COBHAM

SAILOR 6000 VHF Program

Installation manual

SAILOR 6210/6215/6216/6217 VHF

SAILOR 6222/6248/6249 VHF

Record of revisions

Rev.	Description	Release Date	Initials
A	Original document	March 2012	CMA
B	Installation Manual SAILOR 6217 added	June 2012	CMA
C	Program 6000 VHF general - Controls on the front plate, 'Comments to prevent water ingress' added. SAILOR 6222 VHF DSC - '2.5.5 Setup of GPS input from LAN' added	December 2012	CMA
D	Cobham rebranding	November 2013	CMA
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F	SAILOR 6222 VHF DSC - '3.3 Forced low power AUX input control' added. 61162-1:2008 > 61162-1 (Ed. 3)	July 2017	CMA
G	SAILOR 6222 VHF DSC - 3.3.1 TX inhibit, 'see the SAILOR 6222 VHF DSC User manual' removed. 'The menu will be enabled after the password is inserted in the system setup menu' added.	August 2017	CMA

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SAILOR 6210 VHF

Installation manual

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Safety warning

The following general safety precautions must be observed during all phases of operation, service and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture and intended use of the equipment. Thrane & Thrane assumes no liability for the customer's failure to comply with these requirements.

RF exposure hazards and instructions

Your Thrane & Thrane radio set generates electromagnetic RF (radio frequency) energy when transmitting. To ensure that you and those around you are not exposed to excessive amounts of energy and thus to avoid health hazards from excessive exposure to RF energy, all persons must be at least 3ft (0.9 m) away from the antenna when the radio is transmitting.

Warranty limitation

IMPORTANT - The radio is a sealed waterproof unit (classified IPX8). To create and maintain its waterproof integrity it was assembled in a controlled environment using special equipment. The radio is not a user maintainable unit, and under no circumstances should the unit be opened except by authorized personnel. Unauthorized opening of the unit will invalidate the warranty.

Installation and service

Installation and general service must be done by skilled service personnel.

Manual overview

This manual has the following chapters:

- *Introduction* contains a description of the VHF radio.
- *Installation* explains how to mount the VHF radio and how to connect accessories and external equipment.
- *First-time power up* explains how to make and receive voice calls over VHF, including how to use and set-up the channel scanning, the 2-way loudhailer, fog horn external loudspeaker.
- *Service & maintenance* contains support information including lists of accessories and a troubleshooting guide.

Appendices with *Technical specifications* and *System configurations*.

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Introduction

1.1 VHF radio

SAILOR 6210 VHF is approved to R&TTE and is waterproof to the IPx8 and IPx6 standard. As part of the safety equipment, use the SAILOR 6210 VHF in an emergency situation. However the best way to guarantee functionality in an emergency situation, is to use the radio in daily communication on board.

The VHF radio is a simplex/semi duplex VHF radio. It is designed with an easy-to-use menu-driven setup. You use the soft-keys to enter the desired functions, you browse and select a setting using the right selection wheel knob. The large display has red adjustable backlight which provides a good visibility even at night and protects your night vision.

The VHF radio can replay the last 90 s of received voice. This is a useful feature to minimize misunderstandings and to record messages when the radio is unattended.

The VHF radio connects easily to external equipment like a 2-way loudhailer and an external speaker. You can use the loudhailer as a 2-way on-board communicator. The loudhailer also functions as a fog horn. You can select from several programmed fog-horn patterns.

For a list of other accessories available for the SAILOR 6210 VHF check with your nearest distributor.

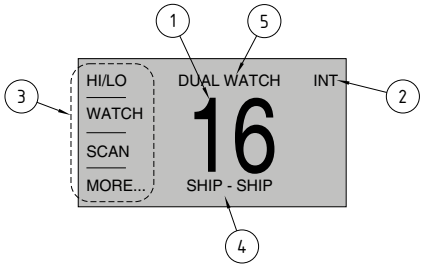
Controls on the front plate

Figure 1-1: Controls on the front plate

1. Loudspeaker.
2. Four soft keys with function title in the display.
3. Quick selection key for channel 16 and the programmed call channel.
4. Large display.
5. Connector for Handmicrophone or handset. If not used, put the cap from the ACC connector on the front connector to prevent water ingress.
6. Squelch control to mute background noise.
7. Replay button to play back up to 90 s voice message.
8. Volume wheel knob with key-press function for volume control and power on/off.
9. Selector wheel knob with key-press function for changing the working channel, navigating in menus in the display and backlight dimming.

1.1.1 SAILOR 6210 VHF display

The picture shows the display after start-up.The display holds various fields of information, depending on the currently selected function.



1. Current working channel.
2. Functions you can select with the soft keys. If there are more than 4 functions in the list press the soft key **MORE** to display further functions.
3. Status and other values for the current state or VHF channel.
4. **Service line** containing current temporary information relevant for the current channel or function.
5. **Action line** containing current state or temporary information relevant for the currently selected function.

For a detailed description of the information shown for each of the functions available see the chapter *First-time power up* on page 3-31.

1.2 Accessories available

Accessory	Description
SAILOR 6201 Handset with cradle (additional)	One SAILOR 6201 Handset with cradle is included in the delivery of the SAILOR 6210 VHF. You can connect another 2 SAILOR 6201 Handsets.
SAILOR 6203 Handset with cradle	SAILOR 6203 Handset with cradle, waterproof to IPx6.
SAILOR 6202 Hand Microphone	You can use the SAILOR 6202 (waterproof to IPx6 and IPx8) Hand Microphone instead of the handset.
SAILOR 6204 Control Speaker Microphone	With the SAILOR 6204 Control Speaker Microphone you can control the VHF functions of the SAILOR 6210 VHF.
SAILOR 6207 Connection Box for parallel handsets	The SAILOR 6207 Connection Box including Connection Cable 406209-941 is used for easy installation of several SAILOR 6201/03 Handsets/SAILOR 6202 Hand Microphones.
SAILOR 6208 Control Unit Connection Box	The SAILOR 6208 Connection Box including Connection Cable 406208-941 is used for easy installation of external equipment and accessories: • Max. 1 SAILOR 6204 Control Speaker Microphones
Connection cables	**5m connection cable for bulkhead mount**: Use this cable in installations where the SAILOR 6202 Hand Microphone is not connected directly to the **SAILOR 6210 VHF**, but located in a different position (part number: 406209-940). **5m Connection cable**, **1x10 pole**: Use this cable in installations when connecting external equipment to the SAILOR 6210 VHF. This cable is included in the SAILOR 6207 Connection Box for parallel handsets (part number: 406209-941). **5 m Connection cable for SAILOR 6204 Control Speaker Microphone**, **1x12 pole** (part number: 406204-940).

Table 1-1: Accessories available

Accessory	Description
SAILOR 6270 External loudspeaker	If you need an additional external loudspeaker you can connect a SAILOR 6270 Loudspeaker. It provides 6 W output power.
SAILOR 6090 Power Converter 24 V to 12 V DC	The SAILOR 6090 Power Converter is used to provide 12 V DC for the SAILOR 6210 VHF from a 24 V DC power source.

Table 1-1: Accessories available (Continued)

1.2.1 System configuration - example

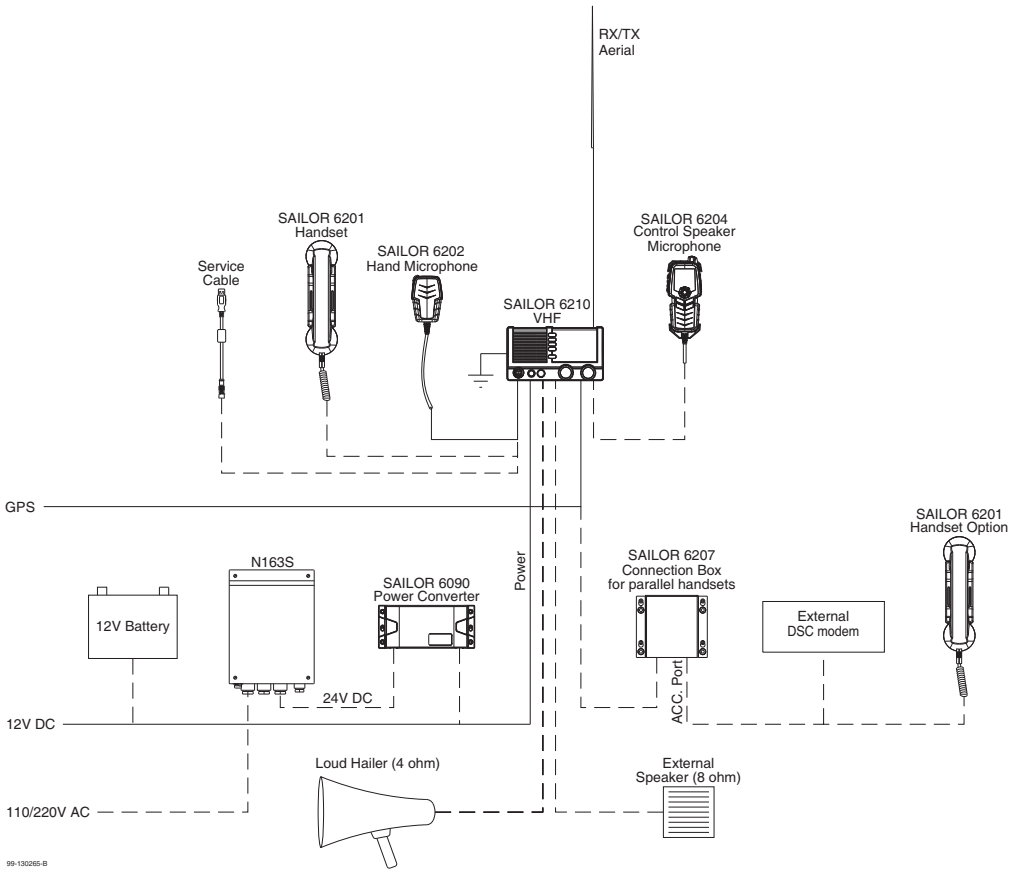


Figure 1-2: System configuration - example

Installation

In this chapter you find information and guidelines for:

- *Unpacking the SAILOR 6210 VHF*
- *Installing the VHF radio*
- *Power, VHF antenna and external equipment*

2.1 Unpacking the SAILOR 6210 VHF

The following items are included in the delivery of a SAILOR 6210 VHF:

- SAILOR 6210 VHF
- SAILOR 6202 Handmicrophone with spiral cable
- User and installation manual
- Installation guide
- Mounting bracket with two wheel knobs
- Connectors for cables
- Power cables, fittings and fuses
- Packaging material
- Sun screen (click-on) for front plate protection
- Kit for flush mount installation, including gasket

2.2 Installing the VHF radio

You can mount the VHF radio as a desktop, overhead or flush-mounted unit integrated in the instrument panel.

Provide space enough to access the front panel connectors and for installing a cradle for the speaking device.

Provide **at least 120 mm space at the back** of the SAILOR 6210 VHF radio to allow free air circulation.

Compass safe distance

Make sure that the VHF radio is far enough from any magnetic compass to avoid influence of the loudspeaker magnet on the compass reading. See the following table for the safe distance after magnetization between the nearest point of the device and the centre of the compass at which it will produce a deviation of 0.3°.

Device	Safe distance
SAILOR 6210 VHF	1.0 m
SAILOR 6202 Handmicrophone	0.8 m
SAILOR 6090 Power Converter 24 V - 12 V	0,15 m
SAILOR 6207 Connection Box for parallel handsets	0.6 m
SAILOR 6208 Control Unit Connection Box	0.6 m

Table 2-1: Compass safe distance

2.2.1 SAILOR 6210 VHF with U mounting bracket

The mounting bracket and two knobs are included in the delivery.

Desktop mounting

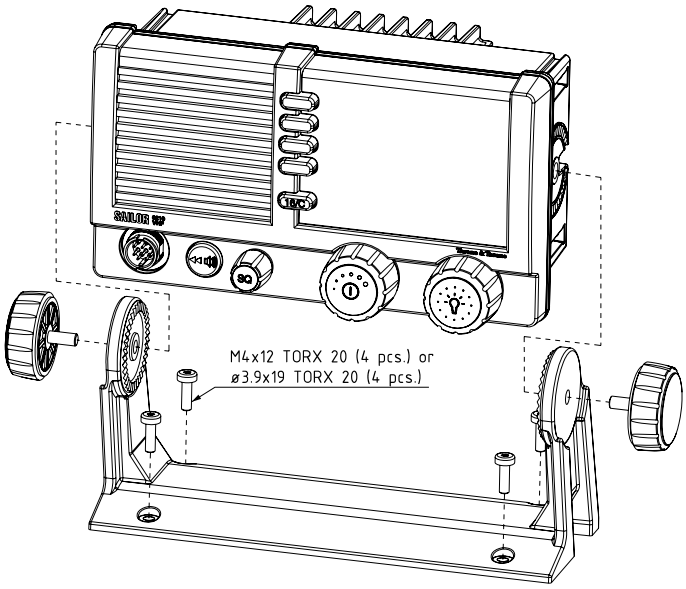


Figure 2-1: Desktop mounting

Overhead mounting

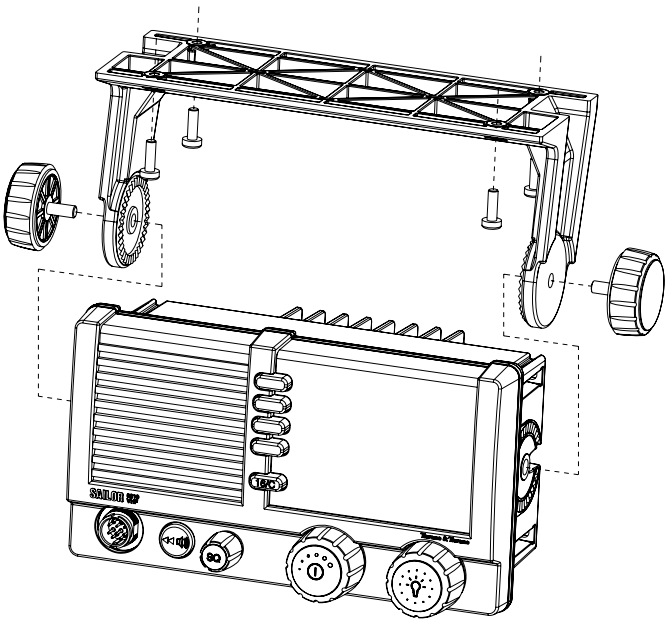
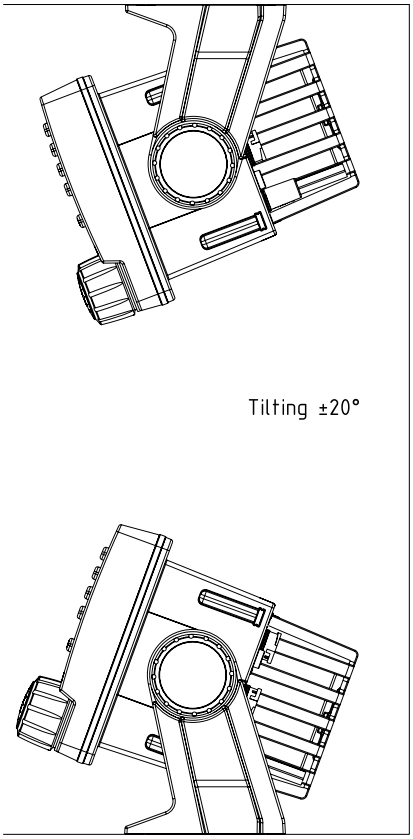


Figure 2-2: Overhead mounting

Mounting with U mounting bracket

To mount the VHF radio as tabletop, do as follows:

1. Find a suitable location for the VHF radio. Check that the space is wide/deep enough to accommodate the VHF radio.
2. Fasten the bracket with 4 screws (included in the delivery.)
3. Insert the VHF radio in the bracket and fasten it with the two knobs.
4. The display of the VHF radio should be at an angle of approximately 90° to your line of sight when operating it.



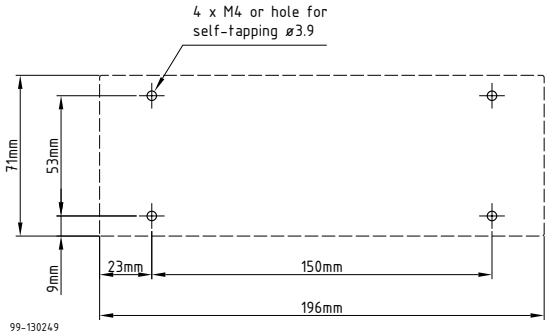


Figure 2-3: Mounting with U mounting bracket

2.2.2 SAILOR 6210 VHF for flush mount

You can mount the VHF radio to a flat surface, e.g. an instrument panel.The flush mount installation kit is included in the delivery.

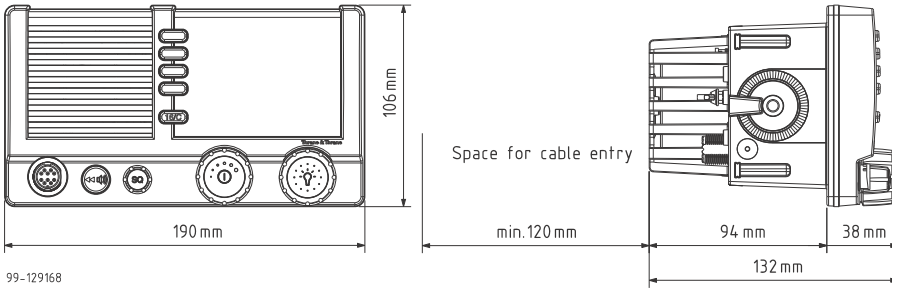


Figure 2-4: Flush mount

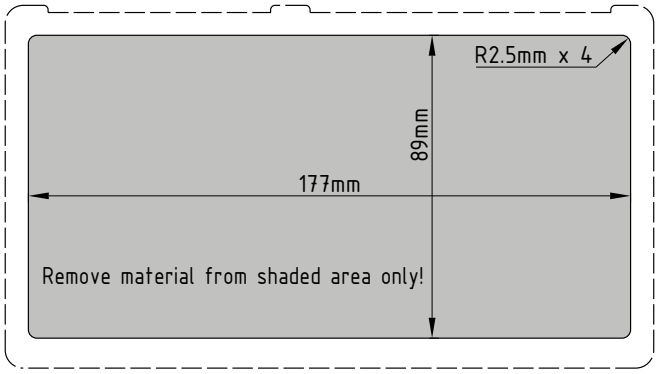


Figure 2-5: Cutout for flush mount

Important **The scaling in the above drawing is not 1:1**. Consequently do not attempt to use a print or copy of this page without checking the dimensions.

1. Find a suitable location for the VHF radio. Check that the space is deep enough to accommodate the VHF radio and an additional min. 120 mm space for cable entry.
2. Keep free distance to allow free air circulation around the VHF radio and to allow sufficient space for access to cables, see the drawing on this page.
3. Cut out the hole for the VHF radio where you want to mount it. Use the cutting template in the installation guide.
4. Mount the 4 square nuts M4 in the cabinet, ensure that they are placed correctly so it is possible to screw in the M4x45 screws.
5. Ensure that the flush mount gasket is placed correctly on the VHF radio.
6. Before mounting the VHF radio be aware that the surface is plane and rigid. If the surface is not plane and/or rigid (stiff) remove the gasket and seal with silicone sealant between the VHF radio and the surface.

7. Slide the VHF radio in the cut-out. Place the flush mount bracket and fasten it with the 4 screws M4x45. Make sure the torque does not exceed 1Nm when fastening the screws.

Note Only use screws supplied with the kit for flush mounting.

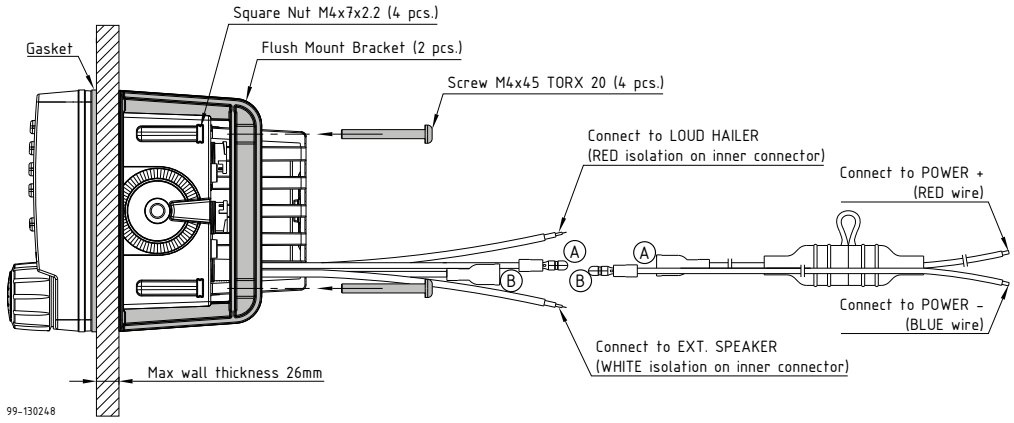


Figure 2-6: Flush mount details

Note Firmly tie back and secure any wires not used to avoid the possibility for mutual shorting or shorting to ground.

2.2.3 SAILOR 6090 Power Converter

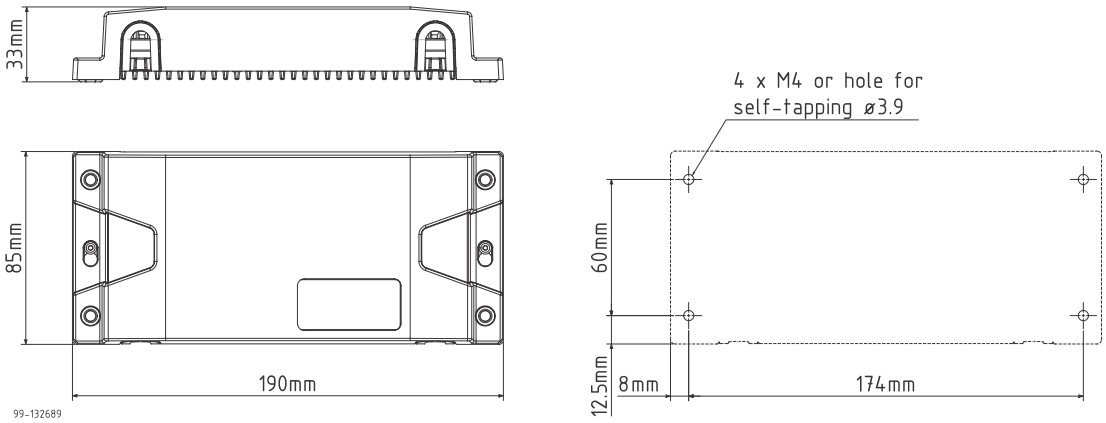


Figure 2-7: SAILOR 6090 Power Converter, dimensions

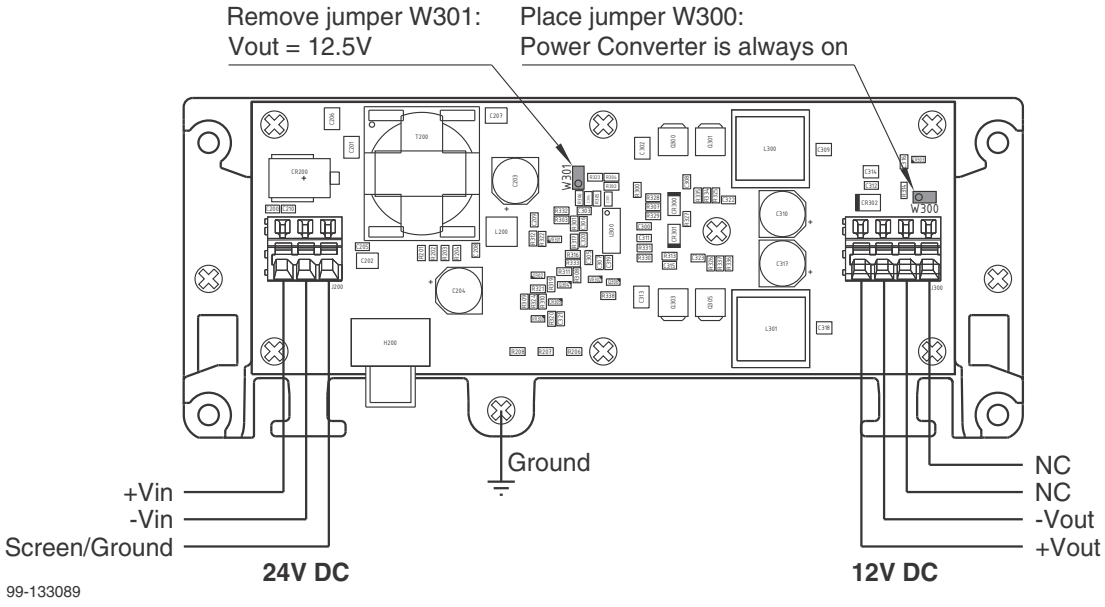


Figure 2-8: Connecting the SAILOR 6090 Power Converter

2.2.4 SAILOR 6202 Handmicrophone

Handmicrophone with spiral cable and PTT button.

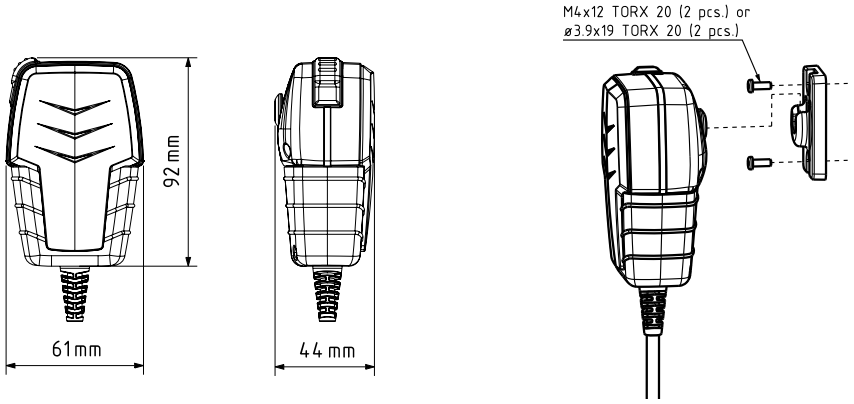


Figure 2-9: Handmicrophone

2.3 Power, VHF antenna and external equipment

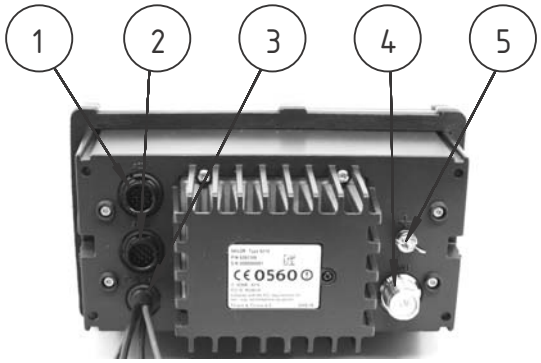


Figure 2-10: Power, VHF antenna and external equipment

1. *ACC connector* for accessories
2. *CTRL connector for control speaker microphone*
3. *Power, Loudhailer, foghorn and external speaker*
4. *VHF antenna*
5. *Ground stud*

2.3.1 ACC connector

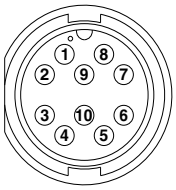
Use the connector marked **ACC** to connect GPS input.

The interface for GPS is NMEA 0183 (EN61162-1)/NMEA.

Connector type: Circular connector, 10-pin.

Connection cable with plug, part number 406209-941.

Pin assignment: Connector front view on the VHF radio.



Pin	Description	Wire color
1	NMEA in+	Brown
2	NMEA in-	Blue
3	NMEA out-	White
4	NMEA out+	Green
5	Mike 2 / Line in	Yellow
6	EAR 2 / Line out	Grey
7	Hook_PTT	Pink
8	Battery supply when radio is on	Red
9	Internal GND = - Battery	Black
10	Internal GND = - Battery	Orange — SCREEN (Drain)

Table 2-2: ACC connector

External DSC controller

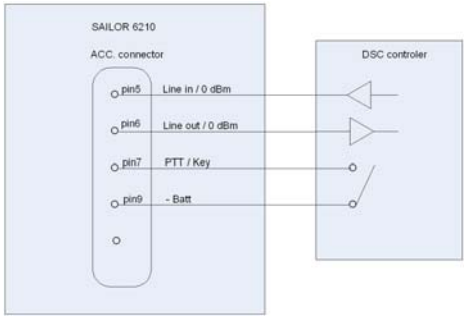


Figure 2-11: External DSC controller

Note To achieve the 0dBm signal level on the Line Out pin the Handset 2 earpiece volume must be configured to level 14 (max).

NMEA interface description

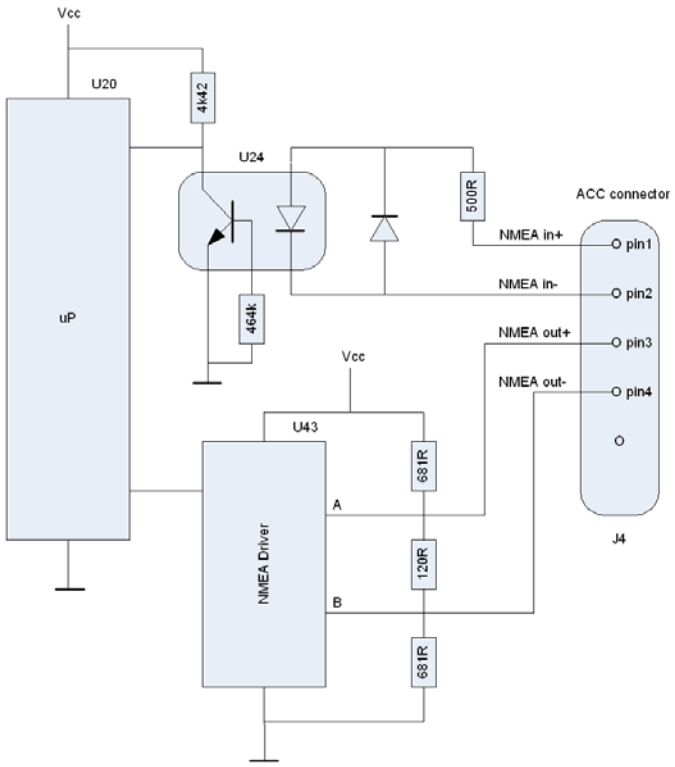


Figure 2-12: NMEA interface description

NMEA interface	Specifications
NMEA input:	Impedance: 600 Ohm Max. 2mA at min. level of 2V
NMEA output	Load Impedance: > 60 Ohm Drive load: < 35 mA

Table 2-3: NMEA interface

The NMEA interface supports NMEA 0183 v2.0, v2.1 and v2.3.

The following sentences are supported:

- FSI: All fields are decoded.
- GGA: UTC, "Position", "quality indicator" (indicators 1-5). All other fields are unused.
- GLL: UTC, "Position", "Status" and "mode" (indicators A and D). All other fields are unused.
- GNS: UTC, "Position" and "mode" (indicators A and D). All other fields are unused.
- RMC: UTC, "Position", "Status", "Date" and "mode" (indicators A and D). All other fields are unused.
- ZDA: UTC, "Day", "Month", and "Year". All other fields are unused.

In accordance with the standard EN61162-1 (Ed. 3).

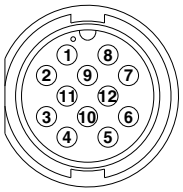
Received NMEA sentences except for FSI can be forwarded to NMEA output. As talker the sentences are streamed when received (with no intervals).
HW revision: 57-127367-D.02

SW revision: 2.00.01

2.3.2 CTRL connector for control speaker microphone

Connector type: Circular connector, 12-pin.

Pin assignment: Connector front view on the VHF radio:



Pin	Description
1	GND for cable screen
2	Internal GND=- Battery
3	Battery supply when radio is on
4	Battery supply when radio is on
5	CAN+
6	CAN-
7	Internal GND = - Battery
8	On/off from Control Speaker Microphone
9	RX out +
10	RX out -
11	TX in +
12	TX in -

Table 2-4: CTRL connector for control speaker microphone

2.3.3 Power, Loudhailer, foghorn and external speaker

Use the connector marked **PWR/EXT** to connect power, loudhailer and an external speaker. The cable for this connector is part of the delivery.

1. Blue wire: Power -
2. Red isolation on inner connector: loudhailer
3. White isolation on inner connector: external speaker
4. Red wire: Power +

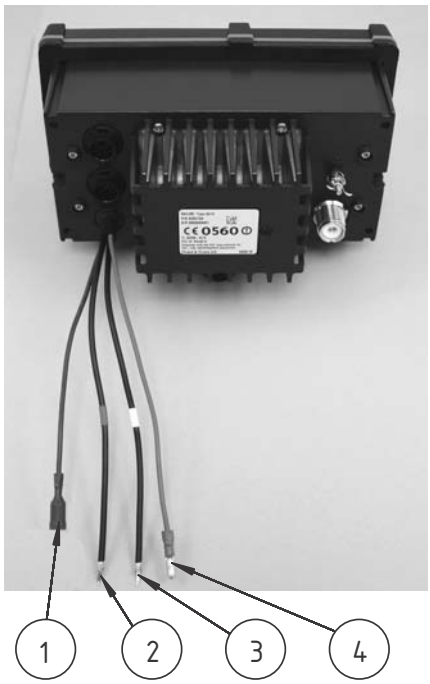


Figure 2-13: Power, loudhailer, foghorn and external speaker

Protection against water ingress

Important

You must protect the cable connection with rubber vulcanizing tape as shown in the pictures below. This protection prevents water seeping into the VHF radio, cable and connectors.

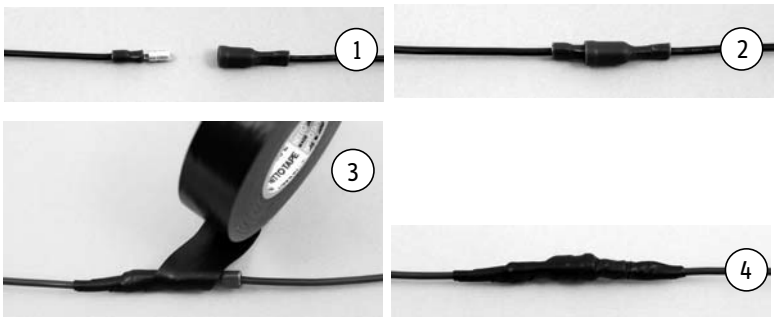


Figure 2-14: Protection against water ingress

2.3.4 VHF antenna

Use the connector marked **ANT** to connect the VHF antenna to the radio with a 50 Ohm coaxial cable with low loss, e.g. RG214. Install a PL259 plug at the cable end.

Place the antenna as high and clear of obstructions as possible. Make sure that the horizontal distance to metal parts is minimum 1.5 m (5 ft).

Connector type: female SO239 for PL259 plug.

2.3.5 Ground stud

To ground the radio connect a ground wire from the ground stud of the radio to a suitable grounding point. Use an appropriately sized wire. The ground stud is located above the VHF antenna connector.

Figure 2-15: Ground stud

2.4 VHF antenna installation

The SAILOR 6210 VHF is be installed with only one antenna for VHF RX/TX and DSC. You can install all commonly available 50 Ohm antennas covering the appropriate frequency range and providing a VSWR less than 1.5 over this range.

If further details are required on equipment and antenna installation, you may see IMO COMSAR/Circ. 32, GUIDELINES FOR THE HARMONIZATION OF GMDSS REQUIREMENTS FOR RADIO INSTALLATIONS ON BOARD SOLAS SHIPS as a guide.

2.4.1 Cable requirements

Connect the antenna using a low loss type 50 Ohm coaxial cable, e.g. good quality RG214 or better. It is recommended to use a double screened type cable (like e.g. RG214) with a maximum insertion loss of 3dB across the antenna cable installation.

The maximum antenna cable length in the installation depends on the quality of the cable, i.e. the specified attenuation (dB/m) of the cable of choice at the high end of the VHF frequency band. As a rule of thumb the cable length using e.g. RG214 coaxial cable should not exceed 25 m.

2.4.2 VHF RX/TX antenna

In installations with two or more VHF radios it is important to ensure the optimum performance of these by carefully selecting the antenna positions for both radios. It is recommended to maximize the RF attenuation between the VHF RX/TX antennas in the installation. You can ensure this by not having the RX/TX antennas positioned at the same horizontal level, i.e. the RX/TX antennas for each radio must be installed at shifted elevations as shown in the following drawing.

If sufficient vertical distance between two or more such antennas cannot be achieved, the horizontal distance between them is increasingly important for optimum performance. If there is hardly any vertical separation ensure that there is a minimum of 5 m horizontal distance between any RX/TX antennas in the installation.

To minimize any increase in VSWR of the VHF RX/TX antenna, install the antenna at a vertical distance of at least 2 m to any other mast, pole or other RF antennas. Keep VHF antennas as far away as possible from antenna main beam of any radar and satellite equipment.

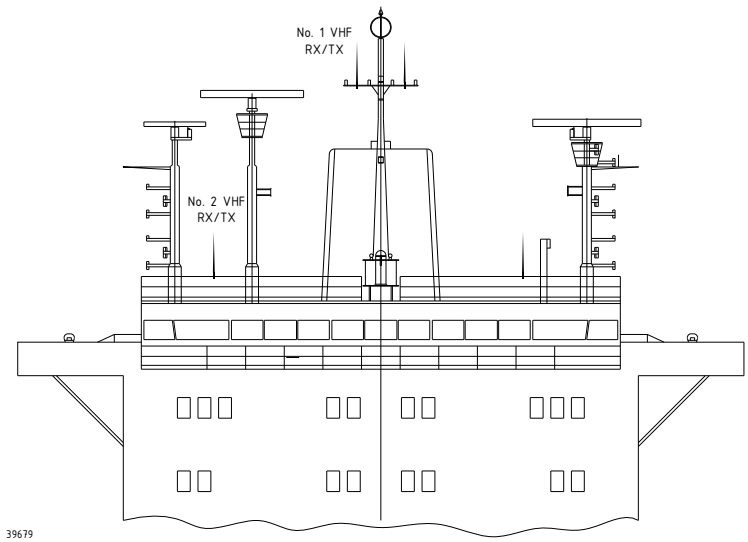


Figure 2-16: Antenna positioning

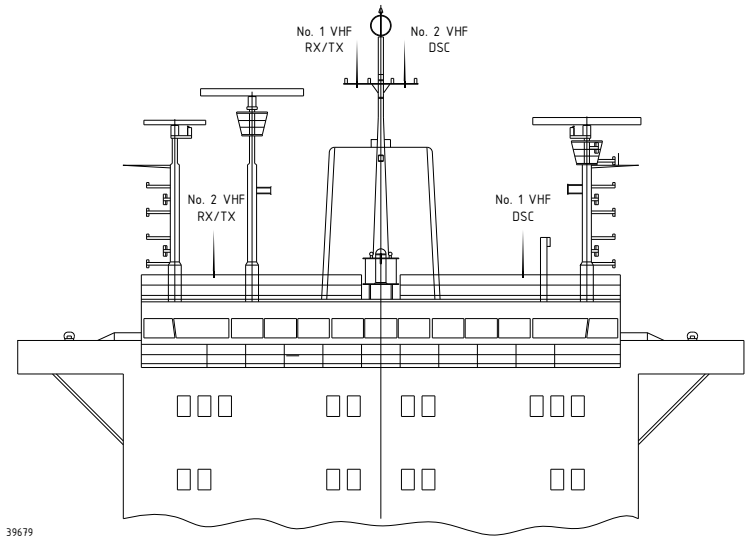


Figure 2-17: Antenna positioning 1/2

2.5 System setup

To change a setting in the **SYSTEM SETUP**, do as follows:

1. Press the soft key **SETUP**. If it is not in the display, press the soft key **MORE** until **SETUP** appears.
2. Press the arrow soft key ➡ or ⬅ to advance to **SYSTEM SETUP**.
3. Turn the selector wheel knob to go to a setting, then press the selector wheel knob to change the setting.
4. Press **EXIT** to return to normal radio operation

SYSTEM SETUP	Description
Inactivity timeout	Inactivity time-out to exit functions (e.g. in setup) and return to the application. Range: 1 to 30 minutes, in 1 minute steps Default: 10 min.
NMEA input (baud rate)	4800
Factory Defaults	Resets the radio to factory defaults.
SW version	Software version of the radio
S/N	Serial number of the radio
Password	If you need to change the identity of the radio (MMSI number or ATIS code), contact your local dealer.

Table 2-5: System setup

2.6 SAILOR 6201 Handset cradle (optional)

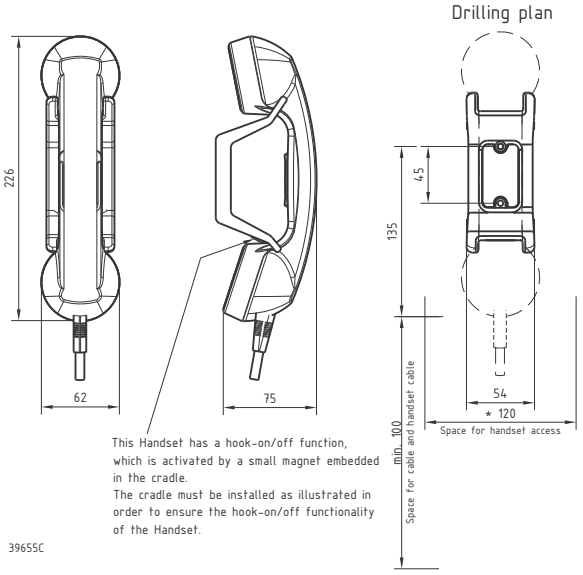


Figure 2-18: Handset.

2.7 Accessories

2.7.1 Part numbers for accessories

The following accessories are available for the SAILOR 6210 VHF:

Part number	Accessories available
406201A-00500	SAILOR 6201 Handset with cradle (additional)
406202A-00500	SAILOR 6202 Hand Microphone
406203A-00500	SAILOR 6203 Handset Waterproof
406204A-00500	SAILOR 6204 Control Speaker Microphone
406205A-00500	SAILOR 6205 Control Speaker Microphone
406207A	SAILOR 6207 Connection Box with Cable 406209-941
406208A	SAILOR 6208 Connection Box with Cable 406208-941
406209-940	Connection Cable for bulkhead mount, 5 m, 1-x10 pole
406209-941	Connection Cable, 5 m, 1x10 pole
406204-940	Cable for SAILOR 6204/6205 Control Speaker Microphone
406270A	SAILOR 6270 External loudspeaker
406090A-00500	SAILOR 6090 Power Converter 24 V — 12 V

Table 2-6: Part numbers for accessories

2.7.2 Connection box SAILOR 6207

The **SAILOR 6207 Connection Box** is used to connect GPS (NMEA), GPS/AIS DSC modem and further SAILOR 6201 Handsets. For wiring and cabling details see *System configuration examples* on page B-1 .

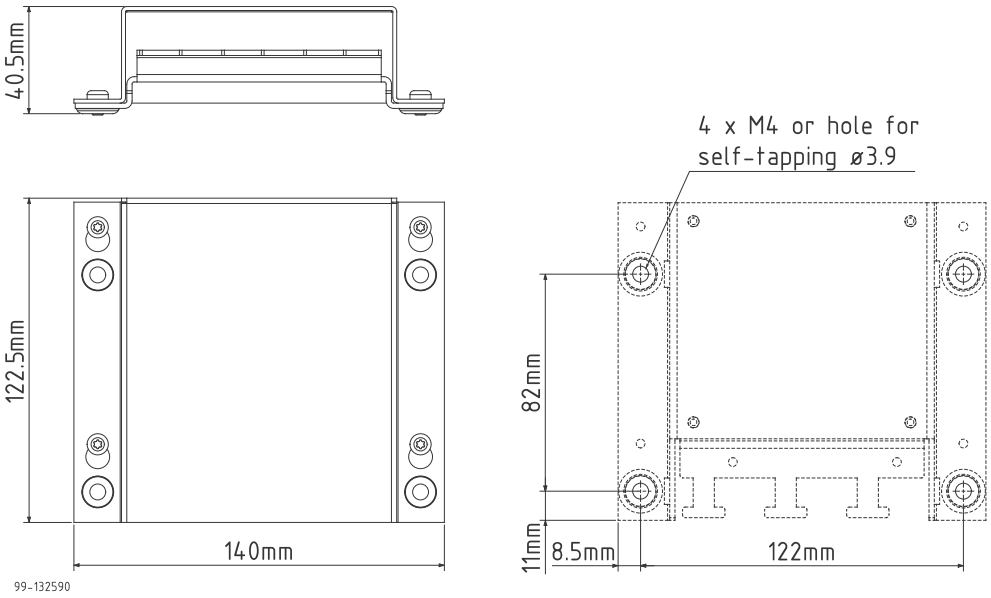
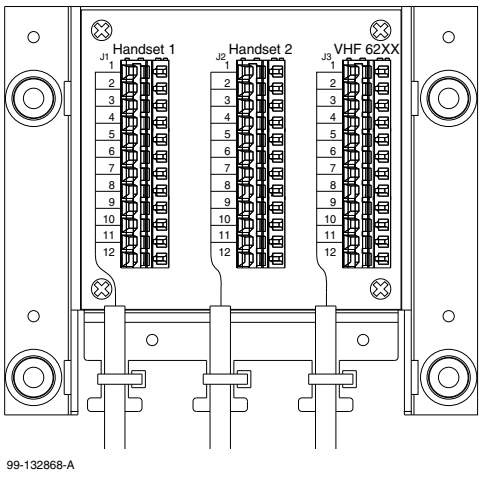


Figure 2-19: SAILOR 6207 Connection Box for parallel handsets, mounting



Description	Pin	Wire color
NMEA in+	1	Brown
NMEA in-	2	Blue
NMEA HS in-	3	White
NMEA HS in+	4	Green
Mike 2 / Line in	5	Yellow
Ear 2 / Line out	6	Grey
Hook_PTT	7	Pink
Bat_SW Supply voltage when on	8	Red
Internal GND = - Battery	9	Black
Internal GND = - Battery	10	Orange
Internal GND = - Battery	11	SCREEN (Drain)
	12	NC

Cable part no. 406209-941

To ensure galvanic separation of battery supply from ship's ground, the cable screens of the ACC cables MUST not touch any part of the metallic parts of the SAILOR 6207 Connection Box. Connect the screens only to the pins at the terminals.

Figure 2-20: Connection Box for parallel handsets, wiring

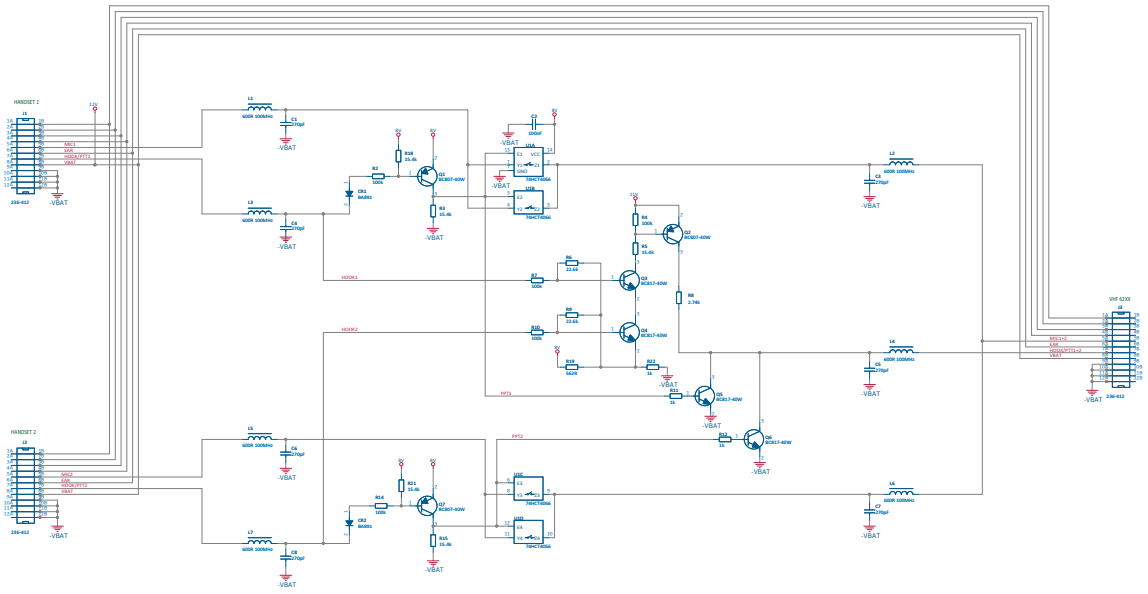


Figure 2-21: SAILOR 6207 Connection Box for parallel handsets, diagram

2.7.3 Connection box SAILOR 6208

The **SAILOR 6208 Connection Box** is used to connect SAILOR 62056204 Control Speaker microphones and other auxiliary equipment. For wiring and cabling details see *System configuration examples* on page B-1.

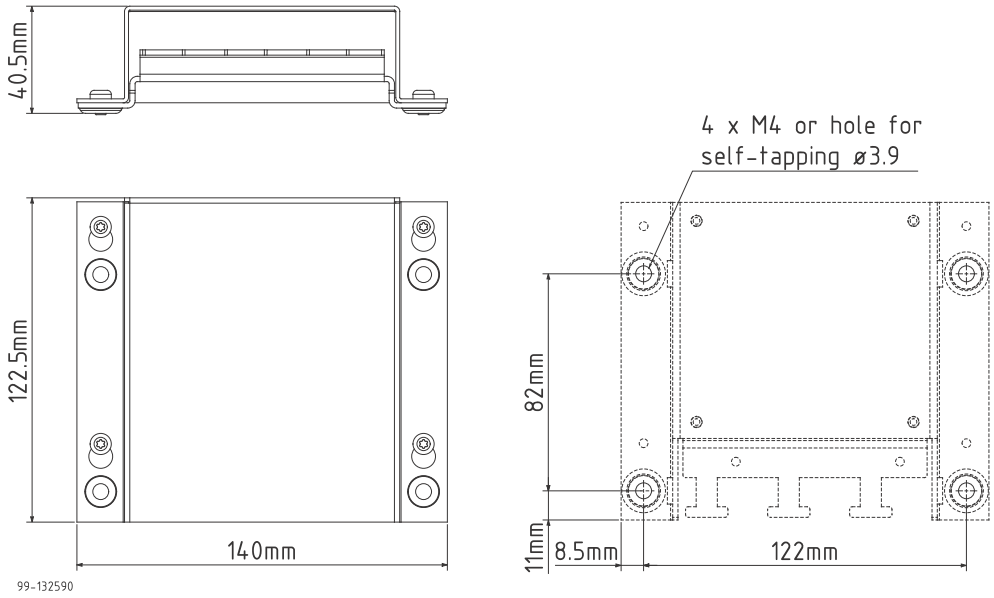


Figure 2-22: SAILOR 6208 Control Unit Connection Box, mounting

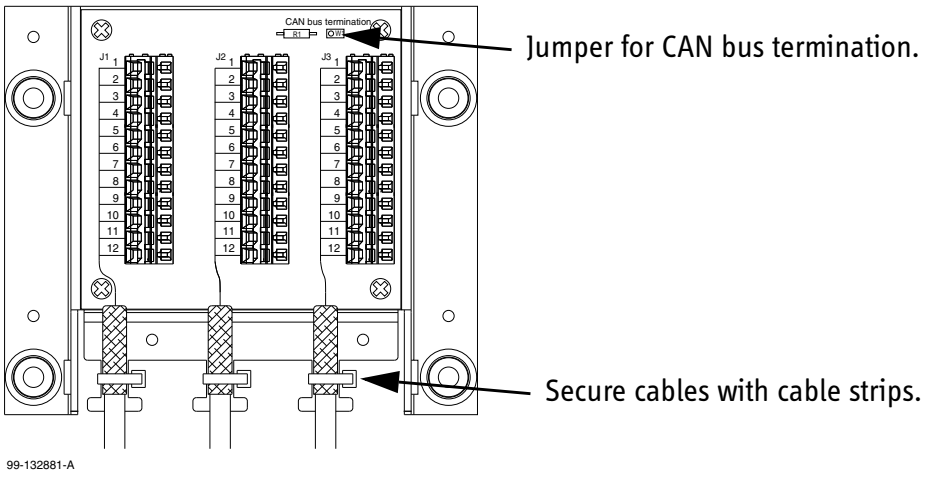


Figure 2-23: SAILOR 6208 Control Unit Connection Box for parallel handsets, wiring

Terminate the last SAILOR 6208 on the CAN bus (furthest away from the transceiver).

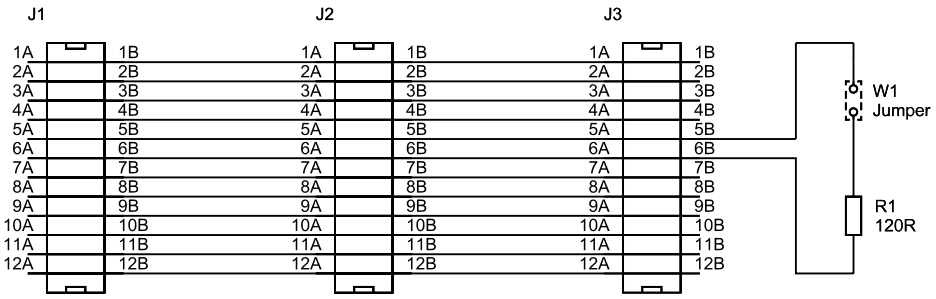


Figure 2-24: SAILOR 6208 Control Unit Connection Box, diagram

First-time power up

3.1 General use and navigation

3.1.1 Power on and speaker volume

The VHF radio has a dual-function on/off wheel knob for power on/off and volume control.

- To power on the VHF radio press the on/off wheel knob.
- To power off the VHF radio, press and hold the on/off wheel knob and follow the instructions in the display.
- To adjust the speaker volume, turn the volume wheel knob (clockwise = louder, counter clockwise = softer, until muted). When adjusted to the muted level is shown in the display.

3.1.2 Working channel, settings and dim function

The selector wheel knob has several functions:

- To select the **working channel**, turn the selector wheel knob.
- To browse and select **settings**, turn the selector wheel knob and press for accept.
- To **dim the backlight** in the display until it is appropriate for the current situation, i.e. to give comfortable night vision, press, hold and turn the selector wheel knob (clockwise= more light).

Service & maintenance

4.1 Contact for support

Contact your authorized dealer for technical service and support of the VHF radio. Before contacting your authorized dealer you can go through the troubleshooting guide to solve some of the most common operational problems.

4.2 Maintenance

4.2.1 Preventive maintenance

Maintenance of the SAILOR 6210 VHF can be reduced to a maintenance check at each visit of the service staff. Inspect the radio for mechanical damages, salt deposits, corrosion and any foreign material. Due to its robust construction and ruggedness the radio has a long lifetime. Anyway it must carefully be checked at intervals not longer than 12 months - dependent on the current working conditions.

Salt deposits

In case the equipment has been exposed to sea water there is a risk of salt crystallization on the keys and wheel knobs and they may become inoperable. Clean the VHF radio and speaker microphones with fresh water.

4.2.2 Error messages and warnings

Errors and warning messages are shown in the display and are read-only.

4.2.3 Troubleshooting guide

Action	Symptom	Remedy
The radio will not turn on	The display is empty.	Check if power is present. Check fuse which is placed in the + supply wire. Check performance of power supply if connected to one.
No communication	The loudspeaker is mute.	Check the antenna installation. Check antenna cable. Check handset/Handmicrophone and cable.
Handset configuration	No sound in earpiece	The earpiece volume may be configured to OFF. See section *Controller setup* on page 2-10 on how to adjust the earpiece volume of the handset.

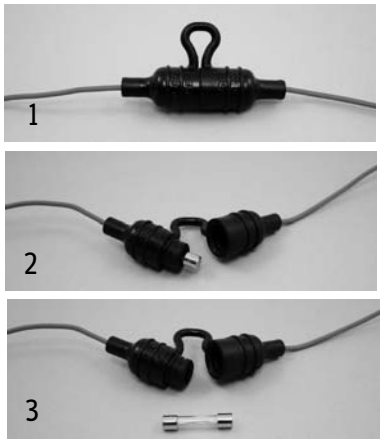
Table 4-1: Troubleshooting guide

Action	Symptom	Remedy
Device failure		If any of the checks and tests described in this section do not assist in resolving the difficulties experienced in the operation and/or performance of the VHF installation, a fault may have developed in the VHF radio itself. When contacting an authorized Thrane & Thrane representative be sure to provide as much information as possible describing the observed behavior - also including the type of the VHF radio, its serial number, and software release version (both found in the setup menu Controller Setup).

Table 4-1: Troubleshooting guide (Continued)

4.2.4 Replacing the fuse in the red wire (Power +)

One fuse is installed in the supplied DC cable. If the fuse is blown, track down why the fuse was blown and solve the problem. To replace the fuse, do as follows:



1. Hold both ends of the fuse holder and pull it apart.
2. Take out the old fuse.
3. Insert the new fuse. The fuse rating is 10 A T.
4. Make sure that the fuse is tightly fixed on the metal contact inside the fuse holder.
5. Put together the fuse holder.

4.2.5 Replacing the fuse in the SAILOR 6090 Power Converter

One fuse is installed in the SAILOR 6090 Power Converter. If the fuse is blown, do as follows:

1. Track down why the fuse was blown and solve the problem.
2. Take out the old fuse.
3. Insert the new fuse. The fuse rating is 10 A T.

Figure 4-1: Fuse in the SAILOR 6090 Power Converter

4.3 Returning units for repair

Should your Cobham SATCOM product fail, please contact your dealer or installer, or the nearest Cobham SATCOM partner. You will find the partner details on www.cobham.com/satcom where you also find the Cobham SATCOM Self Service Center web-portal, which may help you solve the problem. Your dealer, installer or Cobham SATCOM partner will assist you whether the need is user training, technical support, arranging on-site repair or sending the product for repair. Your dealer, installer or Cobham SATCOM partner will also take care of any warranty issue.

4.3.1 Repacking for shipment

Should you need to send the product for repair, please read the below information before packing the product.

The shipping carton has been carefully designed to protect the SAILOR 6210 VHF and its accessories during shipment. This carton and its associated packing material should be used when repacking for shipment. Attach a tag indicating the type of service required, return address, part number and full serial number. Mark the carton FRAGILE to ensure careful handling.

Note Correct shipment is the customer's own responsibility.

If the original shipping carton is not available, the following general instructions should be used for repacking with commercially available material.

1. Wrap the defective unit in heavy paper or plastic. Attach a tag indicating the type of service required, return address, part number and full serial number.
2. Use a strong shipping container, e.g. a double walled carton.
3. Protect the front- and rear panel with cardboard and insert a layer of shock-absorbing material between all surfaces of the equipment and the sides of the container.
4. Seal the shipping container securely.
5. Mark the shipping container FRAGILE to ensure careful handling.

Failure to do so may invalidate the warranty.

Technical specifications

A.1 SAILOR 6210 VHF

Item	Specification
Weight SAILOR 6210 VHF	approx. 1.2 kg, 2.65 lbs
Weight SAILOR 6210 VHF and Handmicrophone	approx. 1,5 kg 3,31 lbs including SAILOR 6202 Handmicrophone and mounting bracket
Dimensions	**Height**: Outer dimension 106 mm, hole height for flush mount 89 mm **Width**: Outer dimension 190 mm, hole width for flush mount 177 mm **Depth**: Outer dimension from front of wheel knobs 132 mm, depth for flush mount 94 mm
Operating temperature	-15˚C to 55˚C
Storage temperature	-30˚C to 80˚C
Power supply	12 VDC Nominal (10,8– 15,6 VDC)
Current consumption	Max. 7 A
Frequency range	TX 156,000-161,450, RX 156,000-163.425 MHz
Channel spacing	12,5 kHz and 25 kHz, all international maritime channels
Number of P channels	The radio may be programmed with up to 40 private channels that can be managed in all channel modes.
Transmit power	Hi/Lo: 25 W and <1 W
RF output power	25 W +0 dB / - 1.5 dB 1 W +0 dB / - 1.5 dB
RF output power, Canada	21 W ±0.75 dB / 0.8 W ±0.75 dB
Modulation 25 kHz 12.5 kHz	 16K0G3E 8K05G3E

Table A-1: Technical specifications

Item	Specification
LF power	Built-in loudspeaker: 6 W External loudspeaker: 6 W / 8 Ohm Loudhailer: 30 W / 4 Ohm (when the unit is not transmitting)
Receiver sensitivity	< -119 dBm typically @ 20 dB SINAD CCITT weighted
Antenna	50 Ohm antenna, 50 Ohm female SO239 for PL259 plug
Water ingress	IPx8 and IPx6 all over. For flush-mount installations a sealing gasket is included in the delivery.

Table A-1: Technical specifications (Continued)

A.2 NMEA data rates and formats

Item	Value
61162-1	4800,8,n,1 (in/out)

Table A-2: NMEA data rates and formats

System configurations

This appendix lists selected examples of system configurations.

For an overview and specifications of the cables needed see

Note | For installation of the connection boxes see *Connection box SAILOR 6207* on page 2-26 and *Connection box SAILOR 6208* on page 2-28

B.1 System configuration examples

The following list shows system configurations, with handset, connection boxes and cable information

1. *How to install a SAILOR 62056204 CSM far from the VHF radio*
2. *How to install a SAILOR 62056204 close to the VHF radio*
3. *How to install a SAILOR 62056204 very close to the VHF radio*

B.1.1 How to install a SAILOR 62056204 CSM far from the VHF radio

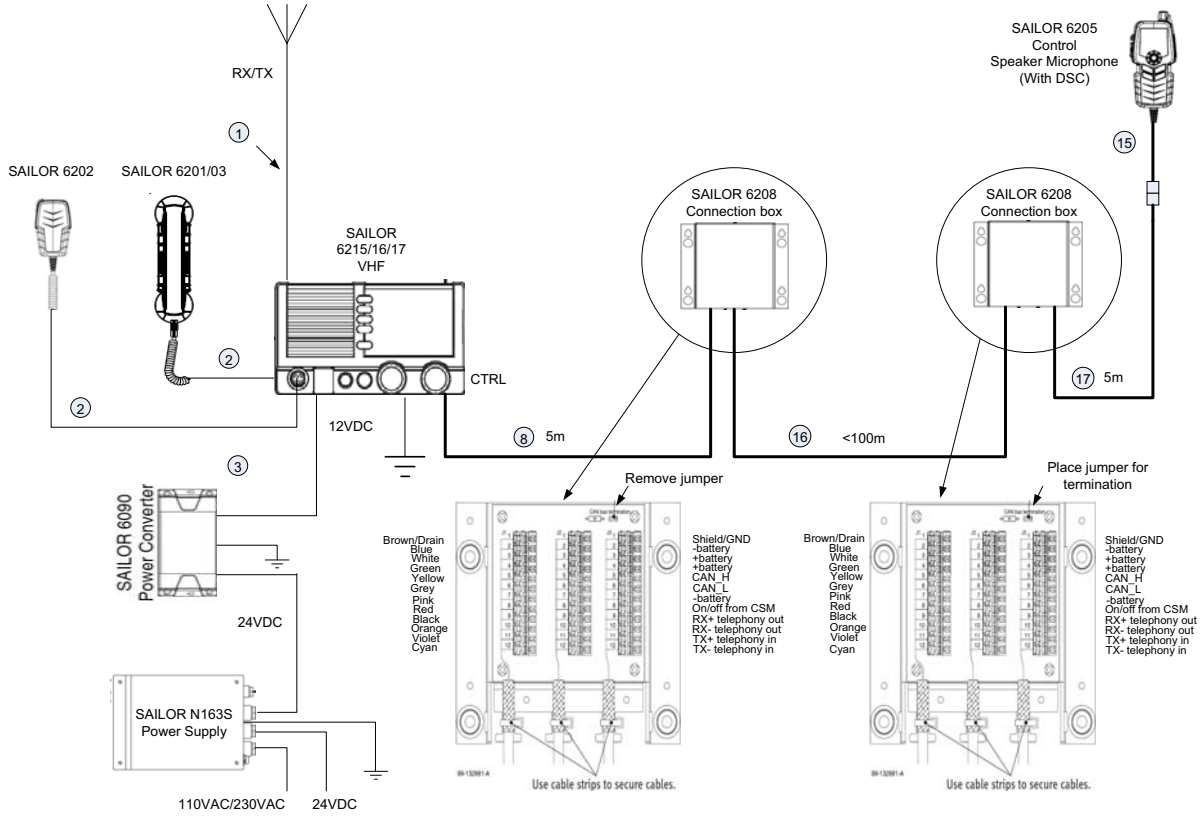


Figure B-1: How to install a SAILOR 6205 CSM far from the VHF radio

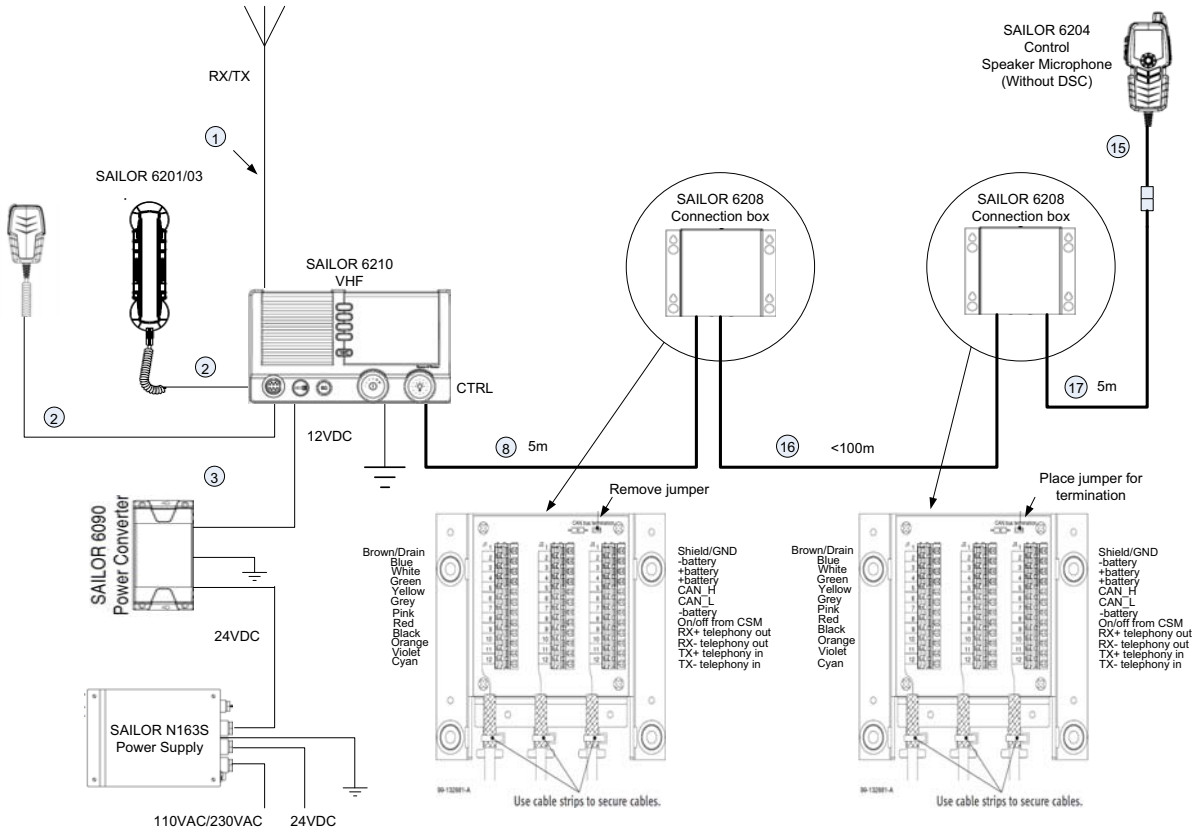


Figure B-2: How to install a SAILOR 6204 CSM far from the VHF

B.1.2 How to install a SAILOR 62056204 close to the VHF radio

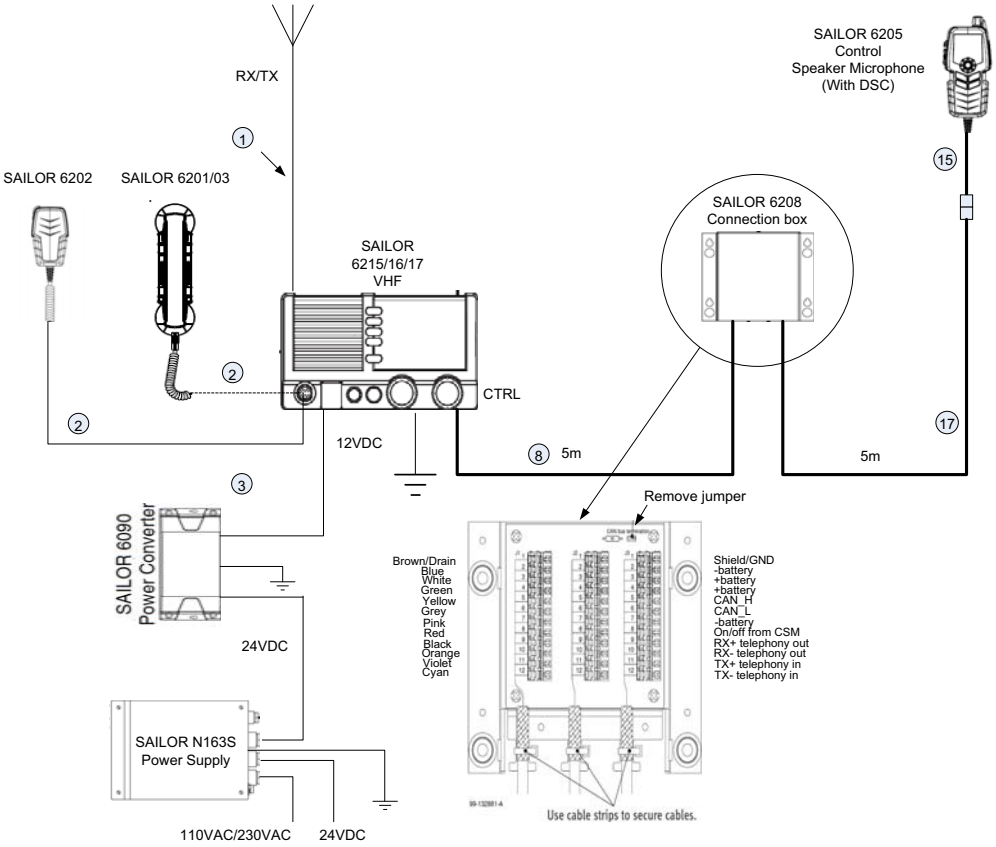


Figure B-3: How to install a SAILOR 6205 close to the VHF radio

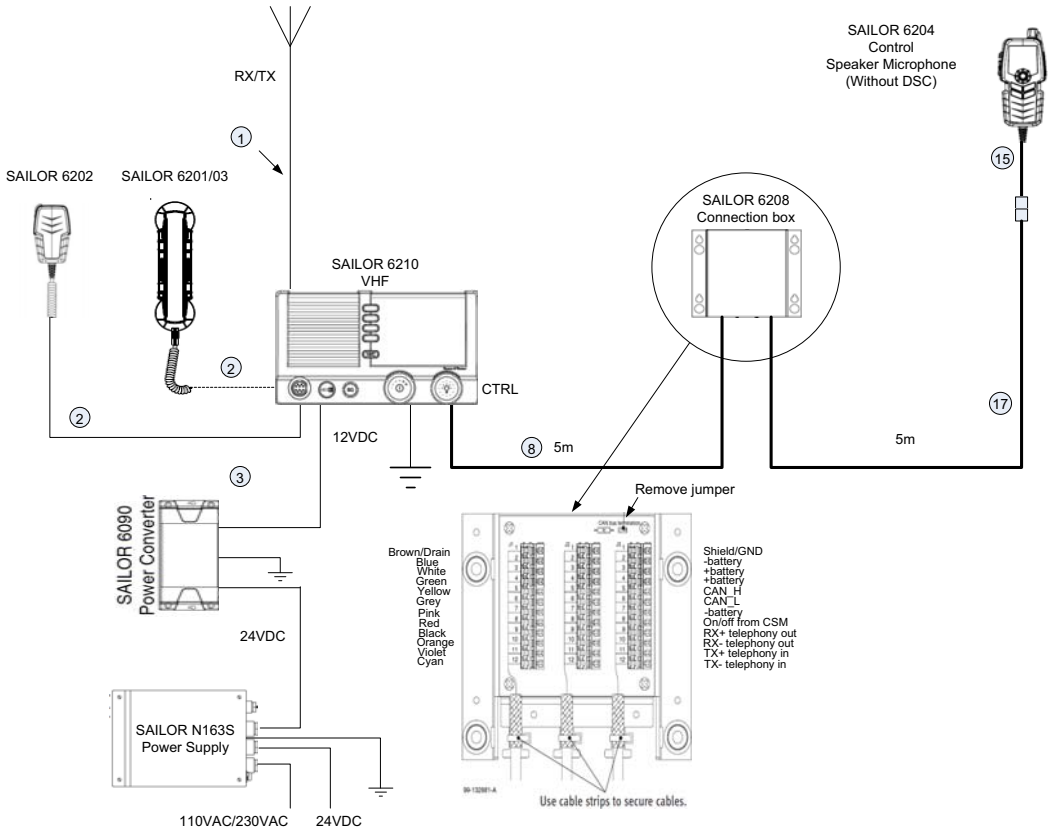


Figure B-4: How to install a SAILOR 6204 close to the VHF radio

B.1.3 How to install a SAILOR 62056204 very close to the VHF radio

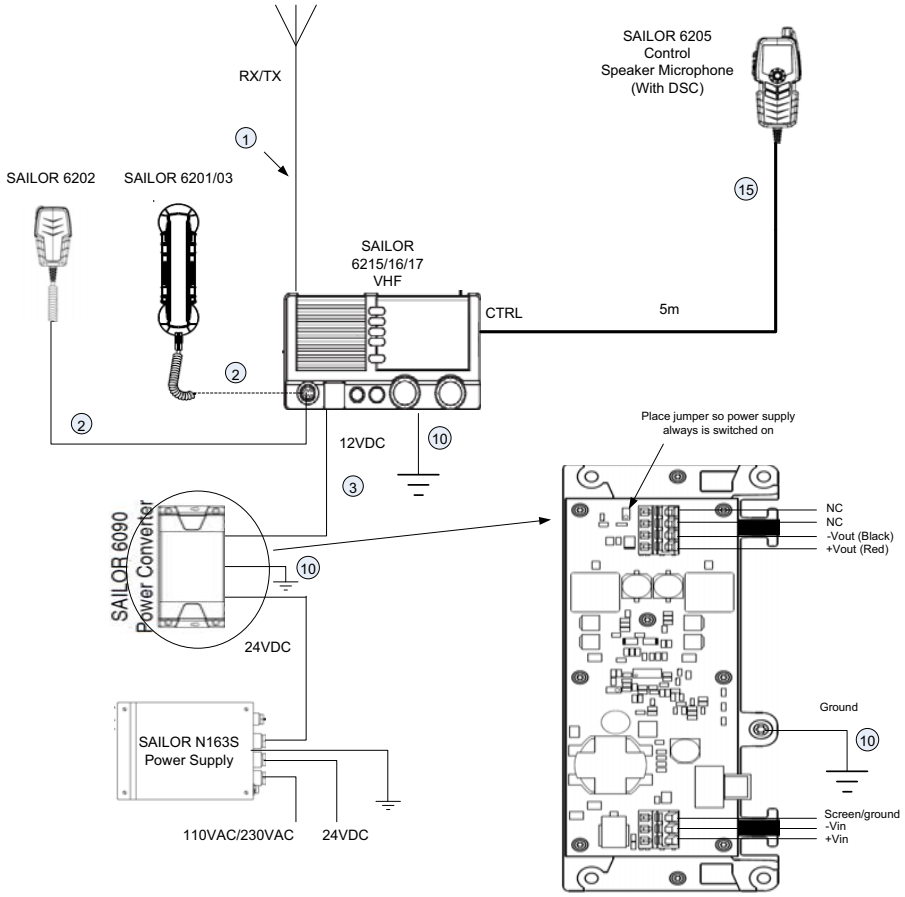


Figure B-5: How to install a SAILOR 6205 very close to the VHF radio

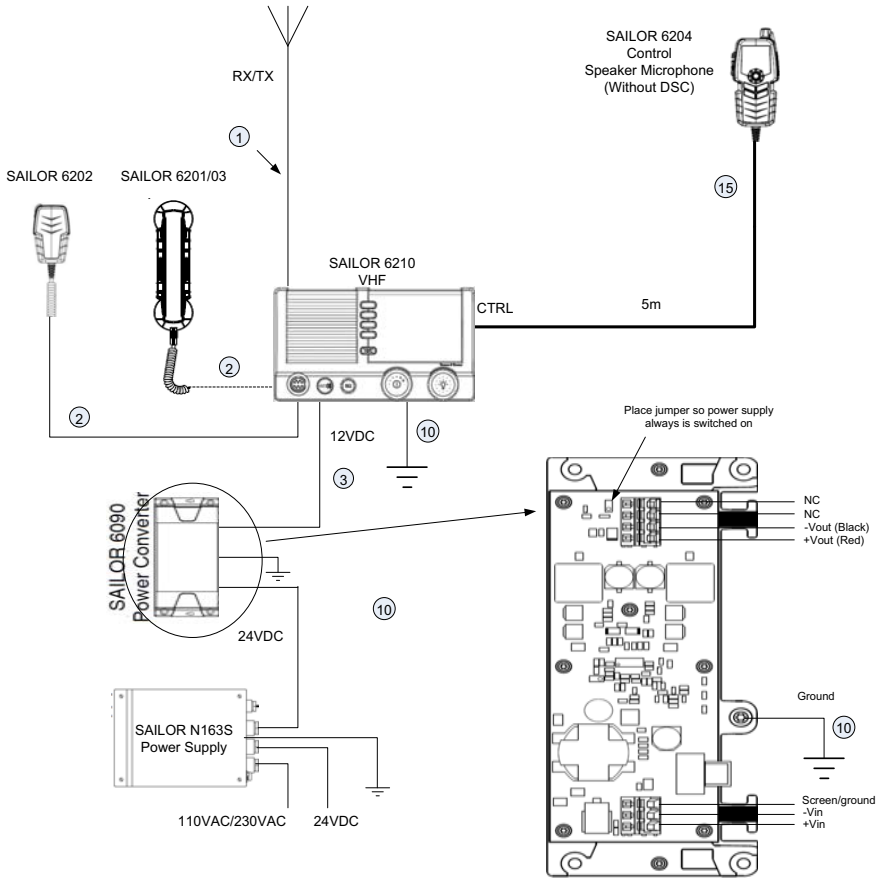


Figure B-6: How to install a SAILOR 6204 very close to the VHF radio

B.2 Cable requirements

The following cable information relates to the cable numbers in the system configuration drawings on the previous pages.

Cable	Part number	Description	Specification	Remarks
1		Antenna cable	RG214 or better	
2		Handset cable	1 m, spiraled	Part of handset
3		Power cable	1.5 m power cable	Included in 406210A
8	406208-941	5 m cable for SAILOR 6208 Connection box	12-pole LTW cable with screen	Included in Connection box 406208A
10		0.3 m	Earth connection	
15		Cable for SAILOR 6204 Control Speaker Microphone	2.5 m, spiraled	Part of handset
16		Cable for CAN	Screened with twisted pairs, length and size see cable description for *Cable 16* on page B-48.	Extension cable for CAN bus, see also under cable description for *Cable 16* on page B-48.
17	406204-940	As cable (12). Plug for CTRL is removed and wires connected to connection box	12-pole LTW cable with screen	Extension cable with LTW bulk mount plug

Table B-1: Cable overview

Cable 1

Cable type: Coax cable RG 214 or better.

Cable 2 (Handset, cable included)

SAILOR 6210 VHF Front connector LTW 10-pin, circular male	Signal designation	Signal description
Pin 1	NC	
Pin 2	NC	
Pin 3	NC	
Pin 4	NC	
Pin 5	MIC+	Microphone signal
Pin 6	Earpiece	Earpiece signal
Pin 7	Hook_PTT	Hook/PTT signal
Pin 8	Battery+ (10.8-15.6 VDC)	Battery supply when radio is on
Pin 9	Internal GND = -Battery	Equipment ground
Pin 10	Internal GND = -Battery	Equipment ground

Table B-2: Cable specifications for cable 2

CAN cable (Cable 8 - CTRL)

Part number: 406208-941

SAILOR 6210 VHF CTRL connector LTW 12-pin, circular male	Signal designation	Cable pin 406208-941 (5 m)	SAILOR 6208 Conn. Box In from VHF	SAILOR 6208 Conn. Box Out of box	SAILOR 6208 Conn. Box Out of box	Signal description	Ships cable 6 twisted pairs overall screen
Pin 1	Shield/GND	Brown	J1-1	J2-1	J3-1	Equipment ground	paired with no. 8
Pin 2	Battery-	Blue	J1-2	J2-2	J3-2	Battery -	paired with no. 3
Pin 3	Battery+	White	J1-3	J2-3	J3-3	10.8-15.6 VDC from VHF radio	paired with no. 2
Pin 4	Battery+	Green	J1-4	J2-4	J3-4	10.8-15.6 VDC from VHF radio	paired with no. 7
Pin 5	CAN_H	Yellow	J1-5	J2-5	J3-5	CAN bus data	paired with no. 6
Pin 6	CAN_L	Grey	J1-6	J2-6	J3-6		paired with no. 5
Pin 7	Battery-	Pink	J1-7	J2-7	J3-7	Battery -	paired with no. 4
Pin 8	ON/OFF from CSM	Red	J1-8	J2-8	J3-8	ON/OFF signal from Control Speaker Microphone	paired with no. 1

Table B-3: Cable specifications for cable 8 (CTRL)

SAILOR 6210 VHF CTRL connector LTW 12-pin, circular male	Signal designation	Cable pin 406208-941 (5 m)	SAILOR 6208 Conn. Box In from VHF	SAILOR 6208 Conn. Box Out of box	SAILOR 6208 Conn. Box Out of box	Signal description	Ships cable 6 twisted pairs overall screen
Pin 9	RX+	Black	J1-9	J2-9	J3-9	RX telephony (out)	paired with no. 10
Pin 10	RX-	Orange	J1-10	J2-10	J3-10		paired with no. 9
Pin 11	TX+	Purple	J1-11	J2-11	J3-11	TX telephony (in)	paired with no. 12
Pin 12	TX-	Light green	J1-12	J2-12	J3-12		paired with no. 11

Table B-3: Cable specifications for cable 8 (CTRL)

Cable 16

The CAN bus cable must be of a paired and twisted type designed for the purpose. The CAN bus cable can handle signals up to 100 m away from the VHF to further Control Speaker Microphones (CSM).

Only 1 CSM can be connected to the VHF with a CAN bus cable of max 100 m if the cable dimension is 0.5mm² of each cord. Other combinations with more CSMs must be calculated seriously before installing the cable. If more CSMs are connected, the CAN cable of 0.5mm² can handle the signals up to max. 100 m. The only restriction is the power supply for the connected CSMs.

The voltage drop along the cable increases with the length of the cable. Separate supply cables can be installed in parallel with the CAN cable to reduce voltage drop in long cables. The maximum allowed voltage drop from VHF to CSM is 2 VDC. It means 1 VDC forward and 1 VDC return.

Max current consumption for each CSM is 0.5A.

Formula to calculate DC resistance in a wire:

$$R = 0,017 \times L / a$$

L = length of wire one way, in metre
a = cross section of the wire in mm²

Contact your local dealer for further information for correct installation.

Cable 17 CAN cable for bulk head installation.

Same cable as cable 12, but the plug is removed and the wires are connected to the connection box.

Same pin configuration as cable 8. See *Cable specifications for cable 8 (CTRL)* on page B-47.

Contact your local dealer for further information for correct installation.

A

ACC	Accessories

C

CAN	Controller-Area Network. A message based protocol designed to allow microcontrollers and devices to communicate with each other within a vehicle without a host computer.
CTRL	Control

E

EXT	External

G

GGA	NMEA sentence, essential fix data which provide 3D location and accuracy data.
GLL	NMEA sentence, Geographic Latitude and Longitude
GNS	NMEA sentence,

N

NMEA	National Marine Electronics Association, specification for communication between marine electronic devices

P

PWR	Power

R

RMC	NMEA sentence, version of essential gps position, velocity, time data.

V

VDR	Voyage Data Recorder, a data recording system designed for all vessels required to comply with the IMO's International Convention SOLAS Requirements in order to collect data from various sensors on board the vessel.
VHF	Very High Frequency

Z

ZDA	NMEA sentence, date and time.

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SAILOR 6215/6216 VHF DSC

Installation manual

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Safety warning

The following general safety precautions must be observed during all phases of operation, service and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture and intended use of the equipment. Thrane & Thrane assumes no liability for the customer's failure to comply with these requirements.

RF exposure hazards and instructions

Your Thrane & Thrane radio set generates electromagnetic RF (radio frequency) energy when transmitting. To ensure that you and those around you are not exposed to excessive amounts of energy and thus to avoid health hazards from excessive exposure to RF energy, all persons must be at least 3ft (0.9 m) away from the antenna when the radio is transmitting.

Warranty limitation

IMPORTANT - The radio is a sealed waterproof unit (classified IPX8). To create and maintain its waterproof integrity it was assembled in a controlled environment using special equipment. The radio is not a user maintainable unit, and under no circumstances should the unit be opened except by authorized personnel. Unauthorized opening of the unit will invalidate the warranty.

Installation and service

Installation and general service must be done by skilled service personnel.

Manual overview

This manual has the following chapters:

- *Introduction* contains a description of the VHF radio.
- *Installation* explains how to mount the VHF radio and how to connect accessories and external equipment.
- *First-time power up* explains how to make and receive voice and DSC calls over VHF, including how to use and set-up the channel scanning, the 2-way loudhailer, fog horn external loudspeaker.
- *Service & maintenance* contains support information including lists of accessories and a troubleshooting guide.

Appendices with *Technical specifications* and *System configurations*.

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Introduction

1.1 VHF radio with DSC

SAILOR 6215/6216 VHF DSC, your new SAILOR VHF radio with full DSC functionality, is approved to R&TTE and is waterproof to the IPx8 and IPx6 standard. As part of the required safety equipment, use the SAILOR 6215/6216 VHF DSC in an emergency situation. However the best way to guarantee functionality in an emergency situation, is to use the radio in daily communication on board.

The VHF radio is a simplex/semi duplex VHF radio. It is designed with an easy-to-use menu-driven setup. You use the soft-keys to enter the desired functions, you browse and select a setting using the right selection wheel knob. The large display has red adjustable backlight which provides a good visibility even at night and protects your night vision.

The VHF radio can replay the last 90 s of received voice. This is a useful feature to minimize misunderstandings and to record messages when the radio is unattended.

The VHF radio connects easily to external equipment like a 2-way loudhailer and an external speaker. You can use the loudhailer as a 2-way on-board communicator. The loudhailer also functions as a fog horn. You can select from several programmed fog-horn patterns.

For a list of other accessories available for the SAILOR 6215/6216 VHF DSC check with your nearest distributor.

Controls on the front plate

1. Loudspeaker.

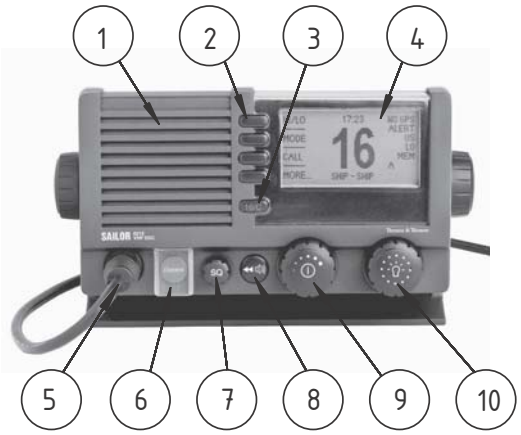
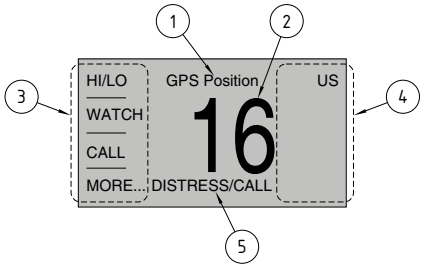


Figure 1-1: Controls on the front plate

2. Four soft keys with function title in the display.
3. Quick selection key for channel 16 and the programmed call channel.
4. Large display.
5. Connector for Handmicrophone or handset. If not used, put the cap from the ACC connector on the front connector to prevent water ingress.
6. Button for sending a DSC Distress alert.
7. Squelch control to mute background noise.
8. Replay button to play back up to 90 s voice message.
9. Volume wheel knob with key-press function for volume control and power on/off.
10. Selector wheel knob with key-press function for changing the working channel, navigating in menus in the display and backlight dimming.

1.1.1 SAILOR 6215/6216 VHF DSC display

The picture shows the display after start-up. The display holds various fields of information, depending on the currently selected function.



1. **Action line** containing information relevant for the currently selected function.
2. Current working channel.
3. Functions you can select with the soft keys. If there are more than 4 functions in the list press the soft key **MORE** to display further functions.
4. Status and other values for the current state or VHF channel.
5. **Service line** containing current temporary information relevant for the current channel or function.

For a detailed description of the information shown for each of the functions available see the chapter *First-time power up* on page 3-31.

1.2 Accessories available

Accessory	Description
SAILOR 6201 Handset with cradle (additional)	One SAILOR 6201 Handset with cradle is included in the delivery of the SAILOR 6215/6216 VHF DSC. You can connect another 2 SAILOR 6201 Handsets.
SAILOR 6203 Handset with cradle	SAILOR 6203 Handset with cradle, waterproof to IPx6.
SAILOR 6202 Hand Microphone	You can use the SAILOR 6202 (waterproof to IPx6 and IPx8) Hand Microphone instead of the handset.
SAILOR 6205 Control Speaker Microphone	With the SAILOR 6205 Control Speaker Microphone you can control the VHF functions of the SAILOR 6215/6216 VHF DSC.
SAILOR 6207 Connection Box for parallel handsets	The SAILOR 6207 Connection Box including Connection Cable 406209-941 is used for easy installation of several SAILOR 6201/03 Handsets/SAILOR 6202 Hand Microphones.
SAILOR 6208 Control Unit Connection Box	The SAILOR 6208 Connection Box including Connection Cable 406208-941 is used for easy installation of external equipment and accessories: • Max. 1 SAILOR 6205 Control Speaker Microphones
Connection cables	**5m connection cable for bulkhead mount**: Use this cable in installations where the SAILOR 6202 Hand Microphone is not connected directly to the **SAILOR 6215/6216 VHF DSC**, but located in a different position (part number: 406209-940). **5m Connection cable**, **1x10 pole**: Use this cable in installations when connecting external equipment to the SAILOR 6215/6216 VHF DSC. This cable is included in the SAILOR 6207 Connection Box for parallel handsets (part number: 406209-941). **5 m Connection cable for SAILOR 6205 Control Speaker Microphone**, **1x12 pole** (part number: 406204-940).

