor
Yellow / Orange:	Starboard Temperature Sensor
Green:	Alarm OUT (Buzzer)
Pink:	NMEA Data

The display requires a 22mm hole.

The sensors are connected to the White/Orange and Yellow/Orange wires with orange being common to both. The sensors are not polarity sensitive and can be wire either way round. If extending the wires please ensure that you solder the connections as a poor connection will affect the temperature reading.

The buzzer is not waterproof and should therefore be mounted behind the panel, please ensure you observe the +/- polarity.
When the alarm sounds the green wire is internally shorted to ground via a self-resetting 160mA fuse. If you add your own alarm please ensure you use a piezo sounder not a mechanical buzzer as mechanical buzzers cause a lot of interference.

Power is connected to the display via the Red (+) and Black (-) wires, you may choose to include a fuse in the power line however the display includes an internal self-resetting fuse on the power line and alarm output.

The unit has been supplied with screw terminal block which can be used for connecting wires to the display, you will also have been supplied heat-shrink tubing. The preferred method of joining the wires is to solder them and slip heat-shrink tubing over the joint.

NMEA data output is available on the pink wire. If you intend to use the NMEA please read the separate section otherwise leave this unconnected and ensure it cannot come into contact with anything.

INITIAL SYSTEM TESTING

When you power up the unit the display will show the current alarm temperature for each engine, it shows 'AL-' followed by the temperature in degrees 'c'. Example "AL-95c". The display will then show the highest recorded temperature for each engine, 'Hi-47c'. After a few seconds the display will clear and then begin to show current exhaust temperature.

If the display shows 'Err' then this indicates a temperature sensor error and you need to check the sensor wiring. Sensors should show a resistance of about 1100 ohms at 25c.

If the display shows "---" then it is in slave mode and unable to communicate with a master, this is not how the unit is shipped and this should only happen if you have specifically wired it to be a slave. (see section on slave displays).

Assuming the display is showing a reasonable temperature for both engines you can now test the alarm, this is done by reducing the alarm temperature below the current exhaust temperature. Follow the instructions below (function menu) for setting the alarm temperature. If the current exhaust temperature is 25c and you set the alarm temperature below this then the alarm will sound and the display will flash 'AL-25c' (AL = Alarm indication followed by current temperature). It is only necessary to check the alarm on one engine as both engines use the same circuitry.

Touching the front of the display will silence the audible alarm for 2 minutes.

Set the alarm temperature back to 95c, then once you have run the engines until they have reached normal working temperature make a note of the highest recorded temperature (it will show this on start-up, example 'Hi-57'). Now set the alarm for each engine to 20c above its highest recorded temperature.

If you ever need to check the sensor use an ohm meter or hot water, NEVER USE A FLAME

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 it to be below 50c.

Note: When the alarm sounds the temperature needs to drop 5c below the alarm temperature to turn off.

Function Menu

The menu is accessed by touching the centre of the display, the button is 'capacitive touch' not pressure sensitive so you don't need to push. You will need to use a bare finger and not be wearing gloves. To prevent accidentally activating the menu there is a sequence that needs to be followed: Firstly the menu is only accessible for 2 minutes from the time of switch-on *, secondly you must touch the front of the display three times within 3 seconds for the menu to become active (hold about half a second for each touch). The menu has 6 functions, two of them 'Bri' and 'Clr' effect both engines, where 'AL-' and 'EN-' will be displayed on either the red or green display and will only effect the port or starboard engine.

The menu functions are shown below:-

- **Bri** :- Sets brightness.
- **AL-** : Shown on the red display sets port engine alarm temperature, shown on green display sets starboard.
- **Clr** : Clears highest recorded temperature for both engines.
- **En-** : Enables/Disables port or starboard displays and associated alarm function.

To scroll through the menu options touch the front of the display. Each time you touch it will change to the next option in a continuous loop. To changing the display brightness for example; select '**Bri**' then, touch again but this time hold your finger down for about two seconds till the display flashes. You will then see the current brightness level, 1-5. Now each time you touch the setting will change and when it gets to 5 it will return to 1. When finished don't touch the display and in about 5 seconds it will show 'End' and return to normal operation. You can only change one menu item at a time.

Changing the alarm temperature is the same as above, the alarm temperature range is 10c – 195c. Both port and starboard engines have independent alarms.

The En- option allows you to enable/disable either port or starboard displays, when OFF the display will be blanked.

