



 Hallberg-Rassy 34.2

# SYSTEMS MANUAL



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### RAFSA(O) HR 34.2 SYSTEMS MANUAL

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## INTRODUCTION

1. The purpose of this HR 34.2 Systems Manual is to explain the location, function and operation of the key systems and equipment on board RAFSA(O) HR 34.2 yachts. It supplements the [Hallberg Rassy Instruction Book – All Models 2016/2017](#), which is carried on board. This Manual supplements RAFSA(O)'s Safety Management Policy and our SOPs; it forms a critical component of the RAFSA(O) Document Set.

2. Both documents also form part of the vital handover information to the skipper and crew and **should** be used as a routine reference source. It is not designed to be exhaustive, rather it covers the key equipment on board that is not better covered by the manufacturer's manual e.g. the Raymarine Navigation suite. Further information is available from the yacht Oi/c or other RAFSA committee members, whose [contact details are in the Boat Folder](#).

2. Suggested amendments should be forwarded to the Training Principal at [trainingprinciple@offshore.rafsa.org.uk](mailto:trainingprinciple@offshore.rafsa.org.uk)

### **Preparation is key – a few thoughts to ponder**

*“Failing to prepare is preparing to fail”.*

John Wooden

*“Success occurs when opportunity meets preparation”.*

Zig Ziglar

*“I don't believe in luck, I believe in preparation”.*

Bobby Knight

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## CHAPTER 1 - BATTERIES AND BATTERY SWITCHES

1. The HR yachts are equipped with separate domestic and start batteries located under the lateral saloon seat amidships, forward of the saloon table. Both can be isolated by the Battery Isolation Switches accessed from wooden door, under the inboard end of the lateral saloon seat at the base of the mast post.



Battery switch compartment

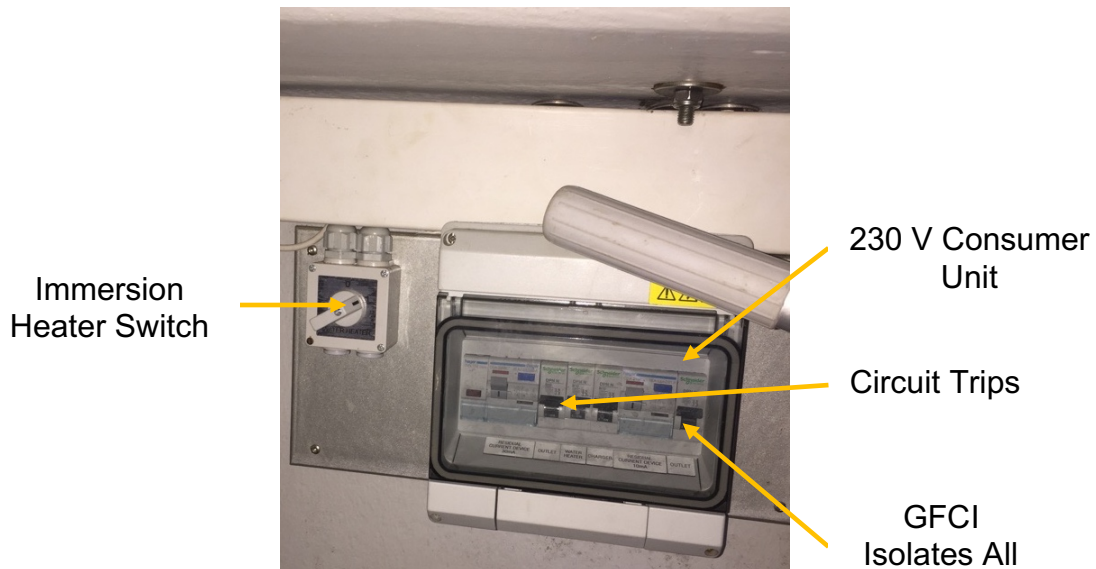


Battery master switches

2. **Charging.** Don't underestimate the time required to charge the batteries. Full charge may take up to 15 hrs using the engine, dependant on electrical load, or overnight if the yacht is plugged into shore power (charging is automatic. **DO NOT adjust the charger settings – irreparable damage can occur**). The alternator on the main engine will give full charge at 1300 rpm. The only volt metre is on the Furuno cockpit display; you will need to find the correct page. As a minimum, this should be checked daily before sailing, once shore power has been disconnected, ideally it should be checked and hourly when completing the ship's log. The voltage should not be allowed to exceed 14.2V and should not be allowed to fall below 11.5V. If this occurs; charge the batteries as soon as possible.

## CHAPTER 2 - 240V ELECTRICAL SYSTEM AND IMMERSION HEATER SWITCH

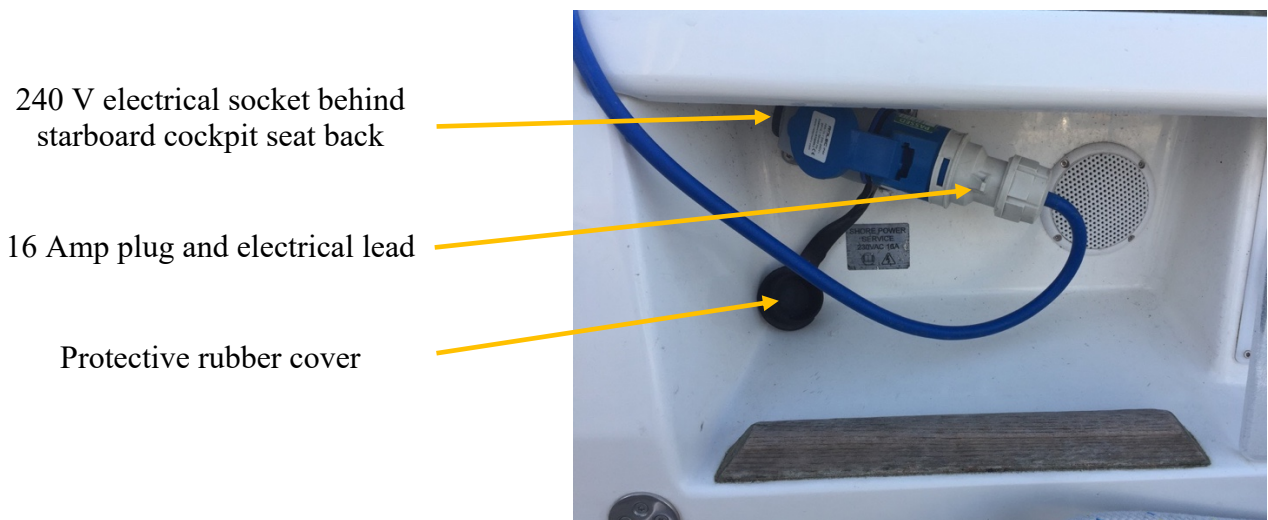
1. **Safety with 240 V on board.** The 230V system is fitted with an earth leak switch (residual current circuit breaker) and a number of combined switches and overload circuit breakers for the different outlets. The Ground Fault Circuit Interrupter (GFCI) switch is a safety device for preventing electric shock accidents if an electric lead should be touched; if it is triggered off, all outlets will be isolated. The GFCI is located on the electrical consumer unit, which is located inside the starboard cockpit locker, outboard. Try to re-engage by lifting the toggle switch after first breaking each of the circuit breakers.