Table 1-1: Accessories available

Accessory	Description
SAILOR 6270 External loudspeaker	If you need an additional external loudspeaker you can connect a SAILOR 6270 Loudspeaker. It provides 6 W output power.
SAILOR 6090 Power Converter 24 V to 12 V DC	The SAILOR 6090 Power Converter is used to provide 12 V DC for the SAILOR 6215/6216 VHF DSC from a 24 V DC power source.

Table 1-1: Accessories available (Continued)

1.2.1 System configuration - example

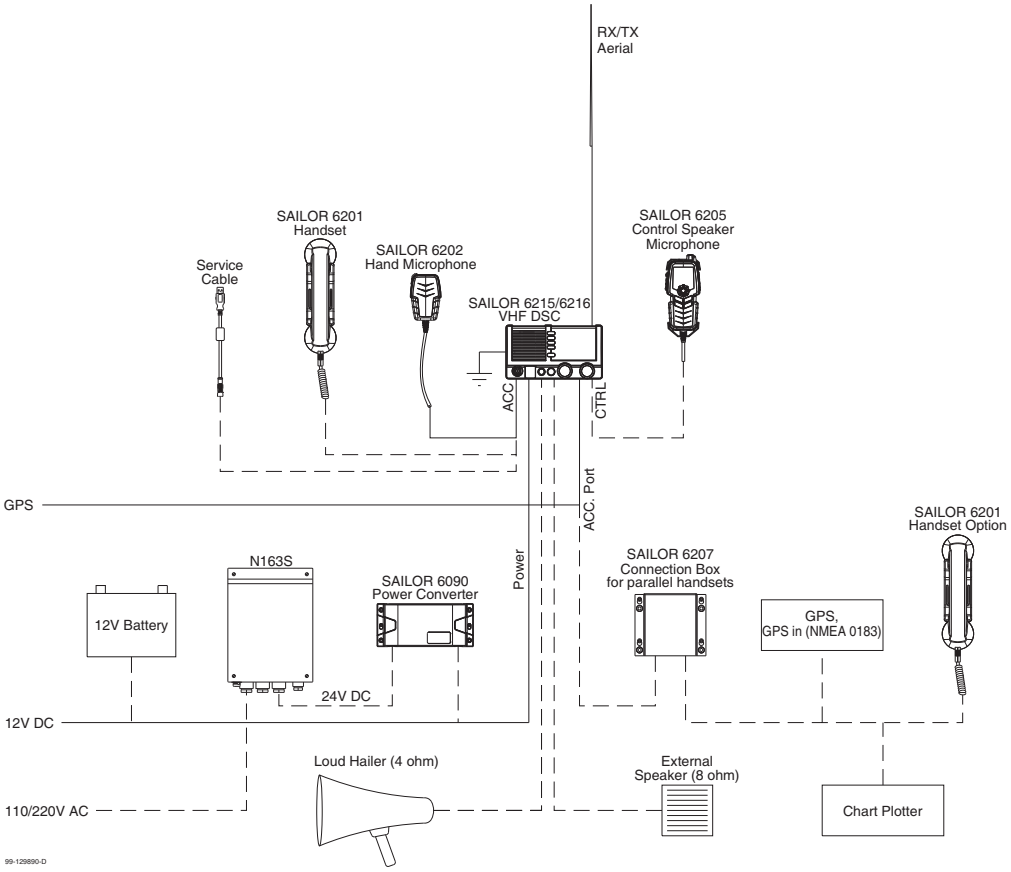


Figure 1-2: System configuration - example

Installation

In this chapter you find information and guidelines for:

- *Unpacking the SAILOR 6215/6216 VHF DSC*
- *Installing the VHF radio*
- *Power, VHF antenna and external equipment*

2.1 Unpacking the SAILOR 6215/6216 VHF DSC

The following items are included in the delivery of a SAILOR 6215/6216 VHF DSC:

- SAILOR 6215/6216 VHF DSC
- SAILOR 6202 Handmicrophone with spiral cable
- User and installation manual
- Installation guide
- Mounting bracket with two wheel knobs
- Connectors for cables
- Power cables, fittings and fuses
- Packaging material
- Sun screen (click-on) for front plate protection
- Kit for flush mount installation, including gasket

2.2 Installing the VHF radio

You can mount the VHF radio as a desktop, overhead or flush-mounted unit integrated in the instrument panel.

Provide space enough to access the front panel connectors and for installing a cradle for the speaking device.

Provide **at least 120 mm space at the back** of the SAILOR 6215/6216 VHF DSC radio to allow free air circulation.

Compass safe distance

Make sure that the VHF radio is far enough from any magnetic compass to avoid influence of the loudspeaker magnet on the compass reading. See the following table for the safe distance after magnetization between the nearest point of the device and the centre of the compass at which it will produce a deviation of 0.3°.

Device	Safe distance
SAILOR 6215/6216 VHF DSC	1.0 m
SAILOR 6202 Handmicrophone	0.8 m
SAILOR 6090 Power Converter 24 V - 12 V	0,15 m
SAILOR 6207 Connection Box for parallel handsets	0.6 m
SAILOR 6208 Control Unit Connection Box	0.6 m

Table 2-1: Compass safe distance

2.2.1 SAILOR 6215/6216 VHF DSC with U mounting bracket

The mounting bracket and two knobs are included in the delivery.

Desktop mounting

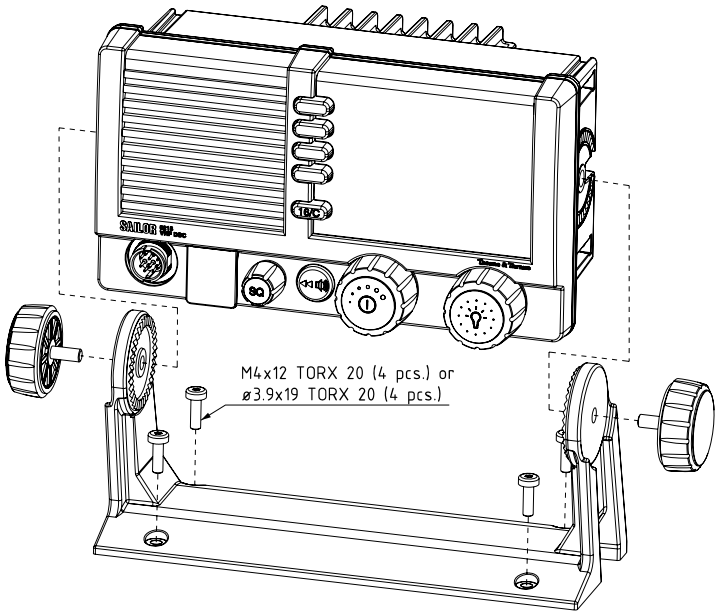


Figure 2-1: Desktop mounting

Overhead mounting

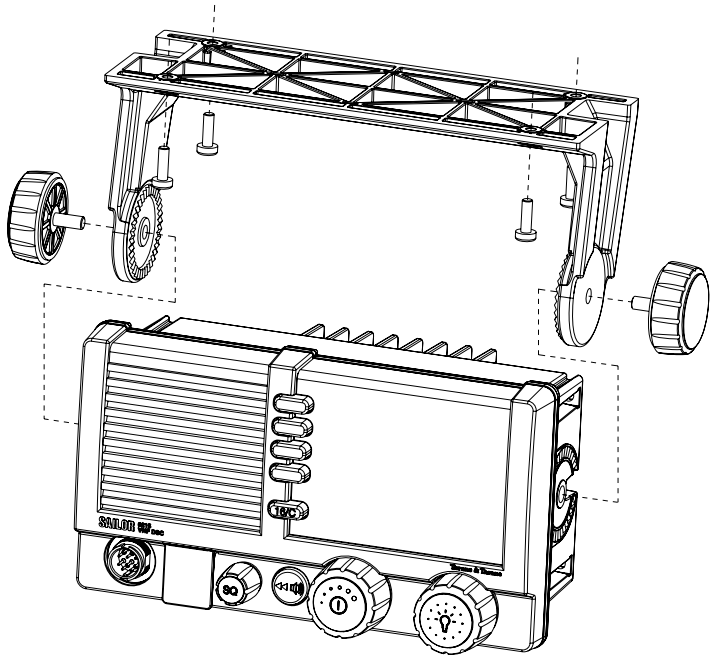


Figure 2-2: Overhead mounting

Mounting with U mounting bracket

To mount the VHF radio as tabletop, do as follows:

1. Find a suitable location for the VHF radio. Check that the space is wide/deep enough to accommodate the VHF radio.
2. Fasten the bracket with 4 screws (included in the delivery.)
3. Insert the VHF radio in the bracket and fasten it with the two knobs.
4. The display of the VHF radio should be at an angle of approximately 90° to your line of sight when operating it.

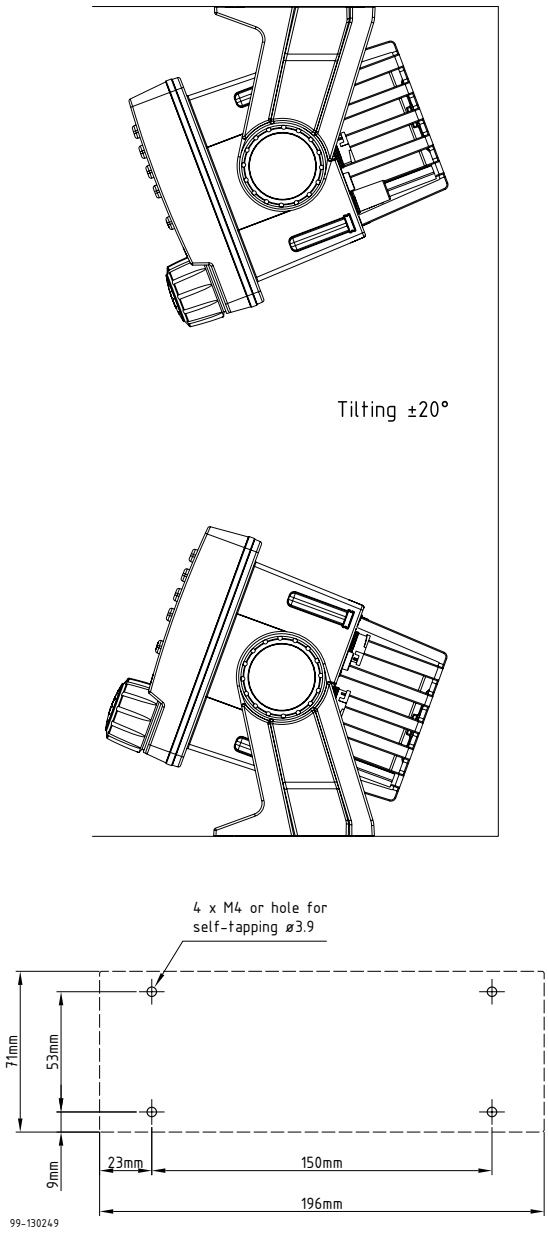


Figure 2-3: Mounting with U mounting bracket

2.2.2 SAILOR 6215/6216 VHF DSC for flush mount

You can mount the VHF radio to a flat surface, e.g. an instrument panel.The flush mount installation kit is included in the delivery.

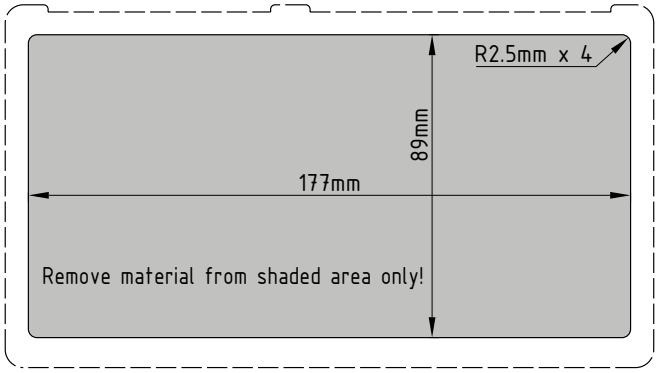


Figure 2-4: Cutout for flush mount

Important | **The scaling in the above drawing is not 1:1**. Consequently do not attempt to use a print or copy of this page without checking the dimensions.

1. Find a suitable location for the VHF radio. Check that the space is deep enough to accommodate the VHF radio and an additional min. 120 mm space for cable entry.
2. Keep free distance to allow free air circulation around the VHF radio and to allow sufficient space for access to cables, see the drawing on this page.
3. Cut out the hole for the VHF radio where you want to mount it. Use the cutting template in the installation guide.
4. Mount the 4 square nuts M4 in the cabinet, ensure that they are placed correctly so it is possible to screw in the M4x45 screws.
5. Ensure that the flush mount gasket is placed correctly on the VHF radio.
6. Before mounting the VHF radio be aware that the surface is plane and rigid. If the surface is not plane and/or rigid (stiff) remove the gasket and seal with silicone sealant between the VHF radio and the surface.
7. Slide the VHF radio in the cut-out. Place the flush mount bracket and fasten it with the 4 screws M4x45. Make sure the torque does not exceed 1Nm when fastening the screws.

Note | Only use screws supplied with the kit for flush mounting.

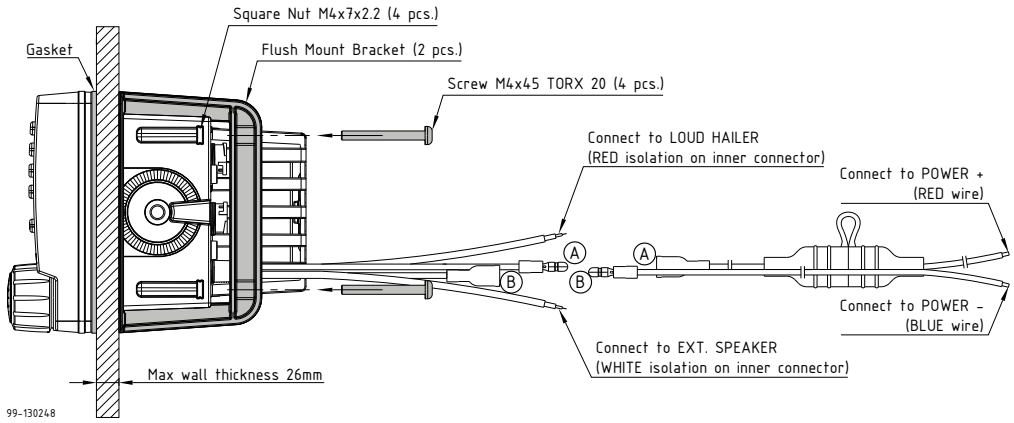


Figure 2-5: Flush mount details

Note Firmly tie back and secure any wires not used to avoid the possibility for mutual shorting or shorting to ground.

2.2.3 SAILOR 6090 Power Converter

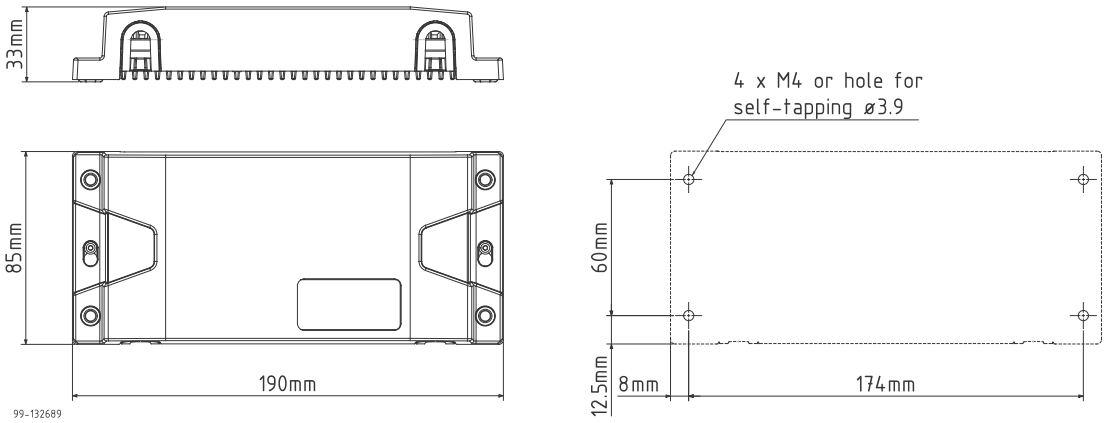


Figure 2-6: SAILOR 6090 Power Converter, dimensions

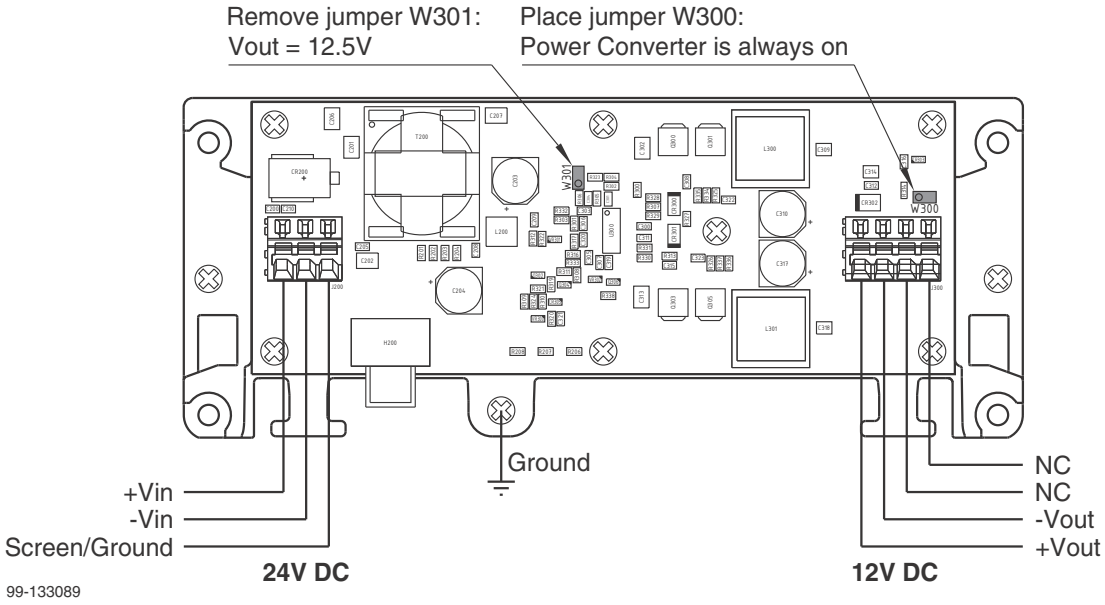


Figure 2-7: Connecting the SAILOR 6090 Power Converter

2.2.4 SAILOR 6202 Handmicrophone

Handmicrophone with spiral cable and PTT button.

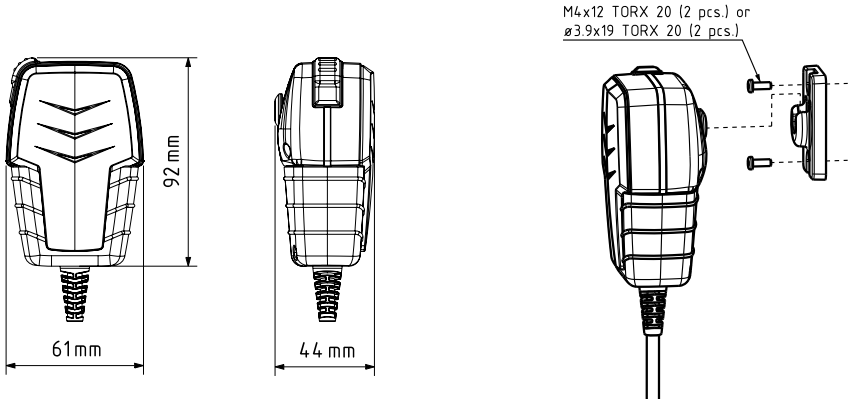


Figure 2-8: Handmicrophone

2.3 Power, VHF antenna and external equipment

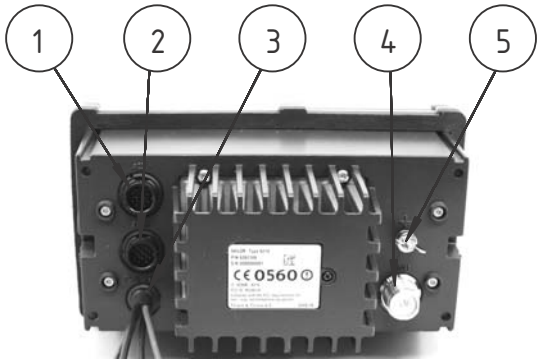


Figure 2-9: Power, VHF antenna and external equipment

1. *ACC connector* for accessories
2. *CTRL connector for control speaker microphone*
3. *Power, Loudhailer, foghorn and external speaker*
4. *VHF antenna*
5. *Ground stud*

2.3.1 ACC connector

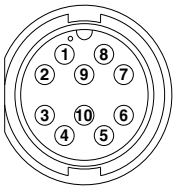
Use the connector marked **ACC** to connect GPS input.

The interface for GPS is NMEA 0183 (EN61162-1)/NMEA.

Connector type: Circular connector, 10-pin.

Connection cable with plug, part number 406209-941.

Pin assignment: Connector front view on the VHF radio.



Pin	Description	Wire color
1	NMEA in+	Brown
2	NMEA in-	Blue
3	NMEA out-	White
4	NMEA out+	Green
5	Mike 2	Yellow
6	EAR 2	Grey
7	Hook_PTT	Pink
8	Battery supply when radio is on	Red
9	Internal GND = - Battery	Black
10	Internal GND = - Battery	Orange — SCREEN (Drain)

Table 2-2: ACC connector

NMEA interface description

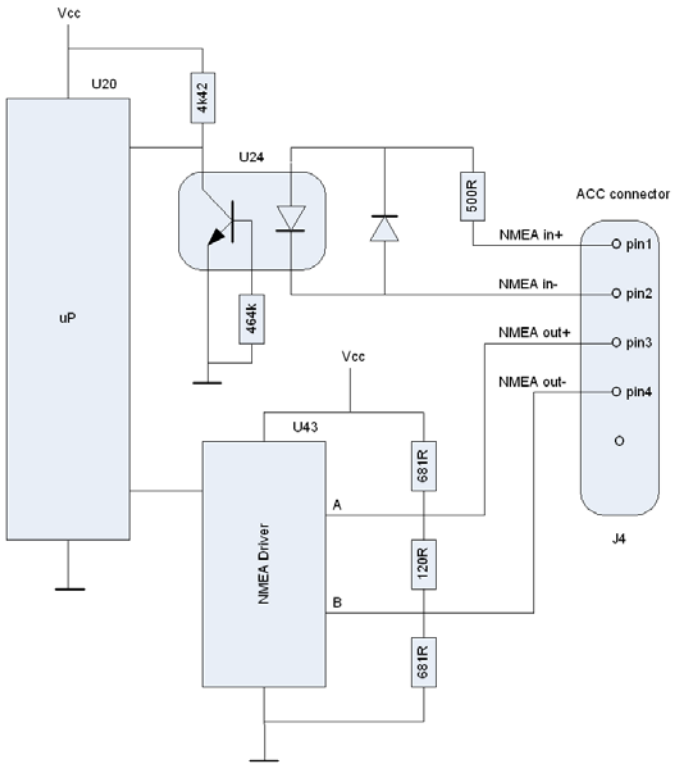


Figure 2-10: NMEA interface description

NMEA interface	Specifications
NMEA input:	Impedance: 600 Ohm Max. 2mA at min. level of 2V
NMEA output	Load Impedance: > 60 Ohm Drive load: < 35 mA

Table 2-3: NMEA interface

The NMEA interface supports NMEA 0183 v2.0, v2.1 and v2.3.

The following sentences are supported:

- FSI: All fields are decoded.
- GGA: UTC, "Position", "quality indicator" (indicators 1-5). All other fields are unused.
- GLL: UTC, "Position", "Status" and "mode" (indicators A and D). All other fields are unused.
- GNS: UTC, "Position" and "mode" (indicators A and D). All other fields are unused.
- RMC: UTC, "Position", "Status", "Date" and "mode" (indicators A and D). All other fields are unused.
- ZDA: UTC, "Day", "Month", and "Year". All other fields are unused.

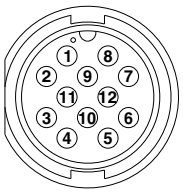
In accordance with the standard EN61162-1 (Ed. 3).

Received NMEA sentences except for FSI can be forwarded to NMEA output. As talker the sentences are streamed when received (with no intervals).
SW revision: 2.00.01

2.3.2 CTRL connector for control speaker microphone

Connector type: Circular connector, 12-pin.

Pin assignment: Connector front view on the VHF radio:



Pin	Description
1	GND for cable screen
2	Internal GND=- Battery
3	Battery supply when radio is on
4	Battery supply when radio is on
5	CAN+
6	CAN-
7	Internal GND = - Battery
8	On/off from Control Speaker Microphone
9	RX out +
10	RX out -
11	TX in +
12	TX in -

Table 2-4: CTRL connector for control speaker microphone

2.3.3 Power, Loudhailer, foghorn and external speaker

Use the connector marked **PWR/EXT** to connect power, loudhailer and an external speaker. The cable for this connector is part of the delivery.

1. Blue wire: Power -
2. Red isolation on inner connector: loudhailer
3. White isolation on inner connector: external speaker
4. Red wire: Power +

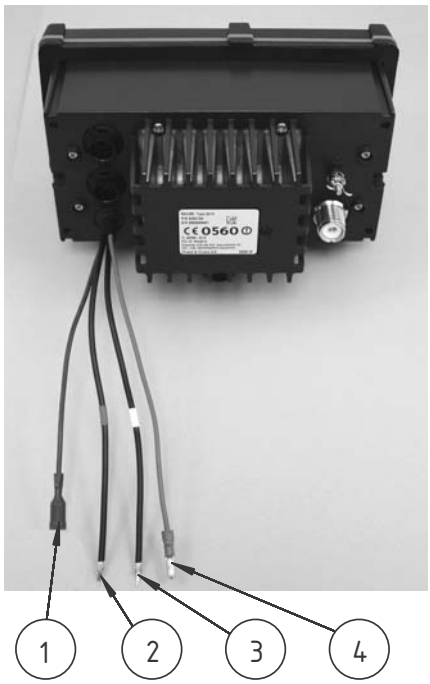


Figure 2-11: Power, loudhailer, foghorn and external speaker

Protection against water ingress

Important

You must protect the cable connection with rubber vulcanizing tape as shown in the pictures below. This protection prevents water seeping into the VHF radio, cable and connectors.

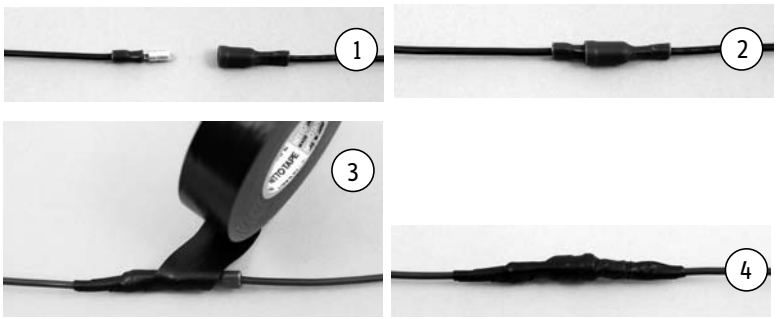


Figure 2-12: Protection against water ingress

2.3.4 VHF antenna

Use the connector marked **ANT** to connect the VHF antenna to the radio with a 50 Ohm coaxial cable with low loss, e.g. RG214. Install a PL259 plug at the cable end.

Place the antenna as high and clear of obstructions as possible. Make sure that the horizontal distance to metal parts is minimum 1.5 m (5 ft).

Connector type: female SO239 for PL259 plug.

2.3.5 Ground stud

To ground the radio connect a ground wire from the ground stud of the radio to a suitable grounding point. Use an appropriately sized wire. The ground stud is located above the VHF antenna connector.

Figure 2-13: Ground stud

2.4 VHF antenna installation

The SAILOR 6215/6216 VHF DSC is be installed with only one antenna for VHF RX/TX and DSC. You can install all commonly available 50 Ohm antennas covering the appropriate frequency range and providing a VSWR less than 1.5 over this range.

If further details are required on equipment and antenna installation, you may see IMO COMSAR/Circ. 32, GUIDELINES FOR THE HARMONIZATION OF GMDSS REQUIREMENTS FOR RADIO INSTALLATIONS ON BOARD SOLAS SHIPS as a guide.

2.4.1 Cable requirements

Connect the antenna using a low loss type 50 Ohm coaxial cable, e.g. good quality RG214 or better. It is recommended to use a double screened type cable (like e.g. RG214) with a maximum insertion loss of 3dB across the antenna cable installation.

The maximum antenna cable length in the installation depends on the quality of the cable, i.e. the specified attenuation (dB/m) of the cable of choice at the high end of the VHF frequency band. As a rule of thumb the cable length using e.g. RG214 coaxial cable should not exceed 25 m.

2.4.2 VHF RX/TX antenna

In installations with two or more VHF radios it is important to ensure the optimum performance of these by carefully selecting the antenna positions for both radios. It is recommended to maximize the RF attenuation between the VHF RX/TX antennas in the installation. You can ensure this by not having the RX/TX antennas positioned at the same horizontal level, i.e. the RX/TX antennas for each radio must be installed at shifted elevations as shown in the following drawing.

If sufficient vertical distance between two or more such antennas cannot be achieved, the horizontal distance between them is increasingly important for optimum performance. If there is hardly any vertical separation ensure that there is a minimum of 5 m horizontal distance between any RX/TX antennas in the installation.

To minimize any increase in VSWR of the VHF RX/TX antenna, install the antenna at a vertical distance of at least 2 m to any other mast, pole or other RF antennas. Keep VHF antennas as far away as possible from antenna main beam of any radar and satellite equipment.

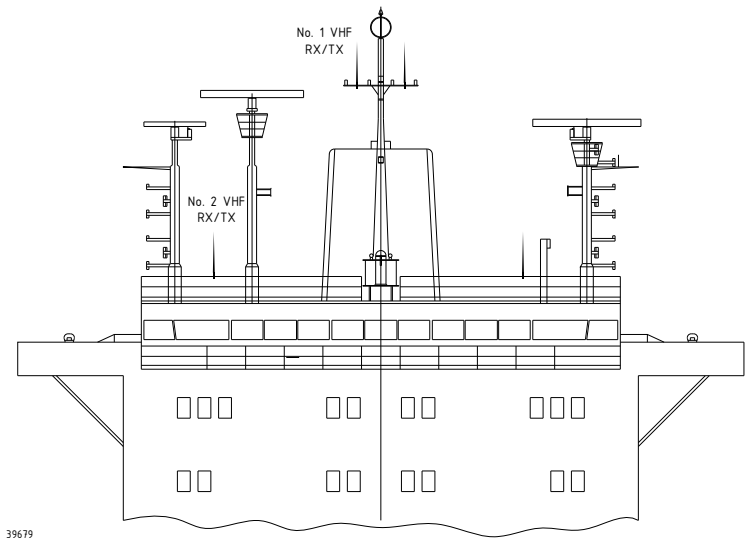


Figure 2-14: Antenna positioning

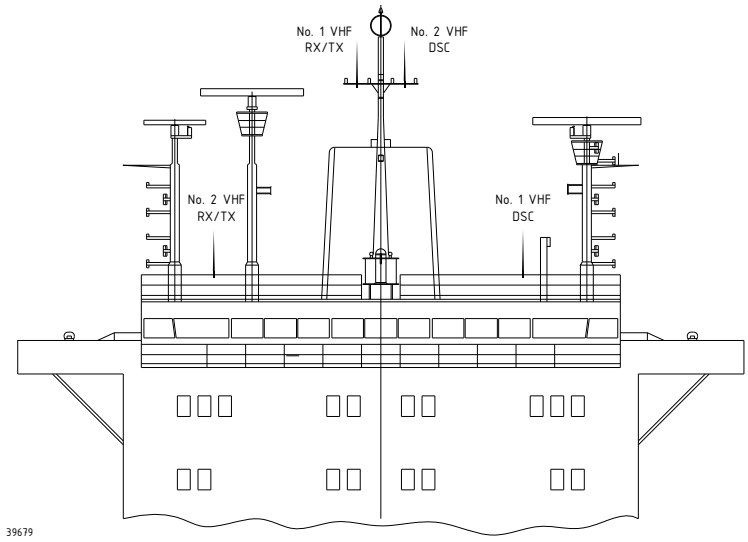


Figure 2-15: Antenna positioning 1/2

2.5 System setup

To change a setting in the **SYSTEM SETUP**, do as follows:

1. Press the soft key **SETUP**. If it is not in the display, press the soft key **MORE** until **SETUP** appears.
2. Press the arrow soft key ➡ or ⬅ to advance to **SYSTEM SETUP**.
3. Turn the selector wheel knob to go to a setting, then press the selector wheel knob to change the setting.
4. Press **EXIT** to return to normal radio operation

SYSTEM SETUP	Description
Inactivity timeout	Inactivity time-out to exit functions (e.g. in setup) and return to the application. Range: 1 to 30 minutes, in 1 minute steps Default: 10 min.
NMEA input (baud rate)	4800
Factory Defaults	Resets the radio to factory defaults.
SW version	Software version of the radio
S/N	Serial number of the radio
Password	If you need to change the identity of the radio (MMSI number or ATIS code), contact your local dealer.

Table 2-5: System setup

2.6 SAILOR 6201 Handset cradle (optional)

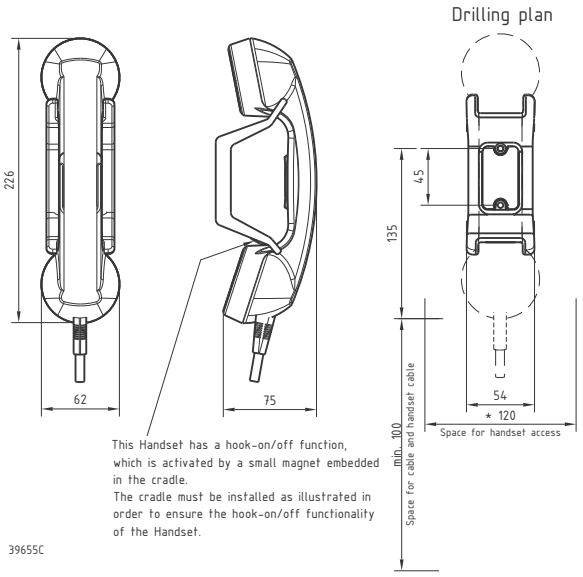


Figure 2-16: Handset.

2.7 Accessories

2.7.1 Part numbers for accessories

The following accessories are available for the SAILOR 6215/6216 VHF DSC:

Part number	Accessories available
406201A-00500	SAILOR 6201 Handset with cradle (additional)
406202A-00500	SAILOR 6202 Hand Microphone
406203A-00500	SAILOR 6203 Handset Waterproof
406205A-00500	SAILOR 6205 Control Speaker Microphone
406207A	SAILOR 6207 Connection Box with Cable 406209-941
406208A	SAILOR 6208 Connection Box with Cable 406208-941
406209-940	Connection Cable for bulkhead mount, 5 m, 1-x10 pole
406209-941	Connection Cable, 5 m, 1x10 pole
406204-940	Cable for SAILOR 6204/6205 Control Speaker Microphone
406270A	SAILOR 6270 External loudspeaker
406090A-00500	SAILOR 6090 Power Converter 24 V — 12 V

Table 2-6: Part numbers for accessories

2.7.2 Connection box SAILOR 6207

The **SAILOR 6207 Connection Box** is used to connect GPS (NMEA), GPS/AIS DSC modem and further SAILOR 6201 Handsets. For wiring and cabling details see *System configuration examples* on page B-1 .

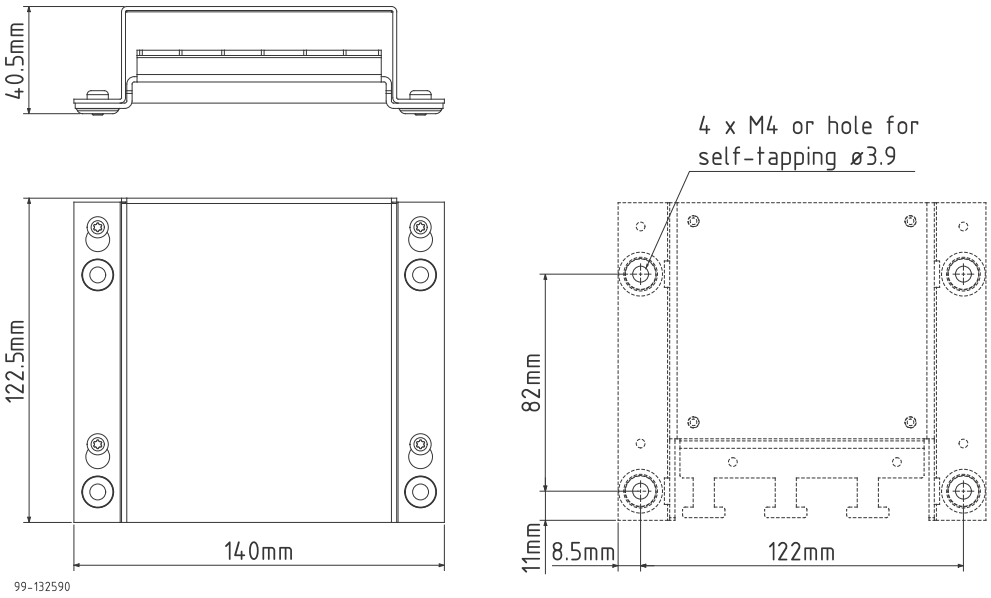
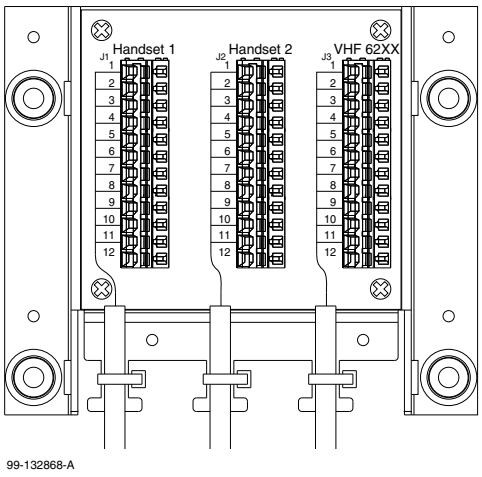


Figure 2-17: SAILOR 6207 Connection Box for parallel handsets, mounting



Description	Pin	Wire color
NMEA in+	1	Brown
NMEA in-	2	Blue
NMEA HS in-	3	White
NMEA HS in+	4	Green
Mike 2 / Line in	5	Yellow
Ear 2 / Line out	6	Grey
Hook_PTT	7	Pink
Bat_SW Supply voltage when on	8	Red
Internal GND = - Battery	9	Black
Internal GND = - Battery	10	Orange
Internal GND = - Battery	11	SCREEN (Drain)
	12	NC

Cable part no. 406209-941

To ensure galvanic separation of battery supply from ship's ground, the cable screens of the ACC cables MUST not touch any part of the metallic parts of the SAILOR 6207 Connection Box. Connect the screens only to the pins at the terminals.

Figure 2-18: Connection Box for parallel handsets, wiring

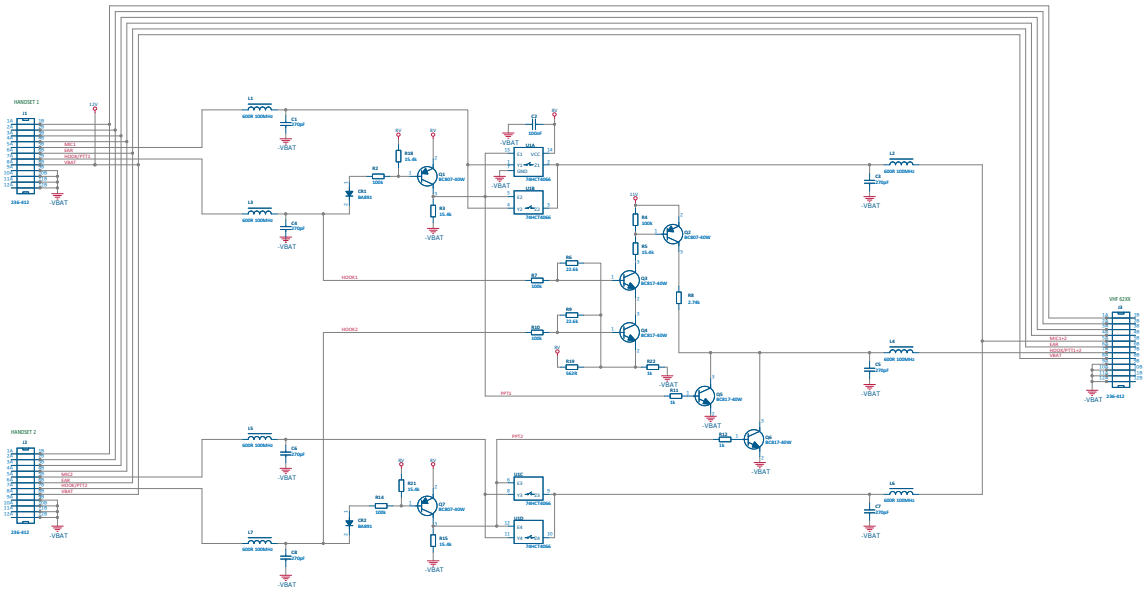


Figure 2-19: SAILOR 6207 Connection Box for parallel handsets, diagram

2.7.3 Connection box SAILOR 6208

The **SAILOR 6208 Connection Box** is used to connect SAILOR 6205 Control Speaker microphones and other auxiliary equipment. For wiring and cabling details see *System configuration examples* on page B-1.

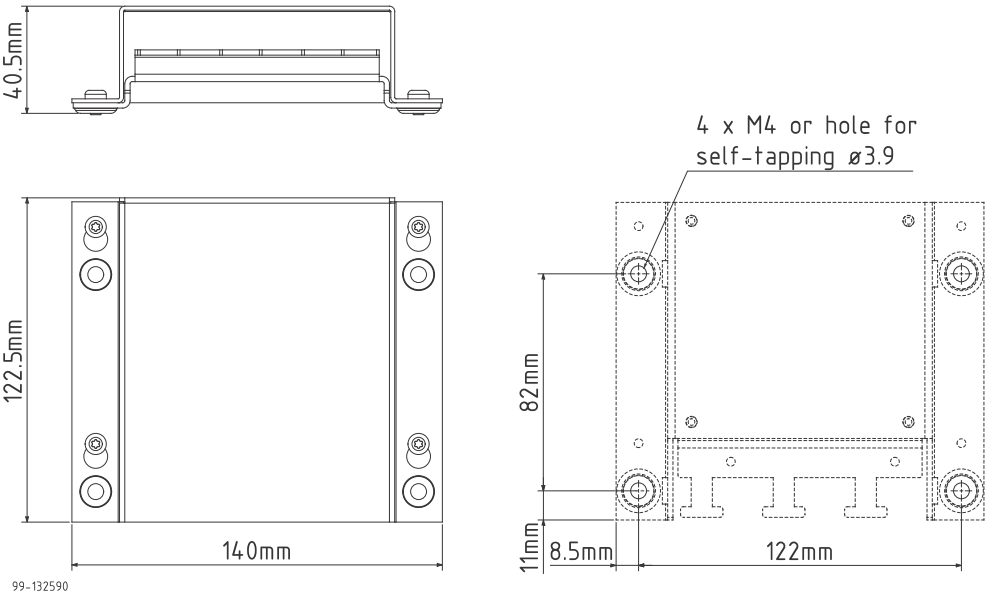


Figure 2-20: SAILOR 6208 Control Unit Connection Box, mounting

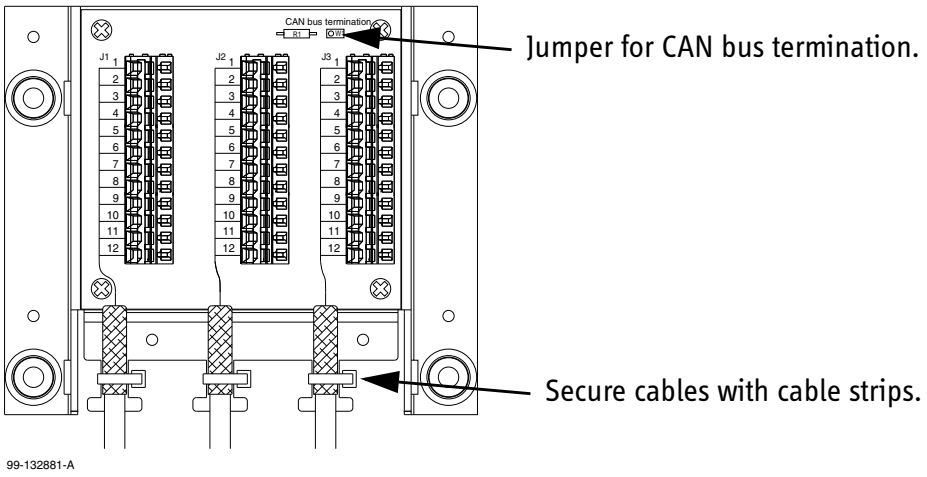


Figure 2-21: SAILOR 6208 Control Unit Connection Box for parallel handsets, wiring

Terminate the last SAILOR 6208 on the CAN bus (furthest away from the transceiver).

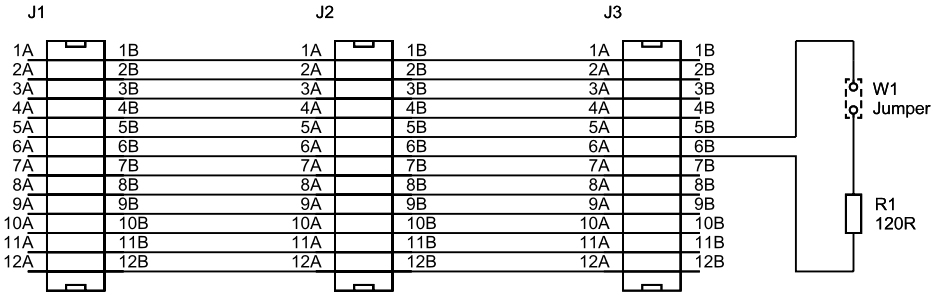


Figure 2-22: SAILOR 6208 Control Unit Connection Box, diagram

First-time power up

3.1 General use and navigation

3.1.1 Power on and speaker volume

The VHF radio has a dual-function on/off wheel knob for power on/off and volume control.

- To power on the VHF radio press the on/off wheel knob.
- To power off the VHF radio, press and hold the on/off wheel knob and follow the instructions in the display.
- To adjust the speaker volume, turn the volume wheel knob (clockwise = louder, counter clockwise = softer, until muted). When adjusted to the muted level is shown in the display.

3.1.2 Working channel, settings and dim function

The selector wheel knob has several functions:

- To select the **working channel**, turn the selector wheel knob.
- To browse and select **settings**, turn the selector wheel knob and press for accept.
- To **dim the backlight** in the display until it is appropriate for the current situation, i.e. to give comfortable night vision, press, hold and turn the selector wheel knob (clockwise= more light).

3.2 Entering the MMSI number

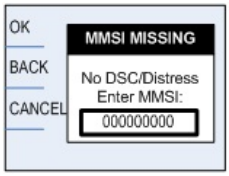
When the VHF radio is powered on for the first time, you must enter the vessel's MMSI number. Hereafter the MMSI number is briefly displayed after power up. The MMSI is a unique, 9-digit identifier assigned to your ship.

Important The MMSI number must be programmed into the VHF radio to use any DSC functionality. The radio will prompt for the MMSI number at each power-up until the MMSI has been entered. An error message is displayed when trying to initiate any DSC function. However, you can use the radio in normal VHF mode.

CAUTION! Without a programmed MMSI number the Distress button will not work!

Entering the MMSI number

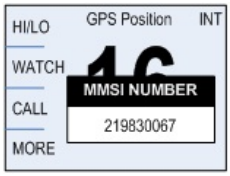
When being prompted after power up enter the MMSI number as described below:



1. Enter the 9 digits one by one by turning the selector wheel knob to the desired digit, press the selector wheel knob to accept the digit and advance to the next digit.
   To delete the previous digit press the soft key **BACK**.
2. Press the soft key **OK** to confirm the entered MMSI number.
3. To leave without saving, press the soft key **CANCEL**.

Note The MMSI number can be programmed by the operator once. If a wrong number has been entered and stored, or if there is a requirement to change it, contact your authorized dealer.

Once programmed, you can see the MMSI number in the service line directly after start-up. The DSC functionality is operational at any time.



The message **NO DSC (NO MMSI)** is shown in the action line if the MMSI is not programmed.

3.2.1 Changing the MMSI number

If you need to change the MMSI number of the SAILOR 6215/6216 VHF DSC use the built-in service tool and a connected PC, or reset the MMSI number from the Setup menu of the radio. The manuals for the service tool and the user manual for the radio can be downloaded from www.cobham.com/satcom.

Service & maintenance

4.1 Contact for support

Contact your authorized dealer for technical service and support of the VHF radio. Before contacting your authorized dealer you can go through the troubleshooting guide to solve some of the most common operational problems.

4.2 Maintenance

4.2.1 Preventive maintenance

Maintenance of the SAILOR 6215/6216 VHF DSC can be reduced to a maintenance check at each visit of the service staff. Inspect the radio for mechanical damages, salt deposits, corrosion and any foreign material. Due to its robust construction and ruggedness the radio has a long lifetime. Anyway it must carefully be checked at intervals not longer than 12 months - dependent on the current working conditions.

Salt deposits

In case the equipment has been exposed to sea water there is a risk of salt crystallization on the keys and wheel knobs and they may become inoperable. Clean the VHF radio and speaker microphones with fresh water.

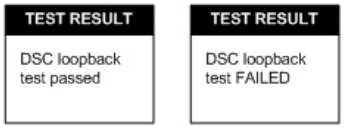
4.2.2 Error messages and warnings

Errors and warning messages are shown in the display and are read-only.

4.2.3 DSC self test

To run a control routine DSC self test, do as follows:

1. Press the soft key **SETUP**. If it is not in the display, press the soft key **MORE** until **SETUP** appears.
2. Press the arrow soft key ➡ or ⬅ to advance to **DSC SETUP**.
3. Turn the selector wheel knob to select **DSC Self Test**. Press and turn the selector wheel knob to select **RUN**.
   The test will check the ability to encode/decode DSC signalling on RF level. The radio will automatically transmit a DSC safety test call to its own MMSI number without enabling the transmitter power amplifier. In parallel the radio decodes and compares the received call to be the same as the transmitted.
   The display shows the result of the test.
4. Press the soft key **OK** to acknowledge the test result and resume normal operation.



Important

If the DSC loopback test fails, this indicates the DSC functionality does not work correctly — including the ability to send a DISTRESS message.

Contact your dealer immediately for further advice.

4.2.4 Troubleshooting guide

Action	Symptom	Remedy
The radio will not turn on	The display is empty.	Check if power is present. Check fuse which is placed in the + supply wire. Check performance of power supply if connected to one.
No communication	The loudspeaker is mute.	Check the antenna installation. Check antenna cable. Check handset/Handmicrophone and cable.
GPS	Position requested.	If the VHF, despite being connected to a GPS/position source, prompts for entering the position and time information, the automated update has most likely been lost either due to missing data on the line, broken cabling or the GPS/position source has failed. Refer to the installation section in the back of this manual for installation and connection details. Until the automatic position update from GPS/position source is restored position and time must be entered manually when prompted by a (four hour) timer in VHF. In the **DSC SETUP**, **Position Info**, you can verity the position data. If data is present Lat/Lon/UTC will be displayed.

Table 4-1: Troubleshooting guide

Action	Symptom	Remedy
DSC routine testing		Check the DSC function regularly. Verify the complete DSC installation, with antennas, by transmitting a Safety Test call to another station (coast or ship). The test call is generated using the DSC call flow via menu CALL. The call should normally be replied by the receiving station without questioning. The default configuration of a DSC VHF radio is auto-acknowledgement of any received Safety test call requests. If a ship is equipped with multiple radios a second radio can be the station to check up against. The transmitting radio will not receive its own transmitted calls. If there is only a single radio on a vessel, a facility is built into the unit where the DSC engine can be verified using a test call that is internally looped without activating the radio transmitter PA. The test is executed via menu SETUP, DSC SETUP. The call sequence that is verified, is an Individual Safety Test Call directed to own MMSI. The test status is read in the display.
Missing MMSI	DSC operation is not working	When powering up the VHF for the first time after leaving factory there is no MMSI number in the VHF radio. For the DSC operation to function the MMSI number must be entered in the VHF radio. For further details see *Entering the MMSI number* on page 3-32.
Radio time	DSC logs are sorted with wrong time stamp or radio time is incorrect	A wrong radio time indication should occur only if GPS position source is not connected or providing correct time data. A valid GPS time signal will update the UTC time used for time stamping the DSC logs. If a GPS/position source is not connected to the VHF radio and hence position and time is entered manually, you must enter the "radio time" also manually, at least after power up. This will ensure correct time stamping of the DSC logs. The UTC time is the suggested time to be entered when prompted for entering position and time manually (every four hours).

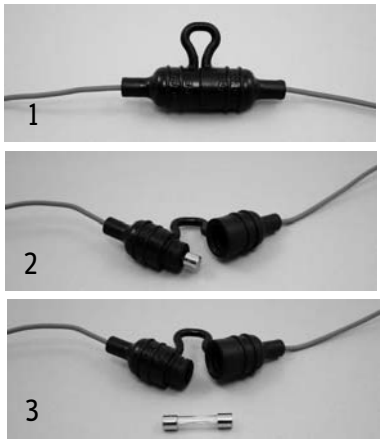
Table 4-1: Troubleshooting guide (Continued)

Action	Symptom	Remedy
DSC Channel not free	DSC transmission delayed	The transmission of a DSC call which is not of category distress or urgency will be postponed if the VHF radio is in the process of decoding an incoming DSC call. As soon as this decoding process has finalized the transmission will take place.
Handset configuration	No sound in earpiece	The earpiece volume may be configured to OFF. See section *Controller setup* on page 2-10 on how to adjust the earpiece volume of the handset.
Device failure		If any of the checks and tests described in this section do not assist in resolving the difficulties experienced in the operation and/or performance of the VHF installation, a fault may have developed in the VHF radio itself. When contacting an authorized Thrane & Thrane representative be sure to provide as much information as possible describing the observed behavior - also including the type of the VHF radio, its serial number, and software release version (both found in the setup menu Controller Setup).

Table 4-1: Troubleshooting guide (Continued)

4.2.5 Replacing the fuse in the red wire (Power +)

One fuse is installed in the supplied DC cable. If the fuse is blown, track down why the fuse was blown and solve the problem. To replace the fuse, do as follows:



1. Hold both ends of the fuse holder and pull it apart.
2. Take out the old fuse.
3. Insert the new fuse. The fuse rating is 10 A T.
4. Make sure that the fuse is tightly fixed on the metal contact inside the fuse holder.
5. Put together the fuse holder.

4.2.6 Replacing the fuse in the SAILOR 6090 Power Converter

One fuse is installed in the SAILOR 6090 Power Converter. If the fuse is blown, do as follows:

1. Track down why the fuse was blown and solve the problem.
2. Take out the old fuse.
3. Insert the new fuse. The fuse rating is 10 A T.

Figure 4-1: Fuse in the SAILOR 6090 Power Converter

4.3 Returning units for repair

Should your Cobham SATCOM product fail, please contact your dealer or installer, or the nearest Cobham SATCOM partner. You will find the partner details on www.cobham.com/satcom where you also find the Cobham SATCOM Self Service Center web-portal, which may help you solve the problem. Your dealer, installer or Cobham SATCOM partner will assist you whether the need is user training, technical support, arranging on-site repair or sending the product for repair. Your dealer, installer or Cobham SATCOM partner will also take care of any warranty issue.

4.3.1 Repacking for shipment

Should you need to send the product for repair, please read the below information before packing the product.

The shipping carton has been carefully designed to protect the SAILOR 6215/6216 VHF DSC and its accessories during shipment. This carton and its associated packing material should be used when repacking for shipment. Attach a tag indicating the type of service required, return address, part number and full serial number. Mark the carton FRAGILE to ensure careful handling.

Note Correct shipment is the customer's own responsibility.

If the original shipping carton is not available, the following general instructions should be used for repacking with commercially available material.

1. Wrap the defective unit in heavy paper or plastic. Attach a tag indicating the type of service required, return address, part number and full serial number.
2. Use a strong shipping container, e.g. a double walled carton.
3. Protect the front- and rear panel with cardboard and insert a layer of shock-absorbing material between all surfaces of the equipment and the sides of the container.
4. Seal the shipping container securely.
5. Mark the shipping container FRAGILE to ensure careful handling.

Failure to do so may invalidate the warranty.

Technical specifications

A.1 SAILOR 6215/6216 VHF DSC

Item	Specification
Weight SAILOR 6215/6216 VHF DSC	approx. 1.2 kg, 2.65 lbs
Weight SAILOR 6215/6216 VHF DSC and Handmicrophone	approx. 1,5 kg 3,31 lbs including SAILOR 6202 Handmicrophone and mounting bracket
Dimensions	**Height**: Outer dimension 106 mm, hole height for flush mount 89 mm **Width**: Outer dimension 190 mm, hole width for flush mount 177 mm **Depth**: Outer dimension from front of wheel knobs 132 mm, depth for flush mount 94 mm
Operating temperature	-15˚C to 55˚C
Storage temperature	-30˚C to 80˚C
Power supply	12 VDC Nominal (10,8– 15,6 VDC)
Current consumption	Max. 7 A
Frequency range	TX 156,000-161,450, RX 156,000-163.425 MHz
Channel spacing	12,5 kHz and 25 kHz, all international maritime channels
Number of P channels	The radio may be programmed with up to 40 private channels that can be managed in all channel modes.
Transmit power	Hi/Lo: 25 W and <1 W
RF output power	25 W +0 dB / - 1.5 dB 1 W +0 dB / - 1.5 dB
Modulation 25 kHz 12.5 kHz	 16K0G3E, 16KOG2B (DSC) 8K05G3E
LF power	Built-in loudspeaker: 6 W External loudspeaker: 6 W / 8 Ohm Loudhailer: 30 W / 4 Ohm (when the unit is not transmitting)

Table A-1: Technical specifications

Item	Specification
Receiver sensitivity	< -119 dBm typically @ 20 dB SINAD CCITT weighted
Antenna	50 Ohm antenna, 50 Ohm female SO239 for PL259 plug 1-antenna operation for VHF and DSC communication
Water ingress	IPx8 and IPx6 all over. For flush-mount installations a sealing gasket is included in the delivery.

Table A-1: Technical specifications (Continued)

A.2 NMEA data rates and formats

Item	Value
61162-1	4800,8,n,1 (in/out)

Table A-2: NMEA data rates and formats

System configurations

This appendix lists selected examples of system configurations.

For an overview and specifications of the cables needed see

Note | For installation of the connection boxes see *Connection box SAILOR 6207* on page 2-26 and *Connection box SAILOR 6208* on page 2-28

B.1 System configuration examples

The following list shows system configurations, with handset, connection boxes and cable information

1. *How to install a SAILOR 6205 CSM far from the VHF radio*
2. *How to install a SAILOR 6205 close to the VHF radio*
3. *How to install a SAILOR 6205 very close to the VHF radio*

B.1.1 How to install a SAILOR 6205 CSM far from the VHF radio

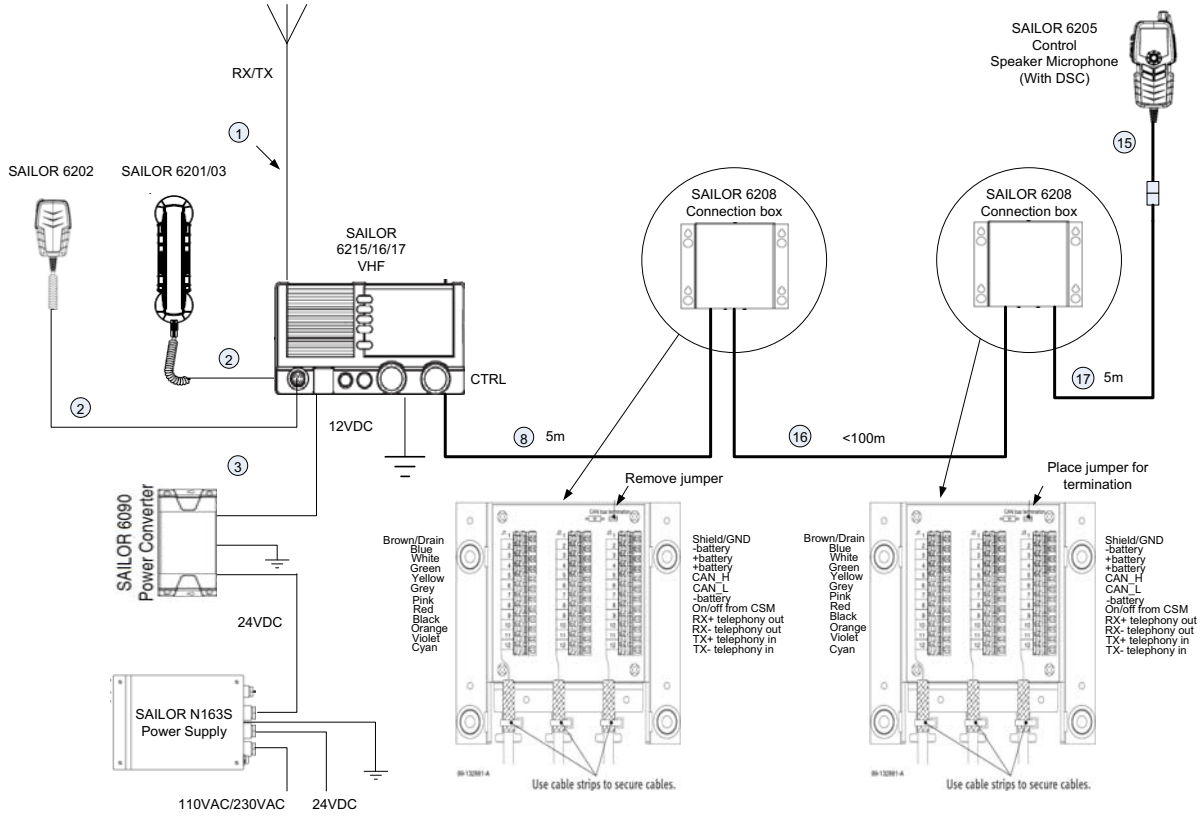


Figure B-1: How to install a SAILOR 6205 CSM far from the VHF radio

B.1.2 How to install a SAILOR 6205 close to the VHF radio

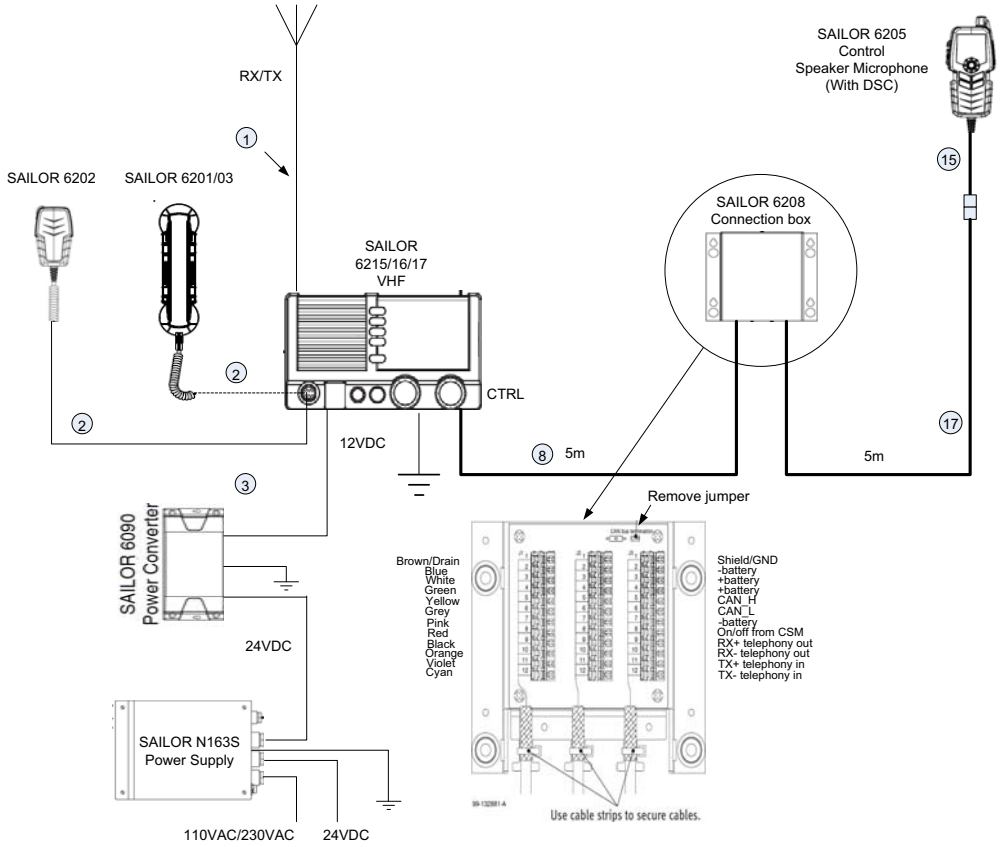


Figure B-2: How to install a SAILOR 6205 close to the VHF radio

B.1.3 How to install a SAILOR 6205 very close to the VHF radio

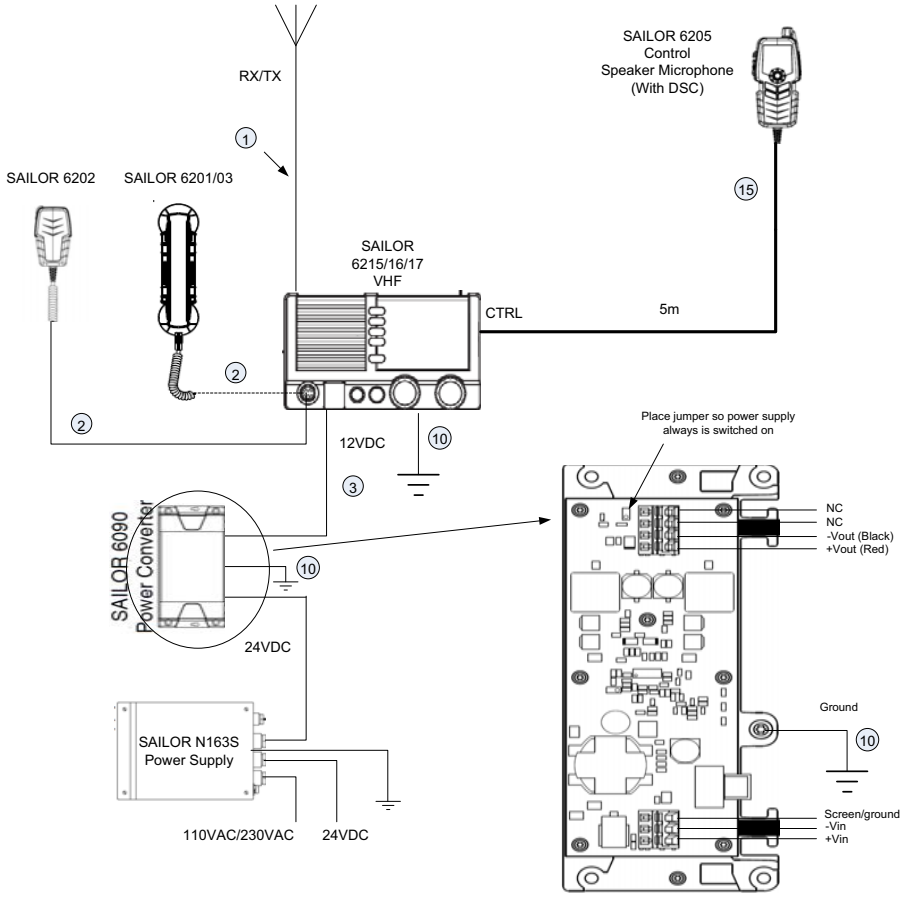


Figure B-3: How to install a SAILOR 6205 very close to the VHF radio

B.2 Cable requirements

The following cable information relates to the cable numbers in the system configuration drawings on the previous pages.

Cable	Part number	Description	Specification	Remarks
1		Antenna cable	RG214 or better	
2		Handset cable	1 m, spiraled	Part of handset
3		Power cable	1.5 m power cable	Included in 406215A
8	406208-941	5 m cable for SAILOR 6208 Connection box	12-pole LTW cable with screen	Included in Connection box 406208A
10		0.3 m	Earth connection	
15		Cable for SAILOR 6205 Control Speaker Microphone	2.5 m, spiraled	Part of handset
16		Cable for CAN	Screened with twisted pairs, length and size see cable description for *Cable 16* on page B-47.	Extension cable for CAN bus, see also under cable description for *Cable 16* on page B-47.
17	406204-940	As cable (12). Plug for CTRL is removed and wires connected to connection box	12-pole LTW cable with screen	Extension cable with LTW bulk mount plug

Table B-1: Cable overview

Cable 1

Cable type: Coax cable RG 214 or better.

Cable 2 (Handset, cable included)

SAILOR 6215/6216 VHF DSC Front connector LTW 10-pin, circular male	Signal designation	Signal description
Pin 1	NC	
Pin 2	NC	
Pin 3	NC	
Pin 4	NC	
Pin 5	MIC+	Microphone signal
Pin 6	Earpiece	Earpiece signal
Pin 7	Hook_PTT	Hook/PTT signal
Pin 8	Battery+ (10.8-15.6 VDC)	Battery supply when radio is on
Pin 9	Internal GND = -Battery	Equipment ground
Pin 10	Internal GND = -Battery	Equipment ground

Table B-2: Cable specifications for cable 2

CAN cable (Cable 8 - CTRL)

Part number: 406208-941

SAILOR 6215/6216 VHF DSC CTRL connector LTW 12-pin, circular male	Signal designation	Cable pin 406208-941 (5 m)	SAILOR 6208 Conn. Box In from VHF	SAILOR 6208 Conn. Box Out of box	SAILOR 6208 Conn. Box Out of box	Signal description	Ships cable 6 twisted pairs overall screen
Pin 1	Shield/GND	Brown	J1-1	J2-1	J3-1	Equipment ground	paired with no. 8
Pin 2	Battery-	Blue	J1-2	J2-2	J3-2	Battery -	paired with no. 3
Pin 3	Battery+	White	J1-3	J2-3	J3-3	10.8-15.6 VDC from VHF radio	paired with no. 2
Pin 4	Battery+	Green	J1-4	J2-4	J3-4	10.8-15.6 VDC from VHF radio	paired with no. 7
Pin 5	CAN_H	Yellow	J1-5	J2-5	J3-5	CAN bus data	paired with no. 6
Pin 6	CAN_L	Grey	J1-6	J2-6	J3-6		paired with no. 5
Pin 7	Battery-	Pink	J1-7	J2-7	J3-7	Battery -	paired with no. 4
Pin 8	ON/OFF from CSM	Red	J1-8	J2-8	J3-8	ON/OFF signal from Control Speaker Microphone	paired with no. 1

Table B-3: Cable specifications for cable 8 (CTRL)

SAILOR 6215/6216 VHF DSC CTRL connector LTW 12-pin, circular male	Signal designation	Cable pin 406208-941 (5 m)	SAILOR 6208 Conn. Box In from VHF	SAILOR 6208 Conn. Box Out of box	SAILOR 6208 Conn. Box Out of box	Signal description	Ships cable 6 twisted pairs overall screen
Pin 9	RX+	Black	J1-9	J2-9	J3-9	RX telephony (out)	paired with no. 10
Pin 10	RX-	Orange	J1-10	J2-10	J3-10		paired with no. 9
Pin 11	TX+	Purple	J1-11	J2-11	J3-11	TX telephony (in)	paired with no. 12
Pin 12	TX-	Light green	J1-12	J2-12	J3-12		paired with no. 11

Table B-3: Cable specifications for cable 8 (CTRL)

Cable 16

The CAN bus cable must be of a paired and twisted type designed for the purpose. The CAN bus cable can handle signals up to 100 m away from the VHF to further Control Speaker Microphones (CSM).

Only 1 CSM can be connected to the VHF with a CAN bus cable of max 100 m if the cable dimension is 0.5mm² of each cord. Other combinations with more CSMs must be calculated seriously before installing the cable. If more CSMs are connected, the CAN cable of 0.5mm² can handle the signals up to max. 100 m. The only restriction is the power supply for the connected CSMs.

The voltage drop along the cable increases with the length of the cable. Separate supply cables can be installed in parallel with the CAN cable to reduce voltage drop in long cables. The maximum allowed voltage drop from VHF to CSM is 2 VDC. It means 1 VDC forward and 1 VDC return.

Max current consumption for each CSM is 0.5A.

Formula to calculate DC resistance in a wire:

$$R = 0,017 \times L / a$$

L = length of wire one way, in metre
a = cross section of the wire in mm²

Contact your local dealer for further information for correct installation.

Cable 17 CAN cable for bulk head installation.

Same cable as cable 12, but the plug is removed and the wires are connected to the connection box.

Same pin configuration as cable 8. See *Cable specifications for cable 8 (CTRL)* on page B-46.

Contact your local dealer for further information for correct installation.

A

ACC	Accessories

C

CAN	Controller-Area Network. A message based protocol designed to allow microcontrollers and devices to communicate with each other within a vehicle without a host computer.
CTRL	Control

D

DSC	Digital Selective Calling

E

EXT	External

G

GGA	NMEA sentence, essential fix data which provide 3D location and accuracy data.
GLL	NMEA sentence, Geographic Latitude and Longitude
GNS	NMEA sentence,
GPS	Global Positioning System

N

NMEA	National Marine Electronics Association, specification for communication between marine electronic devices

P

PWR	Power

R

RMC	NMEA sentence, version of essential gps position, velocity, time data.

U

UTC	Coordinated Universal Time. The International Atomic Time (TAI) with leap seconds added at irregular intervals to compensate for the Earth's slowing rotation. Leap seconds are used to allow UTC to closely track UT1, which is mean solar time at the Royal Observatory, Greenwich.

V

VDR Voyage Data Recorder, a data recording system designed for all vessels required to comply with the IMO's International Convention SOLAS Requirements in order to collect data from various sensors on board the vessel.

VHF Very High Frequency

Z

ZDA NMEA sentence, date and time.

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SAILOR 6217 VHF DSC - AIS Receiver

Installation manual

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Safety warning

The following general safety precautions must be observed during all phases of operation, service and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture and intended use of the equipment. Thrane & Thrane assumes no liability for the customer's failure to comply with these requirements.

AIS for aids to collision avoidance

Note that not all ships have AIS transponders. Hence, AIS cannot be used exclusively for collision avoidance.

Warranty limitation

IMPORTANT - The radio is a sealed waterproof unit (classified IPX8). To create and maintain its waterproof integrity it was assembled in a controlled environment using special equipment. The radio is not a user maintainable unit, and under no circumstances should the unit be opened except by authorized personnel. Unauthorized opening of the unit will invalidate the warranty.

Installation and service

Installation and general service must be done by skilled service personnel.

Manual overview

This manual has the following chapters:

- *Introduction* contains a description of the VHF radio.
- *Installation* explains how to mount the VHF radio and how to connect accessories and external equipment.
- *First-time power up* explains how to make and receive voice calls over VHF, including how to use and set-up the channel scanning, the 2-way loudhailer, fog horn external loudspeaker.
- *Service & maintenance* contains support information including lists of accessories and a troubleshooting guide.

Appendices with *Technical specifications* and *System configurations*.

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Introduction

1.1 VHF radio and AIS receiver

SAILOR 6217 VHF DSC - AIS Receiver is approved to and is waterproof to the IPx8 and IPx6 standard. As part of the safety equipment, use the SAILOR 6217 VHF DSC - AIS Receiver in an emergency situation. However the best way to guarantee functionality in an emergency situation, is to use the radio in daily communication on board.

The VHF radio is a simplex/semi duplex VHF radio. It is designed with an easy-to-use menu-driven setup. You use the soft-keys to enter the desired functions, you browse and select a setting using the right selection wheel knob. The large display has red adjustable backlight which provides a good visibility even at night and protects your night vision.

The VHF radio has a class B AIS receiver for receiving the position of vessels fitted with AIS transponders. Vessel positions can be shown on an AIS enabled chart plotter or by dedicated AIS software, supporting standard NMEA sentences of the format !AIVDM.

The VHF radio can replay the last 90 s of received voice. This is a useful feature to minimize misunderstandings and to record messages when the radio is unattended.

The VHF radio connects easily to external equipment like a 2-way loudhailer and an external speaker. You can use the loudhailer as a 2-way on-board communicator. The loudhailer also functions as a fog horn. You can select from several programmed fog-horn patterns.

For a list of other accessories available for the SAILOR 6217 VHF DSC - AIS Receiver check with your nearest distributor.

Controls on the front plate

Figure 1-1: Controls on the front plate

1. Loudspeaker.
2. Four soft keys with function title in the display.
3. Quick selection key for channel 16 and the programmed call channel.
4. Large display.
5. Connector for Handmicrophone or handset. If not used, put the cap from the ACC connector on the front connector to prevent water ingress.
6. Squelch control to mute background noise.
7. Replay button to play back up to 90 s voice message.
8. Volume wheel knob with key-press function for volume control and power on/off.
9. Selector wheel knob with key-press function for changing the working channel, navigating in menus in the display and backlight dimming.

1.1.1 SAILOR 6217 VHF DSC - AIS Receiver display

The picture shows the display after start-up.The display holds various fields of information, depending on the currently selected function.

10. Functions you can select with the soft keys. If there are more than 4 functions in the list press the soft key **MORE** to display further functions.
11. Status and other values for the current state or VHF channel.
12. **Service line** containing current temporary information relevant for the current channel or function.

For a detailed description of the information shown for each of the functions available see the chapter *First-time power up* on page 3-31.

1.2 Accessories available

Accessory	Description
SAILOR 6201 Handset with cradle (additional)	One SAILOR 6201 Handset with cradle is included in the delivery of the SAILOR 6217 VHF DSC - AIS Receiver. You can connect another 2 SAILOR 6201 Handsets.
SAILOR 6203 Handset with cradle	SAILOR 6203 Handset with cradle, waterproof to IPx6.
SAILOR 6202 Hand Microphone	You can use the SAILOR 6202 (waterproof to IPx6 and IPx8) Hand Microphone instead of the handset.
SAILOR 6205 Control Speaker Microphone	With the SAILOR 6205 Control Speaker Microphone you can control the VHF functions of the SAILOR 6217 VHF DSC - AIS Receiver.
SAILOR 6207 Connection Box for parallel handsets	The SAILOR 6207 Connection Box including Connection Cable 406209-941 is used for easy installation of several SAILOR 6201/03 Handsets/SAILOR 6202 Hand Microphones.
SAILOR 6208 Control Unit Connection Box	The SAILOR 6208 Connection Box including Connection Cable 406208-941 is used for easy installation of external equipment and accessories: • Max. 1 SAILOR 6205 Control Speaker Microphones

Table 1-1: Accessories available

Accessory	Description
Connection cables	**5m connection cable for bulkhead mount**: Use this cable in installations where the SAILOR 6202 Hand Microphone is not connected directly to the **SAILOR 6217 VHF DSC - AIS Receiver**, but located in a different position (part number: 406209-940). **5m Connection cable**, **1x10 pole**: Use this cable in installations when connecting external equipment to the SAILOR 6217 VHF DSC - AIS Receiver. This cable is included in the SAILOR 6207 Connection Box for parallel handsets (part number: 406209-941). **5 m Connection cable for SAILOR 6205 Control Speaker Microphone**, **1x12 pole** (part number: 406204-940).
SAILOR 6270 External loudspeaker	If you need an additional external loudspeaker you can connect a SAILOR 6270 Loudspeaker. It provides 6 W output power.
SAILOR 6090 Power Converter 24 V to 12 V DC	The SAILOR 6090 Power Converter is used to provide 12 V DC for the SAILOR 6217 VHF DSC - AIS Receiver from a 24 V DC power source.

Table 1-1: Accessories available (Continued)

1.2.1 System configuration - example

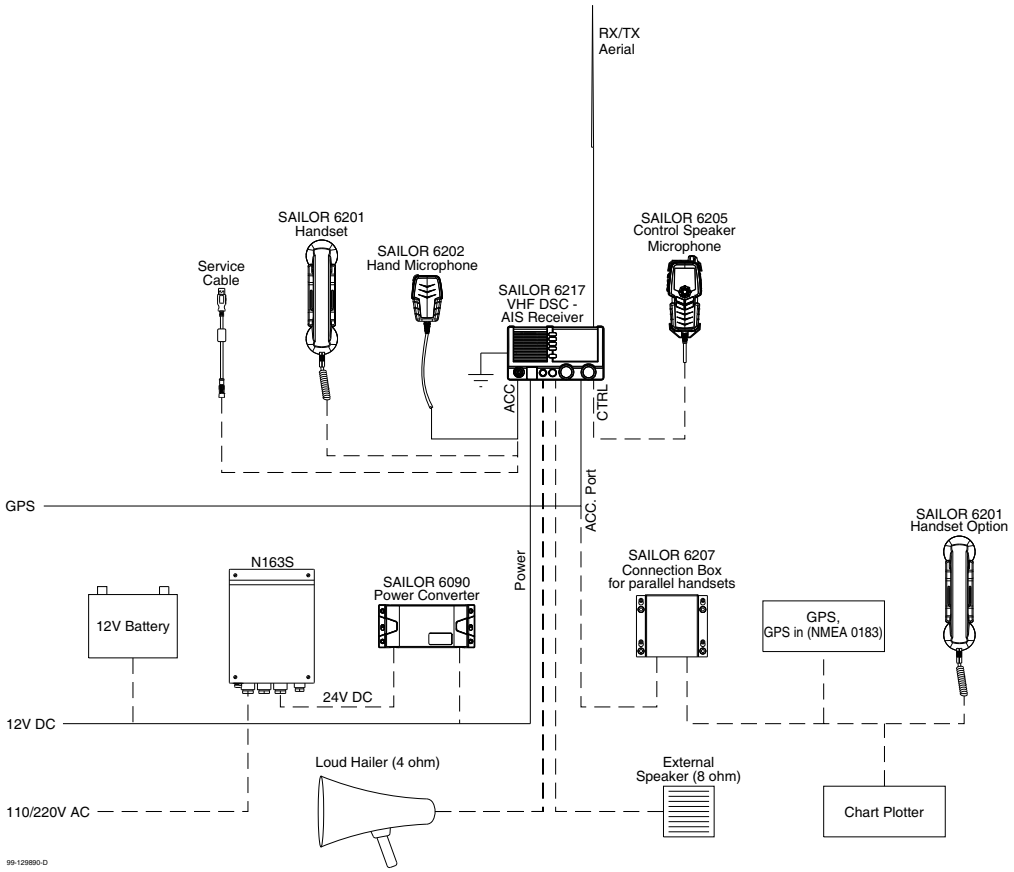


Figure 1-2: System configuration - example

Installation

In this chapter you find information and guidelines for:

- *Unpacking the SAILOR 6217 VHF DSC - AIS Receiver*
- *Installing the VHF radio*
- *Power, VHF antenna and external equipment*

2.1 Unpacking the SAILOR 6217 VHF DSC - AIS Receiver

The following items are included in the delivery of a SAILOR 6217 VHF DSC - AIS Receiver:

- SAILOR 6217 VHF DSC - AIS Receiver
- SAILOR 6202 Handmicrophone with spiral cable
- User and installation manual
- Installation guide
- Mounting bracket with two wheel knobs
- Connectors for cables
- Power cables, fittings and fuses
- Packaging material
- Sun screen (click-on) for front plate protection
- Kit for flush mount installation, including gasket

2.2 Installing the VHF radio

You can mount the VHF radio as a desktop, overhead or flush-mounted unit integrated in the instrument panel.

Provide space enough to access the front panel connectors and for installing a cradle for the speaking device.

Provide **at least 120 mm space at the back** of the SAILOR 6217 VHF DSC - AIS Receiver radio to allow free air circulation.

Compass safe distance

Make sure that the VHF radio is far enough from any magnetic compass to avoid influence of the loudspeaker magnet on the compass reading. See the following table for the safe distance after magnetization between the nearest point of the device and the centre of the compass at which it will produce a deviation of 0.3˚.

Device	Safe distance
SAILOR 6217 VHF DSC - AIS Receiver	1.0 m
SAILOR 6202 Handmicrophone	0.8 m
SAILOR 6090 Power Converter 24 V - 12 V	0,15 m
SAILOR 6207 Connection Box for parallel handsets	0.6 m
SAILOR 6208 Control Unit Connection Box	0.6 m

Table 2-1: Compass safe distance

2.2.1 SAILOR 6217 VHF DSC - AIS Receiver with U mounting bracket

The mounting bracket and two knobs are included in the delivery.

Desktop mounting

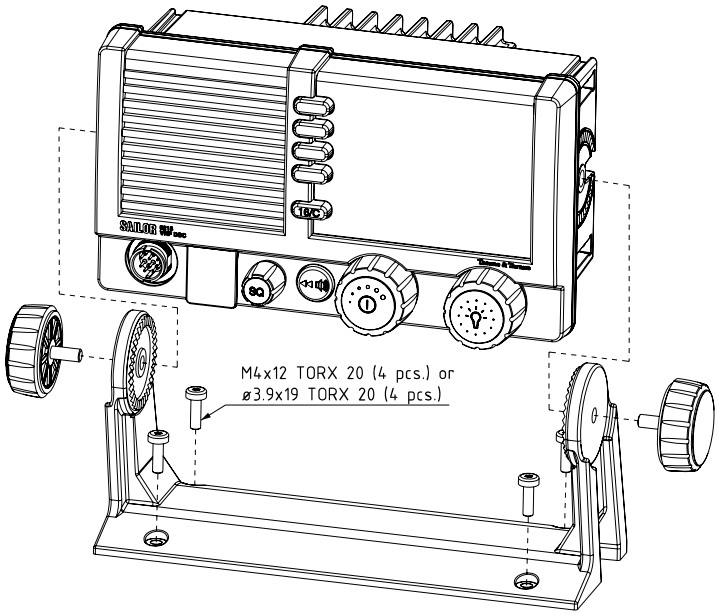


Figure 2-1: Desktop mounting

Overhead mounting

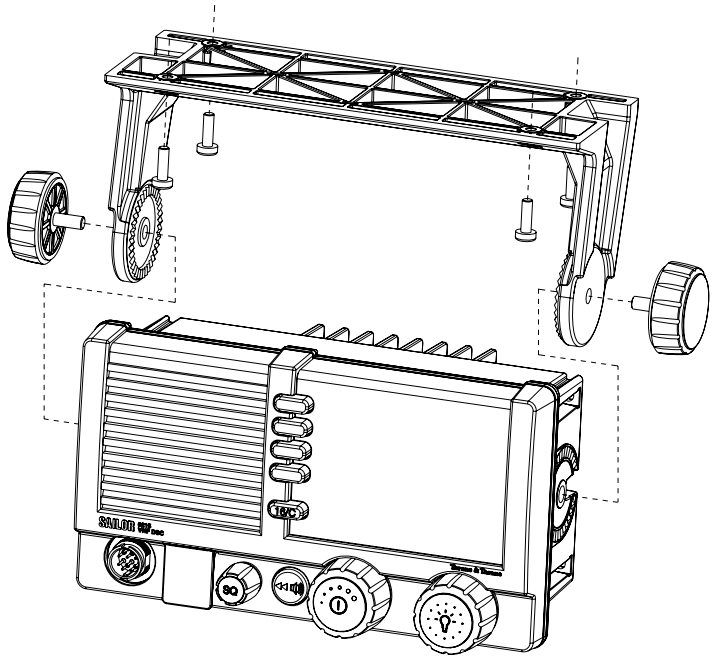
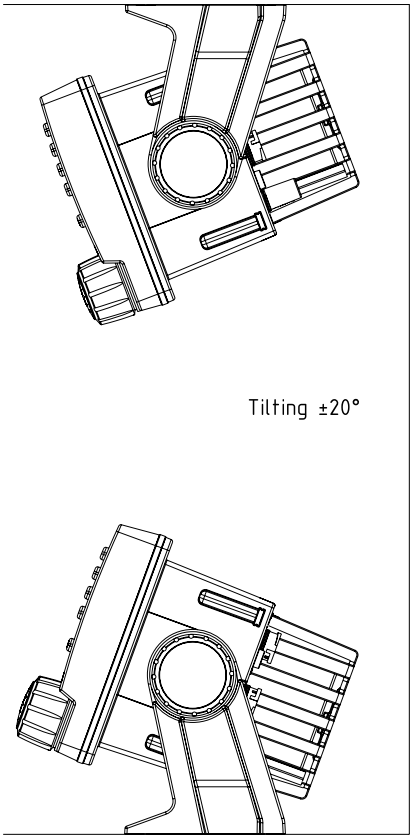


Figure 2-2: Overhead mounting

Mounting with U mounting bracket

To mount the VHF radio as tabletop, do as follows:

1. Find a suitable location for the VHF radio. Check that the space is wide/deep enough to accommodate the VHF radio.
2. Fasten the bracket with 4 screws (included in the delivery.)
3. Insert the VHF radio in the bracket and fasten it with the two knobs.
4. The display of the VHF radio should be at an angle of approximately 90° to your line of sight when operating it.



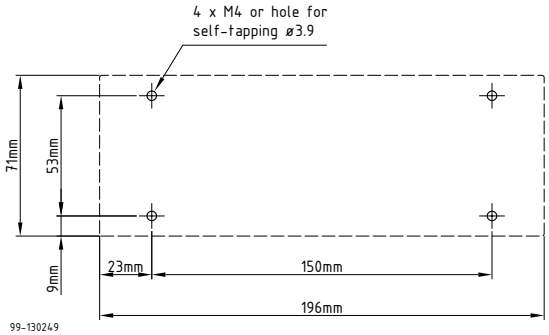


Figure 2-3: Mounting with U mounting bracket

2.2.2 SAILOR 6217 VHF DSC - AIS Receiver for flush mount

You can mount the VHF radio to a flat surface, e.g. an instrument panel.The flush mount installation kit is included in the delivery.

