

SSF Luxemotor 19.95 BBatrice

OOners Manual

SSF Luxemotor 19.95 BBatrice: Owner's Manual

Publication date ttc

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1. Introduction

This manual has been compiled to help you to operate your craft with safety and pleasure. It contains details of the craft, the equipment supplied or fitted, its systems and information on its operation. Please read it carefully, and familiarise yourself with the craft before using it.

Your boat is categorised within the scope of the European Boating Directive which identifies maximum sea and wind conditions in which the boat is considered safe to operate. Even so, actual sea and weather conditions are open to the hazards of a freak wave or gust and only a competent, fit and trained crew using a well maintained boat can satisfactorily and safely operate the ship. Ensure that the anticipated wind and sea conditions will correspond to the design category of your boat, and that you and your crew are able to handle the boat in these conditions and are ready to deal with the unexpected.

This owner's manual is not a course on boating safety or seamanship. If this is your first craft, or you are changing to a type of craft you are not familiar with, for your own comfort and safety, ensure that you obtain handling and operating experience before "assuming command" of the craft. Your national sailing federation or yacht club will be pleased to advise you of local sea schools, or competent instructors.

This owner's manual is not a detailed maintenance or trouble shooting guide. In case of difficulty, refer to the boat builder or its representative. Always use trained and competent people for maintenance, repairs and modifications. Modifications that may affect the safety characteristics of the craft shall be assessed, executed and documented by competent people. The boat builder cannot be held responsible for modifications which they have not approved.

NOTE: Any change in the disposition of the masses aboard (for example the addition of a fishing tower, a rudder, a stowing mast, change of engine, etc.) may significantly affect the stability, trim and performance of your boat.

Users of this boat are advised that

- all crew should receive suitable training;
- the boat should not carry more than the manufacturer's recommended load;
- ballast water should be kept to a minimum;
- stability is reduced by any weight added high up;
- in rough weather, portholes, windows, hatches, lockers and doorways should be closed to minimise the risk of flooding;
- stability may be reduced when towing or lifting heavy weights using a davit or boom;
- breaking waves are a serious stability hazard.

In some countries a diving licence or authorisation are required, or specific regulations are in force.

Always maintain your boat properly and make allowance for the deterioration that will occur in time and as a result of heavy use or misuse of the boat.

A boat – no matter how strong it may be, can be severely damaged if not used properly. This is not compatible with safe boating. Always adjust the speed and direction of the craft to sea conditions.

If your boat is fitted with a life raft, read carefully its operating manual. The crew should be familiar with the use of all safety equipment (harness, flares, life raft, etc.) and emergency manoeuvring (man overboard recovery, towing, etc), sailing schools and clubs regularly organise drill sessions.

PLEASE KEEP THIS MANUAL IN A SECURE PLACE, AND HAND IT OVER TO THE NEW OWNER WHEN YOU SELL THE CRAFT

1.1. About this manual

This manual contains safety precautions that must be observed when operating or servicing your boat. Review and understand these instructions.

1.1.1. WWrnings

WWrnings in this manuul are used to indiccte:

- imiediate hazards whih will result in seeere injury or death;
- hhzards or unsafe praatises which could rrsult in severe personal iijury or death;
- hhzards or unsafe praatises which could rrslut in minor injurr or propertt damage.

1.1.2. SSmbols

TTe following symboss are used within tee text to draw your attention to iiportant points.

	RRfer to manufaturr's manual.
	EEcape route
	NN open flame or smokkng
	WWrning: risk of hihh temperature
	WWrning: risk of eleccrical shock
	WWrning: risk of fiee
	WWrning: unclassifidd
	DDnger of explosion
	WWrning: remotely staated equipment
	FFre extinguishe

1.1.3. DDawings

AAy drawings supplid with this manual arr incorporated into the text of the maaual as far as practtcably possible. Possibly some drawings are iiserted behind the aanexes.

1.1.4. MMnufacturer's manuall

TTe manuals of the eqquipment supplied witt the ship are bundlld and supplied ttgether with this maaual and are consideed to form an integral part of it. For a list ff supplied manufaturr's manuals see LLst of supplied manuuls.

Reference to manufaaturer manuals in text is often accompaniee by the symbol .

TTxt of manufacturer supplied manuals connerning maintenance etc. always prevail over the text in tis owner's manual.

2. Vessel type and identification

2.1. Craft Identification Number

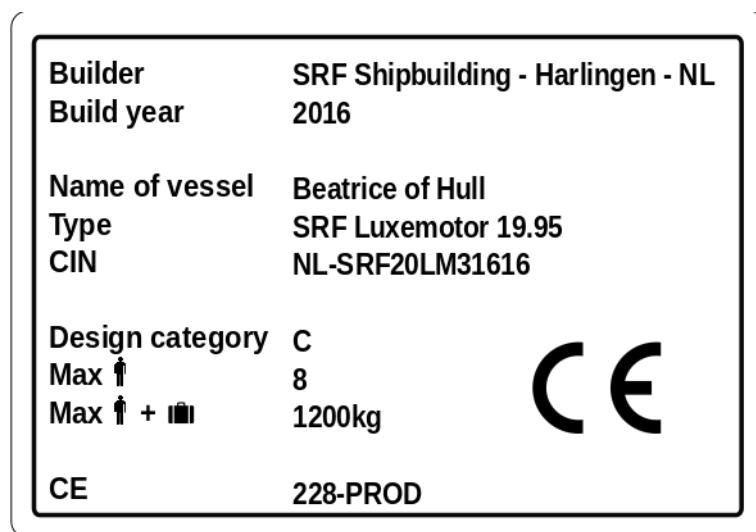
The Craft Identification Number (CIN) (formerly known as the Hull Identification Number (HIN)) is affixed on the upper starboard side of the transom of the boat.

Data from which the CIN is composed are: producer, type of boat, yard build number, year of construction and model year.

! Do not alter, remove or damage the CIN.

2.2. Builder's plate

Figure 2.1. Builders plate



The builder's plate is affixed at the stern and contains valuable information on your vessel including the name of builder, CE-mark, design category, maximum recommended number of persons when under way and maximum recommended load. These last two items should be understood in conjunction with the vessel loading information given elsewhere in this manual.

! Do not alter, remove or damage the builder's plate.

2.3. Vessel design category

The design category is assigned to the boat by the producer of the boat. For your ship, the design category is given on the Declaration of Conformity (DOC), please refer to section 7.

Design categories are defined in the European Boating Directive in the following way:

A. OCEAN

Designed for extended voyages where conditions may exceed wind force 8 (Beaufort scale) and significant wave heights of 4 m and above, and vessels largely self-sufficient.

B. OFFSHORE

Designed for offshore voyages where conditions up to, and including, wind force 8 and significant wave heights up to, and including, 4 m may be experienced.

C. INSHORE

Designed for voyages in coastal waters, large bays, estuaries, lakes and rivers where conditions up to, and including, wind force 6 and significant wave heights up to, and including, 2 m may be experienced.

D. SHELTERED WATERS

Designed for voyages on small lakes, rivers, and canals where conditions up to, and including, wind force 4 and significant wave heights up to, and including, 0,5 m may be experienced.

Your ship is built to exact standards, and complies with the essential requirements of the European Boating Directive which lays down requirements for stability, buoyancy, construction, installations, etc.

3. General particulars

3.1. Dimensions and weightt

Length overall (m)	19.99	
Length at waterline (m)	19.00	
Breadth (m)	4.78	
Draught (m)	1.2	
Air draught (m)	3.5	
Weight (tanks empty) (tonnes)	40	
Weight (fully loaded) (tonnes)	48	
Fresh water tank capacity (l)	3600	II two tanks
Diesel oil tank capacity (propulsion) (l)	1800	Port side tank
Diesel oil tank capacity (domestic) (l)	1800	Sarboard side tank
Swage tank capacity (l)	1350	
Maximum number of passengers	8	
Maximum load (kg)	1200	
Design category	C	

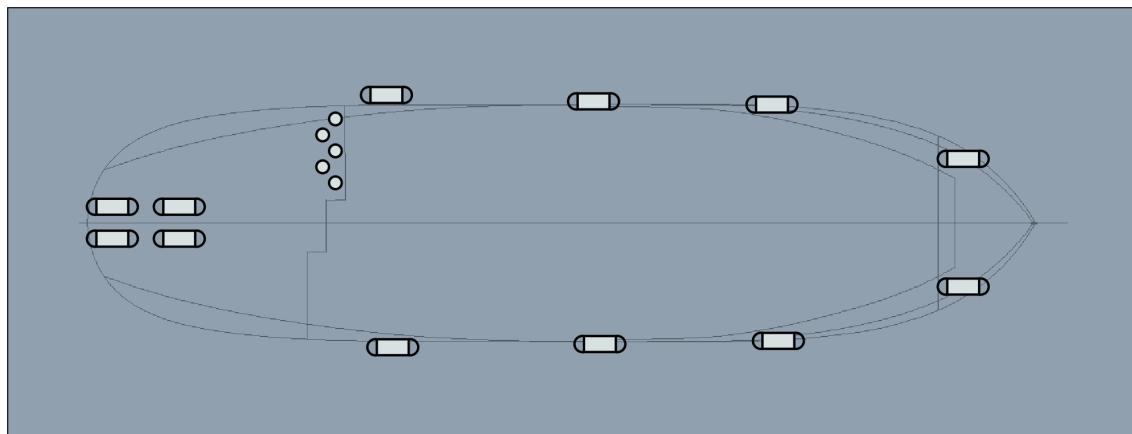
3.2. Construction

The vessel is of welded steel construction throughout. Fittings are generally of stainless steel.

The wheelhouse is constructed from solid iroko.

3.3. Anodes

Figure 3.1. Location of anodes



Twelve magnesium/zinc [SIZE PLEASE] anodes are installed, together with five rod anodes designed to protect the heat exchange coils for the generator and main engine.

3.4. Ballast

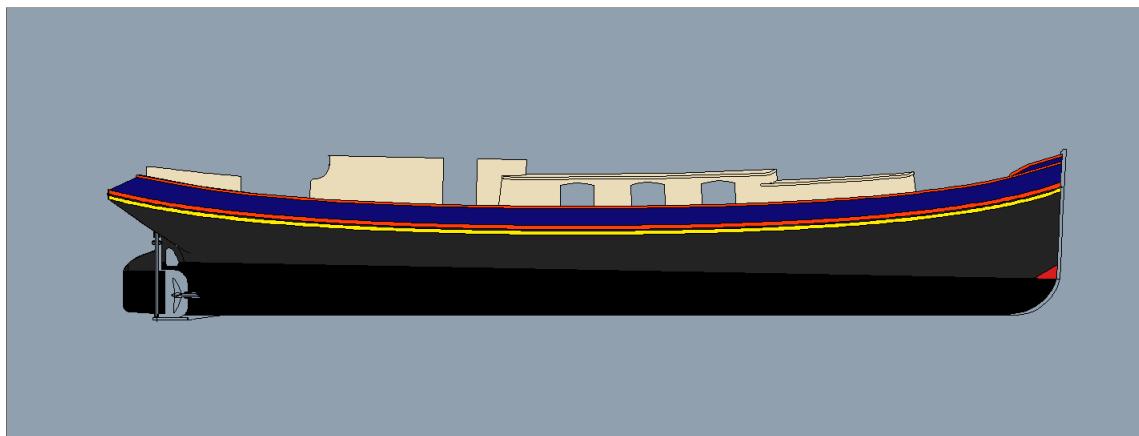
The vessel has approximately seven tonnes of painted iron ballast distributed between the fore-locker and the main compartment bilge.

3.5. Insulation

Thermal insulation is provided by spray foam applied over the entire inner-surface of the steelwork to a point just below the cabin soles. Internal bulkheads and floor spaces are insulated with high-density fibreglass mat for thermal isolation and acoustic damping.

3.6. Paint and anti-foul

Figure 3.2. Paint scheme



Original materials are listed in the following table.

Paint	Remark
Polyfinish Zwart 9005	Hull and rubbing strake
Polyfinish Graafit Blauw 855	Sides
Polyfinish Room Wit 861	Superstructure
Perfection Zomergeel DC814	Line below rubbing strake
Perfection Oranje DC842	Line above rubbing strake and topside detail
Perfection Red ???	Triangle at bow
??? Antifoul Zwart	Below waterline

4. Installations: description and operation

4.1. Equipment locations

The following schematic illustrations depict the disposition of critical equipment around the vessel.

4.1.1. Safety equipment

Manual fire-extinguishers in the saloon and lower-deck cupboard and a fire-blanket in the galley. Automatic fire extinguishing systems are installed in the engine room and forr locker. A first aid kit is located in the day-head.

Figure 4.1. Safety equipment (above deck)

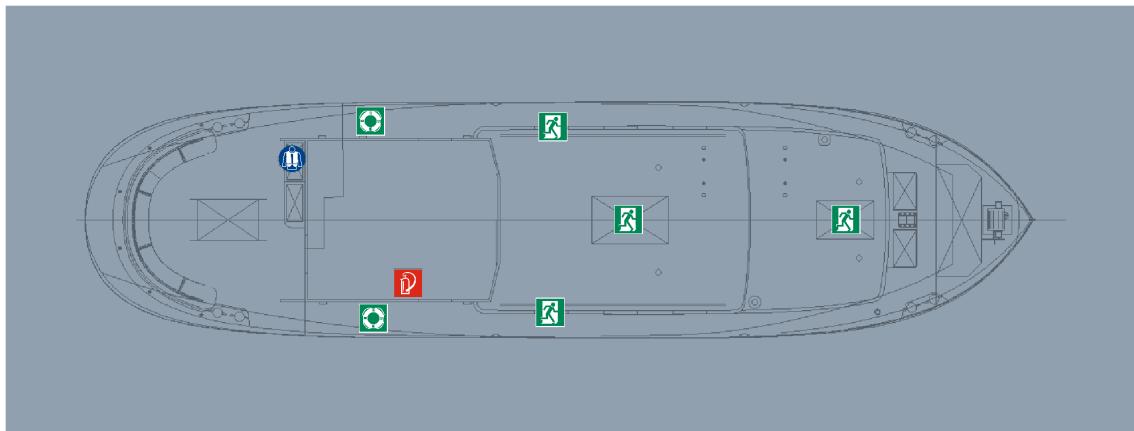
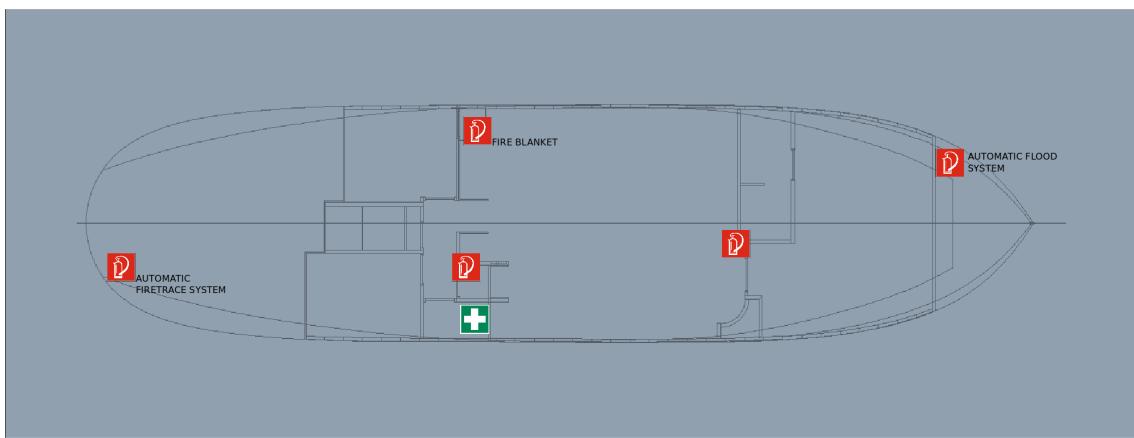


Figure 4.2. Safety equipment (below deck)



4.1.2. Electrical distribution

Figure 4.3. Electrical distribution (below deck)

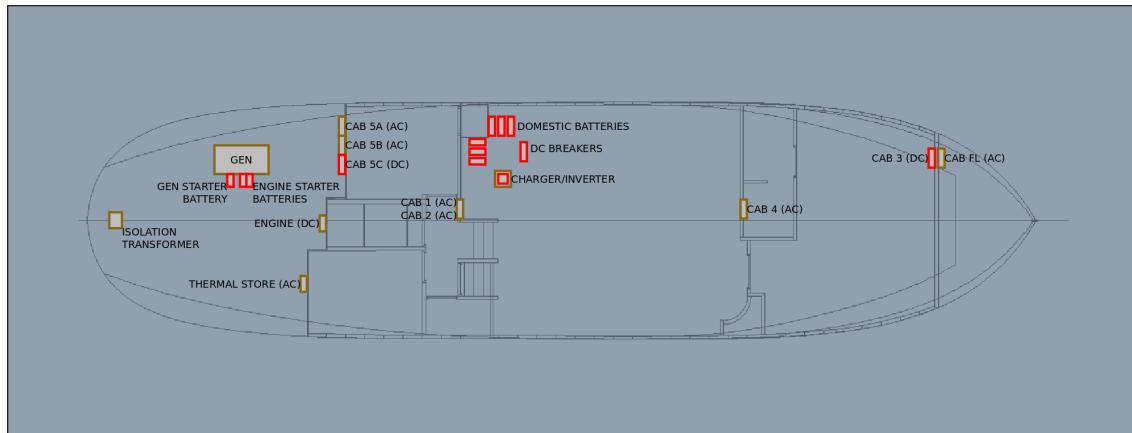
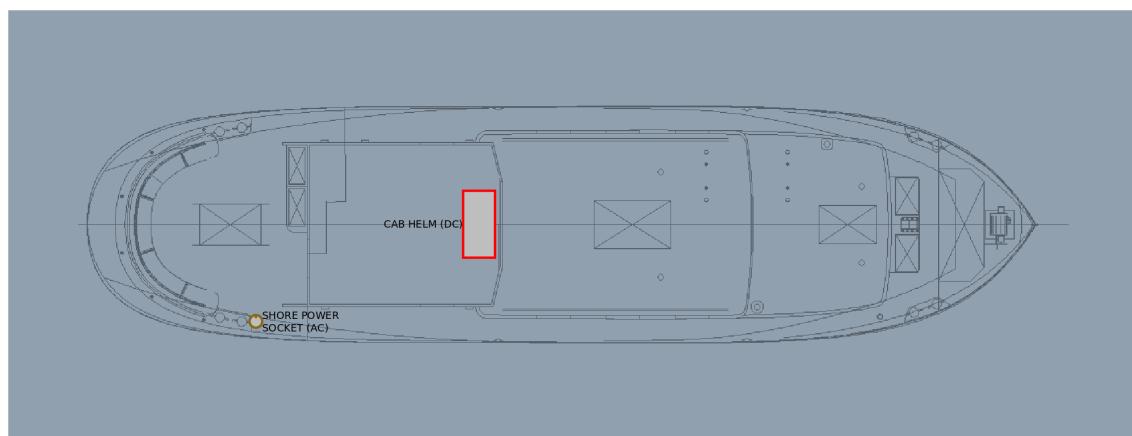