230 V Electric Consumer Unit – Outboard Sdb Cockpit Locker

2. **Danger!** To minimise the risk of shock or fire:

- **Connect** the shore connection cable **on board first** before connecting it to the shore outlet.
- **Disconnect** the shore cable at the **shore outlet first** before disconnecting on board. Replace the rubber cap over the yacht's mains electric socket carefully.
- Use correct adapters to fit different shore outlets.





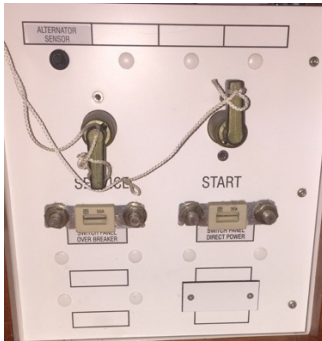
3. **Remember:** if there is no earth breaker ashore, the cable faults are not protected against electrical shock between the boat and the shore.

4. **Note:** The GFCI switch is so sensitive that rain or a damp connection can trigger it. Do not work on energized AC systems.

## CHAPTER 3 - ELECTRICAL SERVICES CONTROLS

### 12V

1. The battery isolation switches (engine start and domestic) are behind a wooden door, at the mast foot, in the forward saloon. The emergency engine start (connects the domestic battery to engine start circuit) is located on the aft side of the quarter berth hanging locker.



Battery Isolation Switches



Emergency Engine Start Battery Switch

2. With the battery isolation switches selected on, the 12V electrical services are controlled from the electrical services control panel outboard of the chart table. Switches and circuit breakers (push buttons with built in safety trip) are labeled and self-explanatory. The panel also houses:

- Fuel tank gauge
- Fresh water tank gauge
- Shore power light (illuminated when 230V connected)
- 12V lighter socket (there is also one in the quarter cabin)

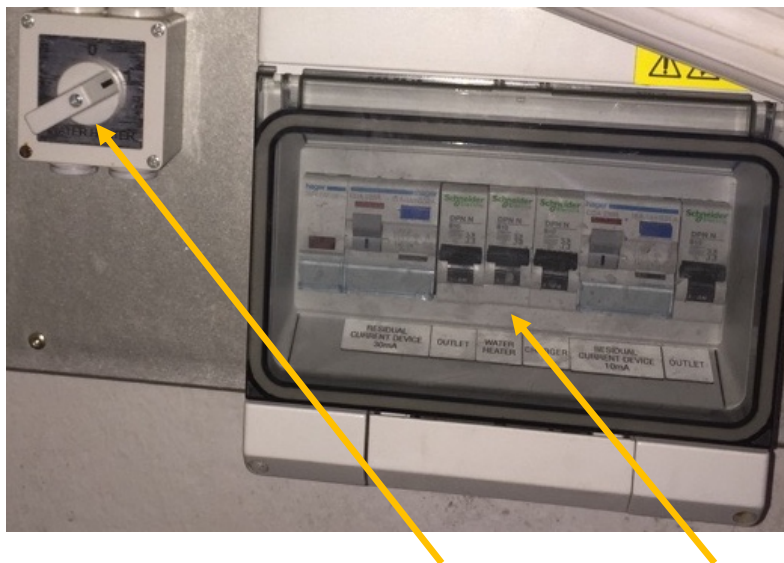


electrical services control panel

## 240V

3. The 230V consumer unit and water heater isolation switch is located in the starboard cockpit locker, outboard. They have built in residual current protection – see Safety Manual. Services are:

- 240V Sockets in saloon, galley and quarter berth
- Water heater with separate isolation switch
- Battery charger
- 2 residual current protection devices at 30mA and 10mA



230V Water Heater Isolation Switch and Consumer Unit

4. **Hot Water Supply.** The hot water tank (calorifier) is located beneath the sole boards in the starboard cockpit locker and provides all domestic hot water. Water is heated by a 240V immersion heater when plugged into shore power or by the engine when it has been running. Access to the Calorifier is shown below:



1. Starboard cockpit locker sole boards



2. Location of thermal cut out switch and Calorifier

5. **Failure of Hot Water Supply on Shore power.** In the event of a failure of electrically-heated hot water (not engine-heated), check the following:

- a. Check that the hot water is switched on at the rotary switch on the outboard wall in the starboard cockpit locker. If ON, the first course of action should be to cycle the switch and wait 20 minutes for a reaction.
- b. After cycling the switch and still no warm/hot water, although there is good flow from the hot water taps, it is possible that the thermostat has failed to control the temperature, followed by operation of the thermal cut-out protection switch. Proceed as follows:
  - Remove all contents of the starboard cockpit locker, leaving the floorboards fully exposed (1 above).
  - Remove the forward inner floorboard to expose the top of the hot water tank, (2 above). Check the tank is cold to the touch.
  - Press to reset the thermal cut-out on the top of the tank as shown in Photo C.
  - In all cases, please **report the fault to the OIC**, using the defects log in the **Boat Folder**.