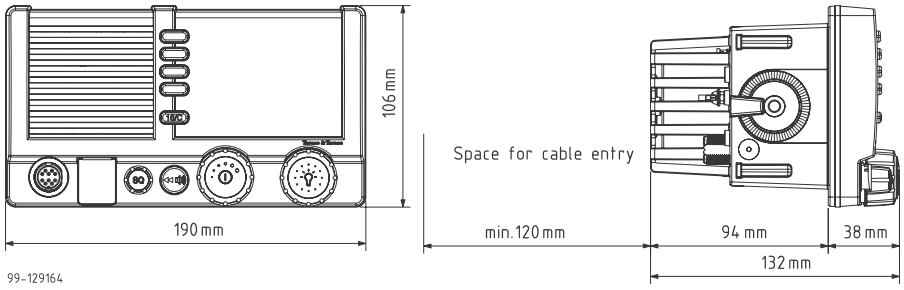


Figure 2-4: Flush mount

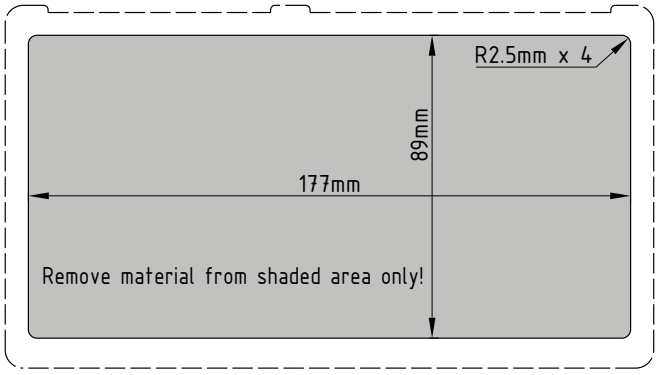


Figure 2-5: Cutout for flush mount

Important **The scaling in the above drawing is not 1:1**. Consequently do not attempt to use a print or copy of this page without checking the dimensions.

1. Find a suitable location for the VHF radio. Check that the space is deep enough to accommodate the VHF radio and an additional min. 120 mm space for cable entry.
2. Keep free distance to allow free air circulation around the VHF radio and to allow sufficient space for access to cables, see the drawing on this page.
3. Cut out the hole for the VHF radio where you want to mount it. Use the cutting template in the installation guide.
4. Mount the 4 square nuts M4 in the cabinet, ensure that they are placed correctly so it is possible to screw in the M4x45 screws.
5. Ensure that the flush mount gasket is placed correctly on the VHF radio.
6. Before mounting the VHF radio be aware that the surface is plane and rigid. If the surface is not plane and/or rigid (stiff) remove the gasket and seal with silicone sealant between the VHF radio and the surface.

7. Slide the VHF radio in the cut-out. Place the flush mount bracket and fasten it with the 4 screws M4x45. Make sure the torque does not exceed 1Nm when fastening the screws.

Note Only use screws supplied with the kit for flush mounting.

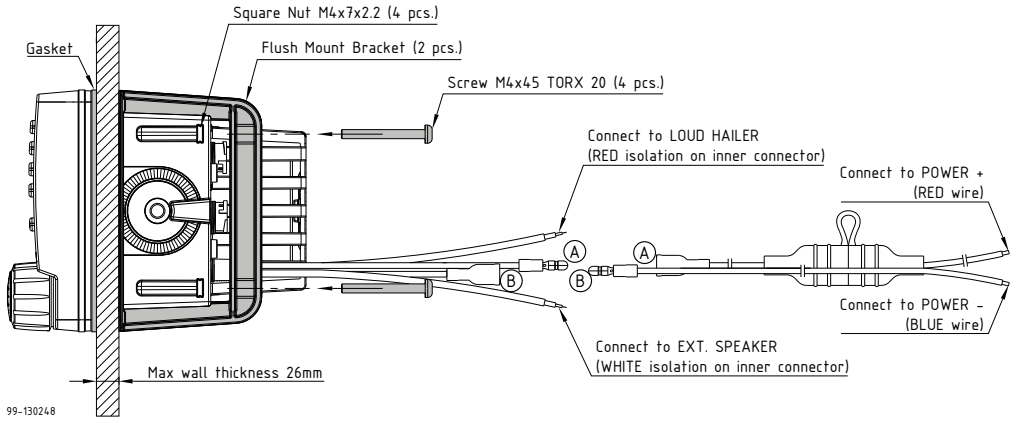


Figure 2-6: Flush mount details

Note Firmly tie back and secure any wires not used to avoid the possibility for mutual shorting or shorting to ground.

2.2.3 SAILOR 6090 Power Converter

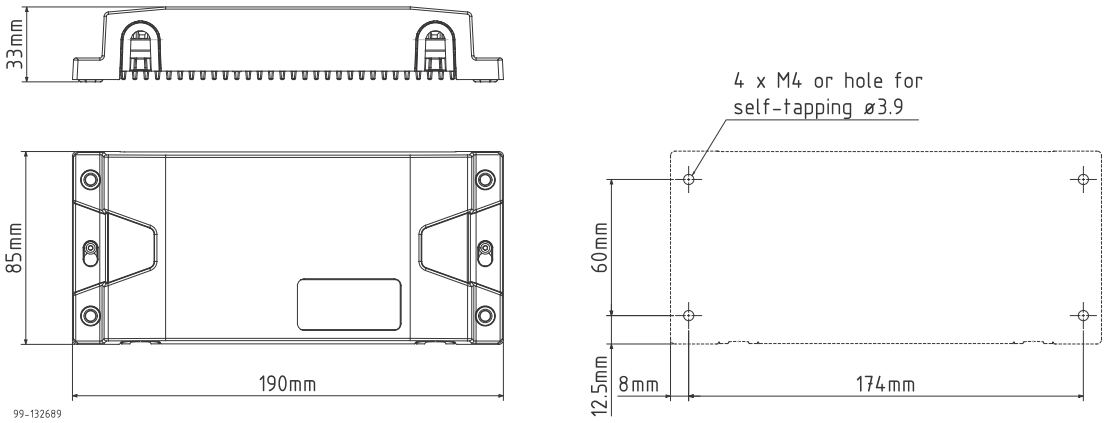


Figure 2-7: SAILOR 6090 Power Converter, dimensions

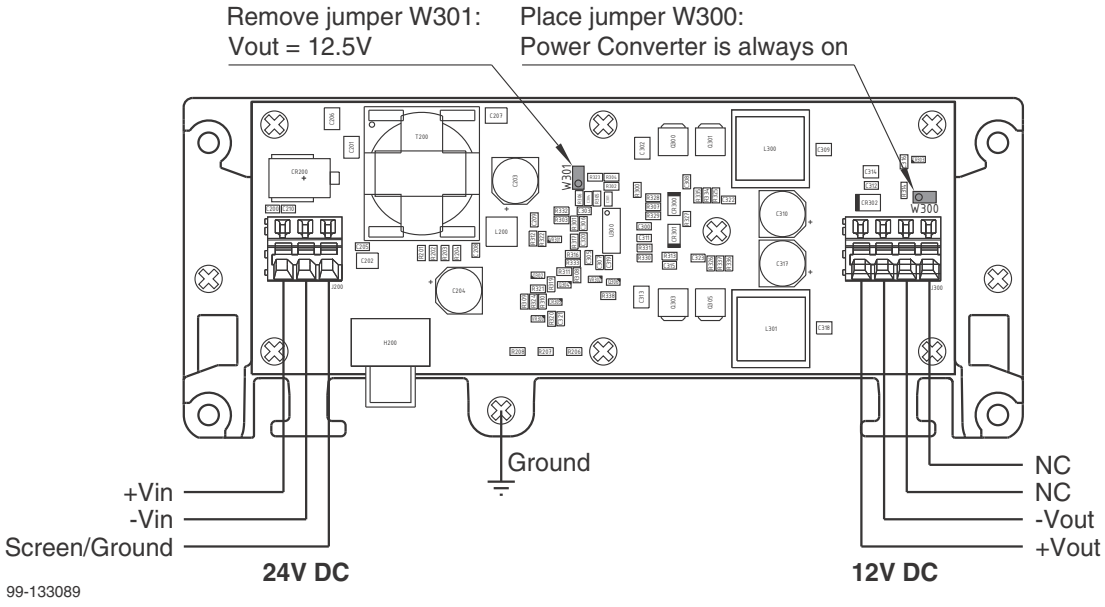


Figure 2-8: Connecting the SAILOR 6090 Power Converter

2.2.4 SAILOR 6202 Handmicrophone

Handmicrophone with spiral cable and PTT button.

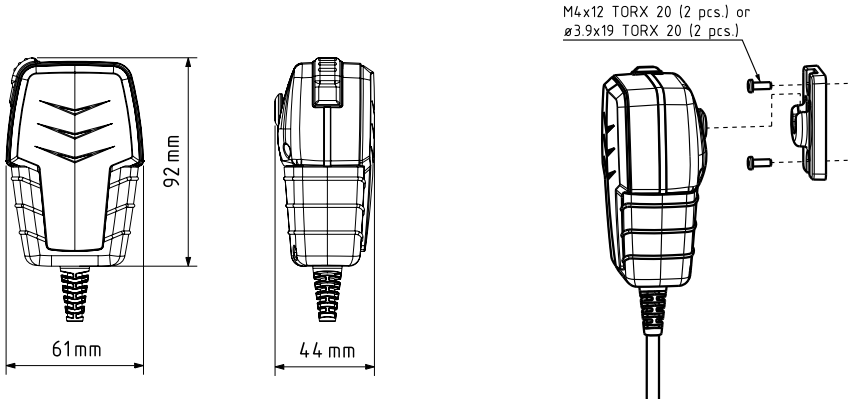


Figure 2-9: Handmicrophone

2.3 Power, VHF antenna and external equipment

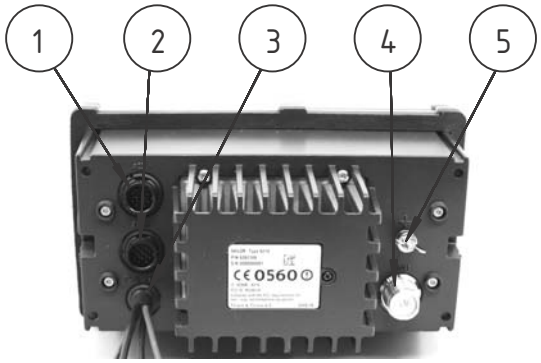


Figure 2-10: Power, VHF antenna and external equipment

1. *ACC connector* for accessories
2. *CTRL connector for control speaker microphone*
3. *Power, Loudhailer, foghorn and external speaker*
4. *VHF antenna*
5. *Ground stud*

2.3.1 ACC connector

Use the connector marked **ACC** to connect GPS input and/or a chart plotter that supports AIS.

The interface for GPS is NMEA 0183 (EN61162-1)/NMEA 0183 (EN61162-2)/ NMEA 0183 Highspeed.

To connect a chart plotter that supports AIS, connect the NMEA output wires from the VHF radio to the NMEA input on the chart plotter.

Note The chart plotter must support NMEA highspeed (38400 baud).

WARNING! Before connecting the VHF radio to a chart plotter, ensure that the power is turned off on both devices.

The AIS receiver is enabled by default. It can be turned off to reduce power consumption. For instructions how to turn it off see *System setup* on page 2-23.

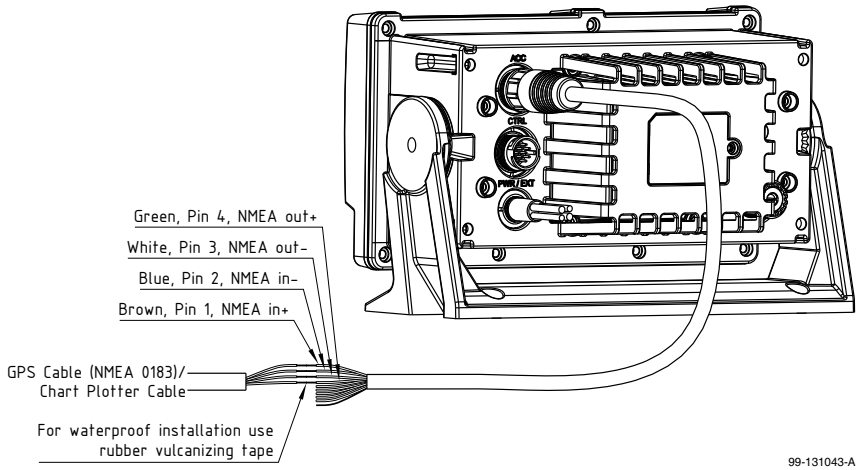
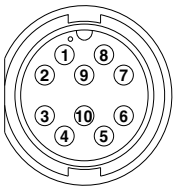


Figure 2-11: ACC connector

Connector type: Circular connector, 10-pin.

Connection cable with plug, part number 406209-941.

Pin assignment: Connector front view on the VHF radio.



Pin	Description	Wire color
1	NMEA in+	Brown
2	NMEA in-	Blue
3	NMEA out-	White
4	NMEA out+	Green

Table 2-2: ACC connector

Pin	Description	Wire color
5	Mike 2	Yellow
6	EAR 2	Grey
7	Hook_PTT	Pink
8	Battery supply when radio is on	Red
9	Internal GND = - Battery	Black
10	Internal GND = - Battery	Orange — SCREEN (Drain)

Table 2-2: ACC connector (Continued)

NMEA interface description

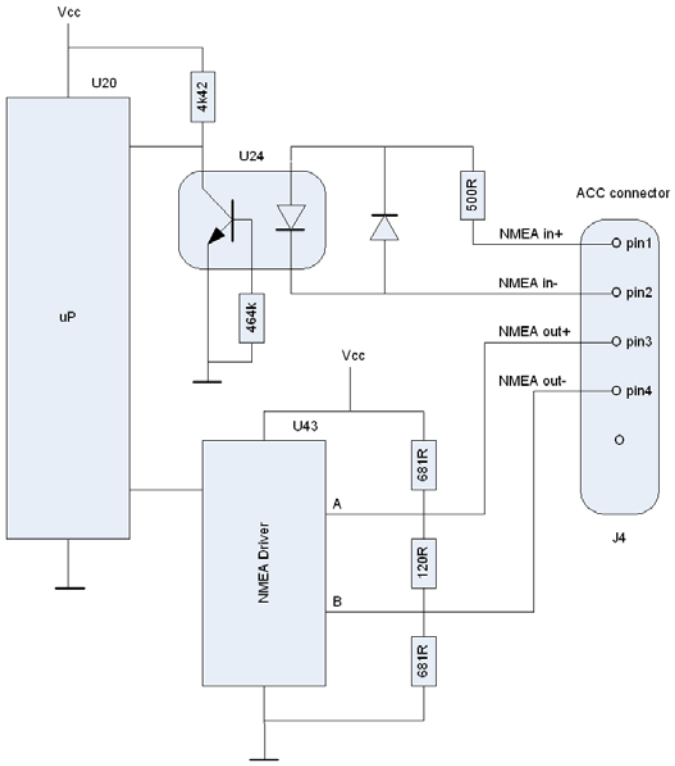


Figure 2-12: NMEA interface description

NMEA interface	Specifications
NMEA input:	Impedance: 600 Ohm Max. 2mA at min. level of 2V
NMEA output	Load Impedance: > 60 Ohm Drive load: < 35 mA

Table 2-3: NMEA interface

The NMEA interface supports NMEA 0183 v2.0, v2.1 and v2.3.

The following sentences are supported:

- FSI: All fields are decoded.
- GGA: UTC, "Position", "quality indicator" (indicators 1-5). All other fields are unused.
- GLL: UTC, "Position", "Status" and "mode" (indicators A and D). All other fields are unused.
- GNS: UTC, "Position" and "mode" (indicators A and D). All other fields are unused.
- RMC: UTC, "Position", "Status", "Date" and "mode" (indicators A and D). All other fields are unused.
- ZDA: UTC, "Day", "Month", and "Year". All other fields are unused.

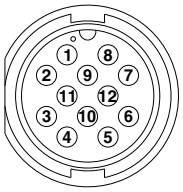
In accordance with the standard EN61162-1 (Ed. 3) and EN61162-2:1998.

Received NMEA sentences except for FSI can be forwarded to NMEA output. As talker the sentences are streamed when received (with no intervals).
SW revision: 2.00.01

2.3.2 CTRL connector for control speaker microphone

Connector type: Circular connector, 12-pin.

Pin assignment: Connector front view on the VHF radio:



Pin	Description
1	GND for cable screen
2	Internal GND=- Battery
3	Battery supply when radio is on
4	Battery supply when radio is on
5	CAN+
6	CAN-
7	Internal GND = - Battery
8	On/off from Control Speaker Microphone
9	RX out +
10	RX out -
11	TX in +
12	TX in -

Table 2-4: CTRL connector for control speaker microphone

2.3.3 Power, Loudhailer, foghorn and external speaker

Use the connector marked **PWR/EXT** to connect power, loudhailer and an external speaker. The cable for this connector is part of the delivery.

1. Blue wire: Power -
2. Red isolation on inner connector: loudhailer
3. White isolation on inner connector: external speaker
4. Red wire: Power +

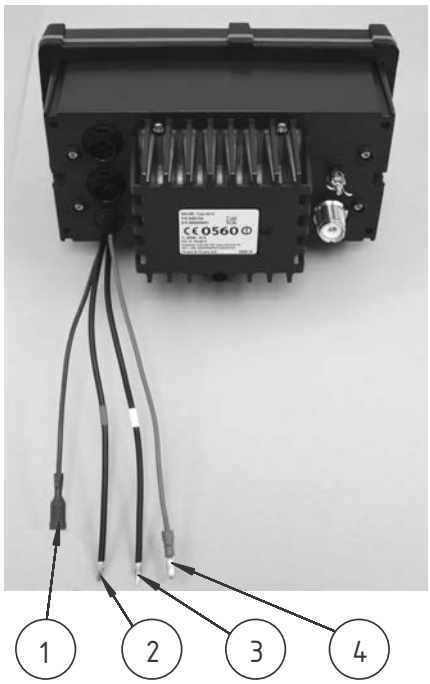


Figure 2-13: Power, loudhailer, foghorn and external speaker

Protection against water ingress

Important

You must protect the cable connection with rubber vulcanizing tape as shown in the pictures below. This protection prevents water seeping into the VHF radio, cable and connectors.

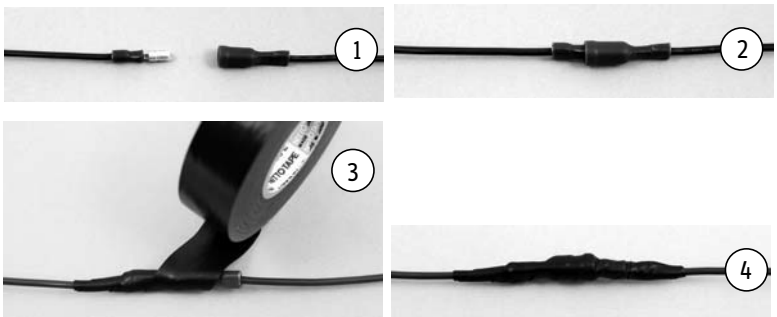


Figure 2-14: Protection against water ingress

2.3.4 VHF antenna

Use the connector marked **ANT** to connect the VHF antenna to the radio with a 50 Ohm coaxial cable with low loss, e.g. RG214. Install a PL259 plug at the cable end.

Place the antenna as high and clear of obstructions as possible. Make sure that the horizontal distance to metal parts is minimum 1.5 m (5 ft).

Connector type: female SO239 for PL259 plug.

2.3.5 Ground stud

To ground the radio connect a ground wire from the ground stud of the radio to a suitable grounding point. Use an appropriately sized wire. The ground stud is located above the VHF antenna connector.

Figure 2-15: Ground stud

2.4 VHF and DSC antenna installation

The SAILOR 6217 VHF DSC - AIS Receiver is be installed with only one antenna for VHF RX/TX and DSC. You can install all commonly available 50 Ohm antennas covering the appropriate frequency range and providing a VSWR less than 1.5 over this range.

If further details are required on equipment and antenna installation, you may see IMO COMSAR/Circ. 32, GUIDELINES FOR THE HARMONIZATION OF GMDSS REQUIREMENTS FOR RADIO INSTALLATIONS ON BOARD SOLAS SHIPS as a guide.

2.4.1 Cable requirements

Connect the antenna using a low loss type 50 Ohm coaxial cable, e.g. good quality RG214 or better. It is recommended to use a double screened type cable (like e.g. RG214) with a maximum insertion loss of 3dB across the antenna cable installation.

The maximum antenna cable length in the installation depends on the quality of the cable, i.e. the specified attenuation (dB/m) of the cable of choice at the high end of the VHF frequency band. As a rule of thumb the cable length using e.g. RG214 coaxial cable should not exceed 25 m.

2.4.2 VHF RX/TX antenna

In installations with two or more VHF radios it is important to ensure the optimum performance of these by carefully selecting the antenna positions for both radios. It is recommended to maximize the RF attenuation between the VHF RX/TX antennas in the installation. You can ensure this by not having the RX/TX antennas positioned at the same horizontal level, i.e. the RX/TX antennas for each radio must be installed at shifted elevations as shown in the following drawing.

If sufficient vertical distance between two or more such antennas cannot be achieved, the horizontal distance between them is increasingly important for optimum performance. If there is hardly any vertical separation ensure that there is a minimum of 5 m horizontal distance between any RX/TX antennas in the installation.

To minimize any increase in VSWR of the VHF RX/TX antenna, install the antenna at a vertical distance of at least 2 m to any other mast, pole or other RF antennas. Keep VHF antennas as far away as possible from antenna main beam of any radar and satellite equipment.

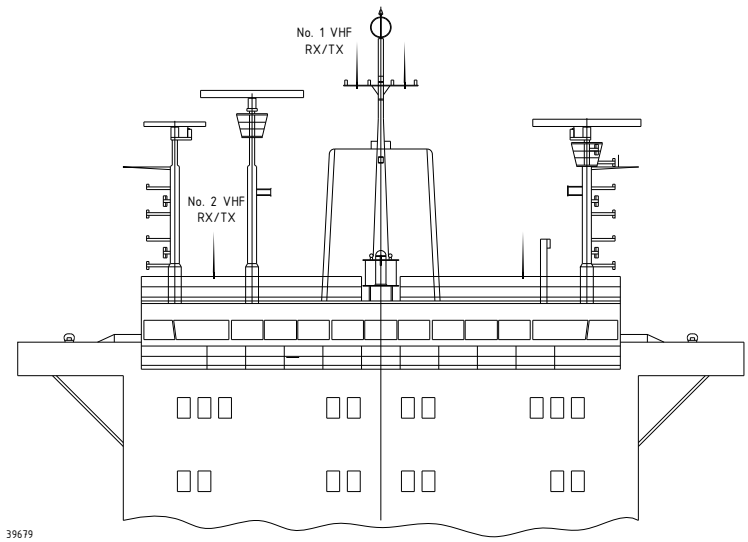


Figure 2-16: Antenna positioning

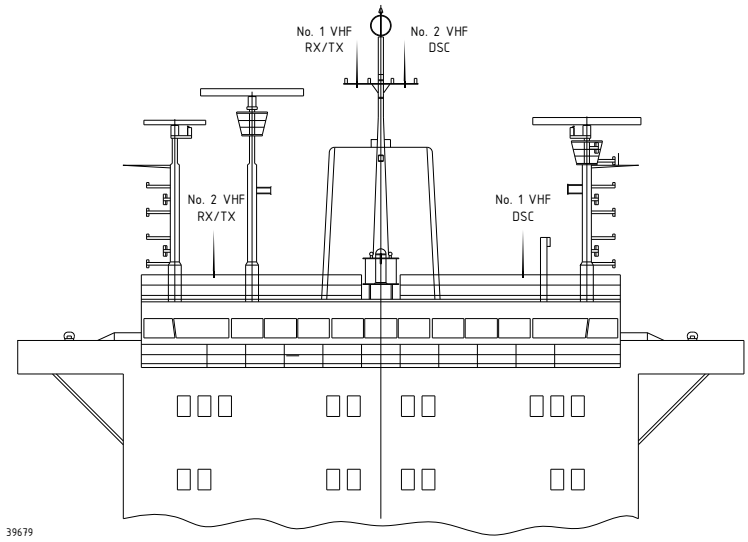


Figure 2-17: Antenna positioning 1/2

2.5 System setup

To change a setting in the **SYSTEM SETUP**, do as follows:

1. Press the soft key **SETUP**. If it is not in the display, press the soft key **MORE** until **SETUP** appears.
2. Press the arrow soft key → or ← to advance to **SYSTEM SETUP**.
3. Turn the selector wheel knob to go to a setting, then press the selector wheel knob to change the setting.
4. Press **EXIT** to return to normal radio operation

SYSTEM SETUP	Description
Inactivity timeout	Inactivity time-out to exit functions (e.g. in setup) and return to the application. Range: 1 to 30 minutes, in 1 minute steps Default: 10 min.
NMEA input (baud rate)	4800
Factory Defaults	Resets the radio to factory defaults.
SW version	Software version of the radio
S/N	Serial number of the radio
Password	If you need to change the identity of the radio (MMSI number or ATIS code), contact your local dealer.
AIS	Switches AIS on (default) or off.

Table 2-5: System setup

2.6 SAILOR 6201 Handset cradle (optional)

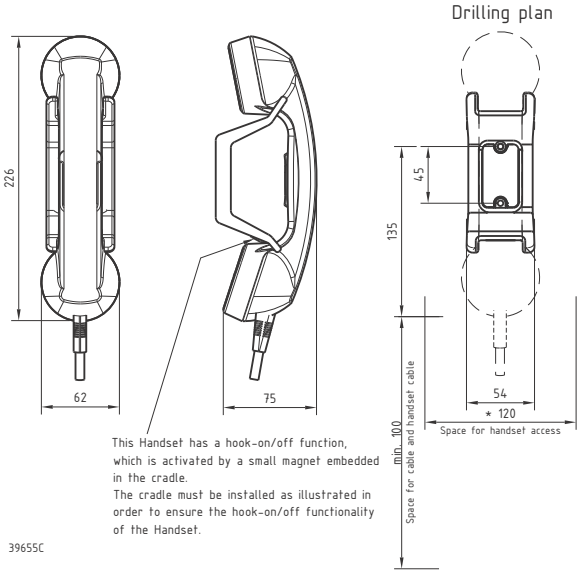


Figure 2-18: Handset.

2.7 Accessories

2.7.1 Part numbers for accessories

The following accessories are available for the SAILOR 6217 VHF DSC - AIS Receiver:

Part number	Accessories available
406201A-00500	SAILOR 6201 Handset with cradle (additional)
406202A-00500	SAILOR 6202 Hand Microphone
406203A-00500	SAILOR 6203 Handset Waterproof
406205A-00500	SAILOR 6205 Control Speaker Microphone
406207A	SAILOR 6207 Connection Box with Cable 406209-941
406208A	SAILOR 6208 Connection Box with Cable 406208-941
406209-940	Connection Cable for bulkhead mount, 5 m, 1-x10 pole
406209-941	Connection Cable, 5 m, 1x10 pole
406204-940	Cable for SAILOR 6204/6205 Control Speaker Microphone
406270A	SAILOR 6270 External loudspeaker
406090A-00500	SAILOR 6090 Power Converter 24 V — 12 V

Table 2-6: Part numbers for accessories

2.7.2 Connection box SAILOR 6207

The **SAILOR 6207 Connection Box** is used to connect GPS (NMEA), GPS/AIS DSC modem and further SAILOR 6201 Handsets. For wiring and cabling details see *System configuration examples* on page B-1 .

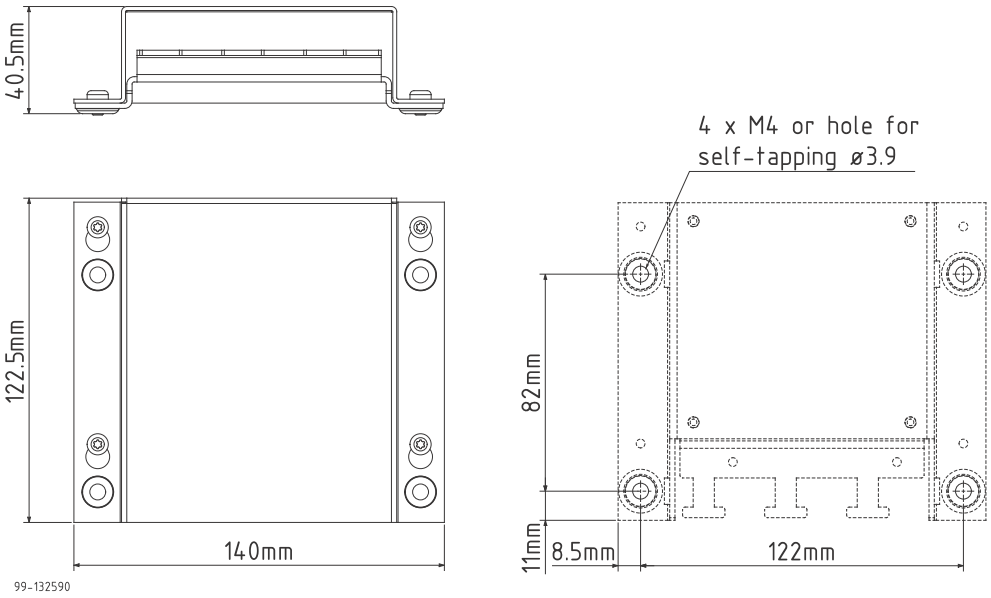
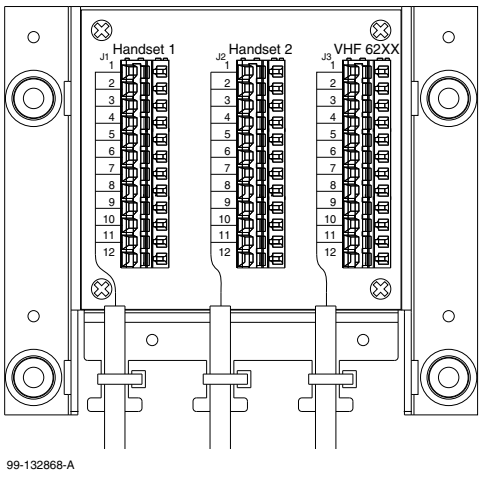


Figure 2-19: SAILOR 6207 Connection Box for parallel handsets, mounting



Description	Pin	Wire color
NMEA in+	1	Brown
NMEA in-	2	Blue
NMEA HS in-	3	White
NMEA HS in+	4	Green
Mike 2 / Line in	5	Yellow
Ear 2 / Line out	6	Grey
Hook_PTT	7	Pink
Bat_SW Supply voltage when on	8	Red
Internal GND = - Battery	9	Black
Internal GND = - Battery	10	Orange
Internal GND = - Battery	11	SCREEN (Drain)
	12	NC

Cable part no. 406209-941

To ensure galvanic separation of battery supply from ship's ground, the cable screens of the ACC cables MUST not touch any part of the metallic parts of the SAILOR 6207 Connection Box. Connect the screens only to the pins at the terminals.

Figure 2-20: Connection Box for parallel handsets, wiring

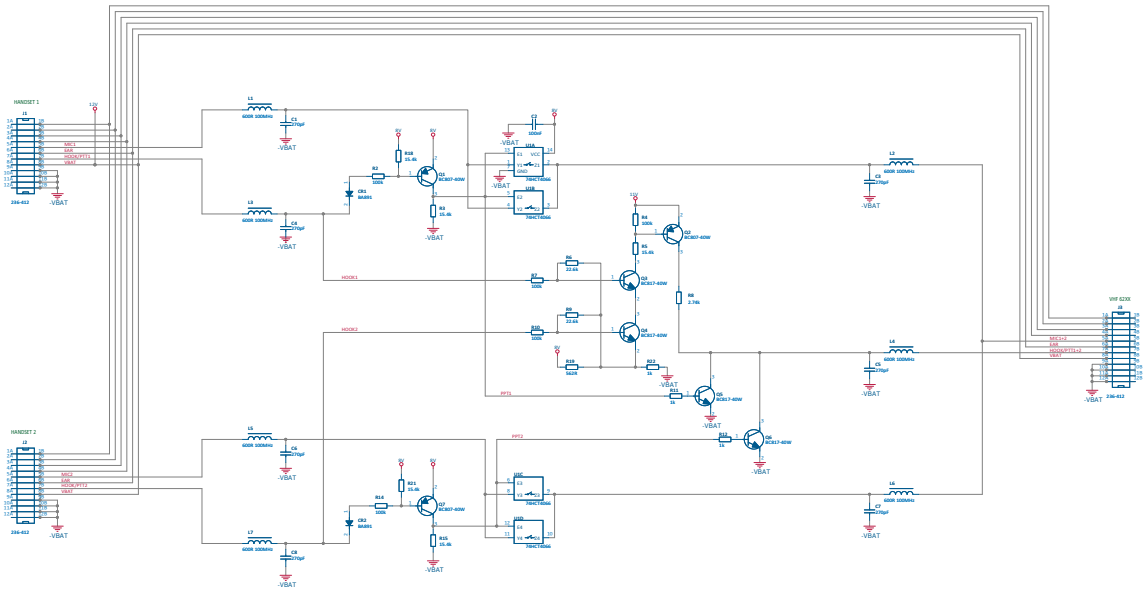


Figure 2-21: SAILOR 6207 Connection Box for parallel handsets, diagram

2.7.3 Connection box SAILOR 6208

The **SAILOR 6208 Connection Box** is used to connect SAILOR 6205 Control Speaker microphones and other auxiliary equipment. For wiring and cabling details see *System configuration examples* on page B-1.

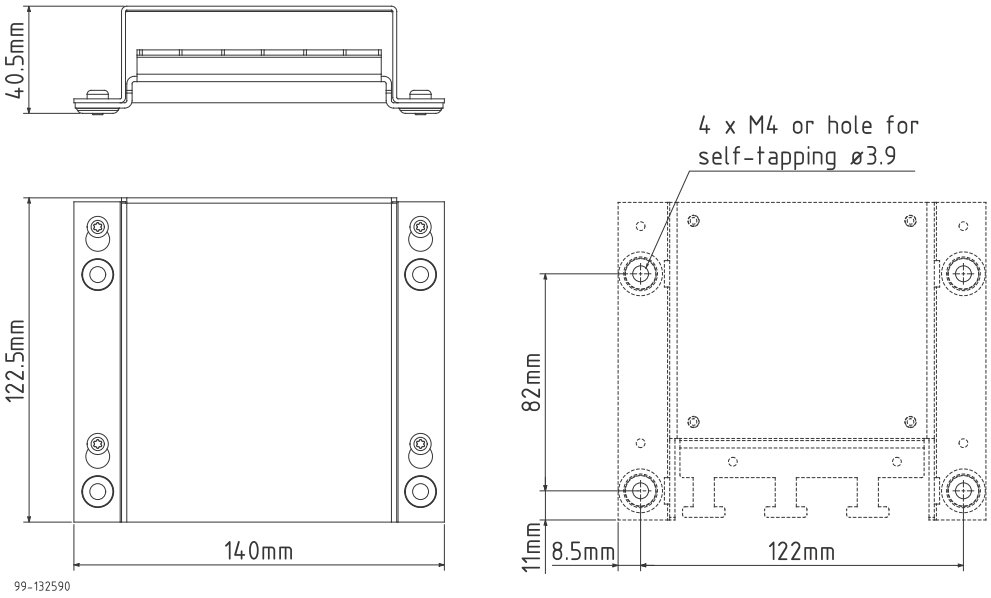


Figure 2-22: SAILOR 6208 Control Unit Connection Box, mounting

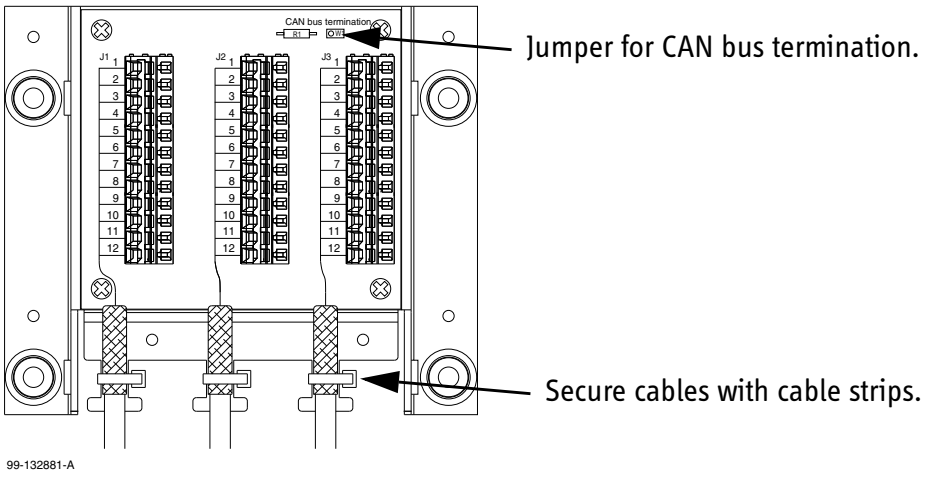


Figure 2-23: SAILOR 6208 Control Unit Connection Box for parallel handsets, wiring

Terminate the last SAILOR 6208 on the CAN bus (furthest away from the transceiver).

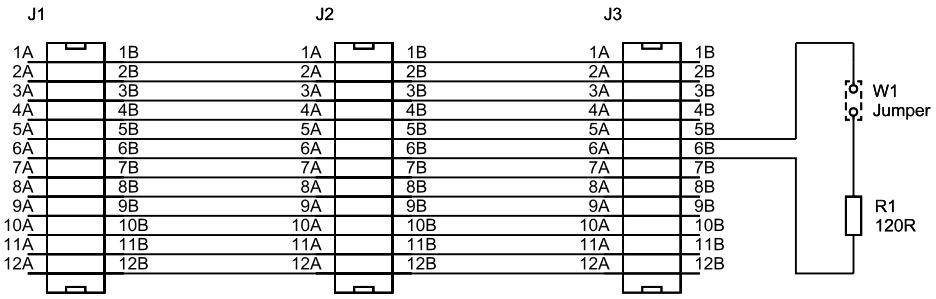


Figure 2-24: SAILOR 6208 Control Unit Connection Box, diagram

First-time power up

3.1 General use and navigation

3.1.1 Power on and speaker volume

The VHF radio has a dual-function on/off wheel knob for power on/off and volume control.

- To power on the VHF radio press the on/off wheel knob.
- To power off the VHF radio, press and hold the on/off wheel knob and follow the instructions in the display.
- To adjust the speaker volume, turn the volume wheel knob (clockwise = louder, counter clockwise = softer, until muted). When adjusted to the muted level is shown in the display.

3.1.2 Working channel, settings and dim function

The selector wheel knob has several functions:

- To select the **working channel**, turn the selector wheel knob.
- To browse and select **settings**, turn the selector wheel knob and press for accept.
- To **dim the backlight** in the display until it is appropriate for the current situation, i.e. to give comfortable night vision, press, hold and turn the selector wheel knob (clockwise= more light).

3.2 Entering the MMSI number

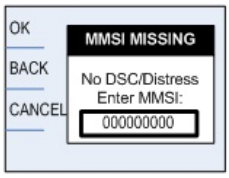
When the VHF radio is powered on for the first time, you must enter the vessel's MMSI number. Hereafter the MMSI number is briefly displayed after power up. The MMSI is a unique, 9-digit identifier assigned to your ship.

Important

CAUTION! Without a programmed MMSI number the Distress button will not work!

Entering the MMSI number

When being prompted after power up enter the MMSI number as described below:

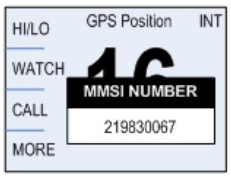


1. Enter the 9 digits one by one by turning the selector wheel knob to the desired digit, press the selector wheel knob to accept the digit and advance to the next digit.
   To delete the previous digit press the soft key **BACK**.
2. Press the soft key **OK** to confirm the entered MMSI number.
3. To leave without saving, press the soft key **CANCEL**.

Note

The MMSI number can be programmed by the operator once. If a wrong number has been entered and stored, or if there is a requirement to change it, contact your authorized dealer.

Once programmed, you can see the MMSI number in the service line directly after start-up. The DSC functionality is operational at any time.



The message **NO DSC (NO MMSI)** is shown in the action line if the MMSI is not programmed.

3.2.1 Changing the MMSI number

If you need to change the MMSI number of the SAILOR 6217 VHF DSC - AIS Receiver use the built-in service tool and a connected PC, or reset the MMSI number from the Setup menu of the radio. The manuals for the service tool and the user manual for the radio can be downloaded from www.cobham.com/satcom.

Service & maintenance

4.1 Contact for support

Contact your authorized dealer for technical service and support of the VHF radio. Before contacting your authorized dealer you can go through the troubleshooting guide to solve some of the most common operational problems.

4.2 Maintenance

4.2.1 Preventive maintenance

Maintenance of the SAILOR 6217 VHF DSC - AIS Receiver can be reduced to a maintenance check at each visit of the service staff. Inspect the radio for mechanical damages, salt deposits, corrosion and any foreign material. Due to its robust construction and ruggedness the radio has a long lifetime. Anyway it must carefully be checked at intervals not longer than 12 months - dependent on the current working conditions.

Salt deposits

In case the equipment has been exposed to sea water there is a risk of salt crystallization on the keys and wheel knobs and they may become inoperable. Clean the VHF radio and speaker microphones with fresh water.

4.2.2 Error messages and warnings

Errors and warning messages are shown in the display and are read-only.

4.2.3 Troubleshooting guide

Action	Symptom	Remedy
The radio will not turn on	The display is empty.	Check if power is present. Check fuse which is placed in the + supply wire. Check performance of power supply if connected to one.
No communication	The loudspeaker is mute.	Check the antenna installation. Check antenna cable. Check handset/Handmicrophone and cable.
Handset configuration	No sound in earpiece	The earpiece volume may be configured to OFF. See section *Controller setup* on page 2-10 on how to adjust the earpiece volume of the handset.

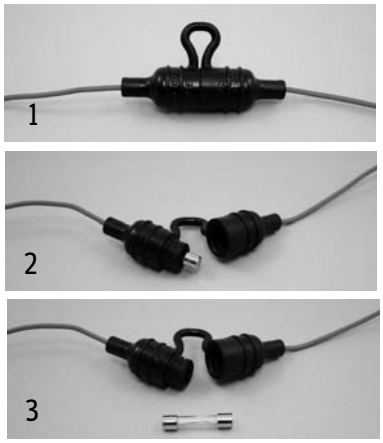
Table 4-1: Troubleshooting guide

Action	Symptom	Remedy
Device failure		If any of the checks and tests described in this section do not assist in resolving the difficulties experienced in the operation and/or performance of the VHF installation, a fault may have developed in the VHF radio itself. When contacting an authorized Thrane & Thrane representative be sure to provide as much information as possible describing the observed behavior - also including the type of the VHF radio, its serial number, and software release version (both found in the setup menu Controller Setup).

Table 4-1: Troubleshooting guide (Continued)

4.2.4 Replacing the fuse in the red wire (Power +)

One fuse is installed in the supplied DC cable. If the fuse is blown, track down why the fuse was blown and solve the problem. To replace the fuse, do as follows:



1. Hold both ends of the fuse holder and pull it apart.
2. Take out the old fuse.
3. Insert the new fuse. The fuse rating is 10 A T.
4. Make sure that the fuse is tightly fixed on the metal contact inside the fuse holder.
5. Put together the fuse holder.

4.2.5 Replacing the fuse in the SAILOR 6090 Power Converter

One fuse is installed in the SAILOR 6090 Power Converter. If the fuse is blown, do as follows:

1. Track down why the fuse was blown and solve the problem.
2. Take out the old fuse.
3. Insert the new fuse. The fuse rating is 10 A T.

Figure 4-1: Fuse in the SAILOR 6090 Power Converter

4.3 Returning units for repair

Should your Cobham SATCOM product fail, please contact your dealer or installer, or the nearest Cobham SATCOM partner. You will find the partner details on www.cobham.com/satcom where you also find the Cobham SATCOM Self Service Center web-portal, which may help you solve the problem. Your dealer, installer or Cobham SATCOM partner will assist you whether the need is user training, technical support, arranging on-site repair or sending the product for repair. Your dealer, installer or Cobham SATCOM partner will also take care of any warranty issue.

4.3.1 Repacking for shipment

Should you need to send the product for repair, please read the below information before packing the product.

The shipping carton has been carefully designed to protect the SAILOR 6217 VHF DSC - AIS Receiver and its accessories during shipment. This carton and its associated packing material should be used when repacking for shipment. Attach a tag indicating the type of service required, return address, part number and full serial number. Mark the carton FRAGILE to ensure careful handling.

Note Correct shipment is the customer's own responsibility.

If the original shipping carton is not available, the following general instructions should be used for repacking with commercially available material.

1. Wrap the defective unit in heavy paper or plastic. Attach a tag indicating the type of service required, return address, part number and full serial number.
2. Use a strong shipping container, e.g. a double walled carton.
3. Protect the front- and rear panel with cardboard and insert a layer of shock-absorbing material between all surfaces of the equipment and the sides of the container.
4. Seal the shipping container securely.
5. Mark the shipping container FRAGILE to ensure careful handling.

Failure to do so may invalidate the warranty.

Technical specifications

A.1 SAILOR 6217 VHF DSC - AIS Receiver

Item	Specification
Weight SAILOR 6217 VHF DSC - AIS Receiver	approx. 1.2 kg, 2.65 lbs
Weight SAILOR 6217 VHF DSC - AIS Receiver and Handmicrophone	approx. 1,5 kg 3,31 lbs including SAILOR 6202 Handmicrophone and mounting bracket
Dimensions	**Height**: Outer dimension 106 mm, hole height for flush mount 89 mm **Width**: Outer dimension 190 mm, hole width for flush mount 177 mm **Depth**: Outer dimension from front of wheel knobs 132 mm, depth for flush mount 94 mm
Operating temperature	-15˚C to 55˚C
Storage temperature	-30˚C to 80˚C
Power supply	12 VDC Nominal (10,8– 15,6 VDC)
Current consumption	Max. 7 A
Frequency range	TX 156,000-161,450, RX 156,000-163.425 MHz
Channel spacing	12,5 kHz and 25 kHz, all international maritime channels
Number of P channels	The radio may be programmed with up to 40 private channels that can be managed in all channel modes.
Transmit power	Hi/Lo: 25 W and <1 W
RF output power	25 W +0 dB / - 1.5 dB 1 W +0 dB / - 1.5 dB
Modulation 25 kHz 12.5 kHz	 16K0G3E, 16KOG2B (DSC) 8K05G3E
LF power	Built-in loudspeaker: 6 W External loudspeaker: 6 W / 8 Ohm Loudhailer: 30 W / 4 Ohm (when the unit is not transmitting)

Table A-1: Technical specifications

Item	Specification
Receiver sensitivity	< -119 dBm typically @ 20 dB SINAD CCITT weighted
AIS receiver	< -112 dBm typically. Dual simultaneous reception and demodulation (in compliance with AIS Class B reception only).
Antenna	50 Ohm antenna, 50 Ohm female SO239 for PL259 plug 1-antenna operation for VHF, AIS and DSC communication
Water ingress	IPx8 and IPx6 all over. For flush-mount installations a sealing gasket is included in the delivery.

Table A-1: Technical specifications (Continued)

A.2 NMEA data rates and formats

Item	Value
61162-1	4800,8,n,1 (in/out)
61162-2	38400,8,n,1 (out only)
Sentence format	!AIVDM

Table A-2: NMEA data rates and formats

System configurations

This appendix lists selected examples of system configurations.

For an overview and specifications of the cables needed see

Note For installation of the connection boxes see *Connection box SAILOR 6207* on page 2-26 and *Connection box SAILOR 6208* on page 2-28

B.1 System configuration examples

The following list shows system configurations, with handset, connection boxes and cable information

1. *How to install a SAILOR 6205 CSM far from the VHF radio*
2. *How to install a SAILOR 6205 close to the VHF radio*
3. *How to install a SAILOR 6205 very close to the VHF radio*
4. *How to install an AIS chart plotter to 6217*

B.1.1 How to install a SAILOR 6205 CSM far from the VHF radio

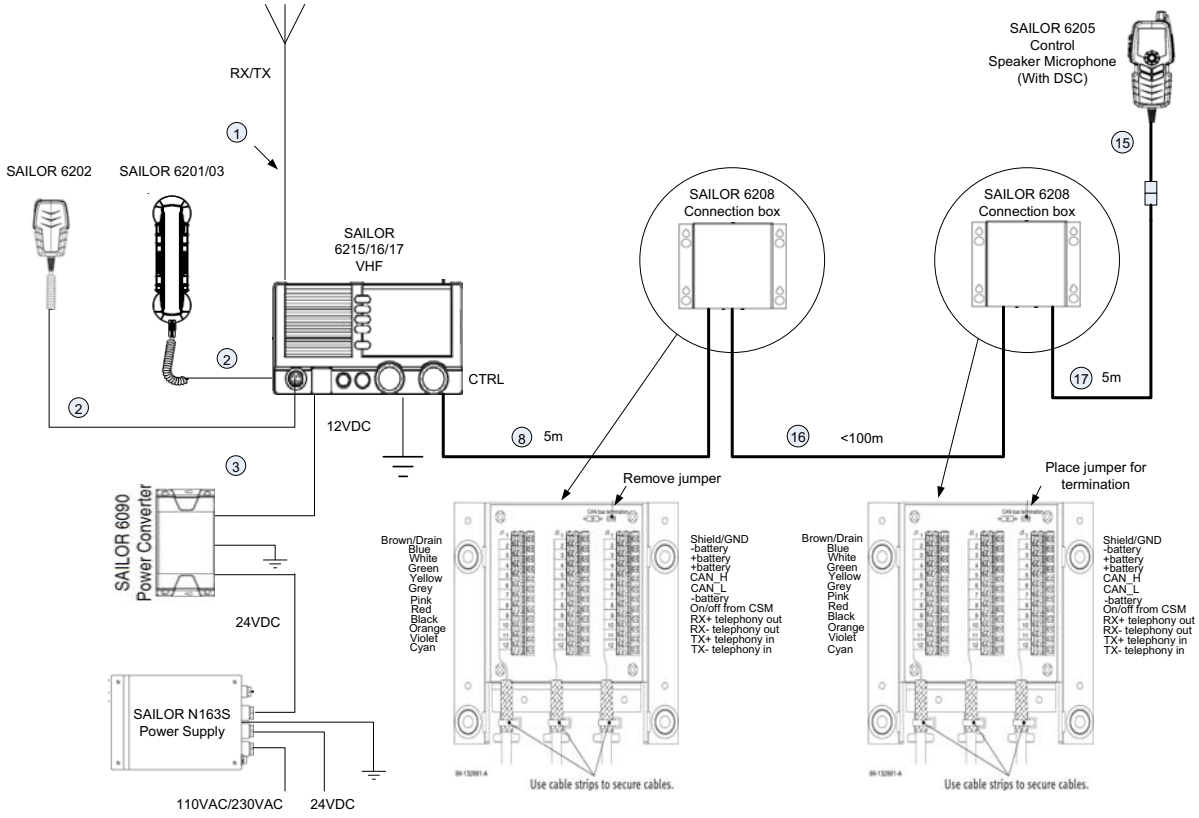


Figure B-1: How to install a SAILOR 6205 CSM far from the VHF radio

B.1.2 How to install a SAILOR 6205 close to the VHF radio

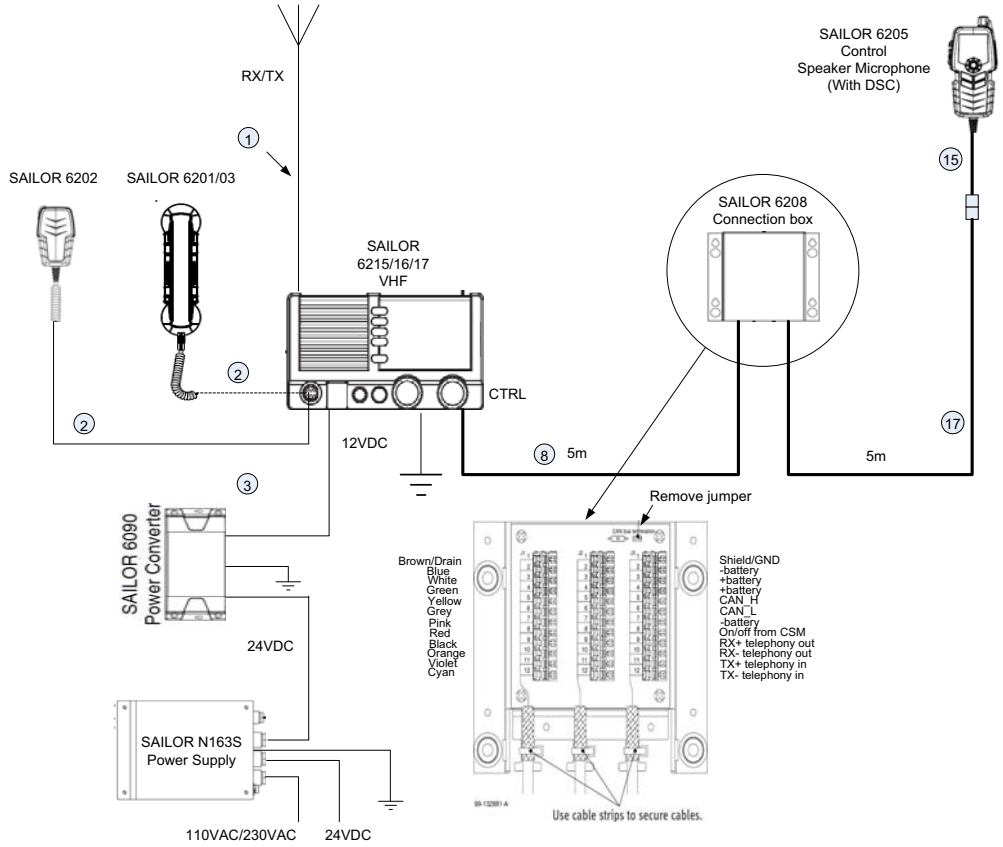


Figure B-2: How to install a SAILOR 6205 close to the VHF radio

B.1.3 How to install a SAILOR 6205 very close to the VHF radio

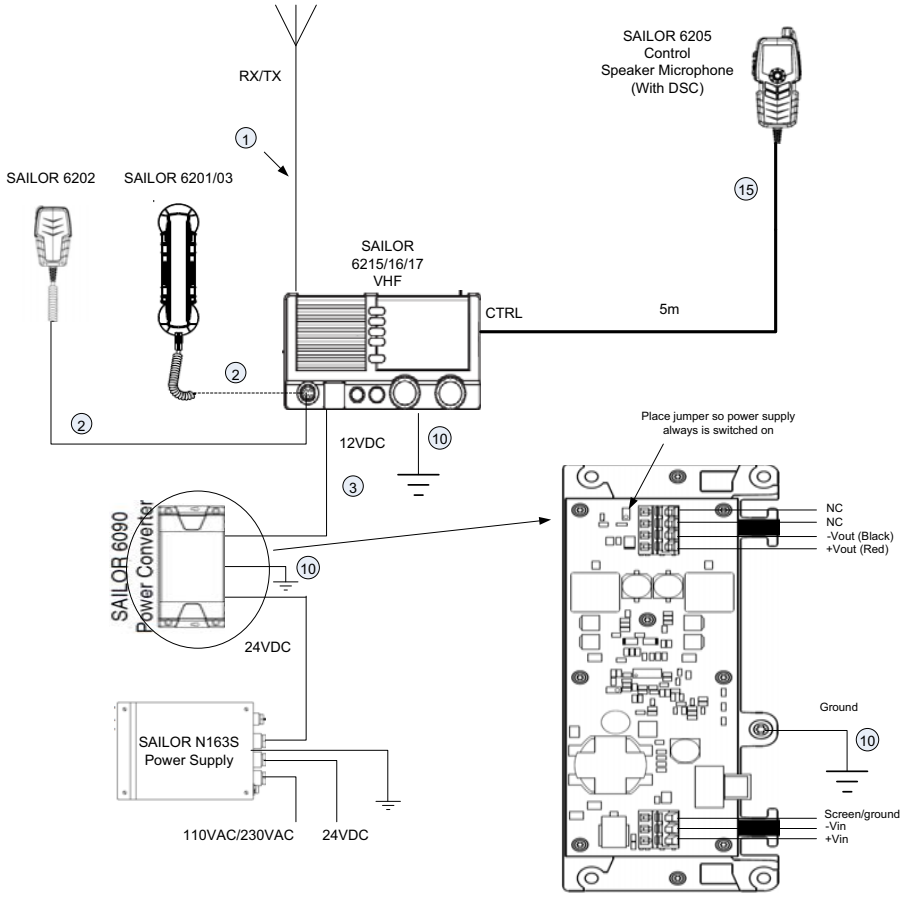


Figure B-3: How to install a SAILOR 6205 very close to the VHF radio

B.1.4 How to install an AIS chart plotter to 6217

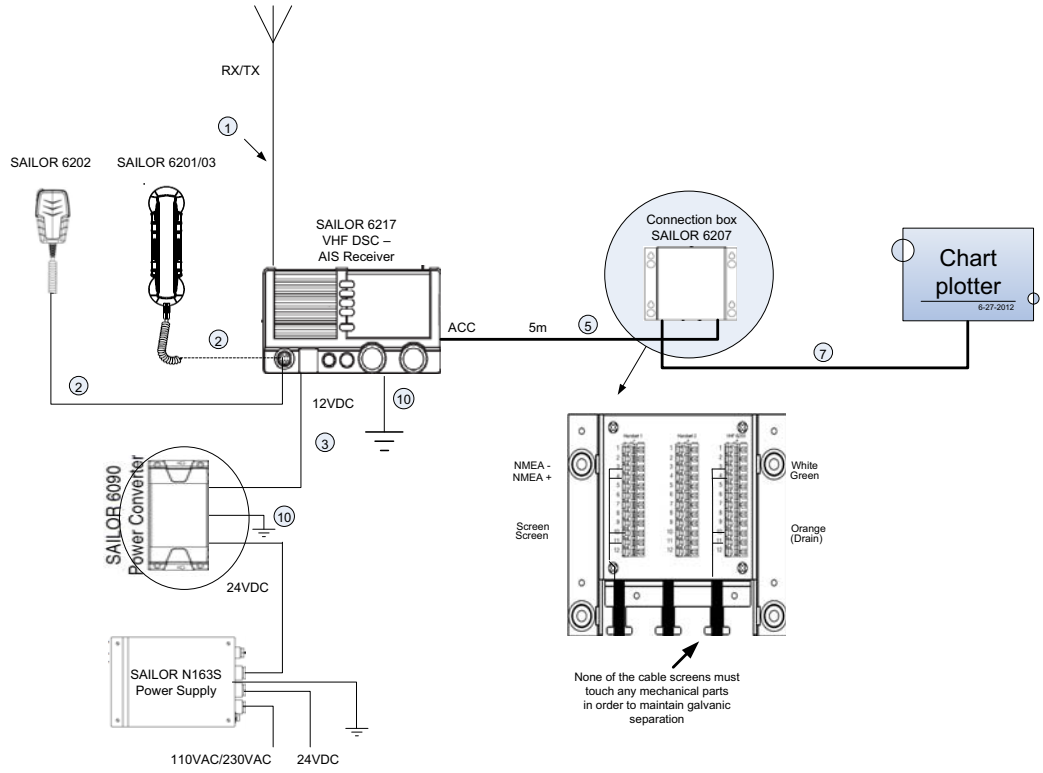


Figure B-4: How to install an AIS chart plotter

B.2 Cable requirements

The following cable information relates to the cable numbers in the system configuration drawings on the previous pages.

Cable	Part number	Description	Specification	Remarks
1		Antenna cable	RG214 or better	
2		Handset cable	1 m, spiraled	Part of handset
3		Power cable	1.5 m power cable	Included in 406217A
5	406209-941	5 m cable for Connection box	10-pole LTW cable with screen	Included in Connection Box 406207A
7			2 pole screened cable for NMEA	
8	406208-941	5 m cable for SAILOR 6208 Connection box	12-pole LTW cable with screen	Included in Connection box 406208A
10		0.3 m	Earth connection	
15		Cable for SAILOR 6205 Control Speaker Microphone	2.5 m, spiraled	Part of handset
16		Cable for CAN	Screened with twisted pairs, length and size see cable description for *Cable 16* on page B-46.	Extension cable for CAN bus, see also under cable description for *Cable 16* on page B-46.
17	406204-940	As cable (12). Plug for CTRL is removed and wires connected to connection box	12-pole LTW cable with screen	Extension cable with LTW bulk mount plug

Table B-1: Cable overview

Cable 1

Cable type: Coax cable RG 214 or better.

Cable 2 (Handset, cable included)

SAILOR 6217 VHF DSC - AIS Receiver Front connector LTW 10-pin, circular male	Signal designation	Signal description
Pin 1	NC	
Pin 2	NC	
Pin 3	NC	
Pin 4	NC	
Pin 5	MIC+	Microphone signal
Pin 6	Earpiece	Earpiece signal
Pin 7	Hook_PTT	Hook/PTT signal
Pin 8	Battery+ (10.8-15.6 VDC)	Battery supply when radio is on
Pin 9	Internal GND = -Battery	Equipment ground
Pin 10	Internal GND = -Battery	Equipment ground

Table B-2: Cable specifications for cable 2

Cable 5 (ACC connection)

Part number 406209-941.

SAILOR 6217 VHF DSC - AIS Receiver Rear connector LTW 10-pin, circular male	Signal description	Wire color
Pin 1	NMEA in+	Brown
Pin 2	NMEA in-	Blue
Pin 3	NMEA out-	White
Pin 4	NMEA out+	Green
Pin 5	Mike 2	Yellow
Pin 6	EAR 2	Grey
Pin 7	Hook_PTT	Pink
8Pin	Battery supply when radio is on	Red
Pin 9	Internal GND = - Battery	Black
Pin 10	Internal GND = - Battery	Orange — SCREEN (Drain)

Table B-3: Cable specifications for cable 5

Cable 7

2-wire screened cable for NMEA (GPS connection).

This cable is not a T&T part.

CAN cable (Cable 8 - CTRL)

Part number: 406208-941

SAILOR 6217 VHF DSC - AIS Receiver CTRL connector LTW 12-pin, circular male	Signal designation	Cable pin 406208-941 (5 m)	SAILOR 6208 Conn. Box In from VHF	SAILOR 6208 Conn. Box Out of box	SAILOR 6208 Conn. Box Out of box	Signal description	Ships cable 6 twisted pairs overall screen
Pin 1	Shield/GND	Brown	J1-1	J2-1	J3-1	Equipment ground	paired with no. 8
Pin 2	Battery-	Blue	J1-2	J2-2	J3-2	Battery -	paired with no. 3
Pin 3	Battery+	White	J1-3	J2-3	J3-3	10.8-15.6 VDC from VHF radio	paired with no. 2
Pin 4	Battery+	Green	J1-4	J2-4	J3-4	10.8-15.6 VDC from VHF radio	paired with no. 7
Pin 5	CAN_H	Yellow	J1-5	J2-5	J3-5	CAN bus data	paired with no. 6
Pin 6	CAN_L	Grey	J1-6	J2-6	J3-6		paired with no. 5
Pin 7	Battery-	Pink	J1-7	J2-7	J3-7	Battery -	paired with no. 4
Pin 8	ON/OFF from CSM	Red	J1-8	J2-8	J3-8	ON/OFF signal from Control Speaker Microphone	paired with no. 1
Pin 9	RX+	Black	J1-9	J2-9	J3-9	RX telephony (out)	paired with no. 10
Pin 10	RX-	Orange	J1-10	J2-10	J3-10		paired with no. 9
Pin 11	TX+	Purple	J1-11	J2-11	J3-11	TX telephony (in)	paired with no. 12
Pin 12	TX-	Light green	J1-12	J2-12	J3-12		paired with no. 11

Table B-4: Cable specifications for cable 8 (CTRL)

Cable 16

The CAN bus cable must be of a paired and twisted type designed for the purpose. The CAN bus cable can handle signals up to 100 m away from the VHF to further Control Speaker Microphones (CSM).

Only 1 CSM can be connected to the VHF with a CAN bus cable of max 100 m if the cable dimension is 0.5mm² of each cord. Other combinations with more CSMs must be calculated seriously before installing the cable. If more CSMs are connected, the CAN cable of 0.5mm² can handle the signals up to max. 100 m. The only restriction is the power supply for the connected CSMs.

The voltage drop along the cable increases with the length of the cable. Separate supply cables can be installed in parallel with the CAN cable to reduce voltage drop in long cables. The maximum allowed voltage drop from VHF to CSM is 2 VDC. It means 1 VDC forward and 1 VDC return.

Max current consumption for each CSM is 0.5A.

Formula to calculate DC resistance in a wire:

$$R = 0,017 \times L / a$$

L = length of wire one way, in metre
a = cross section of the wire in mm²

Contact your local dealer for further information for correct installation.

Cable 17 CAN cable for bulk head installation.

Same cable as cable 12, but the plug is removed and the wires are connected to the connection box.

Same pin configuration as cable 8. See *Cable specifications for cable 8 (CTRL)* on page B-46.

Contact your local dealer for further information for correct installation.

A

ACC	Accessories
AIVDM	NMEA sentences for AIS data, !AIVDM stands for Received Data from other vessels.

C

CAN	Controller-Area Network. A message based protocol designed to allow microcontrollers and devices to communicate with each other within a vehicle without a host computer.
CTRL	Control

D

DSC	Digital Selective Calling

E

EXT	External

G

GGA	NMEA sentence, essential fix data which provide 3D location and accuracy data.
GLL	NMEA sentence, Geographic Latitude and Longitude
GNS	NMEA sentence,

N

NMEA	National Marine Electronics Association, specification for communication between marine electronic devices

P

PWR	Power

R

RMC	NMEA sentence, version of essential gps position, velocity, time data.

V

VDR	Voyage Data Recorder, a data recording system designed for all vessels required to comply with the IMO's International Convention SOLAS Requirements in order to collect data from various sensors on board the vessel.
VHF	Very High Frequency

Z

ZDA NMEA sentence, date and time.

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SAILOR 6248 VHF

Installation manual

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Safety warning

The following general safety precautions must be observed during all phases of operation, service and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture and intended use of the equipment. Thrane & Thrane assumes no liability for the customer's failure to comply with these requirements.

Ground the equipment

To minimise shock hazard, the SAILOR 6248 VHF unit must be connected to an electrical ground and the cable instructions must be followed.

RF exposure hazards and instructions

Your Thrane & Thrane radio set generates electromagnetic RF (radio frequency) energy when transmitting. To ensure that you and those around you are not exposed to excessive amounts of energy and thus to avoid health hazards from excessive exposure to RF energy, all persons must be at least 3ft (0.9 m) away from the antenna when the radio is transmitting.

Warranty limitation

IMPORTANT - The radio is a sealed waterproof unit (classified IPX8). To create and maintain its waterproof integrity it was assembled in a controlled environment using special equipment. The radio is not a user maintainable unit, and under no circumstances should the unit be opened except by authorized personnel. Unauthorized opening of the unit will invalidate the warranty.

Installation and service

Installation and general service must be done by skilled service personnel.

Preface

Radio for occupational use

The SAILOR 6248 VHF meets the requirements of the SOLAS and is intended for use in a maritime environment.
SAILOR 6248 VHF is designed for *occupational use only* and must be operated by licensed personnel only.
SAILOR 6248 VHF is not intended for use in an uncontrolled environment by general public.
SAILOR 6248 VHF is designed for installation by a skilled service person.

Training information

The SAILOR 6248 VHF is designed for *occupational use only* and is also classified as such. It must be operated by licensed personnel only. It must only be used in the course of employment by individuals aware of both the hazards as well as the way to minimize those hazards

The radio is thus NOT intended for use in an uncontrolled environment by general public. The SAILOR 6248 VHF has been tested and complies with the FCC RF exposure limits for *Occupational Use Only*. The radio also complies with the following guidelines and standards regarding RF energy and electromagnetic energy levels including the recommended levels for human exposure:

- FCC OET Bulletin 65 Supplement C, evaluating compliance with FCC guidelines for human exposure to radio frequency electromagnetic fields.
- American National Standards Institute (C95.1) IEEE standard for safety levels with respect to human exposure to radio frequency electromagnetic fields, 3 kHz to 300 GHz
- American National Standards Institute (C95.3) IEEE recommended practice for the measurement of potentially hazardous electromagnetic fields - RF and microwaves.

Below the RF exposure hazards and instructions in safe operation of the radio within the FCC RF exposure limits established for it are described.

Warning

Your Thrane & Thrane radio set generates electromagnetic RF (radio frequency) energy when it is transmitting. To ensure that you and those around you are not exposed to excessive amounts of that energy (beyond FCC allowable limits for occupational use) and thus to avoid health hazards from excessive exposure to RF energy, FCC OET bulletin 65 establishes an Maximum Permissible Exposure (MPE) radius of 200 cm for the maximum power of your radio (25W selected) with a half wave omni-directional antenna having a maximum gain of 4 dB. This means all persons must be at least 200 cm away from the antenna when the radio is transmitting.

Installation

1. An omni-directional antenna with a maximum power gain of 5.2 dBi must be mounted at least 400 cm above the highest deck where people may be staying during radio transmissions. The distance is to be measured vertically from the lowest point of the antenna. This provides the minimum separation distance which is in compliance with RF exposure requirements and is based on the MPE radius of 200 cm plus the 200 cm height of an adult.
2. On vessels that cannot fulfil requirements in item 1, the antenna must be mounted so that its lowest point is at least 200 cm vertically above the heads of people on deck and all persons must be outside the 200 cm MPE radius during radio transmission.
   - Always mount the antenna at least 200 cm from possible human access.
   - Never touch the antenna when transmitting
   - Use only authorized Thrane & Thrane accessories.
3. If the antenna has to be placed in public areas or near people with no awareness of the radio transmission, the antenna must be placed at a distance not less than 200 cm from possible human access.

Failure to observe any of these warnings may cause you or other people to exceed FCC RF exposure limits or create other dangerous conditions.

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Introduction

1.1 VHF radio

SAILOR 6248 VHF is approved to R&TTE and is waterproof to the IPx8 and IPx6 standard. As part of the required safety equipment, use the SAILOR 6248 VHF in an emergency situation. However the best way to guarantee functionality in an emergency situation, is to use the radio in daily communication on board.

The VHF radio is a simplex/semi duplex VHF radio. It is designed with an easy-to-use menu-driven setup. You use the softkeys and the keypad to enter the desired functions, you browse and select a setting using the right selection knob. The large display can be customized for optimum readability and visibility both day and night with several color themes.

The VHF radio can replay the last 240 s of received voice messages. This is a useful feature to minimize misunderstandings and to record messages when the radio is unattended.

With SAILOR connection boxes the VHF radio connects easily to external equipment like additional handsets, water proof hand microphones, control speaker microphone or external speaker. The Ethernet interface enables the VHF radio to be connected to ThraneLINK for service updates.

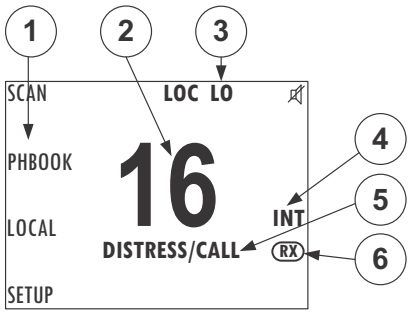
For a list of accessories available for the VHF radio see *Accessories available* on page 1-4 and *Part numbers for accessories* on page 2-19 and check with your nearest distributor.

1.1.1 Controls on the front plate

1. Loudspeaker.
2. Four soft keys with function title in the display.
3. Large display.
4. Keys 0 to 9 to enter numbers or text.
5. **DW** button to toggle the watch function (dual or triple).
6. **16/C** quick selection key for channel 16 and the programmed call channel.
7. Connector for Handset or Handmicrophone. If not used, put the cap from the ACC connector on the front connector to prevent water ingress.
8. Squelch control to mute background noise.
9. Volume knob with key-press function for volume control and power on/off.
10. Selector and dim knob with key-press function for general operation, display color selection and dimming.
11. **1W** button to toggle between high and low power.
12. Replay button to play back up to 240 s voice message.

1.1.2 SAILOR 6248 VHF display

The picture shows the display after start-up. The display holds various fields of information, depending on the currently selected function.



1. Functions you can select with the soft keys.
2. Current working channel.
3. **System property icons** with information relevant for the currently selected functions.
4. Channel properties next to the currently selected VHF channel (if any).
5. **Service line** containing current temporary information relevant for the current channel or function.
6. Current state: RX or TX.

For a detailed description of the information shown for each of the functions available see the user manual.

1.2 Accessories available

Accessory	Description
SAILOR 6201 Handset with cradle (additional)	One SAILOR 6201 Handset with cradle is included in the delivery of the SAILOR 6248 VHF. You can connect another 2 SAILOR 6201 Handsets.
SAILOR 6203 Handset with cradle	SAILOR 6203 Handset with cradle, waterproof to IPx6.
SAILOR 6202 Hand Microphone	You can use the SAILOR 6202 (waterproof to IPx6 and IPx8) Hand Microphone instead of the handset.
SAILOR 6204 Control Speaker Microphone	With the SAILOR 6204 Control Speaker Microphone you can control the VHF functions of the SAILOR 6248 VHF.
SAILOR 6207 Connection Box for parallel handsets	The SAILOR 6207 Connection Box including Connection Cable 406209-941 is used for easy installation of several SAILOR 6201/03 Handsets.
SAILOR 6208 Control Unit Connection Box	The SAILOR 6208 Connection Box including Connection Cable 406208-941 is used for easy installation of external equipment and accessories: • Max. 4 SAILOR 6204 Control Speaker Microphones • VDR • SAILOR 6270 External loudspeaker

Table 1-1: Accessories available

Accessory	Description
Connection cables	**5m connection cable for bulkhead mount**: Use this cable in installations where the SAILOR 6201 or 6203 Handset is not connected directly to the SAILOR 6248 VHF, but located in a different position (part number: 406204-940). **5m Connection cable**, **1x10 pole**: Use this cable in installations when connecting external equipment to the SAILOR 6248 VHF. This cable is included in the SAILOR 6207 Connection Box for parallel handsets (part number: 406207-941). **5 m Connection cable for SAILOR 6204 Control Speaker Microphone**, **1x12 pole** (part number: 406204-940).
SAILOR 6270 External loudspeaker	If you need an additional external loudspeaker you can connect a SAILOR 6270 Loudspeaker. It provides 6 W output power.
SAILOR 6197 Ethernet Switch	The SAILOR 6197 Ethernet Switch is used in installations with ThraneLINK. The Ethernet switch has 5 ports.
SAILOR 6090 Power Converter 24 V to 12 V DC	The SAILOR 6090 Power Converter is used to provide 12 V DC for the SAILOR 6248 VHF from a 24 V DC power source.

Table 1-1: Accessories available (Continued)

1.2.1 System configuration — example

The SAILOR 6248 VHF can be customized to suit your installation. The following illustration is one example of a system. For further configuration examples see Appendix B, *System configurations*.

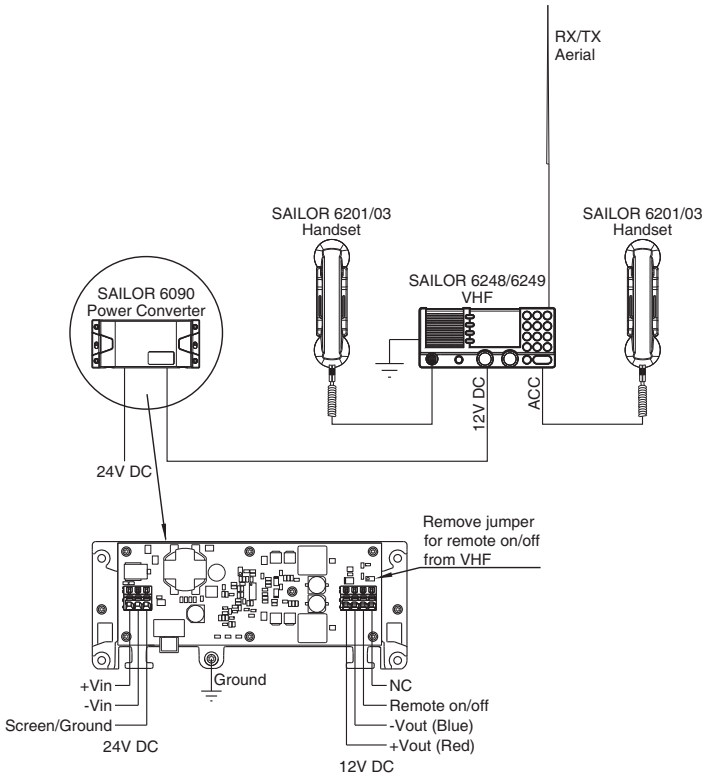


Figure 1-1: System configuration, example

Installation

In this chapter you find information and guidelines for:

- *Unpacking and initial inspection*
- *Installing the VHF radio*
- *Connectors*
- *VHF antenna installation*
- *Accessories*

2.1 Unpacking and initial inspection

The following items are included in the delivery of a SAILOR 6248 VHF:

- SAILOR 6248 VHF
- SAILOR 6201 Handset with cradle
- User manual
- Installation guide
- Emergency call sheet
- Mounting bracket with two knobs
- Connectors for cables
- Power cable, fittings and fuses
- Packaging material
- Kit for flush mount installation, including gasket
- SAILOR 6090 Power Converter 24 to 12 V

2.1.1 Initial inspection

Inspect the shipping carton immediately upon receipt for evidence of damage during transport. If the shipping carton is severely damaged or water stained, request that thecarrier's agent be present when opening the carton. Save the carton packing material for future use.

WARNING! To avoid electric shock, do not apply power to the system if there is any sign of shipping damage to any part of the front or rear panel or the outer cover. Read the safety summary at the front of this manual before installing or operating the system.

After unpacking the system, inspect it thoroughly for hidden damage and loose components or fittings. If the contents are incomplete, if there is mechanical damage or defect, or if the system does not work properly, notify your dealer.

2.2 Installing the VHF radio

You can mount the VHF radio as a desktop, overhead or flush-mounted unit integrated in the instrument panel.

Provide space enough to access the front panel connectors and for installing a cradle for the speaking device.

Provide **at least 120 mm space at the back** of the SAILOR 6248 VHF radio to allow free air circulation and for cable access.

Cable requirements

All cables attached to the SAILOR 6248 VHF must be shielded. Every shield should have a low impedance connection to an electrical ground.

Before using the SAILOR 6248 VHF for the first time, check that all cables are correctly wired and fastened.

Compass safe distance

Make sure that the VHF radio is far enough from any magnetic compass to avoid influence of the loudspeaker magnet on the compass reading. See the following table for the safe distance after magnetization between the nearest point of the device and the centre of the compass at which it will produce a deviation of 0.3˚.

Device	Compass safe distance
SAILOR 6248 VHF	0.85 m
SAILOR 6201 and 6203 Handset with cradle	0.95 m
SAILOR 6090 Power Converter 24 V — 12 V	0.15 m

Table 2-1: Compass safe distance

Device	Compass safe distance
SAILOR 6207 Connection Box for parallel handsets	0.45 m
SAILOR 6208 Control Unit Connection Box	0.45 m

Table 2-1: Compass safe distance

2.2.1 SAILOR 6248 VHF with U mounting bracket

The mounting bracket and two knobs are included in the delivery.

Desktop mounting

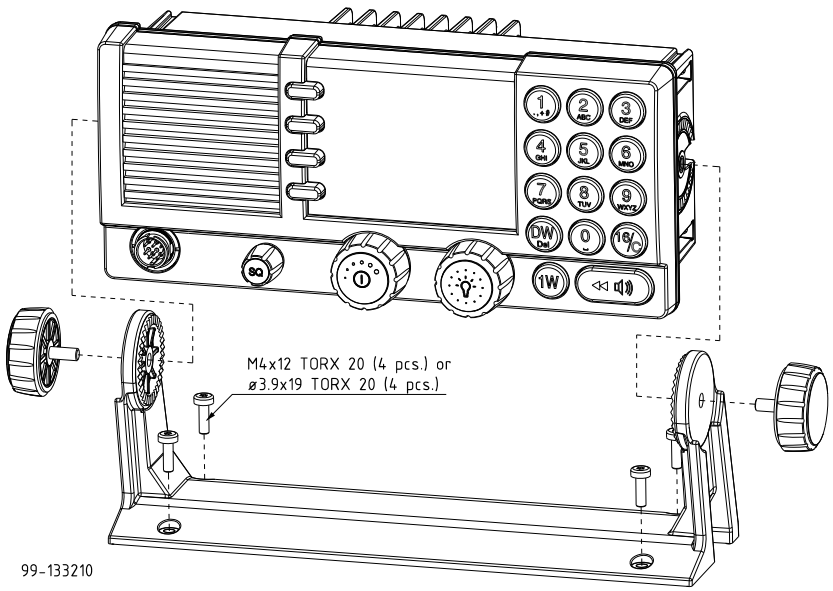


Figure 2-1: Desktop mounting

Overhead mounting

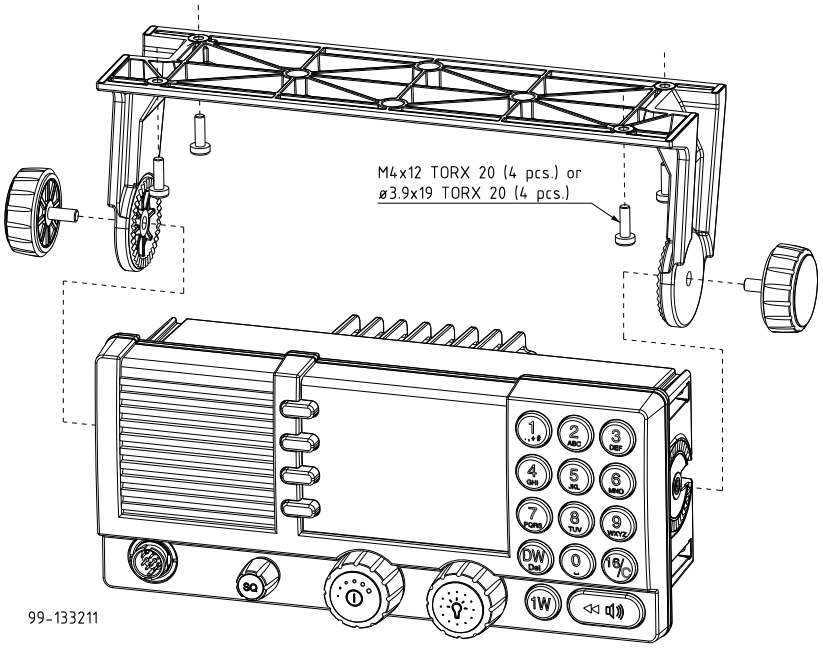


Figure 2-2: Overhead mounting

Mounting with U mounting bracket

To mount the VHF radio as tabletop, do as follows:

1. Find a suitable location for the VHF radio. Check that the space is wide/deep enough to accommodate the VHF radio.
2. Fasten the bracket with 4 screws (included in the delivery.)
3. Insert the VHF radio in the bracket and fasten it with the two knobs.

4. The display of the VHF radio should be at an angle of approximately 90˚ to your line of sight when operating it.

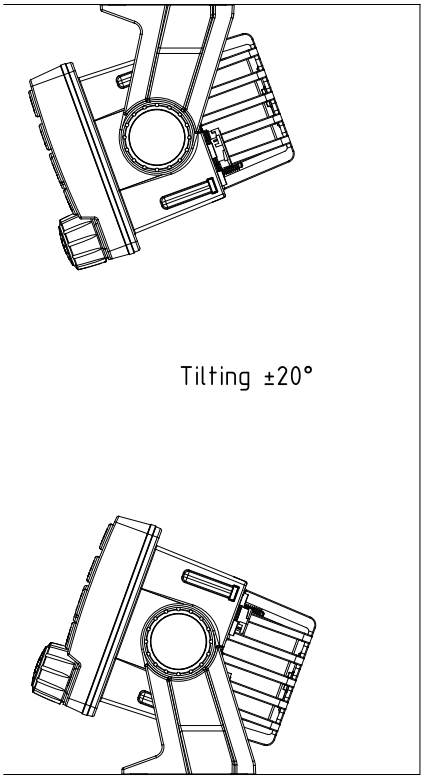


Figure 2-3: Mounting with the mounting bracket

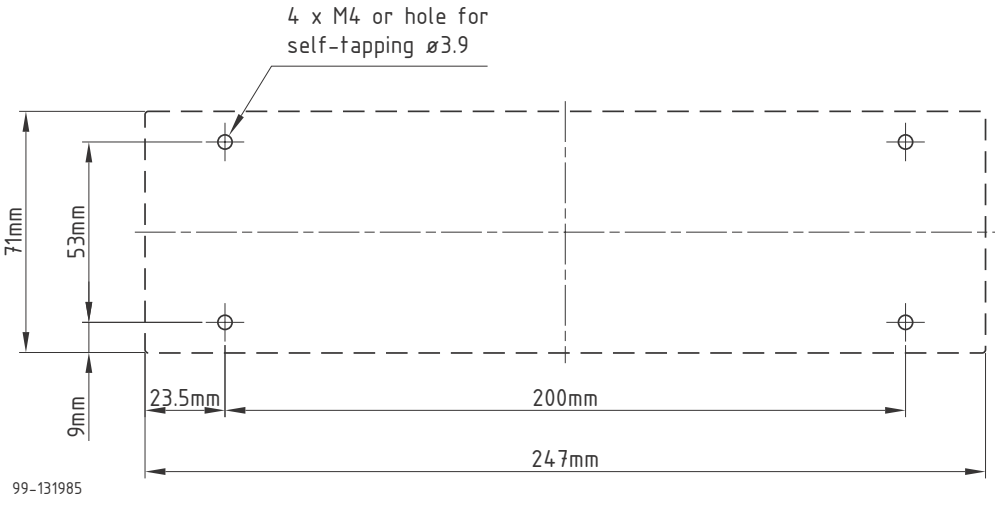


Figure 2-4: Drilling plan for the mounting bracket

2.2.2 SAILOR 6248 VHF for flush mount

You can mount the VHF radio to a flat surface, e.g. an instrument panel.The flush mount installation kit is included in the delivery.

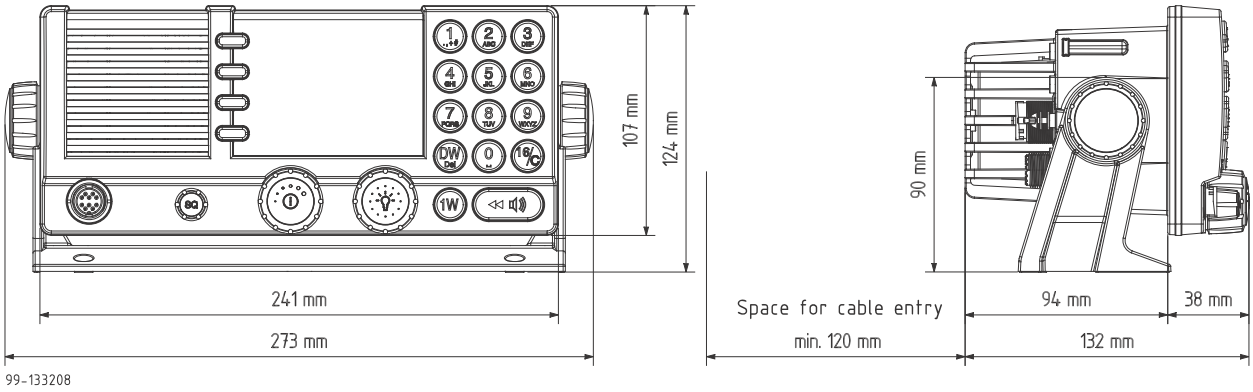


Figure 2-5: SAILOR 6248 VHF Dimension for flush mount

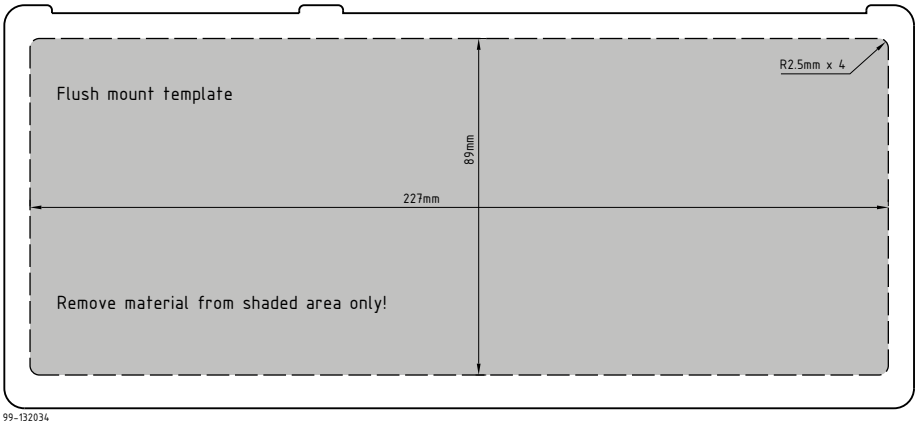


Figure 2-6: Cutout for flush mount

Important **The scaling in the above drawing is not 1:1**. Consequently do not attempt to use a print or copy of this page without checking the dimensions.

1. Find a suitable location for the VHF radio. Check that the space is deep enough to accommodate the VHF radio and an additional min. 120 mm space for cable entry.
2. Keep free distance to allow free air circulation around the VHF radio and to allow sufficient space for access to cables, see the drawing on this page.
3. Cut out the hole for the VHF radio where you want to mount it. Use the cutting template in the installation guide.
4. Mount the 4 square nuts M4 in the cabinet, ensure that they are placed correctly so it is possible to screw in the M4x45 screws.

5. Ensure that the flush mount gasket is placed correctly on the VHF radio.
6. Before mounting the VHF radio be aware that the surface is plane and rigid. If the surface is not plane and/or rigid (stiff) remove the gasket and seal with silicone sealant between the VHF radio and the surface.
7. Slide the VHF radio in the cut-out. Place the flush mount bracket and fasten it with the 4 screws M4x45. Make sure the torque does not exceed 1Nm when fastening the screws.

Note Only use screws supplied with the kit for flush mounting.