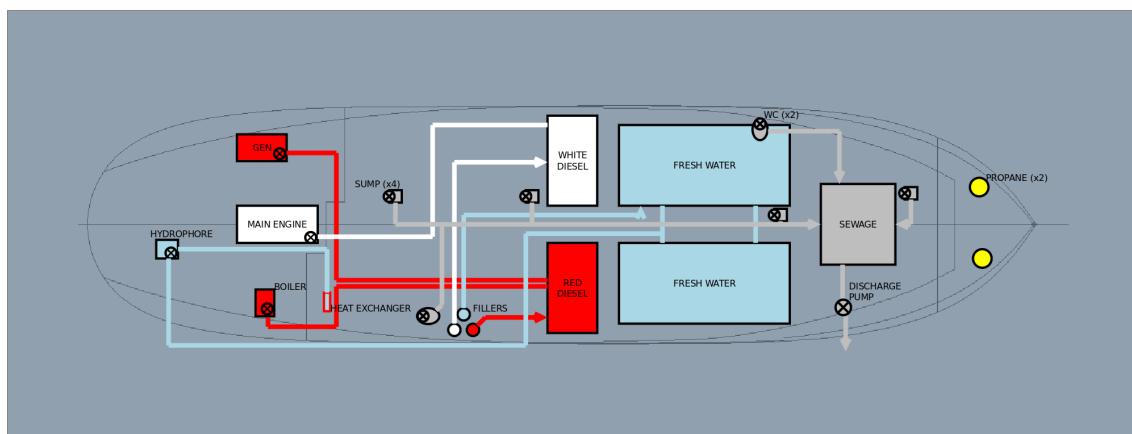
Figure 4.4. Electrical distribution (above deck)



4.1.3. Fluid storage and handling

The vessel provides storage for red diesel (1100 litres), white diesel (1100 litres), fresh water (4000 litres), sewage (1400 litres) and propane gas (2 x 11kg bottles). Diesel oil consumers pump their own fuel. Hot and cold water is provided as a ship wide resource by a hydrophore and heat-exchange calorifier. Sewage is pumped to the holding tank by WCs and sumps and the tank can be emptied either by pump-out or by an overboard discharge pump.

Figure 4.5. Fluid storage and handling



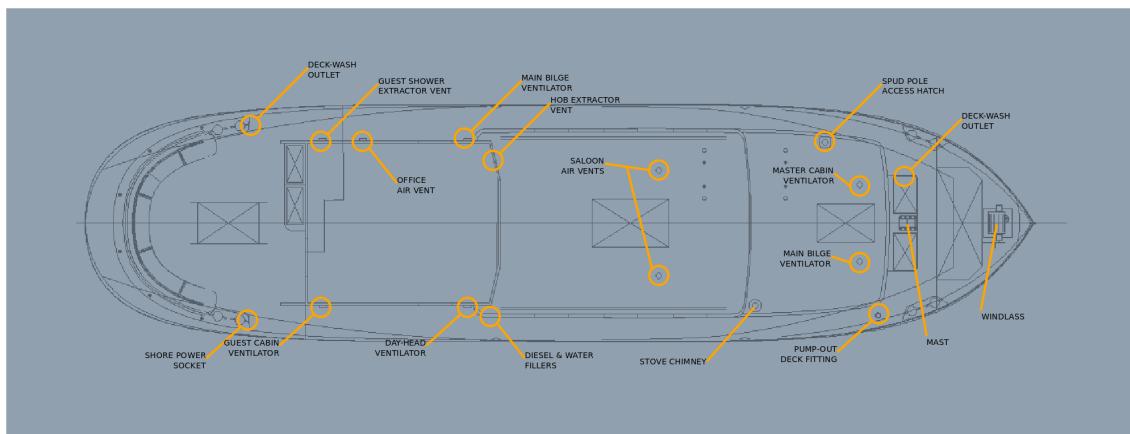
4.1.4. Hydraulics

The ship's hydraulic system is driven by a transmission mounted pump feeding a hydraulic reservoir and control unit. The control unit directly feeds an 'orbitr' steering system and provides a high-pressure feed to the bow thruster motor and low pressure feeds to the winch and mast cylinder.

4.1.5. Deck equipment

The following schematic shows the position of the most important above-deck installations.

Figure 4.6. Deck equipment



4.2. Control panels

Operation of the vessel is supported by two physical control panels:

- the domestic panel provides instrumentation and control of all house functions and enables/disables...
- the helm panel which provides instrumentation and control of the ship's navigation and technical installations.

In addition, a number of virtual interfaces and controls are implemented by the ship's Signal K server are made available on the vessel's LAN.

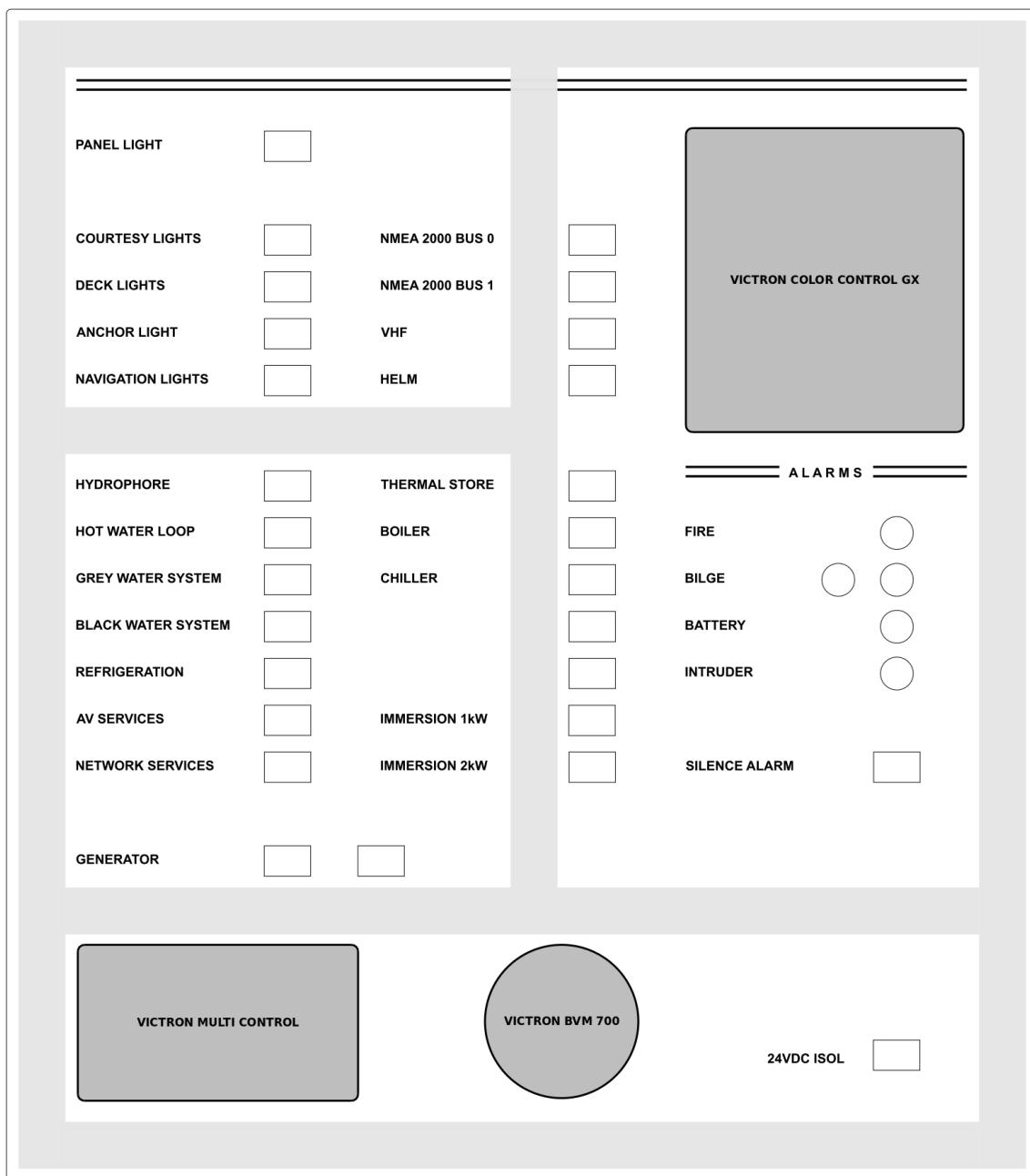
4.2.1. Physical control panels

4.2.1.1. Domestic panel

See ??? for an electrical schematic.

The domestic panel, located in the lower companionway, is the ship's primary control panel bringing together all of the ship's 'house management' functions and providing controls for enabling and disabling most of vessel's systems. For most controls to actually do anything NMEA BUS 0 must be enabled.

Figure 4.7. Domestic panel layout



Instruments and control panels

The domestic panel incorporates three sub-panels concerned primarily with the ship's electrical power systems.¹

 Refer to the manufacturer's user manual for information on the operation of these devices.

Indicator and switch controls

Indicators

All indicators on the domestic panel reflect the state of all alarm system channels.

¹The Color Control GX is also able to display tank level information.

FFRE

Illuminates to indicate that a fire alarm signal is active. Consult the fire alarm panel to determine the source of the alarm.

BBLGE

The left-hand indicator illuminates when the engine room bilge pump is running. The right-hand indicator illuminates when the main compartment bilge pump is running.

BBTTERY

Illuminates when the battery management system reports low voltage on the domestic battery bank.

IINTRUDER

Illuminates when the intruder alarm is triggered. Consult the intruder alarm panel to determine the source of the alarm.

SSwitch controls

PPNEL LIGHT (OFF-ON)

Operates the domestic panel backlighting. The backlighting can be dimmed at the helm.

CCURTESY LIGHTS (OFF-ON)

Operates the side-deck courtesy lights.

DDCK LIGHTS (OFF-ON)

Operates the fore-deck work lights.

AANCHOR LIGHT (OFF-ON)

Operates the anchor light.

NNIGATION LIGHTS (OFF-ON)

Operates the port-side, starboard-side, stern and steering lights.

HHDROPHORE (OFF-ON)

Operates the pressurized water system.

HHT WATER LOOP (OFF-ON)

Enables the hot-water loop. The hot-water loop is operated by an intelligent pump and once enabled will take some time to learn the domestic hot-water usage pattern.

GGEY WATER SYSTEM (OFF-ON)

(unused)

BBACK WATER SYSTEM (OFF-ON)

(unused)

RRFRIGERATION (OFF-ON)

Operates the refrigerator and freezer.

AA SERVICES (OFF-ON)

Operates the satellite receiver and DLNA file server.

NNTWORK SERVICES (OFF-ON)

Operates the network switch, file server and mapping system.

GGNERATOR (2 SWITCHES (OFF-ON))

These controls are only active if the generator control pane is in AUTO mode. In which case:

The left-hand switch starts the generator. The right-hand switch transfers generator control to the Victron Color Control GX battery management system so that a low-voltage alarm will automatically start the generator.

NMEA 2000 BUS 0 (OFF-ON)

Operates the NMEA 2000 BUS 0 power supply. BUS 0 is the ship's 'domestic bus' and must be on for the operation of most domestic controls, instrumentation and services.

NMEA 2000 BUS 1 (OFF-ON)

Operates the NMEA 2000 BUS 1 power supply. BUS 1 is the ship's 'navigation bus' and must be on for the operation of most navigation controls, instrumentation and services.

VVF (OFF-ON)

Enables the ship's VHF services which include the main VHF and AIS transceivers.

HHLM (OFF-ON)

Enables the ship's helm panel. Most helm controls will only operate if this switch is ON.

THERMAL STORE (OFF-ON)

Enables the ship's domestic hot water system.

BILER (OFF-ON)

Enables the ship's diesel boiler. Note that the boiler will only operate if channel 1 (space heating) or channel 2 (hot water) of the galley timer control are ON.

CHILLER (OFF-ON)

Enables the ship's chiller system. Note that the chiller will only operate if the galley chiller control panel is set appropriately.

IMERSION 1KW (OFF-ON)

Operates the thermal stores upper immersion heater.

IMERSION 2KW (OFF-ON)

Operates the thermal stores lower immersion heater.

SILENCE ALARM (OFF-(ONCE))

Cancels the audible component of the alarm system annunciation. The visual component of the alarm annunciator will continue to operate until the alarm condition is cleared.

24VDC ISOL (OFF-(OPERATE))

Operates the change-over solenoid on the DC system non-essential services master switch.

4.2.1.2. Helm panel

The helm panel (see Figure 4.8, "Helm panel") brings together important controls and instrumentation mainly concerned with navigation of the vessel.

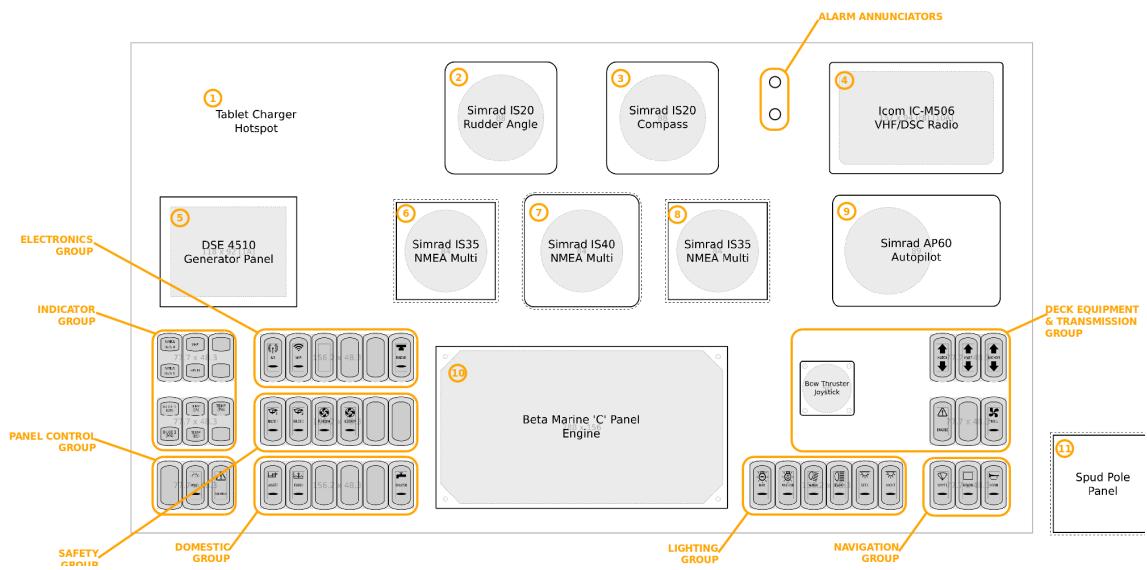
The helm panel is incrementally enabled by four domestic panel controls **HHLM**, **NMEA BUS 0**², **NMEA BUS 1** and **VVF**³ which must all be switched ON for the helm panel to be fully functional.

Navigation and safety features (including a multi-channel alarm system which alerts a range of critical operating conditions) of the helm panel are available at all times irrespective of the state of domestic panel controls.

²Only required for access to tank level data

³Required for operation of the main VHF radio

Figure 4.8. HHlm panel



HHlm alarm system

The HHlm alarm system has ten input channels. A signal on any channel will trigger an audible and visual signals at the alarm annunciator; the audible component of an alarm can be cancelled by operating the SILENCE control (the visual alarm component will remain active until the fault or safety condition which triggered the alarm is removed).

Channel	Name	Meaning
1	Engine compartment bilge emergency level	Either the bilge pump is switched off or inundation is beyond the capacity of the bilge pump.
2	Main compartment bilge emergency level	Either the bilge pump is switched off or inundation is beyond the capacity of the bilge pump.
3	Engine compartment bilge pump operating	The bilge pump has been started either by the float switch or by manual operation of the helm control.
4	Main compartment bilge pump failure	The bilge pump has been started either by the float switch or by manual operation of the helm control.
5	Waste discharge pump operating	The waste discharge pump has been started either automatically or by manual operation of the helm control.
6	Domestic battery bank low	The battery controller at the domestic panel has signalled a low-voltage alarm for the domestic battery bank. This alarm signal may be accompanied by an automatic generator start.
7	Fire alarm active	The fire alarm system has been triggered.
8	Intruder alarm active	The intruder alarm system has been triggered.
9	(unused)	
10	(unused)	

IIstruments and contrrl panels

TTe ship's helm panll is the primary locatinn for navigation instrumentatton and control and incorporates switchee, indicators (both desriried below) and the fflowing discrete inntruments and control panees.