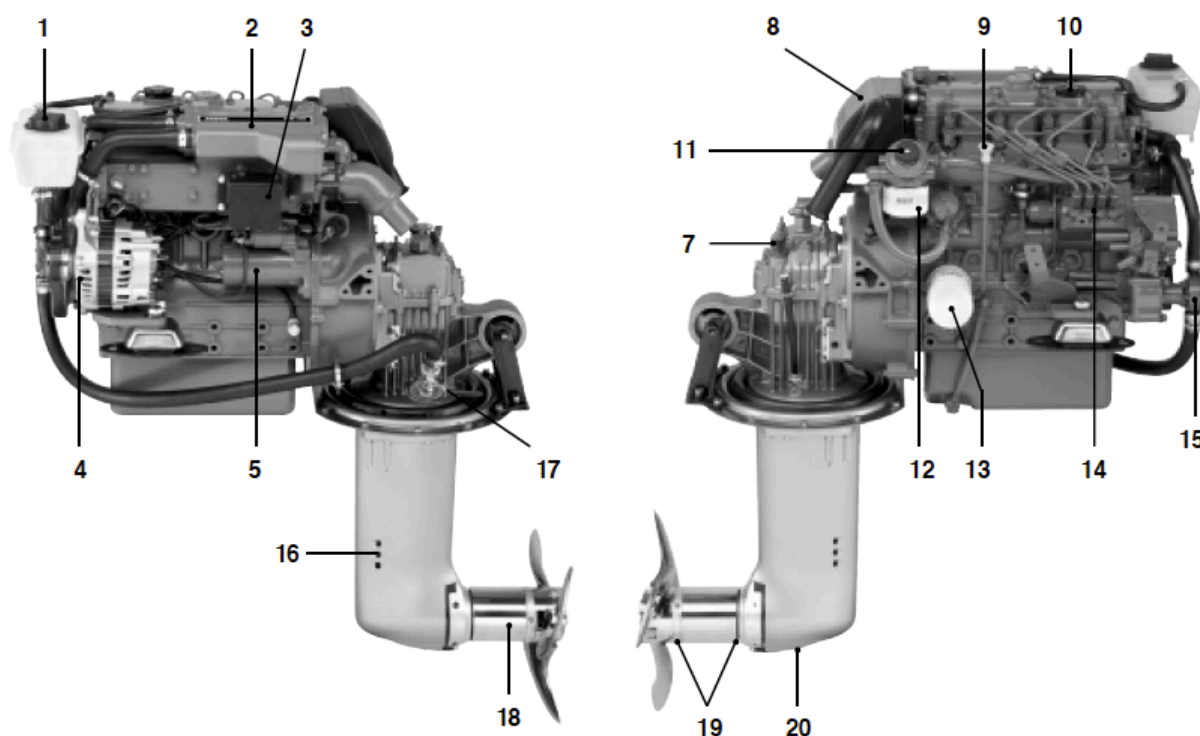
Thermal Cut Out Switch for Calorifier



## CHAPTER 4 - ENGINE AND GEARBOX COMPONENTS

### Overview

1. The pictures below set out the key components in the engine and gearbox compartments.
2. **Access.** Access to these areas is gained by:
  - Unlatching and lifting the companion way steps. **CAUTION: do not hang/store sail ties on the companion way hand holds – they jam the step.** The latch key is on a lanyard in the lower step storage compartment, port side.
  - Removing the access panel at the rear of the engine bay from within the quarter berth. **CAUTION: take care not to damage the inboard reading light.**
  - Lifting the inboard bunk mattress and base boards from the quarter berth
  - Removing the lower step
  - Removing the back panel to the lower step storage compartment
3. **Volvo Penta D1-30 Diesel Engine with Sail Drive – Main Components**



1. Coolant filler cap
2. Heat exchanger
3. Relay box with fuses
4. Generator
5. Starter motor
6. Oil cooler, reverse gear
7. Dipstick, reverse gear/S-drive

8. Air cleaner (ACL)/Air intake
9. Dipstick, engine
10. Oil filler cap, engine
11. Fuel pump
12. Oil filter
13. Fuel filter
14. Injection pump

15. Seawater pump
16. Cooling water intake, S-drive
17. Sea cock, S-drive
18. Folding propeller
19. Sacrificial anodes
20. Oil drain plug, S-drive

## Daily Engine Checks.

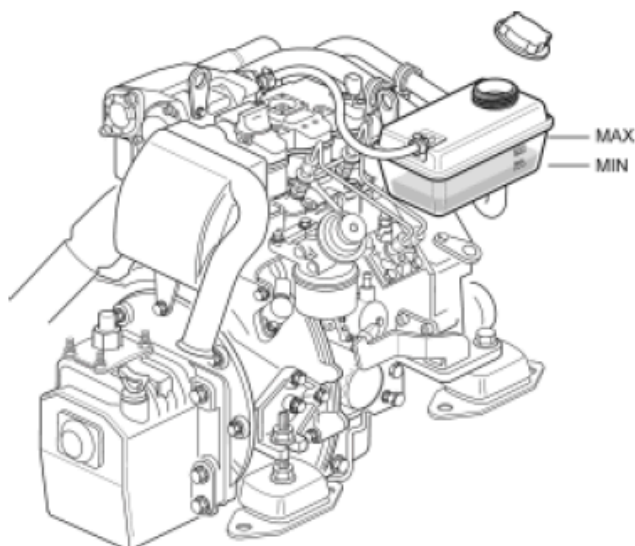


### Rotating parts and hot surfaces

#### **⚠ DANGER!**

Working with or approaching a running engine is a safety risk. Watch out for rotating components and hot surfaces.

4. **Water.** Check: seawater cock is open; coolant level; and seawater filter clean (**do not cross thread lid, it must seal or water flow fails, and engine overheats**);



### Coolant level. Checking and topping up

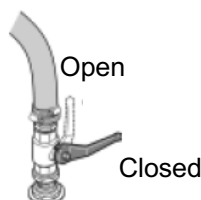
**⚠ WARNING!** Stop the engine and allow it to cool before opening the filler cap. Steam or hot coolant may spurt out. Hot coolant and hot surfaces can cause burns.

Turn the filler cap slowly counter clockwise and let any pressure escape from the system before removing the cap. The coolant level should be between the MAX and MIN marking on the expansion tank, when the engine is cold. Top up coolant if necessary. Reinstall the filler cap.

**⚠ IMPORTANT!** When filling a completely drained system the coolant level must be checked after an hours use because the system is self bleeding. Top up if required.