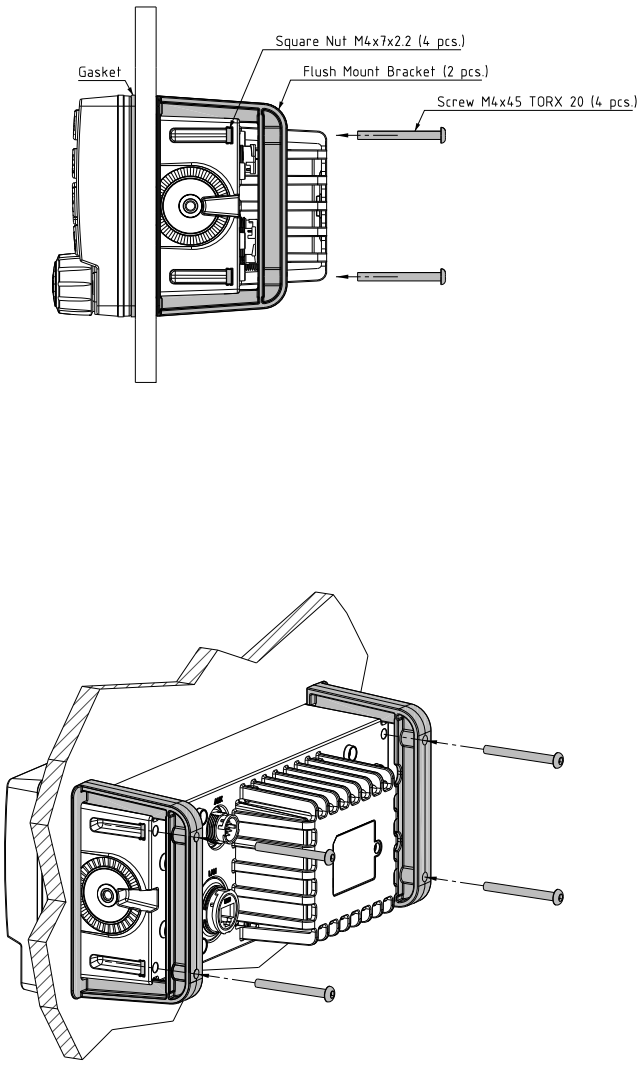


Figure 2-7: Flush mount

Note Firmly tie back and secure any wires not used to avoid the possibility for mutual shorting or shorting to ground.

2.2.3 SAILOR 6090 Power Converter

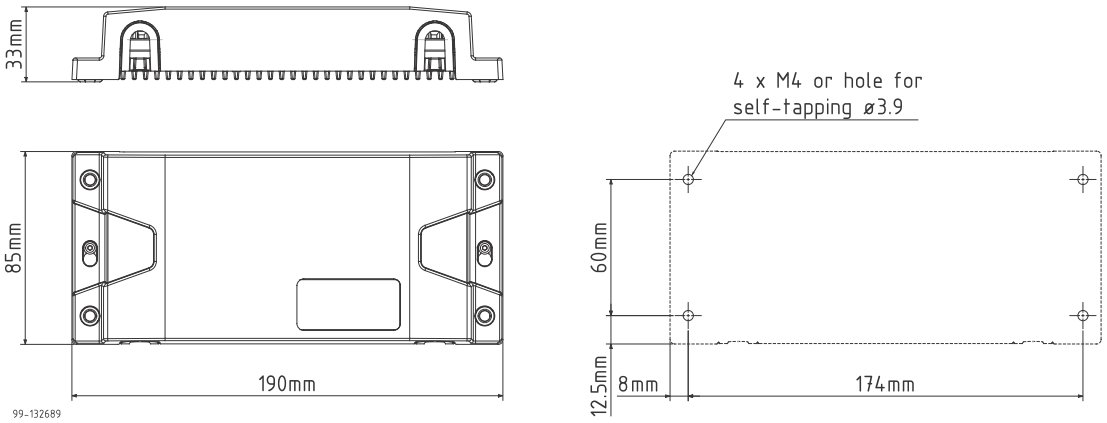


Figure 2-8: SAILOR 6090 Power Converter, dimensions

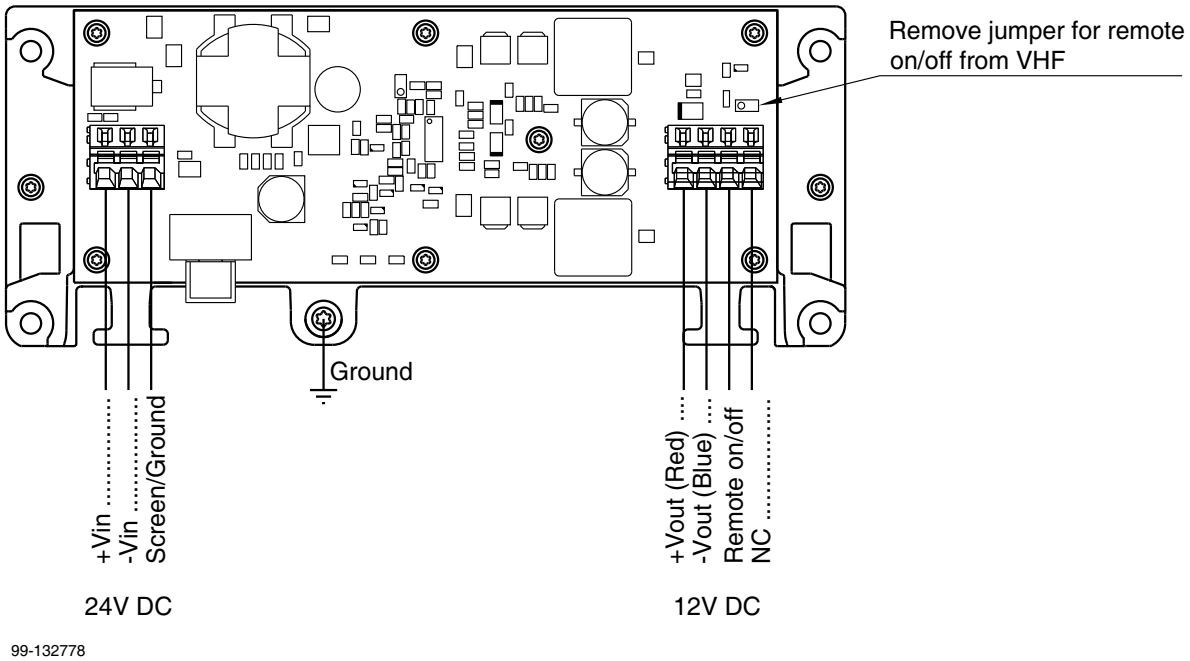


Figure 2-9: Connecting the SAILOR 6090 Power Converter

2.2.4 SAILOR 6201 Handset with cradle

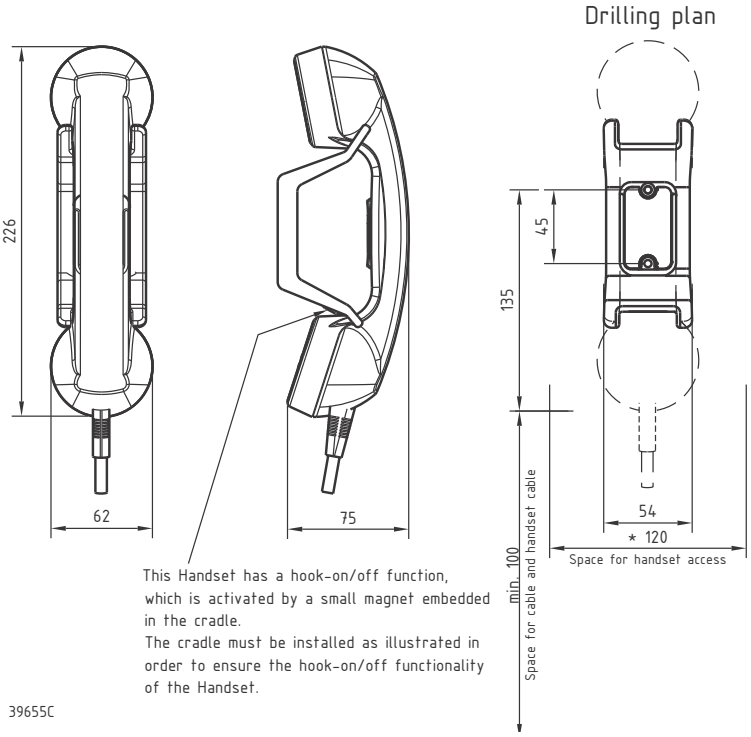


Figure 2-10: SAILOR 6201 Handset with cradle

2.3 Connectors

2.3.1 Connector at the front panel for handset or handmicrophone

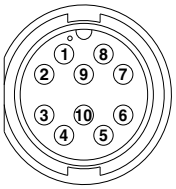
Use the connector at the front of the SAILOR 6248 VHF to connect a SAILOR 6201 Handset. You may also connect a waterproof SAILOR 6203 Handset or SAILOR 6202 Handmicrophone.

Connector type: Circular connector, 10-pin, male.

Connection cable with plug, part number 406209-941.

Pin assignment: Connector front view on the VHF radio.

Panel lock, 10 pin male



Pin	Description	Wire color
1	Not connected	Brown
2	Not connected	Blue
3	Not connected	White
4	Not connected	Green
5	Mic+	Yellow
6	Earpiece	Grey
7	Hook_PTT	Pink
8	Battery V +10.8 — 15.6 VDC	Red
9	Internal GND = - Battery	Black
10	Internal GND = - Battery	Orange — SCREEN (Drain)

Table 2-2: Pin allocation, connector at the front panel

Important If a handset is not mounted at the front connector, put the cap from the ACC connector on the front connector to prevent water ingress.

2.3.2 Connectors at the rear panel

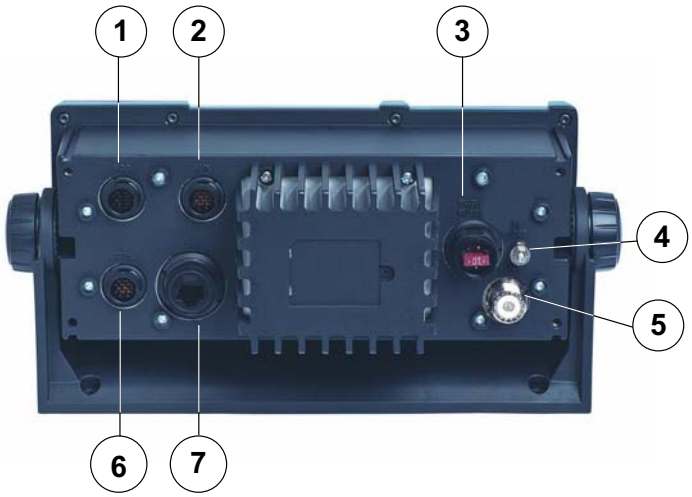


Figure 2-11: Connections at the rear panel

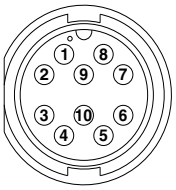
1. *ACC connector* for accessories
2. *AUX connector* for VDR, external speaker
3. *Power connector PWR FUSE* with fuse 10 A mini ATO
4. *Ground stud for grounding*
5. *ANT connector for VHF antenna*
6. *CTRL connector*
7. *Ethernet connector: LAN*

2.3.3 ACC connector

Use the connector marked **ACC** to connect a SAILOR 6201 Handset. You may also connect a waterproof SAILOR 6203 Handset or SAILOR 6202 Handmicrophone.

Connector type: Circular connector, 10-pin, male.

Panel lock, 10 pin male



Connection cable with plug, part number 406209-941.

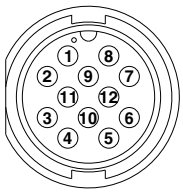
Pin assignment: Connector front view on the VHF radio.

Pin	Description	Wire color
1	—	Brown
2	—	Blue
3	—	White
4	—	Green
5	Mike 2 / Line in	Yellow
6	EAR 2 / Line out	Grey
7	Hook_PTT	Pink
8	Battery supply when radio is on	Red
9	Internal GND = - Battery	Black
10	Internal GND = - Battery	Orange — SCREEN (Drain)

Table 2-3: Pin allocation, ACC connector

2.3.4 AUX connector

This connector is used to connect VDR and external speaker.



Connector type: Circular connector, 12-pin.

Connection cable with plug, part number 406208-941.

Pin assignment: Connector front view on the VHF radio:

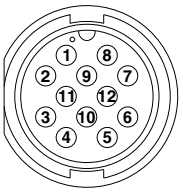
Pin	Description	Wire color
1	Shield (GND)	Brown
2	Lo Power Forced control	Blue
3	—	White
4	—	Green
5	—	Yellow
6	—	Grey
7	AUX OC—	Pink
8	-Battery	Red
9	External Speaker +	Black
10	External Speaker -	Orange
11	VDR+ Mixed RX/TX for record	Violet
12	VDR- Mixed RX/TX for record	Cyan

Table 2-4: Pin allocation, AUX connector

2.3.5 CTRL connector

This connector is used to connect a SAILOR 6204 Control Speaker Microphone or SAILOR 6208 Connection Box.

Connector type: Circular connector, 12-pin.



Connection cable with plug, part number 406208-941.

Pin assignment: Connector front view on the VHF radio:

Pin	Description	Wire color
1	GND for cable screen	Brown
2	Internal GND=- Battery	Blue
3	Battery supply when radio is on	White
4	Battery supply when radio is on	Green
5	CAN+	Yellow
6	CAN-	Grey
7	Internal GND = - Battery	Pink
8	On/off from Control Speaker Microphone	Red
9	RX out +	Black
10	RX out -	Orange
11	TX in +	Violet
12	TX in -	Cyan

Table 2-5: Pin allocation, CTRL connector

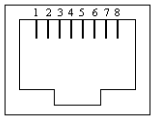
2.3.6 Ethernet connector: LAN

There is one Ethernet (10/100 MB) connector on the rear panel, it is marked LAN.

Connector type: RJ-45 female, shielded

Pin number	Pin function	Wire color
1	Tx+	white/orange
2	Tx-	orange
3	Rx+	white/green
4	Not connected	blue
5	Not connected	white/blue
6	Rx-	green
7	Not connected	white/brown
8	Not connected	brown

Table 2-6: Pin allocation, LAN connector



2.3.7 Power connector PWR FUSE

The DC Power input connects to a DC supply with 12 DC nominal (10.8 to 15,6 V DC). The connector has a 10 A fuse. The interface also has a “remote on/off” function for a remote 24 V — 12 V DC Power Converter.

Connector type: LTW Power
Fuse: 10 A mini ATO

To help extract the fuse you can order a fuse puller in the **ESHOP** at www.cobham.com/satcom.

Pin-out

The table below shows the connector outline, pin assignments and wire color in the power cable delivered with the SAILOR 6248 VHF.

Pin	Pin function	Wire color
1	DC+ (10.8 - 15,6 V DC)	Red
2	DC- (0 V DC)	Blue
3	Remote on/off	Yellow

Table 2-7: Pin allocation, power

Connecting DC power

- Connect DC+ (red wire) to DC out + from your DC supply.
- Connect DC- (blue wire) to DC out - from your DC supply.

Connect the yellow wire in the power cable to use the Remote on/off function.

2.3.8 ANT connector for VHF antenna

Use the connector marked **ANT** to connect the VHF antenna to the radio with a 50 Ohm coaxial cable with low loss, e.g. RG214. Install a PL259 plug at the cable end.

Place the antenna as high and clear of obstructions as possible. Make sure that the horizontal distance to metal parts is minimum 1.5 m (5 ft.).

Connector type: female SO239 for PL259 plug.

For more information about VHF antenna installation see *VHF antenna installation* on page 2-17.

2.3.9 Ground stud for grounding

Important | You must connect the Ground stud to ship ground.

The ground stud is located on the rear panel and is used to connect a ground wire for grounding the SAILOR 6248 VHF. To connect the SAILOR 6248 VHF to ship ground, do as follows:

1. Connect a ground cable of > 1 m length and > 4 mm^2 cross section to the Ground stud located between the DSC ANT and ANT connector and fasten it with the wing nut.
2. Connect the other end of the cable to ship ground. Make the cable as short as possible.

2.4 VHF antenna installation

The SAILOR 6248 VHF must be installed with one antenna for VHF RX/TX communication. You can install all commonly available 50 Ohm antennas covering the appropriate frequency range and providing a VSWR less than 1.5 over this range.

If further details on equipment and antenna installation, see IMO COMSAR/Circ. 32, GUIDELINES FOR THE HARMONIZATION OF GMDSS REQUIREMENTS FOR RADIO INSTALLATIONS ON BOARD SOLAS SHIPS.

2.4.1 Cable requirements

Connect the antennas using a low loss type 50 Ohm coaxial cable, e.g. good quality RG214 or better. It is recommended to use a double screened type cable (like e.g. RG214) with a maximum insertion loss of 3dB across the antenna cable installation.

The maximum antenna cable length in the installation depends on the quality of the cable, i.e. the specified attenuation (dB/m) of the cable of choice at the high end of the VHF frequency band. As a rule of thumb the cable length using e.g. RG214 coaxial cable should not exceed 25 m.

2.4.2 VHF RX/TX antenna

In installations with two or more VHF radios it is important to ensure the optimum performance of these by carefully selecting the antenna positions for both radios. It is recommended to maximize the RF attenuation between the VHF RX/TX antennas in the installation. You can ensure this by not having the RX/TX antennas positioned at the same horizontal level, i.e. the RX/TX antennas for each radio must be installed at shifted elevations as shown in the following drawing.

If sufficient vertical distance between two or more such antennas cannot be achieved, the horizontal distance between them is increasingly important for optimum performance. If there is hardly any vertical separation ensure that there is a minimum of 5 m horizontal distance between any RX/TX antennas in the installation.

To minimize any increase in VSWR of the VHF RX/TX antenna, install the antenna at a vertical distance of at least 2 m to any other mast, pole or other RF antennas. Keep VHF antennas as far away as possible from antenna main beam of any radar and satellite equipment.

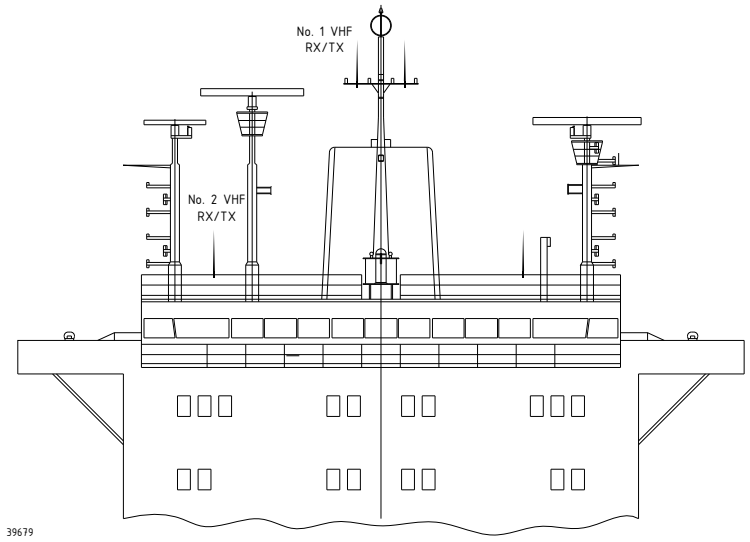


Figure 2-12: Antenna positioning

2.5 Accessories

2.5.1 Part numbers for accessories

The following accessories are available for the SAILOR 6248 VHF:

Part number	Accessories available
406201A-00500	SAILOR 6201 Handset with cradle (additional)
406202A-00500	SAILOR 6202 Hand Microphone
406203A-00500	SAILOR 6203 Handset Waterproof
406204A-00500	SAILOR 6204 Control Speaker Microphone
406207A-00500	SAILOR 6207 Connection Box with Cable 406209-941
406208A-00500	SAILOR 6208 Connection Box with Cable 406208-941
406209-940	Connection Cable for bulkhead mount, 5 m, 1-x10 pole
406209-941	Connection Cable, 5 m, 1x10 pole
406204-940	Cable for SAILOR 6204 Control Speaker Microphone
406270A	SAILOR 6270 External loudspeaker
406197A-00500	SAILOR 6197 Ethernet Switch
406090A-00500	SAILOR 6090 Power Converter 24 V — 12 V

Table 2-8: Part numbers for accessories

2.5.2 Connection box SAILOR 6207

The **SAILOR 6207 Connection Box** is used to connect further SAILOR 6201 Handsets. For wiring and cabling details see *System configuration examples* on page B-1.

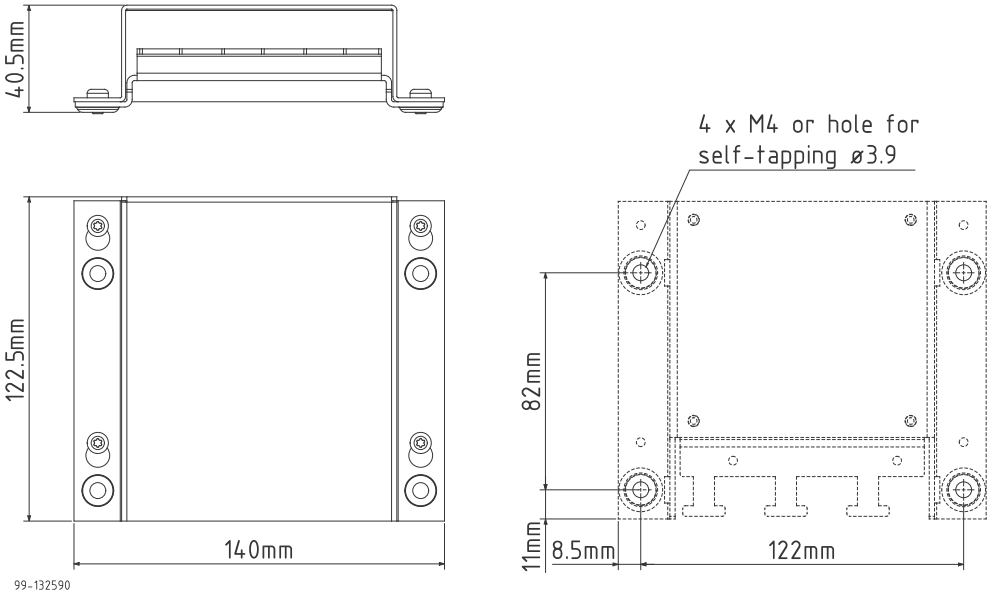
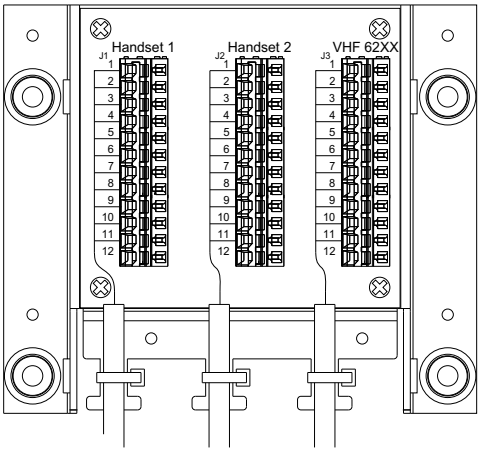


Figure 2-13: SAILOR 6207 Connection Box for parallel handsets, mounting



Description	Pin	Wire color
NC	1	Brown
NC	2	Blue
NC	3	White
NC	4	Green
Mike 2 / Line in	5	Yellow
Ear 2 / Line out	6	Grey
Hook_PTT	7	Pink
Bat_SW Supply voltage when on	8	Red
Internal GND = - Battery	9	Black
Internal GND = - Battery	10	Orange
Internal GND = - Battery	11	SCREEN (Drain)
	12	NC

Cable part no. 406209-941

To ensure galvanic separation of battery supply from ship's ground, the cable screens of the ACC cables MUST not touch any part of the metallic parts of the SAILOR 6207 Connection Box. Connect the screens only to the pins at the terminals.

Figure 2-14: SAILOR 6207 Connection Box for parallel handsets, wiring

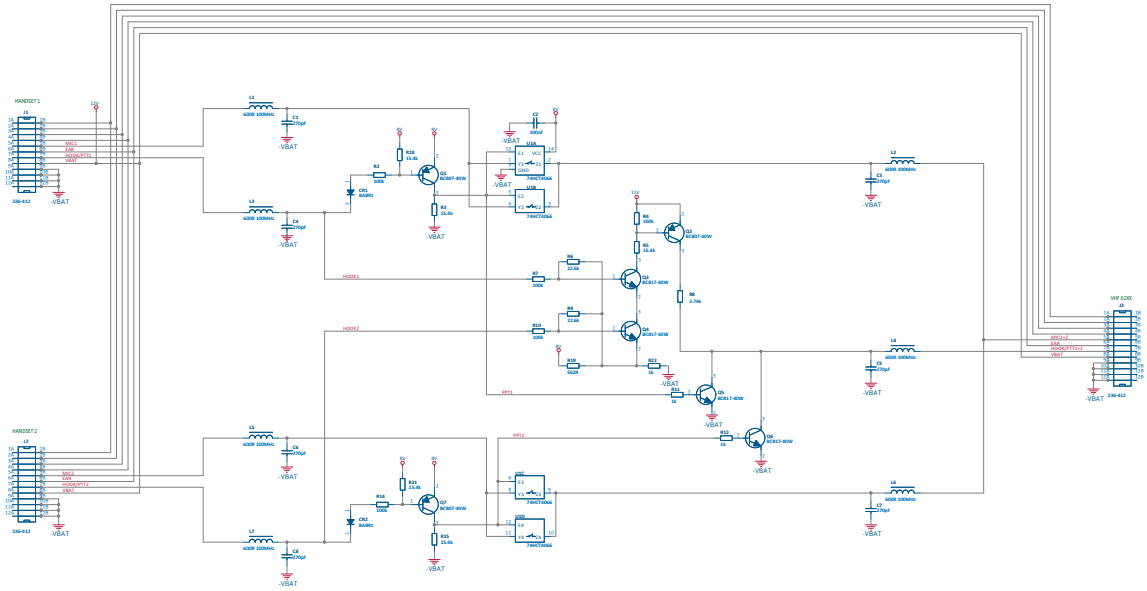


Figure 2-15: SAILOR 6207 Connection Box for parallel handsets, diagram

2.5.3 Connection box SAILOR 6208

The **SAILOR 6208 Connection Box** is used to connect SAILOR 6204 Control Speaker microphones and other auxiliary equipment. For wiring and cabling details see *System configuration examples* on page B-1.

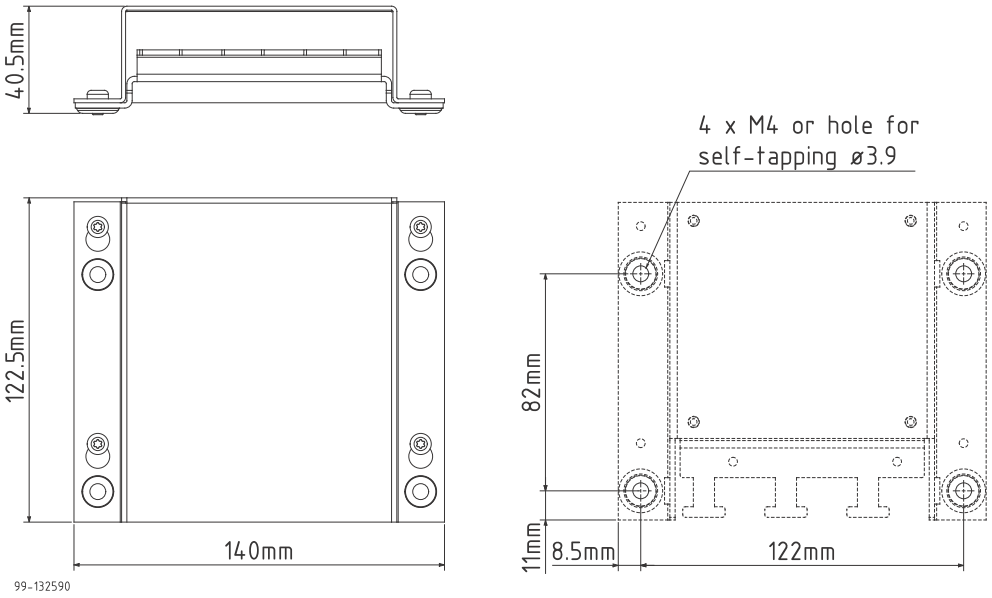


Figure 2-16: SAILOR 6208 Control Unit Connection Box, mounting

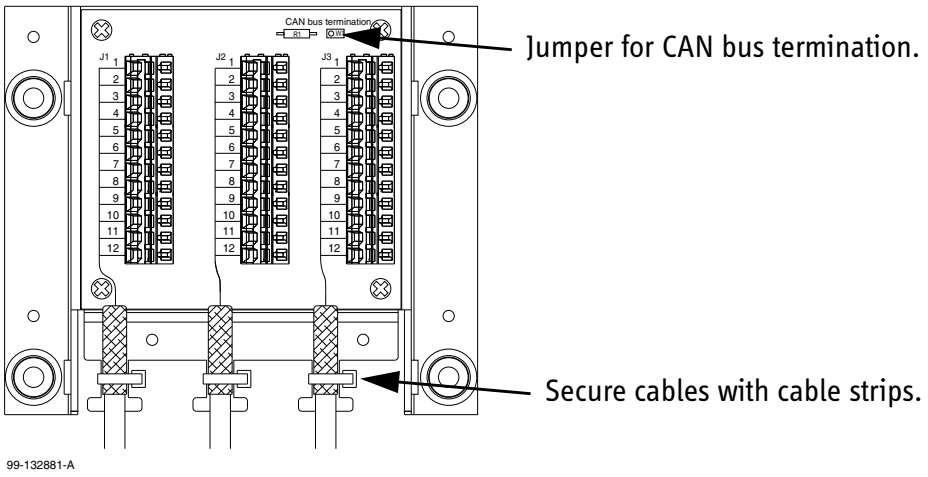


Figure 2-17: SAILOR 6208 Control Unit Connection Box for parallel handsets, wiring

Terminate the last SAILOR 6208 on the CAN bus (furthest away from the transceiver).

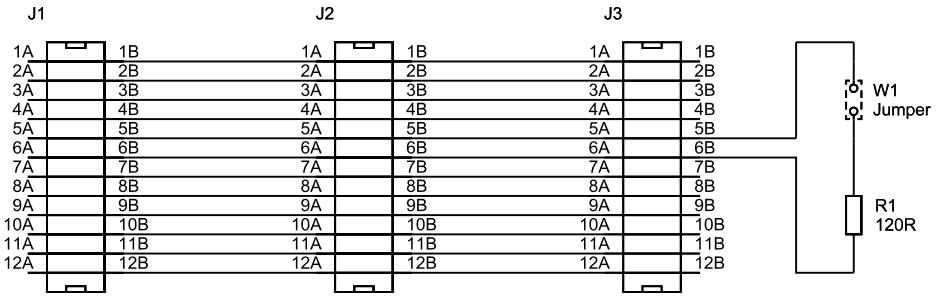


Figure 2-18: SAILOR 6208 Control Unit Connection Box, diagram

First-time power up

3.1 General use and navigation

The tasks needed to be performed during installation are described below. See the SAILOR 6248 VHF User manual for instructions how to operate and set up the VHF radio.

3.1.1 Power on and volume in handset and speaker

The VHF radio has a dual-function on/off knob for power on/off and volume control.

- To power on the VHF radio press the on/off knob.
- To power off the VHF radio, press and hold the on/off knob and follow the instructions in the display.
- To adjust the speaker volume, turn the volume knob (clockwise = louder, counter clockwise = softer, until muted). When muted, is shown in the display.
- To adjust the volume of the handset earpiece see the SAILOR 6248 VHF *User manual*.

3.1.2 Working channel and changing settings

Use the **selector knob** to browse and select:

- To browse and select **settings**, turn the selector knob and press for accept.
- To select a **working channel** use the selector knob or enter the channel number using the keypad.

Service & maintenance

4.1 Contact for support

Contact your authorized dealer for technical service and support of the VHF radio. Before contacting your authorized dealer you can go through the troubleshooting guide to solve some of the most common operational problems.

4.2 Maintenance

4.2.1 Preventive maintenance

Maintenance of the SAILOR 6248 VHF can be reduced to a maintenance check at each visit of the service staff. Inspect the radio for mechanical damages, salt deposits, corrosion and any foreign material. Due to its robust construction and ruggedness the radio has a long lifetime. Anyway it must carefully be checked at intervals not longer than 12 months - dependent on the current working conditions.

Salt deposits

In case the equipment has been exposed to sea water there is a risk of salt crystallization on the keys and knobs and they may become inoperable. Clean the VHF radio and speaker microphones with fresh water.

4.2.2 Error messages and warnings

Errors and warning messages are shown in the display and are read-only.

4.3 Troubleshooting guide

Action	Symptom	Remedy
The radio will not turn on	The display is empty.	Check if power is present. Check fuse which is placed in the power connector. Check performance of power supply if connected to one.
No communication	The loudspeaker is mute.	Check the antenna installation. Check antenna cable. Check handset/Handmicrophone and cable.
Handset configuration	No sound in earpiece	The earpiece volume may be configured to OFF. See section *Controller setup in the user manual* on how to adjust the earpiece volume of the handset.
Device failure		If any of the checks and tests described in this section do not assist in resolving the difficulties experienced in the operation and/or performance of the VHF installation, a fault may have developed in the VHF radio itself. When contacting an authorized Thrane & Thrane representative be sure to provide as much information as possible describing the observed behavior - also including the type of the VHF radio, its serial number, and software release version (both found in the setup menu Controller Setup).
WARNING: POWER SUPPLY LOST CONTACT	Power supply status cannot be monitored.	In Setup, Power Supply, set Monitor to disabled. You can only monitor the power supply if the radio is powered by a SAILOR 6081 Power Supply Unit and Charger.

Table 4-1: Troubleshooting guide

Action	Symptom	Remedy
System Time & Date	Manually entered time & date is overridden	If valid time information is received via NMEA LWE on LAN port, this time source is used to set the system time. If this is not wanted, disconnect LAN cable. Position NMEA sentences from the talkers GP, GL GN (and GA) are prioritized. Position source is selected by the quality indicator: 1. Differential 2. Precise, Autonomomous, Float_RTK, Realtime_RTK 3. Estimated and Manuel 4. Unknown (for instance if not supported in sentence) 5. Simulated and Invalid The device will automatically switch to the position source with the highest priority available after 5 seconds when switching to a lower priority input and 30 seconds when switching to a detected higher priority input.

Table 4-1: Troubleshooting guide

4.3.1 Replacing the fuse in the power connector

One fuse is installed in the power connector. If the fuse is blown, do as follows:

1. Track down why the fuse was blown and solve the problem.
2. Take out the old fuse.
3. Insert the new fuse. The fuse rating is 10 A T.

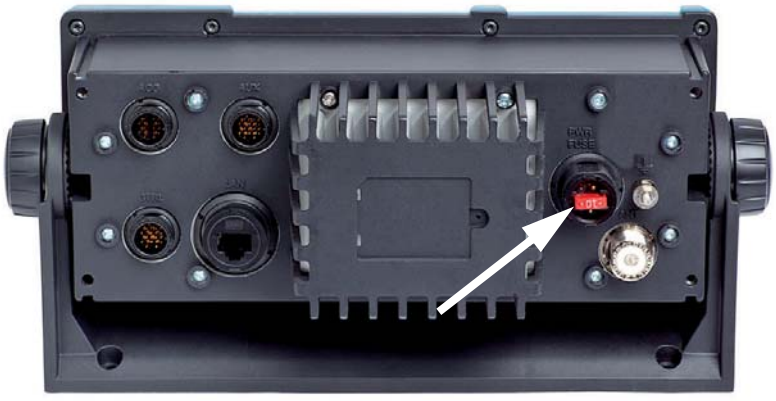


Figure 4-1: Fuse in the power connector

4.3.2 Replacing the fuse in the SAILOR 6090 Power Converter

One fuse is installed in the SAILOR 6090 Power Converter. If the fuse is blown, do as follows:

1. Track down why the fuse was blown and solve the problem.
2. Take out the old fuse.
3. Insert the new fuse. The fuse rating is 7.5 A T.

Figure 4-2: Fuse in the SAILOR 6090 Power Converter

4.4 Returning units for repair

Should your Cobham SATCOM product fail, please contact your dealer or installer, or the nearest Cobham SATCOM partner. You will find the partner details on www.cobham.com/satcom where you also find the Cobham SATCOM Self Service Center web-portal, which may help you solve the problem. Your dealer, installer or Cobham SATCOM partner will assist you whether the need is user training, technical support, arranging on-site repair or sending the product for repair. Your dealer, installer or Cobham SATCOM partner will also take care of any warranty issue.

4.4.1 Repacking for shipment

Should you need to send the product for repair, please read the below information before packing the product.

The shipping carton has been carefully designed to protect the SAILOR 6248 VHF and its accessories during shipment. This carton and its associated packing material should be used when repacking for shipment. Attach a tag indicating the type of service required, return address, part number and full serial number. Mark the carton FRAGILE to ensure careful handling.

Note Correct shipment is the customer's own responsibility.

If the original shipping carton is not available, the following general instructions should be used for repacking with commercially available material.

1. Wrap the defective unit in heavy paper or plastic. Attach a tag indicating the type of service required, return address, part number and full serial number.
2. Use a strong shipping container, e.g. a double walled carton.
3. Protect the front- and rear panel with cardboard and insert a layer of shock-absorbing material between all surfaces of the equipment and the sides of the container.
4. Seal the shipping container securely.
5. Mark the shipping container FRAGILE to ensure careful handling.

Failure to do so may invalidate the warranty.

Specifications & Approval

A.1 Transceiver unit SAILOR 6248 VHF

Item	Specification
Weight SAILOR 6248 VHF	< 1.50 kg (3.3 lbs) approximately
Box weight SAILOR 6248 VHF	3.8 kg (8.4 lbs) approximately, including SAILOR 6201 Handset and wall mount cradle, SAILOR 6090 Power Converter and Installation and user manual in box.
Dimensions	**Height**: Outer dimension 107 mm, hole height for flush mount 89 mm **Width**: Outer dimension 241 mm, hole width for flush mount 227 mm **Depth**: Outer dimension from front of knobs 132 mm, depth for flush mount 94 mm
Operating temperature	-25˚C to 55˚C (5˚F to 131˚F)
Storage temperature	-30˚C to 80˚C (-22˚F to 176˚F)
Power supply	12 VDC Nominal (10,8– 15,6 VDC)
Current consumption	Max. 7 A
Current consumption at 12 VDC (no accessories connected)	RX: 0.5 A TX: 5 A
Current consumption at 12 VDC (all accessories connected)	RX: 0.7 A TX: 7 A

Table A-1: Technical specifications, part 1

Item	Specification
Frequency range	TX: 156,000 MHz — 157,425 MHz, RX: 156,000 MHz — 163.425 MHz

Table A-2: Technical specifications, part 2

Item	Specification
Channel spacing	12.5 kHz and 25 kHz, all international maritime channels
Number of P channels	The radio may be programmed with up to 100 private channels in all channel modes.
Modulation 25 kHz 12.5 kHz	 16K0G3E 10K0G3E
Antenna	50 Ohm antenna, 50 Ohm female SO239 for PL259 plug
Water ingress	IPx8 and IPx6 all over. For flush-mount installations a sealing gasket is included in the delivery.
Transmitter	
Transmit power	Hi/Lo: 25 W and 1 W
RF output power	High: 25 W +0 dB / - 1.5 dB Low: 1 W +0 dB / - 1.5 dB
RF output power, Canada	High: 21 W ±0.75 dB Low: 0.8 W ±0.75 dB
Frequency error	Below 500 Hz
Adjacent channel power	Below 75 dB
Conducted spurious emission	Below 0.25 µW
Distortion	Below 3%
S/N ratio	Better than 46 dB
Receiver	
Sensitivity	< -119 dBm typically @ 20 dB SINAD CCITT weighted
LF power	Built-in loudspeaker: 6 W (at 5 kHz dev./1 kHz tone) External loudspeaker: 6 W / 8 Ohm
Distortion	Below 5%
S/N ratio	Better than 43 dB
Spurious emissions	Below 2 nW

Table A-2: Technical specifications, part 2 (Continued)

Item	Specification
Spurious response rejection	More than 74 dB
Intermodulation response	More than 73 dB
Co-channel rejection	Better than -10 dB
Adjacent channel selectivity	More than 74 dB
Blocking level	More than 94 dBμV

Table A-2: Technical specifications, part 2 (Continued)

A.2 SAILOR 6090 Power Converter 24—12 V

Item	Description
Weight	300 g
Dimensions	Height: 33 mm Width: 190 mm Depth: 85 mm
Operating temperature	-25˚C to 55˚C (5˚F to 131˚F)
Storage temperature	-30˚C to 80˚C (-22˚F to 176˚F)
Input voltage	21—32 VDC
Output voltage	12.5 VDC
Output current (max.)	8 A

Table A-3: Technical specifications, SAILOR 6090

A.3 Declaration of conformity

The SAILOR 6248 VHF complies with the specifications of EC directive 1999/5/EC concerning Radio & Telecommunications Terminal Equipment, enclosed in electronic copy on the next page.

COBHAM

Thrane & Thrane A/S

Declaration of Conformity with R&TTE Directive

The undersigned of this letter declares that the following equipment complies with the specifications of EC directive 1999/5/EC concerning Radio & Telecommunications Terminal Equipment.

Equipment included in this declaration

TT-6248A	SAILOR 6248 VHF Transceiver	PN = 406248A
TT-6201A	SAILOR 6201 Handset	PN = 406201A
TT-6203A	SAILOR 6203 Handset WP	PN = 406203A
TT-6202A	SAILOR 6202 Hand Microphone	PN = 406202A
TT-6204A	SAILOR 6204 Control Speaker Microphone	PN = 406204A
TT-6207A	SAILOR 6207 Accessory Connection box	PN = 406207A
TT-6208A	SAILOR 6208 Control Unit Connection box	PN = 406208A
TT-6090A	SAILOR 6090 Power Converter	PN = 406090A

Equipment Applicability

SAILOR 6248 is a simplex/semi-duplex VHF radiotelephone designed for maritime communication within the frequency range 156.000 MHz to 163.425 MHz.

Declaration

SAILOR 6248 conforms to the RTTE directive with respect to

Article 3(1)(a)	the protection of health and safety
Article 3(1)(b)	electromagnetic compatibility requirements
Article 3(2)	effective use of the spectrum and avoidance of harmful interference

Which is shown by conforming to EU harmonized standards
EN 300 162-2 V1.2.1,
EN 300 698-2 V1.2.1,
EN 301 925 V1.3.1,
EN 60945:2002
EN 60950-1:2006 + A11:2009
EN 60950-22:2006

Manufacturer

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Porsvej 2, DK-9200 Aalborg SV, Denmark

Place and Date

Aalborg, 2nd May 2013

CE 0470

Chief Financial Officer
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DS/EN ISO 9001

Page 1 of 1

System configurations

This appendix lists selected examples of system configurations.

For an overview and specifications of the cables needed see ***Cable requirements* on page B-23**.

Note | For installation of the connection boxes see *Connection box SAILOR 6207* on page 2-20 and *Connection box SAILOR 6208* on page 2-22.

B.1 System configuration examples

The following list shows system configurations, with additional handsets, alarm panels, connection boxes and cable information.

1. *How to connect a DC Power Supply 6090*
2. *How to connect an AC Power Supply N163S*
3. *How to connect a DC Power Supply N420*
4. *How to install an additional SAILOR 6201, VDR, loudspeaker & AUX OC*
5. *How to install a SAILOR 6270 External Loudspeaker*
6. *How to install 2 extra SAILOR 6201 Handsets*
7. *How to install an extra SAILOR 6201 Handset in SAILOR 6207*
8. *How to install a SAILOR 6202 Hand Microphone and an extra SAILOR 6201*
9. *How to install a CAN bus and a SAILOR 6204 CSM close to the VHFHow to install a CAN bus and a SAILOR 6204 CSM close to the VHFHow to install a CAN bus and a SAILOR 6204 CSM close to the VHF*
10. *How to install a CAN bus with a SAILOR 6204 CSM not close to the VHF radio*
11. *How to install a CAN bus with a SAILOR 6204 CSM far from the VHF radio*
12. *How to install a CAN bus with 2 SAILOR 6204 close to the VHFHow to install a CAN bus and 2 SAILOR 6204 CSM far from the VHFHow to install a CAN bus with 2 SAILOR 6204 close to the VHFHow to install a CAN bus and 2 SAILOR 6204 CSM far from the VHF*
13. *How to install a CAN bus with 2 SAILOR 6204 close to the VHFHow to install a CAN bus and 2 SAILOR 6204 CSM far from the VHFHow to install a CAN bus with 2 SAILOR 6204 close to the VHFHow to install a CAN bus and 2 SAILOR 6204 CSM far from the VHF*
14. *How to install a CAN bus with 2 SAILOR 6204 CSMs close to each other*
15. *How to install a CAN bus with 2 SAILOR 6204 CSMs close to VHF on a small bridge*
16. *How to install a CAN bus with 2 CSMs in bridge wings*
17. *How to install a CAN bus with 3 CSMs in bridge wings*
18. *How to install a CAN bus with 4 CSMs in bridge wings*
19. *How to install a CAN bus with 3 SAILOR 6204 CSMs*
20. *How to install a CAN bus with 4 SAILOR 6204 CSMs*

21.*How to install LAN*

B.1.1 How to connect a DC Power Supply 6090

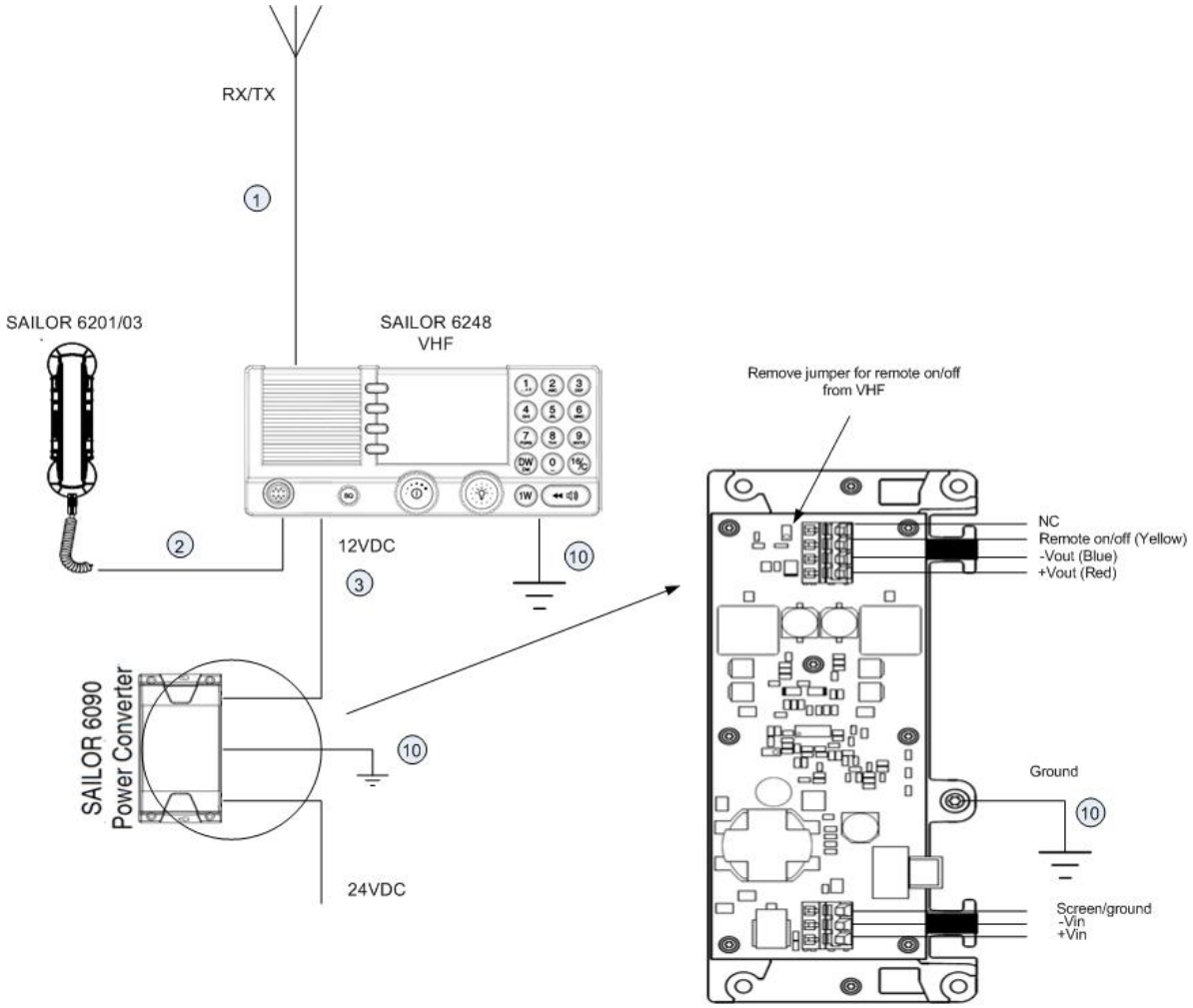

Figure B-1: System configuration, DC Power Supply 6090

B.1.2 How to connect an AC Power Supply N163S

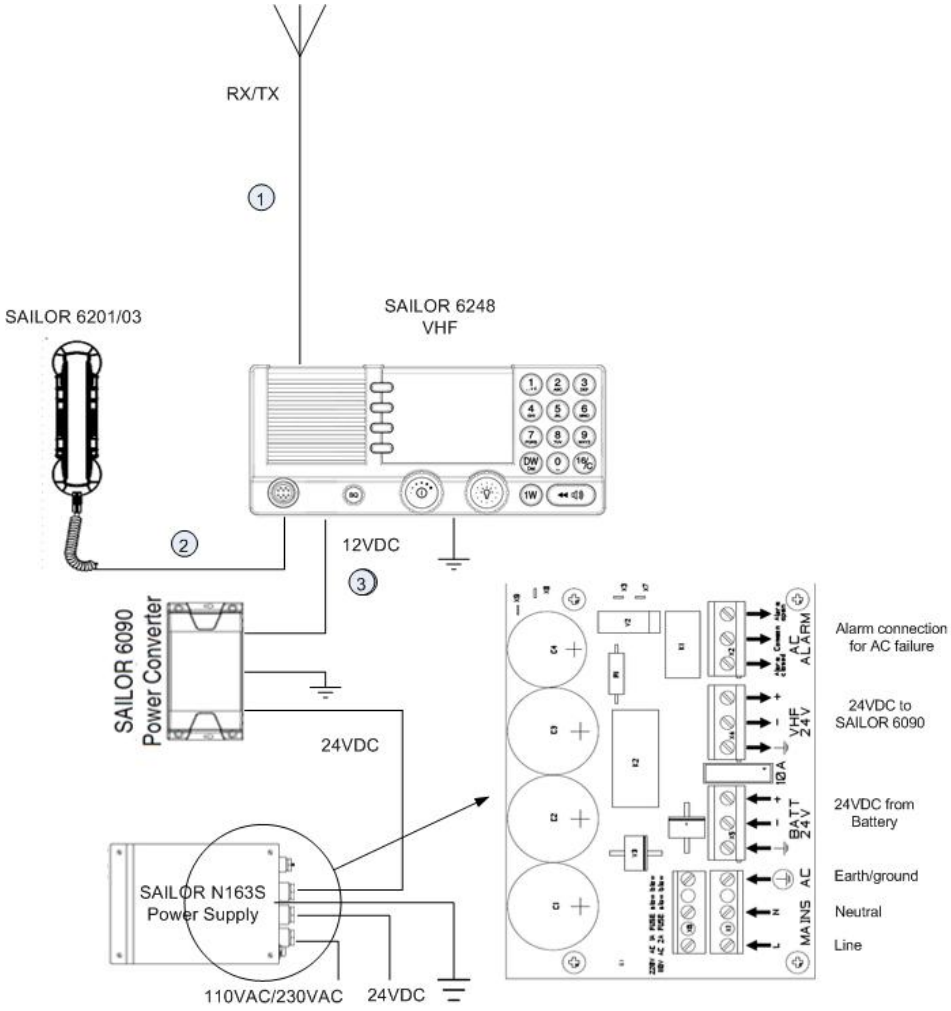

Figure B-2: System configuration, AC Power Supply N163S

B.1.3 How to connect a DC Power Supply N420

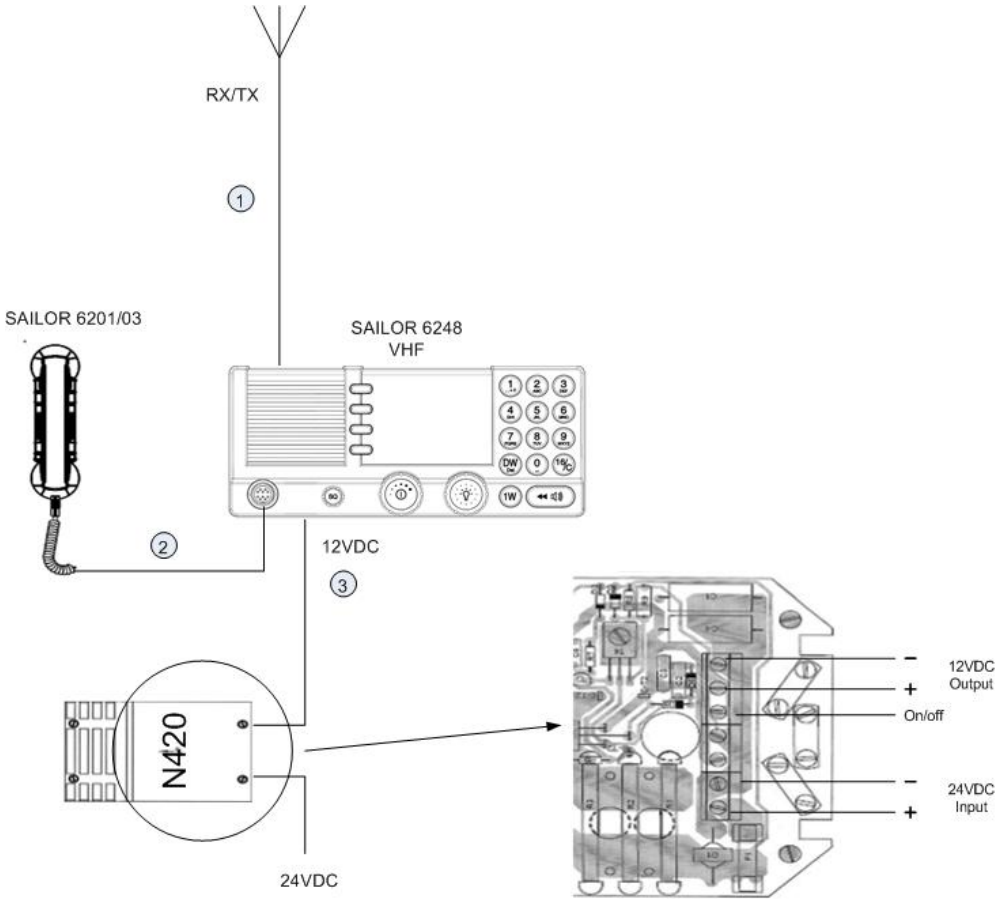

Figure B-3: System configuration, DC Power Supply N420

B.1.4 How to install an additional SAILOR 6201, VDR, loudspeaker & AUX OC

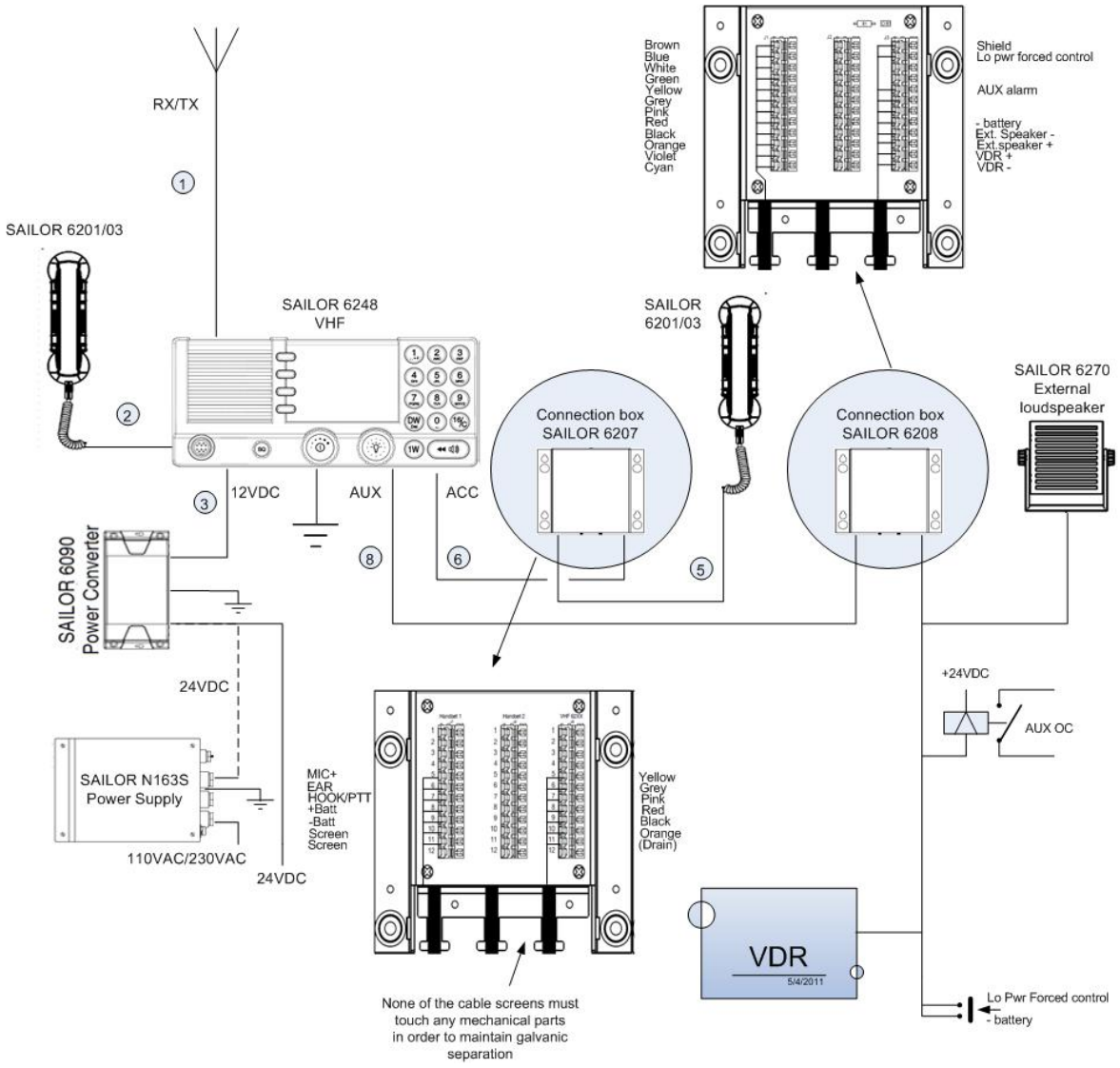

Figure B-4: System configuration, SAILOR 6201, VDR, loudspeaker and AUX OC

B.1.5 How to install a SAILOR 6270 External Loudspeaker

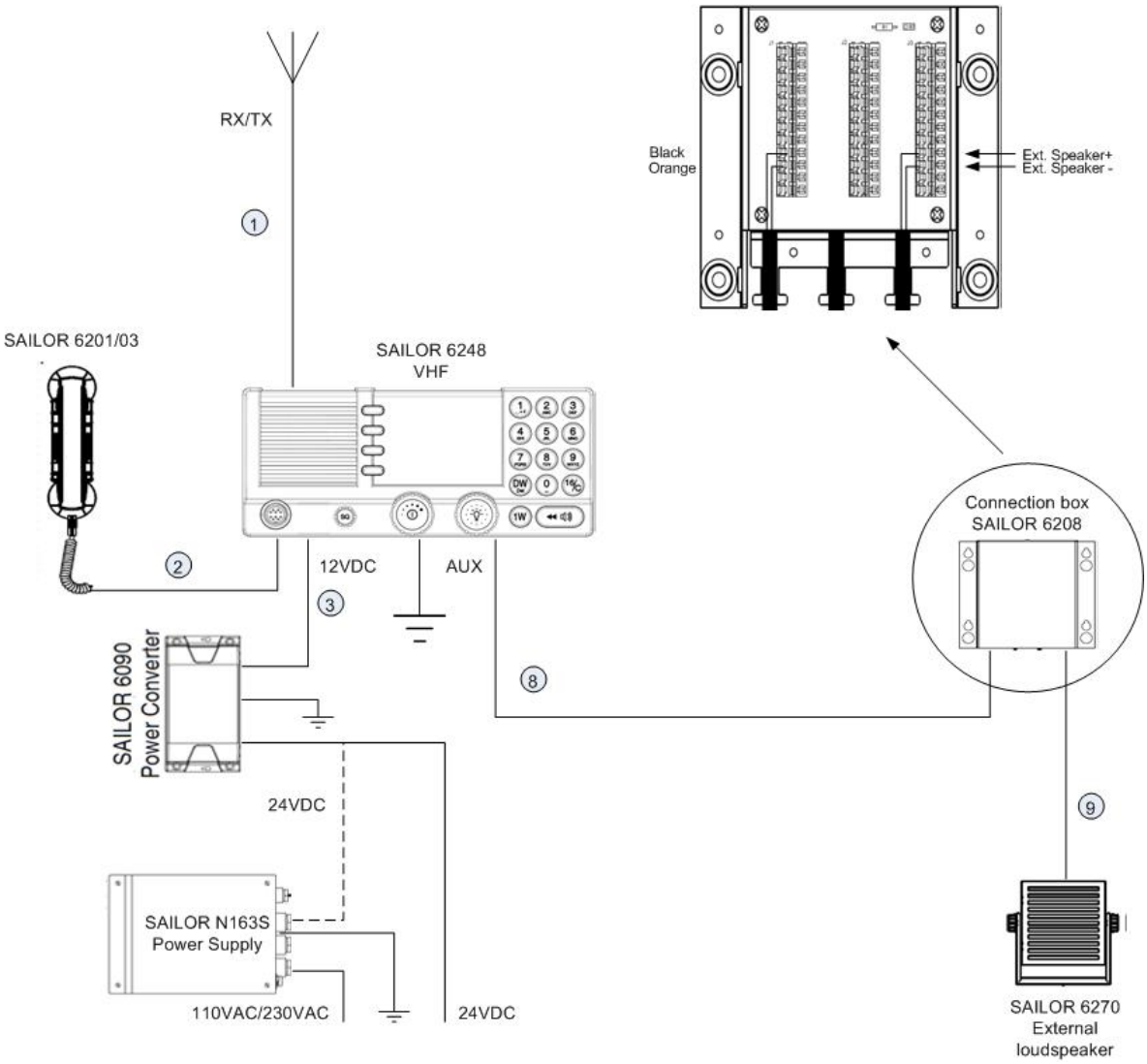

Figure B-5: System configuration, SAILOR 6270 External Loudspeaker

B.1.6 How to install 2 extra SAILOR 6201 Handsets

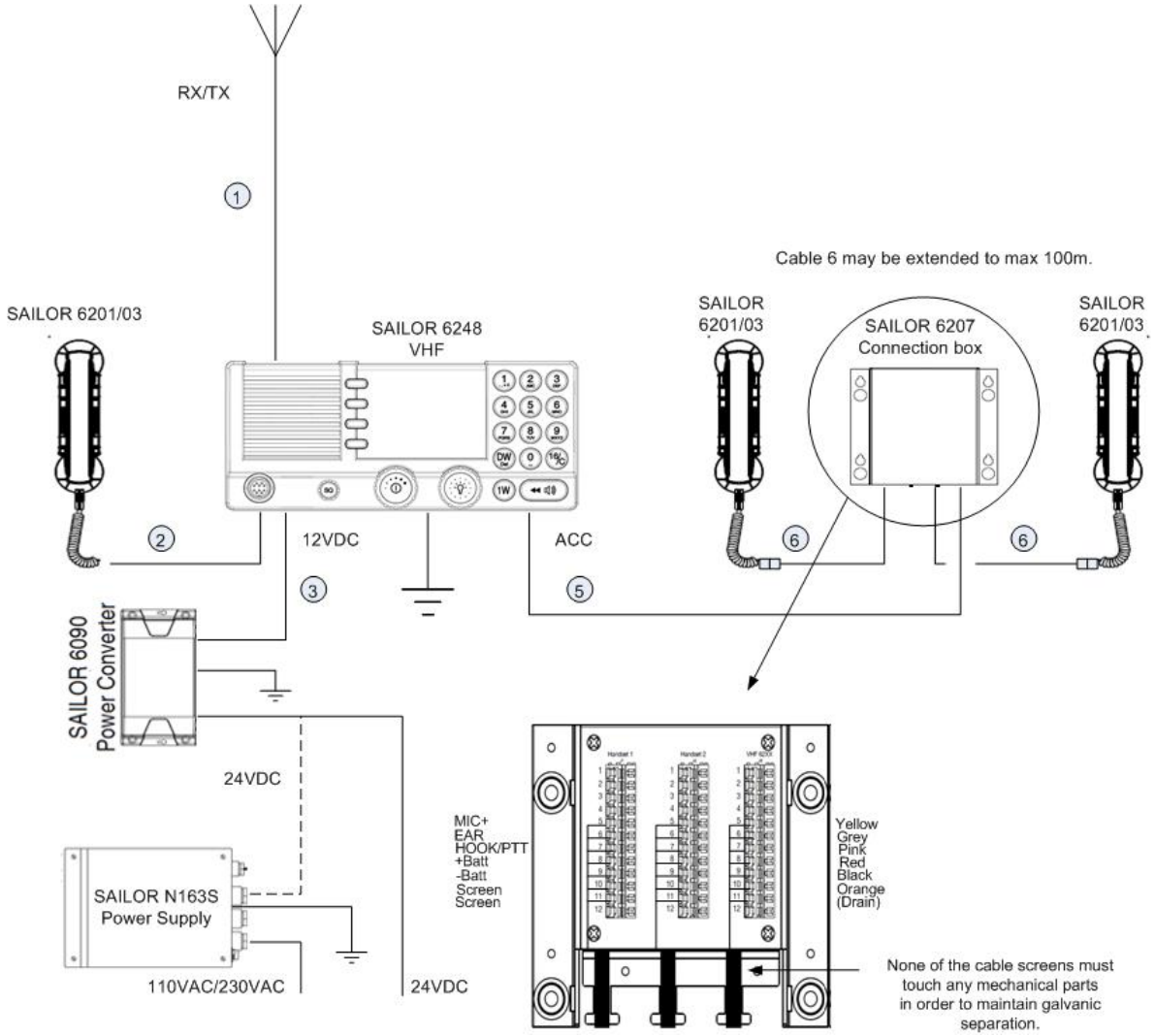

Figure B-6: System configuration, 2 SAILOR 6201 Handsets

B.1.7 How to install an extra SAILOR 6201 Handset in SAILOR 6207

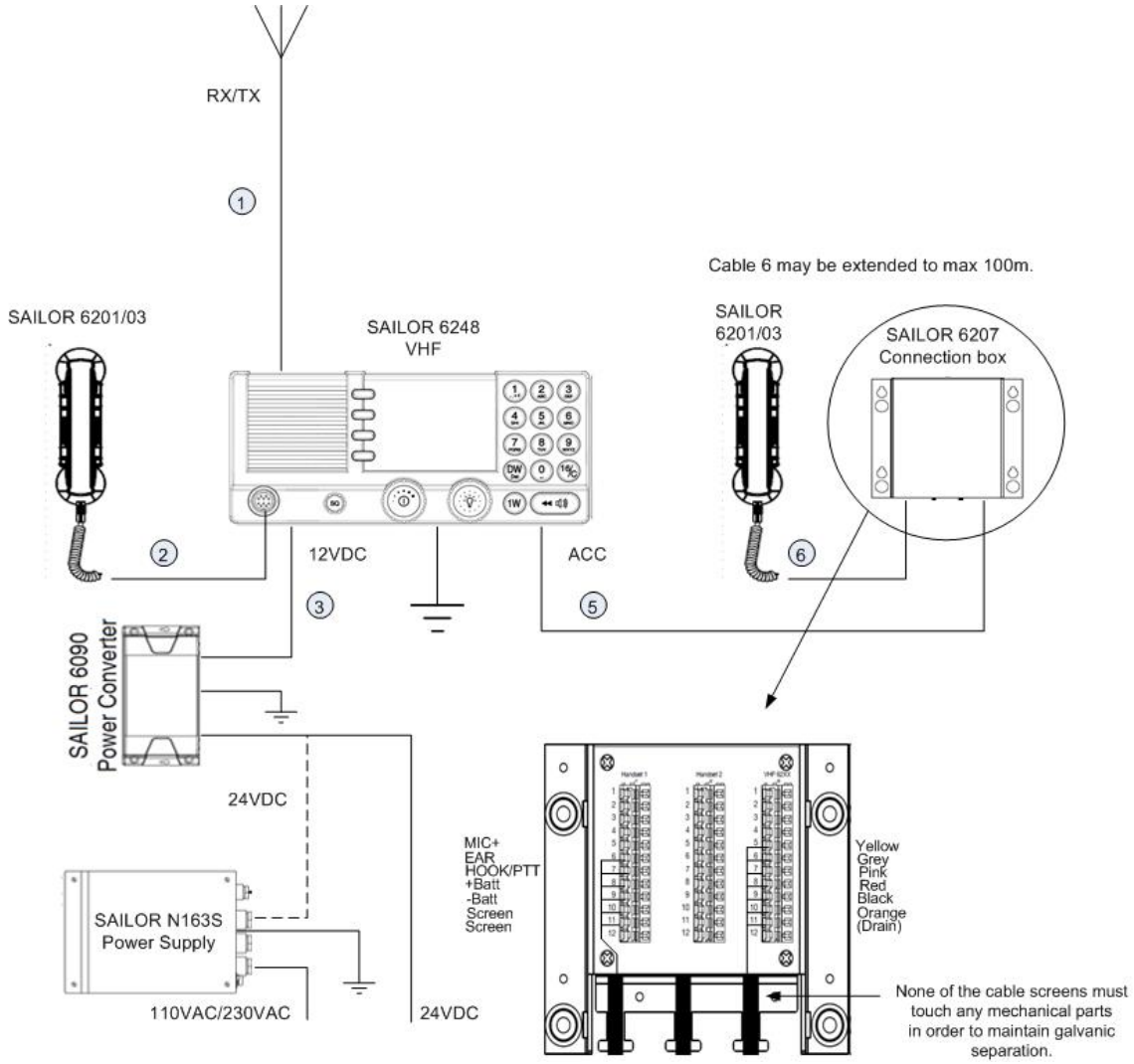

Figure B-7: System configuration, extra SAILOR 6201 Handset in SAILOR 6207

B.1.8 How to install a SAILOR 6202 Hand Microphone and an extra SAILOR 6201

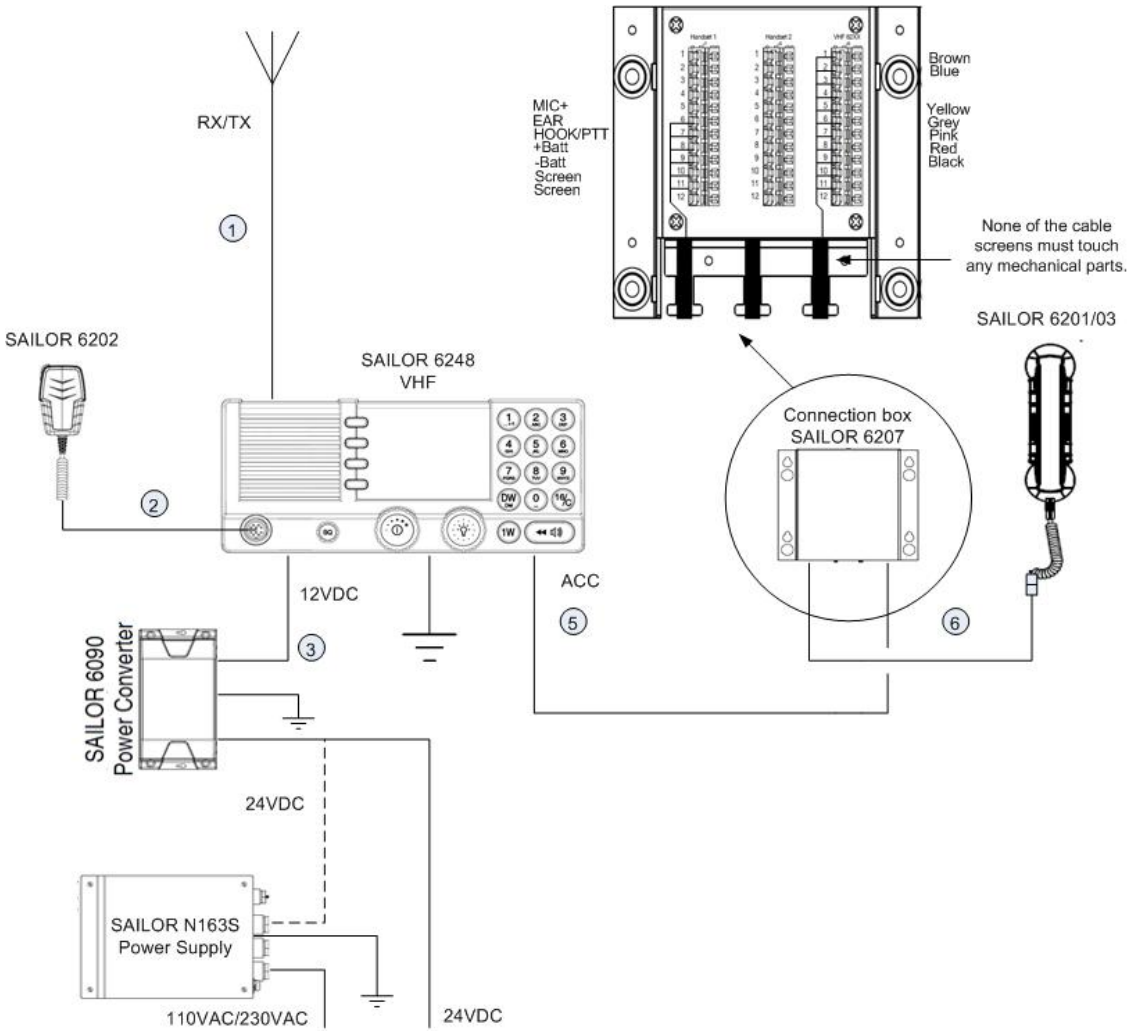

Figure B-8: System configuration, SAILOR 6202 Hand Mic. and SAILOR 6201 Handset

B.1.9 How to install a CAN bus and a SAILOR 6204 CSM close to the

VHF

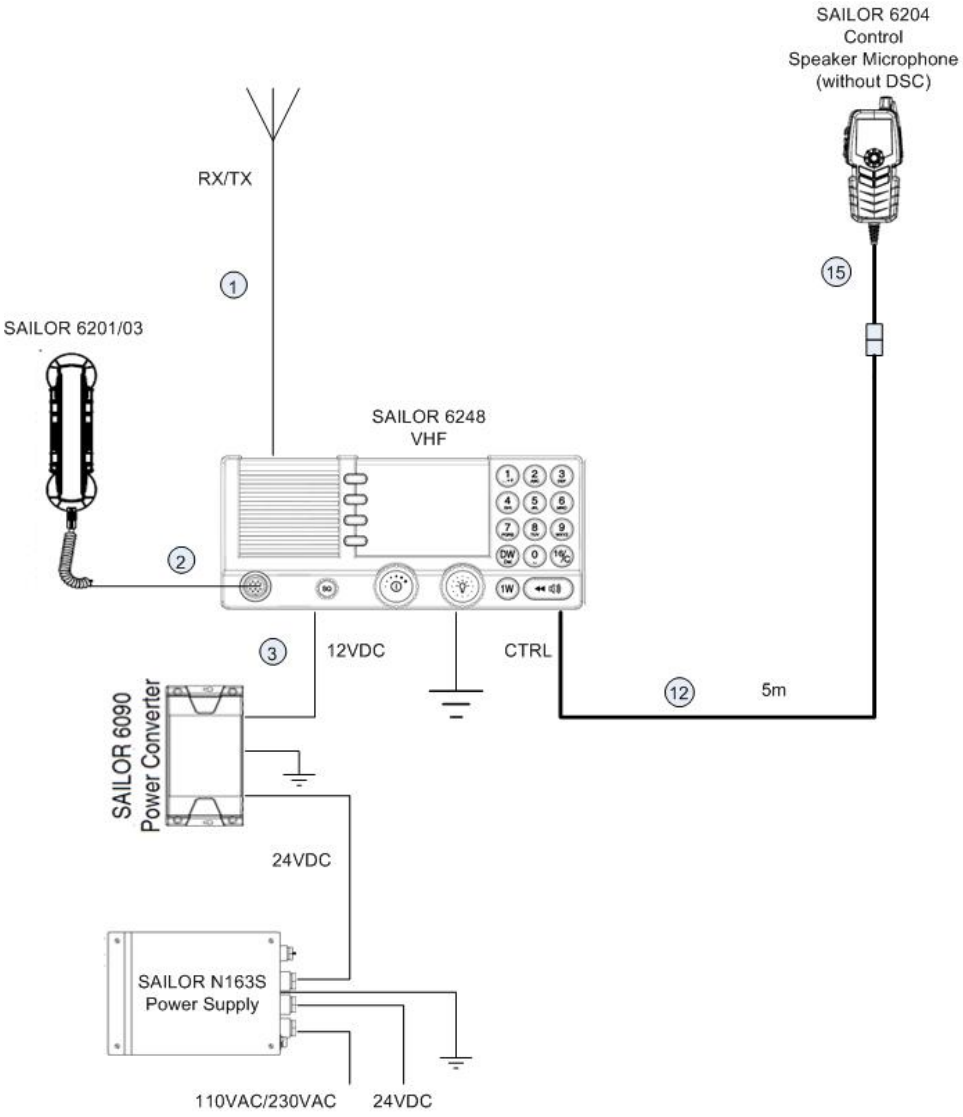

Figure B-9: System configuration, CAN bus, SAILOR 6204 CSM, close to the VHF radio

B.1.10 How to install a CAN bus with a SAILOR 6204 CSM not close to

the VHF radio

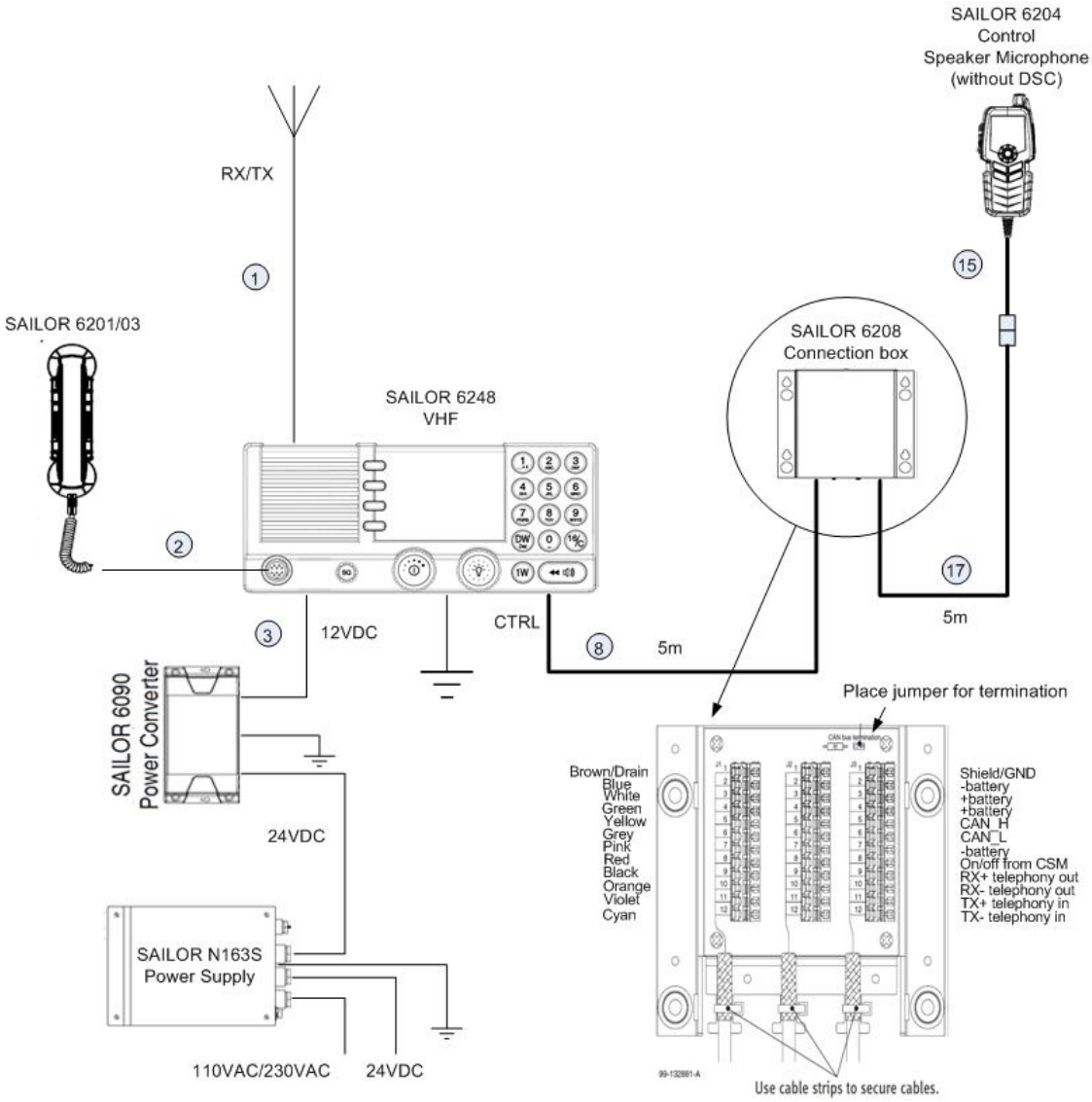

Figure B-10: System configuration, CAN bus, SAILOR 6204 CSM, not close to the VHF radio

B.1.11 How to install a CAN bus with a SAILOR 6204 CSM far from the VHF radio

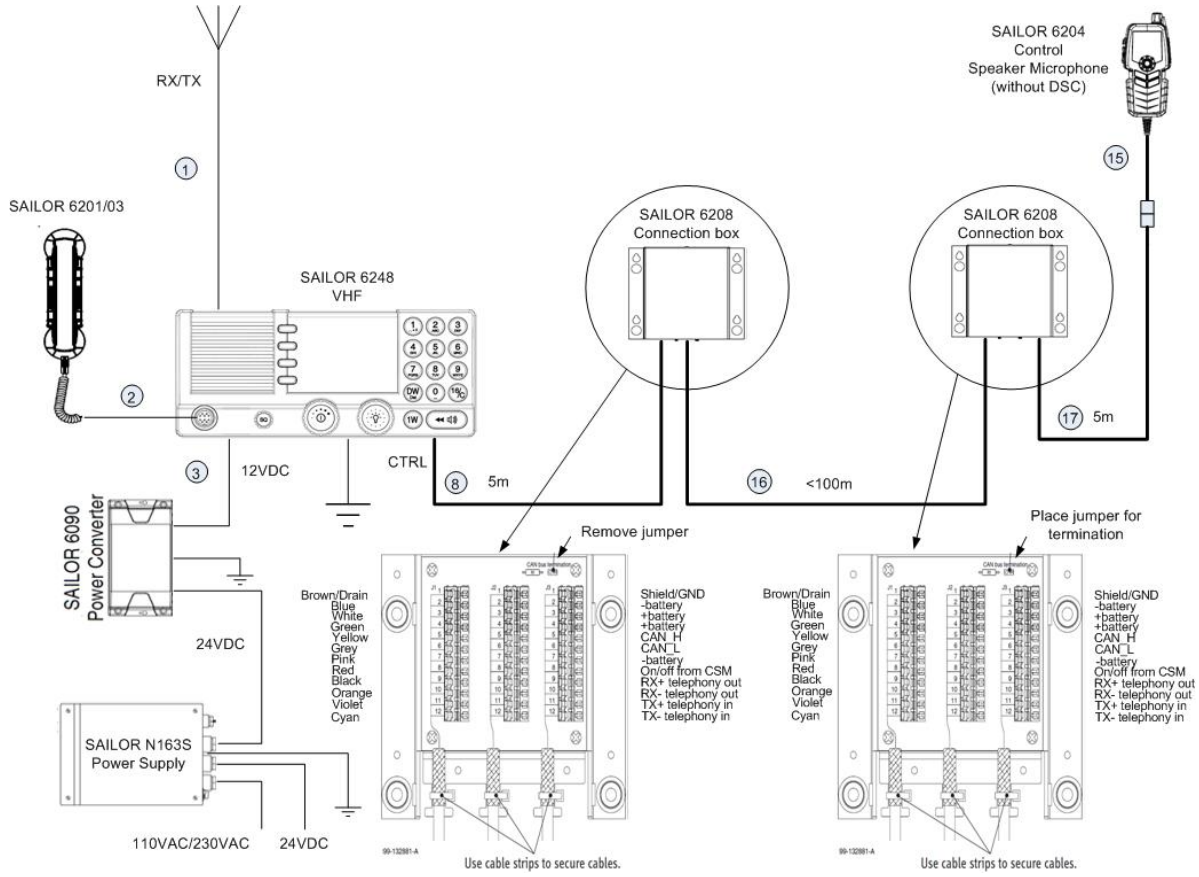

Figure B-11: System configuration, CAN bus, SAILOR 6204 CSM, far from the VHF radio

B.1.12 How to install a CAN bus with 2 SAILOR 6204 close to the

VHFHow to install a CAN bus and 2 SAILOR 6204 CSM far from

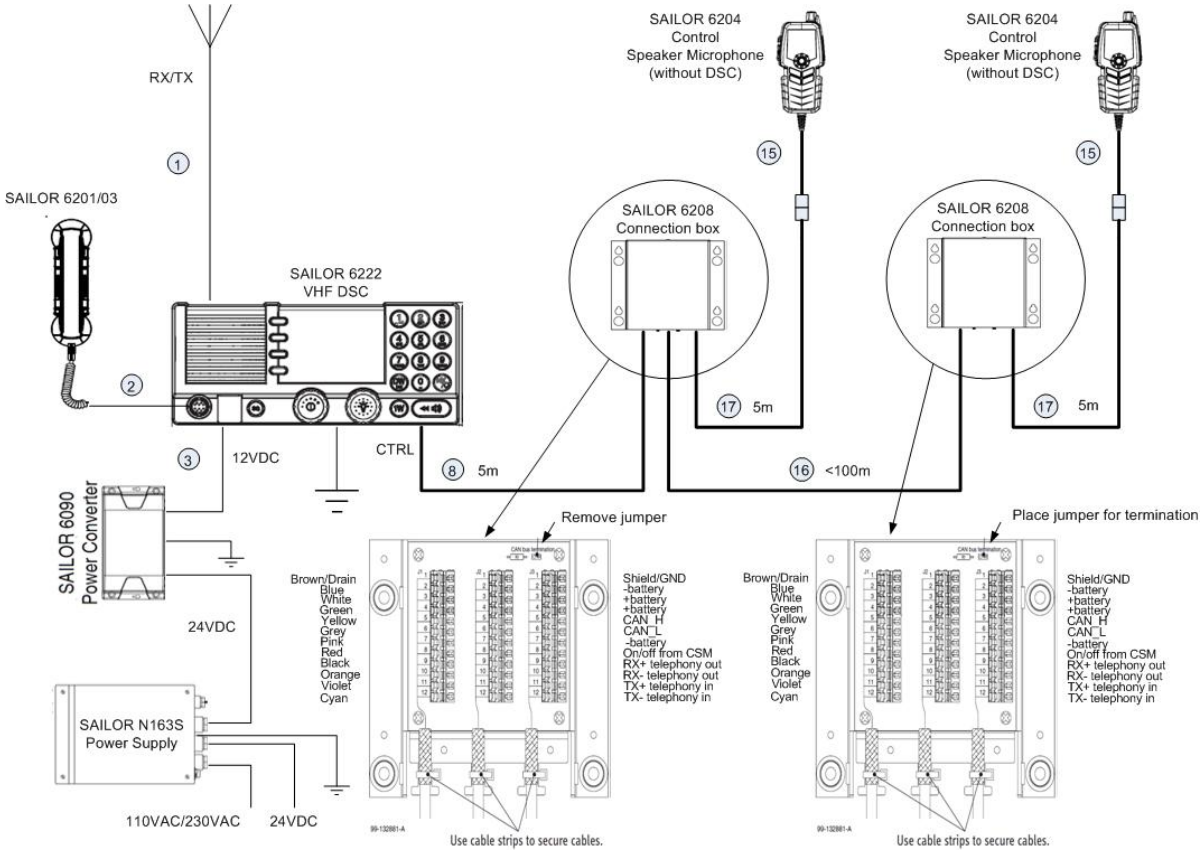

Figure B-12: System configuration, CAN bus, 2 SAILOR 6204 CSMs, close to VHF radio

the VHF

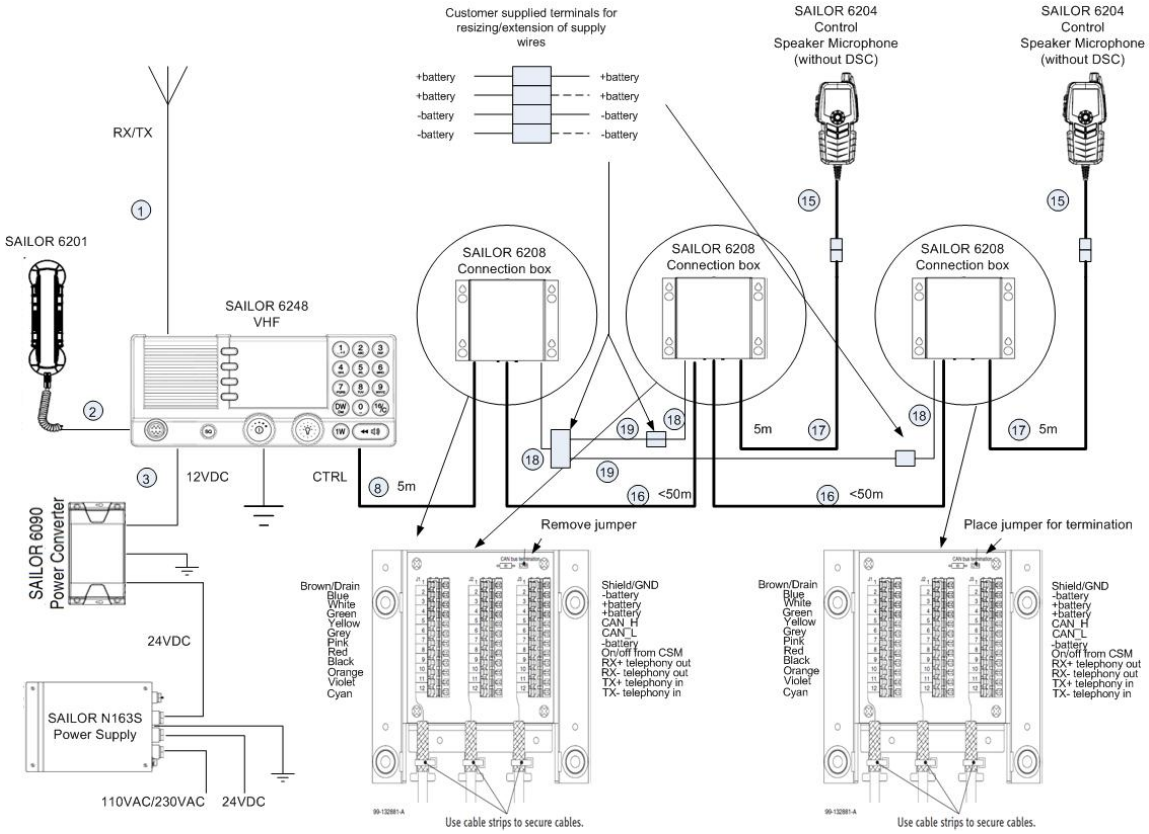

Figure B-13: System configuration, CAN bus, 2 SAILOR 6204 CSMs, far from VHF radio