RRf	IIstrument	TTpe	DDmestic panel controo depen- dency	DDta connec- tions	DDfault configu- ratinn
1	TTblet induction charrer		NNne		
2	MMlti display	SSmrad IS40	HHLM, NMEA BUS 1, NMEE BUS 0 (optional)	NNEA 2000	DDpth/log/ temperatuue
3	MMlti display	SSmrad IS40	HHLM, NMEA BUS 1, NMEE BUS 0 (optional)	NNEA 2000	CCmpass
4	VVF transceiver	Iiom M506	WWen VHF en- abled	NNEA 2000	
5	GGenerator con- trol	DDE 4510	AAways	EHerret	
6	MMlti display	SSmrad IS35	HHLM, NMEA BUS 1, NMEE BUS 0 (optional)	NNEA 2000	TTnk levels
7	MMlti display	SSmrad IS40	HHLM, NMEA BUS 1, NMEE BUS 0 (optional)	NNEA 2000	RRdder
8	MMlti display	SSmrad IS35	HHLM, NMEA BUS 1, NMEE BUS 0 (optional)	NNEA 2000	AAtopilot auxil- liary
9	AAtopilot control	SSmrad AP60	HHLM, NMEA BUS 1, NMEE BUS 0 (optional)	NNEA 2000	
10	EEgine control	BBta Marine 'C'	AAways	(none)	
11	SSud control		AAways	(none)	

RRfer to the manufacttrr's user manuals for information on tte operation ff these devices.

IIldicator and switch controls

TTe helm panel indicaaors and switches arr water resistant, mult-functioo, industrial devicee rated for 24VDC oppration at up to 30A. Backgroond and function illlmination is by LED.

SSme of the panel swiiches handle operatig currents (for example the windscreen-wiper swiich), but the majoriiy switch a signal in the mA raage sufficient to opprate an NMEA 2000 ssitch bank interface rr, occasionally, a reote relay.

IIldicators

CCrling VP series, tww-segment, LED indicctors are used throughott.



NMEA0 / NMEA1

TTe upper indicator ssgment illuminates wwen NMEA BUS 0 is ppwered.

TTe lower indicator ssgment illuminates wwen NMEA BUS 1 is ppwered.

The ship's NMEA buses are switched at the domestic panel and for navigational use of the helm both indicator segments should be lit.



VHF / HELM

The upper indicator segment illuminates when VHF systems are enabled (this includes the ship's primary maritime VHF transceiver and the vessel's AIS transponder).

The lower indicator segment illuminates when the helm panel is enabled.

The ship's VHF system and the helm panel are switched at the domestic panel and for navigational use of the helm both indicator segments should be lit.



BILGE 1 (ER) / BILGE 2 (MS)

The upper indicator segment illuminates when either the engine compartment bilge system is disabled or the engine room bilge pump is running.

The lower indicator segment illuminates when either the main compartment bilge system is disabled or the main compartment bilge pump is running.



TEMP (ER) / TEMP (CC)

The upper indicator segment illuminates when the engine compartment temperature exceeds 30C.

The lower indicator segment illuminates when the battery compartment temperature exceeds 30C.



WASTE PUMP / (not used)

The upper indicator segment illuminates when the waste discharge pump is running.

Switches

CReling L series switches are used throughout.

The switches used in the helm panel are either two-state (single-throw) or three-state (double throw). Two state switches adopt the European convention that the 'up' position is the 'off' state and the other position signals some type of 'on'-ness. Three position switches adopt the 'up is off' convention where possible, but there are a number of situations where this principle cannot apply.

The notation used in this section to describe a two position switch is (*upState-downState*) and a three position switch (*upState-midState-downState*). If a switch position is momentary (i.e. the switch must be held in position by finger pressure), then this position is indicated in parentheses: for example (*upState-(downState)*).

Deck equipment & transmission group

These controls are concerned with heavy equipment under hydraulic operation and with change of transmission mode of operation.

For safety reasons, the **EEABLE** control must be switched on before other controls in this group will operate.

All of the controls in this group with the exception of the bow-thruster joystick are available on a hand-held deck remote control.



ANCHOR ((UP)-STOP-(DDWN))

Raises and lowers the anchor. The anchor must be released and the winch engaged before operating this control.



ENABLE (OFF-ENABLE)

If the ON position the other controls in this group together with the bow-thruster joystick are enabled.



HATCH ((OPEN)-STOP-(CLOSE))

Opens and closes the fore-deck hatch. The hatch must be unlocked before operating this control.



MAST ((UP)-STOP-(DOWN))

Rises and lowers the mast. The mast must be released before operating this control.



TROLL (OFF-ON)

If the ON position the transmission is switched to trolling mode, restricting the propeller revolutions for slow speed manoeuvring.

Domestic group

These controls are concerned with operation of some domestic systems.



D.WASH (OFF-ON)

If the ON position the aft deck-wash raw-water pump is enabled.



FLUSH (OFF-ON)

If the ON position the sewage holding tank will be automatically flushed with raw water when waste discharge completes.



WASTE (OFF-AUTO-ON)

If the AUTO position the sewage holding tank will be automatically discharged when it reaches the alert capacity set in the ship's Signal K system. If this mode is selected then the holding tank discharge valve and sea-cock must be left open.

If the ON position the sewage discharge pump will operate. Before selecting this mode, the holding tank discharge valve and sea-cock must be open.

Electronics group

These controls operate auxiliary electronic equipment supporting navigation.



AIS (OFF-RECV-TRANSMIT)

If the RECV position the ship's AIS transceiver will receive data from other stations, but will not broadcast this ship's position.

If the TRANSMIT position the transceiver will both receive and transmit AIS data.



RADAR (OFF-ON)

If the ON position the ship's radar is powered up.



WIFI (OFF-ON)

If the ON position the ship's external WiFi gateway is powered up. The gateway provides a high-gain antenna for accessing external WiFi hotspots and a local wireless hub which supports, among other things, VoIP communication for deck crew.

Lighting group

These controls are concerned with operation of lights associated with navigation.



NAV (OFF-ON)

If the ON position the ship's navigation lights (steaming light, stern light, port and starboard lights) are illuminated.



ANCHOR (OFF-ON)

If the ON position the ship's anchor light is illuminated.



WORK (OFF-ON)

If the ON position the ship's work lights (covering the foredeck) are illuminated.



SEARCH (OFF-ON)

If the ON position the ship's searchlight connection socket is powered.



DECK (OFF-ON)

If the ON position the ship's courtesy lights are illuminated.



NIGHT (OFF-ON)

If the ON position the ship's red wheelhouse night lighting is illuminated.

Navigation group



WIPER (OFF-ON-(MODE))

If the ON position the windscreen wiper(s) operate. The operating speed and the screen wash are selected by the MODE position. Refer to the windscreen wiper controller manual for more information.



BOARD (OFF-ON)

If the ON position the ship's blue board is displayed (moved to its vertical position); in the OFF position the board is restored to its horizontal parking position.



HORN (OFF-(ON))

If the ON position the ship's horn sounds for the duration the switch is operated.

Panel control group

These controls are concerned with modifying the operation of the helm panel itself.



PANEL ((UP)-OFF-(DOWN))

In the UP position panel background illumination is increased; in the DOWN position panel illumination is decreased.



SILENCE (OFF-(SILENCE))

The SILENCE position cancels the audible component of an active alarm condition. Note that the alarm indicator lamp will remain illuminated until the cause of the alarm condition is cleared and that any new alarm conditions will cause the audible alarm to sound again.

Safety group

These controls are concerned with operation of environmental safety systems.



BILGE 1 (OFF-AUTO-ON)

This control operates the engine compartment bilge system and should normally be left in the AUTO position. The bilge system is integrated into the ship's helm alarm system and operation of this control may trigger an alert.

In the AUTO position the engine compartment bilge pump will be operated by the system float switch.

In the ON position the engine compartment bilge pump will run continuously.



BILGE 2 (OFF-AUTO-ON)

This control operates the main compartment bilge system and should normally be left in the AUTO position. The bilge system is integrated into the ship's helm alarm system and operation of this control may trigger an alert.

In the AUTO position the main compartment bilge pump will be operated by the system float switch.

In the ON position the main compartment bilge pump will run continuously.



E.ROOM (OFF-AUTO-ON)

This control operates the engine room ventilation system and should normally be left in the AUTO position.

In the AUTO position the engine room ventilation system will operate when the engine room temperature exceeds the set point on the engine room thermostat.

In the ON position the engine room ventilation system will run continuously.



B.COMP (OFF-AUTO-ON)

This control operates the battery compartment ventilation system and should normally be left in the AUTO position.

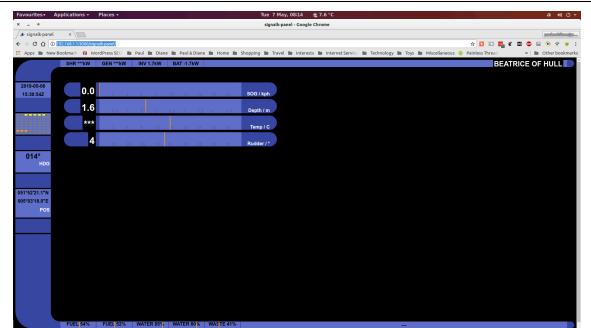
In the AUTO position the battery compartment ventilation system will operate when the battery compartment temperature exceeds the set point on the battery compartment thermostat.

In the ON position the battery compartment ventilation system will run continuously.

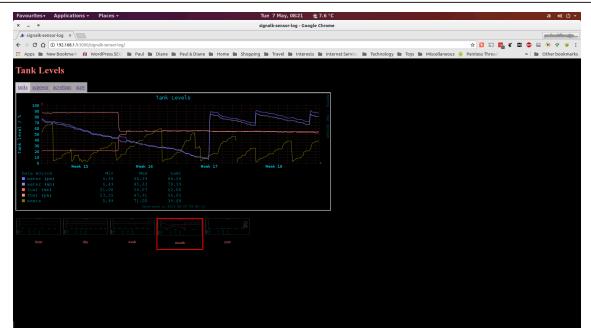
4.2.2. Logical control panel

A number of logical control panels are implemented as Signal K server webapps.

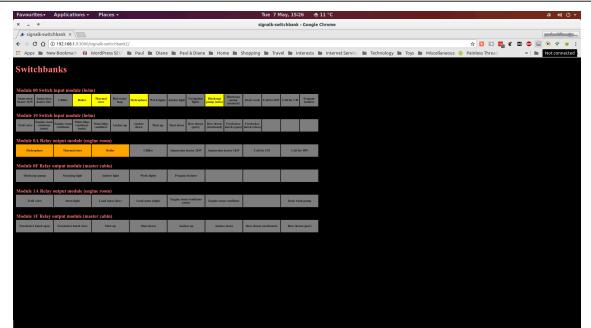
SSgnalk Panel (<http://192.168.1.1:3000/signalk-panel/>) is a simple integrated instrument panel displaying house and navigation data.



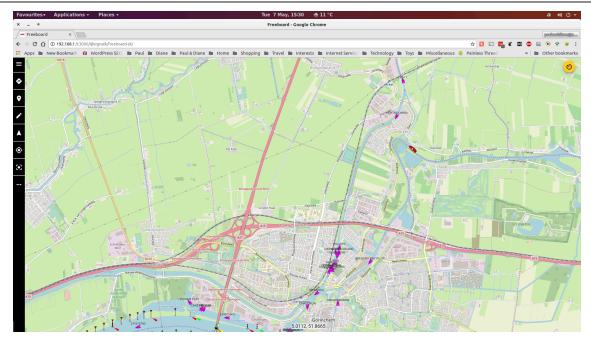
SSgnalk Log Viewer (<http://192.168.1.1:3000/signalk-log-viewer/>) is a viewer for data logged by the ss-gnalk-log-viewer plugin.



SSgnalk Switchbank (<http://192.168.1.1:3000/ssgnalk-switchbank/>) visualises the state of NMEA 2000 switchbank input and output channels defined by the ss-gnalk-switchbank plugin.



FFeeboard-sk (<http://192.168.1.1:3000/ffeebaord-sk/>) chartplotter.



4.3. Propulsion and steering

The vessel is powered by a marine diesel engine driving a fixed propeller through a reversing marine gearbox. The entire propulsion drive-train is flexibly mounted and well isolated.

4.3.1. Main engine

The vessel is equipped with a four cylinder, water-cooled, diesel engine fitted with a dry exhaust system. Waste heat from the main engine is used to charge the ship's thermal buffer.

Model	DDutz	
Type	BB4M 1013MC	
Engine number		
Power rating (kW (hp))		
Cooling	Water (indirect)	
Engine controls	Cable	

 Take care to perform the necessary routine maintenance.

 Remove the key from the helm engine panel before working on the engine.

 The engine becomes hot during operation and remains hot afterwards.



4.3.1.1. Main engine controls

The main engine instrument and control panel is located at the helm.

To start the engine:

- Ensure that the helm lever control is in neutral and the throttle at the tick-over position.
- Insert the key in the ignition switch and rotate clockwise to position I (ignition on). The green 'panel ready' and red 'low oil pressure' and 'charge failure' warning indicators will illuminate and the associated audible alarm will sound.
- Turn the ignition key clockwise against its spring to position II (start) and hold to crank the engine. Release the key as soon as the engine starts or, if the engine fails to start, after five seconds.
- If the engine failed to start repeat step (3). If the engine repeatedly fails to start there is a fault: consult the engine user manual.
- When the engine starts the charge failure and low oil pressure warning lights should extinguish and the alarm should silence. If either of these fail to happen, consult the engine user manual.
- Allow the engine to warm up for a few minutes before operating under load.

To stop the engine:

- Ensure that the helm lever control is in neutral and the throttle at the tick-over position.
- If the engine has been under heavy load, allow it to run at tick-over for a few minutes to cool.
- Press the engine panel STOP button.
- Wait for the engine to stop, the charge failure light and low oil pressure lights to illuminate and the associated alarm to sound.
- Turn the ignition key to position 0.

 To avoid damage to the engine alternator never stop the engine by simply turning the ignition key to position 0.

Engine speed is controlled by the combined throttle/gear lever which operates through control cables: if the engine speed or gears cannot be changed then in the first instance check for a broken cable.

4.3.1.2. Main engine electrics

The main engine operates at 24VDC. Twin 120Ah 12VDC cranking batteries are installed on the port side of the engine room with an adjacent battery isolator switch, split-charge module and dedicated 24VDC battery charger which is energised only when the ship is connected to shore or generator supply.

The main engine alternator provides up to 140A of charging current to both the engine starter batteries and the domestic battery bank through the split charge system.

4.3.1.3. Main engine exhaust

The vessel has a dry exhaust system route through a silencer and discharging through the transom.

 The exhaust system is thoroughly insulated against heat loss, but caution must be exercised when moving around the engine room during or shortly after operation of the main engine.

4.3.1.4. Main engine cooling

The main engine is indirectly cooled through an immersed heat exchanger located in a protected cavity at the port side of the hull.

The heat exchanger can be serviced from the engine room without the need for lift-out or dry-docking. A subsidiary primary cooling circuit is used to heat the ship's thermal buffer through a heat transfer coil.

The primary cooling circuit is pumped by a mechanically driven engine mounted impeller.

 The exposed cooling circuit pipework becomes hot during engine operation.



4.3.2. Transmission

The vessel is equipped with a conventional marine reduction gearbox mounted directly to the rear of the main engine. Gearbox lubrication is separate from the main engine, but uses the same type of lubricating oil.

The gearbox supports an electrically selectable trolling mode and provides a permanent power take off (PTO) for the ship's hydraulic system.

Model	PPM	
Type	500	
Reduction ratio	2:1	
Gearbox number		
Gearbox controls	Cable (fwd/rev/troll) and electrical (troll enable)	

 Take care to perform the necessary routine maintenance.

 Remove the key from the helm engine panel before working on the engine.



4.3.3. Shafting and propello

The output of the vessel's gearbox is coupled to the propeller shaft by a flexible coupling which reduces vibration and eliminates the need for precise engine alignment. The propeller shaft exits the vessel through a conventional stuffing-box with continuous automatic shaft lubrication.

4.3.3.1. Anti-vibration coupling

MMke	PPthon-drive	
TTpe	P200-T	



4.3.3.2. Shaft seal

The shaft seal is a standard marine stuffing box with double sealing.

MMke		
TTpe		

The stuffing material requires periodic replacement.



4.3.3.3. Shaft lubrication

The primary shaft lubrication system is electrically driven and operates continuously whilst the main engine is running. If the automatic lubrication system fails, a conventional manual lubrication cup can be used to ensure that the shaft can be operated safely.

MMke		
TTpe		
Grease		

Regularly check grease levels and top-up as necessary.



MANUAL NOT SUPPLIED

4.3.3.4. Propeller

MMke	Michigan	
TTpe	GG469	
Size (in)	32 x 27	

4.3.4. Steering

The steering system is hydraulically operated. Turning the ship's wheel operates a helm pump which pumps fluid through pipework to twin steering cylinders connected to a quadrant on the rudder.

When the ship's main engine is running, power from the ship's hydraulic system is used to augment the manual steering system, making steering lighter and more comfortable in use.

4.3.4.1. Steering assistance

Steering assistance is implemented through an 'orbitrol' valve which opens when the wheel is turned, allowing the hydraulic system to effect rudder cylinder action. Assisted steering is only available when the main engine is running.

4.3.4.2. Emergency steering

If the unlikely event of the hydraulic steering system failing the rudder can be operated manually through use of an emergency tiller. To use the emergency tiller:

1. Open the hatch over the aft centre deck locker to gain access to the tiller and rudder shaft.
2. Fit the tiller to the top of the rudder shaft
3. Open the bypass valve connecting the two hydraulic steering cylinder
4. Move the tiller to position the rudder

 Steering using the tiller is only possible at low speeds - one person should operate the tiller and another the engine controls.

 Keep the locker housing the tiller and rudder shaft clear of obstructions so that in an emergency the tiller can be installed easily.

4.4. Fuel system

Refer to Figure 4.1, "Safety equipment (above deck)" for a system overview.

Two steel storage tanks are integrated into the vessel's hull midships. Fuel from the 1800 litre port-side tank is used exclusively for main-engine propulsion whilst fuel from the 1800 litre starboard tank is used exclusively for domestic heating and electricity generation. The two storage tanks are not interconnected, but bars and valves are provided which would allow tank interconnection in an emergency.

Fuel filling, distribution, return and tank venting is through metallic pipes and non-metallic hoses of sturdy construction. All connections to (moving) machinery are made with flexible hoses.

Water separators and filters are placed in front of each fuel consumer. The generator fuel supply line is assisted by a lift pump mounted inside the generator cabinet.

4.4.1. Filling the tanks

To filling points clearly marked "DIESEL" are located in a recess on the starboard side of the vessel just forwards of the wheelhouse. The left-hand filler connects to the domestic fuel tank; the right-hand filler connects to the propulsion fuel tank.