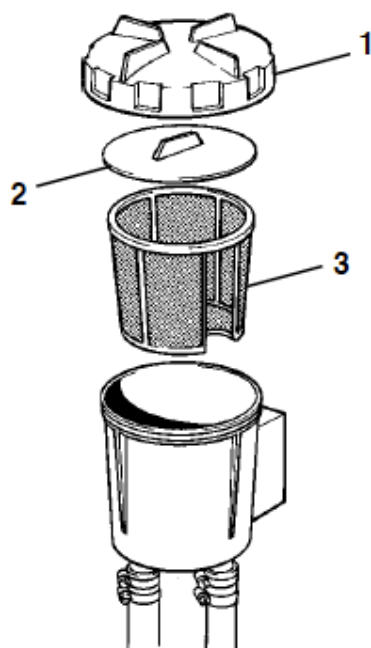
Seawater cock – 17. Above.  
(NB This is from a separate through hull seacock on Atlas & Sir Arthur)

Open = in line with inlet



**Close** seacock before removing (1). **Open** Seacock after replacing (1)

**CAUTION:** Engine will overheat if run with seacock closed



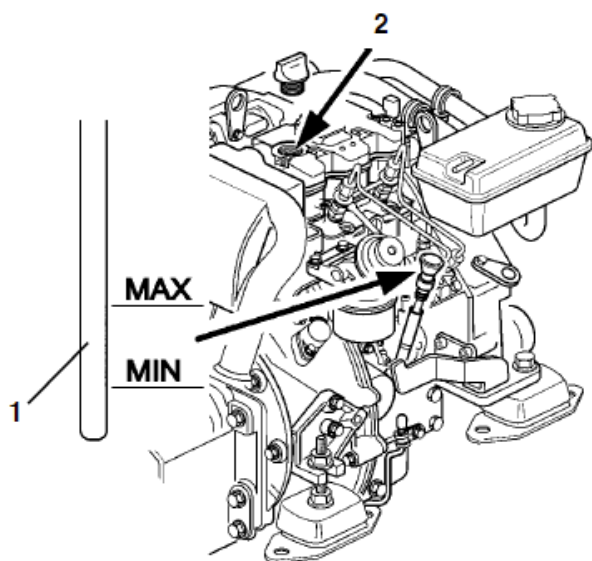
**CAUTION:** Lid must make airtight seal: ensure rubber seal in place and lid not cross threaded

### Seawater filter. Cleaning

The seawater filter is an accessory. Screw off cover (1) and remove seal plate (2). Lift out and clean the insert (3).

**⚠ IMPORTANT!** If the boat is used in water that has a lot of contaminants, seaweed etc. the filter must be checked more frequently than indicated in the maintenance schedule. Otherwise there is a risk the filter will clog and the engine will overheat.

5. **Oil.** Check engine oil level. Ensure dip stick is correctly seated.



### Oil level. Checking and topping up

The oil level should be within the marked area on the dipstick (1). It should be checked every day before the engine is started. Topping up is done through the valve cover (2). Top up oil slowly. Wait a few minutes before checking the oil level again to give the oil time to run down to the oil pan. Then check the level again. Use only the recommended grades of oil: See the chapter "Technical Data".

**⚠ IMPORTANT!** Do not fill the oil above the MAX level.

6. **Belts.** Check no more than 10mm play or 90° twist:

### Drive belt. Check

The belt drives both the circulation pump and the generator. A belt that is too loose can result in slippage, poor cooling and poor charging. A belt that is too tight can damage the bearings in the circulation pump and damage the generator.

Check the tension of the belt regularly. Adjust as required. Check that the belt is not cracked or damaged. Replace a worn belt. Keep a spare belt on-board.

### Drive belt. Adjusting and replacing

**⚠ WARNING!** Always turn the engine off before starting maintenance work.

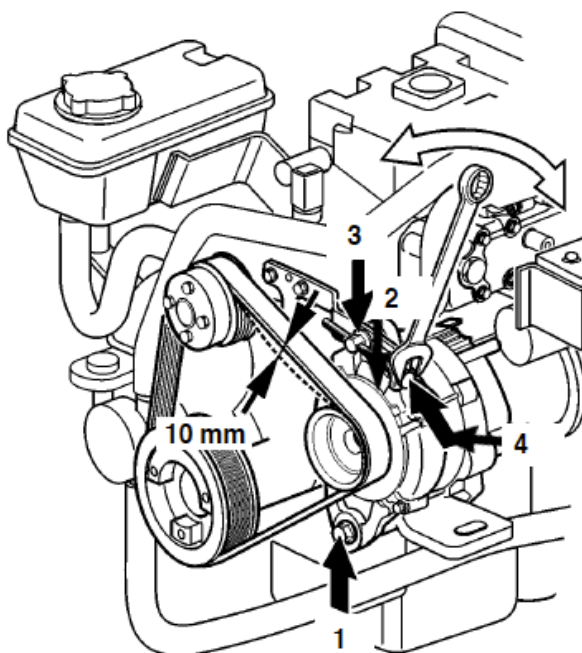
**⚠ IMPORTANT!** Tighten screw (1) to 50 Nm.

Check and adjust as necessary after operating the engine when the belts are warm. It should be possible to depress a belt at the correct tension approx. 10 mm between the pulleys using normal thumb pressure.

Loosen the alternator fixing screws (1-3). Tension the belt with the adjustment screw (4), to the correct tension. Tighten the screws (1-3). Check the tension.

To replace the belt slacken off screws (1 and 2). Press the generator in towards the cylinder block so that the belt can be removed. Clean off the pulley grooves. Install the new belt. Adjust as above. Check belt tension again after a few hours' operation.