B.1.13 How to install a CAN bus with 2 SAILOR 6204 CSMs close to each other

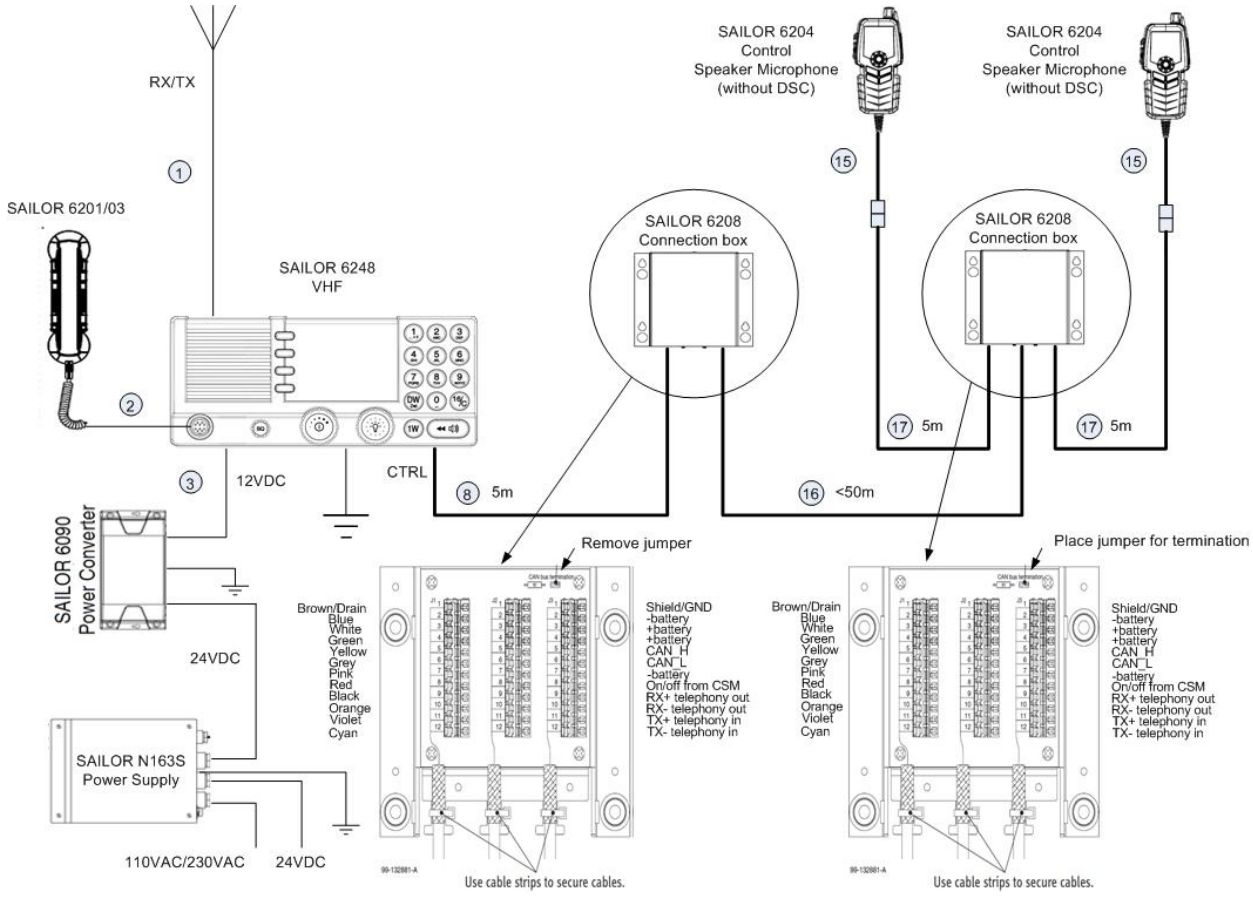

Figure B-14: System configuration: CAN bus, 2 SAILOR 6204 CSMs, close to each other

B.1.14 How to install a CAN bus with 2 SAILOR 6204 CSMs close to VHF on a small bridge

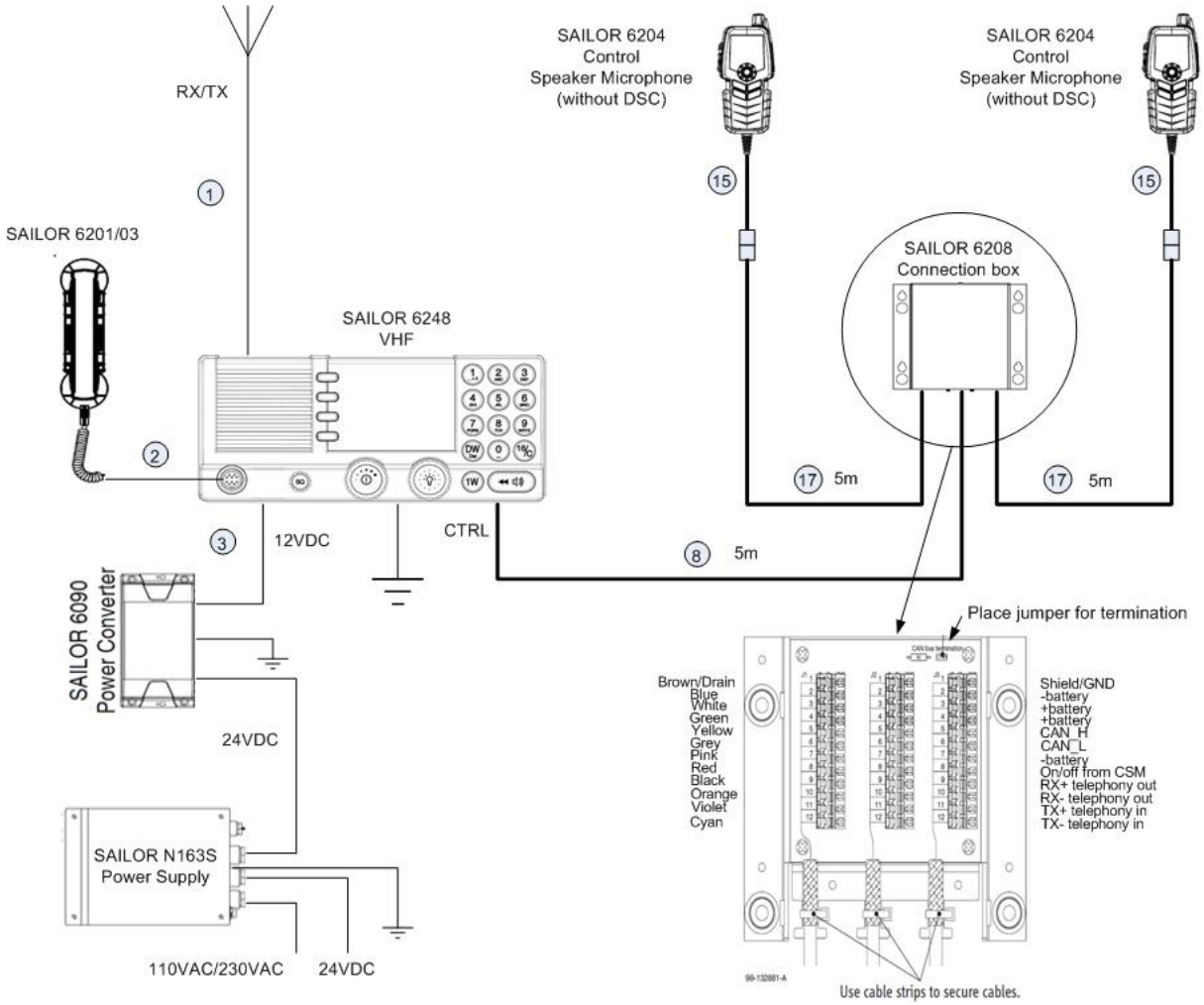

Figure B-15: System configuration: CAN bus, 2 SAILOR 6204 CSMs, close VHF, small bridge

B.1.15 How to install a CAN bus with 2 CSMs in bridge wings

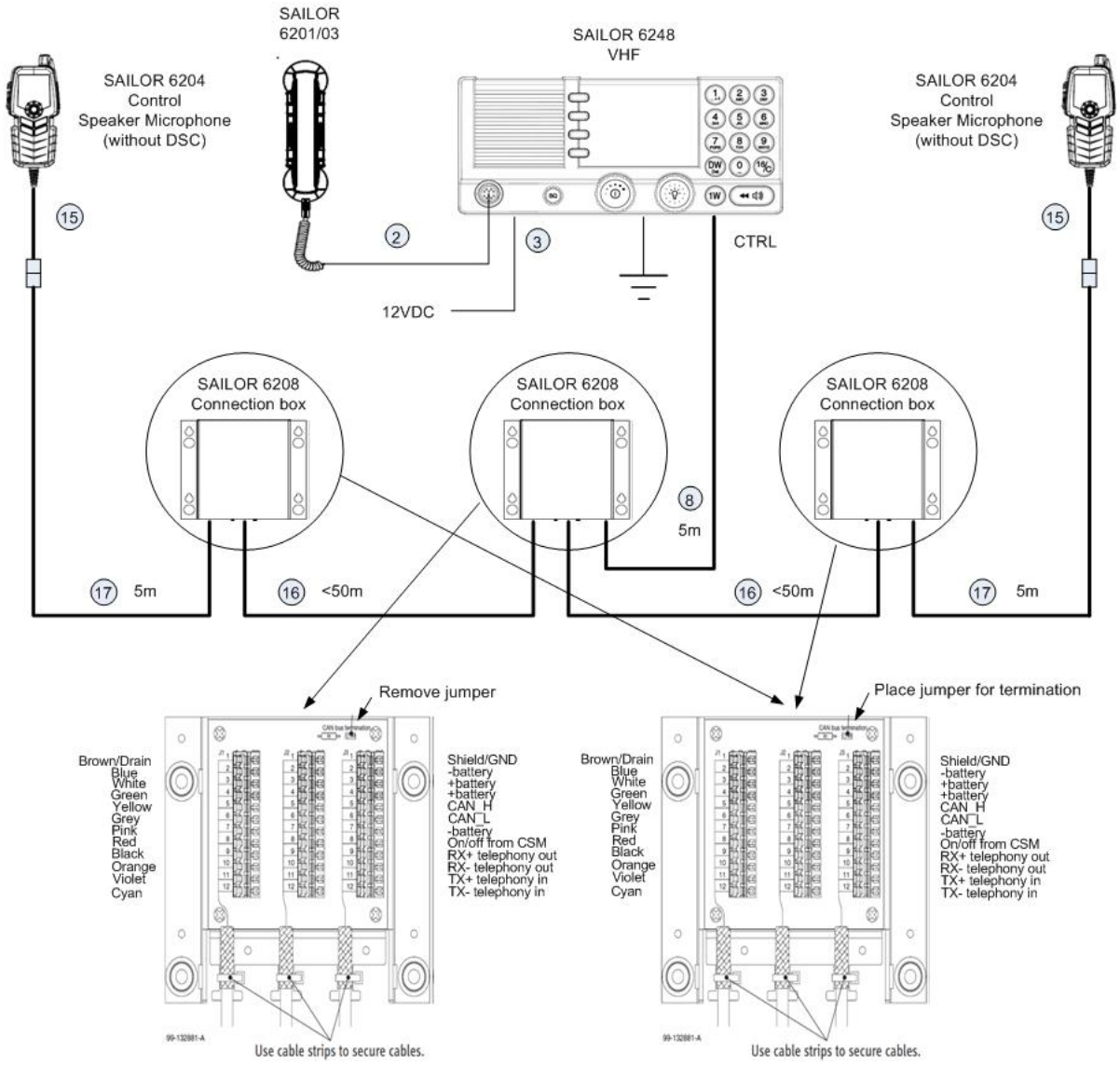

Figure B-16: System configuration: CAN bus, 2 SAILOR 6204 CSMs, in bridge wings

B.1.16 How to install a CAN bus with 3 CSMs in bridge wings

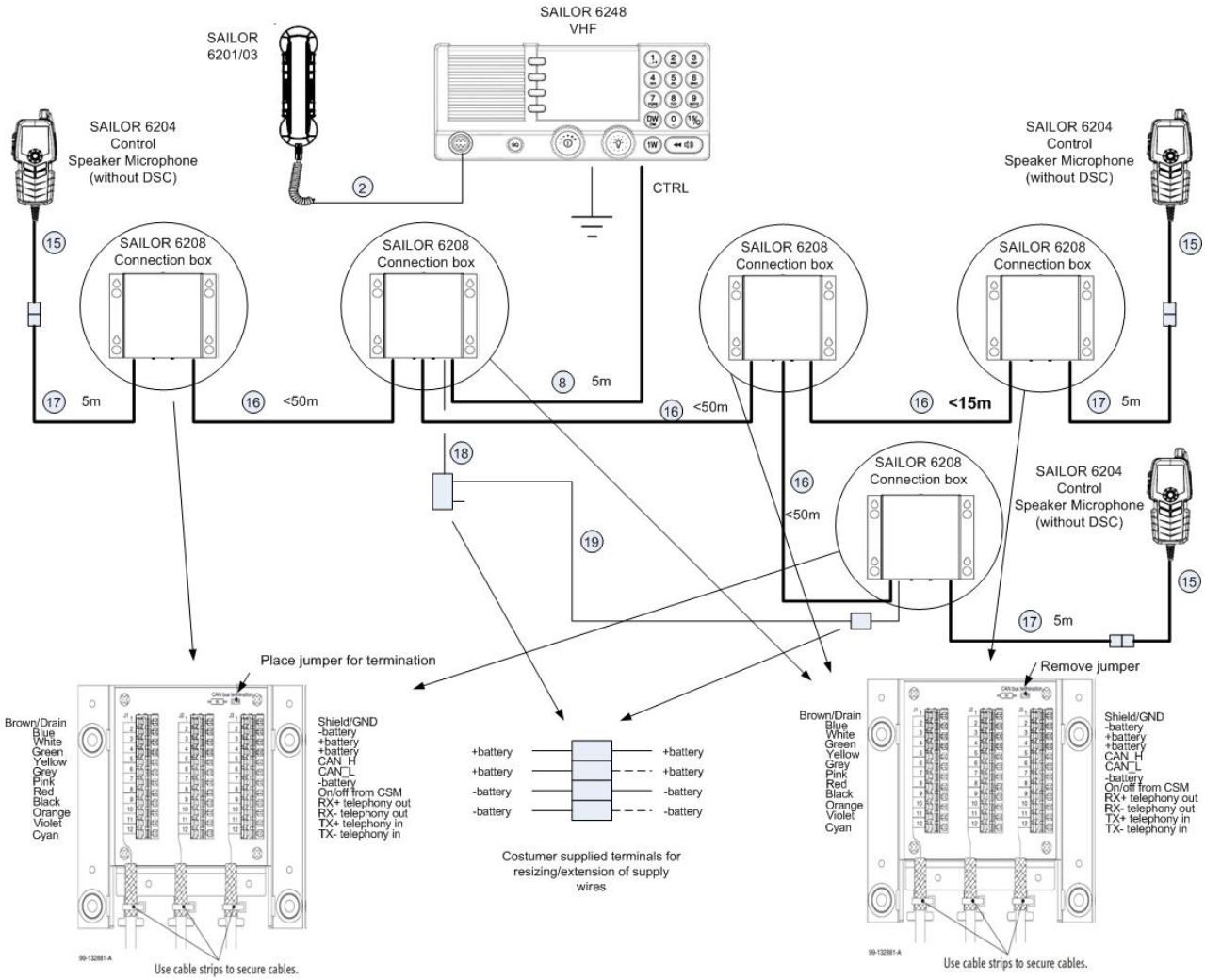

Figure B-17: System configuration: CAN bus, 3 SAILOR 6204 CSMs, in bridge wings

B.1.17 How to install a CAN bus with 4 CSMs in bridge wings

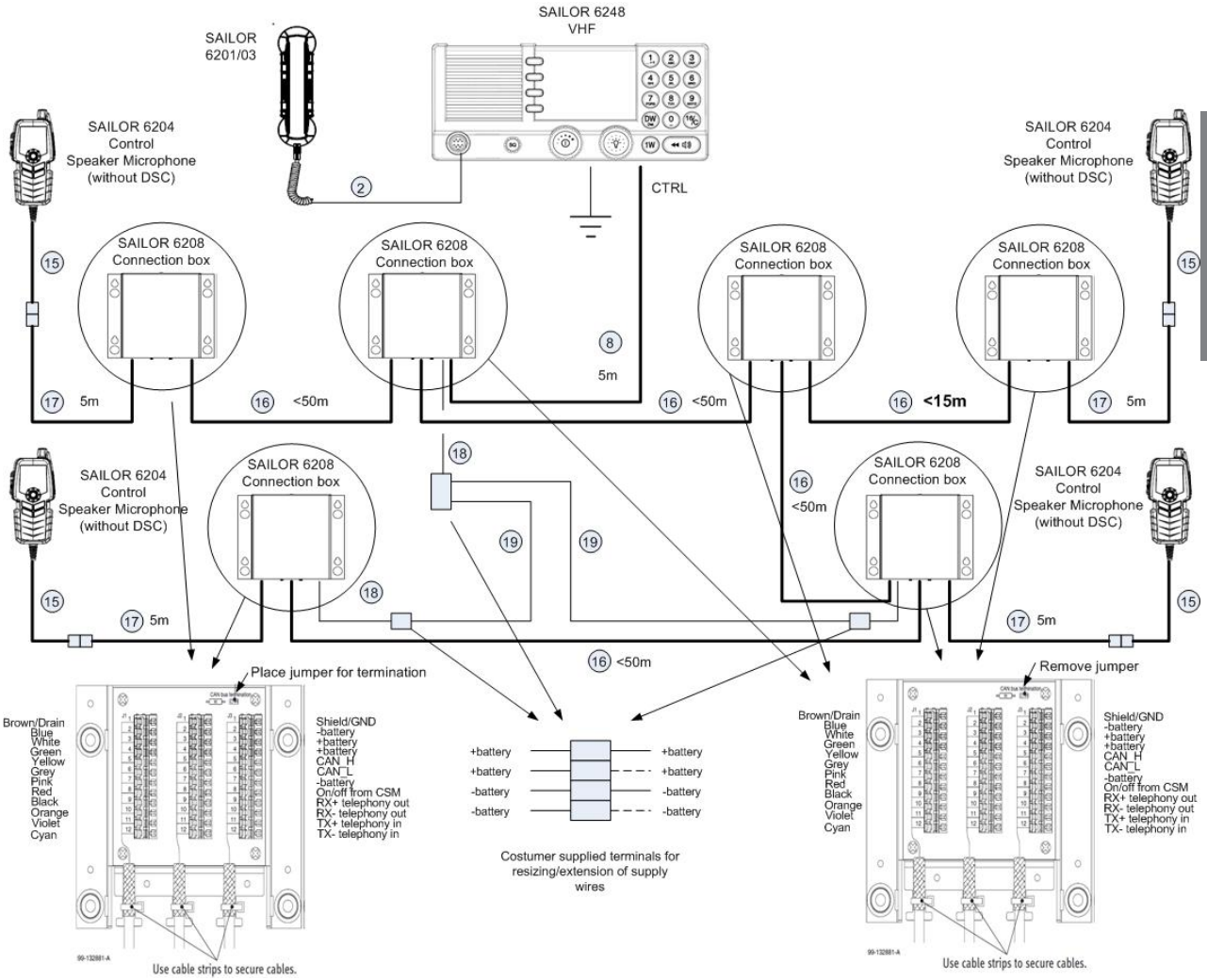

Figure B-18: System configuration: CAN bus, 4 SAILOR 6204 CSMs, in bridge wings

B.1.18 How to install a CAN bus with 3 SAILOR 6204 CSMs

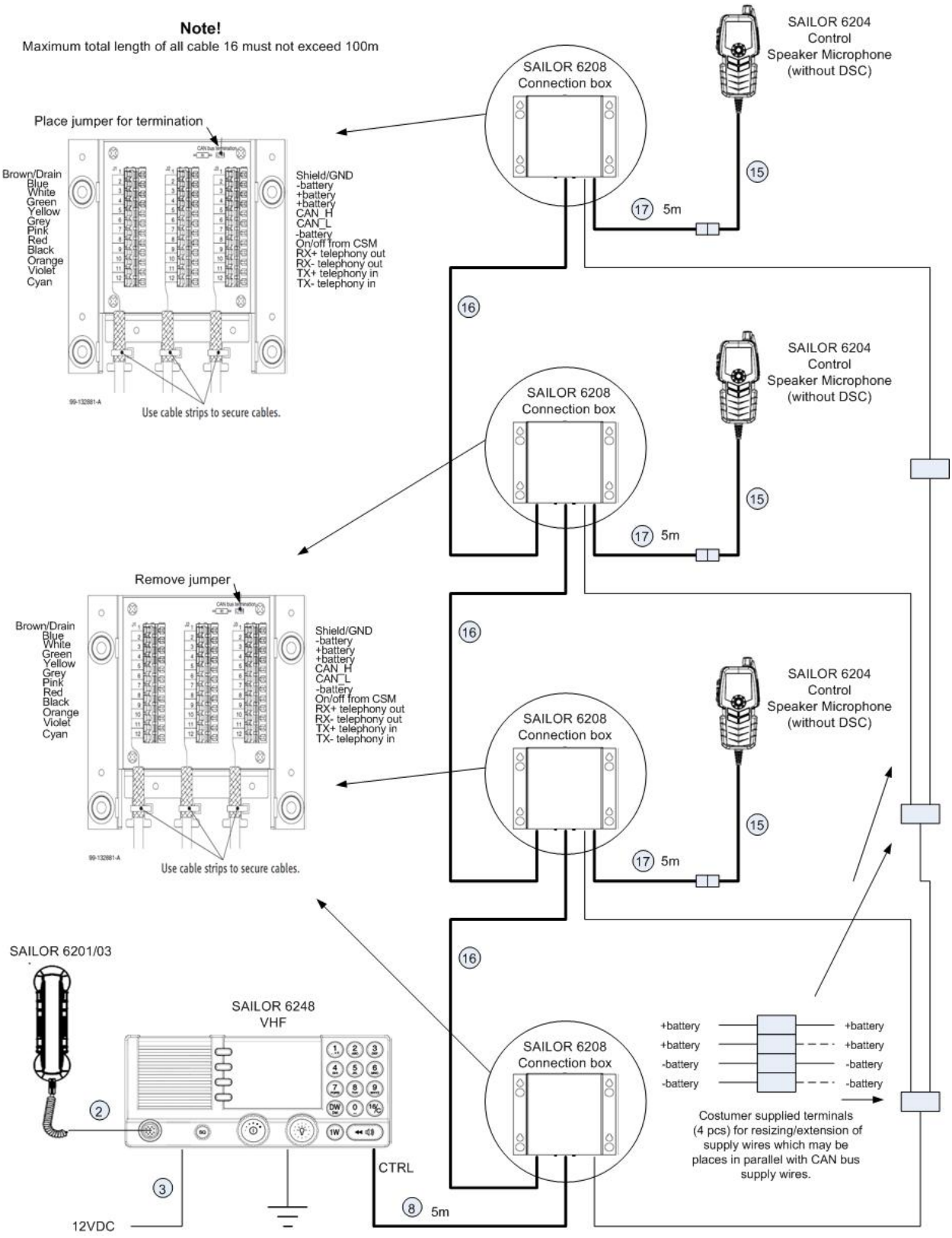

Figure B-19: System configuration: CAN bus, 3 SAILOR 6204 CSMs

B.1.19 How to install a CAN bus with 4 SAILOR 6204 CSMs

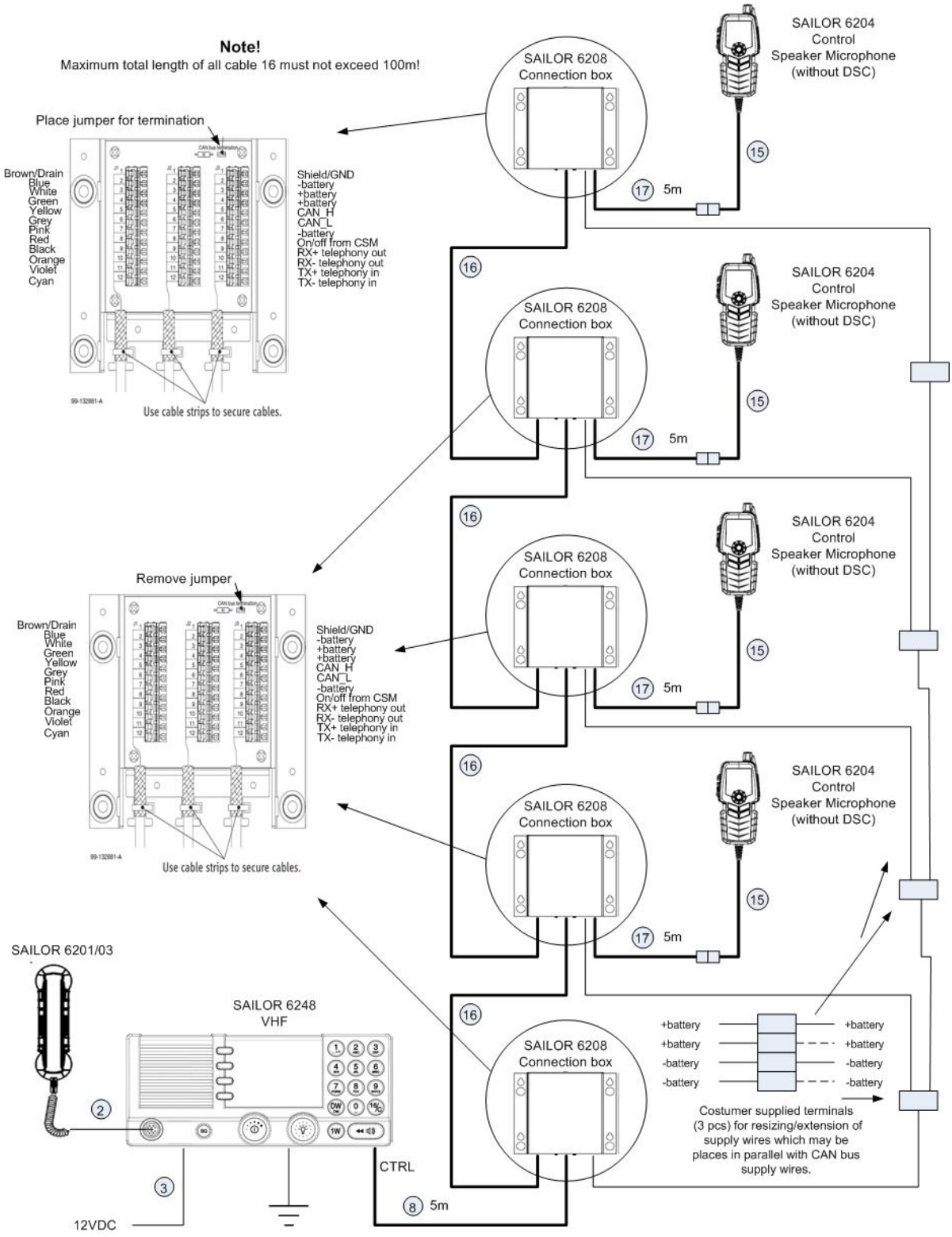

Figure B-20: System configuration: CAN bus, 4 SAILOR 6204 CSMs

B.1.20 How to install LAN

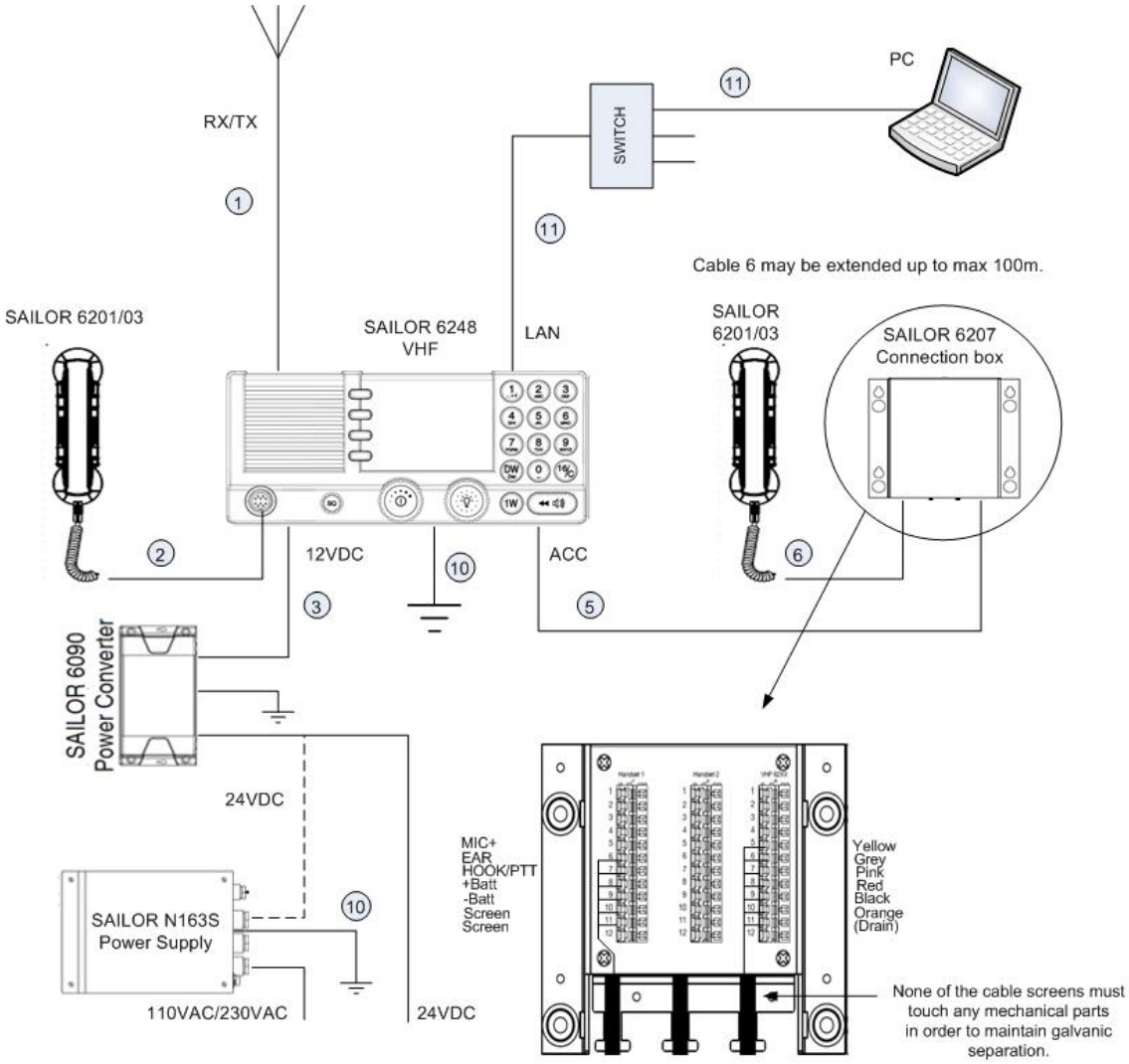

Figure B-21: System configuration: Installation of LAN

B.2 Cable requirements

The following cable information relates to the cable numbers in the system configuration drawings on the previous pages.

Cable	Part number	Description	Specification	Remarks
1		Antenna cable	RG214 or better	
2		Handset cable	1 m, spiraled	Part of handset
3	TT-37-131344	Power cable	1.5 m power cable	Included in 406248A
4	Not a T&T part	3-wire power cable, shielded	Depends on length	24 VDC, 4 A
5	406209-941	5 m cable for SAILOR 6207 Connection Box	10-pole LTW cable with screen	Included in Connection Box 406207A
6	406209-940	5 m cable for bulk mount	10-pole LTW cable with screen	
7			2-pole screened cable	
8	406208-941	5 m cable for SAILOR 6208 Connection Box	12-pole LTW cable with screen	Included in Connection Box 406208A
9			2-pole screened cable for loudspeaker	
10		0.3 m	Earth connection	
11		3 m	LAN, Ethernet cable	Shielded
12	406204-940	5 m cable for SAILOR 6204 Control Speaker Microphone	12-pole LTW cable for CAN, with screen	Extension cable with LTW plugs in both ends
13		3 m audio cable	Test cable	
14		1.5 m power cable		
15		Cable for SAILOR 6204 Control Speaker Microphone	2.5 m, spiraled	Part of handset
16		Cable for CAN	Screened with twisted pairs, length and size see cable description for *Cable 16* on page B-29.	Extension cable for CAN bus, see also under cable description for *Cable 16* on page B-29.

Table B-1: Cable overview

Cable	Part number	Description	Specification	Remarks
17	406204-940	As cable (12). Plug for CTRL is removed and wires connected to connection box	12-pole LTW cable with screen	Extension cable with LTW bulk mount plug
18	Not a T&T part.	Extension cable for power supply. Length: max. 5 m	4 leads, screened wires of 0.5 mm^2	
19	Not a T&T part	Extension cable for power supply for SAILOR 6204.	4 leads, screened wires of 4 mm^2 depending on the current and/or cable length.	See cable description.

Table B-1: Cable overview (Continued)

Cable 1

Cable type: Coax cable RG 214 or better.

Cable 2 (Handset, cable included)

SAILOR 6248 VHF Front connector LTW 10-pin, circular male	Signal designation	Signal description
Pin 1	NC	
Pin 2	NC	
Pin 3	NC	
Pin 4	NC	
Pin 5	MIC+	Microphone signal
Pin 6	Earpiece	Earpiece signal
Pin 7	Hook_PTT	Hook/PTT signal
Pin 8	Battery+ (10.8-15.6 VDC)	Battery supply when radio is on
Pin 9	Internal GND = -Battery	Equipment ground
Pin 10	Internal GND = -Battery	Equipment ground

Table B-2: Cable specifications for cable 2

Cable 3 (Power cable, delivered with 406248A)

Cable type: 3-wire cable.

+ VDC	Red
0 VDC	Blue
ON/OFF	Yellow

Table B-3: Cable specifications for cable 3

Note External power supply input is galvanically isolated from equipment ground reference, i.e. chassis.

Equipment internal power supply reference (-) is at equipment ground reference, i.e. chassis.

Cable 4 (Power cable)

Cable type: 3-wire screened cable. Dimensions depend on the cable length.

Cable 5 (Cable for SAILOR 6207 Connection Box)

Cable type: 10-wire screened cable.

Part number: 406209-941

The cable screen must not touch any metal part of the connection box due to galvanic separation.

SAILOR 6248 VHF ACC connector LTW 10-pin, circular male	Signal designation	Cable pin 406209-941 (5 m)	SAILOR 6207 Connection Box In from VHF	SAILOR 6207 Connection Box Ext. connections	Signal description
Pin 1	NC	Brown	1-1	2(3)-1	Impedance: 600 Ohm. Max. 2 mA at min. level of 2 V (61162-1)
Pin 2	NC	Blue	1-2	2(3)-2	
Pin 3	NC	White	1-3	2(3)-3	Impedance: 600 Ohm. Max. 2 mA at min. level of 2 V
Pin 4	NC	Green	1-4	2(3)-4	
Pin 5	MIC+	Yellow	1-5	2(3)-5	Microphone signal
Pin 6	Earpiece	Grey	1-6	2(3)-6	Earpiece signal
Pin 7	Hook_PTT	Pink	1-7	2(3)-7	Hook/PTT signal

Table B-4: Cable specifications for cable 5

SAILOR 6248 VHF ACC connector LTW 10-pin, circular male	Signal designation	Cable pin 406209-941 (5 m)	SAILOR 6207 Connection Box In from VHF	SAILOR 6207 Connection Box Ext. connections	Signal description
Pin 8	Battery+ (10.8-15.6 VDC)	Red	1-8	2(3)-8	Battery supply when radio is on
Pin 9	Internal GND = -Battery	Black	1-9	2(3)-9	Equipment ground
Pin 10	Internal GND = -Battery	Orange - SCREEN (Drain)	1-10	2(3)-10	Equipment ground
	Cable screen		1-11	2(3)-11	Cable screen must not touch any metal part of the connection box.
			1-12	2(3)-12	Not in use.

Table B-4: Cable specifications for cable 5

Cable 6

Connection cable for bulkhead mount, 5 m.

Part number: 406209-940

Same pin configuration as cable 5.

Cable 7

2-wire screened cable. Not used.

Cable 8 (AUX)

Part number: 406208-941

SAILOR 6248 VHF AUX connector LTW 12-pin, circular male	Signal designation	Cable pin 406208-941 (5 m)	SAILOR 6208 Conn. Box In from VHF	SAILOR 6208 Conn. Box Out of box	SAILOR 6208 Conn. Box Out of box	Signal description	Ships cable 6 twisted pairs overall screen
Pin 1	Shield/GND	Brown	J1-1	J2-1	J3-1	Equipment ground	paired with no. 8
Pin 2	Lo Power	Blue	J1-2	J2-2	J3-2	Low power forced control. Active when connected to ground	paired with no. 3
Pin 3	Not used	White	J1-3	J2-3	J3-3	Impedance: 600 Ohm. Max. 2 mA at min. level of 2 V	paired with no. 2
Pin 4	Not used	Green	J1-4	J2-4	J3-4		paired with no. 7
Pin 5	Not used	Yellow					
Pin 6	Not used	Grey					
Pin 7	AUX	Yellow	J1-5	J2-5	J3-5	Open Collector output. Closing on event predefined through service programming[a]	paired with no. 6
Pin 8	Battery-	Red	J1-8	J2-8	J3-8	Battery GND	paired with no. 1
Pin 9	Ext. Speaker+	Black	J1-9	J2-9	J3-9	VHF radio external speaker output, nom. 6 W into 8 Ohm	paired with no. 10
Pin 10	Ext. Speaker+	Orange	J1-10	J2-10	J3-10		paired with no. 9
Pin 11	VDR+	Purple	J1-11	J2-11	J3-11	Mixed RX/TX audio output for recording. Galvanically isolated, balanced signal, 0 dBm into 600 Ohm	paired with no. 12
Pin 12	VDR-	Light green	J1-12	J2-12	J3-12		paired with no. 11

Table B-5: Cable specifications for cable 8 (AUX)

a. 24 VDC, max. 100 mA

CAN cable (Cable 8 - CTRL)

Part number: 406208-941

SAILOR 6248 VHF CTRL connector LTW 12-pin, circular male	Signal designation	Cable pin 406208-941 (5 m)	SAILOR 6208 Conn. Box In from VHF	SAILOR 6208 Conn. Box Out of box	SAILOR 6208 Conn. Box Out of box	Signal description	Ships cable 6 twisted pairs overall screen
Pin 1	Shield/GND	Brown	J1-1	J2-1	J3-1	Equipment ground	paired with no. 8
Pin 2	Battery-	Blue	J1-2	J2-2	J3-2	Battery -	paired with no. 3
Pin 3	Battery+	White	J1-3	J2-3	J3-3	10.8-15.6 VDC from VHF radio	paired with no. 2
Pin 4	Battery+	Green	J1-4	J2-4	J3-4	10.8-15.6 VDC from VHF radio	paired with no. 7
Pin 5	CAN_H	Yellow	J1-5	J2-5	J3-5	CAN bus data	paired with no. 6
Pin 6	CAN_L	Grey	J1-6	J2-6	J3-6		paired with no. 5
Pin 7	Battery-	Pink	J1-7	J2-7	J3-7	Battery -	paired with no. 4
Pin 8	ON/OFF from CSM	Red	J1-8	J2-8	J3-8	ON/OFF signal from Control Speaker Microphone	paired with no. 1
Pin 9	RX+	Black	J1-9	J2-9	J3-9	RX telephony (out)	paired with no. 10
Pin 10	RX-	Orange	J1-10	J2-10	J3-10		paired with no. 9
Pin 11	TX+	Purple	J1-11	J2-11	J3-11	TX telephony (in)	paired with no. 12
Pin 12	TX-	Light green	J1-12	J2-12	J3-12		paired with no. 11

Table B-6: Cable specifications for cable 8 (CTRL)

Cable 11

LAN connection.

Ethernet cable with screen and RJ45 shielded plugs.

Pin number	Pin function	Wire color
1	Tx+	white/orange
2	Tx-	orange
3	Rx+	white/green
4	Not connected	blue
5	Not connected	white/blue
6	Rx-	green
7	Not connected	white/brown
8	Not connected	brown

Table B-7: Pin allocation, LAN connector

Cable 16

The CAN bus cable must be of a paired and twisted type designed for the purpose. The CAN bus cable can handle signals up to 100 m away from the VHF to further Control Speaker Microphones (CSM).

Only 1 CSM can be connected to the VHF with a CAN bus cable of max 100 m if the cable dimension is 0.5mm^2 of each cord. Other combinations with more CSMs must be calculated seriously before installing the cable. If more CSMs are connected, the CAN cable of 0.5mm^2 can handle the signals up to max. 100 m. The only restriction is the power supply for the connected CSMs.

The voltage drop along the cable increases with the length of the cable. Separate supply cables can be installed in parallel with the CAN cable to reduce voltage drop in long cables. The maximum allowed voltage drop from VHF to CSM is 2 VDC. It means 1 VDC forward and 1 VDC return.

Max current consumption for each CSM is 0.5A.

Formula to calculate DC resistance in a wire:

$$R = 0,017 \times L / a$$

L = length of wire one way, in metre
a = cross section of the wire in mm^2

Contact your local dealer for further information for correct installation.

Cable 17: CAN cable for bulk head installation.

Same cable as cable 12, but the plug is removed and the wires are connected to the connection box.

Same pin configuration as cable 8. See *Cable specifications for cable 8 (CTRL)* on page B-28.

Cable 18

Cable between the connection box and terminals to extend the power supply wires.

4 leads, screened wires of 0.5mm^2. Supply for 6204 CSM for extended CAN BUS connections.

Cable 19

The voltage drop along the cable increases with the length of the cable. Separate supply cables can be installed in parallel with the CAN cable to reduce voltage drop in long cables. The maximum allowed voltage drop from VHF to CSM is 2 VDC. It means 1 VDC forward and 1 VDC return.

The maximum current consumption for each CSM is 0.5 A.

Formula to calculate DC resistance in a wire:

$$R = 0,017 \times L/a$$

L = length of wire one way, in metre
a = cross section of the wire in mm^2

For best EMC performance, place the supply cables in parallel with CAN cable

Contact your local dealer for further information for correct installation.

A

ACC	Accessories

C

CAN	Controller-Area Network. A message based protocol designed to allow microcontrollers and devices to communicate with each other within a vehicle without a host computer.
CTRL	Control

L

LAN	Local Area Network ,
LTW	LTW Technology is a professional designer and manufacturer of waterproof connectors.
LWE	Light Weight Ethernet

V

VDR	Voyage Data Recorder, a data recording system designed for all vessels required to comply with the IMO's International Convention SOLAS Requirements in order to collect data from various sensors on board the vessel.
VHF	Very High Frequency

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SAILOR 6249 VHF Survival Craft

Installation manual

Disclaimer

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Safety warning

The following general safety precautions must be observed during all phases of operation, service and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture and intended use of the equipment. Thrane & Thrane assumes no liability for the customer's failure to comply with these requirements.

Ground the equipment

To minimise shock hazard, the SAILOR 6249 VHF Survival Craft unit must be connected to an electrical ground and the cable instructions must be followed.

RF exposure hazards and instructions

Your Thrane & Thrane radio set generates electromagnetic RF (radio frequency) energy when transmitting. To ensure that you and those around you are not exposed to excessive amounts of energy and thus to avoid health hazards from excessive exposure to RF energy, all persons must be at least 3ft (0.9 m) away from the antenna when the radio is transmitting.

Warranty limitation

IMPORTANT - The radio is a sealed waterproof unit (classified IPX8). To create and maintain its waterproof integrity it was assembled in a controlled environment using special equipment. The radio is not a user maintainable unit, and under no circumstances should the unit be opened except by authorized personnel. Unauthorized opening of the unit will invalidate the warranty.

Installation and service

Installation and general service must be done by skilled service personnel.

Preface

Radio for occupational use

The SAILOR 6249 VHF Survival Craft meets the requirements of the SOLAS and is intended for use in a maritime environment.
SAILOR 6249 VHF Survival Craft is designed for *occupational use only* and must be operated by licensed personnel only.
SAILOR 6249 VHF Survival Craft is not intended for use in an uncontrolled environment by general public.
SAILOR 6249 VHF Survival Craft is designed for installation by a skilled service person.

Training information

The SAILOR 6249 VHF Survival Craft is designed for *occupational use only* and is also classified as such. It must be operated by licensed personnel only. It must only be used in the course of employment by individuals aware of both the hazards as well as the way to minimize those hazards

The radio is thus NOT intended for use in an uncontrolled environment by general public. The SAILOR 6249 VHF Survival Craft has been tested and complies with the FCC RF exposure limits for *Occupational Use Only*. The radio also complies with the following guidelines and standards regarding RF energy and electromagnetic energy levels including the recommended levels for human exposure:

- FCC OET Bulletin 65 Supplement C, evaluating compliance with FCC guidelines for human exposure to radio frequency electromagnetic fields.
- American National Standards Institute (C95.1) IEEE standard for safety levels with respect to human exposure to radio frequency electromagnetic fields, 3 kHz to 300 GHz
- American National Standards Institute (C95.3) IEEE recommended practice for the measurement of potentially hazardous electromagnetic fields - RF and microwaves.

Below the RF exposure hazards and instructions in safe operation of the radio within the FCC RF exposure limits established for it are described.

Warning

Your Thrane & Thrane radio set generates electromagnetic RF (radio frequency) energy when it is transmitting. To ensure that you and those around you are not exposed to excessive amounts of that energy (beyond FCC allowable limits for occupational use) and thus to avoid health hazards from excessive exposure to RF energy, FCC OET bulletin 65 establishes an Maximum Permissible Exposure (MPE) radius of 200 cm for the maximum power of your radio (25W selected) with a half wave omni-directional antenna having a maximum gain of 4 dB. This means all persons must be at least 200 cm away from the antenna when the radio is transmitting.

Installation

1. An omni-directional antenna with a maximum power gain of 5.2 dBi must be mounted at least 400 cm above the highest deck where people may be staying during radio transmissions. The distance is to be measured vertically from the lowest point of the antenna. This provides the minimum separation distance which is in compliance with RF exposure requirements and is based on the MPE radius of 200 cm plus the 200 cm height of an adult.
2. On vessels that cannot fulfil requirements in item 1, the antenna must be mounted so that its lowest point is at least 200 cm vertically above the heads of people on deck and all persons must be outside the 200 cm MPE radius during radio transmission.
   - Always mount the antenna at least 200 cm from possible human access.
   - Never touch the antenna when transmitting
   - Use only authorized Thrane & Thrane accessories.
3. If the antenna has to be placed in public areas or near people with no awareness of the radio transmission, the antenna must be placed at a distance not less than 200 cm from possible human access.

Failure to observe any of these warnings may cause you or other people to exceed FCC RF exposure limits or create other dangerous conditions.

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Appendix A Technical specifications

A.1 Transceiver unit SAILOR 6249 VHF Survival Craft A-1

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Introduction

1.1 VHF radio

SAILOR 6249 VHF Survival Craft is designed for use in survival crafts. It is approved to MED and waterproof to the IPx8 and IPx6 standard. As part of the required safety equipment, use the SAILOR 6249 VHF Survival Craft in an emergency situation. However the best way to guarantee functionality in an emergency situation, is to use the radio in daily communication on board.

The VHF radio is a simplex VHF radio. It is designed with an easy-to-use menu-driven setup. You use the softkeys and the keypad to enter the desired functions, you browse and select a setting using the right selection knob. The large display can be customized for optimum readability and visibility both day and night with several color themes.

The VHF radio can replay the last 240 s of received voice messages. This is a useful feature to minimize misunderstandings and to record messages when the radio is unattended.

The Ethernet interface enables the VHF radio to be connected to ThraneLINK for service updates.

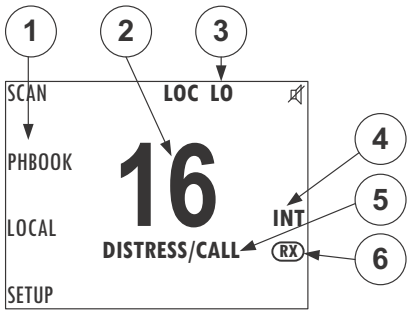
For a list of accessories available for the VHF radio see *Accessories available* on page 1-4 and *Part numbers for accessories* on page 2-18 and check with your nearest distributor.

1.1.1 Controls on the front plate

1. Loudspeaker.
2. Four soft keys with function title in the display.
3. Large display.
4. Keys 0 to 9 to enter numbers or text.
5. **DW** button to toggle the watch function.
6. **16/C** quick selection key for channel 16 and the programmed call channel.
7. Connector for Handmicrophone. If not used, put the cap from the ACC connector on the front connector to prevent water ingress.
8. Squelch control to mute background noise.
9. Volume knob with key-press function for volume control and power on/off.
10. Selector and dim knob with key-press function for general operation, display color selection and dimming.
11. **1W** button to toggle between high and low power.
12. Replay button to play back up to 240 s voice message.

1.1.2 SAILOR 6249 VHF Survival Craft display

The picture shows the display after start-up. The display holds various fields of information, depending on the currently selected function.



1. Functions you can select with the soft keys.
2. Current working channel.
3. **System property icons** with information relevant for the currently selected functions.
4. Channel properties next to the currently selected VHF channel (if any).
5. **Service line** containing current temporary information relevant for the current channel or function.
6. Current state: RX or TX.

For a detailed description of the information shown for each of the functions available see the user manual.

1.2 Accessories available

Accessory	Description
SAILOR 6202 Hand Microphone	You can use the SAILOR 6202 (waterproof to IPx6 and IPx8) Hand Microphone.
SAILOR 6207 Connection Box for parallel handsets	The SAILOR 6207 Connection Box including Connection Cable 406209-941 is used for easy installation of several Hand Microphones.
SAILOR 6208 Control Unit Connection Box	The SAILOR 6208 Connection Box including Connection Cable 406208-941 is used for easy installation of external equipment and accessories: • Max. 4 SAILOR 6204 Control Speaker Microphones • VDR • SAILOR 6270 External loudspeaker
Connection cables	**5m connection cable for bulkhead mount**: Use this cable in installations where the SAILOR 6202 Hand Microphone is not connected directly to the **SAILOR 6249 VHF Survival Craft**, but located in a different position (part number: 406204-940).
SAILOR 6270 External loudspeaker	If you need an additional external loudspeaker you can connect a SAILOR 6270 Loudspeaker. It provides 6 W output power.
SAILOR 6090 Power Converter 24 V to 12 V DC	The SAILOR 6090 Power Converter is used to provide 12 V DC for the SAILOR 6249 VHF Survival Craft from a 24 V DC power source.

Table 1-1: Accessories available

1.2.1 System configuration — example

The SAILOR 6249 VHF Survival Craft can be customized to suit your installation. The following illustration is one example of a system. For further configuration examples see Appendix B, *System configurations*.

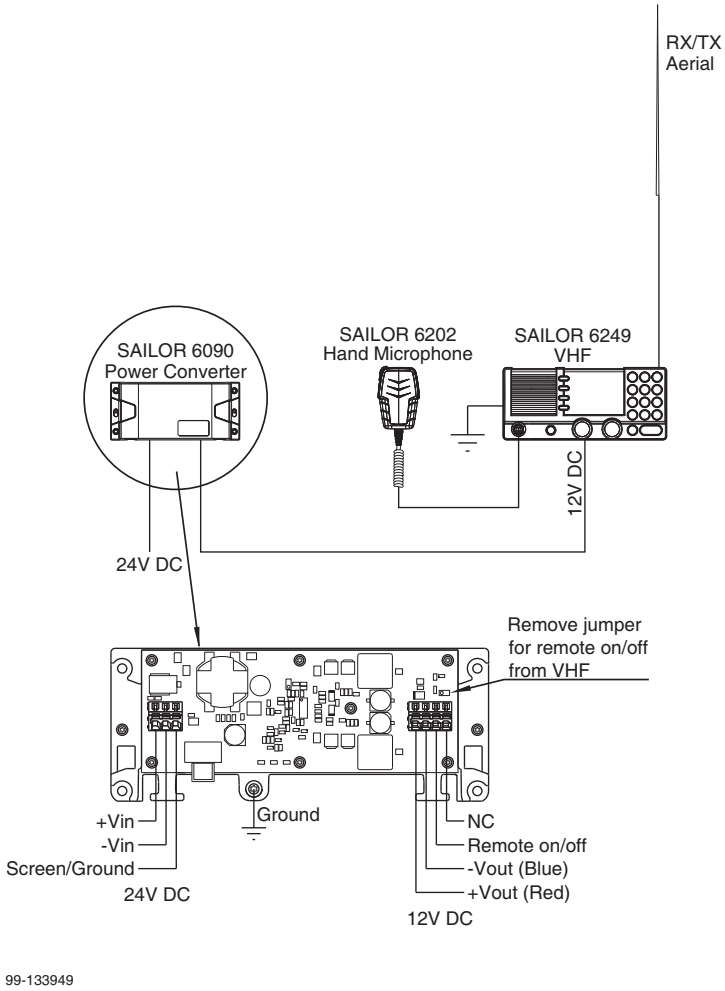


Figure 1-1: System configuration, example

Installation

In this chapter you find information and guidelines for:

- *Unpacking and initial inspection*
- *Installing the VHF radio*
- *Connectors*
- *VHF antenna installation*
- *Accessories*

2.1 Unpacking and initial inspection

The following items are included in the delivery of a SAILOR 6249 VHF Survival Craft:

- SAILOR 6249 VHF Survival Craft
- SAILOR 6202 Hand microphone
- User manual
- Installation guide
- Emergency call sheet
- Mounting bracket with two knobs
- Connectors for cables
- Power cable, fittings and fuses
- Packaging material
- Kit for flush mount installation, including gasket
- SAILOR 6090 Power Converter 24 to 12 V

2.1.1 Initial inspection

Inspect the shipping carton immediately upon receipt for evidence of damage during transport. If the shipping carton is severely damaged or water stained, request that thecarrier's agent be present when opening the carton. Save the carton packing material for future use.

WARNING! To avoid electric shock, do not apply power to the system if there is any sign of shipping damage to any part of the front or rear panel or the outer cover. Read the safety summary at the front of this manual before installing or operating the system.

After unpacking the system, inspect it thoroughly for hidden damage and loose components or fittings. If the contents are incomplete, if there is mechanical damage or defect, or if the system does not work properly, notify your dealer.

2.2 Installing the VHF radio

You can mount the VHF radio as a desktop, overhead or flush-mounted unit integrated in the instrument panel.

Provide space enough to access the front panel connectors and for installing a cradle for the speaking device.

Provide **at least 120 mm space at the back** of the SAILOR 6249 VHF Survival Craft radio to allow free air circulation and for cable access.

Cable requirements

All cables attached to the SAILOR 6249 VHF Survival Craft must be shielded. Every shield should have a low impedance connection to an electrical ground.

Before using the SAILOR 6249 VHF Survival Craft for the first time, check that all cables are correctly wired and fastened.

Compass safe distance

Make sure that the VHF radio is far enough from any magnetic compass to avoid influence of the loudspeaker magnet on the compass reading. See the following table for the safe distance after magnetization between the nearest point of the device and the centre of the compass at which it will produce a deviation of 0.3˚.

Device	Compass safe distance
SAILOR 6249 VHF Survival Craft	0.85 m
SAILOR 6090 Power Converter 24 V — 12 V	0.15 m

Table 2-1: Compass safe distance

Device	Compass safe distance
SAILOR 6207 Connection Box for parallel handsets	0.45 m
SAILOR 6208 Control Unit Connection Box	0.45 m

Table 2-1: Compass safe distance

2.2.1 SAILOR 6249 VHF Survival Craft with U mounting bracket

The mounting bracket and two knobs are included in the delivery.

Desktop mounting

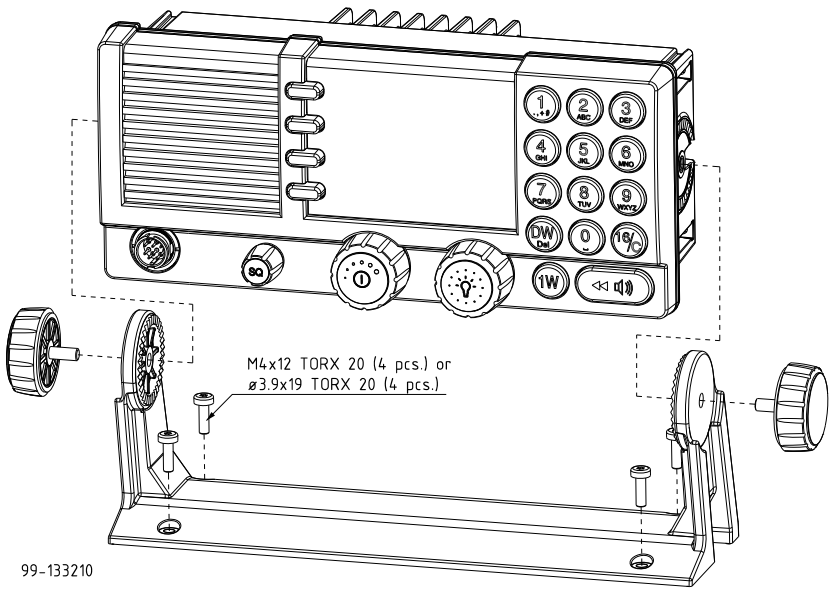


Figure 2-1: Desktop mounting

Overhead mounting

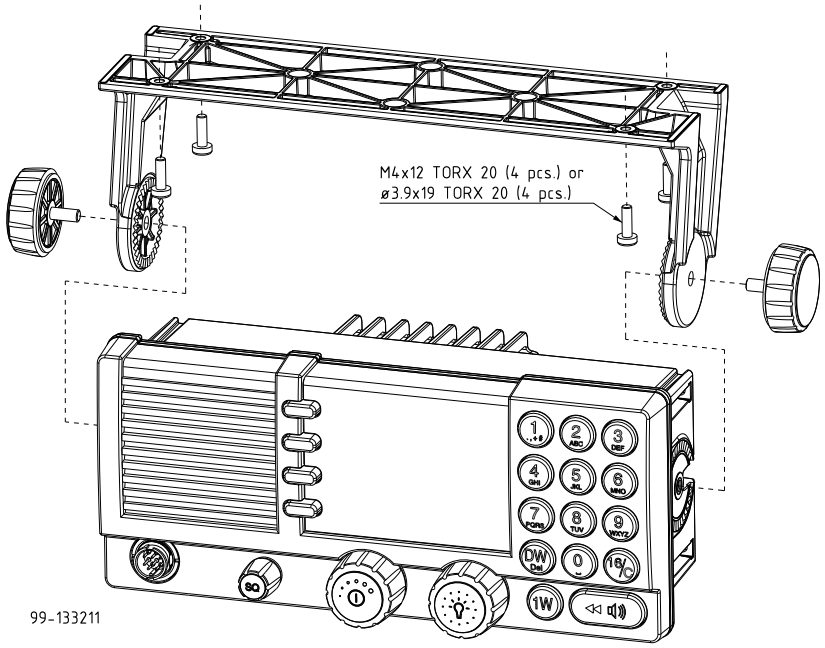


Figure 2-2: Overhead mounting

Mounting with U mounting bracket

To mount the VHF radio as tabletop, do as follows:

1. Find a suitable location for the VHF radio. Check that the space is wide/deep enough to accommodate the VHF radio.
2. Fasten the bracket with 4 screws (included in the delivery.)
3. Insert the VHF radio in the bracket and fasten it with the two knobs.

4. The display of the VHF radio should be at an angle of approximately 90˚ to your line of sight when operating it.

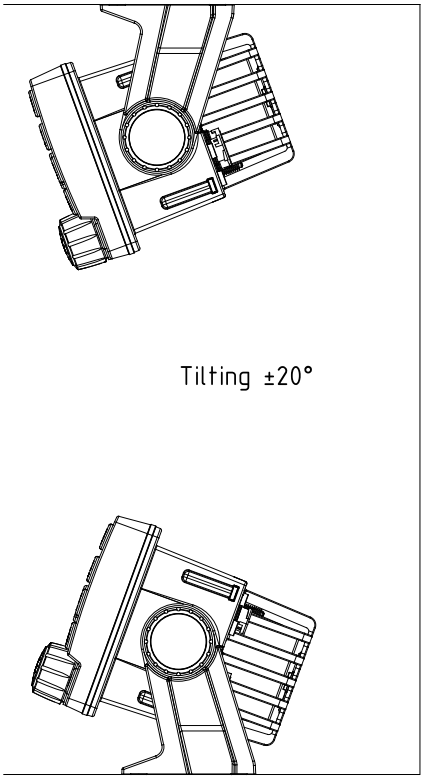


Figure 2-3: Mounting with the mounting bracket

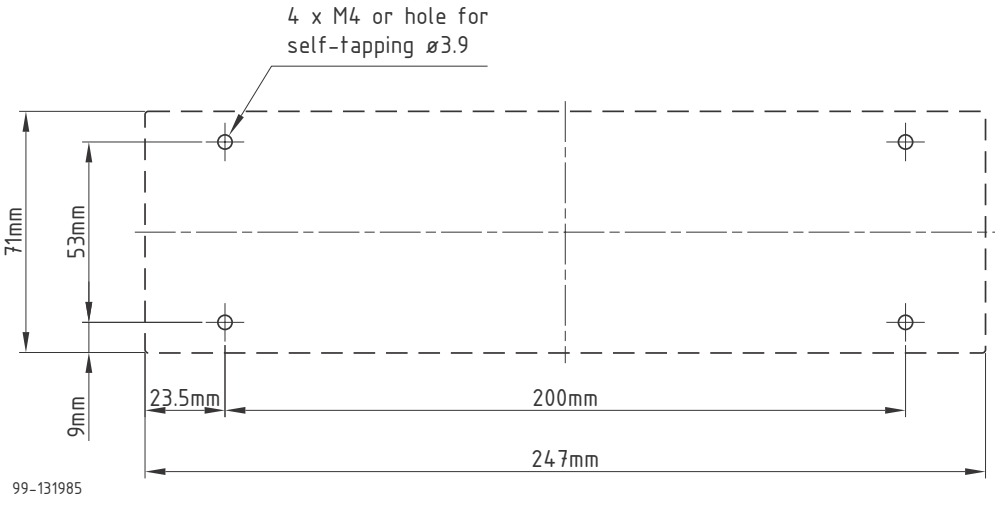


Figure 2-4: Drilling plan for the mounting bracket

2.2.2 SAILOR 6249 VHF Survival Craft for flush mount

You can mount the VHF radio to a flat surface, e.g. an instrument panel.The flush mount installation kit is included in the delivery.

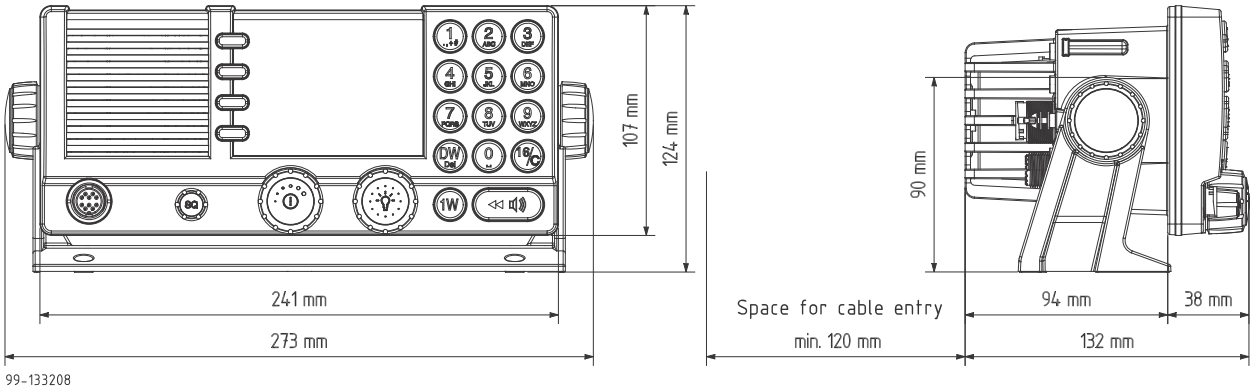


Figure 2-5: SAILOR 6249 VHF Survival Craft Dimension for flush mount

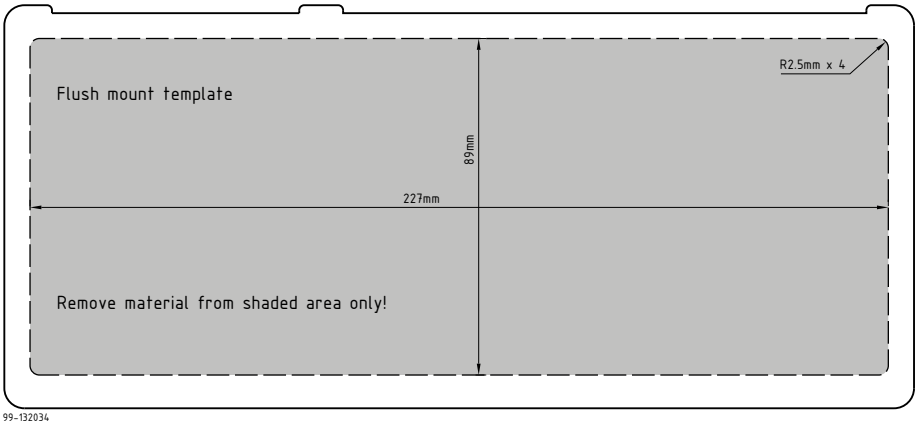


Figure 2-6: Cutout for flush mount

Important **The scaling in the above drawing is not 1:1**. Consequently do not attempt to use a print or copy of this page without checking the dimensions.

1. Find a suitable location for the VHF radio. Check that the space is deep enough to accommodate the VHF radio and an additional min. 120 mm space for cable entry.
2. Keep free distance to allow free air circulation around the VHF radio and to allow sufficient space for access to cables, see the drawing on this page.
3. Cut out the hole for the VHF radio where you want to mount it. Use the cutting template in the installation guide.
4. Mount the 4 square nuts M4 in the cabinet, ensure that they are placed correctly so it is possible to screw in the M4x45 screws.

5. Ensure that the flush mount gasket is placed correctly on the VHF radio.
6. Before mounting the VHF radio be aware that the surface is plane and rigid. If the surface is not plane and/or rigid (stiff) remove the gasket and seal with silicone sealant between the VHF radio and the surface.
7. Slide the VHF radio in the cut-out. Place the flush mount bracket and fasten it with the 4 screws M4x45. Make sure the torque does not exceed 1Nm when fastening the screws.

Note Only use screws supplied with the kit for flush mounting.

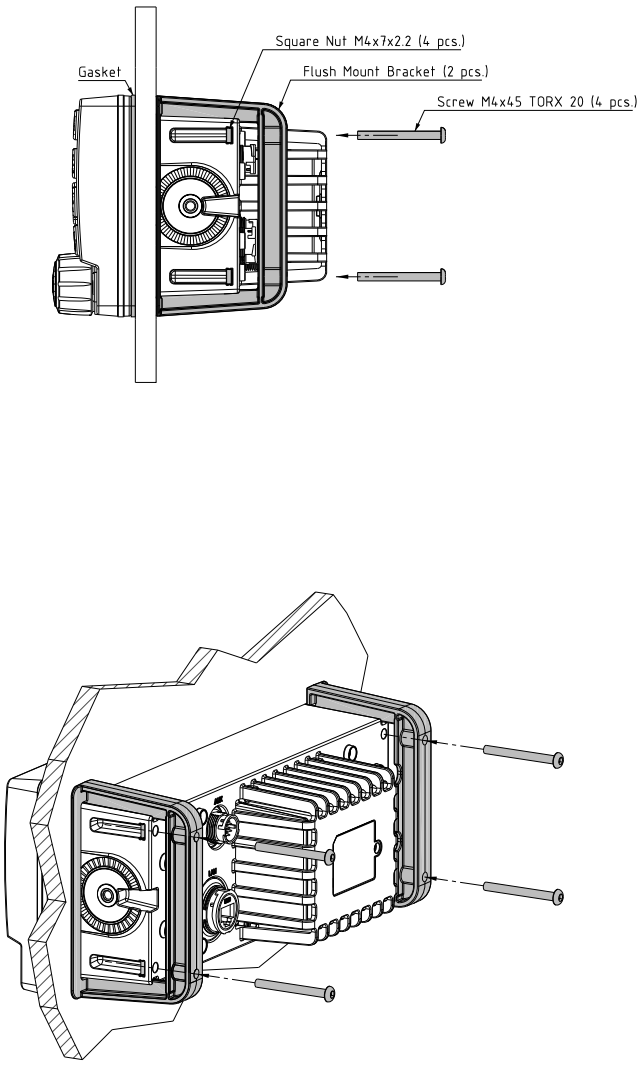


Figure 2-7: Flush mount

Note Firmly tie back and secure any wires not used to avoid the possibility for mutual shorting or shorting to ground.

2.2.3 SAILOR 6090 Power Converter

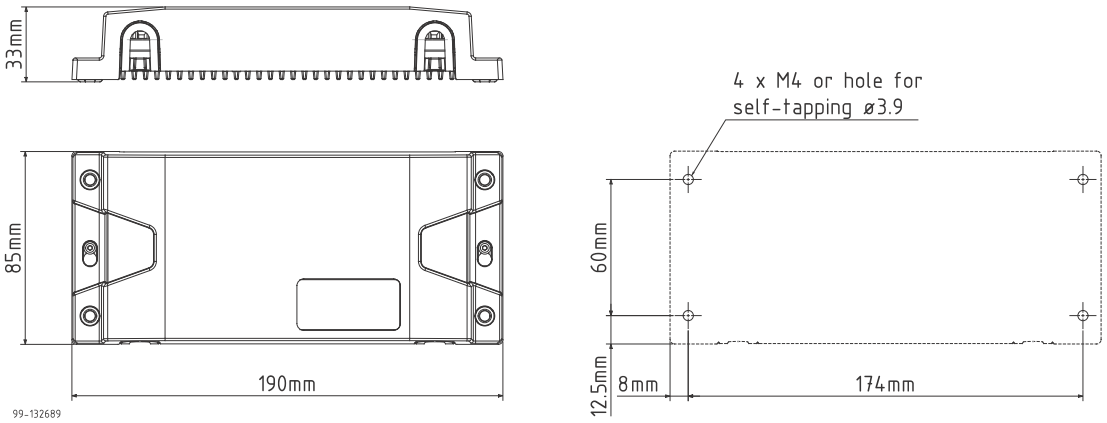


Figure 2-8: SAILOR 6090 Power Converter, dimensions

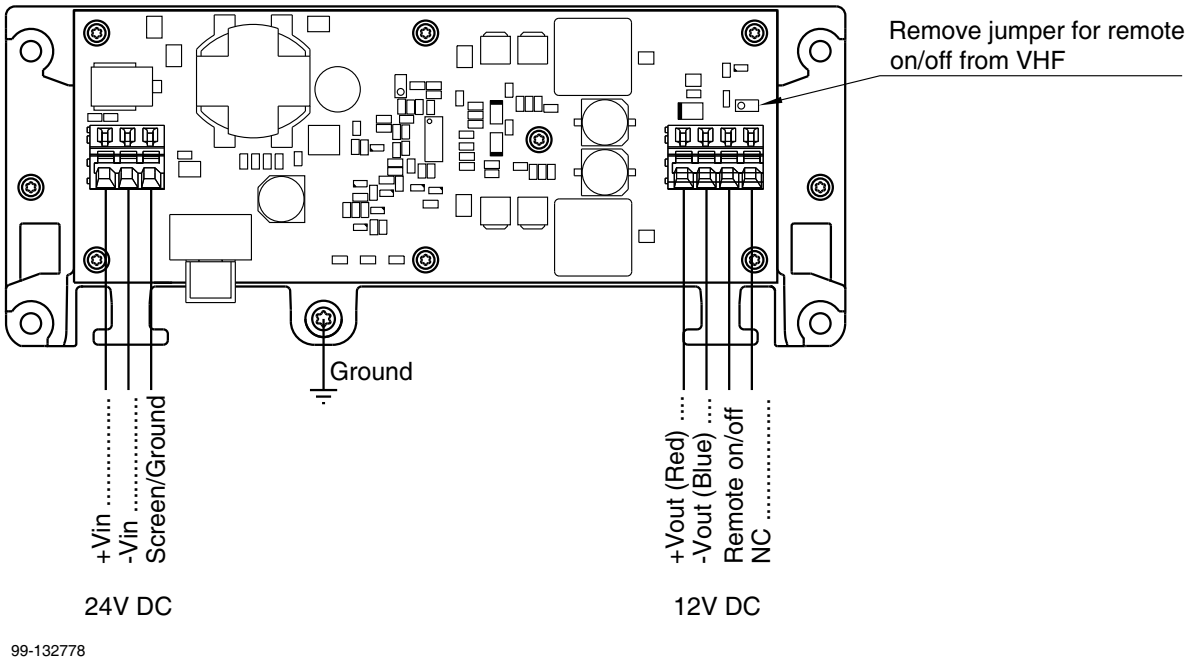


Figure 2-9: Connecting the SAILOR 6090 Power Converter

2.3 Connectors

2.3.1 Connector at the front panel for handmicrophone

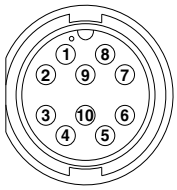
Use the connector at the front of the SAILOR 6249 VHF Survival Craft to connect a SAILOR 6202 Handmicrophone.

Connector type: Circular connector, 10-pin, male.

Connection cable with plug, part number 406209-941.

Pin assignment: Connector front view on the VHF radio.

Panel lock, 10 pin male



Pin	Description	Wire color
1	Not connected	Brown
2	Not connected	Blue
3	Not connected	White
4	Not connected	Green
5	Mic+	Yellow
6	Earpiece	Grey
7	Hook_PTT	Pink
8	Battery V +10.8 — 15.6 VDC	Red
9	Internal GND = - Battery	Black
10	Internal GND = - Battery	Orange — SCREEN (Drain)

Table 2-2: Pin allocation, connector at the front panel

Important If a handset is not mounted at the front connector, put the cap from the ACC connector on the front connector to prevent water ingress.

2.3.2 Connectors at the rear panel

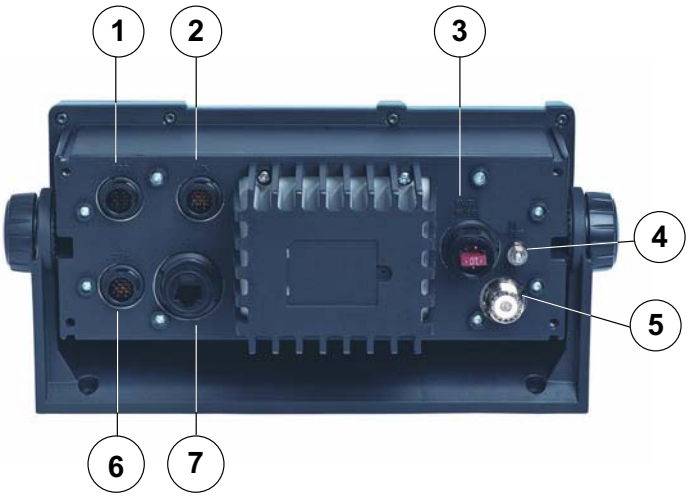


Figure 2-10: Connections at the rear panel

1. *ACC connector* for accessories
2. *AUX connector* for VDR, external speaker
3. *Power connector PWR FUSE* with fuse 10 A mini ATO
4. *Ground stud for grounding*
5. *ANT connector for VHF antenna*
6. *CTRL connector*
7. *Ethernet connector: LAN*

2.3.3 ACC connector

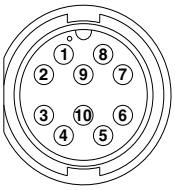
Use the connector marked **ACC** to connect a SAILOR 6201 Handset. You may also connect a waterproof SAILOR 6203 Handset or SAILOR 6202 Handmicrophone.

Connector type: Circular connector, 10-pin, male.

Connection cable with plug, part number 406209-941.

Pin assignment: Connector front view on the VHF radio.

Panel lock, 10 pin male

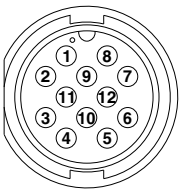


Pin	Description	Wire color
1		Brown
2		Blue
3		White
4		Green
5	Mike 2 / Line in	Yellow
6	EAR 2 / Line out	Grey
7	Hook_PTT	Pink
8	Battery supply when radio is on	Red
9	Internal GND = - Battery	Black
10	Internal GND = - Battery	Orange — SCREEN (Drain)

Table 2-3: Pin allocation, ACC connector

2.3.4 AUX connector

This connector is used to connect VDR external speaker.



Connector type: Circular connector, 12-pin.

Connection cable with plug, part number 406208-941.

Pin assignment: Connector front view on the VHF radio:

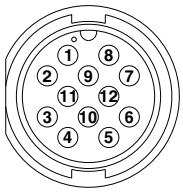
Pin	Description	Wire color
1	Shield (GND)	Brown
2	Lo Power Forced control	Blue
3	—	White
4	—	Green
5	—	Yellow
6		Grey
7	AUX OC—	Pink
8	-Battery	Red
9	External Speaker +	Black
10	External Speaker -	Orange
11	VDR+ Mixed RX/TX for record	Violet
12	VDR- Mixed RX/TX for record	Cyan

Table 2-4: Pin allocation, AUX connector

2.3.5 CTRL connector

This connector is used to connect a SAILOR 6204 Control Speaker Microphone or SAILOR 6208 Connection Box.

Connector type: Circular connector, 12-pin.



Connection cable with plug, part number 406208-941.

Pin assignment: Connector front view on the VHF radio:

Pin	Description	Wire color
1	GND for cable screen	Brown
2	Internal GND=- Battery	Blue
3	Battery supply when radio is on	White
4	Battery supply when radio is on	Green
5	CAN+	Yellow
6	CAN-	Grey
7	Internal GND = - Battery	Pink
8	On/off from Control Speaker Microphone	Red
9	RX out +	Black
10	RX out -	Orange
11	TX in +	Violet
12	TX in -	Cyan

Table 2-5: Pin allocation, CTRL connector

2.3.6 Ethernet connector: LAN

There is one Ethernet (10/100 MB) connector on the rear panel, it is marked LAN.

Connector type: RJ-45 female, shielded

Pin number	Pin function	Wire color
1	Tx+	white/orange
2	Tx-	orange
3	Rx+	white/green
4	Not connected	blue
5	Not connected	white/blue
6	Rx-	green
7	Not connected	white/brown
8	Not connected	brown

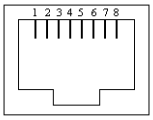


Table 2-6: Pin allocation, LAN connector

2.3.7 Power connector PWR FUSE

The DC Power input connects to a DC supply with 12 DC nominal (10.8 to 15,6 V DC). The connector has a 10 A fuse. The interface also has a “remote on/off” function for a remote 24 V — 12 V DC Power Converter.

Connector type: LTW Power
Fuse: 10 A mini ATO

To help extract the fuse you can order a fuse puller in the **ESHOP** at www.cobham.com/satcom.

Pin-out

The table below shows the connector outline, pin assignments and wire color in the power cable delivered with the SAILOR 6249 VHF Survival Craft.

Pin	Pin function	Wire color
1	DC+ (10.8 - 15,6 V DC)	Red
2	DC- (0 V DC)	Blue
3	Remote on/off	Yellow

Table 2-7: Pin allocation, power

Connecting DC power

- Connect DC+ (red wire) to DC out + from your DC supply.
- Connect DC- (blue wire) to DC out - from your DC supply.

Connect the yellow wire in the power cable to use the Remote on/off function.

2.3.8 ANT connector for VHF antenna

Use the connector marked **ANT** to connect the VHF antenna to the radio with a 50 Ohm coaxial cable with low loss, e.g. RG214. Install a PL259 plug at the cable end.

Place the antenna as high and clear of obstructions as possible. Make sure that the horizontal distance to metal parts is minimum 1.5 m (5 ft.).

Connector type: female SO239 for PL259 plug.

For more information about VHF antenna installation see *VHF antenna installation* on page 2-16.

2.3.9 Ground stud for grounding

Important You must connect the Ground stud to ship ground.

The ground stud is located on the rear panel and is used to connect a ground wire for grounding the SAILOR 6249 VHF Survival Craft. To connect the SAILOR 6249 VHF Survival Craft to ship ground, do as follows:

1. Connect a ground cable of > 1 m length and > 4 mm^2 cross section to the Ground stud located between the DSC ANT and ANT connector and fasten it with the wing nut.
2. Connect the other end of the cable to ship ground. Make the cable as short as possible.

2.4 VHF antenna installation

The SAILOR 6249 VHF Survival Craft must be installed with one antenna for VHF RX/TX communication. You can install all commonly available 50 Ohm antennas covering the appropriate frequency range and providing a VSWR less than 1.5 over this range.

If further details on equipment and antenna installation, see IMO COMSAR/Circ. 32, GUIDELINES FOR THE HARMONIZATION OF GMDSS REQUIREMENTS FOR RADIO INSTALLATIONS ON BOARD SOLAS SHIPS.

2.4.1 Cable requirements

Connect the antennas using a low loss type 50 Ohm coaxial cable, e.g. good quality RG214 or better. It is recommended to use a double screened type cable (like e.g. RG214) with a maximum insertion loss of 3dB across the antenna cable installation.

The maximum antenna cable length in the installation depends on the quality of the cable, i.e. the specified attenuation (dB/m) of the cable of choice at the high end of the VHF frequency band. As a rule of thumb the cable length using e.g. RG214 coaxial cable should not exceed 25 m.

2.4.2 VHF RX/TX antenna

In installations with two or more VHF radios it is important to ensure the optimum performance of these by carefully selecting the antenna positions for both radios. It is recommended to maximize the RF attenuation between the VHF RX/TX antennas in the installation. You can ensure this by not having the RX/TX antennas positioned at the same horizontal level, i.e. the RX/TX antennas for each radio must be installed at shifted elevations as shown in the following drawing.

If sufficient vertical distance between two or more such antennas cannot be achieved, the horizontal distance between them is increasingly important for optimum performance. If there is hardly any vertical separation ensure that there is a minimum of 5 m horizontal distance between any RX/TX antennas in the installation.

To minimize any increase in VSWR of the VHF RX/TX antenna, install the antenna at a vertical distance of at least 2 m to any other mast, pole or other RF antennas. Keep VHF antennas as far away as possible from antenna main beam of any radar and satellite equipment.

2.5 Accessories

2.5.1 Part numbers for accessories

The following accessories are available for the SAILOR 6249 VHF Survival Craft:

Part number	Accessories available
406202A-00500	SAILOR 6202 Hand Microphone
406207A-00500	SAILOR 6207 Connection Box with Cable 406209-941
406208A-00500	SAILOR 6208 Connection Box with Cable 406208-941
406209-940	Connection Cable for bulkhead mount, 5 m, 1-x10 pole
406209-941	Connection Cable, 5 m, 1x10 pole
406270A	SAILOR 6270 External loudspeaker
406090A-00500	SAILOR 6090 Power Converter 24 V — 12 V

Table 2-8: Part numbers for accessories

2.5.2 Connection box SAILOR 6207

The **SAILOR 6207 Connection Box** is used to connect further SAILOR 6201 Handsets. For wiring and cabling details see *System configuration examples* on page B-1.

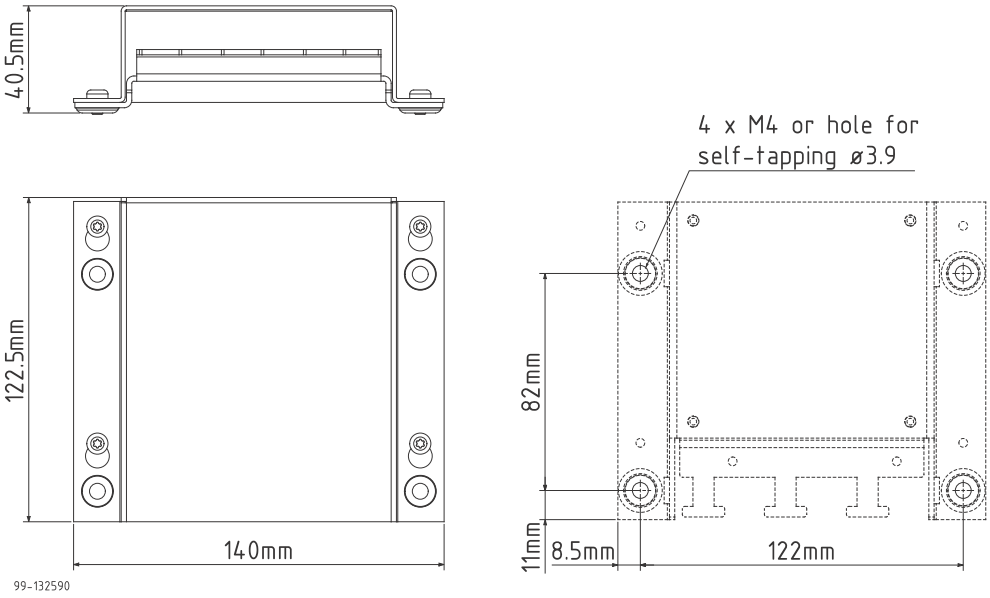


Figure 2-11: SAILOR 6207 Connection Box for parallel handsets, mounting

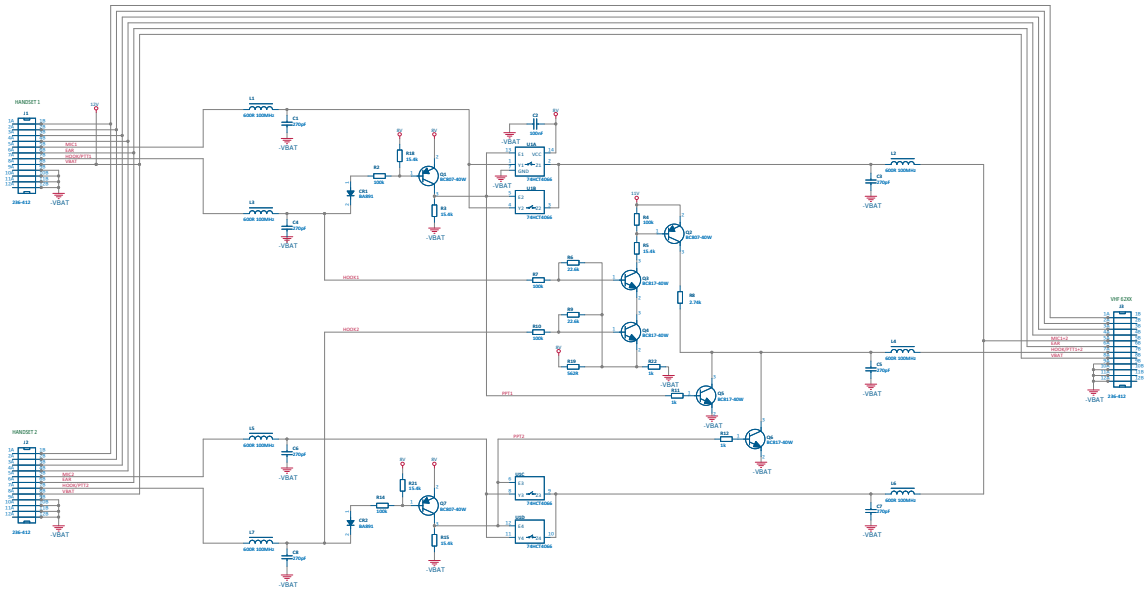


Figure 2-12: SAILOR 6207 Connection Box for parallel handsets, diagram

2.5.3 Connection box SAILOR 6208

The **SAILOR 6208 Connection Box** is used to connect SAILOR 6204 Control Speaker microphones and other auxiliary equipment. For wiring and cabling details see *System configuration examples* on page B-1.

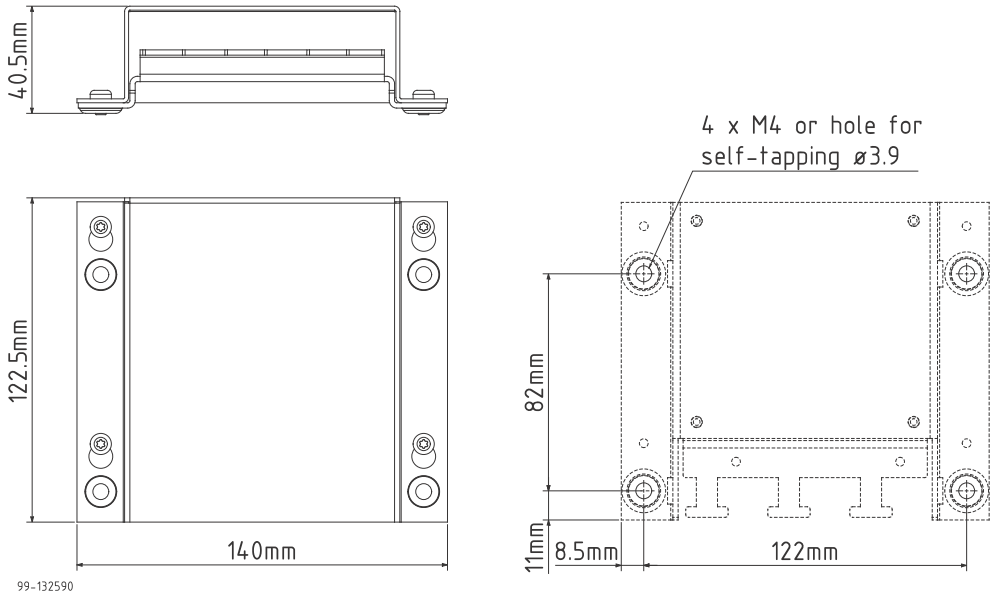


Figure 2-13: SAILOR 6208 Control Unit Connection Box, mounting

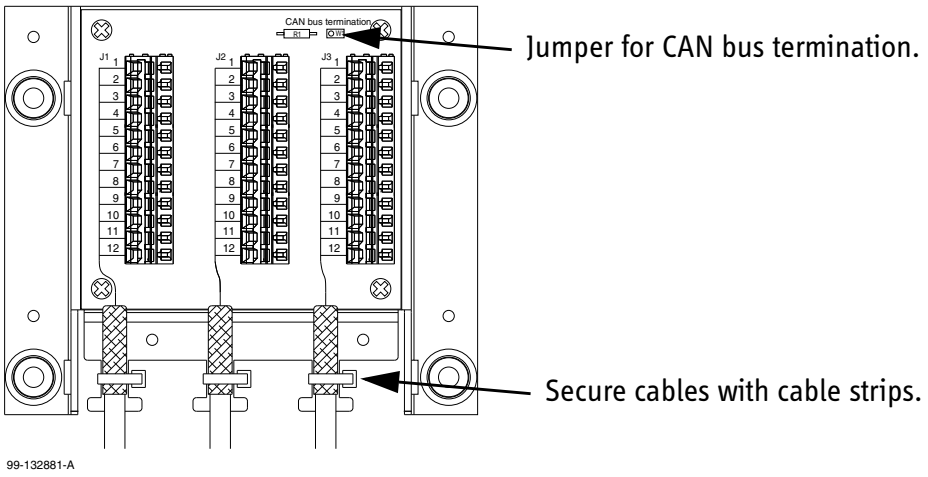


Figure 2-14: SAILOR 6208 Control Unit Connection Box for parallel handsets, wiring

Terminate the last SAILOR 6208 on the CAN bus (furthest away from the transceiver).