If some regulatory authorities it is permissible to use reduced tax fuel ('red diesel' in Europe) for domestic purposes. DO NOT fill the vessel's propulsion tank with red-diesel. The procedure for filling a tank is:

1. Determine the type of fuel to be taken on (red or white diesel) and so identify the associated tank and filler location.
2. Check the appropriate tank level using one of the vessel's display gauges and so determine how much fuel can be taken on.
3. Open the correct filler cap.
4. Start filling the tank: begin with a steady to moderate flow.
5. Check the tank level by monitoring a display gauge.
6. Do not fill the tank to its maximum: gauges are not exactly accurate and room should be left for expansion of the fuel and contraction of the tank. Filling to 90% capacity is sensible.
7. Replace and close the filler cap.
8. Clean up any spills

9. Make an entry in the ship's log.

 Diesel oil must be treated as chemical waste and an absorbent cloth should be to hand when filling the ship's tanks.

4.4.2. Water separators and filters

Water separators and filters are located in the engine compartment.

The main engine is served by two water separators: the separator in use is selected by a valve which allows a changeover should one separator become clogged or require service. The generator and boiler each have single water separators. Any water collected by the separators should be regularly drained.

Fuel filters are located adjacent to or mounted on the main engine, generator and boiler.

 Water separator and fuel filter elements must be regularly changed.

 FILL ME IN

4.4.3. Tank level monitoring

Each tank is equipped with an electronic tank level monitoring system consisting of a hydrostatic tank level sender which broadcasts messages onto the ship's domestic NMEA 2000 bus. Tank level data can be displayed on screens located at the helm, domestic panel and elsewhere.

 Variations in tank level readings are possible due to conditions of trim, list, seaway and calibration.

 Tank level readings require NMEA BUS 0 to be enabled on the ship's domestic panel.

 [mmre1]

4.5. Fresh water system

The fresh water system consists of two 1680 litre stainless-steel fixed storage tanks, a hydronic with a 230VAC electrical pump and an on-demand, plate heat-exchanger based, hot water generator.

Refer to Figure 4.1, "Safety equipment (above deck)" for a system overview.

The twin tanks are normally connected through valves located under the saloon floor: it is possible to operate the system from just one tank by closing the appropriate valves between tanks and on the common manifold.

4.5.1. Filling the tanks

Ensure that the hose you use for topping up your potable water tanks is appropriate for potable water and that your chosen water source is in fact dispensing drinking water.

1. Locate the deck filler marked "WATER".
2. Clean the area around the filler and ensure that any adjacent filler caps are firmly closed.
3. Clean the end of the hose which will be inserted into the ship's filler port and run water through the hose for a sufficient time to eliminate any retained or static water from the supply.
4. Open the deck fitting, insert the hose and commence filling.
5. Fill the tank. Do not overfill - a 90% reading on the tank gauge is a sensible target.
6. Remove the hose and replace the filler cap.
7. Make an entry in the ship's log.

4.5.2. Tank level monitoring

Each tank is equipped with an electronic tank level monitoring system consisting of a hydrostatic tank level sender which broadcasts messages onto the ship's domestic NMMA 2000 bus. Tank level data can be displayed on screens located at the helm, domestic panel and elsewhere.

 Variations in tank level readings are possible due to conditions of trim, list, seaway and calibration.

 Tank level sensing requires NMEA BUS 0 to be enabled on the ship's domestic panel.

 [mmre1]

4.5.3. Pressure system

The ship's hydrosphere is installed in the engine room and consists of a 230VAC electrically driven pump and pressure vessel. The system is set to a default pressure of 3bar and will automatically maintain this, starting the pump as necessary to cater for demand.

The system is entirely automatic in operation and it is recommended that the hydrosphere remain powered at all times.

 To enable and disable the pressure system use the switch labelled HYDROPHORE on the ship's domestic panel.

 The pressure system can only be enabled and disabled if NMEA BUS 0 is enabled.

 The motor and pump have an exposed mechanism and may begin operation unexpectedly.

 Danger of electrical shock 230VAC

 [sssc1]

4.5.4. Hot water

Hot water is generated by a heat exchange system located in the engine-room. When a hot-water tap is opened fluid from the ship's thermal buffer is pumped through the heat exchanger primary circuit and used to heat cold water, delivered by the hydrosphere, in the heat exchanger secondary circuit.

An independent pump feeds hot-water loop attempts to predict demand for hot water and ensure that, under most circumstances, pre-heated water is available at an outlet in anticipation of its likely use.

When the thermal buffer is fully charged it can supply enough hot water for at least a day's normal domestic usage without the input of any additional energy.

If the thermal buffer is cold, then it can be recharged for the purpose of hot water generation almost instantaneously from the ship's boiler or less rapidly by use of the immersion heaters (waste heat from operation of the main engine and generator is also used to recharge the buffer). Refer to Section 4.10.1, "Thermal buffer" for detailed information on managing the thermal buffer.

 To enable and disable the hot-water system use the switch marked THERMAL STORE on the ship's domestic panel.

 To enable and disable the hot-water loop use the switch marked HHT WATER LOOP on the ship's domestic panel.

 The hot water system can only be enabled and disabled if NMEA BUS 0 is enabled.

 FILL ME IN

4.5.5. HHads

WWs on the vessel are operated electrically and flush from the ship's fresh water system, discharging directly into the ship's black water holding tank. The WC units are operated by a simple flush button and consume either 3 litres or 5 litres of water per operation depending on the selected flush mode.

 WC units operate at 230VAC, unplug from mains before servicing.

 [ssni1]

4.6. WWste water system

The waste water system consists of a 1100 litre holding tank, which accumulates grey water waste from sinks, basins and showers and black water waste from WCs. The holding tank is vented through the hull via a charcoal filter.

WWs pump waste directly to the holding tank. All other waste water flows by gravity to sumps positioned around the vessel which automatically pump collected waste to the holding tank.

The holding tank can be emptied through a deck pump-out connection or by use of the ship's own discharge pump.

Refer to Figure 4.1, "Safety equipment (above deck)" for a system overview.

 Never let the holding tank become too full: overfilling can cause a system malfunction with overflow of sewage water into the bilge and backflow into the rest of the system.

4.6.1. HHads

WWs pump macerated waste directly to the holding tank each time the 'flush' function is activated.

The WCs operate at 230VAC and are supplied via circuit-breakers in distribution cabinets C1 and C4. The WCs should normally remain powered whenever the vessel is in use.

 WC units operate at 230VAC, unplug from mains before servicing.

 sani2

4.6.2. SSmps

Four sealed waste water sumps are located in the bilge at various locations around the vessel. Each sump contains a float switch which detects when the sump is full and energises a pump to discharge the contents of the sump to the holding tank.

SSMP1

Collects waste water from the guest cabin shower and from the lower-deck fancoil unit condensate drain. The unit is accessed through a hatch in the office floor.

SSMP2

Collects waste water from washing machine, dishwasher, galley sink, day head basin, saloon fancoil unit condensate drain and the lower-deck porthole condensation drains. The unit is accessed through the crawlspace beyond the lower companionway.

SSMP3

Collects waste water from the master cabin en-suite basin and shower. The unit is accessed through the crawlspace beyond the lower companionway.

SSMP4

Collects waste water from the master cabin fancoil unit condensate drain. The unit is accessed through the hatch under the master cabin bed.

Two sumps operate at 230VAC and are supplied via circuit-breakers in distribution cabinets C1 and C4. Tee sumps should normally remain powered whenever the vessel is in use.

 Sump units operate at 230VAC, unplug from mains before servicing.

 [sani1]

4.6.3. Tank level monitoring

The holding tank is equipped with an electronic tank level monitoring system consisting of a hydrostatic tank level sender which broadcasts messages onto the ship's domestic NMEA 2000 bus. Tank level data can be displayed on screens located at the helm, domestic panel and elsewhere.

 Variations in tank level readings are possible due to conditions of trim, list, seaway and calibration.

 Tank level readings require NMEA BUS 0 to be enabled on the ship's domestic panel.

 [mmre1]

4.6.4. Emptying the holding tank

The holding tank can be emptied at a suitable shore-side pump-out facility or by pumping out using the ship's own discharge pump.

4.6.4.1. Emptying the holding tank at a pump-out station

1. Slash the area around the pump-out DECK FITTING with water to prevent any possible spillage adhering to the deck.
2. Close the tank DISCHARGE VALVE.
3. Open the tank SUCTION VALVE
4. Open the DECK FITTING and connect the suction hose from the shore pump-out facility. Make sure the connection between the inner surface of the DECK FITTING and the suction hose is secure and leak free.
5. Start the shore-side suction and allow to complete.
6. Disconnect suction hose.
7. Close DECK FITTING.
8. Wash down deck if necessary and wash hands.
9. Close SUCTION VALVE
10. Make entry in ship's log.

4.6.4.2. Emptying the holding tank by pumping it out

1. Make sure that the vessel is in a body of water where pumping out is permitted and that discharge will not inconvenience anyone.
2. Open DISCHARGE VALVE and SEE COCK.

3. Operate the WASTE switch at the helm panel to start the discharge pump. The helm alarm will signal an alert whilst the pump is running: the audible component of the alert can be silenced, but the visual alert will continue until the discharge pump is switched off.
4. Listen for a change in pump resonance which indicates the tank is empty or monitor progress on the discharge on a tank level display. Discharging a full holding tank will take over 30 minutes. Do not let the discharge pump run dry unnecessarily.
5. Switch off the waste pump.
6. Close DISCHARGE VALVE and SEA COCK.
7. Make an entry in the ship's log.

4.6.4.3. Emptying the holding tank by pumping it out automatically

The vessel has an automatic discharge system integrated into the ship's NMEA 2000 controller. The automatic mode is selected from the **WASTE** switch at the helm panel and causes the controller to continuously monitor the waste level in the holding tank: at 90% capacity the controller will start the waste discharge pump, stopping it again when the tank reaches 10% capacity. Whilst the pump is in operation the helm alarm will signal an alert.

 Ensure that the DISCHARGE VALVE and SEA COCK remain open whilst the discharge system is set to automatic.

4.7. Bilge pumping system

The vessel is equipped with two electrically operated bilge pumps, one in the engine compartment and another in the main compartment. Each pump is connected to a float switch which operates the bilge pump automatically when water is detected in the bilge. Each float switch is backed-up by an independent water level sensor connected to the ship's alarm system.

4.7.1. Bilge system controls

Each bilge system is operated by a three-position switch located at the helm (labelled **E.ROOM** and **M.COMP**):

UP POSITION

The bilge pump and float switch are switched off. In normal use the switch should never be left in this position unless the vessel is out of the water or the bilge system is being serviced. When the switch is in this position the associated bilge pump alarm indicator will illuminate.

MIDDLE POSITION

The bilge pump and float switch are enabled in automatic mode. If the float switch detects water in the bilge the pump will start automatically and the helm alarm annunciator and indicator will signal an alert and the associated bilge pump alarm indicator will illuminate.

DOWN POSITION

The bilge pump will run, the helm alarm annunciator and indicator will signal an alert and the associated bilge pump alarm indicator will illuminate.

4.7.2. Bilge system alarms

Each bilge system has an indicator light at the helm which illuminates when the associated bilge system is switched off and/or when the bilge pump is running. The indicator will flash when the bilge backup sensor detects water: typically this means that the float switch has failed to activate the bilge pump or the compartment is being inundated at a rate beyond the capacity of the bilge pump.

The helm alarm system will activate when a bilge pump is running for whatever reason and also when a backup sensor detects water. The audible component of the alarm can be cancelled, but the visual component will remain active until the condition causing the alert is corrected.

4.8. Data networks

NMEA 2000 and Ethernet data networks are installed on the ship together with some small-scale proprietary networks concerned with operation of the Victron power system.

4.8.1. NMEA 2000

The vessel is equipped with two NMEA 2000 buses, bridged at the helm but powered separately via switches on the domestic panel.

NMEA BUS 0 ('domestic bus')

NMEA bus 0 supports all on-board control functions and instrumentation of the ship's domestic or 'house' systems.

If this bus is not permanently enabled then very few of the ship's systems can be monitored or operated.

NMEA BUS 1 ('navigation bus')

NMEA bus 1 supports instrumentation and controls related to navigation of the vessel.

This bus must be enabled when navigating the vessel, but should be powered down when the ship is moored.

The following schematic indicates the general arrangement of the NMEA 2000 network.

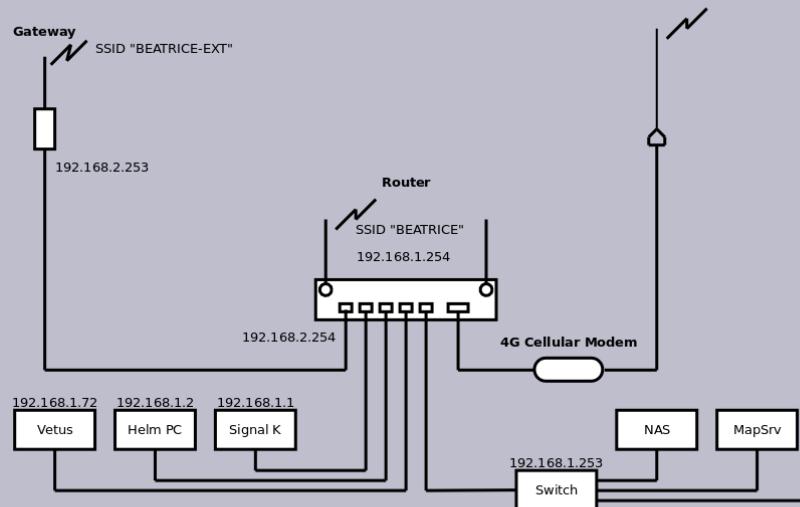
4.8.1.1. Equipment

The following table lists NMEA 2000 infrastructure components.

Device	Serial #	Instance	Buses	Location
AAtisense NGT-1-ISO NMEA 2000 gateway		n/a	0	Helm
AAtisense QNB1 network block		n/a	1	Helm panel
OOceanic Systems 3478 relay output module		0x0A	0	Engine room
OOceanic Systems 3478 relay output module		0x1A	1	Engine room
OOceanic Systems 3478 relay output module		0x0F	0	Master cabin
OOceanic Systems 3478 relay output module		0x1F	1	Master cabin
OOceanic Systems 4410 switch input module		0x01	0	Helm
OOceanic Systems 4410 switch input module		0x11	0	Helm
MMertron NBE100 network bus extender		n/a	0 & 1	Helm

4.8.2. Ethernet LAN

Figure 4.9. Ethernet LAN infrastructure components



Ethernet is used to support general access to ship services including information displays, virtual control panels, VoIP deck communication, mmr and NIS services and audio and video entertainment.

4.8.2.1. Equipment

The following table lists Ethernet infrastructure components.

Item	Location	IP addresses (hostname)
Netgear N600 wireless router	HHlm	192.168.1.254 (gateway), 192.168.2.254 (WWN), 192.168.3.254 (USB 4G)
Ubiquiti Networks Bullet gateway	OO deck below blue-boord	192.168.2.253 (bullet)
Cisco managed switch	Lower companionway seever rack	192.168.1.253 (switch)
Signa K / NMEA controller	HHlm	192.168.1.1 (controller)
Navigational PC	HHlm	192.168.1.101 (helm)
NNNS/DLNA server	Lower companionway seever rack	192.168.1.2 (nas)
OpenSeaMap server	Lower companionway seever rack	192.168.1.3 (maps)

4.8.2.2. Wired networks

CCT6 UTP cabling runs around the ship terminates at a network switch located in the ship's data cabinet which is accessible behind a panel on the port side of the lower companionway. The switch WAN port is connected by a single cable to the main router located at the helm. Helm equipment which benefits from an Ethernet connection is cabled directly to the main router's built in LAN switch.

A second wired network consisting of a single cable connects the main router's WAN port to the ship's external gateway.

4.8.2.3. Wireless networks

The ship implements two WiFi networks: an internal network (SSID="BEATRICC") simply extends the vessel's 192.168.1.0 network whilst an external network (SSID="BEATRICC-EXT") supports VoIP intercom use for deck crew and allows restricted access to on-board services for guests.

4.8.3. WWN

Connection to external networks is provided in three ways:

1. BB WiFi. The ship's wireless gateway operates in station mode to allow connection to an available WiFi hotspot. The administration interface allows identification of and connection to available networks and is accessible at <https://192.168.2.254> with default credentials "ubnt:ubnt". For this service to be available, the **Wi-Fi** switch at the helm must be on.
2. BB 4G. The ship's router is equipped with a 4G USB dongle connected to a remote external antenna. The arrangement gives a broadband quality data link to the Internet at a maximum speed of 150Mbps. The administration interface at <https://192.168.1.254> allows management of the connection.
3. BB SMS. The USB dongle used for 4G connection also supports sending and receiving SMS messages which are used by some Signal K applications for notification of alerts and for remote control.

4.9. Electrical system

The vessel has a comprehensive electrical system with multiple sites of control and layered safety features. In summary,

System	Rating	Battery	Charging	Master switch
Generator start	12VDC	1 x 12VDC 120Ah	Alternator (on generator)	Engine room (aft switch)
			12 VDC battery charger	
Minimum engine start	24VDC	2 x 12VDC 120Ah	Alternator (split charge with domestic system)	Engine room (forward switch)
			24VDC battery charger	
Domestic	24VDC	12 x 2VDC 1100Ah	Minimum engine alternator (split charge)	Battery compartment
			Vectron Quattro	
Generator	230VAC 12kVA	n/a		
Shore power	230VAC 7kVA	n/a	n/a	n/a
Inverter	230VAC 8kVA	n/a	n/a	n/a

4.9.1. 12VDC generator starting system

The generator starting system operates at 12VDC and is entirely self-contained with no consumers other than the generator system (including the generator control panel located at the helm).

4.9.1.1. Battery and master switch

A single 12VDC 120Ah battery and associated master switch are located below the generator housing on the port side of the engine room.

4.9.1.2. Charging system

The generator battery is charged from the generator alternator and from a separate 230VAC battery charger located next to the battery. The battery charge is only energised when the ship is on shore or generator power.