**⚠ IMPORTANT!** D1-30 and D2-40: make sure the drive belt is positioned in the track closest to the alternator.





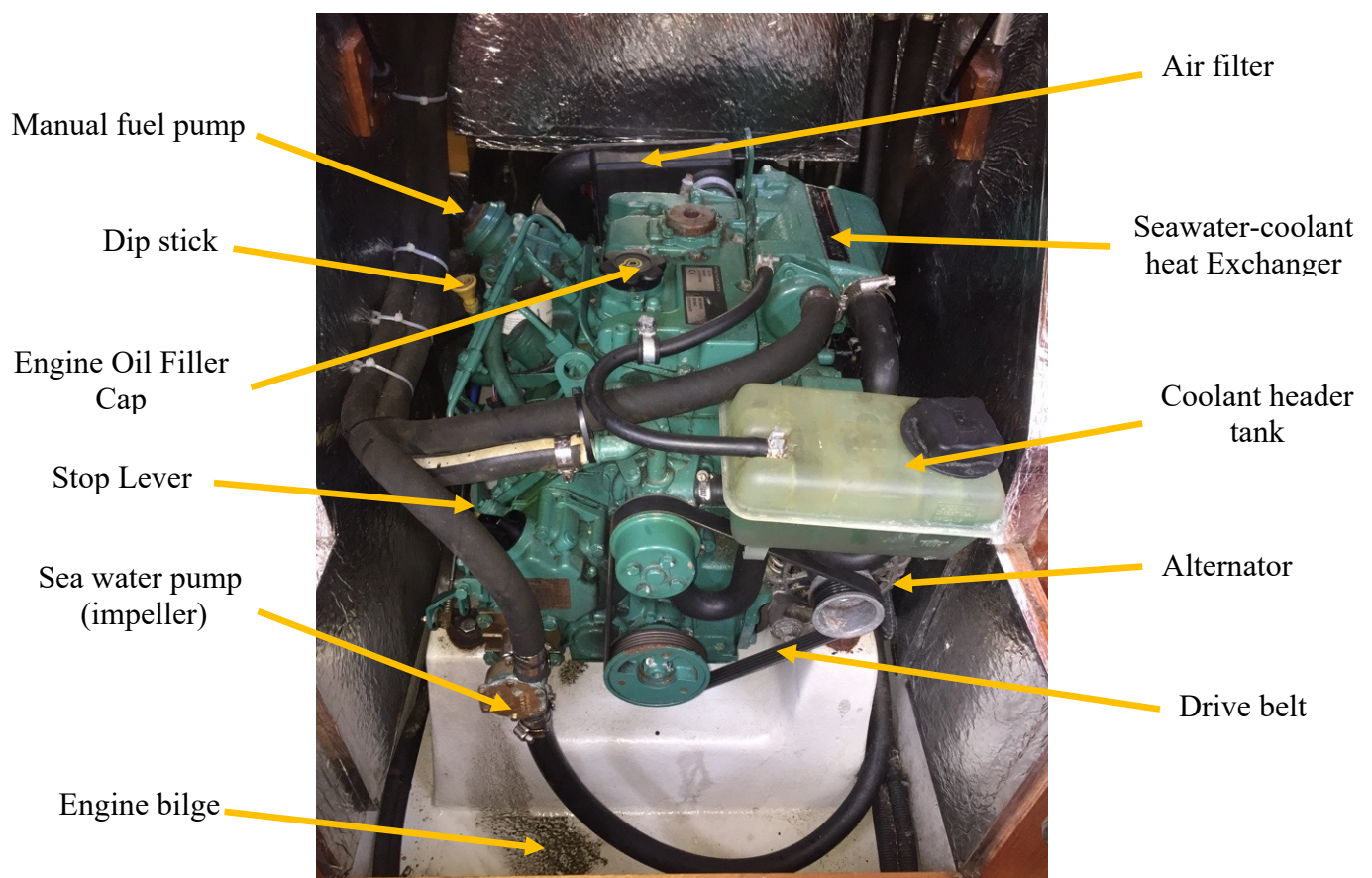
6. **Bilge.** The engine bilge is separate and isolated in order to contain any fuel, oil and coolant leaks. Check the engine bilge for fluid leaks. Fuel, oil, coolant or seawater in the bilge indicate a leak. Clean thoroughly and investigate. Small leaks should be monitored and cleaned regularly. Top up fluids to the required level. Dispose of waste appropriately.

8. **Lines.** Check the engine bay pipes, cables and lines to ensure no obvious damage and that they remain clear of hot and rotating parts.

9. **Re-latching the Steps.** This is best achieved by:

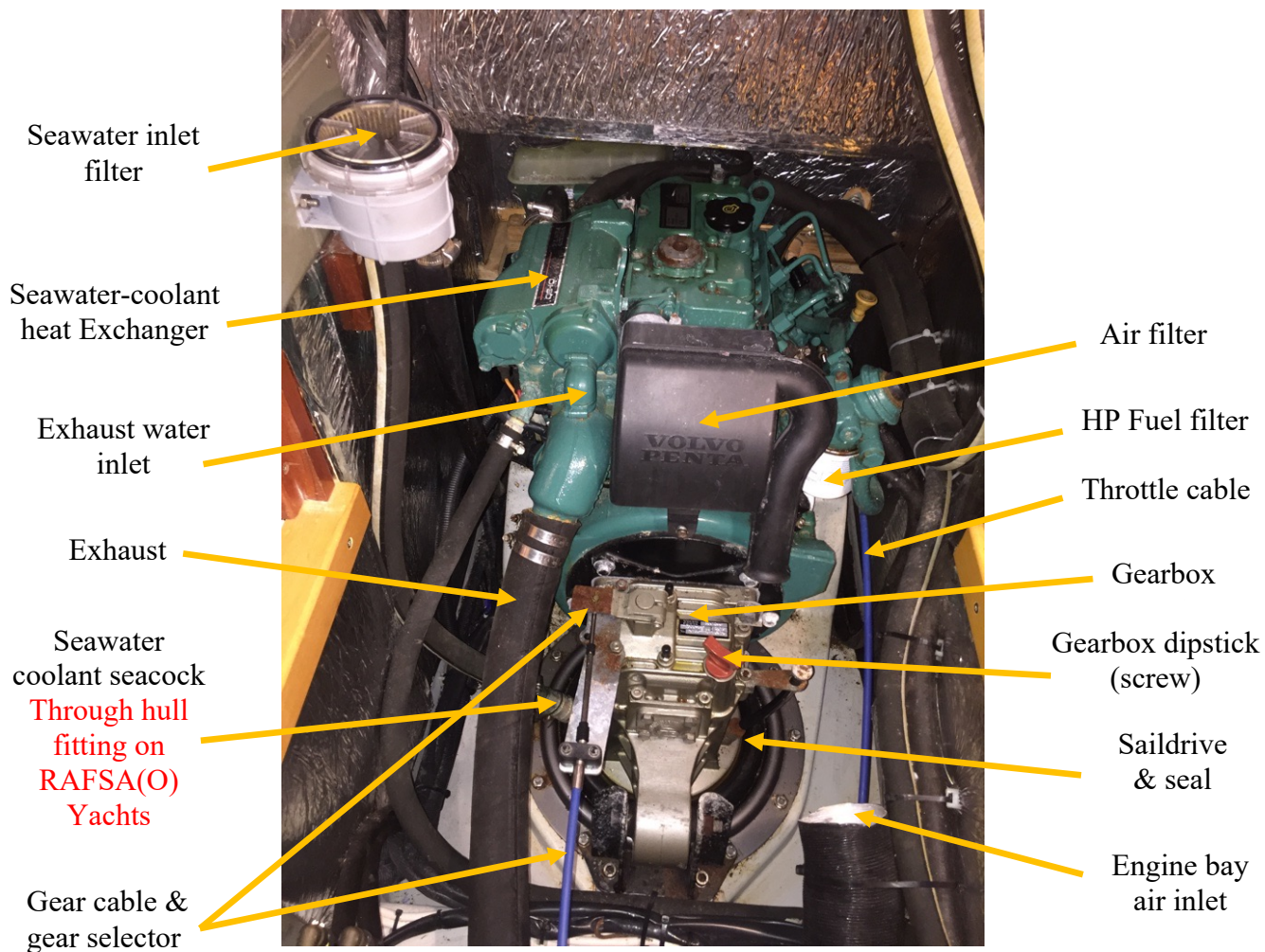
- Replace the lower step and hanging the latches on the hooks on both sides, **but do not snap closed**
- Push the lower step fully aft
- Pull and hold down the steps – they are raised by gas struts
- Using the key, gently tighten the two swivel latches, located above the lower step
- If necessary, gently slide the lower step fore and aft to aid location of the latches
- Once step latches are correctly located and locked, tighten the lower step latches