You can only set one menu option at a time, when you have finished leave the display and after about 5 seconds the display will show 'End' and return to normal. Note: changes are not saved until the display returns to normal so don't turn the unit off until this happens.

When the menu is locked it will display 'Loc' and only turning it off and on again will unlock it.

* The 2 minute menu lockout does not apply when you are in the menu and is reset each time you exit therefore giving you another 2 minutes if you want to change another setting.

NMEA

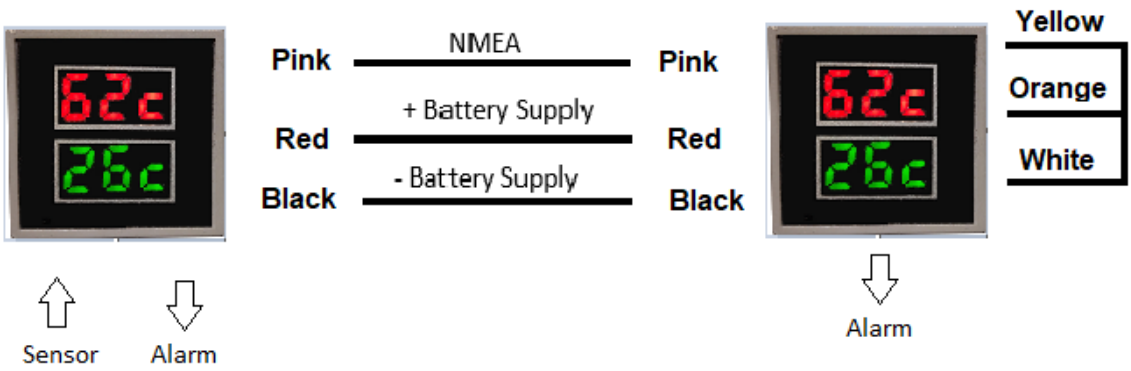
The display outputs NMEA data containing the current exhaust temperature in centigrade on the pink wire, the data format is as follows:-

$XDR,C,25.5,C,SM013A,*xx <CR> <LF> where xx is the checksum (port SM013A, Starboard SM013B)

4800 baud, No parity, 1 stop

The primary function for the NMEA data to link exhaust alarms together as a master/slave to enable dual position monitoring, however the data can be used to display the temperatures on other instrumentation provided they are able to handle it.
The current range of Silicon Marine alarms that can be linked are SM010, SM007, SM013 and SM014 but it is always best to check as specifications can change.

Slave Displays



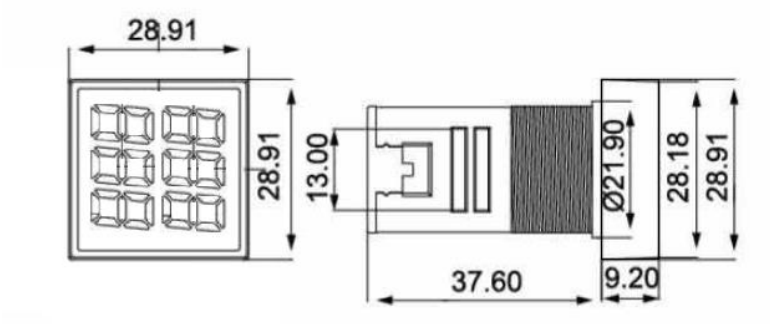
You may connect additional displays to work as slaves, slave displays do not directly connect to the temperature sensor but instead get their information from the 'master' via the NMEA (pink wire). When wiring a slave display use a three core cable to connect the two displays together, that way they get their power and ground connection from the same point.

On the slave display short the Orange, Yellow and White wires together and insulated them so they cannot touch anything else, the display looks for this configuration to determine if it is a slave.

The display on a slave will show '---' until it receives data from the master.

If you change the menu settings on the master or slave it will automatically change them on the other unit with the exception of brightness. It is not possible to have different settings on the displays, they will always be the same.

If the alarm sounds on the master it will also sound on the slave.



Specifications

Dual Engine

Supply Voltage: 7 – 20v DC, 40mA (no alarm) Internal 160mA self-resetting fuse

Sensor Temperature range: -20 - + 250°C (0-199°C read range)

Temperature probe: A4 Marine grade stainless steel with platinum wire sensor and 3.0mtr cable.

Calibration: +/- 1°C

Alarm range: 5 - 195°C user adjustable, independent for each engine

NMEA: NMEA 0183 4800 baud.

Alarm Output: Ground connection, 160mA max, internal self-resetting fuse

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Designed and Manufactured in the United Kingdom