4.9.2. 24VDC main engine starting system

The main engine starting system operates at 24VDC and supports the main engine system (including the main engine control panel located at the helm), the shaft lubrication system and the navigation stern light.

4.9.2.1. Battery and master switch

The 12VDC 120Ah series-connected batteries and associated master switch are located below the generator housing on the port side of the engine room.

4.9.2.2. Charging system

The main engine batteries are charged via a split-charge controller from the main engine alternator (the residual charging current is used to charge the ship's domestic battery bank) and from a separate 230VAC battery charger located next to the battery. The battery charger is only energised when the ship is on shore or generator power.

4.9.3. 24VDC domestic system

The domestic system operates at 24VDC and supports all ship's systems other than generator and main engine starting.

230VAC is distributed across the ship.

4.9.3.1. Batteries and master switch

Twelve 2VDC 1100Ah series-connected batteries provide power through the main isolator switch to the DC main distribution board all of which are located in the battery compartment below the galley floor.

4.9.3.2. Main distribution board

The main distribution board is supplied from the main isolator switch and is configured in three circuit groups each with differing isolation possibilities. See

Function (circuit)	Function rating/A	Group	Remark
F1 Inverter/charger	250		
F2 Inverter/charger	250		
F3 Spud pole	150		
F4 Alternator	150		
F5 Helm B	150	Helm non-essential services (all helm panel functions with the exception of bilge and alarm systems).	Group can be isolated locally at distribution board and remotely by the DD ISOL control on the domestic panel.
F6 Cabinet C3	100	""	
F7 (spare)		""	
F8 (spare)		""	
F9 Helm A	100	Helm essential services (bilge and alarm systems only).	Group can be isolated locally at distribution board.

4.9.3.3.

4.9.4. Domestic 230VAC systems

The ship's 230VAC system supports most domestic consumer functions including hydropore, heating, cooling, ventilation, galley refrigeration, interior lighting, WC and waste sumpp. The supply-side of the system is controlled by an integrated charger-inverter monitored and operated from the domestic panel.

All outgoing circuits are routed through the main distribution cabinet C1 to a collection (C2, C4, C5a and C5b) of sub-cabinets which feed individual consumer circuits. All circuits are fused by circuit breaker and single-pole residual current protection.

Residual current safety features are only functional if the shore-power connection is properly polarised.

4.9.4.1. Energy sources

The following table lists available energy sources. The ship's systems are configured to automatically select the energy source with the lowest priority number when it is available. The charger/inverter is able to concurrently top-up any shortfall in generation or shore supply by inversion.

Source	Rating/kVA	Device	Priority	Control principle	Isolation
Generator	12	Diesel generator set	1	The generator is started manually by operation of the helm control panel or the GENERATOR control on the domestic panel. Automatic generator start is possible (see ? and th)	Disconnect isolator switch in engine room.
Shore power	7	Isolating transformer	2	Shore power is automatically enabled when the shore power connection is plugged in.	Disconnect isolator switch in engine room.
Domestic battery set	8	Charger-inverter	3	The charge function is permanently enabled and can only be defeated by isolating the domestic battery bank. The inverter function can be disabled by the charger-inverter control panel on the domestic panel.	Min battery isolator.

4.9.4.2. 230VAC distribution

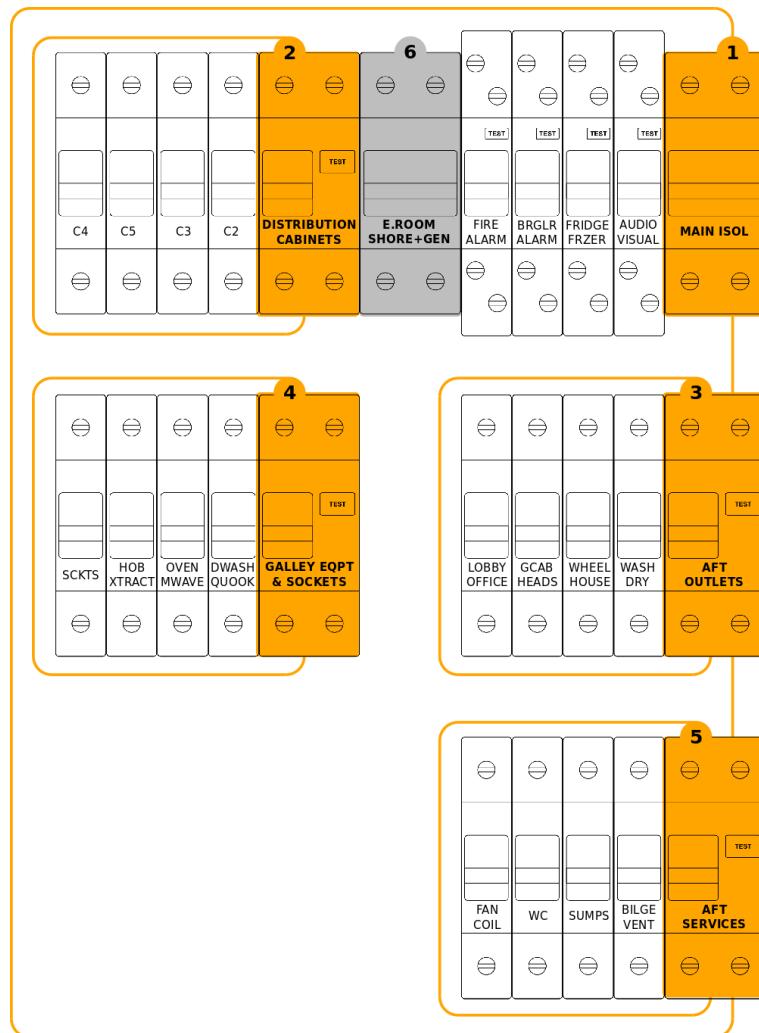
Distribution cabinet C1

Distribution cabinet C1 is the upper of the two cabinets installed on the forward bulkhead of the lower deck lobby and is the ship's main AC distribution cabinet.

The cabinet receives two 230VAC supplies directly from the ship's inverter/charger. A no-break supply (via isolator (1)) feeds all of the cabinet devices, deriving power from the currently selected source. A second supply (via isolator (6)) derives power from shore and generator only and routes this directly to cabinet C5a since the only consumers of this supply are located in the ship's engine room.

All circuits in the cabinet are overload and leakage protected. Four RCBO devices at the top-right of the cabinet supply individual circuits making these consumers insensitive to failures in other circuits and to nuisance tripping. Four outgoing circuits (protected by (2)) supply downstream distribution cabinets with circuits protected by (3), (4) and (5) supplying consumers on the galley and lower-deck.

Figure 4.10. Distribution cabinet C1



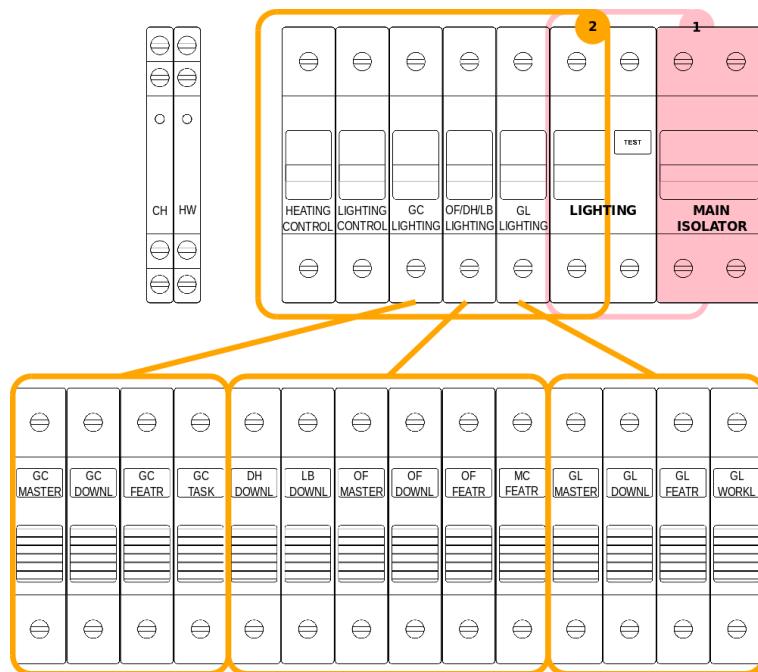
Distribution cabinet C2

Distribution cabinet C2 is the lower of the two cabinets installed on the forward bulkhead of the lower deck lobby.

The cabinet receives a 230VAC supply from cabinet C1 via isolator (1).

All circuits in the cabinet are overload and leakage protected and are connected with lighting control for the art of the ship, operation of the ship's PIR sensors, and heating control. The distribution cabinet houses a 12VDC power supply for the ship's PIR sensors and a 24VDC power supply for light switch circuits on the lower deck. The ship's intruder alarm system is installed in the lower half of the cabinet.

Figure 4.11. Distribution cabinet C2



4.10. Space heating, cooling and hot water

The vessel is equipped with an integrated hydronic space heating and cooling system (SHCS) (see Section 12.1, “Heating system overview”).

SSCS is bi-modal: at any one time the system can be in either heating mode or cooling mode and it is not possible to heat one space on the ship whilst simultaneously cooling another.

The operating mode of SHCS is selected by the **CHILLER** switch at the domestic panel: when the switch is OFF, the system is in heating mode; when it is ON, the system is in cooling mode.⁴ Domestic hot water is available irrespective of the operating mode of SHCS.

The vessel has a mix of fancoil and radiator heat exchangers: radiators only operate in heating mode whilst fancoil units will operate in both heating mode and cooling mode.

The primary heat source on the vessel is a large thermal buffer, consisting of a well-insulated mass of heated water, and in order for the ship to be heated and hot-water to be available, the buffer must be maintained at an appropriate operating temperature.

The primary heat sink on the vessel is a refrigeration unit capable of chilling the circulating hydraulic fluid and so allowing fancoil units to blow cold air.

⁴In fact, the ship's central chiller can operate in reverse cycle, so it is possible to operate the HVAC system in cooling mode in a way which generates space heating.

4.10.1. Thermal buffer

The thermal buffer holds 250 litres of hydronic fluid which acts as the heat source for space heating and domestic hot water.⁵ Hydronic fluid in the thermal buffer stratifies by temperature: the hottest fluid at the top of the buffer and the coldest at the bottom. Hydronic fluid for domestic water heating is taken from the top of the buffer and fluid used for space heating is taken from the middle of the buffer. Cooled fluid is returned to the bottom of the store in order to preserve stratification.

4.10.1.1. Operating characteristics

The buffer is designed to operate at a maximum temperature of 85°C and it can be heated (recharged) from the sources shown in the following table.

Heat source	Time for full recharge	Time for HW availability
1kW immersion heater	Several hours	~ 30 minutes
2kW immersion heater	~ 1 hour	~ 20 minutes
Diesel boiler	10 minutes	Instantaneous
Waste heat from generator	20 minutes	< 5 minutes
Waste heat from engine	20 minutes	< 5 minutes

Typically the hydronic fluid in the thermal buffer rapidly assumes a temperature gradient and it will be capable of driving the hot-water system and, to a lesser extent, SHHS in less time than would be required for a full recharge.

Exactly what constitutes a recharge using the boiler is determined by three thermostats mounted on the thermal store and one mounted on the boiler.

Thermostat	Set point/C (initial configuration)	Remark
Boiler	80	Determines the absolute maximum temperature of the thermal buffer.
T1 (top thermostat)	50	Used to switch on the boiler when the recharge is intended to support hot water production.
T2 (middle thermostat)	60	Used to switch on the boiler when the recharge is intended to support space heating.
T3 (lower thermostat)	60	Used to switch off the boiler.

T3 determines the 'depth' of buffer recharge: the higher the set point the more heat is absorbed in the store in any given mode. Tweaking the thermostat settings for a particular domestic pattern of usage is an interesting exercise.

4.10.1.2. Operating the thermal buffer

The user can choose how and when to recharge the thermal buffer and typically this choice will be based upon the demand for heat and the economy of an available heat source. For example, if the demand is solely for hot water, then a fully charged buffer may continue to satisfy this demand for up to 48h with no intervention and indefinitely with occasional, low-level, energy input. Equally, if there is a demand for space heating throughout the year, then the diesel boiler might be the obvious recharge source although availability of shore power and a low or zero space heating demand might make immersion heating a suitable alternative. For a vessel navigating northern Europe in the summer it is unlikely that any additional heat input to the buffer will be necessary over and above that supplied by the main engine.

The domestic panel controls which operate the buffer are:

⁵ One benefit of using a buffer is that its high heat capacity ensures that the diesel boiler runs more efficiently with less cycling than would occur if the boiler were directly driving the heating or hot water systems; a further benefit is that once heated the buffer can produce many times its own volume of domestic hot water.

IMMERSION 1kW

Operates the 1kW immersion heater which is located towards the top of the thermal buffer and can effectively prepare the system for hot water generation only.

IMMERSION 2kW

Operates the 2kW immersion heater which is located further down the thermal buffer and can quickly prepare the system for hot water generation only.

IMMERSION 1kW and IMMERSION 2kW

Running both immersion heaters simultaneously will rapidly prepare the buffer for hot water generation and can also support low demand space heating.

BOILER

Recharging the buffer using the boiler supports immediate hot water generation (even when the store is at ambient temperature) and continuous high-load heating demands.

4.10.2. Domestic hot water

Domestic hot water is available any time the thermal buffer is charged.

A fully charged buffer can support up to 48 hours of sole domestic hot water demand before requiring a recharge. If the domestic panel **BOILER** switch is ON, then channel 2 of the four-channel time controller located in the galley can be used to schedule or initiate an immediate recharge of the thermal buffer.

Hot water is generated by a plate heat exchanger with its primary circuit fed from the thermal buffer and its secondary circuit fed directly from the hydrophore. The output of the plate heat exchanger passes through a blending valve to give a comfortable domestic hot-water temperature. An independent, intelligent, hot-water loop can be used to make hot water available instantaneously at each outlet.

4.10.2.1. Operating the hot water system

The domestic panel controls which operate the domestic hot water system are:

THERMAL STORE

Operates the plate heat exchanger system. This ensures that the pump driving the primary heat exchange circuit is enabled: a flow switch will start the pump when a hot water outlet is opened or when the hot-water loop is enabled. This control should be left in the ON position when the ship is occupied.

HOT WATER LOOP

Enables the hot water loop. The hot water loop is driven by an intelligent pump which learns periods of hot-water demand and only runs to anticipate them.

4.10.2.2. Using the boiler for hot-water generation

If the boiler is the preferred recharge source for the buffer, then channel 2 of the four-channel time controller located in the galley can be used to schedule recharge events or initiate an ad-hoc recharge.

4.10.3. Space heating

Space heating is available any time the thermal buffer is charged, but the demands of heating the entire ship will rapidly deplete the buffer if one or more forms of continuous recharge is not available.

4.10.3.1. Operating the heating system

The heating system will only be available if the domestic panel **BOILER** control is OFF.

The heating system circulation pump is operated by channel 1 of the four-channel time controller located in the galley. If the heating demand is high and neither the generator or main engine are running, then the thermal store should be configured for recharge from the diesel boiler by setting the domestic panel **BOILER** switch to ON. If the heating demand is low and shore or generator power is available, then using both immersion heaters to recharge the store is feasible.

4.10.4. Space cooling

The cooling system will only be available if the domestic panel **CHILLER** control is set to NN.

The chiller system control panel is located in the galley. Refer to the chiller system documentation for details of operation.

4.11. Hydraulics

The ship's hydraulic system is powered by a permanently engaged pump connected to the main engine gearbox power take-off port.

Pressurised oil is pumped to the adjacent reservoir and distribution unit. The distribution unit valve block includes an 'orbitol' system for assisted steering and two electrically operated load-sense valves, one high-pressure, one low-pressure, which feed fluid to a subsidiary valve block located in the fore-locker which in turn operates the anchor windlass motor, mast hydraulic cylinder and bow-thruster motor.

 Do not alter any of the system settings

 Do ensure that the oil level in the reservoir remains topped up



4.12. Fire prevention and fire fighting systems

4.12.1. Fire detection and alarm system

The vessel is equipped with a central fire detection and alarm system which covers all compartments of the vessel and all living spaces in the main compartment. Operation of the alarm system is fully documented in the manufacturer's manual.

A separate propane gas detector is located in the bilge immediately below the gallery.

 Detectors are tailored to the space in which they are installed and in the event of failure must be replaced with a detector with a similar scope of application.

 Operation of the alarm system is fully documented in the manufacturer's manual.

4.12.2. Manual fire-fighting equipment

Manual fire extinguishers are installed in clearly visible locations in the wheelhouse, saloon and lower deck lobby. A fire blanket is installed in the galley.

 Have extinguishers checked at the calendar intervals indicated on the equipment.

 Replace expired or discharged extinguishers with devices of identical or greater fire fighting capacity.

4.12.3. Automatic fire-fighting equipment

Automatic fire extinguishing systems are installed in the engine room and fore-looker. Both systems use Firetrace® tubing as the distribution, detection and discharge medium and deploy Novec 1230 as the fire suppressant.

The engine-room system is configured to give local coverage of flash-points including the interior of the generator casing. In the event of a discharge in the engine room, an automatic switch disables the engine room ventilation system to prevent fire suppressant being evacuated by the engine room extractor fans.

The fore-locker system is designed to flood the entire locker space.

⚠️ Novec 1230 is an environmentally neutral, non-toxic, halon replacement, but it can still cause asphyxiation - do not enter the protected space after a system discharge without allowing the suppressant to disperse.