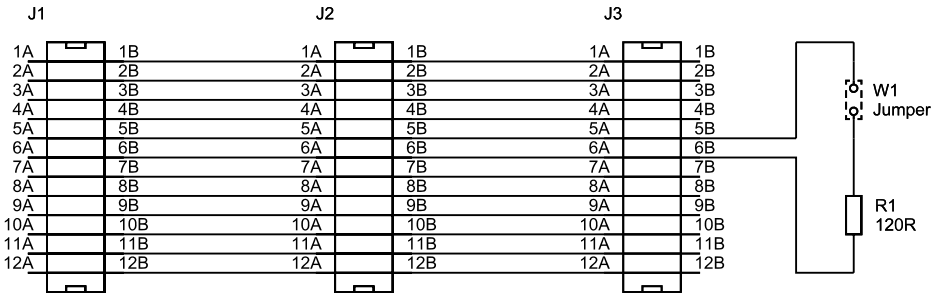


Figure 2-15: SAILOR 6208 Control Unit Connection Box, diagram

First-time power up

3.1 General use and navigation

The tasks needed to be performed during installation are described below. See the SAILOR 6249 VHF Survival Craft User manual for instructions how to operate and set up the VHF radio.

3.1.1 Power on and volume in handset and speaker

The VHF radio has a dual-function on/off knob for power on/off and volume control.

- To power on the VHF radio press the on/off knob.
- To power off the VHF radio, press and hold the on/off knob and follow the instructions in the display.
- To adjust the speaker volume, turn the volume knob (clockwise = louder, counter clockwise = softer, until muted). When muted, is shown in the display.
- To adjust the volume of the handset earpiece see the SAILOR 6249 VHF Survival Craft *User manual*.

3.1.2 Working channel and changing settings

Use the **selector knob** to browse and select:

- To browse and select **settings**, turn the selector knob and press for accept.
- To select a **working channel** use the selector knob or enter the channel number using the keypad.

Service & maintenance

4.1 Contact for support

Contact your authorized dealer for technical service and support of the VHF radio. Before contacting your authorized dealer you can go through the troubleshooting guide to solve some of the most common operational problems.

4.2 Maintenance

4.2.1 Preventive maintenance

Maintenance of the SAILOR 6249 VHF Survival Craft can be reduced to a maintenance check at each visit of the service staff. Inspect the radio for mechanical damages, salt deposits, corrosion and any foreign material. Due to its robust construction and ruggedness the radio has a long lifetime. Anyway it must carefully be checked at intervals not longer than 12 months - dependent on the current working conditions.

Salt deposits

In case the equipment has been exposed to sea water there is a risk of salt crystallization on the keys and knobs and they may become inoperable. Clean the VHF radio and speaker microphones with fresh water.

4.2.2 Error messages and warnings

Errors and warning messages are shown in the display and are read-only.

4.3 Troubleshooting guide

Action	Symptom	Remedy
The radio will not turn on	The display is empty.	Check if power is present. Check fuse which is placed in the power connector. Check performance of power supply if connected to one.
No commu-nication	The loud-speaker is mute.	Check the antenna installation. Check antenna cable. Check Handmicrophone and cable.
Device failure		If any of the checks and tests described in this section do not assist in resolving the difficulties experienced in the operation and/or performance of the VHF installation, a fault may have developed in the VHF radio itself. When contacting an authorized Thrane & Thrane representative be sure to provide as much information as possible describing the observed behavior - also including the type of the VHF radio, its serial number, and software release version (both found in the setup menu Controller Setup).
WARNING: POWER SUPPLY LOST CONTACT	Power supply status cannot be monitored.	In Setup, Power Supply, set Monitor to disabled. You can only monitor the power supply if the radio is powered by a SAILOR 6081 Power Supply Unit and Charger.

Table 4-1: Troubleshooting guide

Action	Symptom	Remedy
System Time & Date	Manually entered time & date is overridden	If valid time information is received via NMEA LWE on LAN port, this time source is used to set the system time. If this is not wanted, disconnect LAN cable. Position NMEA sentences from the talkers GP, GL GN (and GA) are prioritized. Position source is selected by the quality indicator: 1. Differential 2. Precise, Autonomomous, Float_RTK, Realtime_RTK 3. Estimated and Manuel 4. Unknown (for instance if not supported in sentence) 5. Simulated and Invalid The device will automatically switch to the position source with the highest priority available after 5 seconds when switching to a lower priority input and 30 seconds when switching to a detected higher priority input.

Table 4-1: Troubleshooting guide

4.3.1 Replacing the fuse in the power connector

One fuse is installed in the power connector. If the fuse is blown, do as follows:

1. Track down why the fuse was blown and solve the problem.
2. Take out the old fuse.
3. Insert the new fuse. The fuse rating is 10 A T.

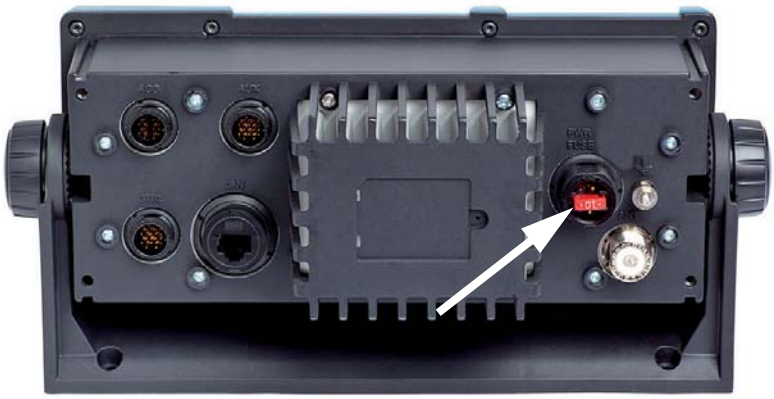


Figure 4-1: Fuse in the power connector

4.3.2 Replacing the fuse in the SAILOR 6090 Power Converter

One fuse is installed in the SAILOR 6090 Power Converter. If the fuse is blown, do as follows:

1. Track down why the fuse was blown and solve the problem.
2. Take out the old fuse.
3. Insert the new fuse. The fuse rating is 10 A T.

Figure 4-2: Fuse in the SAILOR 6090 Power Converter

4.4 Returning units for repair

Should your Cobham SATCOM product fail, please contact your dealer or installer, or the nearest Cobham SATCOM partner. You will find the partner details on www.cobham.com/satcom where you also find the Cobham SATCOM Self Service Center web-portal, which may help you solve the problem. Your dealer, installer or Cobham SATCOM partner will assist you whether the need is user training, technical support, arranging on-site repair or sending the product for repair. Your dealer, installer or Cobham SATCOM partner will also take care of any warranty issue.

4.4.1 Repacking for shipment

Should you need to send the product for repair, please read the below information before packing the product.

The shipping carton has been carefully designed to protect the SAILOR 6249 VHF Survival Craft and its accessories during shipment. This carton and its associated packing material should be used when repacking for shipment. Attach a tag indicating the type of service required, return address, part number and full serial number. Mark the carton FRAGILE to ensure careful handling.

Note Correct shipment is the customer's own responsibility.

If the original shipping carton is not available, the following general instructions should be used for repacking with commercially available material.

1. Wrap the defective unit in heavy paper or plastic. Attach a tag indicating the type of service required, return address, part number and full serial number.
2. Use a strong shipping container, e.g. a double walled carton.
3. Protect the front- and rear panel with cardboard and insert a layer of shock-absorbing material between all surfaces of the equipment and the sides of the container.
4. Seal the shipping container securely.
5. Mark the shipping container FRAGILE to ensure careful handling.

Failure to do so may invalidate the warranty.

Technical specifications

A.1 Transceiver unit SAILOR 6249 VHF Survival Craft

Item	Specification
Weight SAILOR 6249 VHF Survival Craft	< 1.50 kg (3.3 lbs) approximately
Box weight SAILOR 6249 VHF Survival Craft	3.8 kg (8.4 lbs) approximately, including SAILOR 6202 Hand Microphone and wall mount cradle, SAILOR 6090 Power Converter and Installation and user manual in box.
Dimensions	**Height**: Outer dimension 107 mm, hole height for flush mount 89 mm **Width**: Outer dimension 241 mm, hole width for flush mount 227 mm **Depth**: Outer dimension from front of knobs 132 mm, depth for flush mount 94 mm
Operating temperature	-25˚C to 55˚C (5˚F to 131˚F)
Storage temperature	-30˚C to 80˚C (-22˚F to 176˚F)
Power supply	12 VDC Nominal (10,8– 15,6 VDC)
Current consumption	Max. 7 A
Current consumption at 12 VDC (no accessories connected)	RX: 0.5 A TX: 5 A
Current consumption at 12 VDC (all accessories connected)	RX: 0.7 A TX: 7 A

Table A-1: Technical specifications, part 1

Item	Specification
Frequency range	TX: 156,000 MHz — 157,425 MHz, RX: 156,000 MHz — 163.425 MHz
Channel spacing	25 kHz, all international maritime channels
Number of P channels	The radio may be programmed with up to 100 private channels in all channel modes.
Modulation 25 kHz	 16K0G3E
Antenna	50 Ohm antenna, 50 Ohm female SO239 for PL259 plug
Water ingress	IPx8 and IPx6 all over. For flush-mount installations a sealing gasket is included in the delivery.
Transmitter	
Transmit power	Hi/Lo: 25 W and 1 W
RF output power	High: 25 W +0 dB / - 1.5 dB Low: 1 W +0 dB / - 1.5 dB
RF output power, Canada	High: 21 W ±0.75 dB Low: 0.8 W ±0.75 dB
Frequency error	Below 500 Hz
Adjacent channel power	Below 75 dB
Conducted spurious emission	Below 0.25 μW
Distortion	Below 3%
S/N ratio	Better than 46 dB
Receiver	
Sensitivity	< -119 dBm typically @ 20 dB SINAD CCITT weighted
LF power	Built-in loudspeaker: 6 W (at 5 kHz dev./1 kHz tone) External loudspeaker: 6 W / 8 Ohm
Distortion	Below 5%
S/N ratio	Better than 43 dB

Table A-2: Technical specifications, part 2

Item	Specification
Spurious emissions	Below 2 nW
Spurious response rejection	More than 74 dB
Intermodulation response	More than 73 dB
Co-channel rejection	Better than -10 dB
Adjacent channel selectivity	More than 74 dB
Blocking level	More than 94 dBμV

Table A-2: Technical specifications, part 2 (Continued)

A.2 SAILOR 6090 Power Converter 24—12 V

Item	Description
Weight	300 g
Dimensions	Height: 33 mm Width: 190 mm Depth: 85 mm
Operating temperature	-25˚C to 55˚C (5˚F to 131˚F)
Storage temperature	-30˚C to 80˚C (-22˚F to 176˚F)
Input voltage	21—32 VDC
Output voltage	12.5 VDC
Output current (max.)	8 A

Table A-3: Technical specifications, SAILOR 6090

System configurations

This appendix lists selected examples of system configurations.

For an overview and specifications of the cables needed see ***Cable requirements* on page B-23**.

Note For installation of the connection boxes see *Connection box SAILOR 6207* on page 2-19 and *Connection box SAILOR 6208* on page 2-20.

B.1 System configuration examples

The following list shows system configurations, with additional handsets, alarm panels, connection boxes and cable information.

Important The SAILOR 6249 VHF Survival Craft has been tested by Thrane & Thrane with the following equipment not covered by the approval certificate:

- SAILOR 6207 Connection box (TT-6207-A)
- SAILOR 6208 CU Connection box (TT-6208-A)
- SAILOR 6209 Connection box (TT-6209-A)
- SAILOR 6203 Handset with cradle, waterproof (TT-6203A)
- SAILOR N163S Power Supply (AC/DC)
- SAILOR N420 (DC/DC)
- SAILOR 6270 External loudspeaker (TT-6207A)

1. *How to connect a DC Power Supply 6090*
2. *How to connect an AC Power Supply N163S*
3. *How to connect a DC Power Supply N420*
4. *How to install an additional SAILOR 6201, VDR, loudspeaker & AUX OC*
5. *How to install a SAILOR 6270 External Loudspeaker*
6. *How to install 2 extra SAILOR 6201 Handsets*
7. *How to install an extra SAILOR 6201 Handset in SAILOR 6207*
8. *How to install a SAILOR 6202 Hand Microphone and an extra SAILOR 6201How to install a CAN bus and a SAILOR 6204 CSM close to the VHF*
9. *How to install a SAILOR 6202 Hand Microphone and an extra SAILOR 6201How to install a CAN bus and a SAILOR 6204 CSM close to the VHF*
10. *How to install a CAN bus with a SAILOR 6204 CSM not close to the VHF radio*
11. *How to install a CAN bus with a SAILOR 6204 CSM far from the VHF radio*
12. *How to install a CAN bus with 2 SAILOR 6204 close to the VHF*
13. *How to install a CAN bus and 2 SAILOR 6204 CSM far from the VHF*
14. *How to install a CAN bus with 2 SAILOR 6204 CSMs close to each other*

15.*How to install a CAN bus with 2 SAILOR 6204 CSMs close to VHF on a small bridge*

16.*How to install a CAN bus with 2 CSMs in bridge wings*

17.*How to install a CAN bus with 3 CSMs in bridge wings*

18.*How to install a CAN bus with 4 CSMs in bridge wings*

19.*How to install a CAN bus with 3 SAILOR 6204 CSMs*

20.*How to install a CAN bus with 4 SAILOR 6204 CSMs*

21.*How to install LAN*

B.1.1 How to connect a DC Power Supply 6090

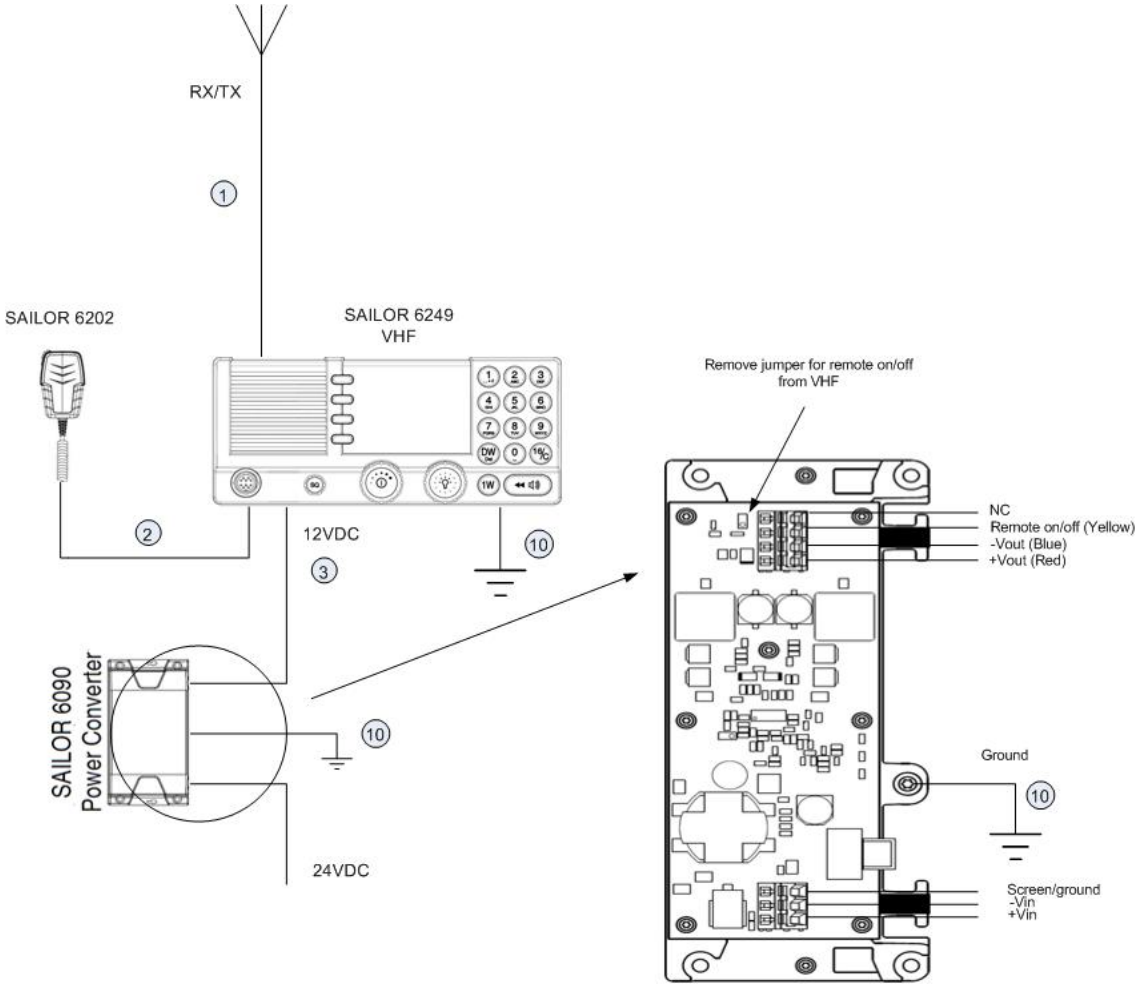


Figure B-1: System configuration, DC Power Supply 6090

B.1.2 How to connect an AC Power Supply N163S

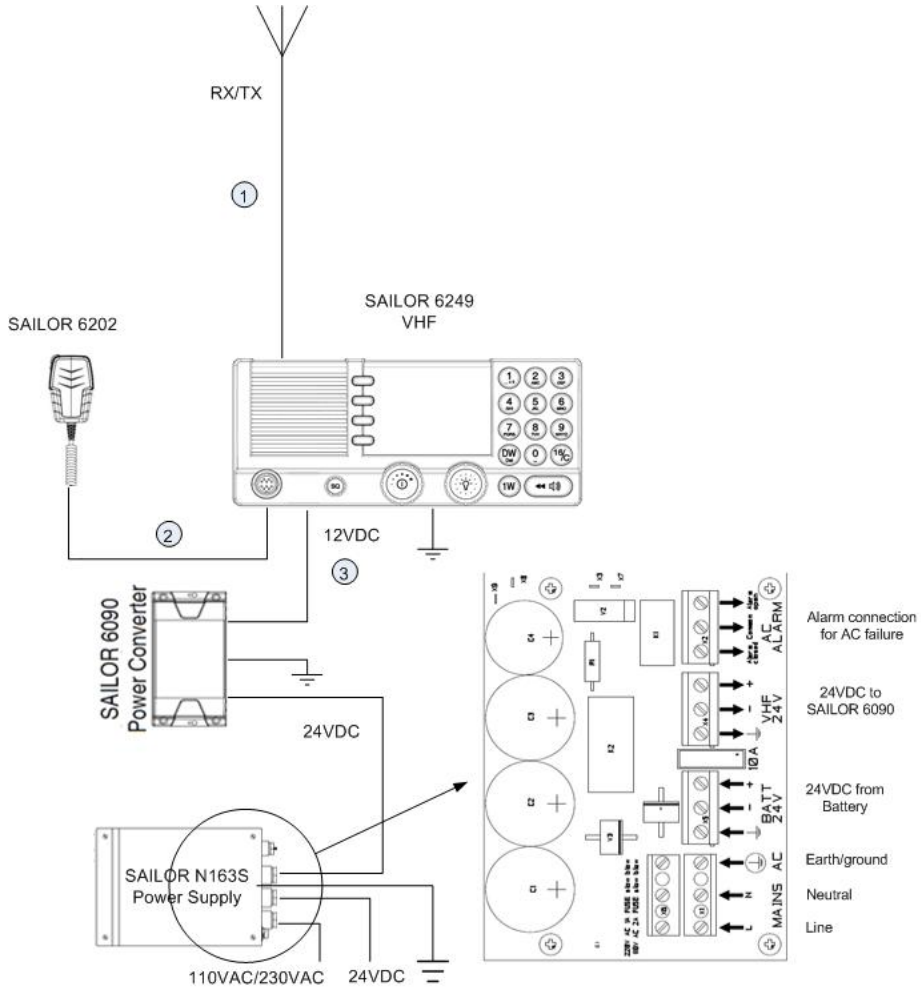


Figure B-2: System configuration, AC Power Supply N163S

B.1.3 How to connect a DC Power Supply N420

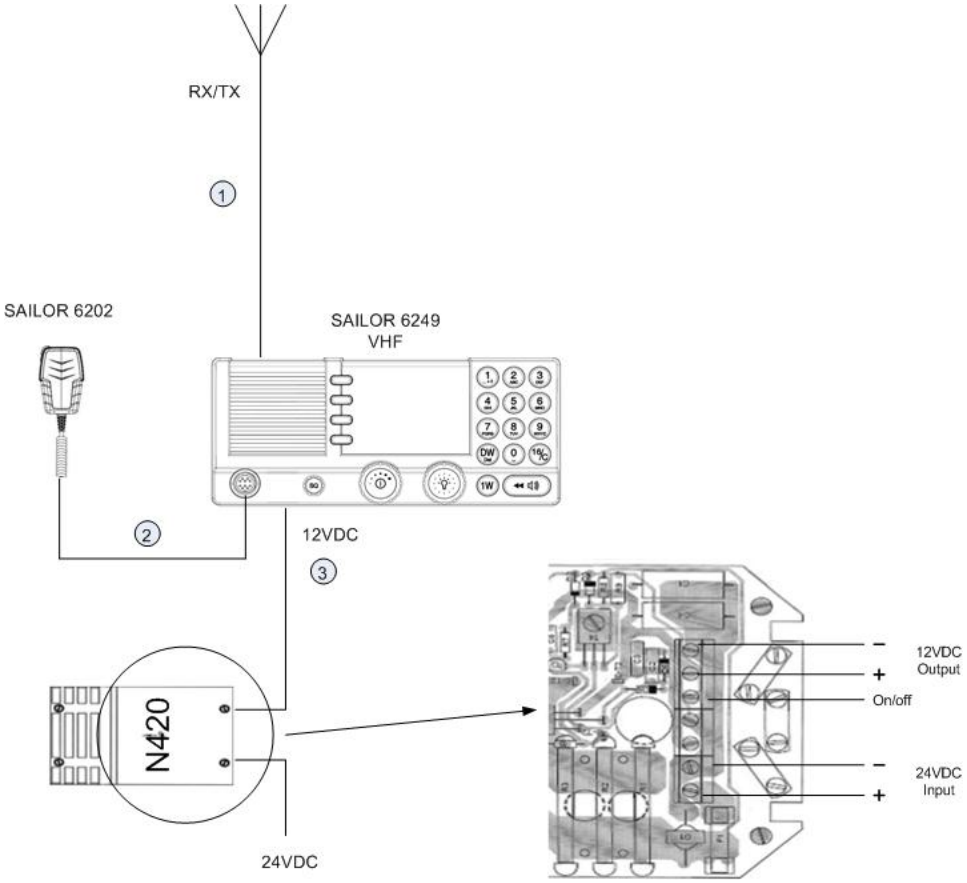


Figure B-3: System configuration, DC Power Supply N420

B.1.4 How to install an additional SAILOR 6201, VDR, loudspeaker & AUX OC

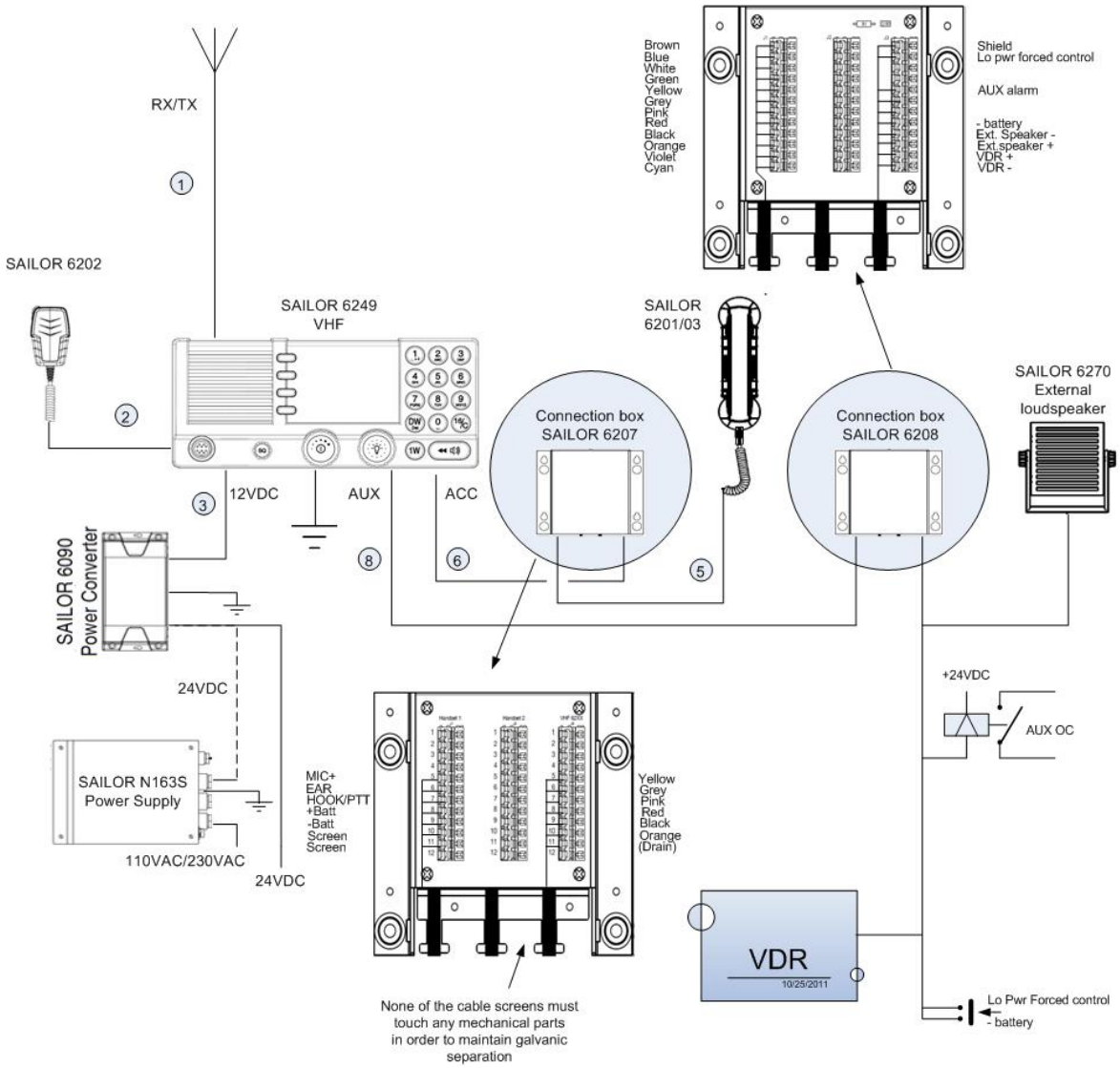


Figure B-4: System configuration, SAILOR 6201, VDR, loudspeaker and AUX OC

B.1.5 How to install a SAILOR 6270 External Loudspeaker

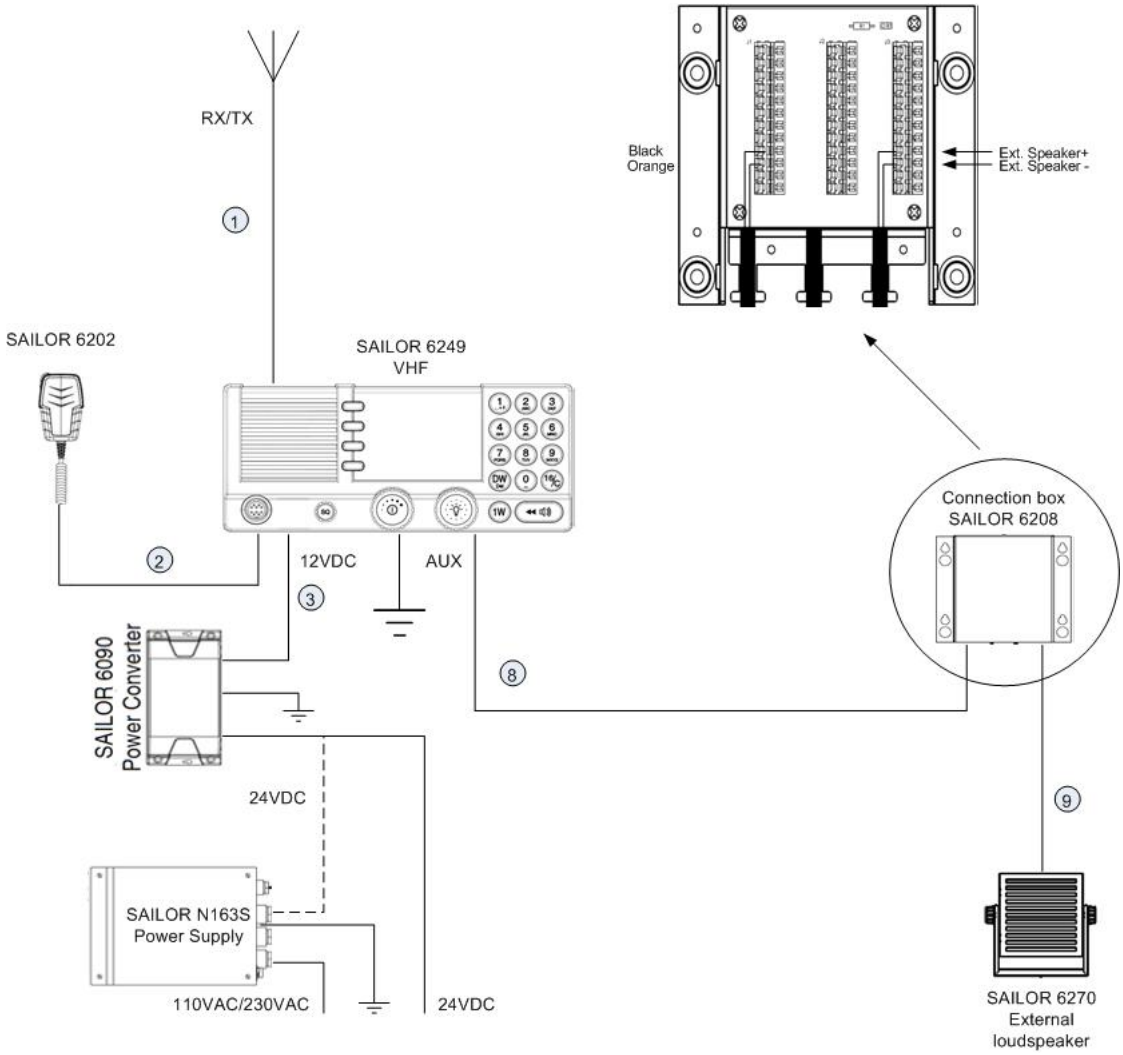


Figure B-5: System configuration, SAILOR 6270 External Loudspeaker

B.1.6 How to install 2 extra SAILOR 6201 Handsets

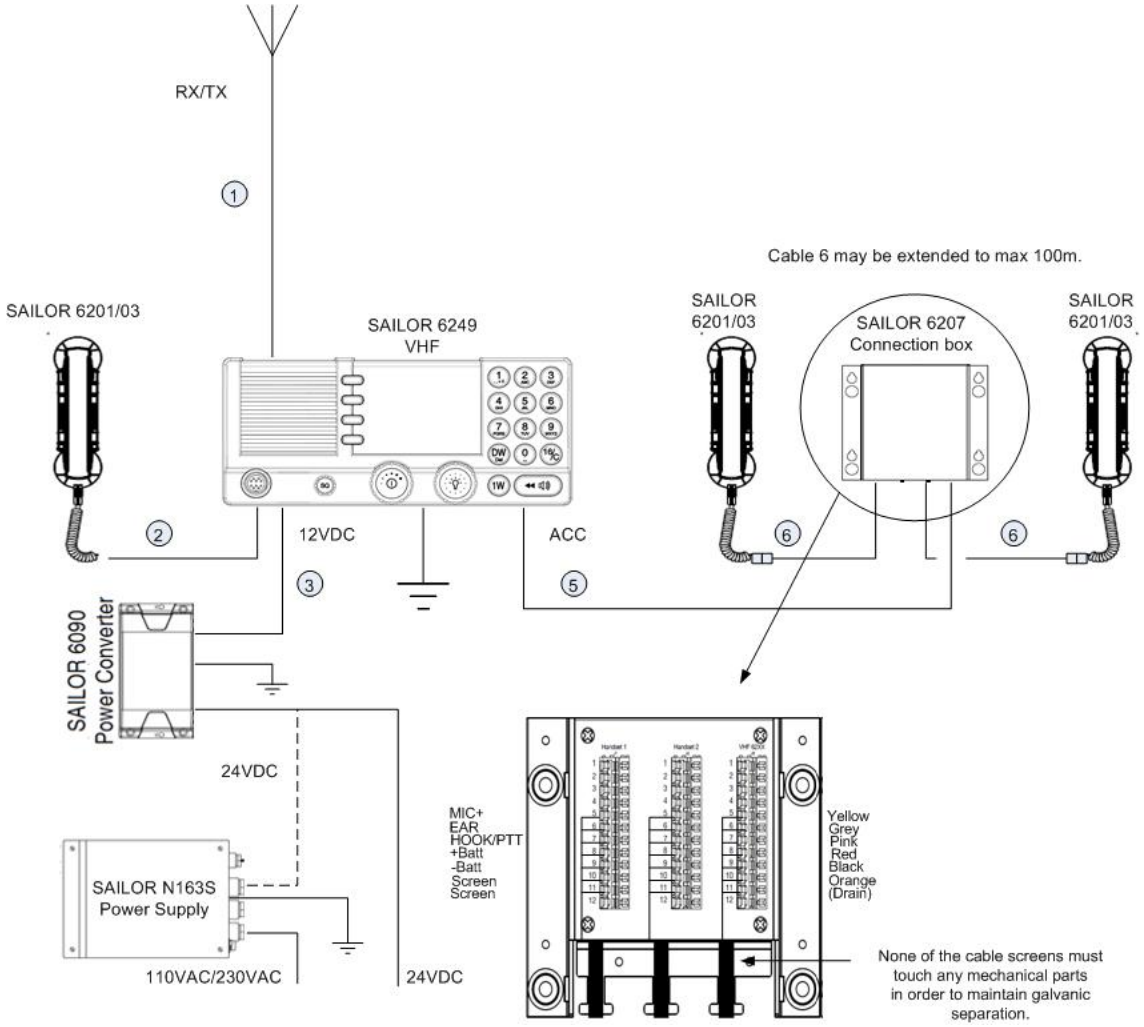


Figure B-6: System configuration, 2 SAILOR 6201 Handsets

B.1.7 How to install an extra SAILOR 6201 Handset in SAILOR 6207

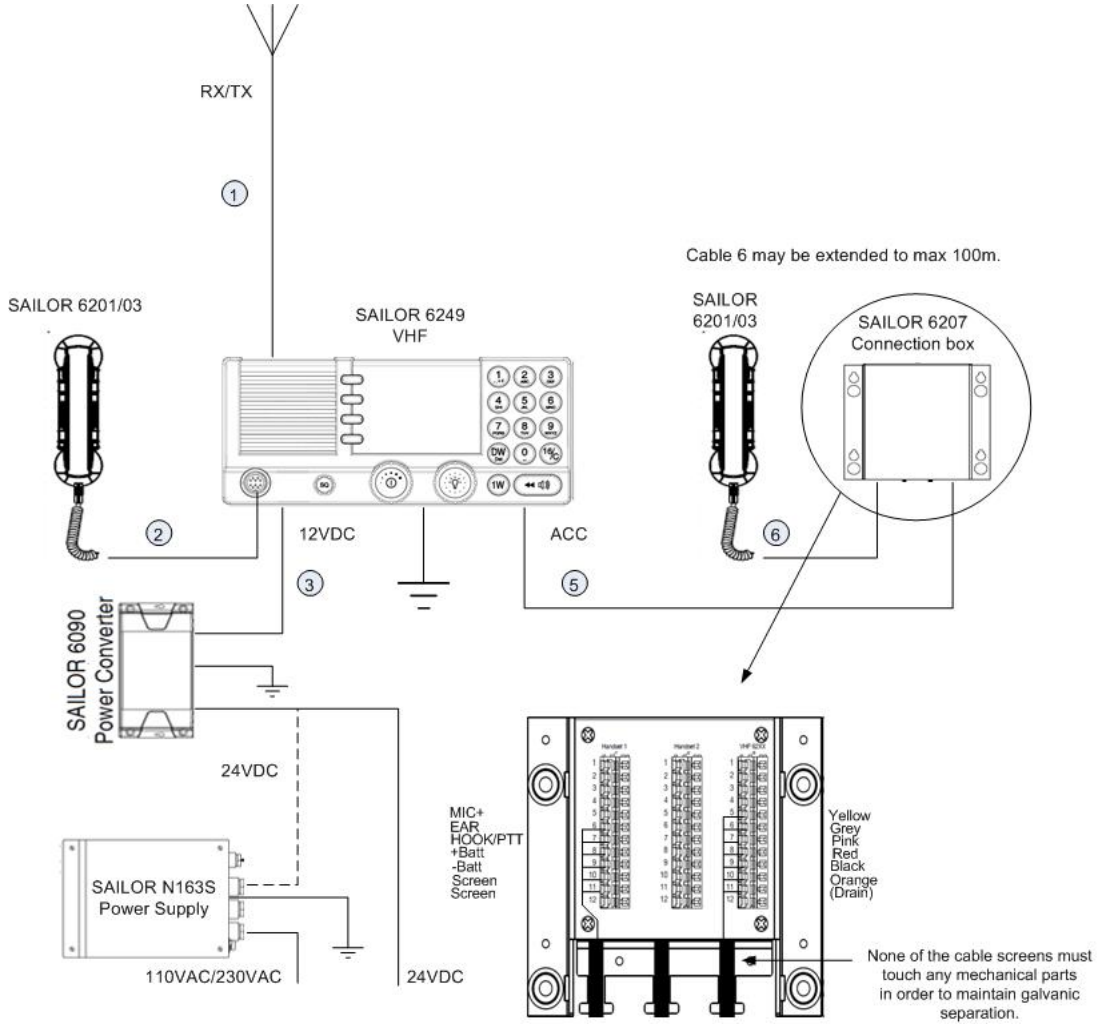


Figure B-7: System configuration, extra SAILOR 6201 Handset in SAILOR 6207

B.1.8 How to install a SAILOR 6202 Hand Microphone and an extra SAILOR 6201How to install a CAN bus and a SAILOR 6204 CSM

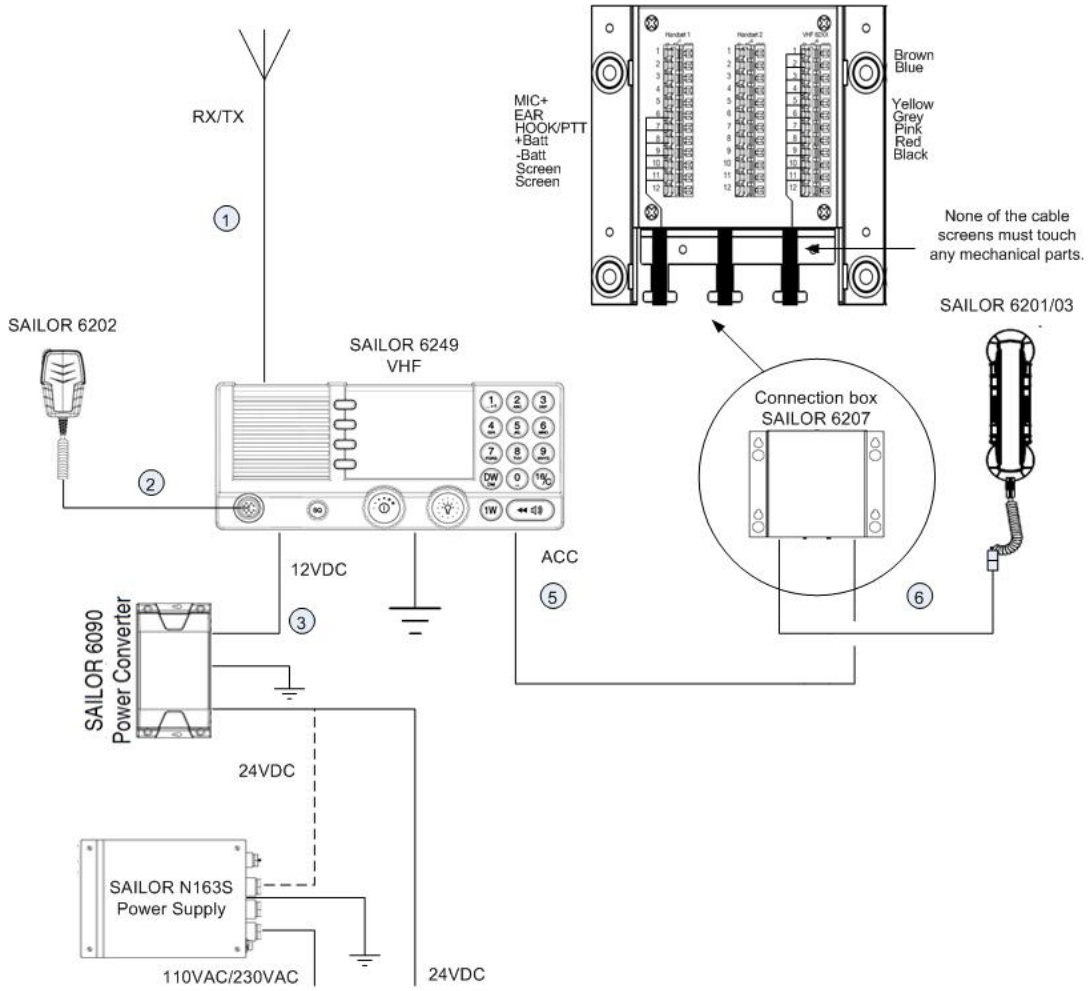


Figure B-8: System configuration, SAILOR 6202 Hand Mic. and SAILOR 6201 Handset

close to the VHF

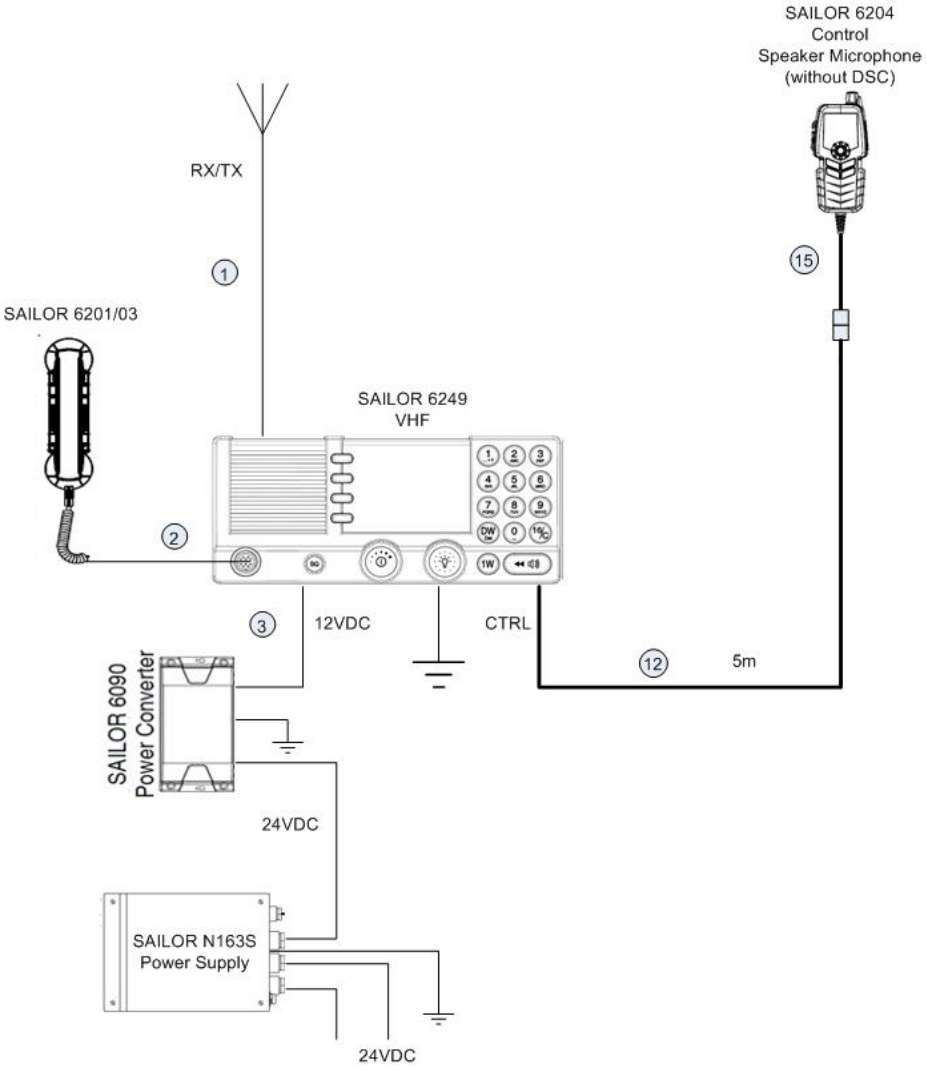


Figure B-9: System configuration, CAN bus, SAILOR 6204 CSM, close to the VHF radio

B.1.9 How to install a CAN bus with a SAILOR 6204 CSM not close to the VHF radio

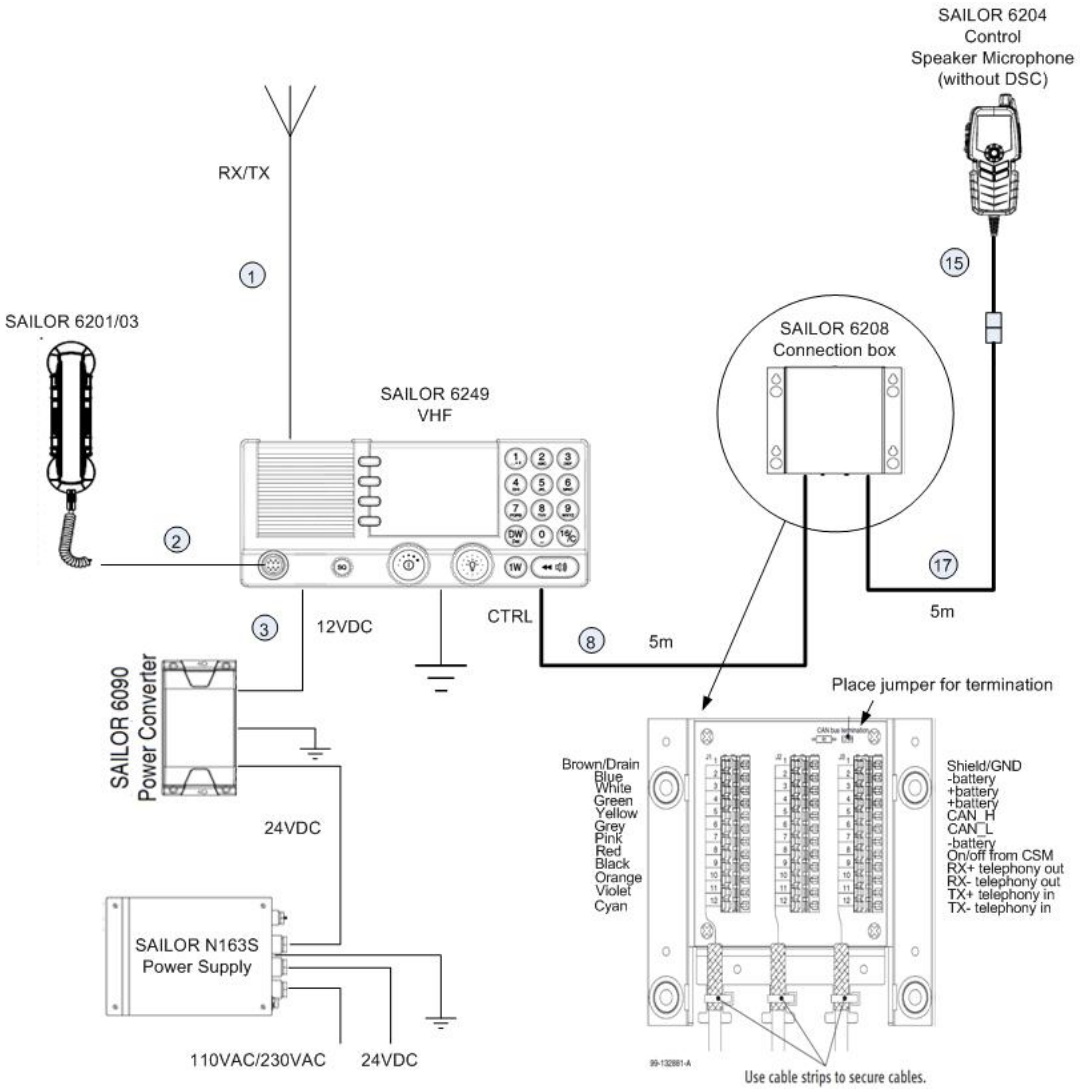


Figure B-10: System configuration, CAN bus, SAILOR 6204 CSM, not close to the VHF radio

B.1.10 How to install a CAN bus with a SAILOR 6204 CSM far from the VHF radio

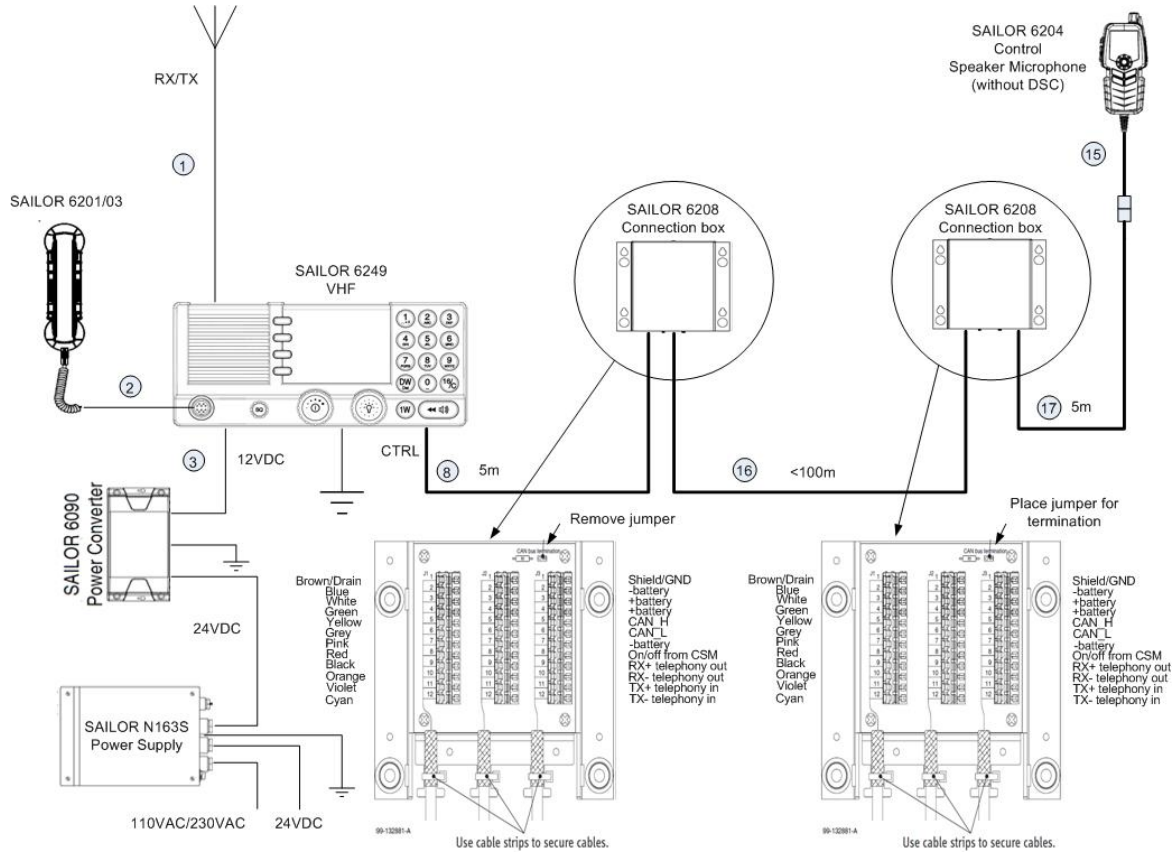


Figure B-11: System configuration, CAN bus, SAILOR 6204 CSM, far from the VHF radio

B.1.11 How to install a CAN bus with 2 SAILOR 6204 close to the VHF

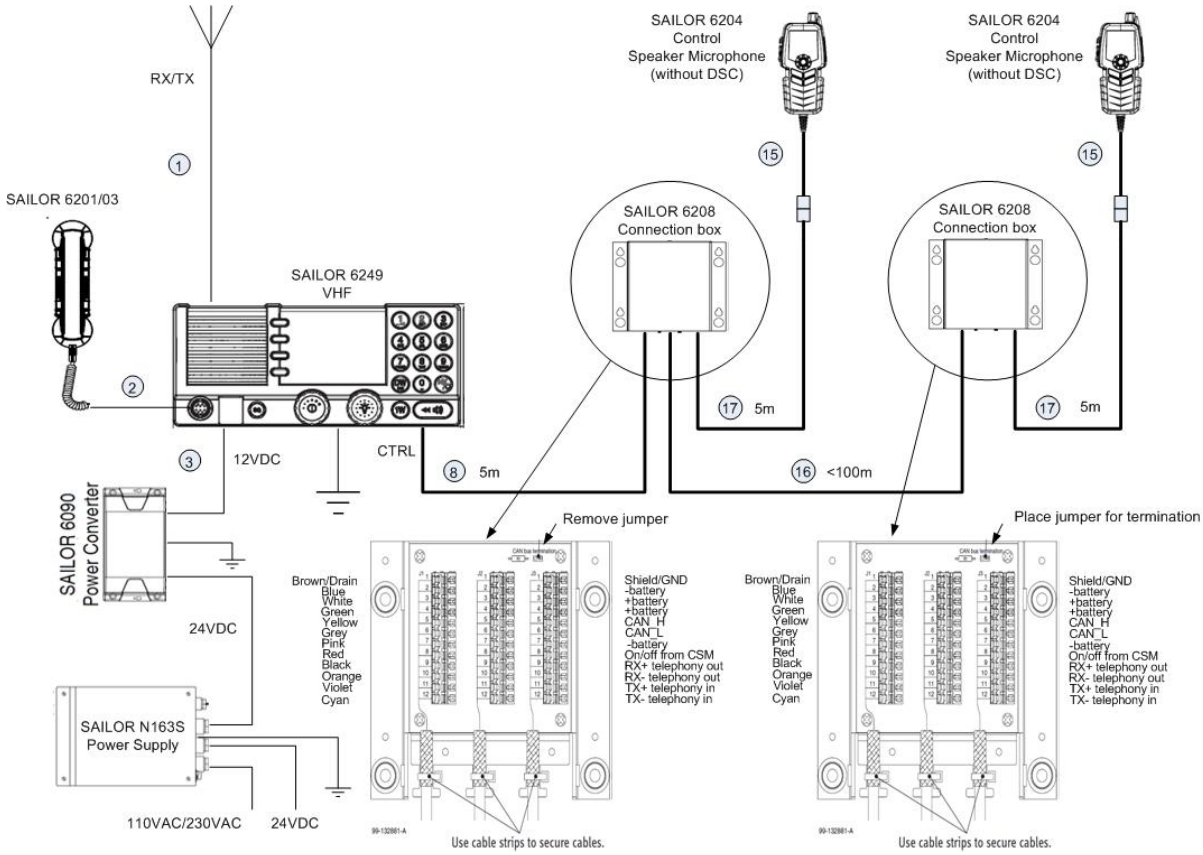


Figure B-12: System configuration, CAN bus, 2 SAILOR 6204 CSMs, close to VHF radio

B.1.12 How to install a CAN bus and 2 SAILOR 6204 CSM far from the VHF

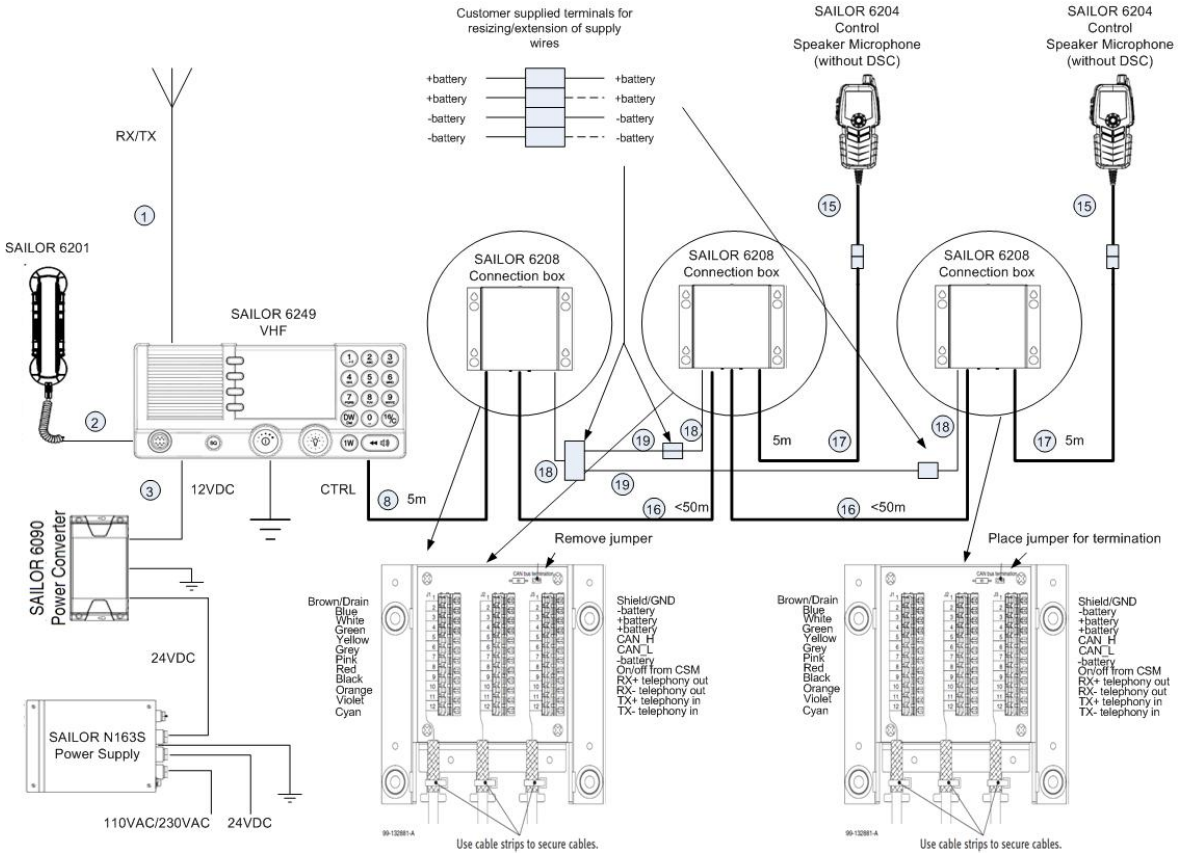


Figure B-13: System configuration, CAN bus, 2 SAILOR 6204 CSMs, far from VHF radio

B.1.13 How to install a CAN bus with 2 SAILOR 6204 CSMs close to each other

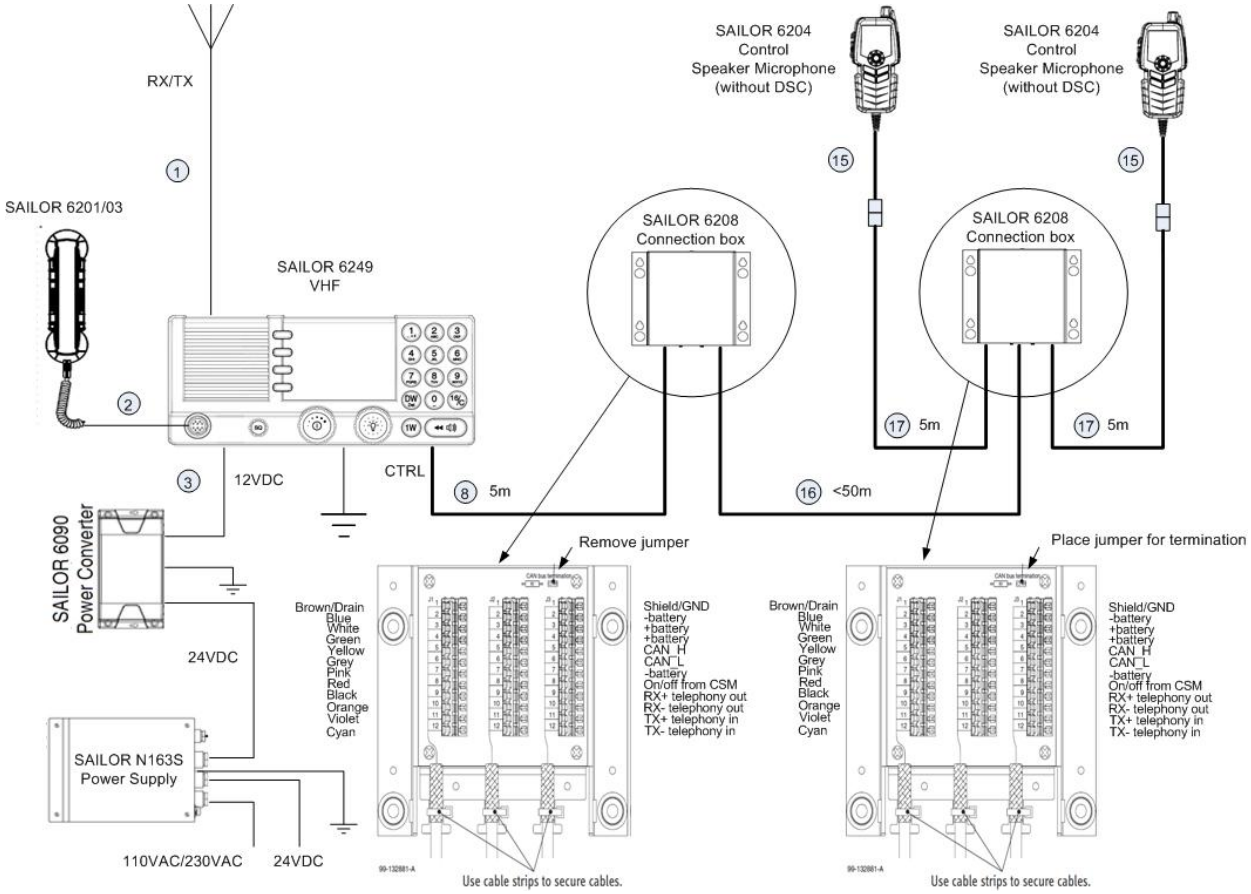


Figure B-14: System configuration: CAN bus, 2 SAILOR 6204 CSMs, close to each other

B.1.14 How to install a CAN bus with 2 SAILOR 6204 CSMs close to VHF on a small bridge

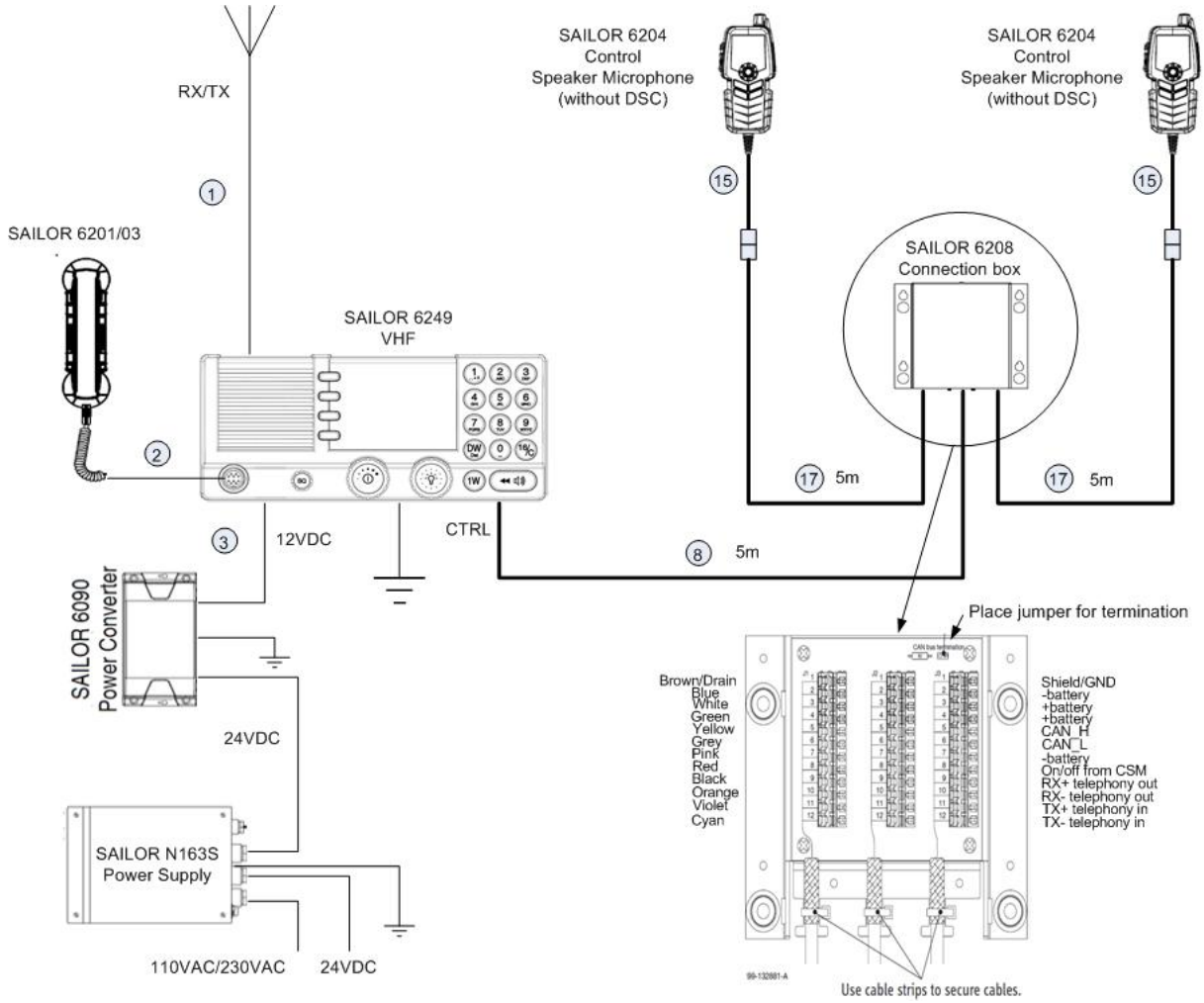


Figure B-15: System configuration: CAN bus, 2 SAILOR 6204 CSMs, close VHF, small bridge

B.1.15 How to install a CAN bus with 2 CSMs in bridge wings

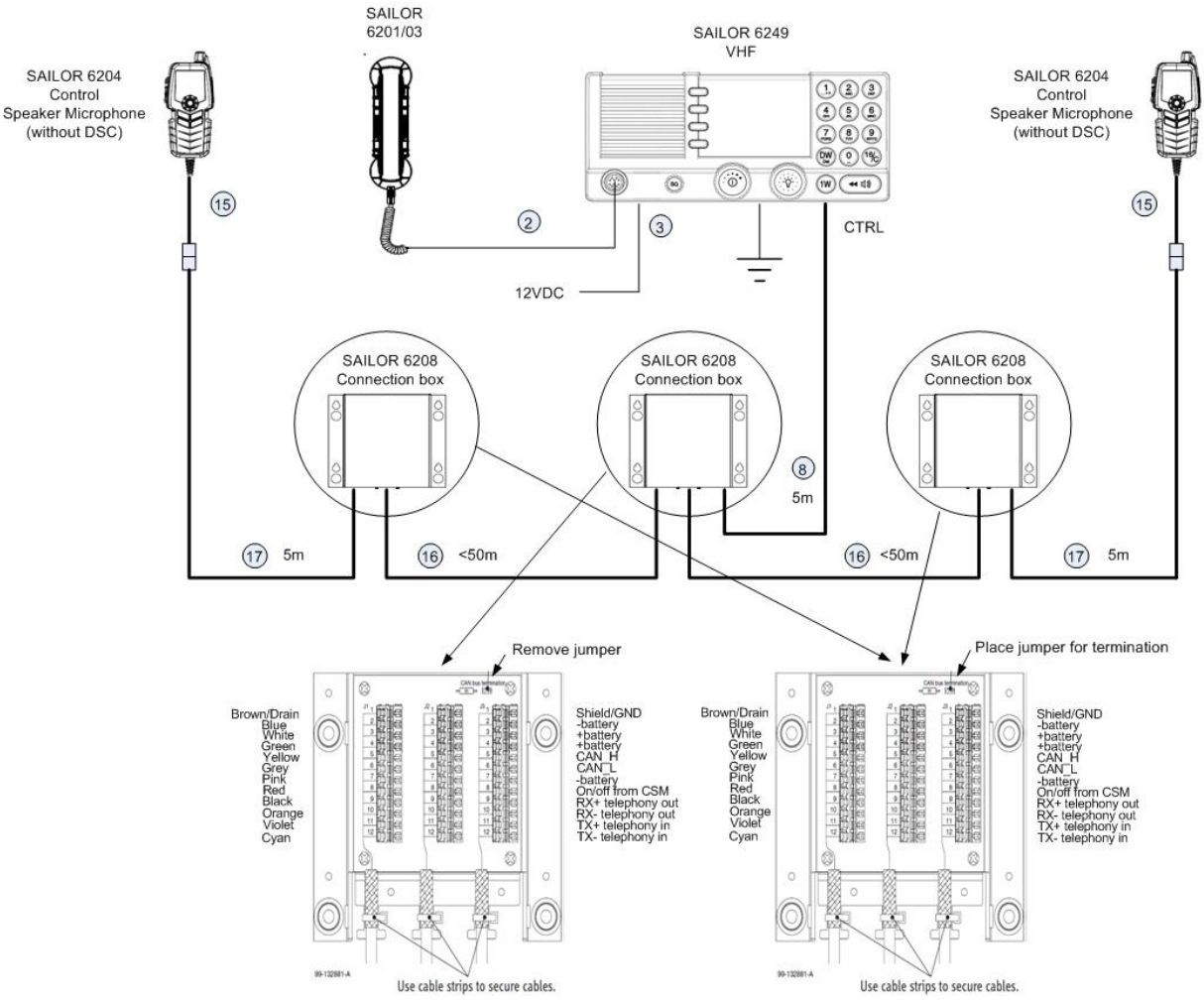


Figure B-16: System configuration: CAN bus, 2 SAILOR 6204 CSMs, in bridge wings

B.1.16 How to install a CAN bus with 3 CSMs in bridge wings

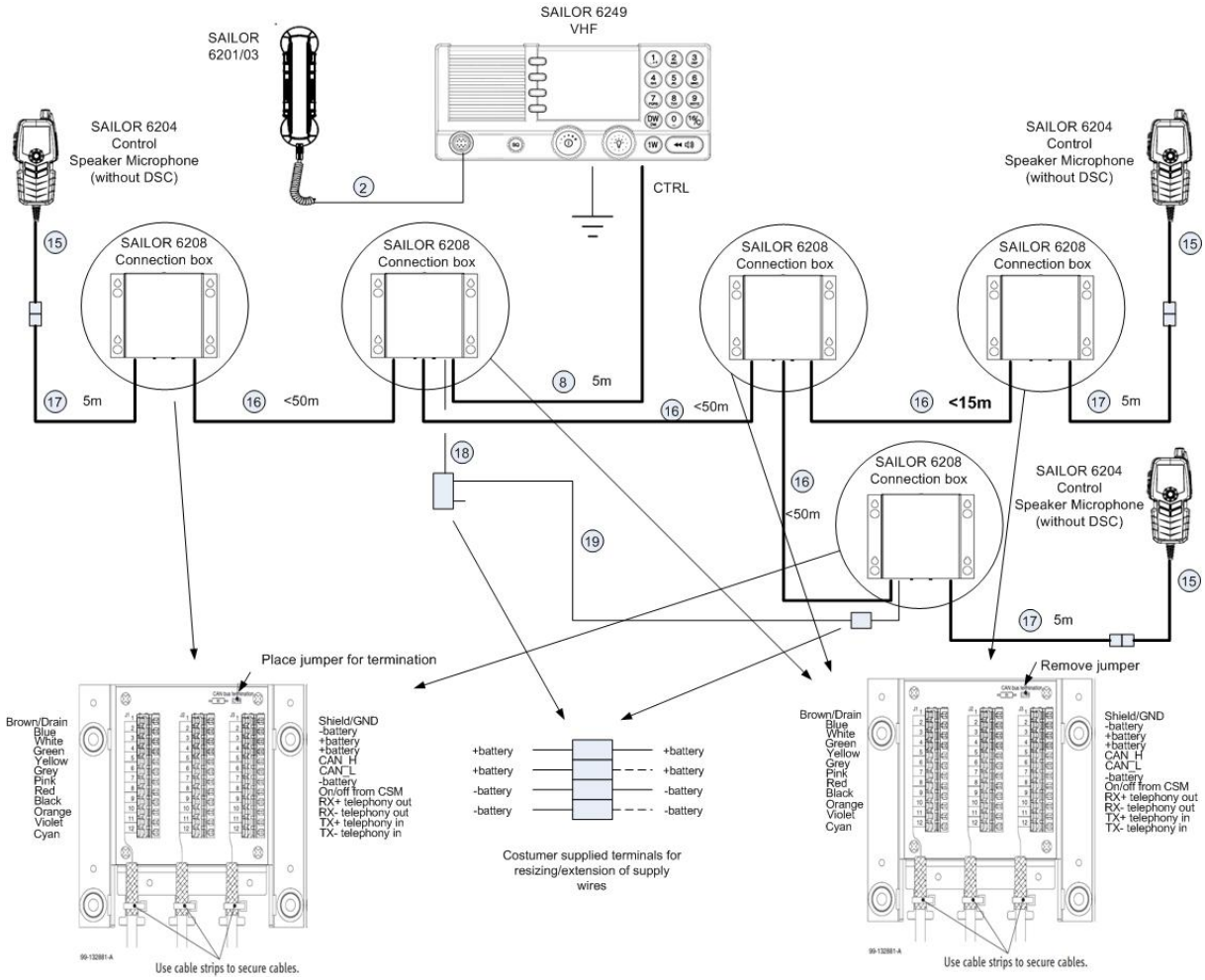


Figure B-17: System configuration: CAN bus, 3 SAILOR 6204 CSMs, in bridge wings

B.1.17 How to install a CAN bus with 4 CSMs in bridge wings

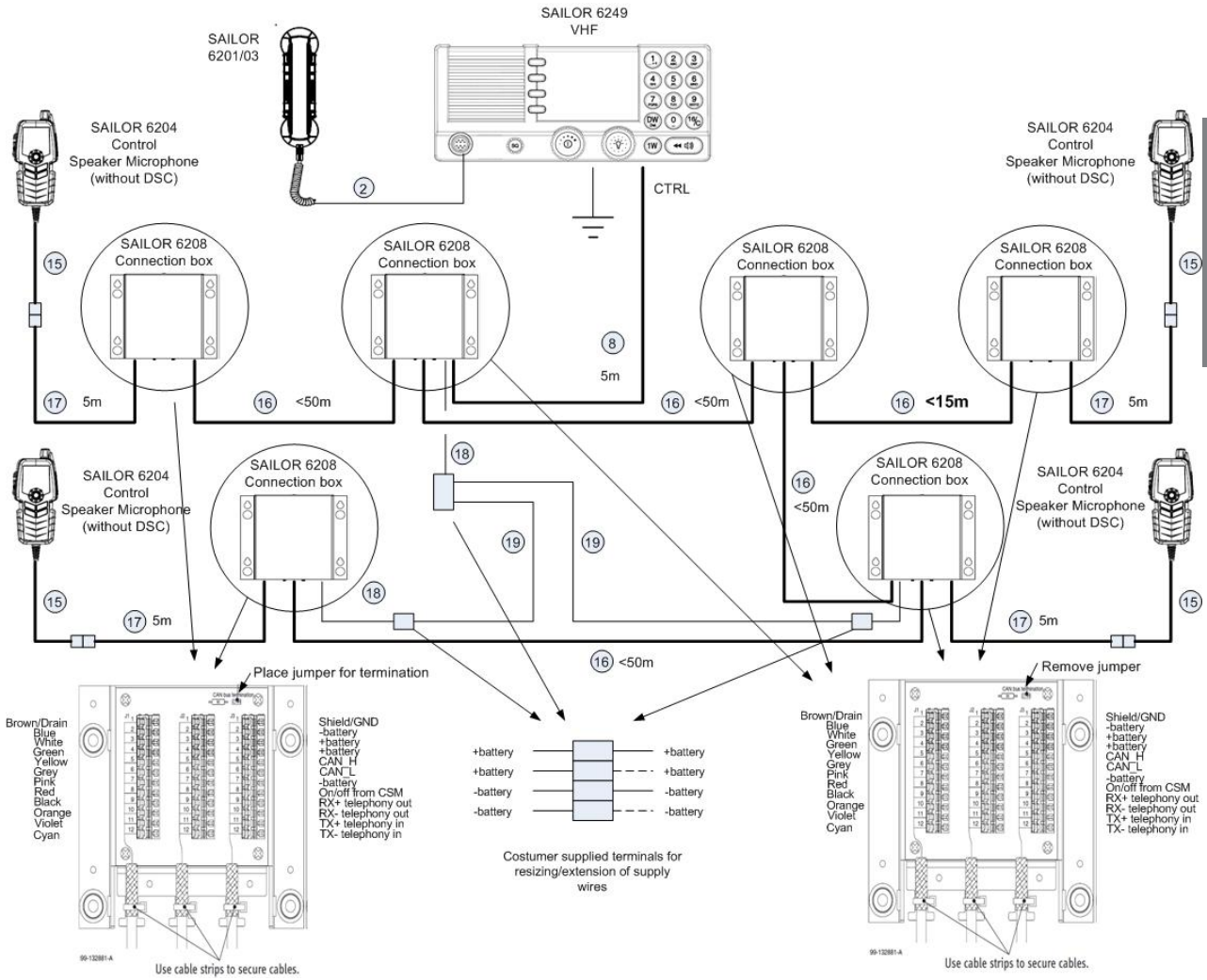


Figure B-18: System configuration: CAN bus, 4 SAILOR 6204 CSMs, in bridge wings

B.1.18 How to install a CAN bus with 3 SAILOR 6204 CSMs

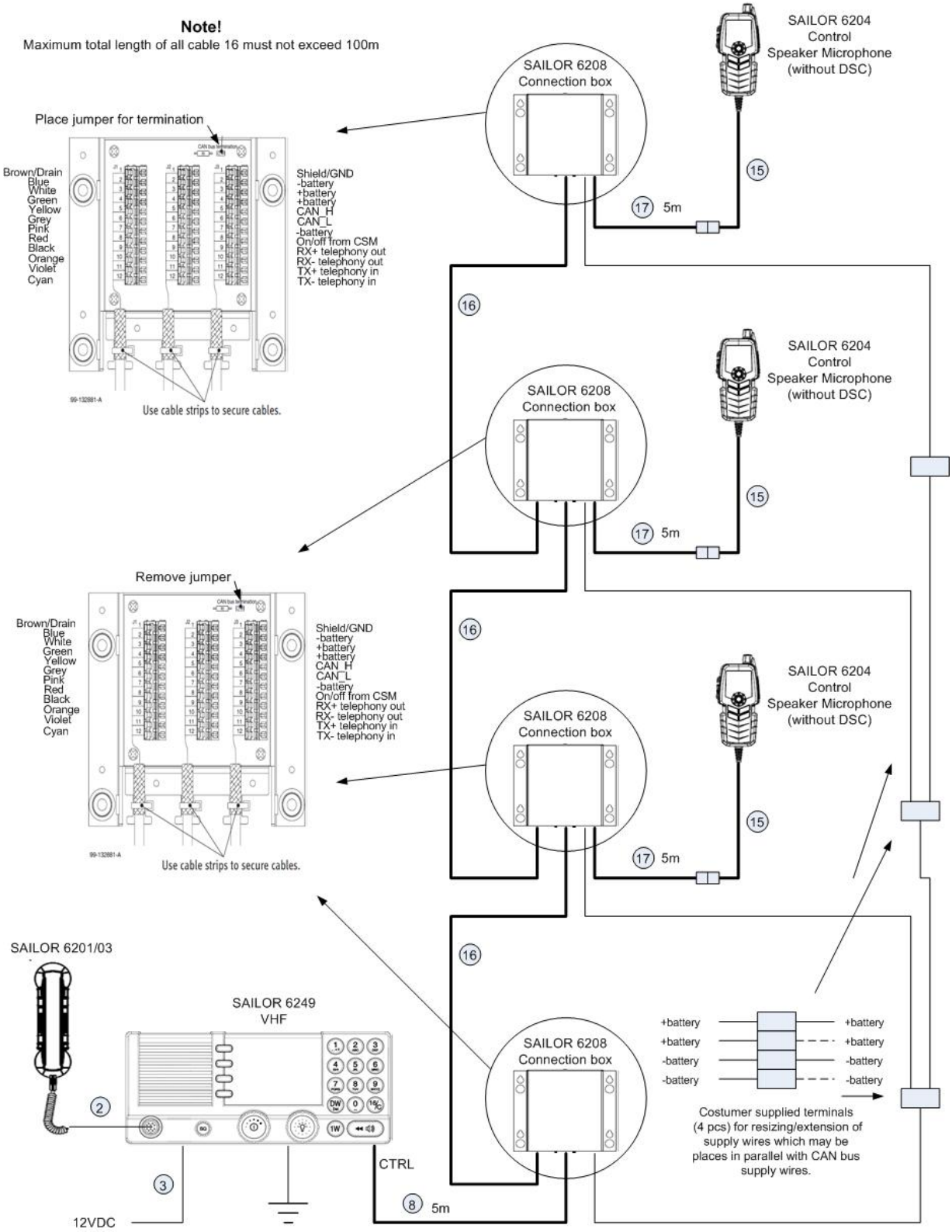


Figure B-19: System configuration: CAN bus, 3 SAILOR 6204 CSMs

B.1.19 How to install a CAN bus with 4 SAILOR 6204 CSMs

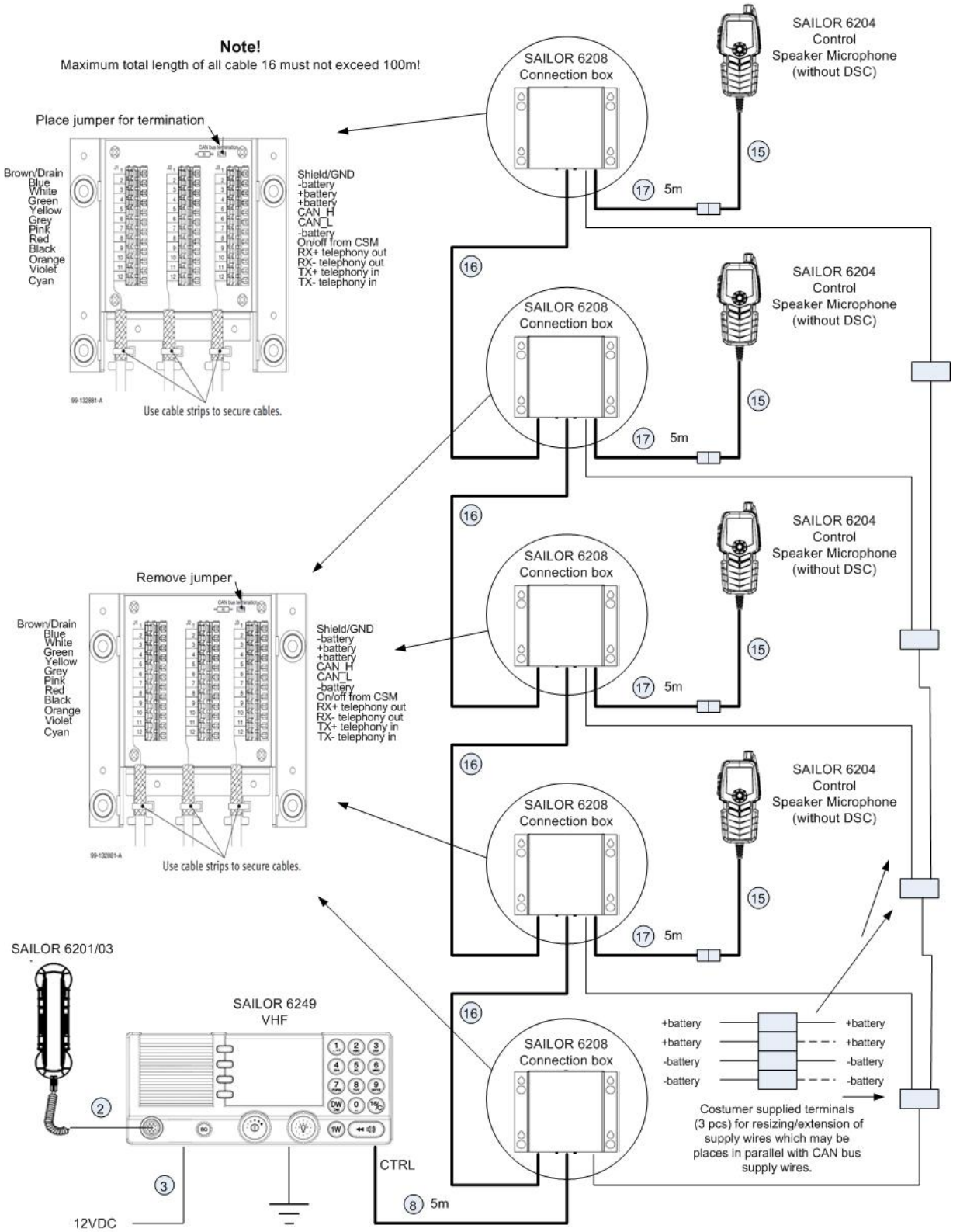


Figure B-20: System configuration: CAN bus, 4 SAILOR 6204 CSMs

B.1.20 How to install LAN

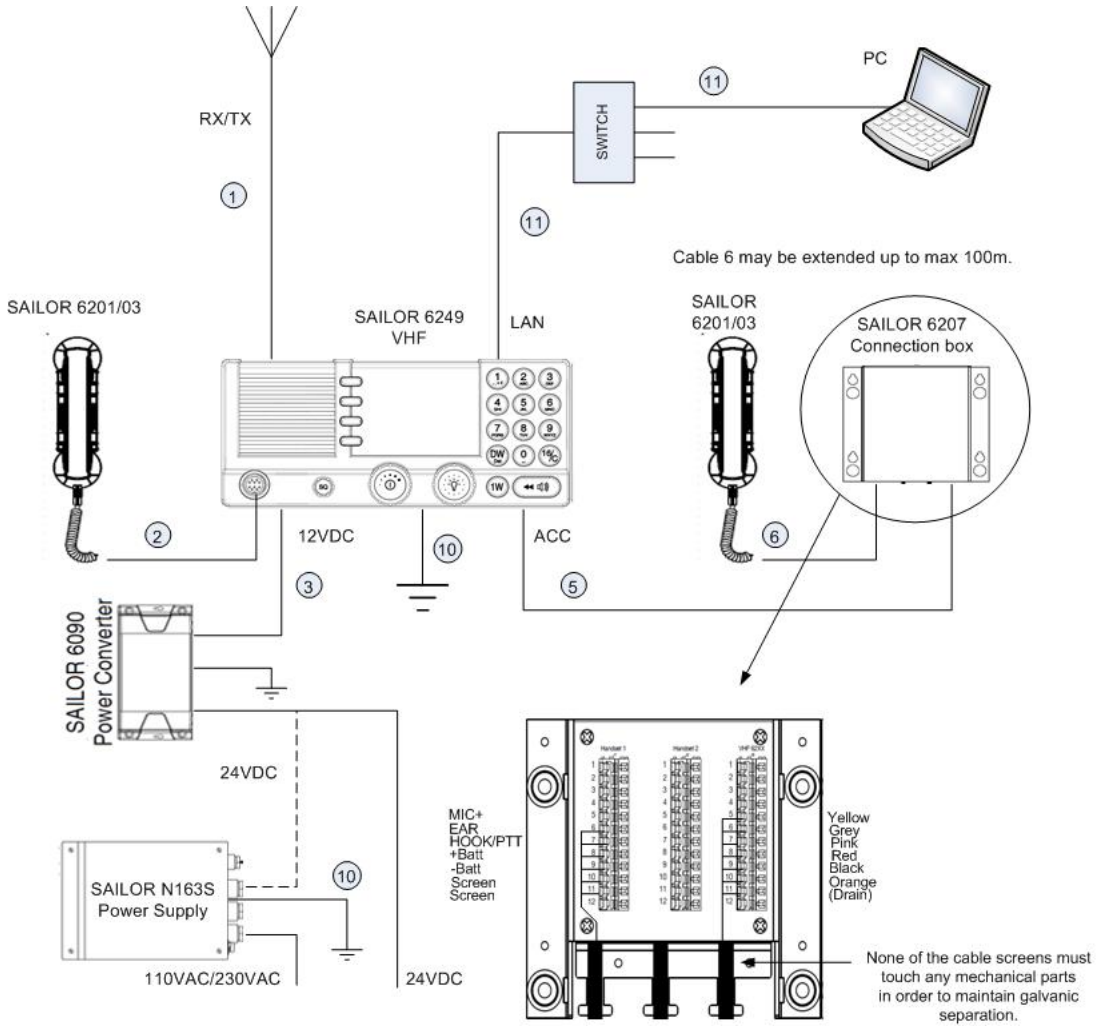


Figure B-21: System configuration: Installation of LAN

B.2 Cable requirements

The following cable information relates to the cable numbers in the system configuration drawings on the previous pages.