### Engine and Gearbox Bay – layout and Components

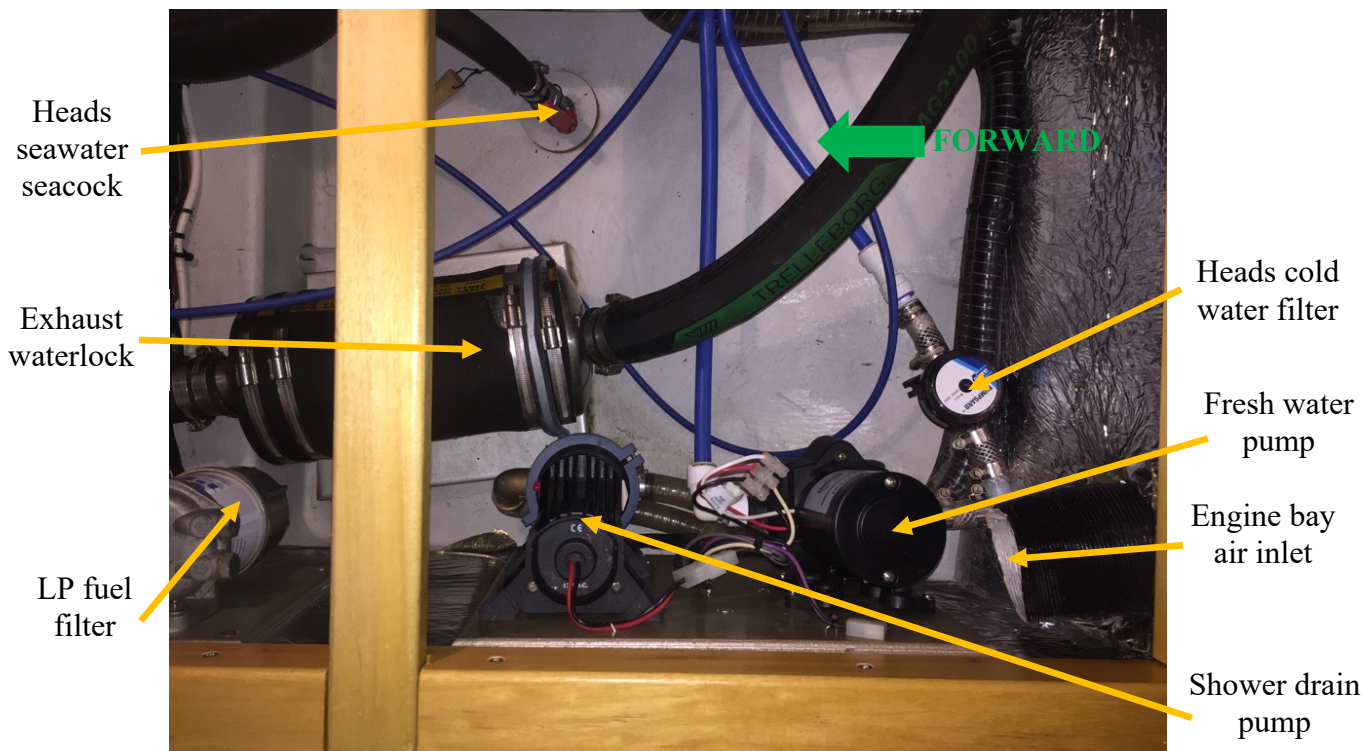


Engine compartment from front





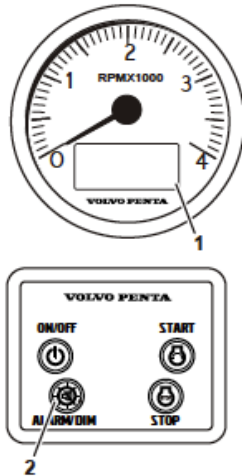
Aft view of engine and gearbox from quarter berth access



Aft ancillaries compartment view from quarter berth

## Fault Handling

10. Engine faults are indicated by an audio alarm, an alarm light and symbols displayed on the tachometer as follows:



If an operational fault arises an audible alarm will sound and a symbol will flash in the tachometer window (1). If optional equipment such as an alarm monitor or an EVC display are installed, the relevant warning lamp will flash there also. Cancel the alarm by depressing the multi-function button (2). The audible alarm will be silenced. The symbol will be lit continuously until the fault is remedied.

## 11. Symbols



**WARNING:**  
Close down  
engine  
immediately

### Coolant Temperature

The coolant temperature lamp is lit if the coolant temperature is too high.

#### IMPORTANT:

Continued operations with too-high engine temperature can cause serious engine damage.

- Check coolant level. Refer to *Coolant Level, Checking and Topping Up*, page 59.
- Check that the raw water filter, where such is fitted, is not clogged. Refer to *Seawater Filter, Check and Cleaning*, page 64.
- Check the impeller in the sea water pump. Refer to *Impeller, Check and Change*, page 62.

If the alarm continues despite the above actions being carried out, run the engine at low revolutions and drive the boat to the nearest service workshop for repair.



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### Battery

The charging lamp lights up when the alternator stops charging the batteries, which may result from a fault in the electrical system or the need to tension the alternator drive belt.

- Check belt tension. Refer to *Drive belt, check and change, page 53*.
- Check to see if there are no short circuit, chafed wires or wires with loose connections.
- Check the fluid level in the battery; refer to *Battery, page 66*.
- Contact a Volvo Penta workshop if the fault remains.