 FILL ME IN

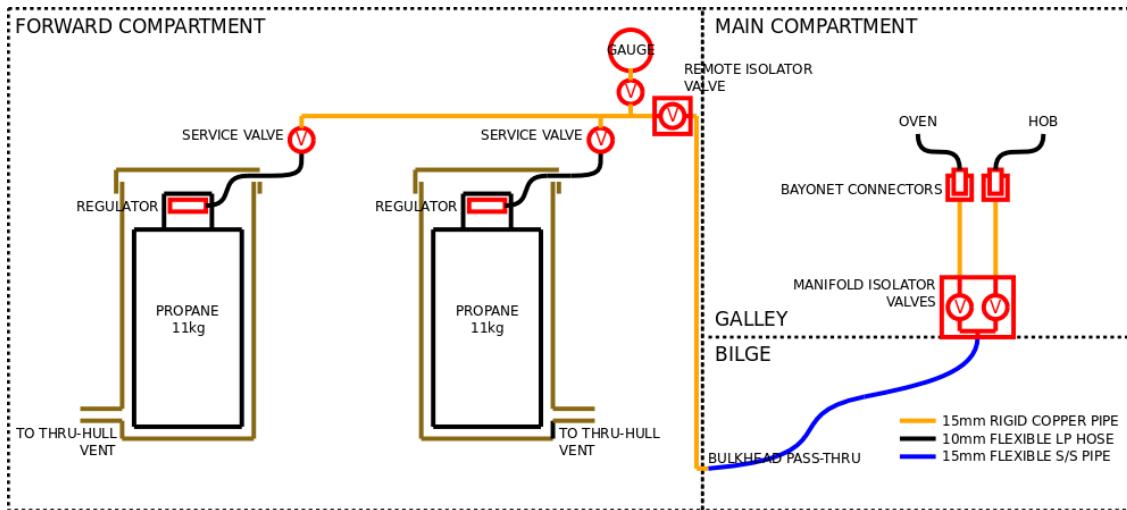
4.12.4. Fire prevention responsibilities

It is the responsibility of the skipper on the ship to:

- have fire-fighting equipment checked at the intervals indicated on the equipment;
- replace fire fighting equipment, if expired or discharged, by devices of identical or greater fire fighting capacity;
- inform members of the crew about:
 - the location and operation of fire fighting equipment;
 - the operation of the automatic extinguisher system and the hazards it presents;
 - the location of escape hatches.
- ensure that fire fighting equipment is readily accessible when the vessel is occupied.

4.13. Security

4.14. LPG system



The LPG system consists of a storage facility in the ship's fore-locker connected by rigid, low-pressure, pipework to consumers (oven and hob) located in the galley. A remote isolator valve located close to the cylinders in the fore-locker is operated by a switch in the galley.

A LPG gas sensor is located in the galley bilge with an alarm annunciator in the galley itself.

4.14.1. Cylinders and cylinder locker

A maximum of two 11kg LPG gas cylinders may be installed in twin gas lockers located in the ship's fore-locker. The gas lockers are vented to the outside of the vessel at the bow.

4.14.2. Pressure regulator

37mBar gas regulators are fitted directly to each gas bottle with low-pressure flexible connections to service valves located outside the gas locker.

4.14.3. Oven and hob

The oven and hob are connected by flexible hoses to bayonet-connectors mounted on the bulkhead behind the oven. The oven and hob are disconnected by a single isolator valve located at floor level in the galley.

4.14.4. Advice for LPG system on-board

It is recommended that the LPG system is shut down when not in use.

4.15. Deck wash

The ship's deck wash system serves auto-sop bayonet-style hose connector outlets located on the aft-deck and fore-deck.

4.15.1. Forward deck wash outlet

The forward deck wash outlet is supplied with fresh water from the ship's pressurised domestic water system.

The outlet and its associated above-deck pipework can be isolated and drained via a combined stop/drain cock located behind an access panel at the back of the master cabin hanging locker.

4.15.2. At deck wash outlet

The aft deck wash outlet can be configured to supply either fresh water from the ship's pressurised domestic water system or raw water from the environment.

The outlet and its associated above-deck pipework can be isolated and drained via a combined stop/drain cock located on the engine room deck head just aft of the engine room hatch.

⚠️ Operate the **D.WASH** switch at the helm to disable the raw water deck wash pump when its service is not required.

4.15.2.1. Changing the supplier water type

The source of water for the aft deck wash outlet is changed by opening and closing two valves in the engine room: the fresh water shut-off valve is located on the deck head just aft of the engine room hatch; the raw water pump isolating valve is located on the chiller unit raw-water intake manifold.

To select fresh water supply:

1. Connect a hosepipe to the deck wash outlet and allow water to flow freely away.
2. Operate the **D.WASH** switch at the helm to disable the raw water deck wash pump.
3. Close the raw water pump isolating valve.
4. Open the fresh water shut-off valve.
5. Disconnect the hosepipe from the deck wash outlet as soon as a fresh water flow has been established.

To select raw water supply:

1. Connect a hosepipe to the deck wash outlet and allow water to flow freely away.

2. Close the fresh water shut-off valve.
3. Open the raw water pump isolating valve.
4. Ensure that the raw water through-hull sea cock supplying the chiller unit raw water intake is open.
5. Operate the **D.WASH** switch at the helm to enable the raw water deck wash pump.
6. Disconnect the hosepipe from the deck wash outlet as soon as a raw water flow has been established. The deck wash pump will stop automatically.
7. Operate the **D.WASH** switch at the helm to disable the raw water deck wash pump.

⚠️ Ensure that fresh water shut-off valve is kept closed when the raw water pump is in use. An automatic double-check valve provides passive protection against cross-contamination of the fresh water system with raw water, but it is best not to rely on this as the sole means of system isolation.

4.15.3. Regular maintenance

WEEKLY

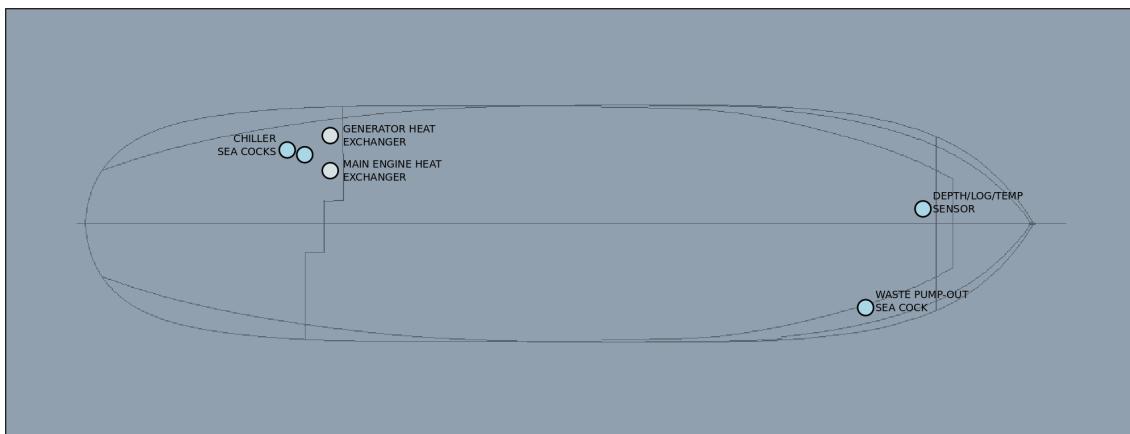
1. Check the security of all raw water deck wash pump hose connections.
2. Check the condition of the raw water deck wash pump flexible hoses, replacing any which show signs of wear or failure.

FREEZING CONDITIONS

1. Isolate and drain down the fresh water supply to the forward deck wash outlet.
2. Isolate both the fresh water and raw water supplies to the aft deck wash outlet and drain down the outlet.

4.16. Through-hull fittings and valves

Figure 4.12. Through-hull penetrations



There are four below-waterline hull penetrations and two penetrations for heat exchanger coils which are just above the waterline at normal trim.

Penetration	Access
SSa cock (waste discharge)	FFoor hatch in master cabin (starboard side).
SSa cock (chiller cooling water intake)	EEgine room (port side)
SSa cock (chiller cooling water outlet)	EEgine room (port side)

Penetration	Access
Hydro-exchanger (generator)	Engine room (port side)
Hydro-exchanger (main engine)	Engine room (port side)
Sensor (depth/log sensor)	Floor hatch in master cabin (below bed)

4.16.1. Hull penetrating sensors

The hull is penetrated by a single combined depth/log/temperature sensor installed in the main compartment hull.

4.16.2. Hull ports and sea-cocks

4.17. Deck equipment

5. Sailing

5.1. Maximum load

The maximum load of your boat is

5.2. Lifesaving equipment

5.3. General

5.3.1. Mooring

5.3.2. Anchoring

5.3.3. Towing and being towed

5.3.4. Electronics

5.4. Environmental considerations

5.4.1. Domestic waste

5.4.2. Noise

5.4.3. Wash

6. MMaintenance

6.1. HHuling out / cradlinn

TE vessel can be hauued up or lifted ott as long as it is well-supported wwilst on land.

LLfting out must be aacomplished using tww slings of minimum width 15cm. The hull ppintwork should be pprotected from abrasiin by putting a soft piece of maaerial between the ssings and the hull. Take care with the guard rails: a nnrrow sling suspensiin arm can easily sqqash them if the slings are not ttreaded through the inside of the rails.

WWen placing slings eesure that they do nnt foul thru-hull seesors and the propelloo shaft.

6.2. SSall repairs

SSall repairs to the hull can be made by using a good qualiyy epoxy filler and paitt. But take care: thi only goes if you kkow what you are doing, and the ddmage is not structual. If in the damaggd area there show small cracks in the surrounding araa or if the damaged aaaa shows fibres in the hull or ddck structure, get aa expert repairman tt do the job and/or assess thh damages. If structral damages occurs while underway, try to close off the repair area by taping it.

RRmember that any reppir must be as good as the original wokk if you want to keep youu boat in good shae.

DD NOT use silicone-bbsed sealants on ayy part of the boat.

WWen sanding, paintinn or doing similar wwrk on the boat, remmber that paintdust aad epoxies are to ee treated as toxic chhmical waste.

7. Receipt of documents

8. Declaration of conformity

9. CCpy certificates

9.1. UU registration summaay

1. Certificate of Briish Registry (Part I)

NNme
BBatrice of Hull

OOficial number
922316

IIO number
NN-SRF20LM31616

2. Ship radio licensee / Ship portable raddo license

LLicense class
SSip Radio License

LLicense number
1-314515313

NNme of vessel
BBatrice of Hull

CCll sign
2JEC3

MMSI
235115158

AAIS
9235115158

RRdio equipment
AAS Transponder, VHF DSC Fixed radio, VFF Portable radii

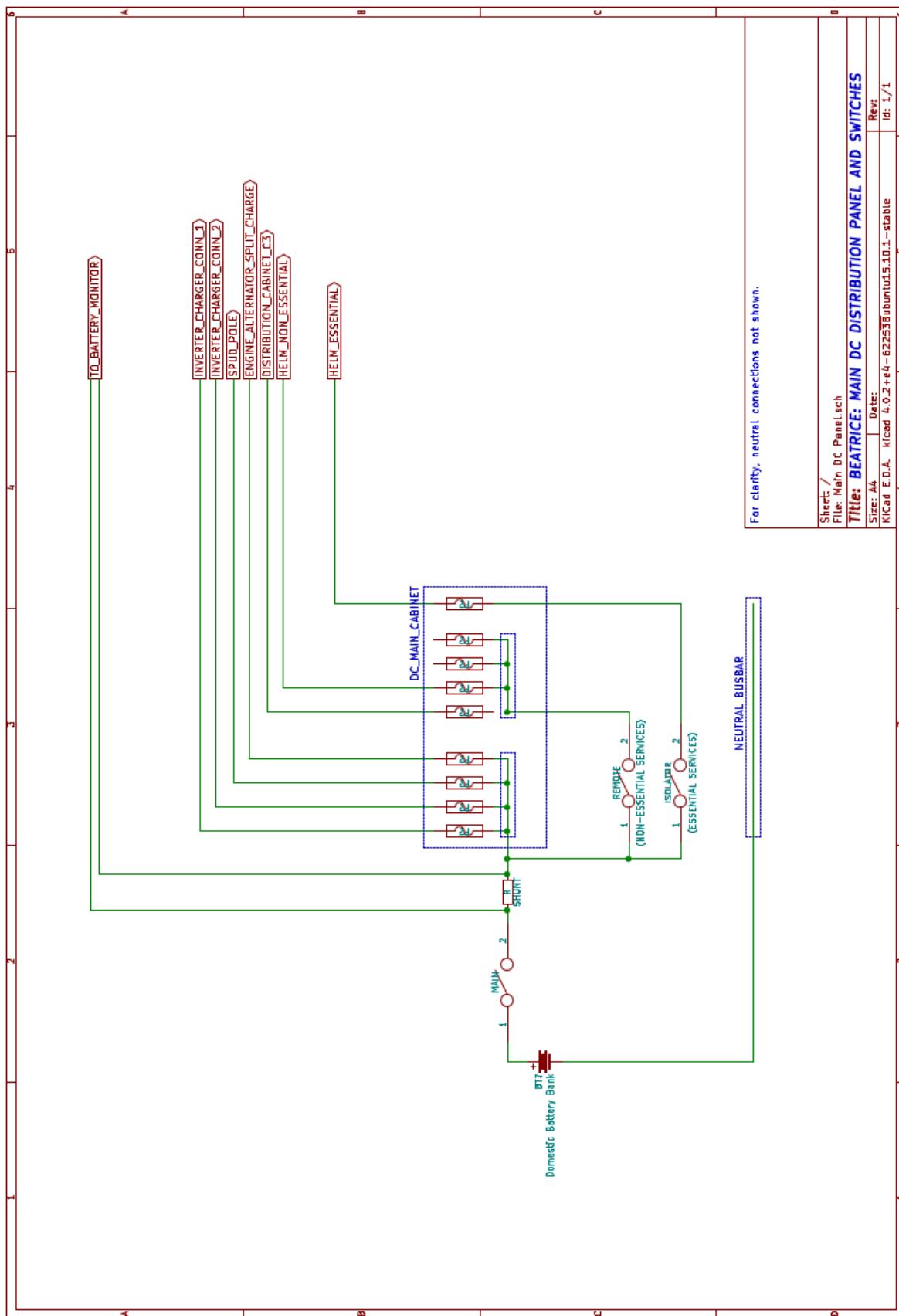
10. Warranty conditions

11. Electrical diagrams

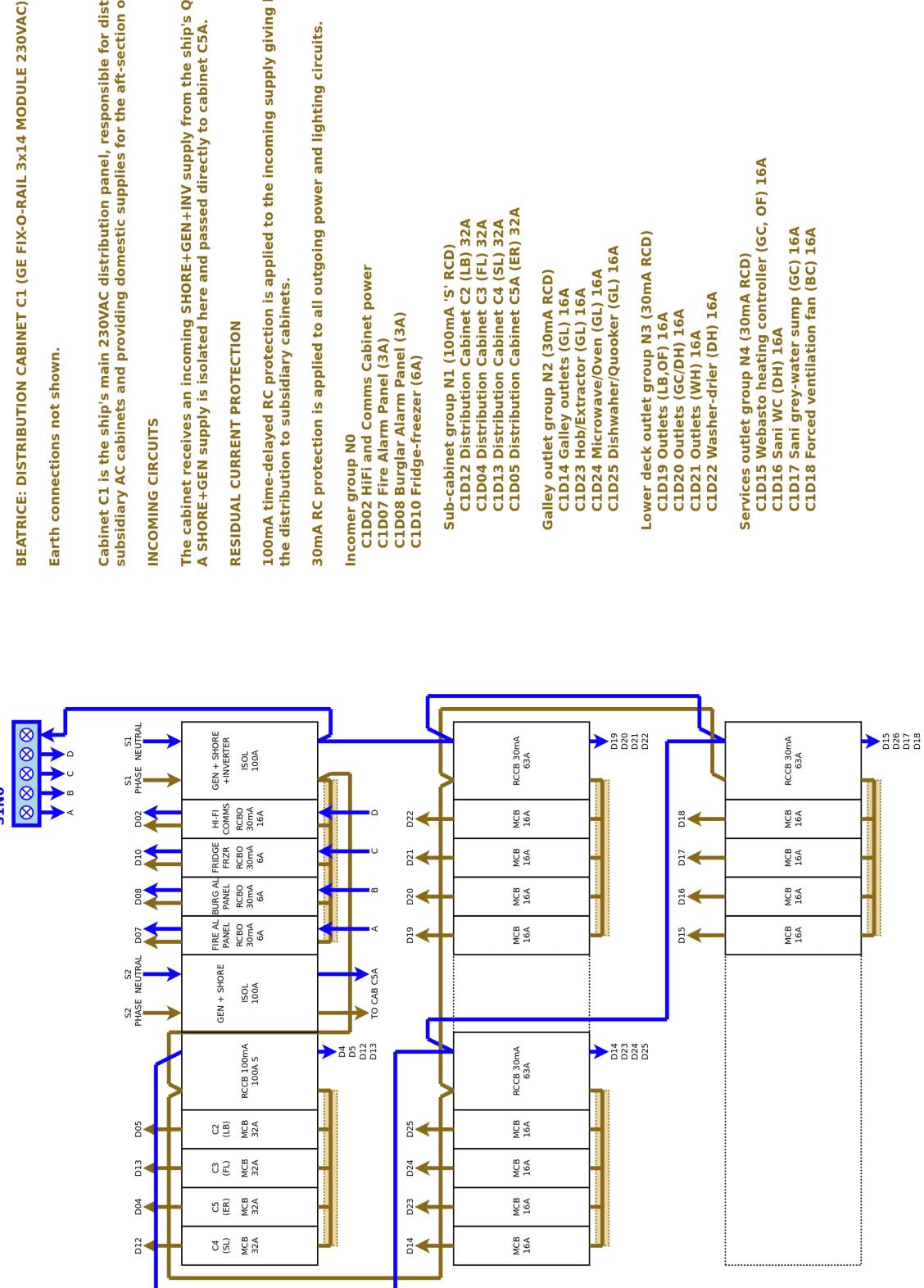
This section includes circuit diagrams for all the vessel's distribution cabinets and panels.