Cable	Part number	Description	Specification	Remarks
1		Antenna cable	RG214 or better	
2		Handset cable	1 m, spiraled	Part of handset
3	TT-37-131344	Power cable	1.5 m power cable	Included in 406249A
4	Not a T&T part	3-wire power cable, shielded	Depends on length	24 VDC, 4 A
5	406209-941	5 m cable for SAILOR 6207 Connection Box	10-pole LTW cable with screen	Included in Connection Box 406207A
6	406209-940	5 m cable for bulk mount	10-pole LTW cable with screen	
7			2-pole screened cable	
8	406208-941	5 m cable for SAILOR 6208 Connection Box	12-pole LTW cable with screen	Included in Connection Box 406208A
9			2-pole screened cable for loudspeaker	
10		0.3 m	Earth connection	
11		3 m	LAN, Ethernet cable	Shielded
12	406204-940	5 m cable for SAILOR 6204 Control Speaker Microphone	12-pole LTW cable for CAN, with screen	Extension cable with LTW plugs in both ends
13		3 m audio cable	Test cable	
14		1.5 m power cable		
15		Cable for SAILOR 6204 Control Speaker Microphone	2.5 m, spiraled	Part of handset
16		Cable for CAN	Screened with twisted pairs, length and size see cable description for *Cable 16* on page B-29.	Extension cable for CAN bus, see also under cable description for *Cable 16* on page B-29.

Table B-1: Cable overview

Cable	Part number	Description	Specification	Remarks
17	406204-940	As cable (12). Plug for CTRL is removed and wires connected to connection box	12-pole LTW cable with screen	Extension cable with LTW bulk mount plug
18	Not a T&T part.	Extension cable for power supply. Length: max. 5 m	4 leads, screened wires of 0.5 mm^2	
19	Not a T&T part	Extension cable for power supply for SAILOR 6204.	4 leads, screened wires of 4 mm^2 depending on the current and/or cable length.	See cable description.

Table B-1: Cable overview (Continued)

Cable 1

Cable type: Coax cable RG 214 or better.

Cable 2 (Handset, cable included)

SAILOR 6249 VHF Survival Craft Front connector LTW 10-pin, circular male	Signal designation	Signal description
Pin 1	NC	
Pin 2	NC	
Pin 3	NC	
Pin 4	NC	
Pin 5	MIC+	Microphone signal
Pin 6	Earpiece	Earpiece signal
Pin 7	Hook_PTT	Hook/PTT signal
Pin 8	Battery+ (10.8-15.6 VDC)	Battery supply when radio is on
Pin 9	Internal GND = -Battery	Equipment ground
Pin 10	Internal GND = -Battery	Equipment ground

Table B-2: Cable specifications for cable 2

Cable 3 (Power cable, delivered with 406249A)

Cable type: 3-wire cable.

+ VDC	Red
0 VDC	Blue
ON/OFF	Yellow

Table B-3: Cable specifications for cable 3

Note External power supply input is galvanically isolated from equipment ground reference, i.e. chassis.

Equipment internal power supply reference (-) is at equipment ground reference, i.e. chassis.

Cable 4 (Power cable)

Cable type: 3-wire screened cable. Dimensions depend on the cable length.

Cable 5 (Cable for SAILOR 6207 Connection Box)

Cable type: 10-wire screened cable.

Part number: 406209-941

The cable screen must not touch any metal part of the connection box due to galvanic separation.

SAILOR 6249 VHF Survival Craft ACC connector LTW 10-pin, circular male	Signal designation	Cable pin 406209-941 (5 m)	SAILOR 6207 Connection Box In from VHF	SAILOR 6207 Connection Box Ext. connections	Signal description
Pin 1		Brown	1-1	2(3)-1	Impedance: 600 Ohm. Max. 2 mA at min. level of 2 V (61162-1)
Pin 2		Blue	1-2	2(3)-2	
Pin 3		White	1-3	2(3)-3	Impedance: 600 Ohm. Max. 2 mA at min. level of 2 V
Pin 4		Green	1-4	2(3)-4	
Pin 5	MIC+	Yellow	1-5	2(3)-5	Microphone signal
Pin 6	Earpiece	Grey	1-6	2(3)-6	Earpiece signal
Pin 7	Hook_PTT	Pink	1-7	2(3)-7	Hook/PTT signal

Table B-4: Cable specifications for cable 5

SAILOR 6249 VHF Survival Craft ACC connector LTW 10-pin, circular male	Signal designation	Cable pin 406209-941 (5 m)	SAILOR 6207 Connection Box In from VHF	SAILOR 6207 Connection Box Ext. connections	Signal description
Pin 8	Battery+ (10.8-15.6 VDC)	Red	1-8	2(3)-8	Battery supply when radio is on
Pin 9	Internal GND = -Battery	Black	1-9	2(3)-9	Equipment ground
Pin 10	Internal GND = -Battery	Orange - SCREEN (Drain)	1-10	2(3)-10	Equipment ground
	Cable screen		1-11	2(3)-11	Cable screen must not touch any metal part of the connection box.
			1-12	2(3)-12	Not in use.

Table B-4: Cable specifications for cable 5

Cable 6

Connection cable for bulkhead mount, 5 m.

Part number: 406209-940

Same pin configuration as cable 5.

Cable 7

2-wire screened cable.

Cable 8 (AUX)

Part number: 406208-941

SAILOR 6249 VHF Survival Craft AUX connector LTW 12-pin, circular male	Signal designation	Cable pin 406208-941 (5 m)	SAILOR 6208 Conn. Box In from VHF	SAILOR 6208 Conn. Box Out of box	SAILOR 6208 Conn. Box Out of box	Signal description	Ships cable 6 twisted pairs overall screen
Pin 1	Shield/GND	Brown	J1-1	J2-1	J3-1	Equipment ground	paired with no. 8
Pin 2	Lo Power	Blue	J1-2	J2-2	J3-2	Low power forced control. Active when connected to ground	paired with no. 3
Pin 3		White	J1-3	J2-3	J3-3	Impedance: 600 Ohm. Max. 2 mA at min. level of 2 V	paired with no. 2
Pin 4		Green	J1-4	J2-4	J3-4		paired with no. 7
Pin 8	Battery-	Red	J1-8	J2-8	J3-8	Battery GND	paired with no. 1
Pin 9	Ext. Speaker+	Black	J1-9	J2-9	J3-9	VHF radio external speaker output, nom. 6 W into 8 Ohm	paired with no. 10
Pin 10	Ext. Speaker+	Orange	J1-10	J2-10	J3-10		paired with no. 9
Pin 11	VDR+	Purple	J1-11	J2-11	J3-11	Mixed RX/TX audio output for recording. Galvanically isolated, balanced signal, 0 dBm into 600 Ohm	paired with no. 12
Pin 12	VDR-	Light green	J1-12	J2-12	J3-12		paired with no. 11

Table B-5: Cable specifications for cable 8 (AUX)

CAN cable (Cable 8 - CTRL)

Part number: 406208-941

SAILOR 6249 VHF Survival Craft CTRL connector LTW 12-pin, circular male	Signal designation	Cable pin 406208-941 (5 m)	SAILOR 6208 Conn. Box In from VHF	SAILOR 6208 Conn. Box Out of box	SAILOR 6208 Conn. Box Out of box	Signal description	Ships cable 6 twisted pairs overall screen
Pin 1	Shield/GND	Brown	J1-1	J2-1	J3-1	Equipment ground	paired with no. 8
Pin 2	Battery-	Blue	J1-2	J2-2	J3-2	Battery -	paired with no. 3
Pin 3	Battery+	White	J1-3	J2-3	J3-3	10.8-15.6 VDC from VHF radio	paired with no. 2
Pin 4	Battery+	Green	J1-4	J2-4	J3-4	10.8-15.6 VDC from VHF radio	paired with no. 7
Pin 5	CAN_H	Yellow	J1-5	J2-5	J3-5	CAN bus data	paired with no. 6
Pin 6	CAN_L	Grey	J1-6	J2-6	J3-6		paired with no. 5
Pin 7	Battery-	Pink	J1-7	J2-7	J3-7	Battery -	paired with no. 4
Pin 8	ON/OFF from CSM	Red	J1-8	J2-8	J3-8	ON/OFF signal from Control Speaker Microphone	paired with no. 1
Pin 9	RX+	Black	J1-9	J2-9	J3-9	RX telephony (out)	paired with no. 10
Pin 10	RX-	Orange	J1-10	J2-10	J3-10		paired with no. 9
Pin 11	TX+	Purple	J1-11	J2-11	J3-11	TX telephony (in)	paired with no. 12
Pin 12	TX-	Light green	J1-12	J2-12	J3-12		paired with no. 11

Table B-6: Cable specifications for cable 8 (CTRL)

Cable 11

LAN connection.

Ethernet cable with screen and RJ45 shielded plugs.

Pin number	Pin function	Wire color
1	Tx+	white/orange
2	Tx-	orange
3	Rx+	white/green
4	Not connected	blue
5	Not connected	white/blue
6	Rx-	green
7	Not connected	white/brown
8	Not connected	brown

Table B-7: Pin allocation, LAN connector

Cable 16

The CAN bus cable must be of a paired and twisted type designed for the purpose. The CAN bus cable can handle signals up to 100 m away from the VHF to further Control Speaker Microphones (CSM).

Only 1 CSM can be connected to the VHF with a CAN bus cable of max 100 m if the cable dimension is 0.5mm^2 of each cord. Other combinations with more CSMs must be calculated seriously before installing the cable. If more CSMs are connected, the CAN cable of 0.5mm^2 can handle the signals up to max. 100 m. The only restriction is the power supply for the connected CSMs.

The voltage drop along the cable increases with the length of the cable. Separate supply cables can be installed in parallel with the CAN cable to reduce voltage drop in long cables. The maximum allowed voltage drop from VHF to CSM is 2 VDC. It means 1 VDC forward and 1 VDC return.

Max current consumption for each CSM is 0.5A.

Formula to calculate DC resistance in a wire:

$$R = 0,017 \times L / a$$

L = length of wire one way, in metre
a = cross section of the wire in mm^2

Contact your local dealer for further information for correct installation.

Cable 17: CAN cable for bulk head installation.

Same cable as cable 12, but the plug is removed and the wires are connected to the connection box.

Same pin configuration as cable 8. See *Cable specifications for cable 8 (CTRL)* on page B-28.

Cable 18

Cable between the connection box and terminals to extend the power supply wires.

4 leads, screened wires of 0.5mm^2. Supply for 6204 CSM for extended CAN BUS connections.

Cable 19

The voltage drop along the cable increases with the length of the cable. Separate supply cables can be installed in parallel with the CAN cable to reduce voltage drop in long cables. The maximum allowed voltage drop from VHF to CSM is 2 VDC. It means 1 VDC forward and 1 VDC return.

The maximum current consumption for each CSM is 0.5 A.

Formula to calculate DC resistance in a wire:

$$R = 0,017 \times L/a$$

L = length of wire one way, in metre
a = cross section of the wire in mm^2

For best EMC performance, place the supply cables in parallel with CAN cable

Contact your local dealer for further information for correct installation.

A

ACC	Accessories

C

CAN	Controller-Area Network. A message based protocol designed to allow microcontrollers and devices to communicate with each other within a vehicle without a host computer.
CTRL	Control

L

LAN	Local Area Network ,
LTW	LTW Technology is a professional designer and manufacturer of waterproof connectors.
LWE	Light Weight Ethernet

V

VDR	Voyage Data Recorder, a data recording system designed for all vessels required to comply with the IMO's International Convention SOLAS Requirements in order to collect data from various sensors on board the vessel.
VHF	Very High Frequency

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SAILOR 6222 VHF DSC

Installation manual

Disclaimer

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Safety warning

The following general safety precautions must be observed during all phases of operation, service and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture and intended use of the equipment. Thrane & Thrane assumes no liability for the customer's failure to comply with these requirements.

Ground the equipment

To minimise shock hazard, the SAILOR 6222 VHF DSC unit must be connected to an electrical ground and the cable instructions must be followed.

RF exposure hazards and instructions

Your Thrane & Thrane radio set generates electromagnetic RF (radio frequency) energy when transmitting. To ensure that you and those around you are not exposed to excessive amounts of energy and thus to avoid health hazards from excessive exposure to RF energy, all persons must be at least 3ft (0.9 m) away from the antenna when the radio is transmitting.

Warranty limitation

IMPORTANT - The radio is a sealed waterproof unit (classified IPX8). To create and maintain its waterproof integrity it was assembled in a controlled environment using special equipment. The radio is not a user maintainable unit, and under no circumstances should the unit be opened except by authorized personnel. Unauthorized opening of the unit will invalidate the warranty.

Installation and service

Installation and general service must be done by skilled service personnel.

Preface

Radio for occupational use

The SAILOR 6222 VHF DSC meets the requirements of the SOLAS and is intended for use in a maritime environment.
SAILOR 6222 VHF DSC is designed for *occupational use only* and must be operated by licensed personnel only.
SAILOR 6222 VHF DSC is not intended for use in an uncontrolled environment by general public.
SAILOR 6222 VHF DSC is designed for installation by a skilled service person.

Training information

The SAILOR 6222 VHF DSC is designed for *occupational use only* and is also classified as such. It must be operated by licensed personnel only. It must only be used in the course of employment by individuals aware of both the hazards as well as the way to minimize those hazards

The radio is thus NOT intended for use in an uncontrolled environment by general public. The SAILOR 6222 VHF DSC has been tested and complies with the FCC RF exposure limits for *Occupational Use Only*. The radio also complies with the following guidelines and standards regarding RF energy and electromagnetic energy levels including the recommended levels for human exposure:

- FCC OET Bulletin 65 Supplement C, evaluating compliance with FCC guidelines for human exposure to radio frequency electromagnetic fields.
- American National Standards Institute (C95.1) IEEE standard for safety levels with respect to human exposure to radio frequency electromagnetic fields, 3 kHz to 300 GHz
- American National Standards Institute (C95.3) IEEE recommended practice for the measurement of potentially hazardous electromagnetic fields - RF and microwaves.

Below the RF exposure hazards and instructions in safe operation of the radio within the FCC RF exposure limits established for it are described.

Warning

Your Thrane & Thrane radio set generates electromagnetic RF (radio frequency) energy when it is transmitting. To ensure that you and those around you are not exposed to excessive amounts of that energy (beyond FCC allowable limits for occupational use) and thus to avoid health hazards from excessive exposure to RF energy, FCC OET bulletin 65 establishes an Maximum Permissible Exposure (MPE) radius of 200 cm for the maximum power of your radio (25W selected) with a half wave omni-directional antenna having a maximum gain of 4 dB. This means all persons must be at least 200 cm away from the antenna when the radio is transmitting.

Installation

1. An omni-directional antenna with a maximum power gain of 5.2 dBi must be mounted at least 400 cm above the highest deck where people may be staying during radio transmissions. The distance is to be measured vertically from the lowest point of the antenna. This provides the minimum separation distance which is in compliance with RF exposure requirements and is based on the MPE radius of 200 cm plus the 200 cm height of an adult.
2. On vessels that cannot fulfil requirements in item 1, the antenna must be mounted so that its lowest point is at least 200 cm vertically above the heads of people on deck and all persons must be outside the 200 cm MPE radius during radio transmission.
   - Always mount the antenna at least 200 cm from possible human access.
   - Never touch the antenna when transmitting
   - Use only authorized Thrane & Thrane accessories.
3. If the antenna has to be placed in public areas or near people with no awareness of the radio transmission, the antenna must be placed at a distance not less than 200 cm from possible human access.

Failure to observe any of these warnings may cause you or other people to exceed FCC RF exposure limits or create other dangerous conditions.

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Introduction

1.1 VHF radio with DSC Class A

SAILOR 6222 VHF DSC, your new VHF radio with full DSC functionality, is approved to MED, FCC and Industry Canada and is waterproof to the IPx8 and IPx6 standard. As part of the required safety equipment, use the SAILOR 6222 VHF DSC in an emergency situation. However the best way to guarantee functionality in an emergency situation, is to use the radio in daily communication on board.

The VHF radio is a simplex/semi duplex VHF radio. It is designed with an easy-to-use menu-driven setup. You use the softkeys and the keypad to enter the desired functions, you browse and select a setting using the right selection knob. The large display can be customized for optimum readability and visibility both day and night with several color themes.

The VHF radio can replay the last 240 s of received voice messages. This is a useful feature to minimize misunderstandings and to record messages when the radio is unattended.

With SAILOR connection boxes the VHF radio connects easily to external equipment like additional handsets, water proof hand microphones, control speaker microphone, alarm panel or external speaker. The Ethernet interface enables the VHF radio to be connected to ThraneLINK for service updates.

For a list of accessories available for the VHF radio see *Accessories available* on page 1-4 and *Part numbers for accessories* on page 2-21 and check with your nearest distributor.

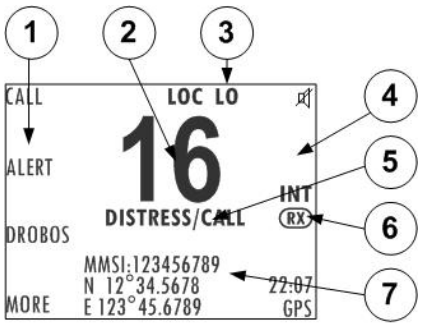
1.1.1 Controls on the front plate

Figure 1-1: Controls on the front plate

1. Loudspeaker.
2. Four soft keys with function title in the display.
3. Large display.
4. Keys 0 to 9 to enter numbers or text.
5. **DW** button to toggle the watch function (dual or triple).
6. **16/C** quick selection key for channel 16 and the programmed call channel.
7. Connector for Handset or Handmicrophone. If not used, put the cap from the ACC connector on the front connector to prevent water ingress.
8. Distress button for sending a Distress alert.
9. Squelch control to mute background noise.
10. Volume knob with key-press function for volume control and power on/off.
11. Selector and dim knob with key-press function for general operation, display color selection and dimming.
12. **1W** button to toggle between high and low power.
13. Replay button to play back up to 240 s voice message.

1.1.2 SAILOR 6222 VHF DSC display

The picture shows the display after start-up. The display holds various fields of information, depending on the currently selected function.



1. Functions you can select with the soft keys. If there are more than 4 functions in the list press the soft key **MORE** to display further functions.
2. Current working channel.
3. **System property icons** with information relevant for the currently selected functions.
4. Channel properties next to the currently selected VHF channel (if any).
5. **Service line** containing current temporary information relevant for the current channel or function.
6. Current state: RX or TX.
7. **DSC window** with DSC information (MMSI number, position information and UTC time of position and origin), or specific information relevant to other functions, e.g. Replay, etc.).

For a detailed description of the information shown for each of the functions available see the user manual.

1.2 Accessories available

Accessory	Description
SAILOR 6201 Handset with cradle (additional)	One SAILOR 6201 Handset with cradle is included in the delivery of the SAILOR 6222 VHF DSC. You can connect another 2 SAILOR 6201 Handsets.
SAILOR 6203 Handset with cradle	SAILOR 6203 Handset with cradle, waterproof to IPx6.
SAILOR 6202 Hand Microphone	You can use the SAILOR 6202 (waterproof to IPx6 and IPx8) Hand Microphone instead of the handset.
SAILOR 6204 Control Speaker Microphone	With the SAILOR 6204 Control Speaker Microphone you can control the VHF functions of the SAILOR 6222 VHF DSC.
SAILOR 6207 Connection Box for parallel handsets	The SAILOR 6207 Connection Box including Connection Cable 406209-941 is used for easy installation of several SAILOR 6201/03 Handsets.
SAILOR 6208 Control Unit Connection Box	The SAILOR 6208 Connection Box including Connection Cable 406208-941 is used for easy installation of external equipment and accessories: • Max. 4 SAILOR 6204 Control Speaker Microphones • VDR • SAILOR 6270 External loudspeaker • Alarm panels and GPS input

Table 1-1: Accessories available

Accessory	Description
Connection cables	**5m connection cable for bulkhead mount**: Use this cable in installations where the SAILOR 6201 or 6203 Handset is not connected directly to the SAILOR 6222 VHF DSC, but located in a different position (part number: 406204-940). **5m Connection cable**, **1x10 pole**: Use this cable in installations when connecting external equipment to the SAILOR 6222 VHF DSC. This cable is included in the SAILOR 6207 Connection Box for parallel handsets (part number: 406207-941). **5 m Connection cable for SAILOR 6204 Control Speaker Microphone**, **1x12 pole** (part number: 406204-940).
SAILOR 6270 External loudspeaker	If you need an additional external loudspeaker you can connect a SAILOR 6270 Loudspeaker. It provides 6 W output power.
SAILOR 6103 Multi Alarm Panel	With the SAILOR 6103 Multi Alarm Panel you can activate GMDSS Distress Alarms. The Multi Alarm Panel can be connected to the SAILOR 6222 VHF DSC via the Ethernet interface (LAN connector, ThraneLINK).
SAILOR 6197 Ethernet Switch	The SAILOR 6197 Ethernet Switch is used in installations with SAILOR 6103 GMDSS Alarm Panels and in installations with ThraneLINK. The Ethernet switch has 5 ports.
SAILOR 6090 Power Converter 24 V to 12 V DC	The SAILOR 6090 Power Converter is used to provide 12 V DC for the SAILOR 6222 VHF DSC from a 24 V DC power source.
SAILOR 6588 DGNSS Receiver	The SAILOR 6588 DGNSS Receiver is the main unit in a DGNSS or GNSS position system.
SAILOR 6286 DGNSS Antenna - Active	The SAILOR 6286 DGNSS Antenna - Active is a sealed waterproof DGNSS and GLONAS antenna.

Table 1-1: Accessories available (Continued)

1.2.1 System configuration — example

The SAILOR 6222 VHF DSC can be customized to suit your installation. The following illustration is one example of a system. For further configuration examples see Appendix B, *System configurations*.

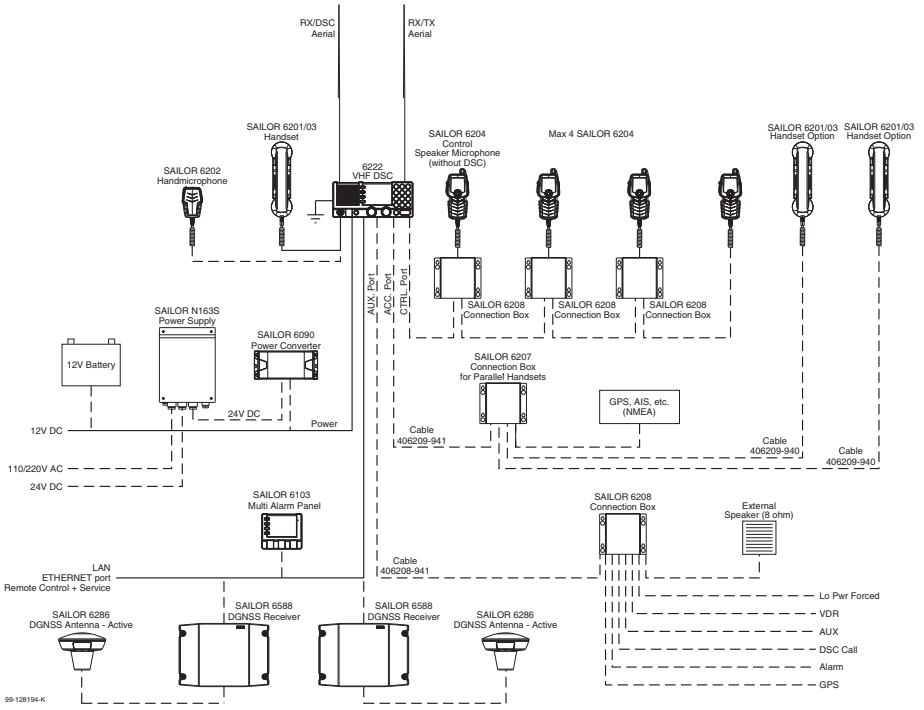


Figure 1-2: System configuration, example

Installation

In this chapter you find information and guidelines for:

- *Unpacking and initial inspection*
- *Installing the VHF radio*
- *Connectors*
- *VHF and DSC antenna installation*
- *Accessories*

2.1 Unpacking and initial inspection

The following items are included in the delivery of a SAILOR 6222 VHF DSC:

- SAILOR 6222 VHF DSC
- SAILOR 6201 Handset with cradle
- User manual
- Installation guide
- Emergency call sheet
- Mounting bracket with two knobs
- Connectors for cables
- Power cable, fittings and fuses
- Packaging material
- Kit for flush mount installation, including gasket
- SAILOR 6090 Power Converter 24 to 12 V

2.1.1 Initial inspection

Inspect the shipping carton immediately upon receipt for evidence of damage during transport. If the shipping carton is severely damaged or water stained, request that thecarrier's agent be present when opening the carton. Save the carton packing material for future use.

WARNING! To avoid electric shock, do not apply power to the system if there is any sign of shipping damage to any part of the front or rear panel or the outer cover. Read the safety summary at the front of this manual before installing or operating the system.

After unpacking the system, inspect it thoroughly for hidden damage and loose components or fittings. If the contents are incomplete, if there is mechanical damage or defect, or if the system does not work properly, notify your dealer.

2.2 Installing the VHF radio

You can mount the VHF radio as a desktop, overhead or flush-mounted unit integrated in the instrument panel.

Provide space enough to access the front panel connectors and for installing a cradle for the speaking device.

Provide **at least 120 mm space at the back** of the SAILOR 6222 VHF DSC radio to allow free air circulation and for cable access.

Cable requirements

All cables attached to the SAILOR 6222 VHF DSC must be shielded. Every shield should have a low impedance connection to an electrical ground.

Before using the SAILOR 6222 VHF DSC for the first time, check that all cables are correctly wired and fastened.

Compass safe distance

Make sure that the VHF radio is far enough from any magnetic compass to avoid influence of the loudspeaker magnet on the compass reading. See the following table for the safe distance after magnetization between the nearest point of the device and the centre of the compass at which it will produce a deviation of 0.3˚.

Device	Compass safe distance
SAILOR 6222 VHF DSC	0.85 m
SAILOR 6201 and 6203 Handset with cradle	0.95 m
SAILOR 6090 Power Converter 24 V — 12 V	0.15 m

Table 2-1: Compass safe distance

Device	Compass safe distance
SAILOR 6207 Connection Box for parallel handsets	0.45 m
SAILOR 6208 Control Unit Connection Box	0.45 m

Table 2-1: Compass safe distance

2.2.1 SAILOR 6222 VHF DSC with U mounting bracket

The mounting bracket and two knobs are included in the delivery.

Desktop mounting

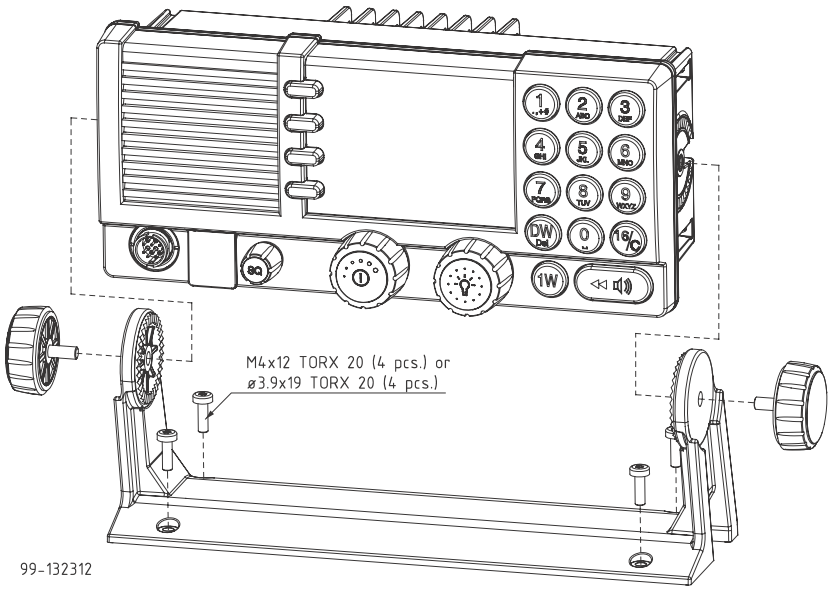


Figure 2-1: Desktop mounting 1/2

Overhead mounting

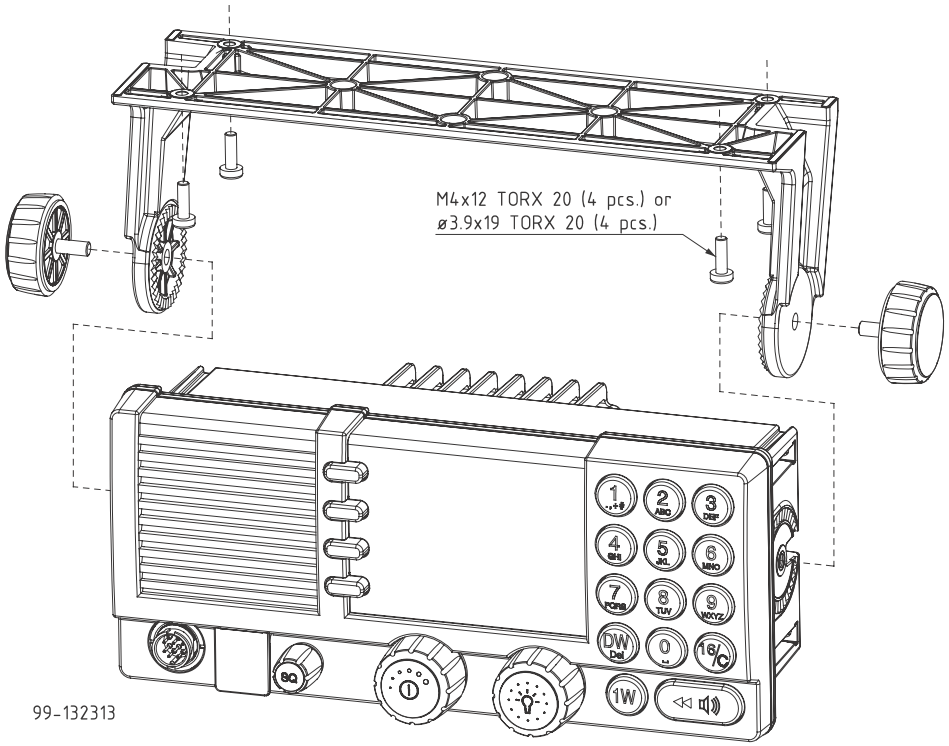


Figure 2-2: Overhead mounting

Mounting with U mounting bracket

To mount the VHF radio as tabletop, do as follows:

1. Find a suitable location for the VHF radio. Check that the space is wide/deep enough to accommodate the VHF radio.
2. Fasten the bracket with 4 screws (included in the delivery.)
3. Insert the VHF radio in the bracket and fasten it with the two knobs.

4. The display of the VHF radio should be at an angle of approximately 90˚ to your line of sight when operating it.

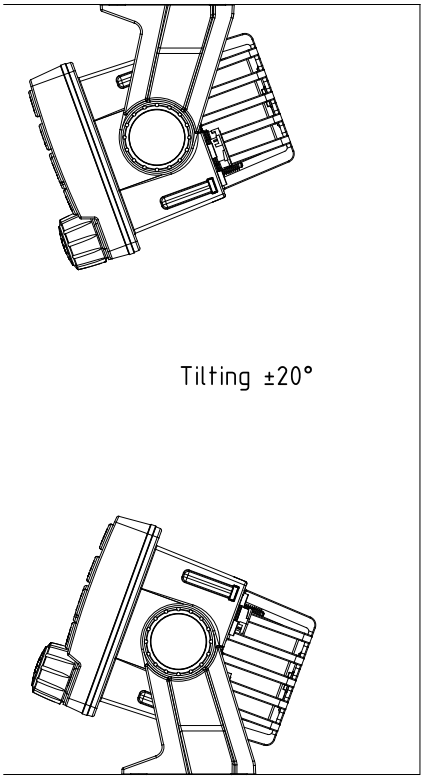


Figure 2-3: Mounting with the mounting bracket

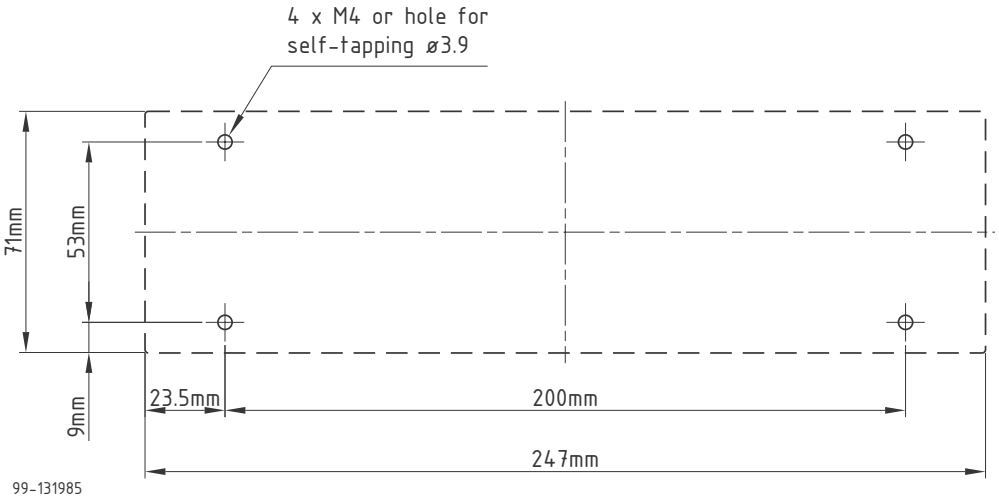


Figure 2-4: Drilling plan for the mounting bracket

2.2.2 SAILOR 6222 VHF DSC for flush mount

You can mount the VHF radio to a flat surface, e.g. an instrument panel.The flush mount installation kit is included in the delivery.

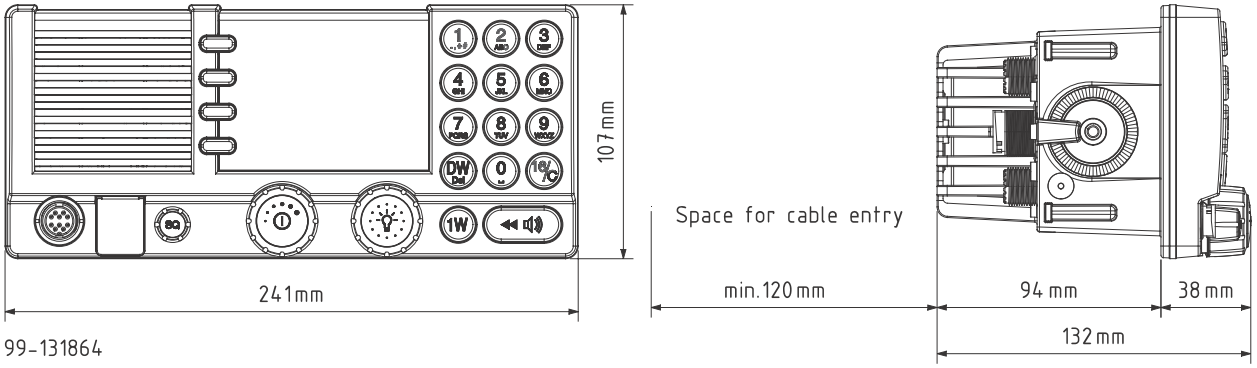


Figure 2-5: SAILOR 6222 VHF DSC Dimension for flush mount

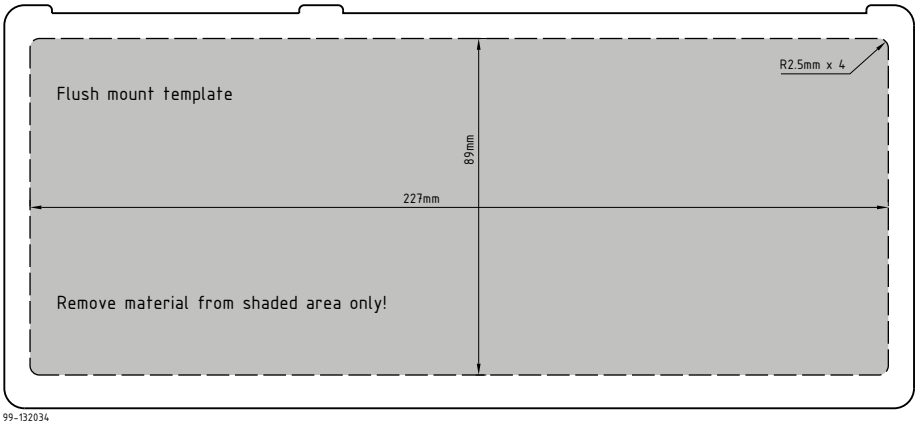


Figure 2-6: Cutout for flush mount

Important **The scaling in the above drawing is not 1:1**. Consequently do not attempt to use a print or copy of this page without checking the dimensions.

1. Find a suitable location for the VHF radio. Check that the space is deep enough to accommodate the VHF radio and an additional min. 120 mm space for cable entry.
2. Keep free distance to allow free air circulation around the VHF radio and to allow sufficient space for access to cables, see the drawing on this page.
3. Cut out the hole for the VHF radio where you want to mount it. Use the cutting template in the installation guide.
4. Mount the 4 square nuts M4 in the cabinet, ensure that they are placed correctly so it is possible to screw in the M4x45 screws.

5. Ensure that the flush mount gasket is placed correctly on the VHF radio.
6. Before mounting the VHF radio be aware that the surface is plane and rigid. If the surface is not plane and/or rigid (stiff) remove the gasket and seal with silicone sealant between the VHF radio and the surface.
7. Slide the VHF radio in the cut-out. Place the flush mount bracket and fasten it with the 4 screws M4x45. Make sure the torque does not exceed 1Nm when fastening the screws.

Note Only use screws supplied with the kit for flush mounting.

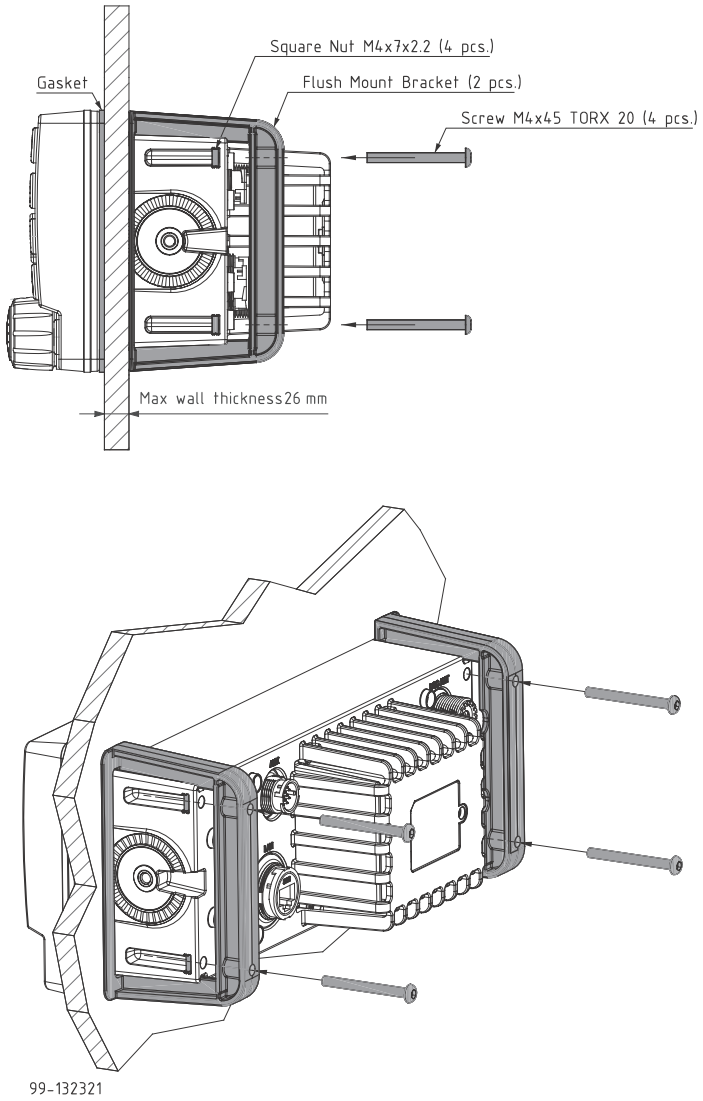


Figure 2-7: Flush mount

Note Firmly tie back and secure any wires not used to avoid the possibility for mutual shorting or shorting to ground.

2.2.3 SAILOR 6090 Power Converter

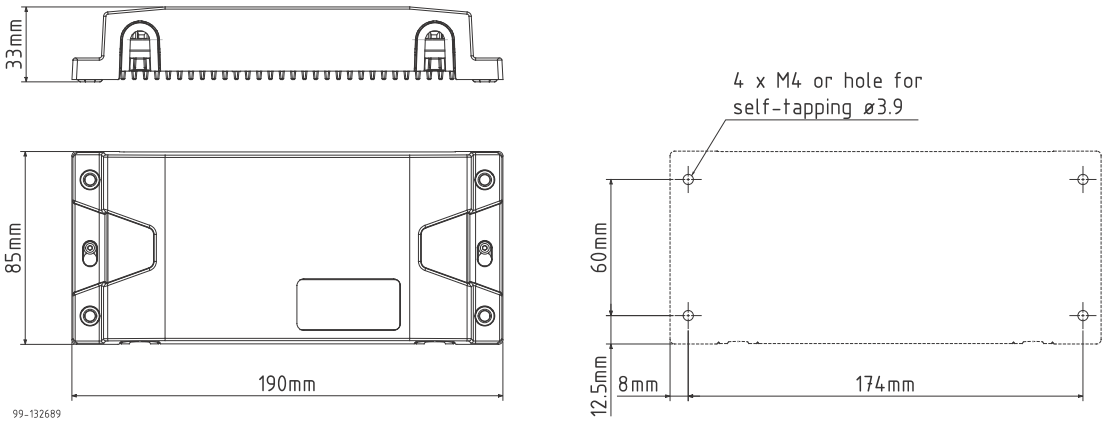


Figure 2-8: SAILOR 6090 Power Converter, dimensions

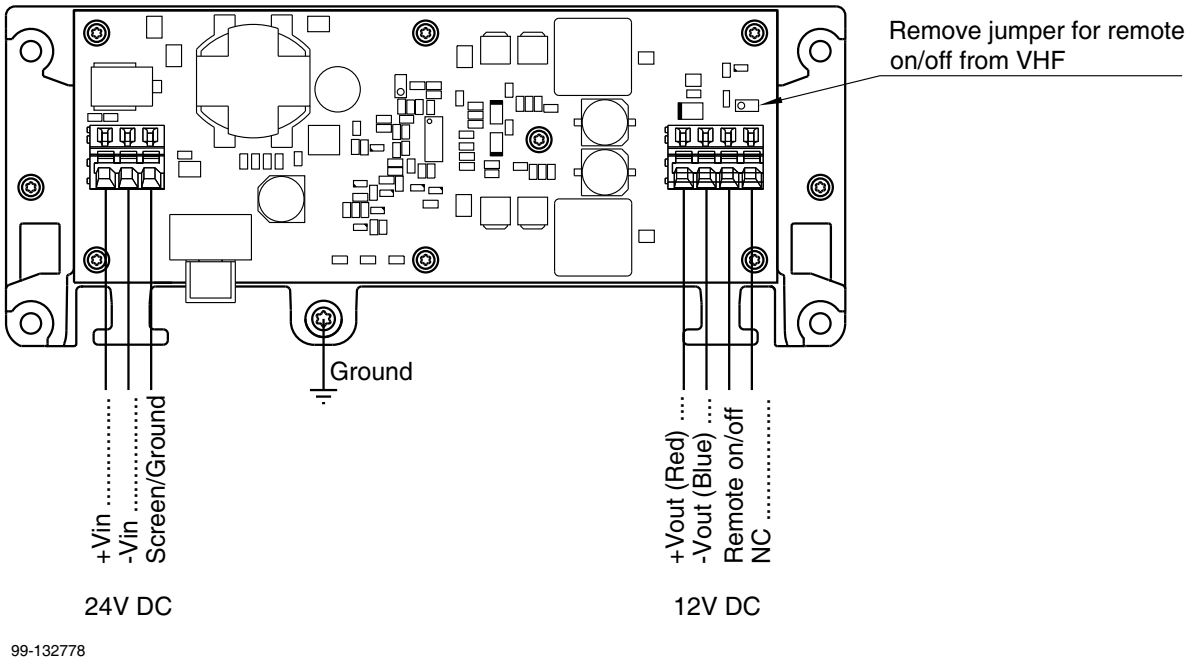


Figure 2-9: Connecting the SAILOR 6090 Power Converter

2.2.4 SAILOR 6201 Handset with cradle

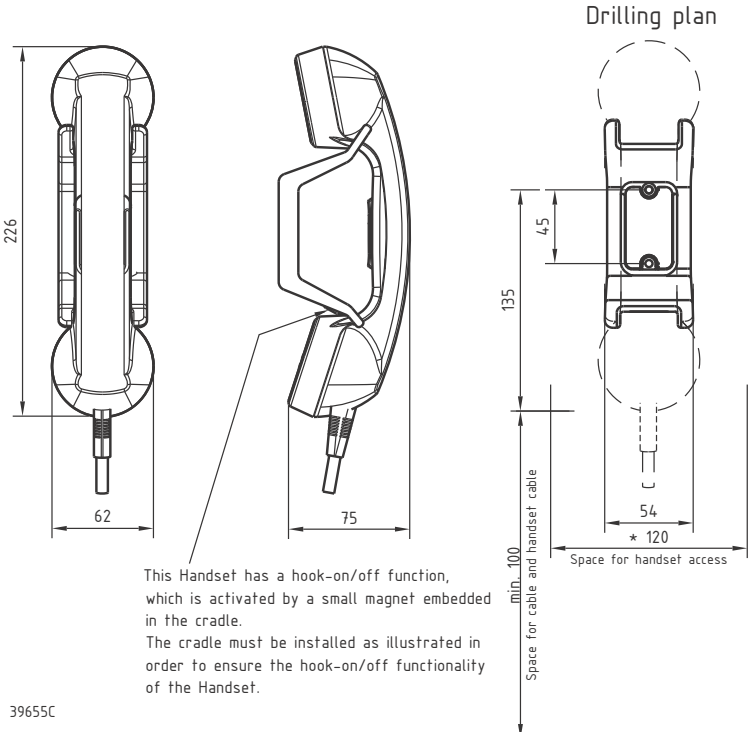


Figure 2-10: SAILOR 6201 Handset with cradle

2.3 Connectors

2.3.1 Connector at the front panel for handset or handmicrophone

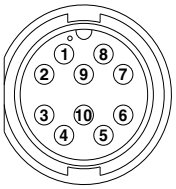
Use the connector at the front of the SAILOR 6222 VHF DSC to connect a SAILOR 6201 Handset. You may also connect a waterproof SAILOR 6203 Handset or SAILOR 6202 Handmicrophone.

Connector type: Circular connector, 10-pin, male.

Connection cable with plug, part number 406209-941.

Pin assignment: Connector front view on the VHF radio.

Panel lock, 10 pin male



Pin	Description	Wire color
1	Not connected	Brown
2	Not connected	Blue
3	Not connected	White
4	Not connected	Green
5	Mic+	Yellow
6	Earpiece	Grey
7	Hook_PTT	Pink
8	Battery V +10.8 — 15.6 VDC	Red
9	Internal GND = - Battery	Black
10	Internal GND = - Battery	Orange — SCREEN (Drain)

Table 2-2: Pin allocation, connector at the front panel

Important If a handset is not mounted at the front connector, put the cap from the ACC connector on the front connector to prevent water ingress.

2.3.2 Connectors at the rear panel

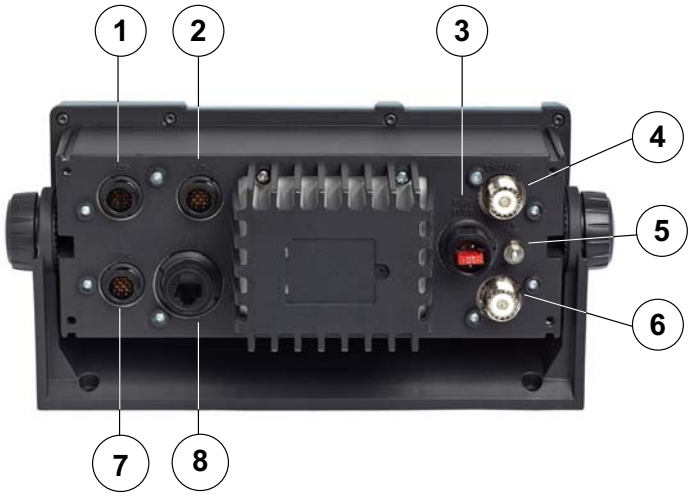


Figure 2-11: Connections at the rear panel

1. *ACC connector* for accessories
2. *AUX connector* for VDR, external speaker, alarm panels, GPS input
3. *Power connector PWR FUSE* with fuse 10 A mini ATO
4. *DSC ANT connector for DSC antenna*
5. *Ground stud for grounding*
6. *ANT connector for VHF antenna*
7. *CTRL connector*
8. *Ethernet connector: LAN*

2.3.3 ACC connector

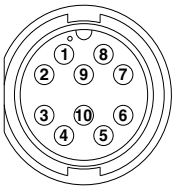
Use the connector marked **ACC** to connect GPS and a SAILOR 6201 Handset. You may also connect a waterproof SAILOR 6203 Handset or SAILOR 6202 Handmicrophone.

Connector type: Circular connector, 10-pin, male.

Connection cable with plug, part number 406209-941.

Pin assignment: Connector front view on the VHF radio.

Panel lock, 10 pin male



Pin	Description	Wire color
1	NMEA in+	Brown
2	NMEA in-	Blue
3	NMEA HS in -	White
4	NMEA HS in +	Green
5	Mike 2 / Line in	Yellow
6	EAR 2 / Line out	Grey
7	Hook_PTT	Pink
8	Battery supply when radio is on	Red
9	Internal GND = - Battery	Black
10	Internal GND = - Battery	Orange — SCREEN (Drain)

Table 2-3: Pin allocation, ACC connector

NMEA interface description

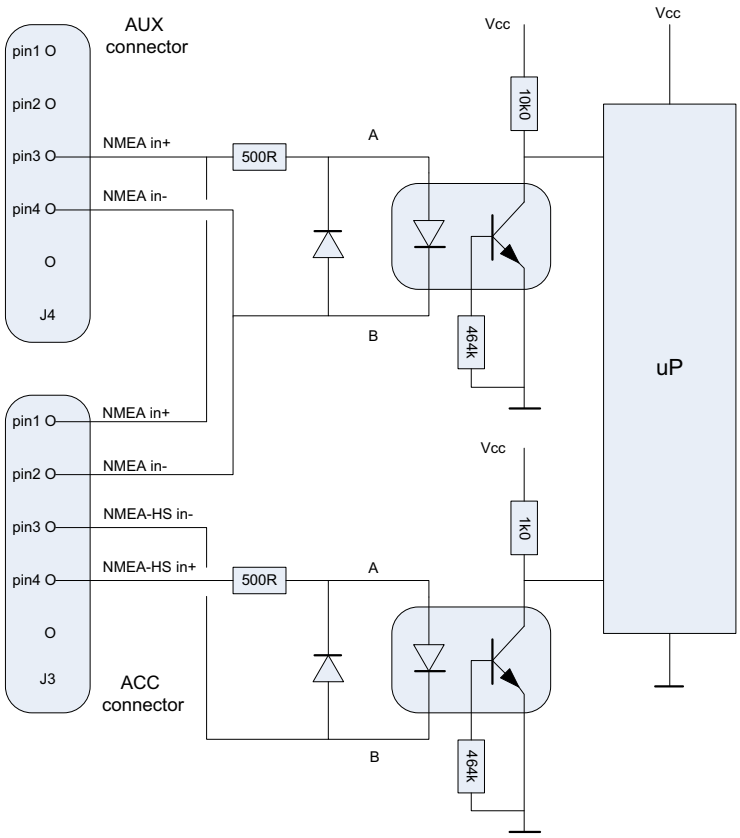


Figure 2-12: NMEA interface description

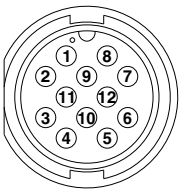
NMEA input: Impedance: 600 Ohm. Max. 2mA at min. level of 2V

The NMEA interface supports NMEA 0183 v2.0, v2.1 and v2.3. The following sentences are supported:

- GGA: UTC, "Position", "quality indicator" (indicators 1-5). All other fields are unused.
- GLL: UTC, "Position", "Status" and "mode" (indicators A and D). All other fields are unused.
- GNS: UTC, "Position" and "mode" (indicators A and D). All other fields are unused.
- RMC: UTC, "Position", "Status", "Date" and "mode" (indicators A and D). All other fields are unused.
- ZDA: UTC, "Day", "Month", and "Year". All other fields are unused.

In accordance with the standard EN61162-1 (Ed. 3).

2.3.4 AUX connector



This connector is used to connect VDR, external speaker, DSC alarms and GPS input.

Connector type: Circular connector, 12-pin.

Connection cable with plug, part number 406208-941.

Pin assignment: Connector front view on the VHF radio:

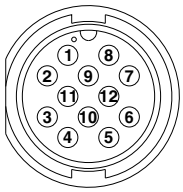
Pin	Description	Wire color
1	Shield (GND)	Brown
2	Lo Power Forced control	Blue
3	NMEA+ In	White
4	NMEA- In	Green
5	AUX OC	Yellow
6	DSC Call	Grey
7	DSC Alarm	Pink
8	-Battery	Red
9	External Speaker +	Black
10	External Speaker -	Orange
11	VDR+ Mixed RX/TX for record	Violet
12	VDR- Mixed RX/TX for record	Cyan

Table 2-4: Pin allocation, AUX connector

2.3.5 CTRL connector

This connector is used to connect a SAILOR 6204 Control Speaker Microphone or SAILOR 6208 Connection Box.

Connector type: Circular connector, 12-pin.



Connection cable with plug, part number 406208-941.

Pin assignment: Connector front view on the VHF radio:

Pin	Description	Wire color
1	GND for cable screen	Brown
2	Internal GND=- Battery	Blue
3	Battery supply when radio is on	White
4	Battery supply when radio is on	Green
5	CAN+	Yellow
6	CAN-	Grey
7	Internal GND = - Battery	Pink
8	On/off from Control Speaker Microphone	Red
9	RX out +	Black
10	RX out -	Orange
11	TX in +	Violet
12	TX in -	Cyan

Table 2-5: Pin allocation, CTRL connector

2.3.6 Ethernet connector: LAN

There is one Ethernet (10/100 MB) connector on the rear panel, it is marked LAN.

Connector type: RJ-45 female, shielded

Pin number	Pin function	Wire color
1	Tx+	white/orange
2	Tx-	orange
3	Rx+	white/green
4	Not connected	blue
5	Not connected	white/blue
6	Rx-	green
7	Not connected	white/brown
8	Not connected	brown

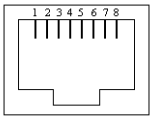


Table 2-6: Pin allocation, LAN connector

2.3.7 Power connector PWR FUSE

The DC Power input connects to a DC supply with 12 DC nominal (10.8 to 15,6 V DC). The connector has a 10 A fuse. The interface also has a “remote on/off” function for a remote 24 V — 12 V DC Power Converter.

Connector type: LTW Power
Fuse: 10 A mini ATO

To help extract the fuse you can order a fuse puller in the **ESHOP** at www.cobham.com/satcom.

Pin-out

The table below shows the connector outline, pin assignments and wire color in the power cable delivered with the SAILOR 6222 VHF DSC.

Pin	Pin function	Wire color
1	DC+ (10.8 - 15,6 V DC)	Red
2	DC- (0 V DC)	Blue
3	Remote on/off	Yellow

Table 2-7: Pin allocation, power

Connecting DC power

- Connect DC+ (red wire) to DC out + from your DC supply.
- Connect DC- (blue wire) to DC out - from your DC supply.

Connect the yellow wire in the power cable to use the Remote on/off function.

2.3.8 DSC ANT connector for DSC antenna

Use the connector marked **DSC ANT** on the rear panel to connect the DSC antenna to the radio with a 50 Ohm coaxial cable with low loss, e.g. RG214. Install a PL259 plug at the cable end.

Place the antenna as high and clear of obstructions as possible. Make sure that the horizontal distance to metal parts is minimum 1.5 m (5 ft.).

Connector type: female SO239 for PL259 plug.

For more information about DSC antenna installation see *VHF and DSC antenna installation* on page 2-18

2.3.9 ANT connector for VHF antenna

Use the connector marked **ANT** to connect the VHF antenna to the radio with a 50 Ohm coaxial cable with low loss, e.g. RG214. Install a PL259 plug at the cable end.

Place the antenna as high and clear of obstructions as possible. Make sure that the horizontal distance to metal parts is minimum 1.5 m (5 ft.).

Connector type: female SO239 for PL259 plug.

For more information about VHF antenna installation see *VHF and DSC antenna installation* on page 2-18.

2.3.10 Ground stud for grounding

Important You must connect the Ground stud to ship ground.

The ground stud is located on the rear panel and is used to connect a ground wire for grounding the SAILOR 6222 VHF DSC. To connect the SAILOR 6222 VHF DSC to ship ground, do as follows:

1. Connect a ground cable of > 1 m length and > 4 mm^2 cross section to the Ground stud located between the DSC ANT and ANT connector and fasten it with the wing nut.
2. Connect the other end of the cable to ship ground. Make the cable as short as possible.

2.4 VHF and DSC antenna installation

The SAILOR 6222 VHF DSC must be installed with one antenna for VHF RX/TX communication and one antenna for DSC communication. You can install all commonly available 50 Ohm antennas covering the appropriate frequency range and providing a VSWR less than 1.5 over this range.

If further details on equipment and antenna installation, see IMO COMSAR/Circ. 32, GUIDELINES FOR THE HARMONIZATION OF GMDSS REQUIREMENTS FOR RADIO INSTALLATIONS ON BOARD SOLAS SHIPS.

2.4.1 Cable requirements

Connect the antennas using a low loss type 50 Ohm coaxial cable, e.g. good quality RG214 or better. It is recommended to use a double screened type cable (like e.g. RG214) with a maximum insertion loss of 3dB across the antenna cable installation.

The maximum antenna cable length in the installation depends on the quality of the cable, i.e. the specified attenuation (dB/m) of the cable of choice at the high end of the VHF frequency band. As a rule of thumb the cable length using e.g. RG214 coaxial cable should not exceed 25 m.

2.4.2 VHF RX/TX antenna

In installations with two or more VHF radios it is important to ensure the optimum performance of these by carefully selecting the antenna positions for both radios. It is recommended to maximize the RF attenuation between the VHF RX/TX antennas in the installation. You can ensure this by not having the RX/TX antennas positioned at the same horizontal level, i.e. the RX/TX antennas for each radio must be installed at shifted elevations as shown in the following drawing.

If sufficient vertical distance between two or more such antennas cannot be achieved, the horizontal distance between them is increasingly important for optimum performance. If there is hardly any vertical separation ensure that there is a minimum of 5 m horizontal distance between any RX/TX antennas in the installation.

To minimize any increase in VSWR of the VHF RX/TX antenna, install the antenna at a vertical distance of at least 2 m to any other mast, pole or other RF antennas. Keep VHF antennas as far away as possible from antenna main beam of any radar and satellite equipment.

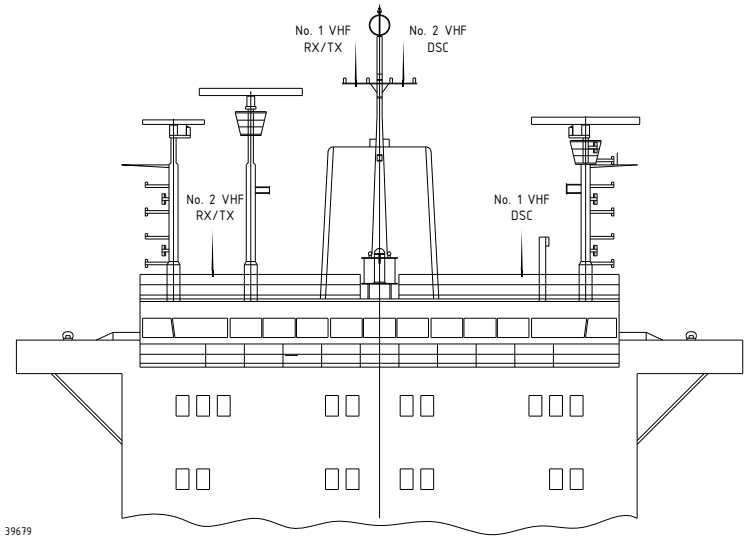


Figure 2-13: Antenna positioning 1/2

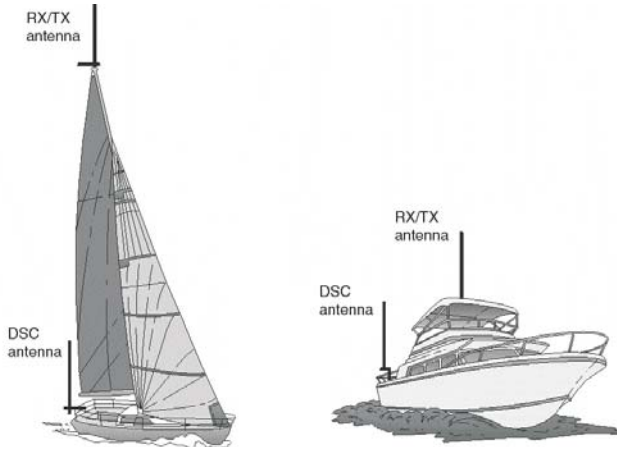


Figure 2-14: Antenna positioning, 2/2

2.4.3 DSC antenna

The positioning of the DSC antennas is less critical in terms of the imposed VSWR and due to the nature of the DSC signalling. Please note that the DSC receiver of a VHF radio is likely to be temporarily blocked in reception due to high signal blocking, if the DSC antenna is installed close to a transmitting RX/TX antenna at the same horizontal level.

2.5 Accessories

2.5.1 Part numbers for accessories

The following accessories are available for the SAILOR 6222 VHF DSC:

Part number	Accessories available
406201A-00500	SAILOR 6201 Handset with cradle (additional)
406202A-00500	SAILOR 6202 Hand Microphone
406203A-00500	SAILOR 6203 Handset Waterproof
406204A-00500	SAILOR 6204 Control Speaker Microphone
406207A-00500	SAILOR 6207 Connection Box with Cable 406209-941
406208A-00500	SAILOR 6208 Connection Box with Cable 406208-941
406209-940	Connection Cable for bulkhead mount, 5 m, 1-x10 pole
406209-941	Connection Cable, 5 m, 1x10 pole
406204-940	Cable for SAILOR 6204 Control Speaker Microphone
406270A	SAILOR 6270 External loudspeaker
406103A-00500	SAILOR 6103 GMDSS Alarm Panel
406197A-00500	SAILOR 6197 Ethernet Switch
406090A-00500	SAILOR 6090 Power Converter 24 V — 12 V
406588A-00500	SAILOR 6588 DGNSS Receiver
406286A-00500	SAILOR 6286 DGNSS Antenna - Active

Table 2-8: Part numbers for accessories

You can connect a LAN printer to the radio for printing DSC messages, see also *How to install an additional printer* on page B-26.

2.5.2 Connection box SAILOR 6207

The **SAILOR 6207 Connection Box** is used to connect GPS (NMEA), GPS/AIS DSC modem and further SAILOR 6201 Handsets. For wiring and cabling details see *System*

configuration examples on page B-1 and *How to install LAN* on page B-24.

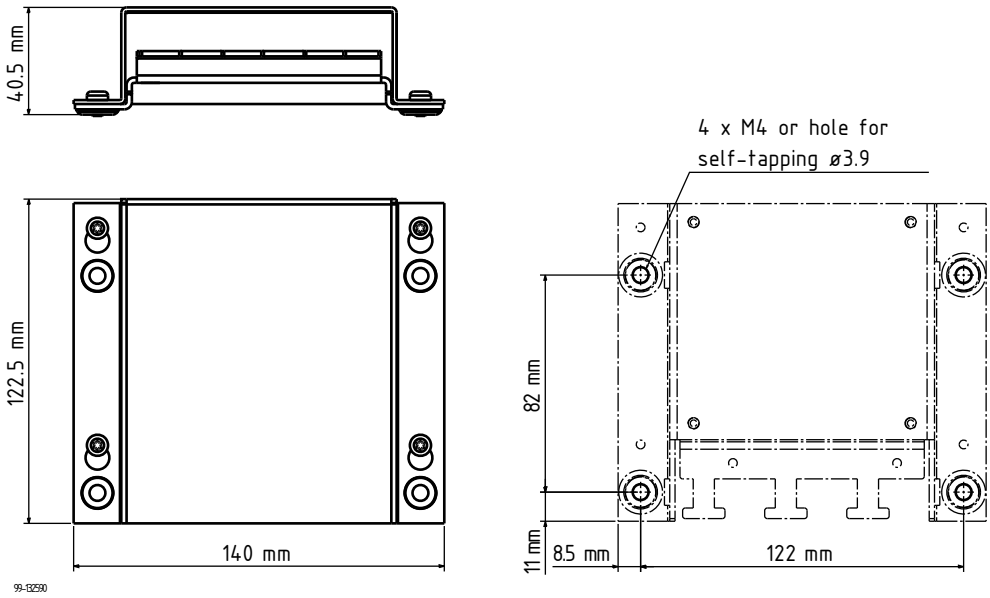
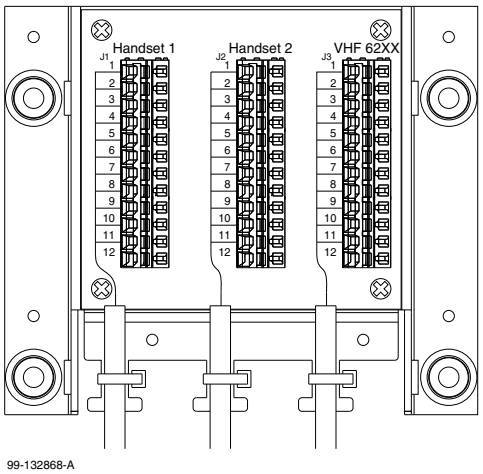


Figure 2-15: SAILOR 6207 Connection Box for parallel handsets, mounting



Description	Pin	Wire color
NMEA in+	1	Brown
NMEA in-	2	Blue
NMEA HS in-	3	White
NMEA HS in+	4	Green
Mike 2 / Line in	5	Yellow
Ear 2 / Line out	6	Grey
Hook_PTT	7	Pink
Bat_SW Supply voltage when on	8	Red
Internal GND = - Battery	9	Black
Internal GND = - Battery	10	Orange
Internal GND = - Battery	11	SCREEN (Drain)
	12	NC

Cable part no. 406209-941

To ensure galvanic separation of battery supply from ship's ground, the cable screens of the ACC cables MUST not touch any part of the metallic parts of the SAILOR 6207 Connection Box. Connect the screens only to the pins at the terminals.

Figure 2-16: SAILOR 6207 Connection Box for parallel handsets, wiring

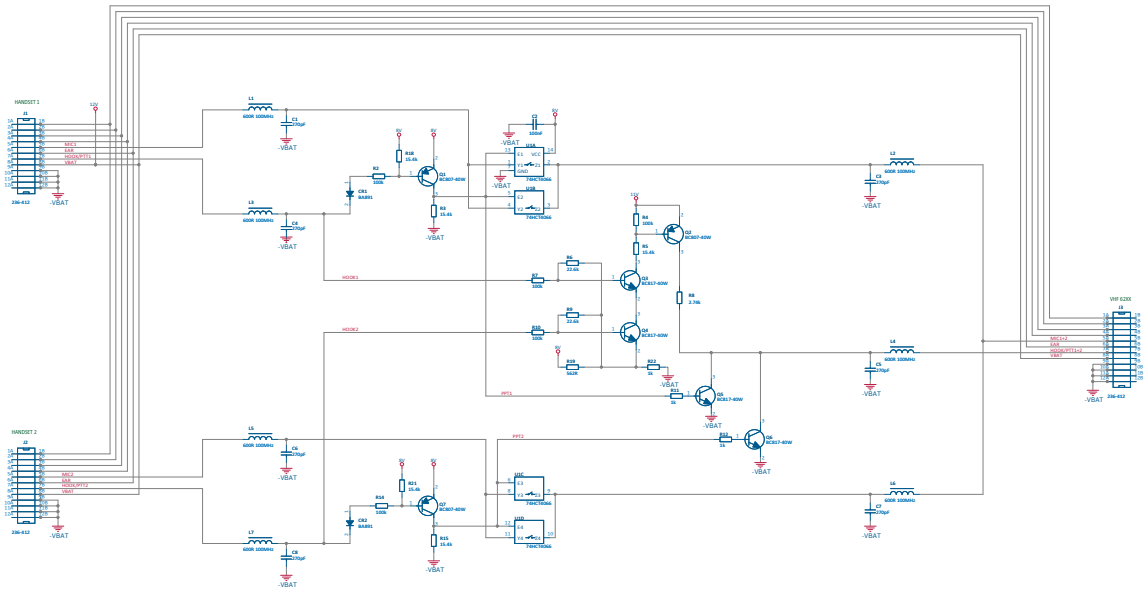


Figure 2-17: SAILOR 6207 Connection Box for parallel handsets, diagram

2.5.3 Connection box SAILOR 6208

The **SAILOR 6208 Connection Box** is used to connect SAILOR 6204 Control Speaker microphones and other auxiliary equipment. For wiring and cabling details see *System configuration examples* on page B-1 and *How to install LAN* on page B-24.

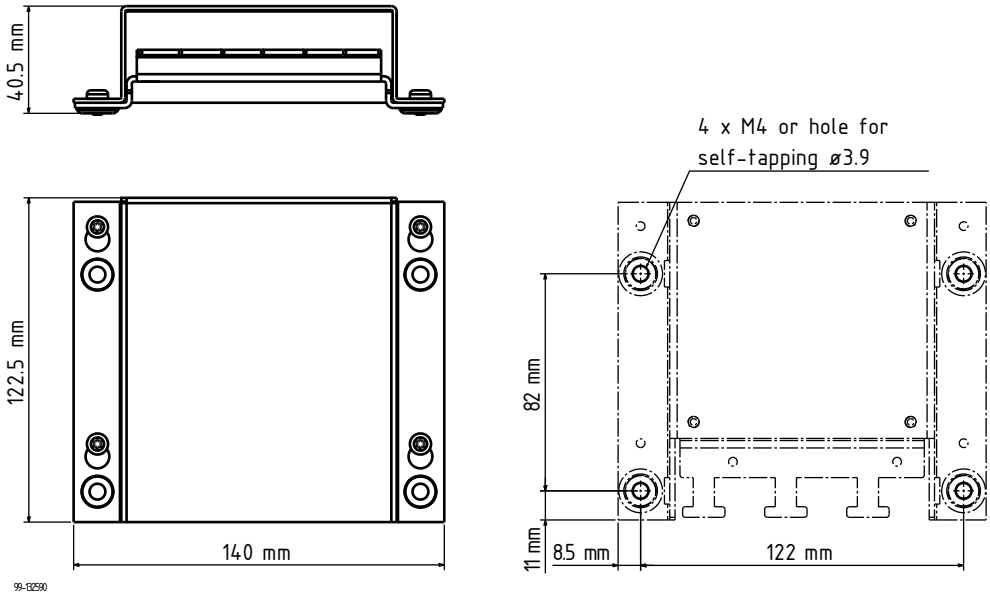
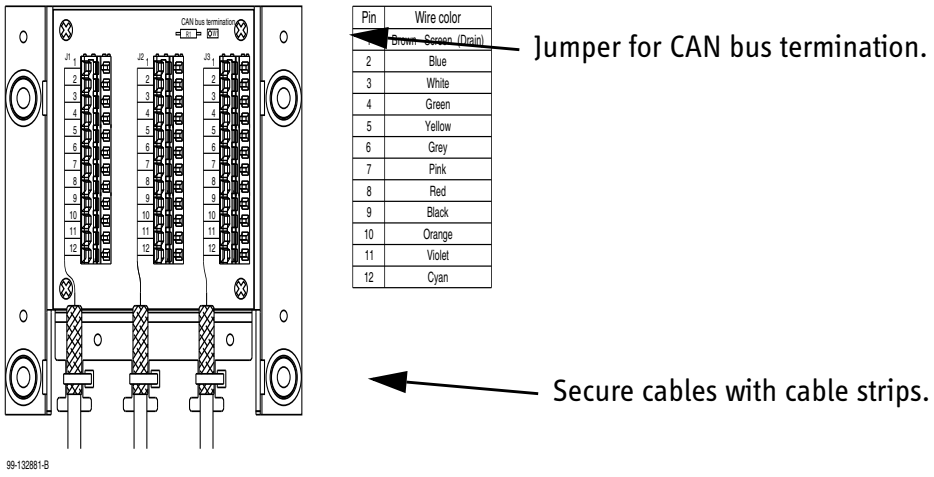


Figure 2-18: SAILOR 6208 Control Unit Connection Box, mounting



Pin	Wire color
1	Brown Screen (Drain)
2	Blue
3	White
4	Green
5	Yellow
6	Grey
7	Pink
8	Red
9	Black
10	Orange
11	Violet
12	Cyan

Figure 2-19: SAILOR 6208 Control Unit Connection Box for parallel handsets, wiring

Terminate the last SAILOR 6208 on the CAN bus (furthest away from the transceiver).

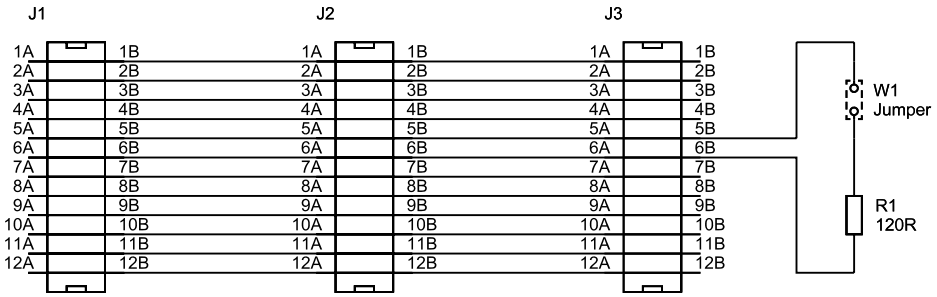


Figure 2-20: SAILOR 6208 Control Unit Connection Box, diagram

First-time power up

3.1 General use and navigation

The tasks needed to be performed during installation are described below. See the SAILOR 6222 VHF DSC User manual for instructions how to operate and set up the VHF radio.

3.1.1 Power on and volume in handset and speaker

The VHF radio has a dual-function on/off knob for power on/off and volume control.

- To power on the VHF radio press the on/off knob.
- To power off the VHF radio, press and hold the on/off knob and follow the instructions in the display.
- To adjust the speaker volume, turn the volume knob (clockwise = louder, counter clockwise = softer, until muted). When muted, is shown in the display.
- To adjust the volume of the handset earpiece see the SAILOR 6222 VHF DSC *User manual*.

3.1.2 Working channel and changing settings

Use the **selector knob** to browse and select:

- To browse and select **settings**, turn the selector knob and press for accept.
- To select a **working channel** use the selector knob or enter the channel number using the keypad.

3.2 Entering the MMSI number

When the VHF radio is powered on for the first time, you must enter the vessel's MMSI number. Hereafter the MMSI number is briefly displayed after power up. The MMSI is a unique, 9-digit identifier assigned to your ship.

Important The MMSI number must be programmed into the VHF radio to use any DSC functionality. The radio will prompt for the MMSI number at each power-up until the MMSI has been entered. An error message is displayed when trying to initiate any DSC function. However, you can use the radio in normal VHF mode.

CAUTION! Without a programmed MMSI number the Distress button will not work!

3.2.1 Entering the MMSI number

When being prompted after power up enter the MMSI number as described below:

1. Enter the 9 digits one by one using the keypad or by turning the selector knob to the desired digit, press the selector knob to accept the digit and advance to the next digit.
2. If you need to delete the previous digit press the soft key **BACK**.

Note The MMSI number can be programmed by the operator once. If a wrong number has been entered and stored, or if there is a requirement to change it, contact your authorized dealer.

Once programmed, the MMSI number is displayed in the DSC window directly after start-up. The DSC functionality is operational at any time.

The message **NO DSC (NO MMSI)** is shown in the DSC window if the MMSI is not programmed.

3.2.2 Changing the MMSI number

If you need to change the MMSI number of the SAILOR 6222 VHF DSC use the built-in service tool and a connected PC, or reset the MMSI number from the Setup menu of the radio. The manuals for the service tool and the user manual for the radio can be downloaded from www.cobham.com/satcom.

3.3 Forced low power AUX input control

The default behavior of the radio, when the AUX Lo Power input is activated, is that the radio is forced into low power control.

3.3.1 TX inhibit

It is possible to TX inhibit the radio when the low power auxiliary input is activated.

This can be done in the radio setup menu by setting “TX INHIB on Lo Pow: ON”.

The menu will be enabled after the password is inserted in the system setup menu.

Service & maintenance

4.1 Contact for support

Contact your authorized dealer for technical service and support of the VHF radio. Before contacting your authorized dealer you can go through the troubleshooting guide to solve some of the most common operational problems.

4.2 Maintenance

4.2.1 Preventive maintenance

Maintenance of the SAILOR 6222 VHF DSC can be reduced to a maintenance check at each visit of the service staff. Inspect the radio for mechanical damages, salt deposits, corrosion and any foreign material. Due to its robust construction and ruggedness the radio has a long lifetime. Anyway it must carefully be checked at intervals not longer than 12 months - dependent on the current working conditions.

Salt deposits

In case the equipment has been exposed to sea water there is a risk of salt crystallization on the keys and knobs and they may become inoperable. Clean the VHF radio and speaker microphones with fresh water.

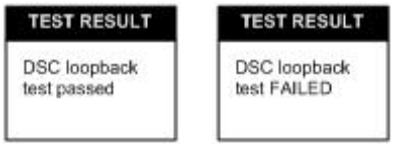
4.2.2 Error messages and warnings

Errors and warning messages are shown in the display and are read-only.

4.2.3 DSC self test

To run a control routine DSC self test, do as follows:

1. Press the soft key **SETUP**. If it is not in the display, press the soft key **MORE** until **SETUP** appears.
2. Press the arrow soft key ▶ or ◀ to advance to **DSC SETUP**.
3. Turn the selector knob to select **DSC Self Test**. Press and turn the selector knob to select **RUN**.
   The test will check the ability to encode/decode DSC signalling on RF level. The radio will automatically transmit a DSC safety test call to its own MMSI number without enabling the transmitter power amplifier. In parallel the radio decodes and compares the received call to be the same as the transmitted.
   The display shows the result of the test.
4. Press the soft key **OK** to acknowledge the test result and resume normal operation.



Important

If the DSC loopback test fails, this indicates the DSC functionality does not work correctly — including the ability to send a DISTRESS message.

Contact your dealer immediately for further advice.

4.3 Troubleshooting guide

Action	Symptom	Remedy
The radio will not turn on	The display is empty.	Check if power is present. Check fuse which is placed in the power connector. Check performance of power supply if connected to one.
No commu-nication	The loud-speaker is mute.	Check the antenna installation. Check antenna cable. Check handset/Handmicrophone and cable.
GPS	Position requested.	Check the GPS input - see the Installation guide 98-132281. If the VHF, despite being connected to a GPS/position source, prompts for entering the position and time information, the automated update has most likely been lost either due to missing data on the line, broken cabling or the GPS/position source has failed. Refer to the installation section in the back of this manual for installation and connection details. Until the automatic position update from GPS/position source is restored position and time must be entered manually when prompted by a (four hour) timer in VHF. In the **DSC SETUP**, **Position Info**, you can verity the position data. If data is present Lat/Lon/UTC will be displayed.

Table 4-1: Troubleshooting guide

Action	Symptom	Remedy
GPS	Position source used is different from the expected	If position input source is set to **Automatic** position (see System Setup) sentences from the following talkers GP, GL, GN (and GA) are prioritized. Position source is selected by the quality indicator: 1. Differential 2. Precise, Autonomous, Float_RTK, Realtime_RTK 3. Estimated and Manuel 4. Unknown (for instance if not supported in sentence) 5. Simulated and Invalid On equal priority the following port order is used: 1. NMEA 2. NMEA HS 3. LWE1 4. LWE2 5. LWE3 6. INM-C The device will automatically switch to the position source with the highest priority available after 5 seconds when switching to a lower priority input and 30 seconds when switching to a detected higher priority input.
GPS	Potion source selected via LAN is different from the expected	The SAILOR 6588 DGNSS Receiver can transmit position over LAN/LWE. Automatic discovery and selection of up to three (LWE1, LWE2 and LWE3) SAILOR 6588 DGNSS Receiver source inputs are supported via SLP. If any of the LWE source inputs are manually programmed in System Setup, this will be excluded from automatic discovery. Available source inputs will discover and use the SAILOR 6588 DGNSS Receiver LWE sources with the most important role (primary, secondary, ...)

Table 4-1: Troubleshooting guide

Action	Symptom	Remedy
DSC routine testing		Check the DSC function regularly. Verify the complete DSC installation, with antennas, by transmitting a Safety Test call to another station (coast or ship). The test call is generated using the DSC call flow via menu CALL. The call should normally be replied by the receiving station without questioning. The default configuration of a DSC VHF radio is auto-acknowledgement of any received Safety test call requests. If a ship is equipped with multiple radios a second radio can be the station to check up against. The transmitting radio will not receive its own transmitted calls. If there is only a single radio on a vessel, a facility is built into the unit where the DSC engine can be verified using a test call that is internally looped without activating the radio transmitter PA. The test is executed via menu SETUP, DSC SETUP. The call sequence that is verified, is an Individual Safety Test Call directed to own MMSI. The test status is read in the display.
Missing MMSI	DSC operation is not working	When powering up the VHF for the first time after leaving factory there is no MMSI number in the VHF radio. For the DSC operation to function the MMSI number must be entered in the VHF radio. For further details see *Entering the MMSI number* on page 3-1.
	Wrong MMSI number	If a wrong number has been entered and stored, or if there is a requirement to change it, contact your authorized dealer.

Table 4-1: Troubleshooting guide

Action	Symptom	Remedy
System time	DSC logs are sorted with wrong time stamp or radio time is incorrect	A wrong radio time indication should occur only if GPS position source is not connected or providing correct time data. A valid GPS time signal will update the UTC time used for time stamping the DSC logs. If a GPS/position source is not connected to the VHF radio and hence position and time is entered manually, you must enter the "radio time" also manually, at least after power up. This will ensure correct time stamping of the DSC logs. The UTC time is the suggested time to be entered when prompted for entering position and time manually (every four hours).
DSC Channel not free	DSC transmissio n delayed	The transmission of a DSC call which is not of category distress will be postponed if the VHF radio is in the process of decoding an incoming DSC call. As soon as this decoding process has finalized the transmission will take place.
Handset configura-tion	No sound in earpiece	The earpiece volume may be configured to OFF. See section *Controller setup in the user manual* on how to adjust the earpiece volume of the handset.
Device failure		If any of the checks and tests described in this section do not assist in resolving the difficulties experienced in the operation and/or performance of the VHF installation, a fault may have developed in the VHF radio itself. When contacting an authorized Thrane & Thrane representative be sure to provide as much information as possible describing the observed behavior - also including the type of the VHF radio, its serial number, and software release version (both found in the setup menu Controller Setup).
WARNING: POWER SUPPLY LOST CONTACT	Power supply status cannot be monitored.	In Setup, Power Supply, set Monitor to disabled. You can only monitor the power supply if the radio is powered by a SAILOR 6081 Power Supply Unit and Charger.

Table 4-1: Troubleshooting guide

Action	Symptom	Remedy
System Time & Date	Manually entered time & date is overridden	If valid time information is received via NMEA LWE on LAN port, this time source is used to set the system time. If this is not wanted, disconnect LAN cable. Position NMEA sentences from the talkers GP, GL GN (and GA) are prioritized. Position source is selected by the quality indicator: 1. Differential 2. Precise, Autonomomous, Float_RTK, Realtime_RTK 3. Estimated and Manuel 4. Unknown (for instance if not supported in sentence) 5. Simulated and Invalid The device will automatically switch to the position source with the highest priority available after 5 seconds when switching to a lower priority input and 30 seconds when switching to a detected higher priority input.

Table 4-1: Troubleshooting guide

4.3.1 Replacing the fuse in the power connector

One fuse is installed in the power connector. If the fuse is blown, do as follows:

1. Track down why the fuse was blown and solve the problem.
2. Take out the old fuse.
3. Insert the new fuse. The fuse rating is 10 A T.

Figure 4-1: Fuse in the power connector

4.3.2 Replacing the fuse in the SAILOR 6090 Power Converter

One fuse is installed in the SAILOR 6090 Power Converter. If the fuse is blown, do as follows:

1. Track down why the fuse was blown and solve the problem.
2. Take out the old fuse.
3. Insert the new fuse. The fuse rating is 10 A T.

Figure 4-2: Fuse in the SAILOR 6090 Power Converter

4.4 Returning units for repair

Should your Cobham SATCOM product fail, please contact your dealer or installer, or the nearest Cobham SATCOM partner. You will find the partner details on www.cobham.com/satcom, **Technical Service Partner List**. You can also access the Partner Portal at www.cobham.com/satcom, **Cobham SYNC Partner Portal**, which may help you solve the problem. Your dealer, installer or Cobham SATCOM partner will assist you whether the need is user training, technical support, arranging on-site repair or sending the product for repair. Your dealer, installer or Cobham SATCOM partner will also take care of any warranty issue.

4.4.1 Repacking for shipment

Should you need to send the product for repair, please read the below information before packing the product.

The shipping carton has been carefully designed to protect the SAILOR 6222 VHF DSC and its accessories during shipment. This carton and its associated packing material should be used when repacking for shipment. Attach a tag indicating the type of service required, return address, part number and full serial number. Mark the carton FRAGILE to ensure careful handling.

Note Correct shipment is the customer's own responsibility.

If the original shipping carton is not available, the following general instructions should be used for repacking with commercially available material.

1. Wrap the defective unit in heavy paper or plastic. Attach a tag indicating the type of service required, return address, part number and full serial number.
2. Use a strong shipping container, e.g. a double walled carton.
3. Protect the front- and rear panel with cardboard and insert a layer of shock-absorbing material between all surfaces of the equipment and the sides of the container.
4. Seal the shipping container securely.
5. Mark the shipping container FRAGILE to ensure careful handling.

Failure to do so may invalidate the warranty.

Technical specifications

A.1 Transceiver unit SAILOR 6222 VHF DSC

Item	Specification
Weight SAILOR 6222 VHF DSC	< 1.50 kg (3.3 lbs) approximately
Box weight SAILOR 6222 VHF DSC	3.8 kg (8.4 lbs) approximately, including SAILOR 6201 Handset and wall mount cradle, SAILOR 6090 Power Converter and Installation and user manual in box.
Dimensions	**Height**: Outer dimension 107 mm, hole height for flush mount 89 mm **Width**: Outer dimension 241 mm, hole width for flush mount 227 mm **Depth**: Outer dimension from front of knobs 132 mm, depth for flush mount 94 mm
Operating temperature	-25˚C to 55˚C (5˚F to 131˚F)
Storage temperature	-30˚C to 80˚C (-22˚F to 176˚F)
Power supply	12 VDC Nominal (10,8– 15,6 VDC)
Current consumption	Max. 7 A
Current consumption at 12 VDC (no accessories connected)	RX: 0.5 A TX: 5 A
Current consumption at 12 VDC (all accessories connected)	RX: 0.7 A TX: 7 A

Table A-1: Technical specifications, part 1

Item	Specification
Frequency range	TX: 156,000 MHz — 157,425 MHz, RX: 156,000 MHz — 163.425 MHz
Channel spacing	12.5 kHz and 25 kHz, all international maritime channels
Number of P channels	The radio may be programmed with up to 100 private channels in all channel modes.
Modulation 25 kHz 12.5 kHz	 16K0G3E, 16KOG2B (DSC) 10K0G3E
Antenna	50 Ohm antenna, 50 Ohm female SO239 for PL259 plug 2-antenna operation for VHF and DSC communication
Water ingress	IPx8 and IPx6 all over. For flush-mount installations a sealing gasket is included in the delivery.
Transmitter	
Transmit power	Hi/Lo: 25 W and 1 W
RF output power	High: 25 W +0 dB / - 1.5 dB Low: 1 W +0 dB / - 1.5 dB
RF output power, Canada	High: 21 W ±0.75 dB Low: 0.8 W ±0.75 dB
Frequency error	Below 500 Hz
Adjacent channel power	Below 75 dB
Conducted spurious emission	Below 0.25 µW
Distortion	Below 3%
S/N ratio	Better than 46 dB
Receiver	
Sensitivity	< -119 dBm typically @ 20 dB SINAD CCITT weighted
LF power	Built-in loudspeaker: 6 W (at 5 kHz dev./1 kHz tone) External loudspeaker: 6 W / 8 Ohm

Table A-2: Technical specifications, part 2

Item	Specification
Distortion	Below 5%
S/N ratio	Better than 43 dB
Spurious emissions	Below 2 nW
Spurious response rejection	More than 74 dB
Intermodulation response	More than 73 dB
Co-channel rejection	Better than -10 dB
Adjacent channel selectivity	More than 74 dB
Blocking level	More than 94 dBμV

Table A-2: Technical specifications, part 2 (Continued)

A.2 General DSC specifications

Item	Description
DSC operation	According to Rec. ITU-R M.541-9 and Rec. ITU-R M.689-2, EN 300338-2
DSC protocol	According to Rec. ITU-R M.493-13 - Class A
Navigator interface	According to IEC 61162-1 GLL, RMC, ZDA, GGA, VTG, GNS
Symbol error rate	Below $1x10^{-2}$ -113 dBm or 0.20 μV p.d.
Modulation	1700 Hz ± 400 Hz. 1200 baud
Frequency error	Below ± 1 Hz
Residual modulation	Below -26 dB

Table A-3: DSC specifications

A.3 NMEA data rates and formats

Item	Value
61162-1	4800,8,n,1
	Position over LAN

Table A-4: NMEA data rates and formats

A.4 SAILOR 6090 Power Converter 24—12 V

Item	Description
Weight	300 g
Dimensions	Height: 33 mm Width: 190 mm Depth: 85 mm
Operating temperature	-25˚C to 55˚C (5˚F to 131˚F)
Storage temperature	-30˚C to 80˚C (-22˚F to 176˚F)
Input voltage	21—32 VDC
Output voltage	12.5 VDC
Output current (max.)	8 A

Table A-5: Technical specifications, SAILOR 6090

System configurations

This appendix lists selected examples of system configurations.