### Starting and stopping the engine.

12. The controls comprise the Electronic Vessel Control (EVC) panel and a tachometer.

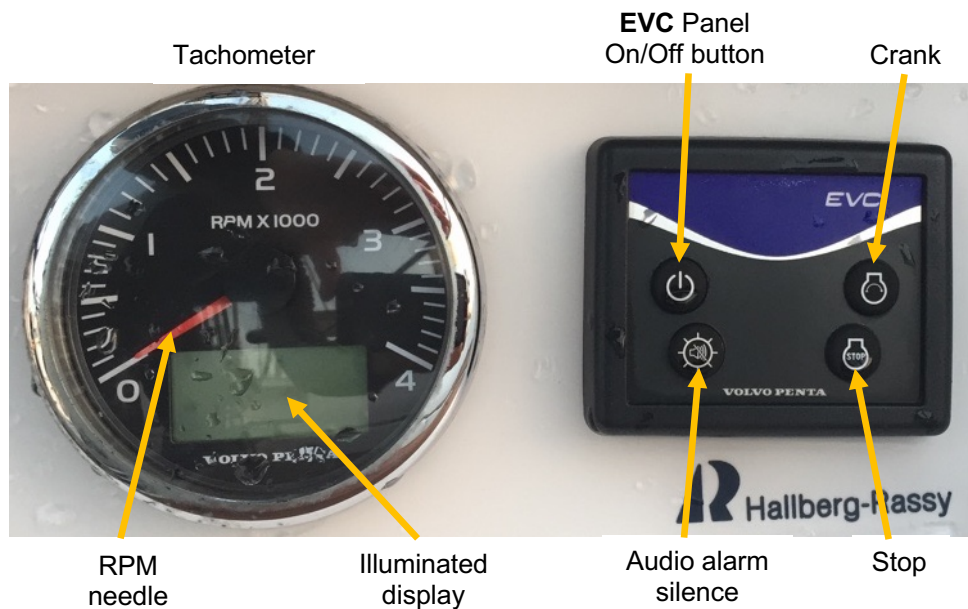
a. **Starting.**

- Morse to neutral
- Press EVC Panel on/off button for 2 secs (Taco screen illuminates, displays 'Volvo Penta' and then engine hours run – difficult to see in sunlight)
- EVC carries out Built in Test and pre-heating of coils automatically – wait for 'two beeps'. (In an emergency, no need to wait for BIT check)
- Press and hold 'Crank' button until engine starts
- Check: no audio alarms; No warnings, water being expelled from exhaust outlet.
- Allow engine to warm up

b. **Stopping.**

- Ensure EVC panel is turned on (Tachometer illuminated)
- Press and hold 'Stop' button, until engine stops
- Turn panel off





Engine controls – cockpit panel

13. **Manual Engine Stop.** Pull stop lever forward & hold (starboard side of engine):

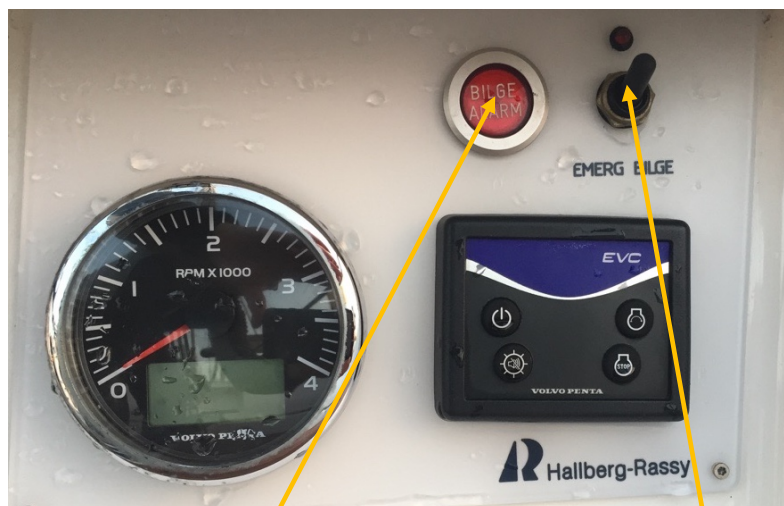


## CHAPTER 5 - BILGE PUMPS

1. There is one manual and one electric (Emergency) bilge pump and a bilge alarm. The manual pump is located in the port, aft, cockpit; the handle is located in the port aft cockpit gas locker. The electric bilge pump is located in the bilge under the saloon table alongside both pickup pipes. It is controlled from the engine start panel in the cockpit, starboard side. The alarm is a quiet buzzer which can easily be missed, as can the red 'Bilge Alarm' light, during daylight hours. The pump requires the switch on the 12V electrical Service panel by the chart table to be selected on and is then operated from the cockpit using the switch on the engine control panel on the starboard side. Consider battery drain if frequent or prolonged use is required.



Manual bilge pump – handle stowed in gas locker (port aft)



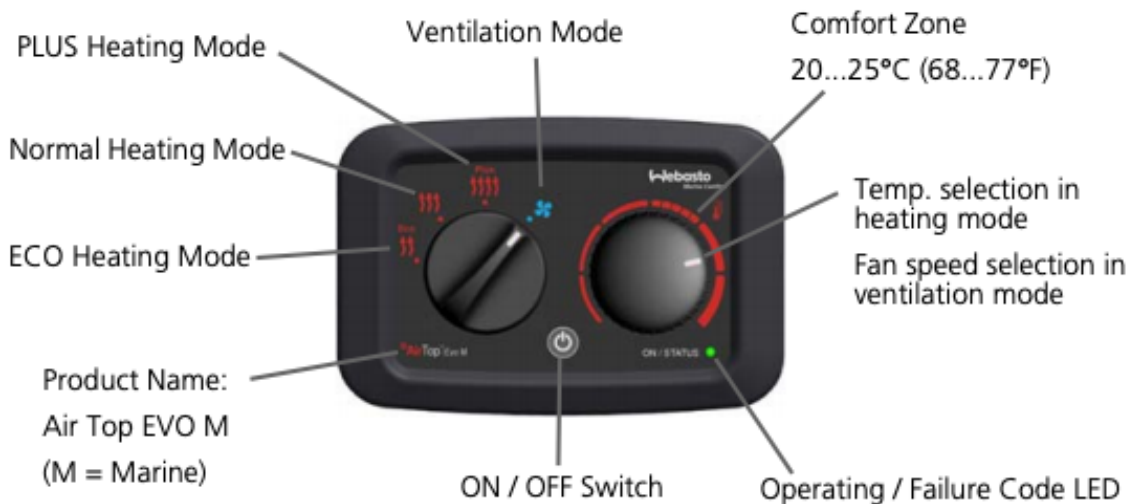
Bilge alarm light/buzzer and emergency bilge pump switch

## CHAPTER 6 - WEBASTO HEATER CONTROLS

1. There is an excellent diesel heater onboard which quickly dries out the yacht and damp clothing. Heat transfer is via hot air, through adjustable low-level air vents in all cabins and the heads. Vents can be regulated from fully open to fully closed and the airflow directed. The control unit is outboard of the chart table adjacent to the electrical services switch panel.