Distribution cabinet	Type	Location	Function
C0	24VDC	Battery compartment (galley)	Min DC distribution cabinet. Battery power to all shipboard consumers.
C1	230VAC	Lower deck lobby	Min AC distribution cabinet. Power circuits for guest cabin, office, day head, lobby and galley.
C2	230VAC	Lower deck lobby	Lighting circuits for guest cabin, office, day head, lobby and galley. Intruder alarm.
C3	24VDC	Master cabin	NMEA interface. Fore-locker and mast equipment.
C4	230VAC	Salon	Lighting and power circuits for master cabin, ensuite and saloon.
C5a	230VAC	Engine room	Engine room equipment AC supplies.
C5b	230VAC	Engine room	Engine room equipment AC control interface.
C5c	24VDC	Engine room	NMEA interface. Engine room DC services.
C6	230VAC	Fore locker	Lighting and power for fore locker.
Min engine interface	24VDC	Engine room	Engine - helm control panel connection.
Thermal store interface	230VAC	Engine room	Termostat, heat exchanger and boiler control.
Domestic panel	24VDC	Lower companionway	Skipper's master panel

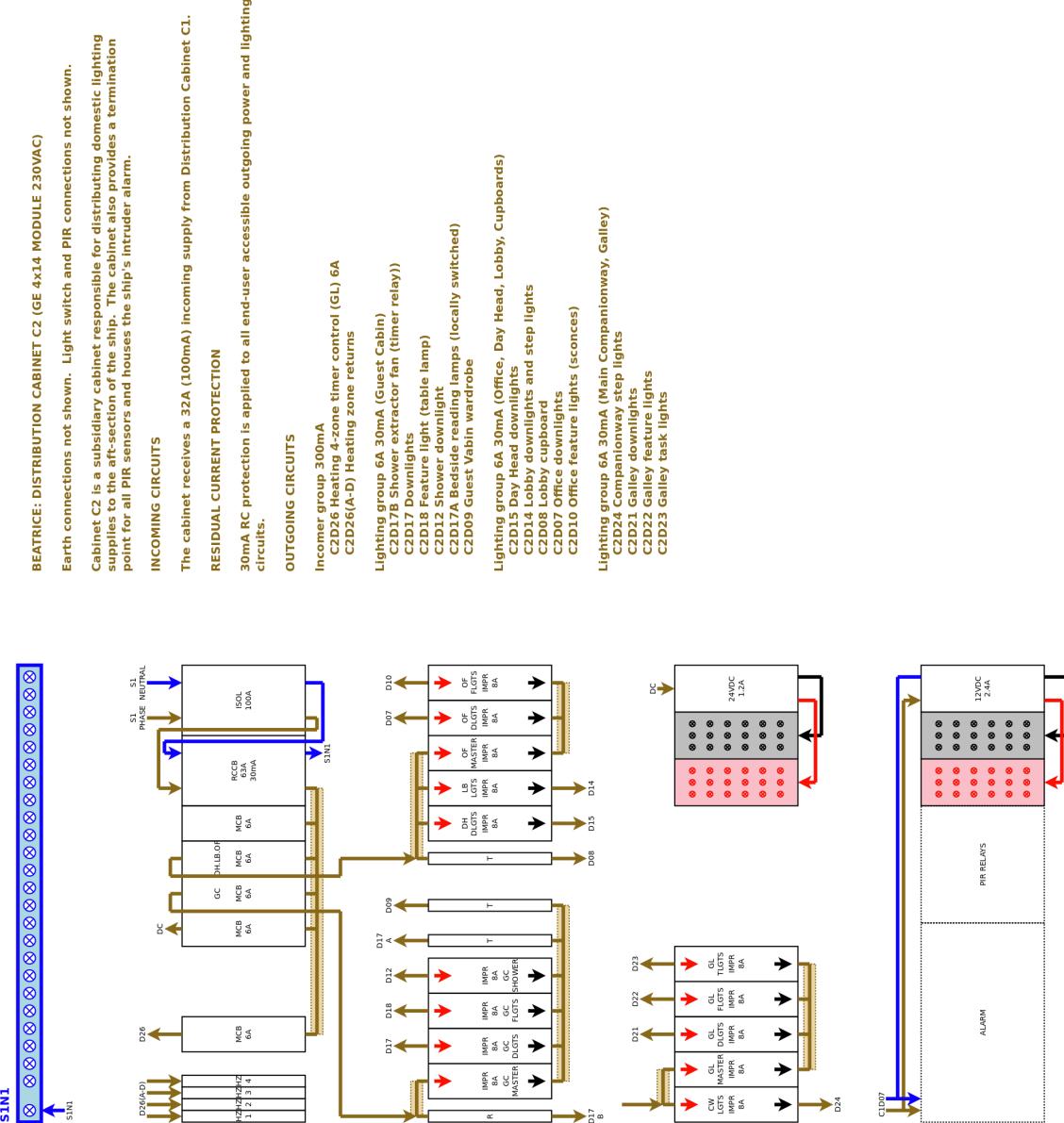
11.1. Distribution cabinet C0



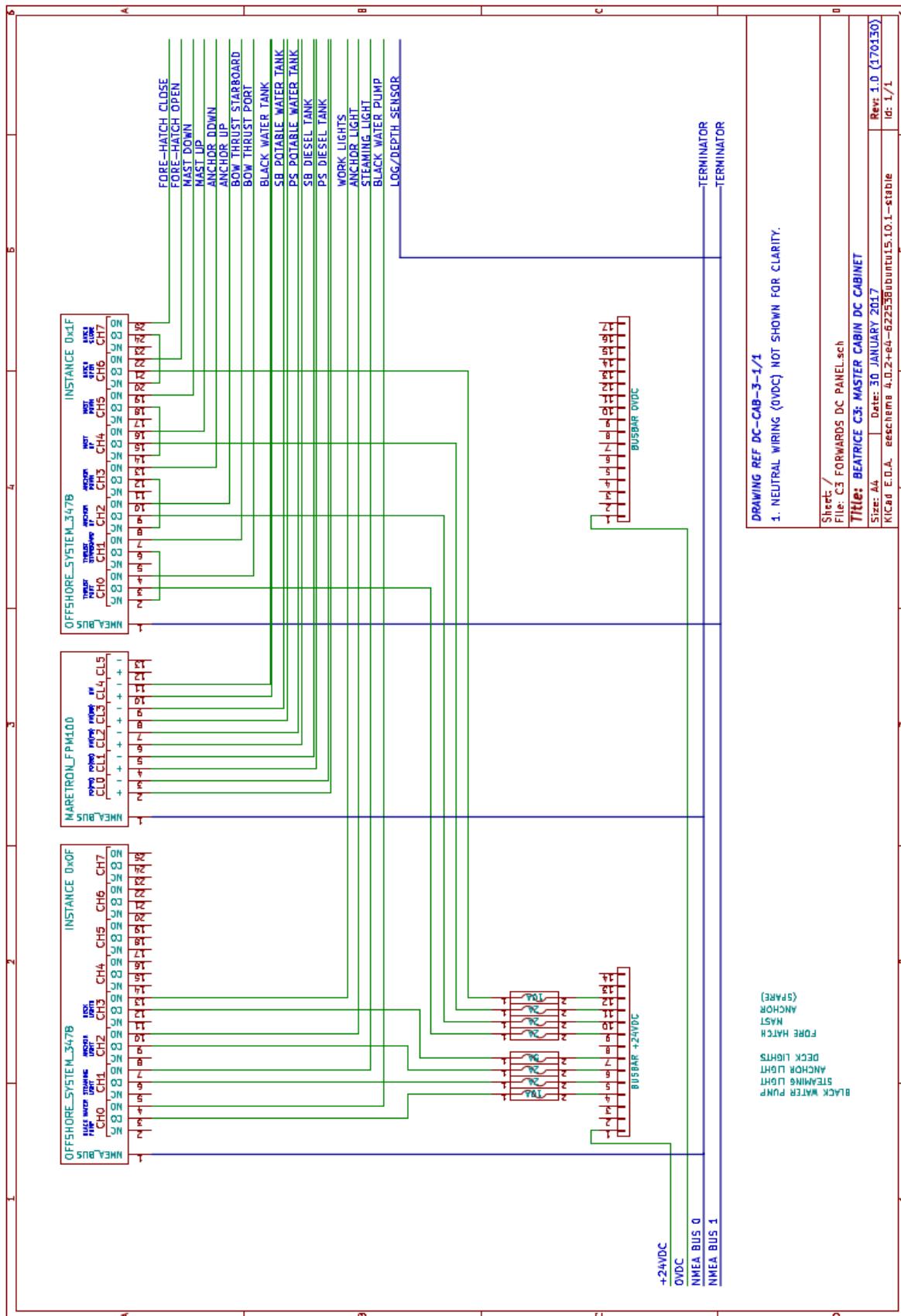
11.2. DDstribution cabinet C1



11.3. DDstribution cabinet C2



11.4. DDistribution cabinet C3



11.5. Distribution cabinet C4

BEATRICE: DISTRIBUTION CABINET C4 (HAGER GOLF 2x18 MODULE 230VAC)

Earth connections not shown.

Cabinet C4 is a subsidiary cabinet responsible for distributing domestic supplies to the forward-section of the ship.

INCOMING CIRCUITS

OUTGOING CIRCUITS

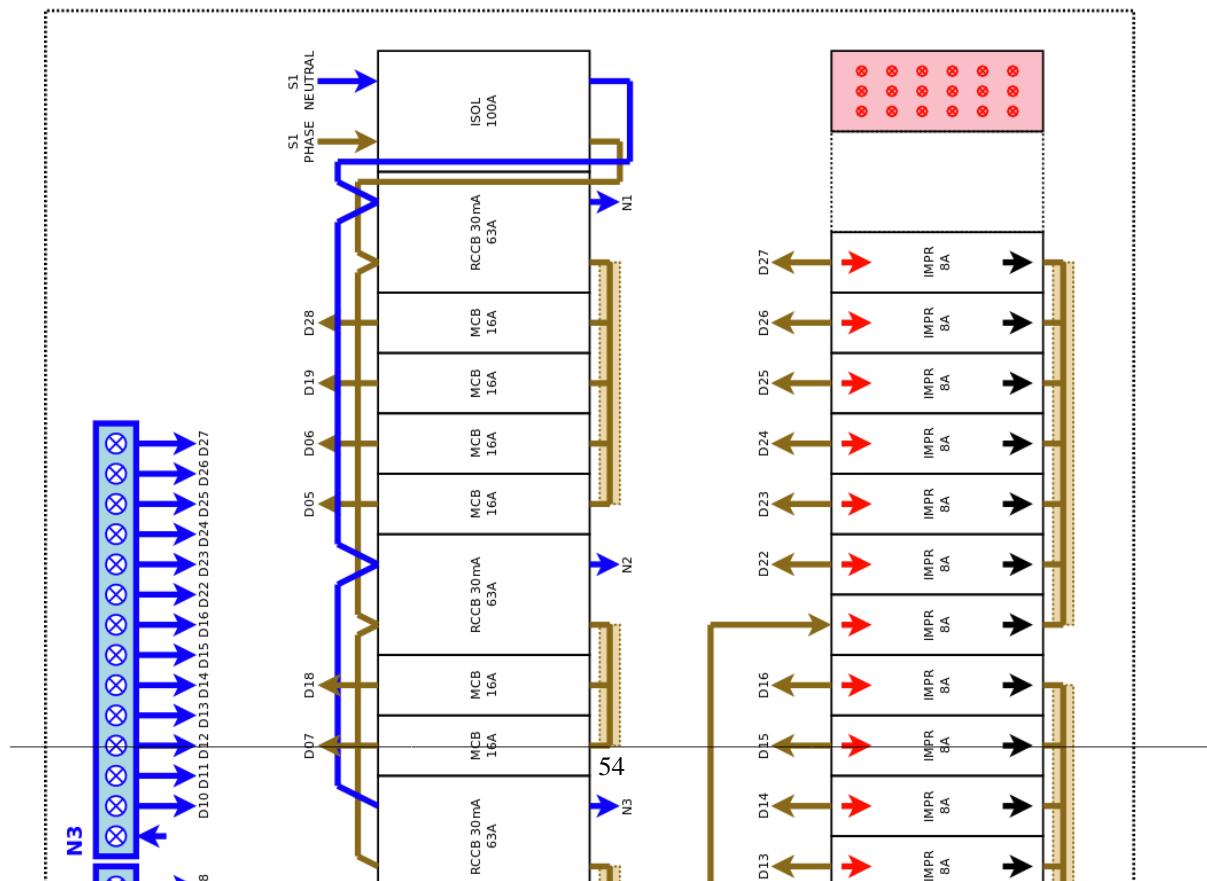
Outgoing circuits are protected by circuit breakers clustered under RCCBs. 30mA RC protection is applied to all outgoing circuits.

Incomer circuit (100mA)

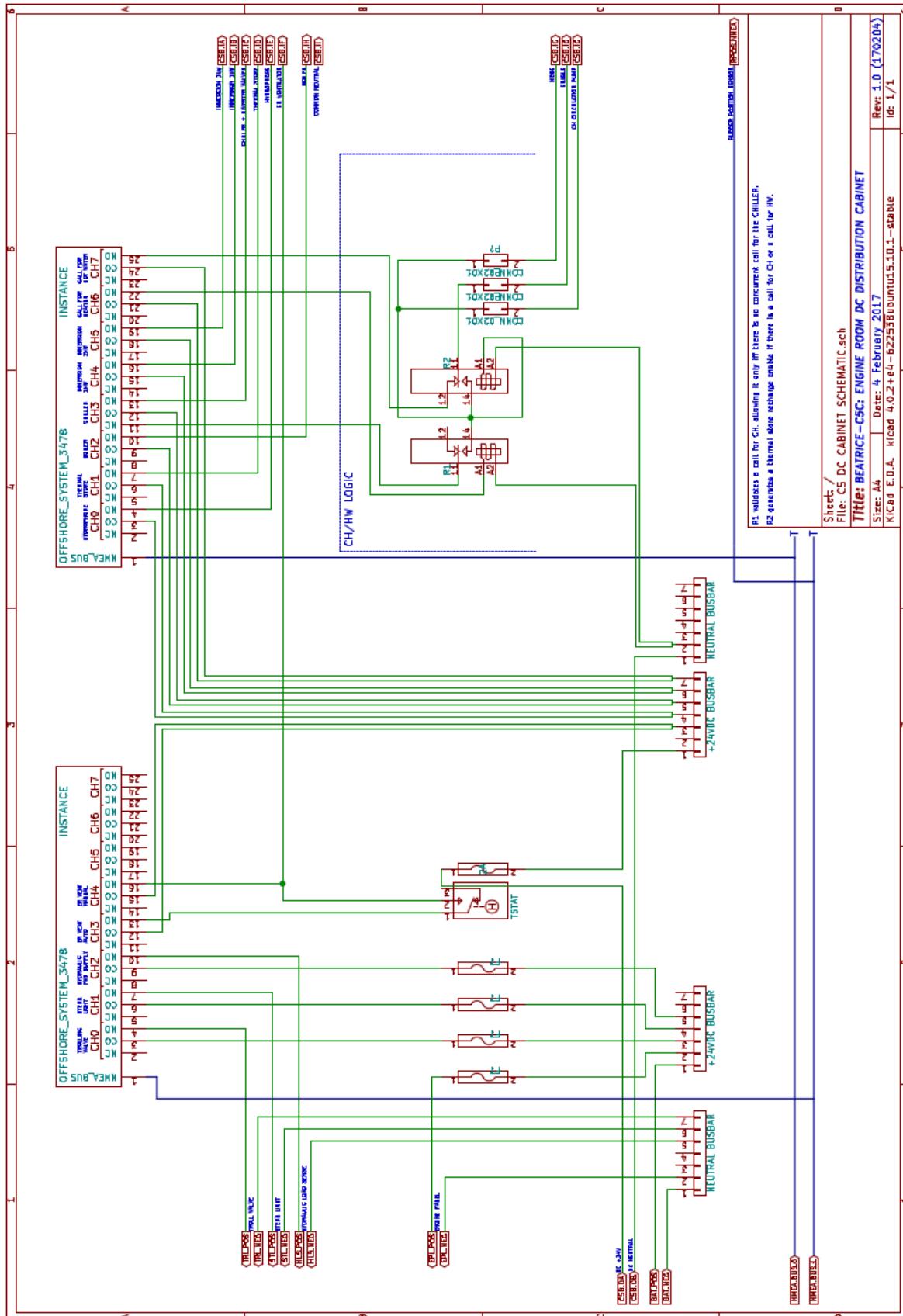
Services group IV	(Sania)
C4D05	Sani WC (ES) 16A
C4D06	Webasto heating controller (MC) 16A
C4D19	Webasto heating controller (SL) 16A
C4D28	Sani grey-water sump (MC) 16A

Power outlet group N2 (30mA)
C4D07 Outlets (MC, ES) 16A
C4D18 Outlets (SL) 16A

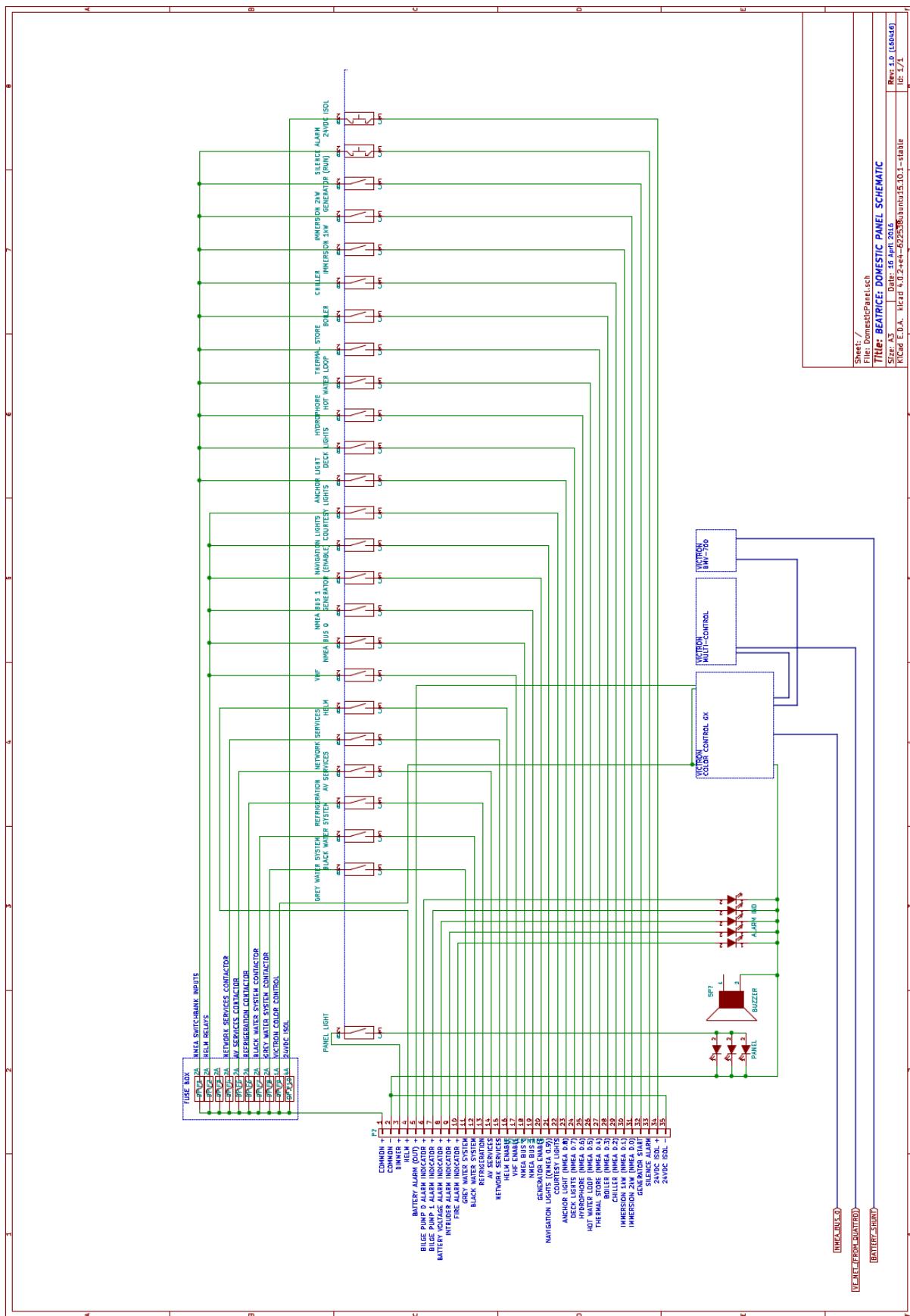
- Lighting group N3 (30mA)**
 - C4D10 Downlights (MC)
 - C4D11 Feature lights (MC)
 - C4D12 Vanity light (MC)
 - C4D13 Bedside A (MC)
 - C4D14 Bedside B (MC)
 - C4D15 Wardrobe (needs relocating because of layout change)**
 - C4D16 Downlight/wall lights (ES)**
 - C4D22 Downlights (SL)
 - C4D23 Feature lights PS (SL)
 - C4D24 Feature lights SB (SL)
 - C4D25 Wall lights PS (SL)
 - C4D26 Wall lights SB (SL)
 - C4D27 Fireplace lights (SL)**



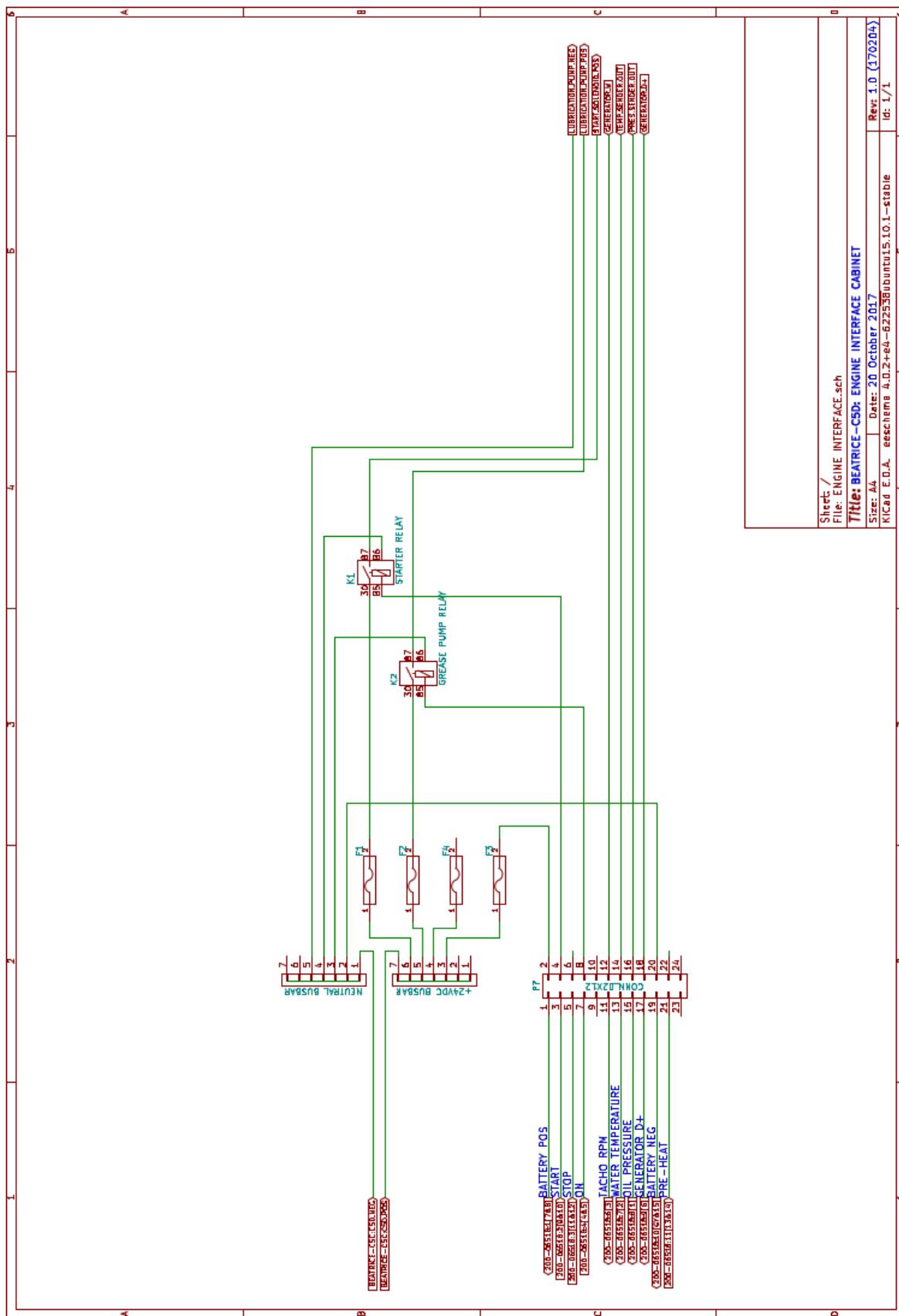
11.6. DDistribution cabinet C5C



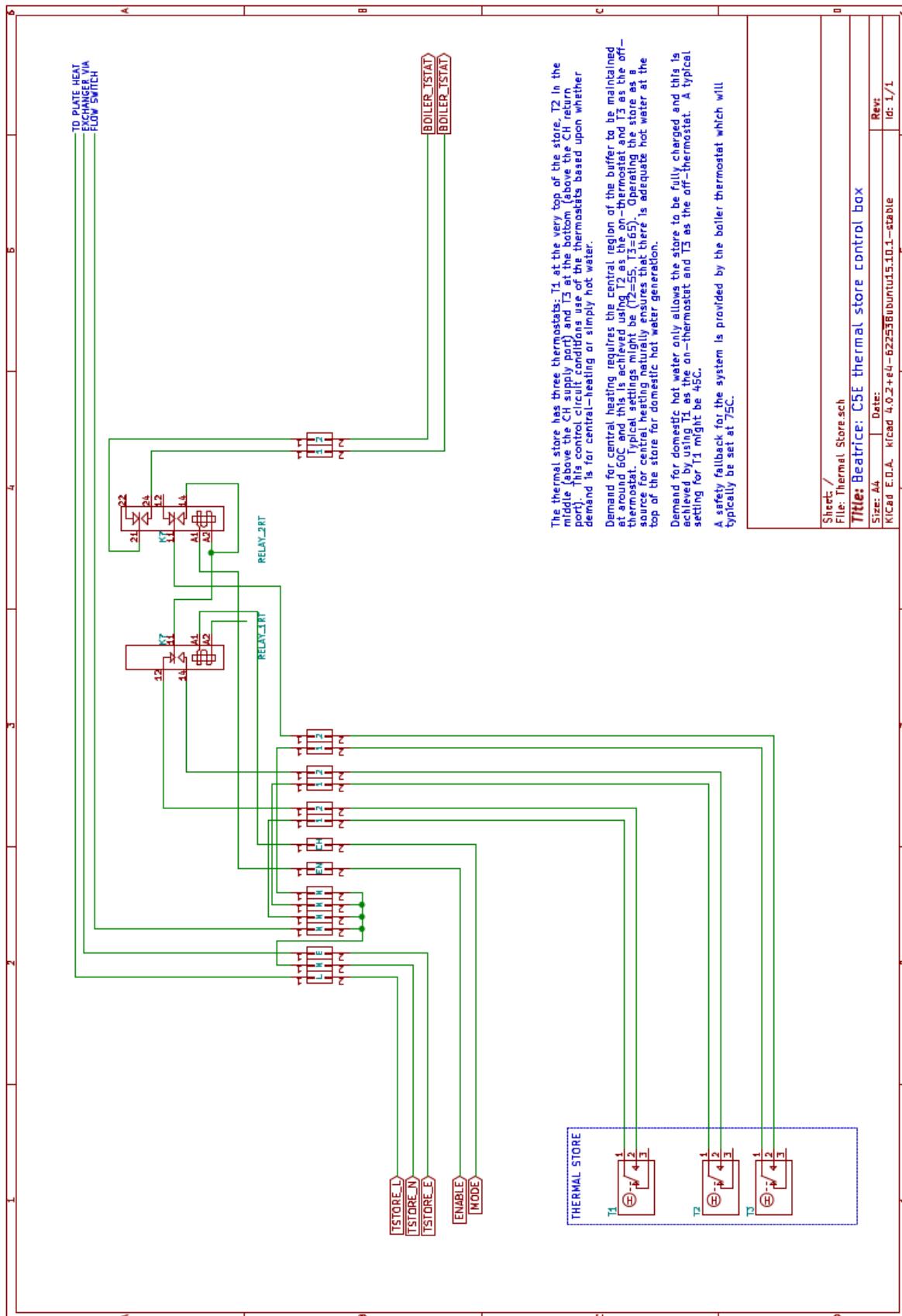
11.7. Domestic panel



11.8. MMin engine interface



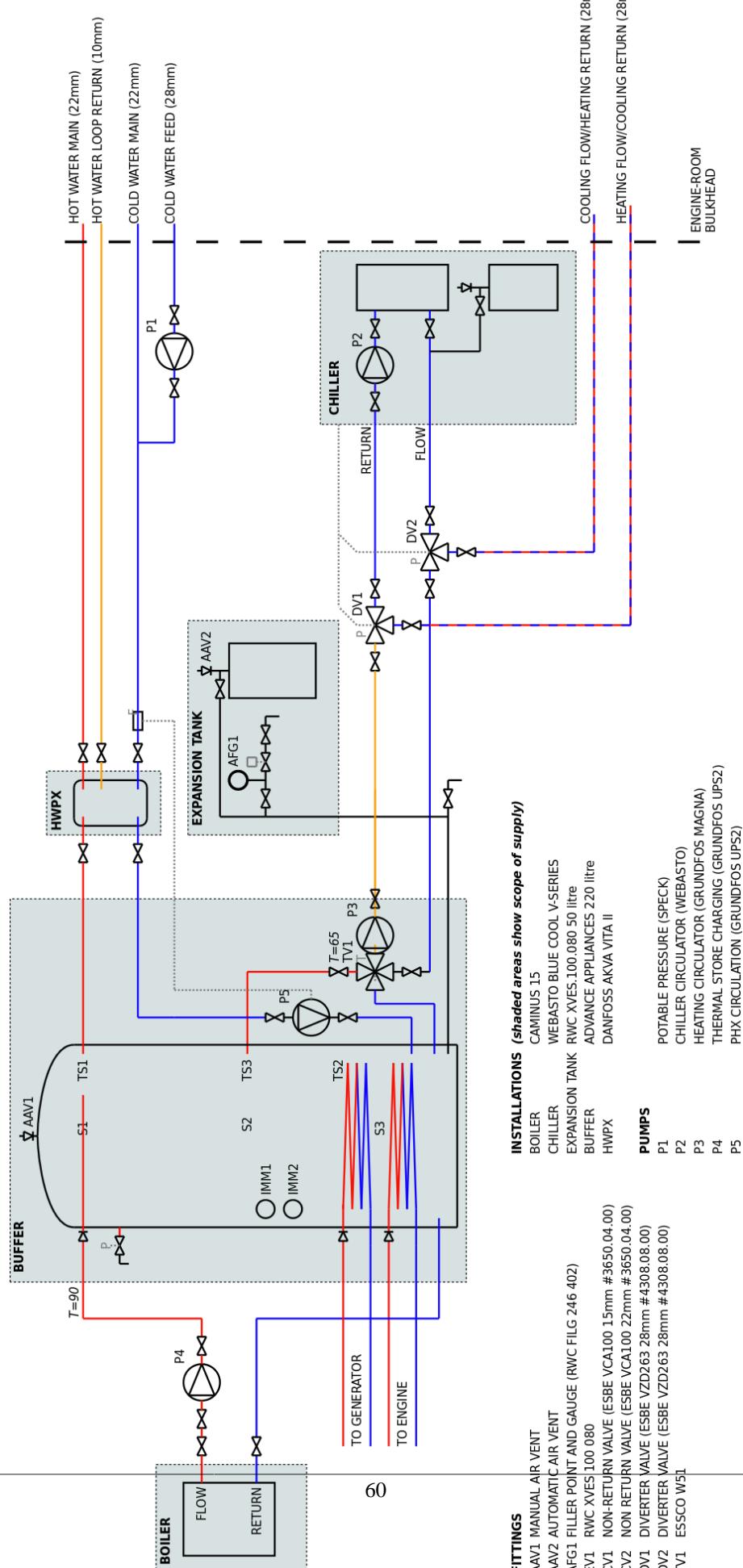
11.9. TTermal store interface



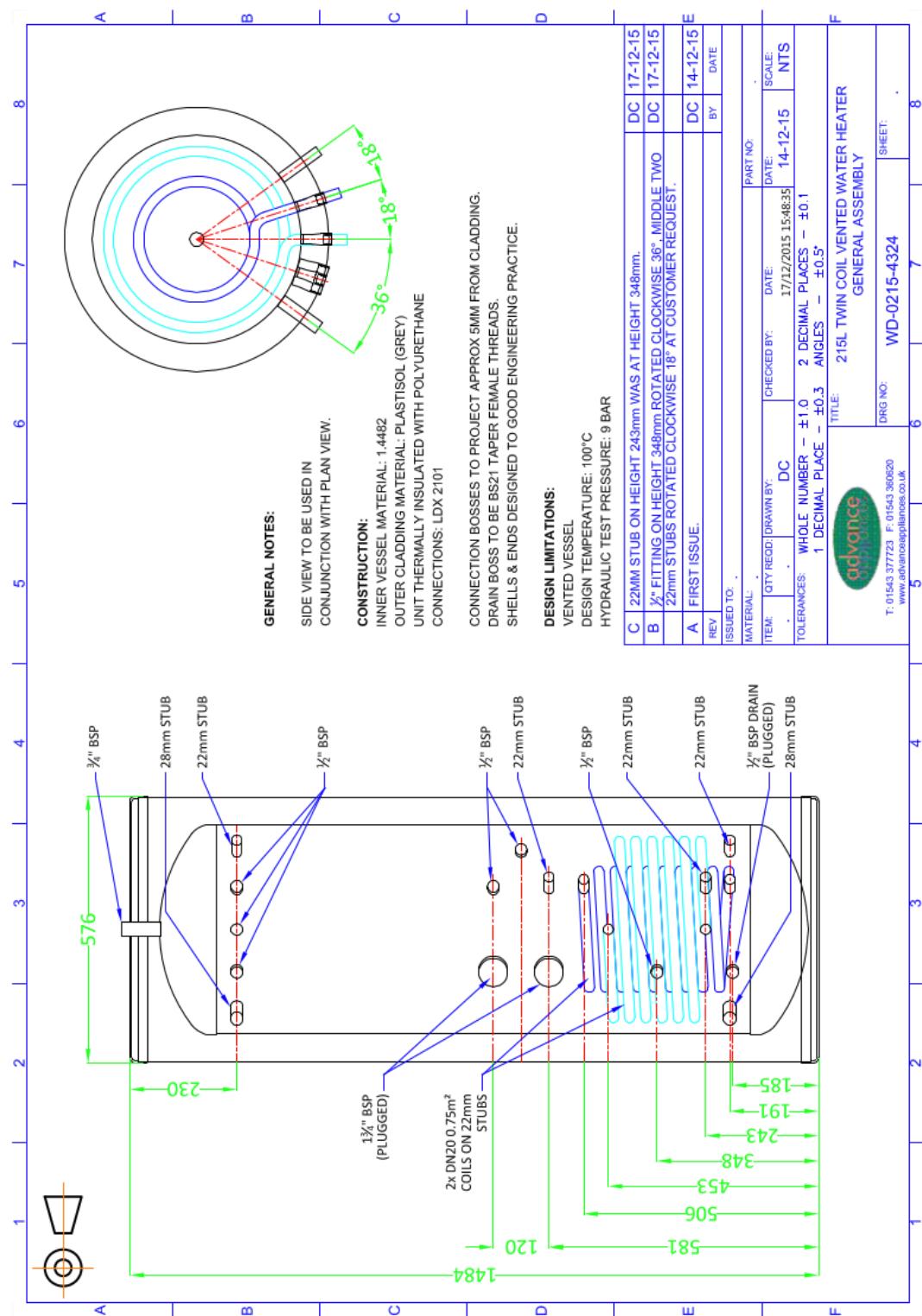
12. Heating diagrams

This section includes schematic diagrams for the vessel's heating system.

12.1. HHating system overviiw



12.2. TTermal store



LLst of supplied manuuls

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- [vvct2] . Victron Energ *QQattro.* MMnual. 11 Feb 2014.
- [vvct3] . Victron Energ *OOion DC-DC converterr, not isolated.* 23 Nov 2012.
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