### Controls

2. The controls and their function is shown below:



3. **Caution:**



- When heater is in use, the exhaust becomes **very hot**. Contact with skin, warps or fenders will cause burns/damage.
- Do not obstruct the air vents and keep flammable materials well clear
- The heater must be switched off at refuelling stations due to the risk of explosion
- In the event of smoke development, unusual combustion noises or a smell of fuel, shut down and check the exhaust is not obstructed.

- If a fault persists or the heater suffers continuous fault cut-outs with error messages (flashing code), it must be shut down and the power selected off. Do Not reuse until it has been inspected by a qualified engineer

## Operation

4. **Switching on the heater.** By pressing the main switch ON / OFF the heater is activated. After switching on, the main switch illuminates and the indicator "ON / Status" lights to confirm the heater operation.
5. **Switching off the heater.** By pressing the main switch ON / OFF again the heater operation is stopped. After switching off, the lighting of the main switch is also off. The indicator "ON / Status" goes off after approximately 3 minutes (cooling down of the heater).
6. **Mode selector knob.** With the mode selector knob, you can select the desired functions of your heater by placing the index on the desired symbol.
  - "Eco" mode reduces the electrical power consumption by reducing the max. heating power. Useful when saving the battery is more important than quick heating up.
  - In the "Normal" heating the heater behaves like a standard heater.
  - "Plus" increases the max. heating power by ~10%. It provides extra power for quicker heating up.
  - In "Ventilation" mode the blower runs but the heater is off.
7. **Temperature selector.** You can adjust the desired interior temperature with the temperature selector. With the yacht 'closed up' experience shows the selector often sits below the comfort range in air temperatures below 0° C
8. **LED.** The status LED lights green in normal heating mode. Blinking indicates failure code; see the faults section in the manual in the documents folder.

## CHAPTER 7 - Gas Bottle Connection and Gas Detector Control Panel

### Gas Bottles

1. The gas locker is located port aft in the cockpit; it has drains to atmosphere that must be kept clear. The locker can hold two R907 refillable gas cylinders. The gas regulator simply clips on (push fit) and the gas is turned on and off by rotating the black lever through 90 degrees.



R 907 Gas bottle



Butane regulator & gas on/off switch

### Gas Detectors

2. Two gas detectors are located onboard, one below the cooker and one in the bilge beneath the saloon table. The Gas alarm control panel is located outboard of the chart table adjacent the electrical services switch panel. **The system detects combustible gases (i.e. Propane) and Carbon Monoxide (CO).**

3. **WARNING:** As soon as the gas detector detects the presence of gas:

- Never switch on any electrical equipment
- No heat, sparks or naked flames
- Ventilate the compartment
- Use soap solution to find the gas leak

### Operation

4. **Switching on and off.**

a. **Switching on.** Briefly press the button once. After switching on the gas detector will check for the presence of gas continuously. The LED above the button



will come on. This LED will flash if the battery voltage is too low. **The gas detector is switched on automatically when the power supply is switched on.** This is to prevent you from forgetting to switch it on.

- b. Once switched on, the sensor will have warmed up after about 1 minute and the gas detector can then detect the presence of gas reliably. A test is carried out while the sensor is warming up to see if a sensor is connected and if it is functioning correctly.



Vetus GD1000 Gas Detector Control Panel

- c. **Switching off.** Press the button and hold down for 5 seconds.

## Testing

5. The gas detector can be tested by activating the test cycle. A false alarm is given for 7 seconds after pressing the TEST button. The following are tested during this false alarm:









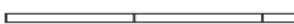









- The working of the sensors
- The working of the acoustic alarm
- The correct functioning of the gas valve and the fan; the gas valve is closed and the fan switched on.

The gas detector checks continuously that the sensor or sensors are connected and functioning correctly. An alarm is given if this is not the case.

## Indicating the measured gas concentration (Alarm or safe)

6. Whether a gas concentration has been measured by the sensor and whether the sensor is functioning correctly is shown by an acoustic alarm and two LEDs, one for each sensor. 1 SENSOR 2

7. The indication is as follows:

LED  GREEN  	<b>Safe</b>	No combustible gas or CO has been detected.
LED  GREEN 1 s - 0,25 s - 0,25 s - 1 s   0,3 s - 8 s	<b>Warning CO</b>	A minimum amount of CO has been detected, but less than the alarm level. This is in the warning range.
LED  GREEN 1 s - 0,25 s - 0,25 s - 0,25 s - 0,25 s - 1 s   0,3 s - 8 s	<b>Warning Combustible gas</b>	A minimum amount of combustible gas has been detected, but less than the alarm level. This is in the warning range.
LED  RED 1 s - 0,25 s - 0,25 s - 1 s   0,6 s - 0,3 s	<b>Alarm CO</b>	An amount of CO higher than the alarm level has been detected.
LED  RED 1 s - 0,25 s - 0,25 s - 0,25 s - 0,25 s - 1 s   0,6 s - 0,3 s	<b>Alarm Combustible gas</b>	An amount of combustible gas higher than the alarm level has been detected.
LED  RED 0,5 s - 0,5 s   0,15 s - 8 s	<b>Attention</b>	The sensor is faulty or aged.

## Switching off the acoustic alarm.

8. If there is an alarm situation, the acoustic alarm (buzzer) can be switched off by pressing alarm mute button. If the alarm situation still exists 5 minutes after the alarm mute button has been pressed the acoustic alarm will be switched on again.

## Fan.

9. Use the fan button to switch the fan on and off. When the fan is switched on the green LED above the fan button will be on. This LED will flash if the battery voltage is too low. **The fan is switched on automatically if there is an alarm situation.**

## Ageing of the sensors

10. The sensor ages through use. The extent of the ageing is monitored by the gas detector. After about 2 years continuous use, the sensor is aged and the gas detector will give a warning. The LED of the corresponding sensor on the panel will flash red and the red

LED on the particular sensor will also come on. The buzzer will also give the attention signal. A sensor that has aged must be replaced.

### **False Alarms**

11. False alarms can occur through the use of deodorant sprays etc. Moreover, **transmission on the VHF radio**, located near the Gas Detector Control Panel, will often initiate an audio and visual alarm. **If this occurs, silence the alarm.**