For an overview and specifications of the cables needed see ***Cable requirements* on page B-27**.

Note For installation of the connection boxes see *Connection box SAILOR 6207* on page 2-22 and *Connection box SAILOR 6208* on page 2-24.

B.1 System configuration examples

The following list shows system configurations, with additional handsets, alarm panels, connection boxes and cable information.

1. *How to connect a SAILOR 6090 Power Converter*
2. *How to connect a SAILOR N163S AC Power Supply*
3. *How to connect an N420 DC Power Supply*
4. *How to install an extra SAILOR 6201, GPS, ext. loudspeaker and alarms*
5. *How to install a GPS and SAILOR 6270 External loudspeaker*
6. *How to install 2 extra SAILOR 6201 Handsets and a GPS*
7. *How to install an extra Handset SAILOR 6201 in SAILOR 6207*
8. *How to install a SAILOR 6202 Handmicrophone, an extra SAILOR 6201 and a GPS*
9. *How to install a GPS to the ACC port with a SAILOR 6208 Connection Box*
10. *How to install a GPS to the ACC port using a SAILOR 6207 Connection Box*
11. *How to install a CAN bus with a SAILOR 6204 CSM close to the VHF radio*
12. *How to install a CAN bus with a SAILOR 6204 CSM not close to the VHF radio*
13. *How to install a CAN bus with a SAILOR 6204 CSM far from the VHF radio*
14. *How to install a CAN bus with 2 SAILOR 6204 CSMs close to the VHF radio*
15. *How to install a CAN bus with 2 SAILOR 6204 CSMs far from the VHF radio*
16. *How to install a CAN bus with 2 SAILOR 6204 CSMs close to each other*
17. *How to install a CAN bus with 2 SAILOR 6204 CSMs close to VHF on a small bridge*
18. *How to install a CAN bus with 2 CSMs in bridge wings*
19. *How to install a CAN bus with 4 SAILOR 6204 CSMs*
20. *How to install a CAN bus with 4 CSMs in bridge wings*
21. *How to install a CAN bus with 3 SAILOR 6204 CSMs*
22. *How to install a CAN bus with 4 SAILOR 6204 CSMs*
23. *How to install LAN*
24. *How to install a printer*
25. *How to install an additional printer*

B.1.1 How to connect a SAILOR 6090 Power Converter

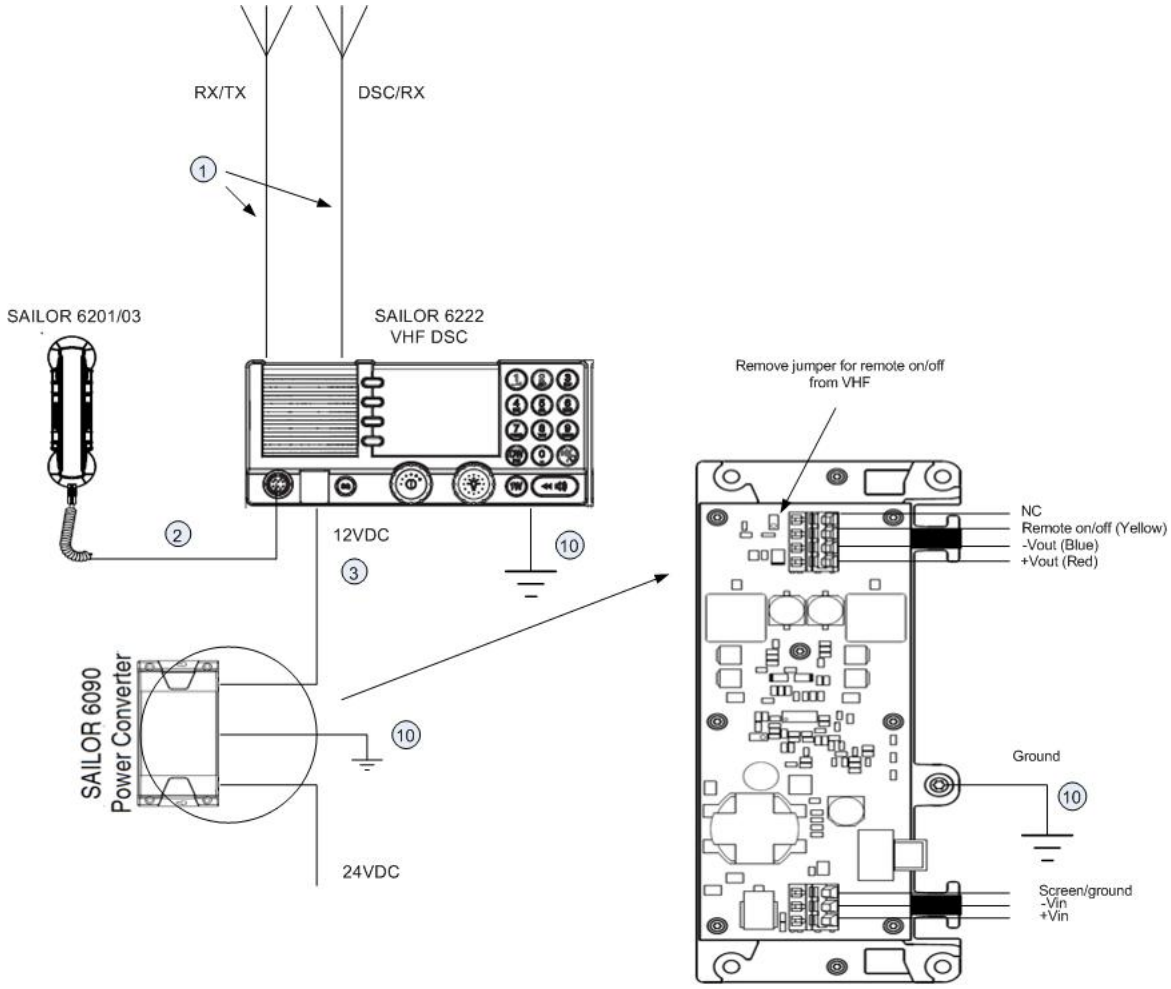


Figure B-1: System configuration, SAILOR 6090 Power Converter

B.1.2 How to connect a SAILOR N163S AC Power Supply

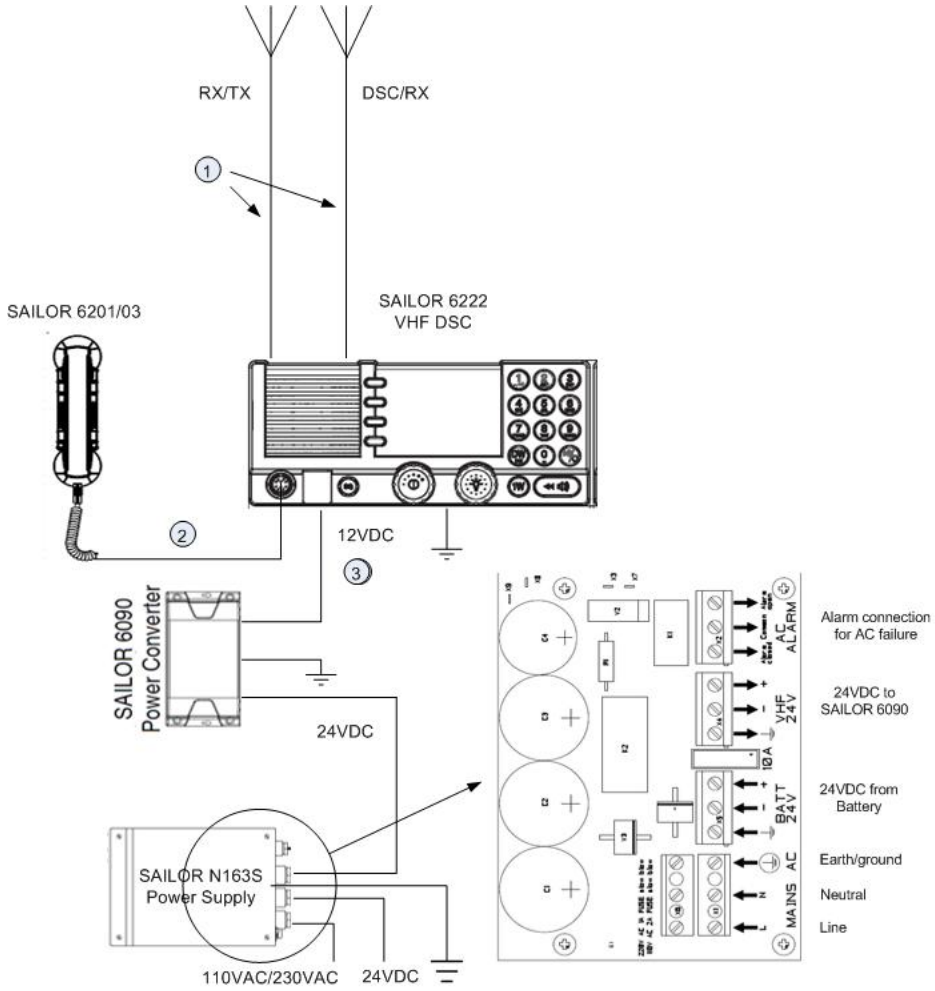


Figure B-2: System configuration, SAILOR N163S Power Supply

B.1.3 How to connect an N420 DC Power Supply

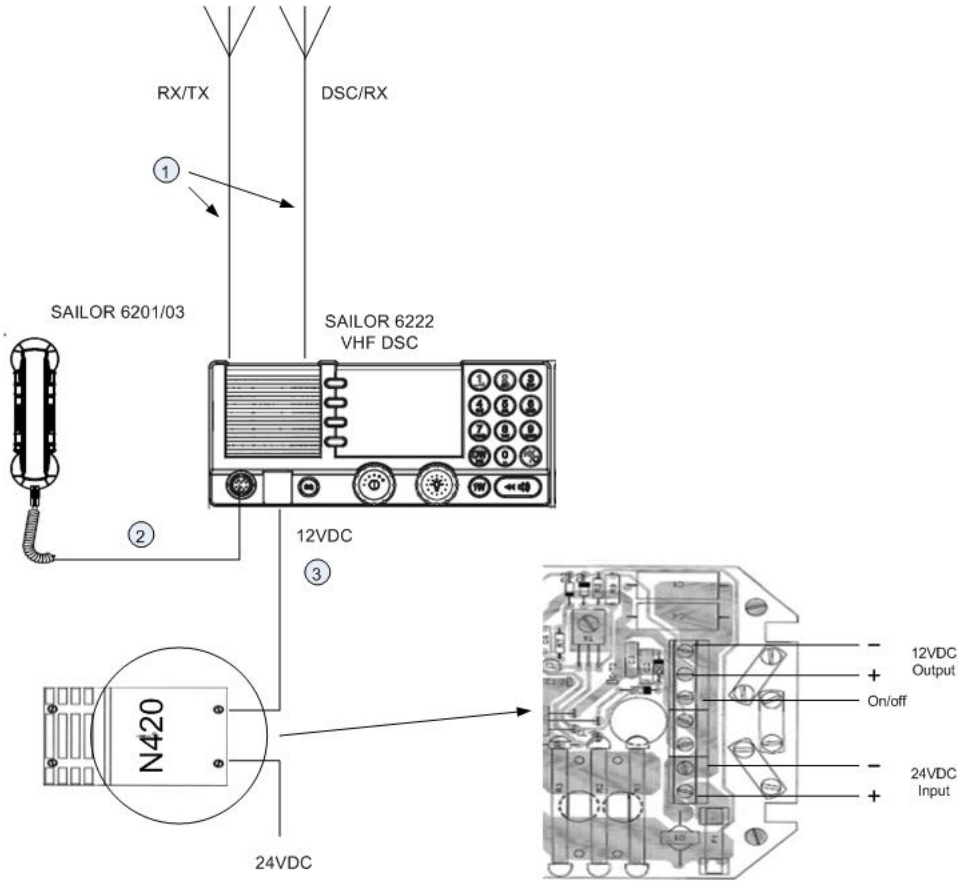


Figure B-3: System configuration, SAILOR 6201 Handset and N420 DC Power Supply

B.1.4 How to install an extra SAILOR 6201, GPS, ext. loudspeaker and alarms

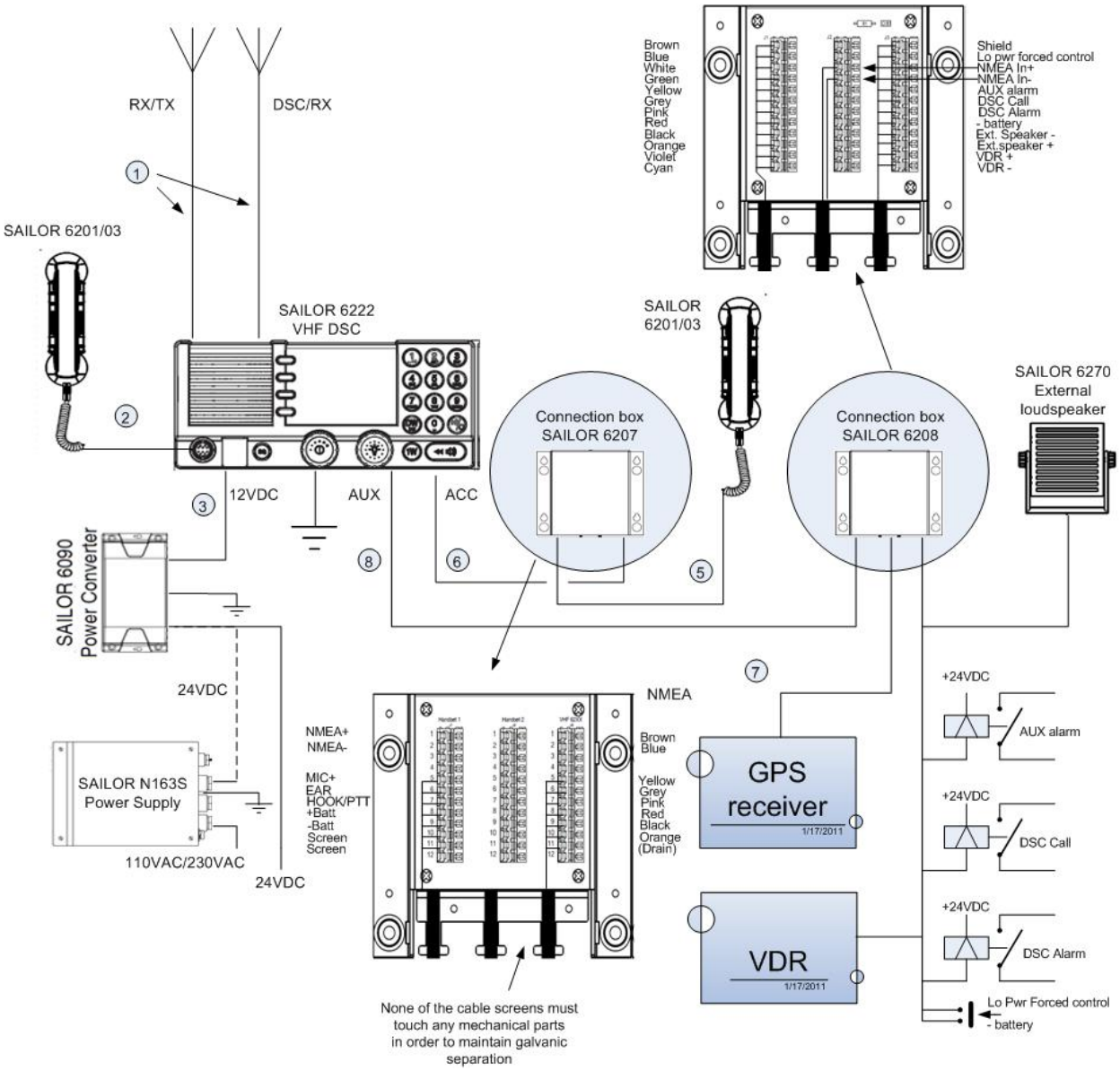


Figure B-4: System configuration, SAILOR 6201, GPS, ext. loudspeaker and alarms

B.1.5 How to install a GPS and SAILOR 6270 External loudspeaker

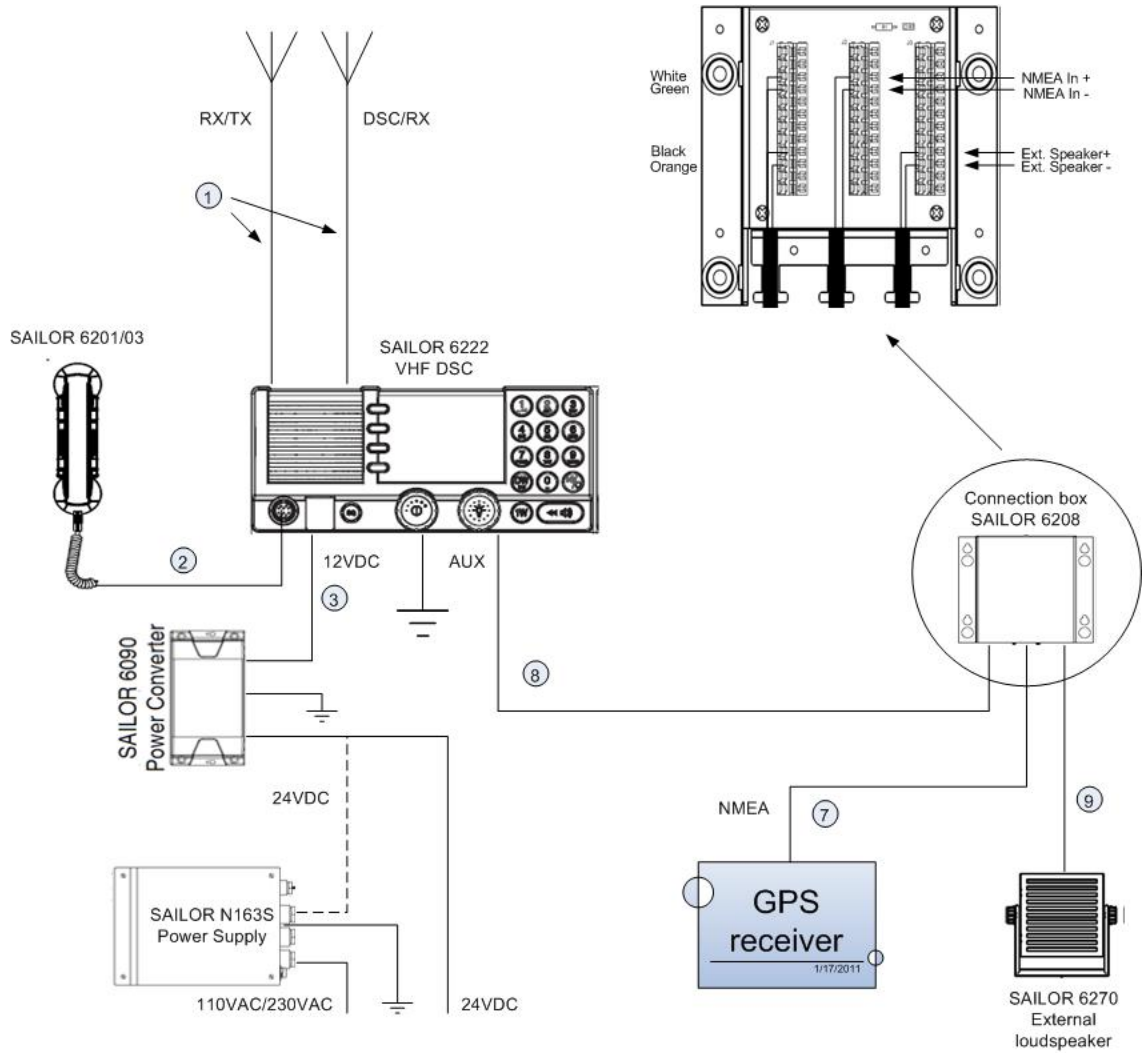


Figure B-5: System configuration, GPS and SAILOR 6270 External loudspeaker

B.1.6 How to install 2 extra SAILOR 6201 Handsets and a GPS

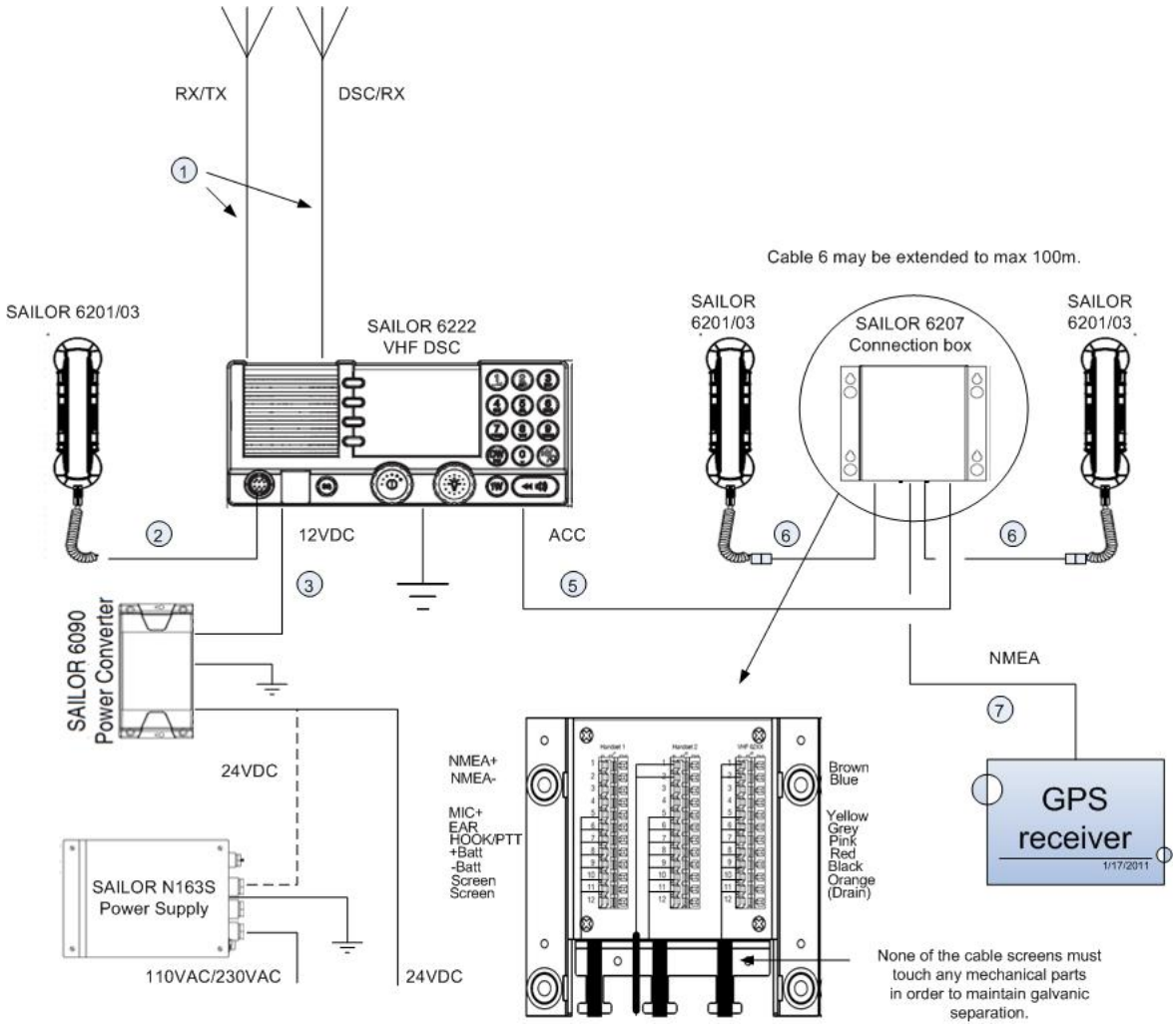


Figure B-6: System configurations, 2 SAILOR 6201 Handsets and a GPS

B.1.7 How to install an extra Handset SAILOR 6201 in SAILOR 6207

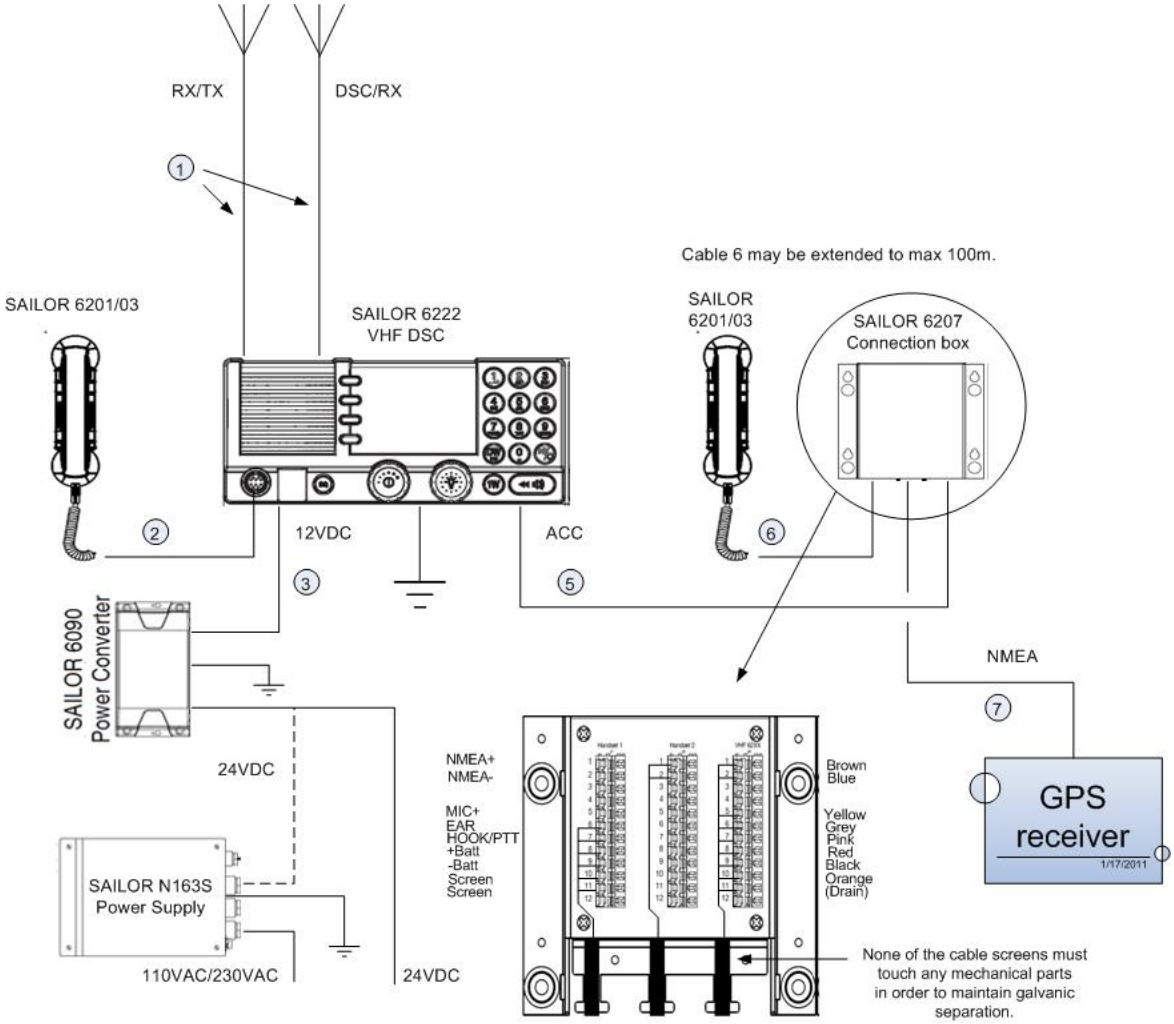


Figure B-7: System configurations, extra handset SAILOR 6201 in SAILOR 6207

B.1.8 How to install a SAILOR 6202 Handmicrophone, an extra SAILOR 6201 and a GPS

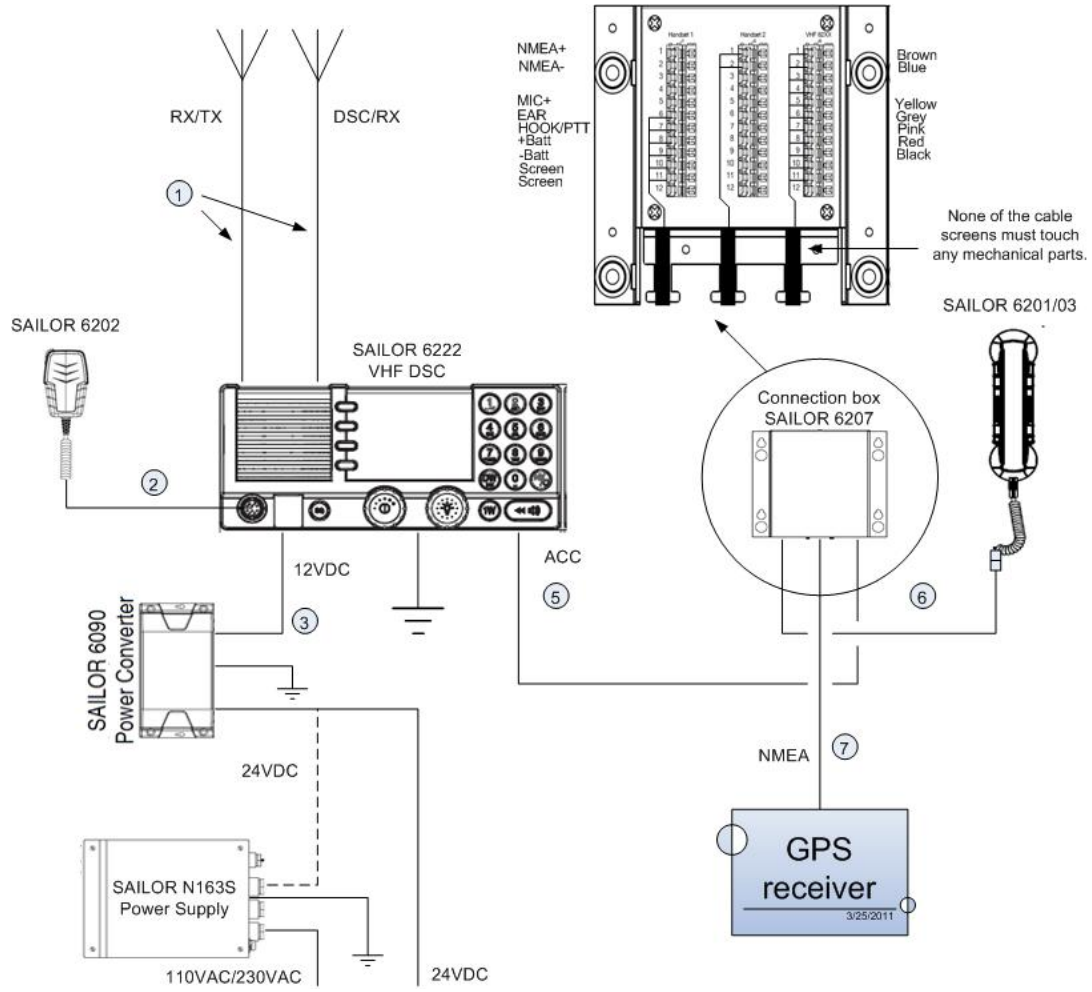


Figure B-8: System configuration, SAILOR 6202 Handmic., SAILOR 6201 Handset, GPS

B.1.9 How to install a GPS to the ACC port with a SAILOR 6208 Connection Box

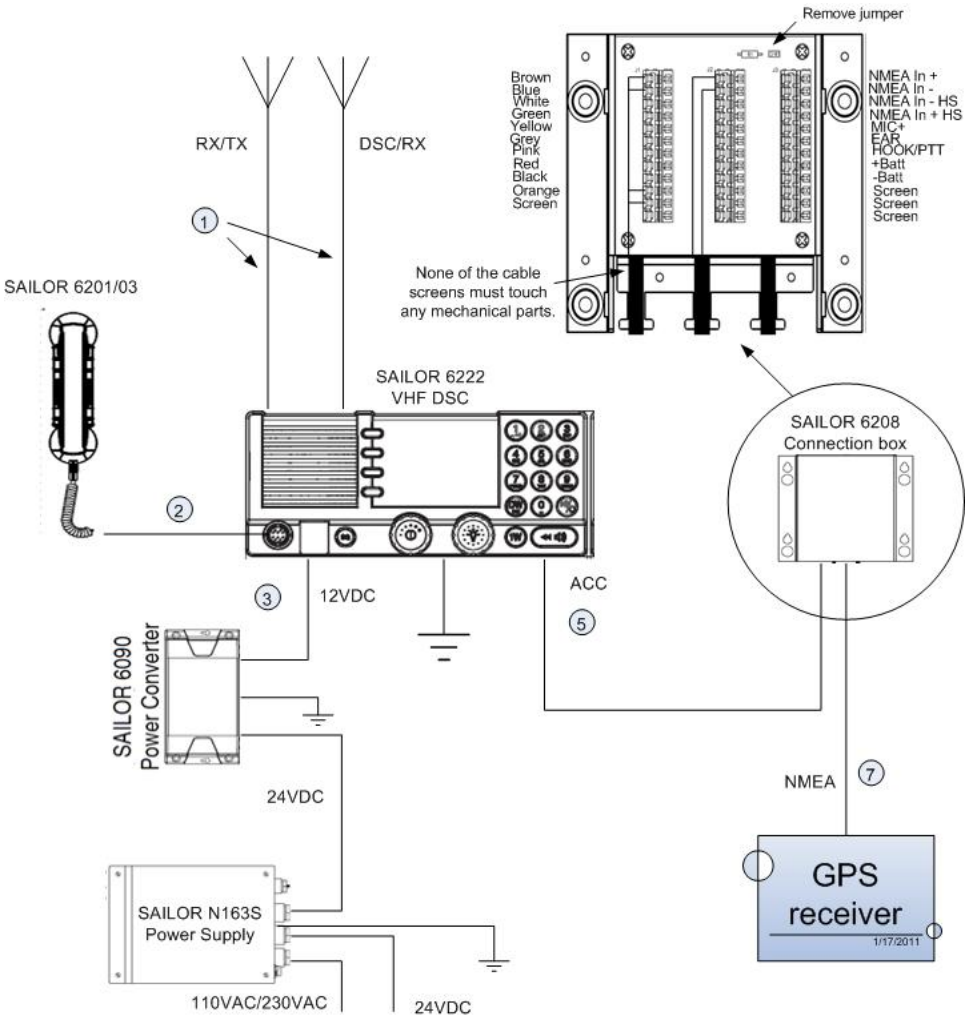


Figure B-9: System configuration, GPS and SAILOR 6208 Connection Box

B.1.10 How to install a GPS to the ACC port using a SAILOR 6207 Connection Box

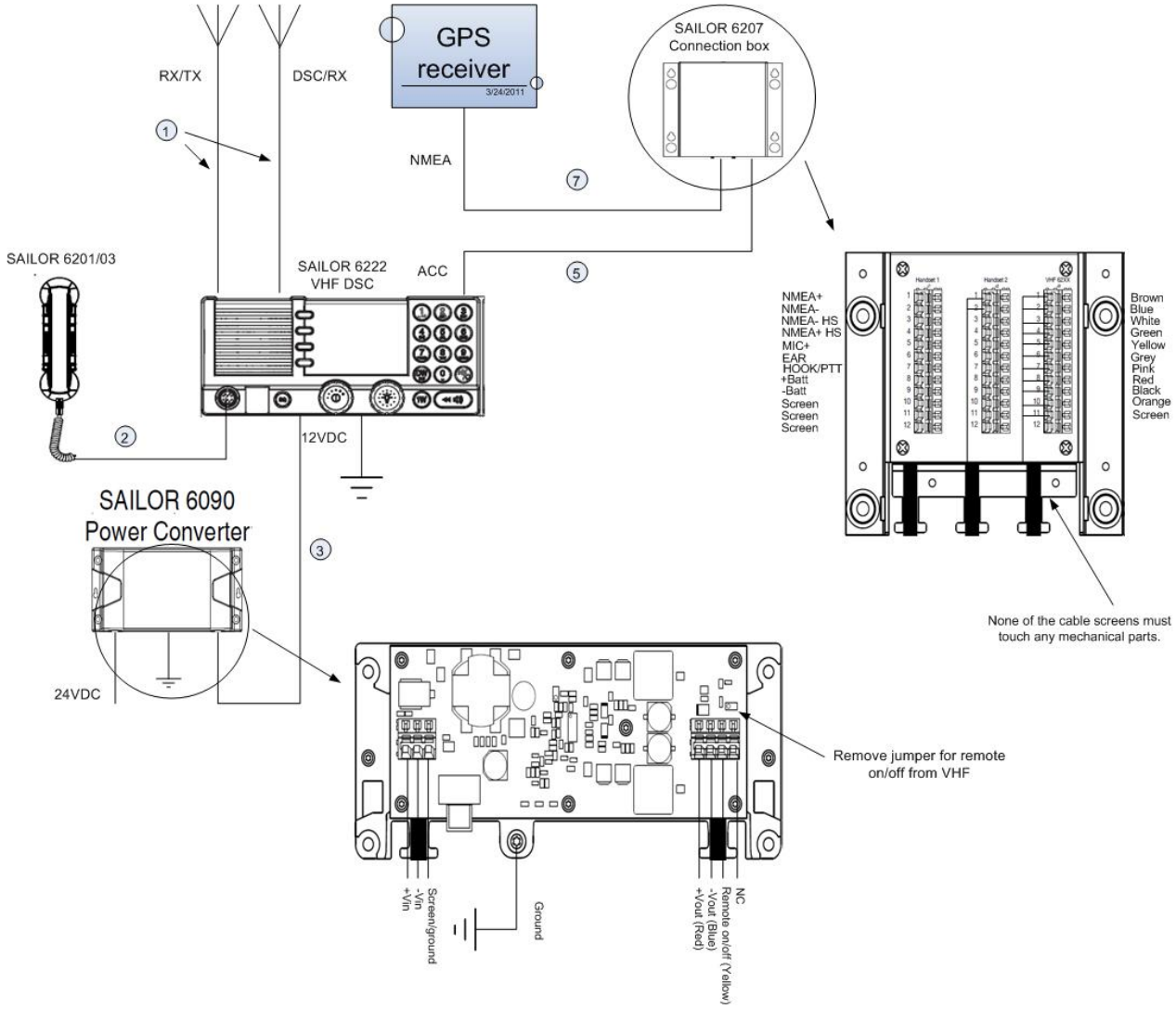


Figure B-10: System configuration, GPS and SAILOR 6207 Connection Box

B.1.11 How to install a CAN bus with a SAILOR 6204 CSM close to the VHF radio

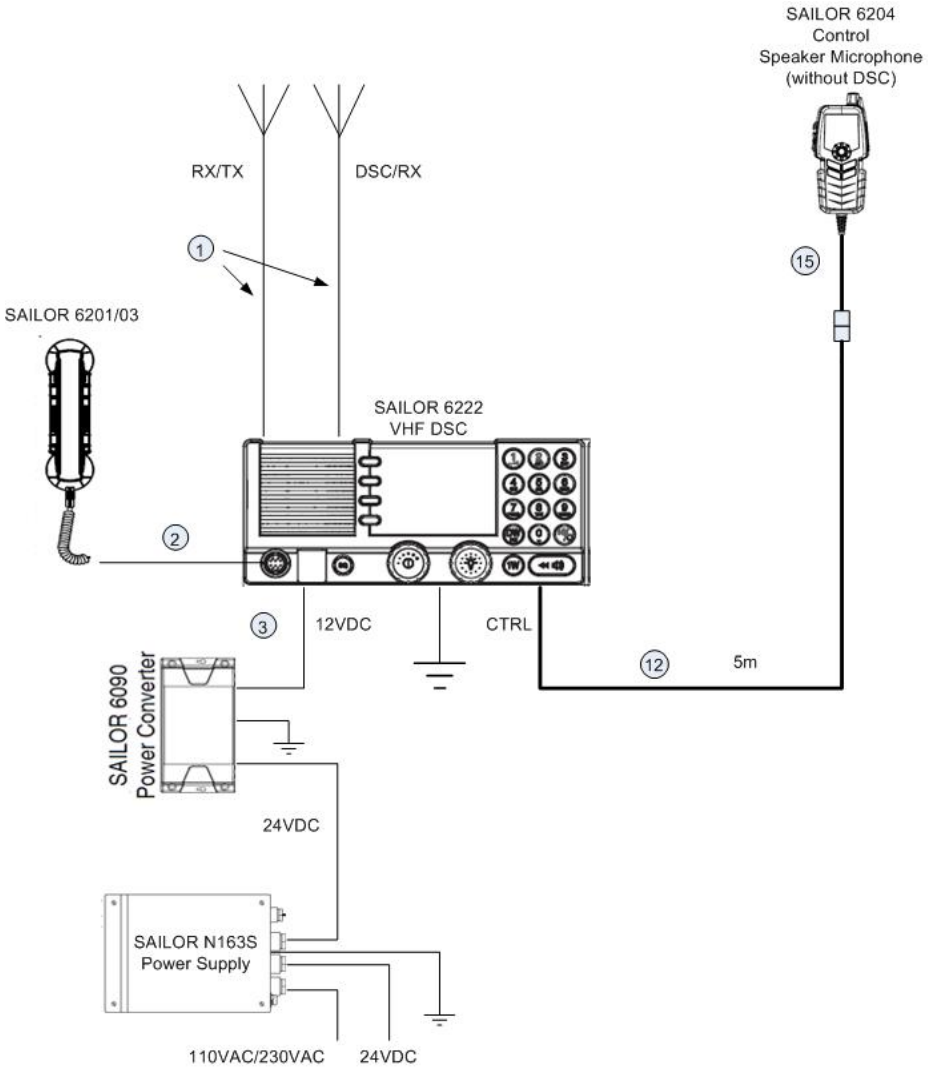


Figure B-11: System configuration, CAN bus, SAILOR 6204 CSM, close to the VHF radio

B.1.12 How to install a CAN bus with a SAILOR 6204 CSM not close to the VHF radio

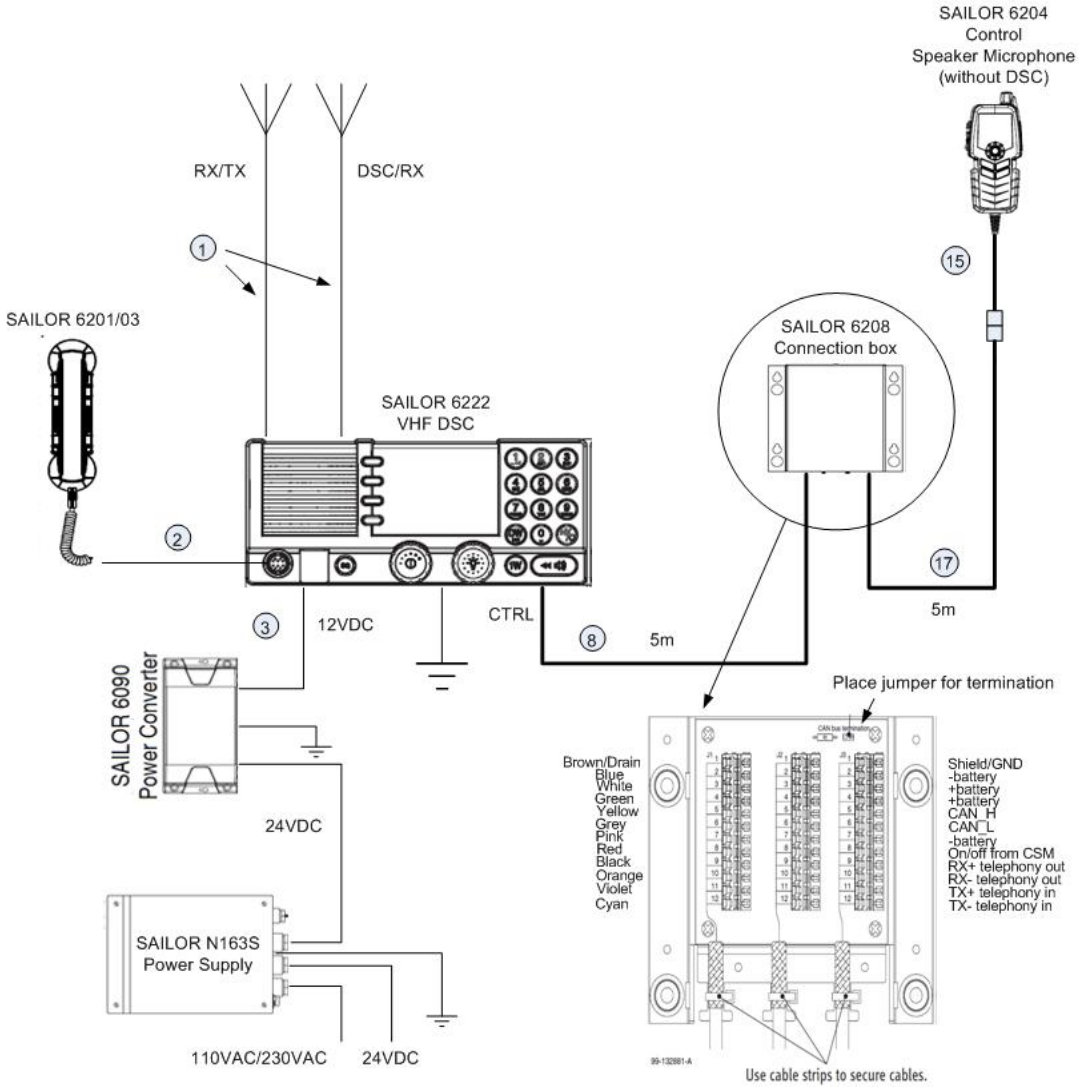


Figure B-12: System configuration, CAN bus, SAILOR 6204 CSM, not close to the VHF radio

B.1.13 How to install a CAN bus with a SAILOR 6204 CSM far from the VHF radio

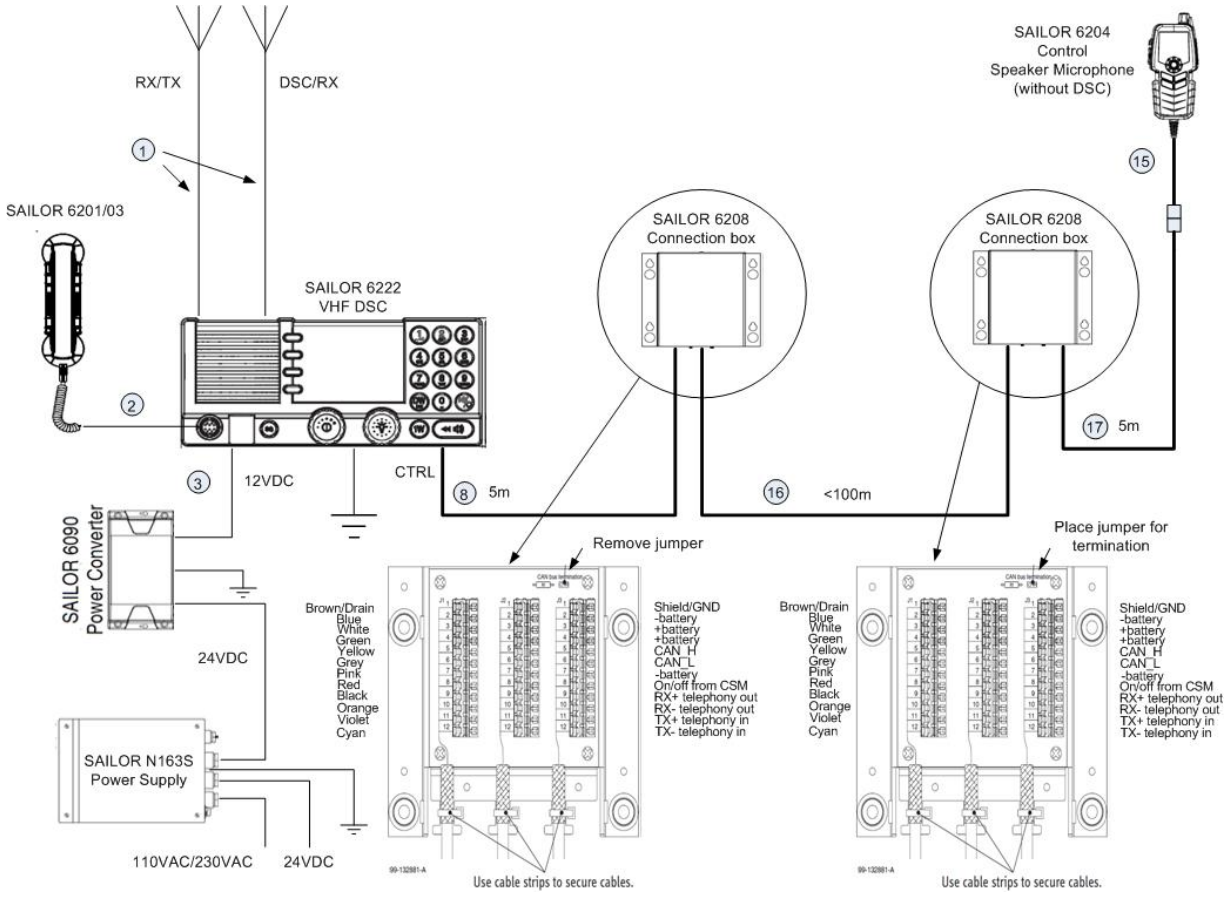


Figure B-13: System configuration, CAN bus, SAILOR 6204 CSM, far from the VHF radio

B.1.14 How to install a CAN bus with 2 SAILOR 6204 CSMs close to the VHF radio

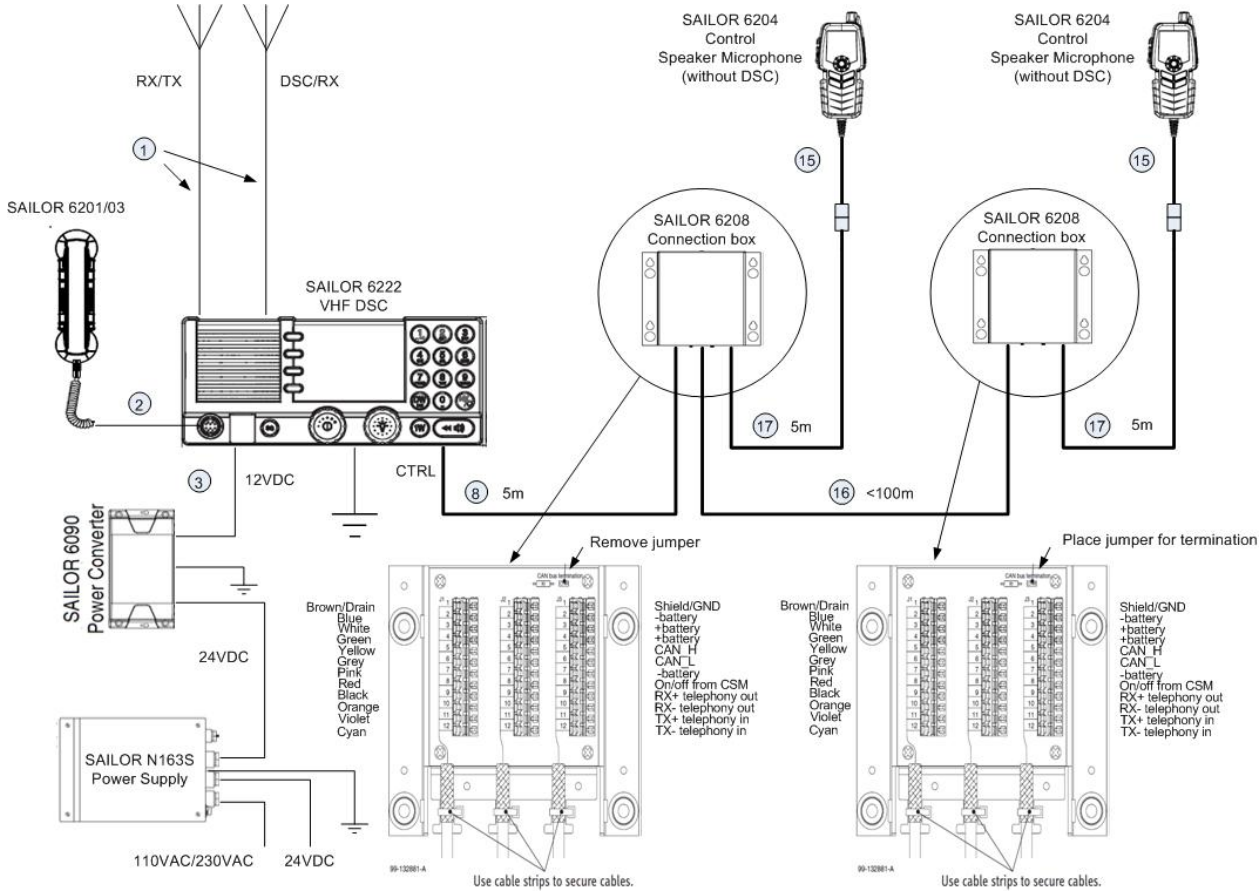


Figure B-14: System configuration, CAN bus, 2 SAILOR 6204 CSMs, close to VHF radio

B.1.15 How to install a CAN bus with 2 SAILOR 6204 CSMs far from the VHF radio

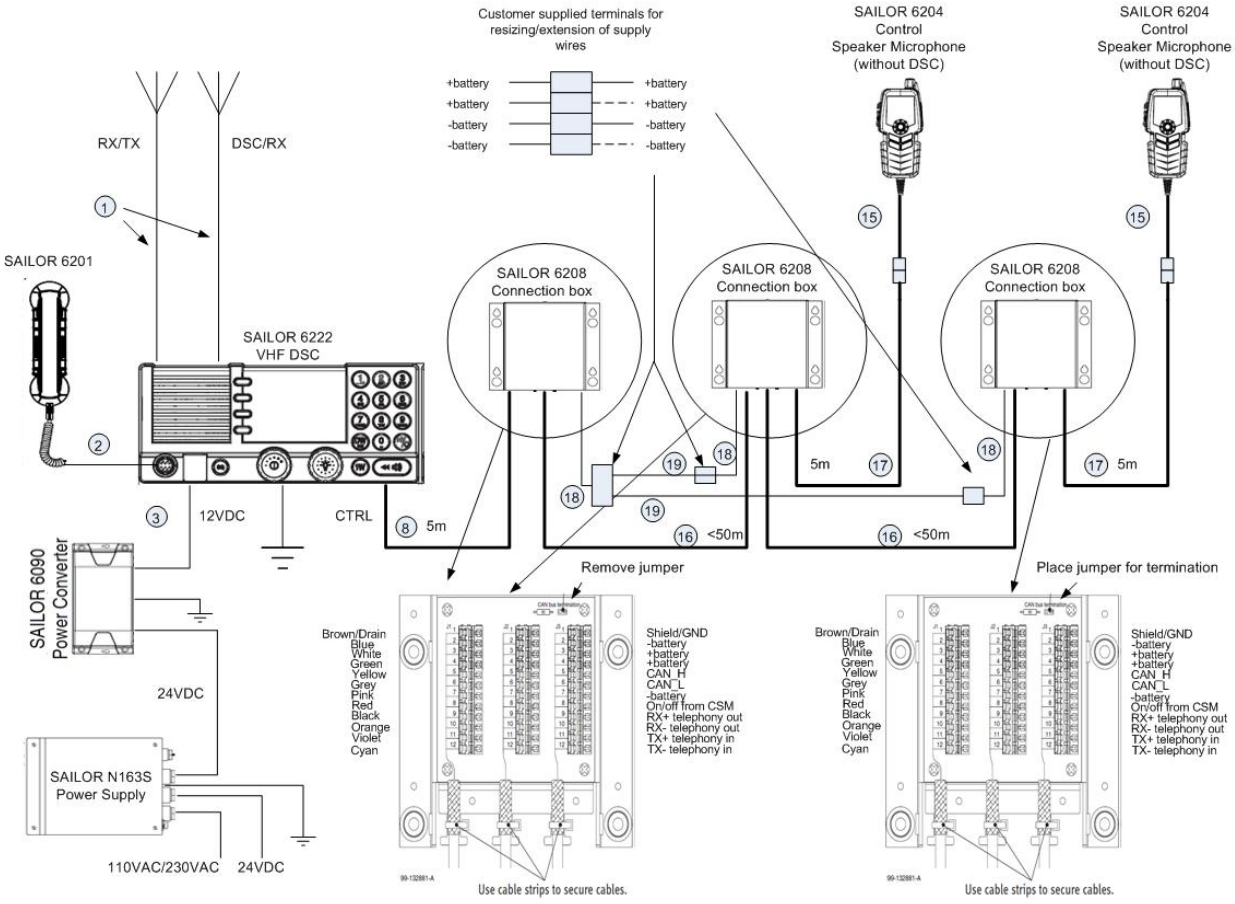


Figure B-15: System configuration: CAN bus, 2 SAILOR 6204 CSMs, far from VHF radio

B.1.16 How to install a CAN bus with 2 SAILOR 6204 CSMs close to each other

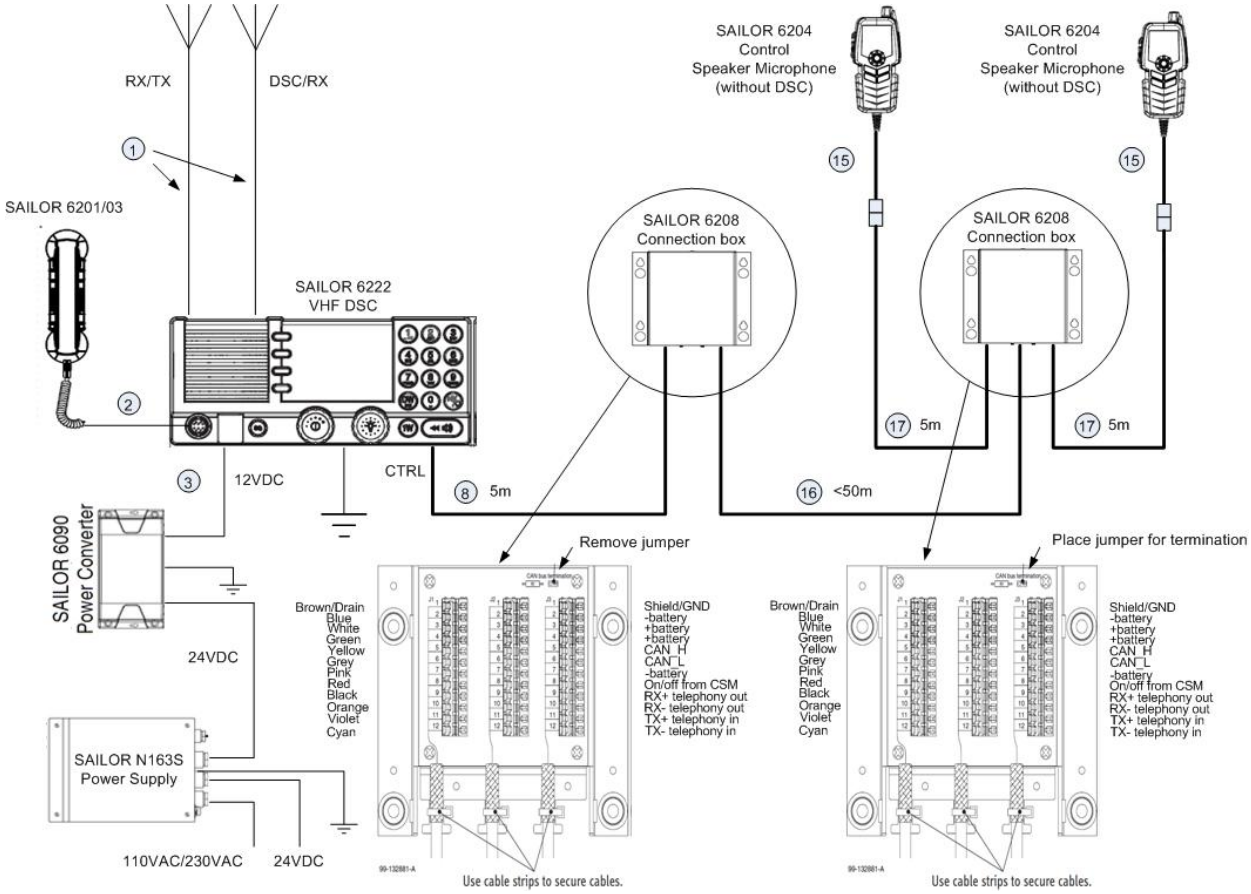


Figure B-16: System configuration: CAN bus, 2 SAILOR 6204 CSMs, close to each other

B.1.17 How to install a CAN bus with 2 SAILOR 6204 CSMs close to VHF on a small bridge

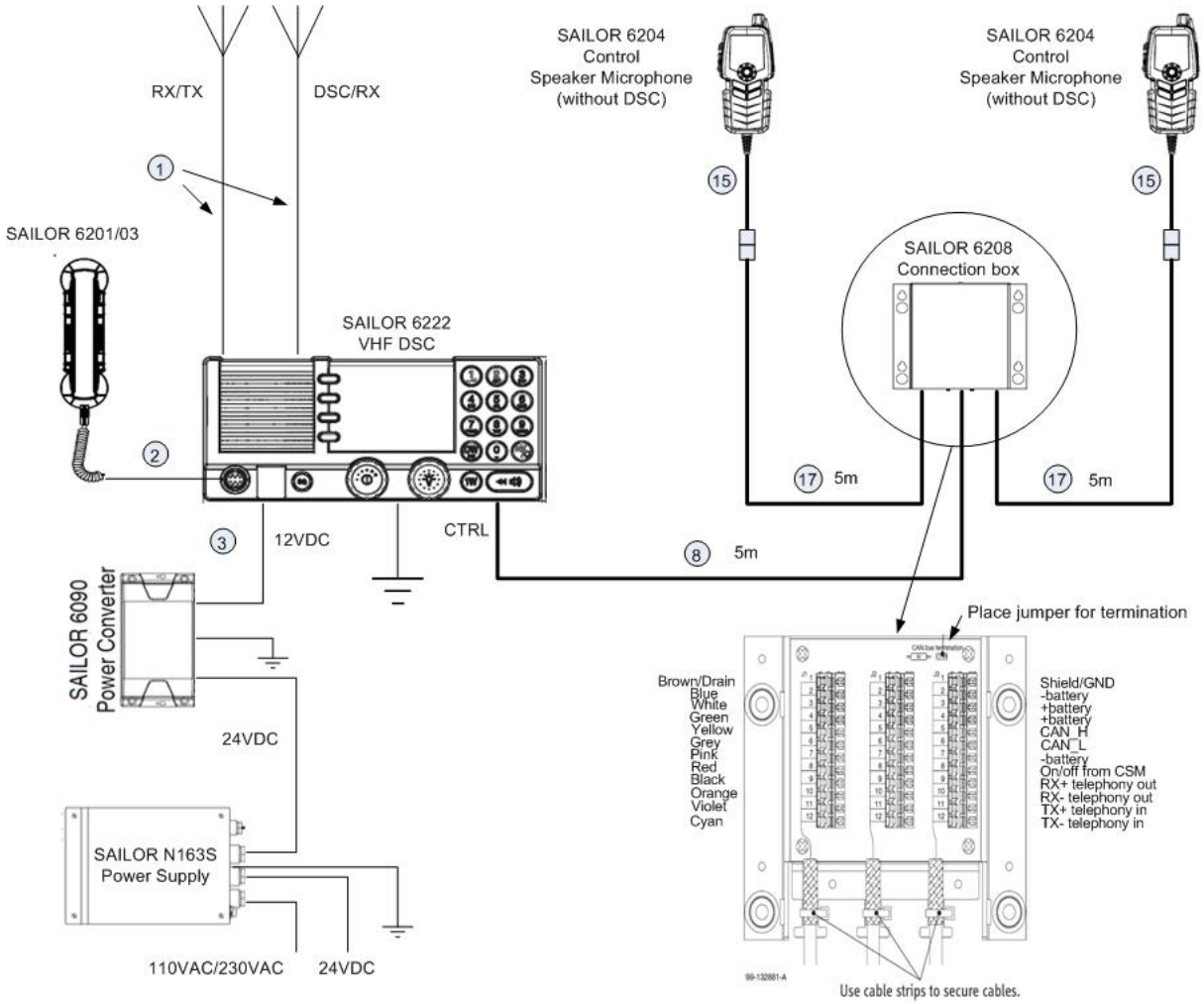


Figure B-17: System configuration: CAN bus, 2 SAILOR 6204 CSMs, close VHF, small bridge

B.1.18 How to install a CAN bus with 2 CSMs in bridge wings

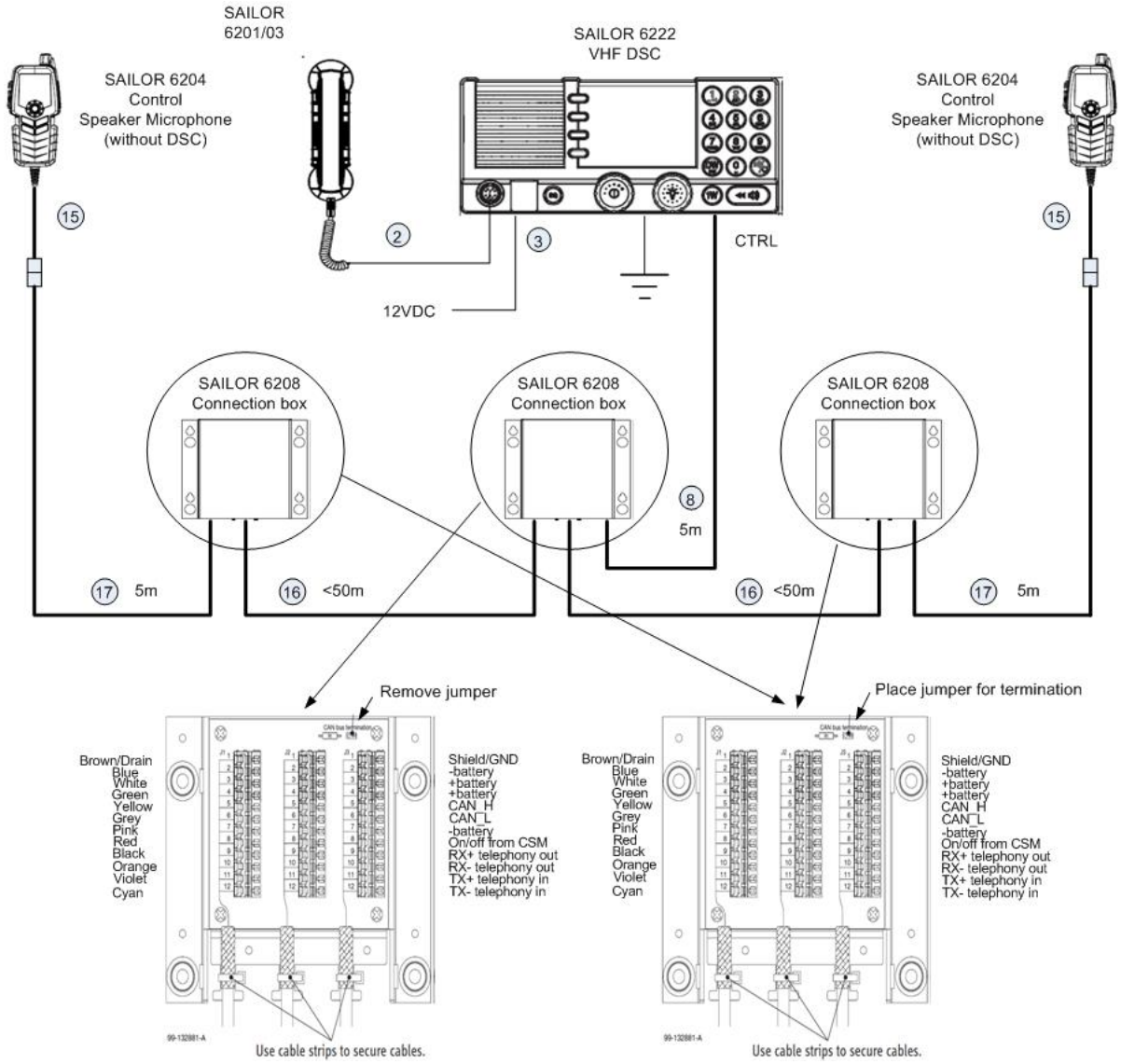


Figure B-18: System configuration: CAN bus, 2 SAILOR 6204 CSMs, in bridge wings

B.1.19 How to install a CAN bus with 3 CSMs in bridge wings

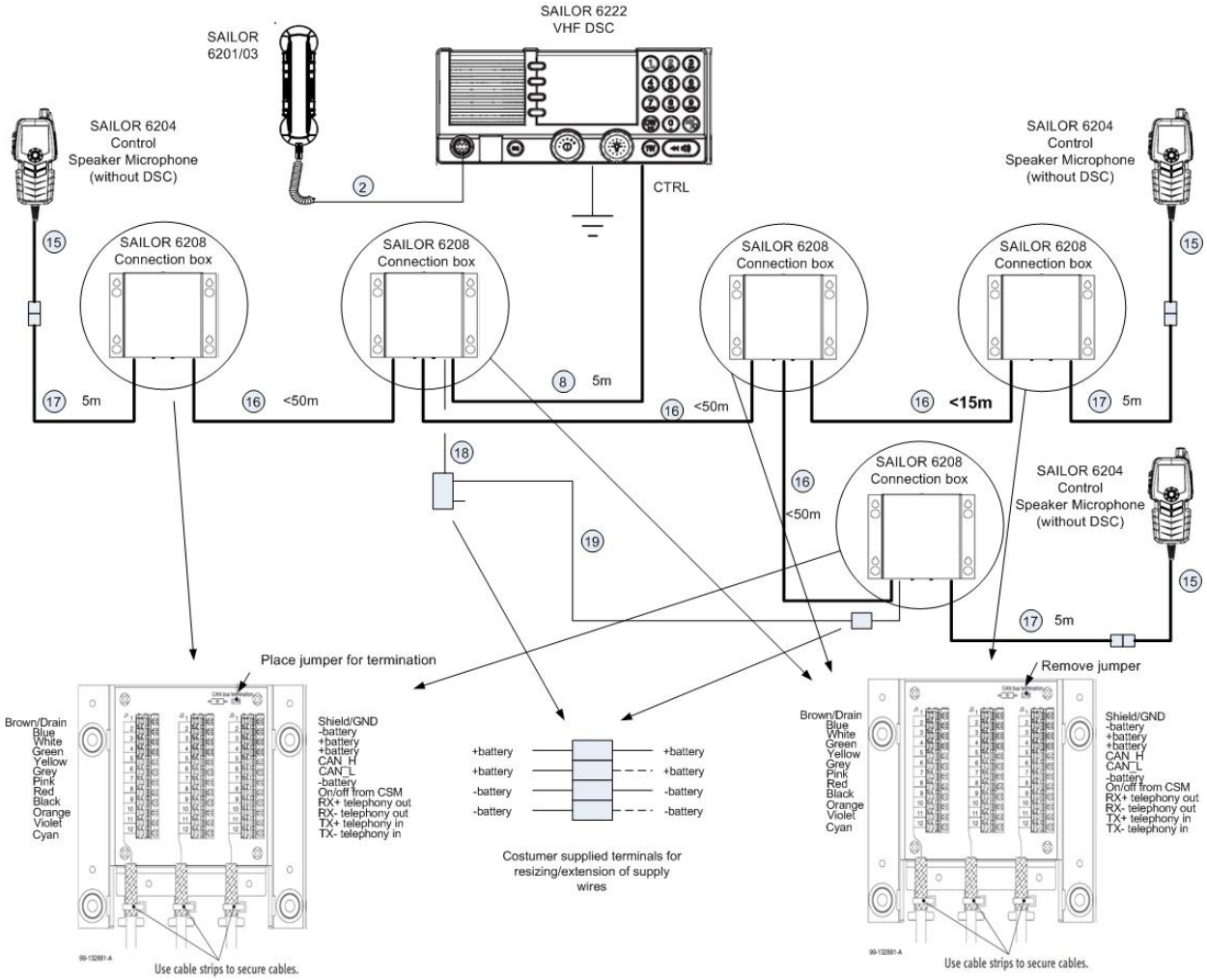


Figure B-19: System configuration: CAN bus, 3 SAILOR 6204 CSMs, in bridge wings

B.1.20 How to install a CAN bus with 4 CSMs in bridge wings

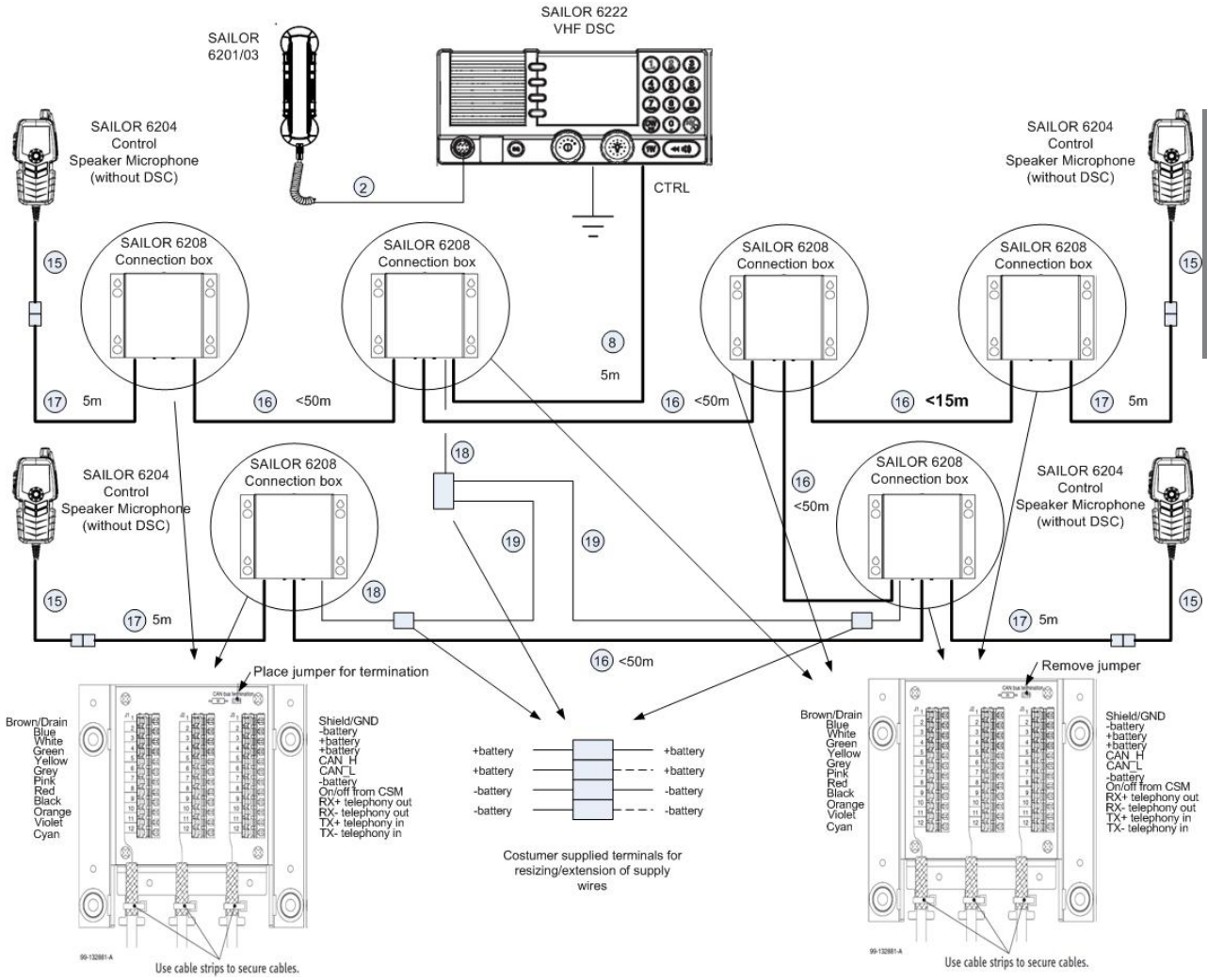


Figure B-20: System configuration: CAN bus, 4 SAILOR 6204 CSMs, in bridge wings

B.1.21 How to install a CAN bus with 3 SAILOR 6204 CSMs

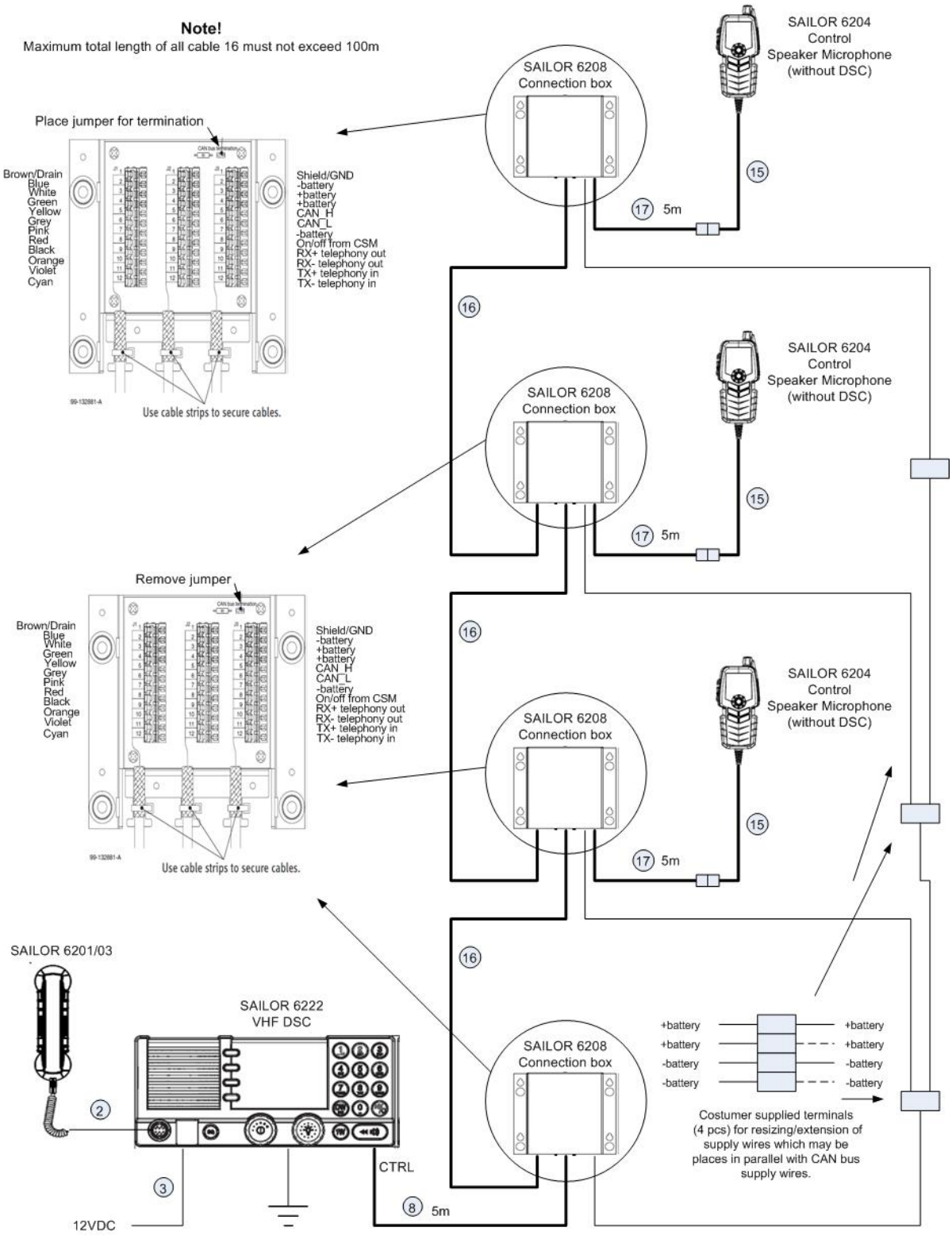


Figure B-21: System configuration: CAN bus, 3 SAILOR 6204 CSMs

B.1.22 How to install a CAN bus with 4 SAILOR 6204 CSMs

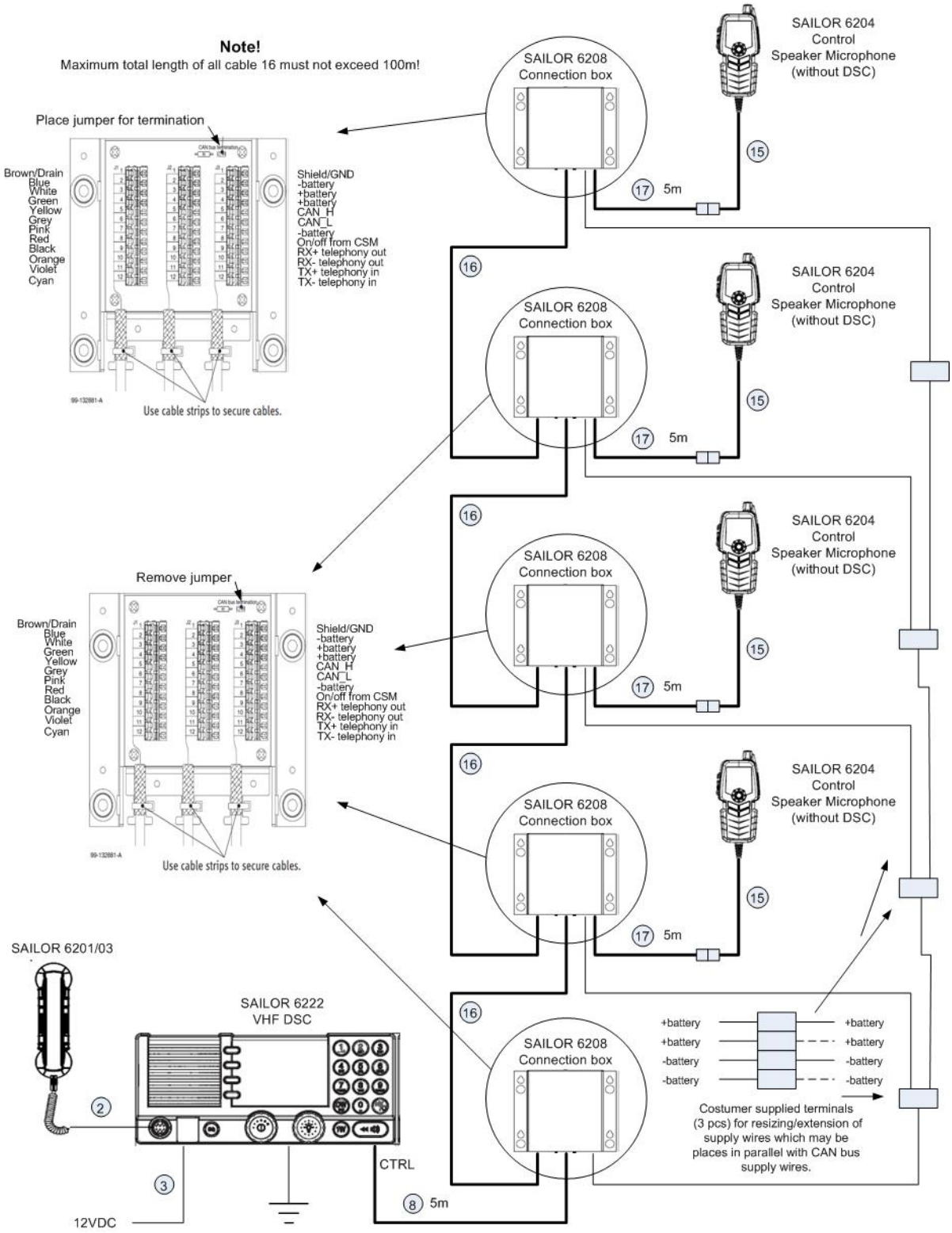


Figure B-22: System configuration: CAN bus, 4 SAILOR 6204 CSMs

B.1.23 How to install LAN

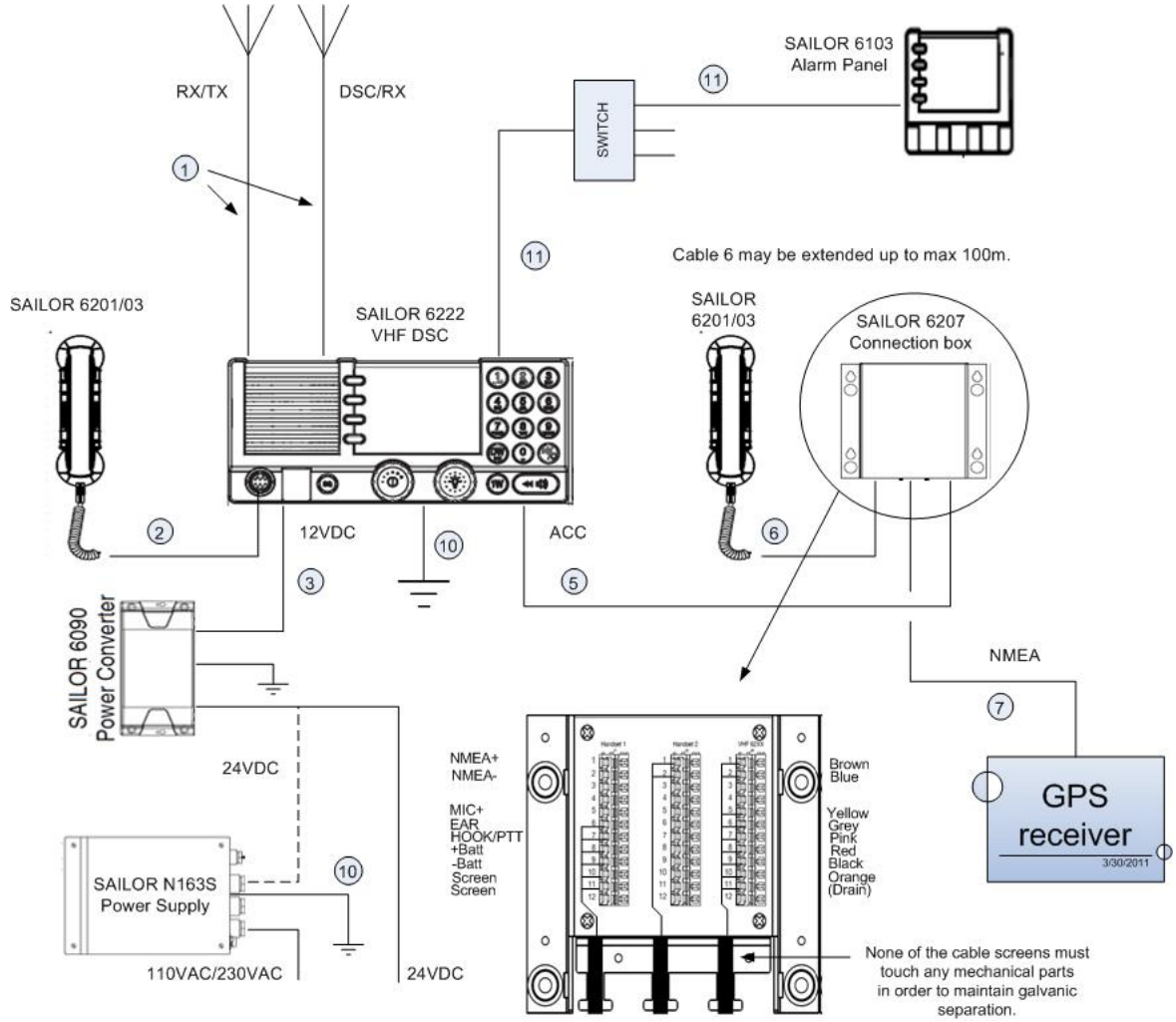


Figure B-23: System configuration: Installation of LAN

B.1.24 How to install a printer

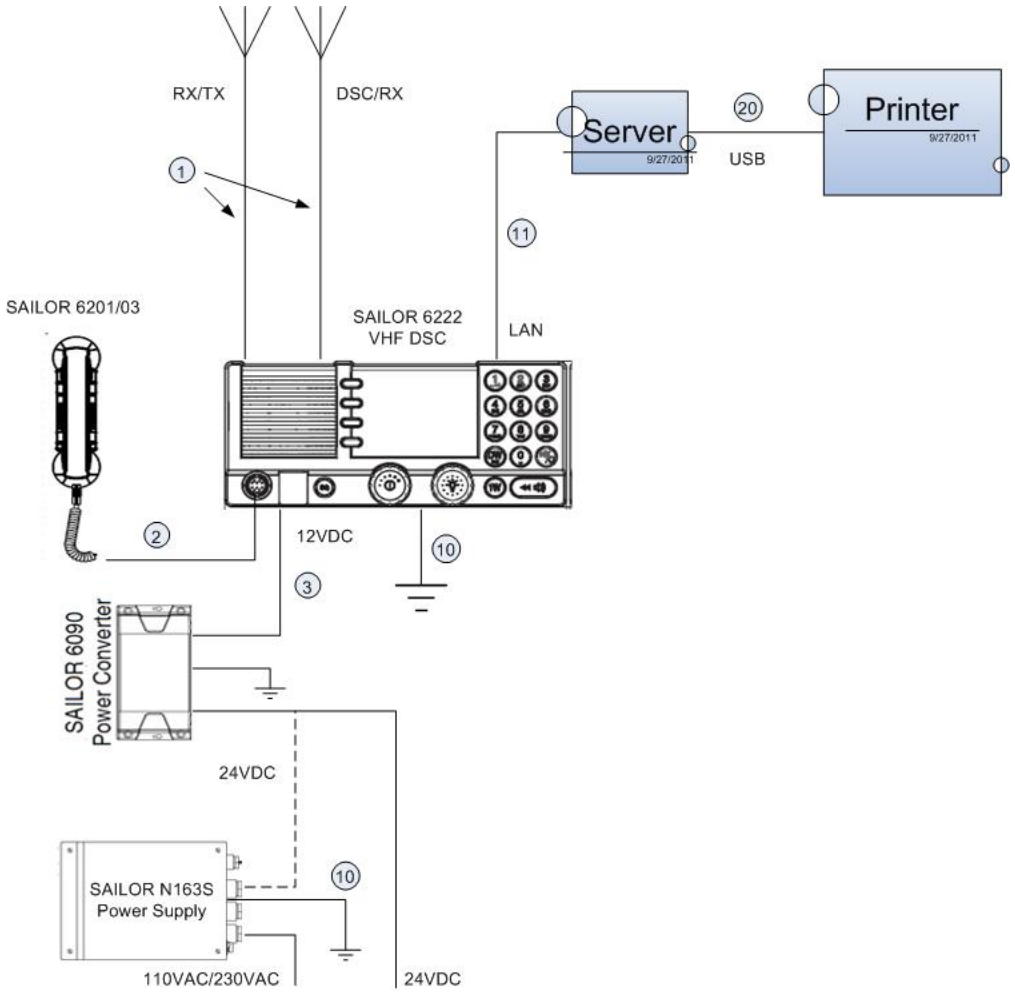


Figure B-24: System configuration: Installation of a printer

B.1.25 How to install an additional printer

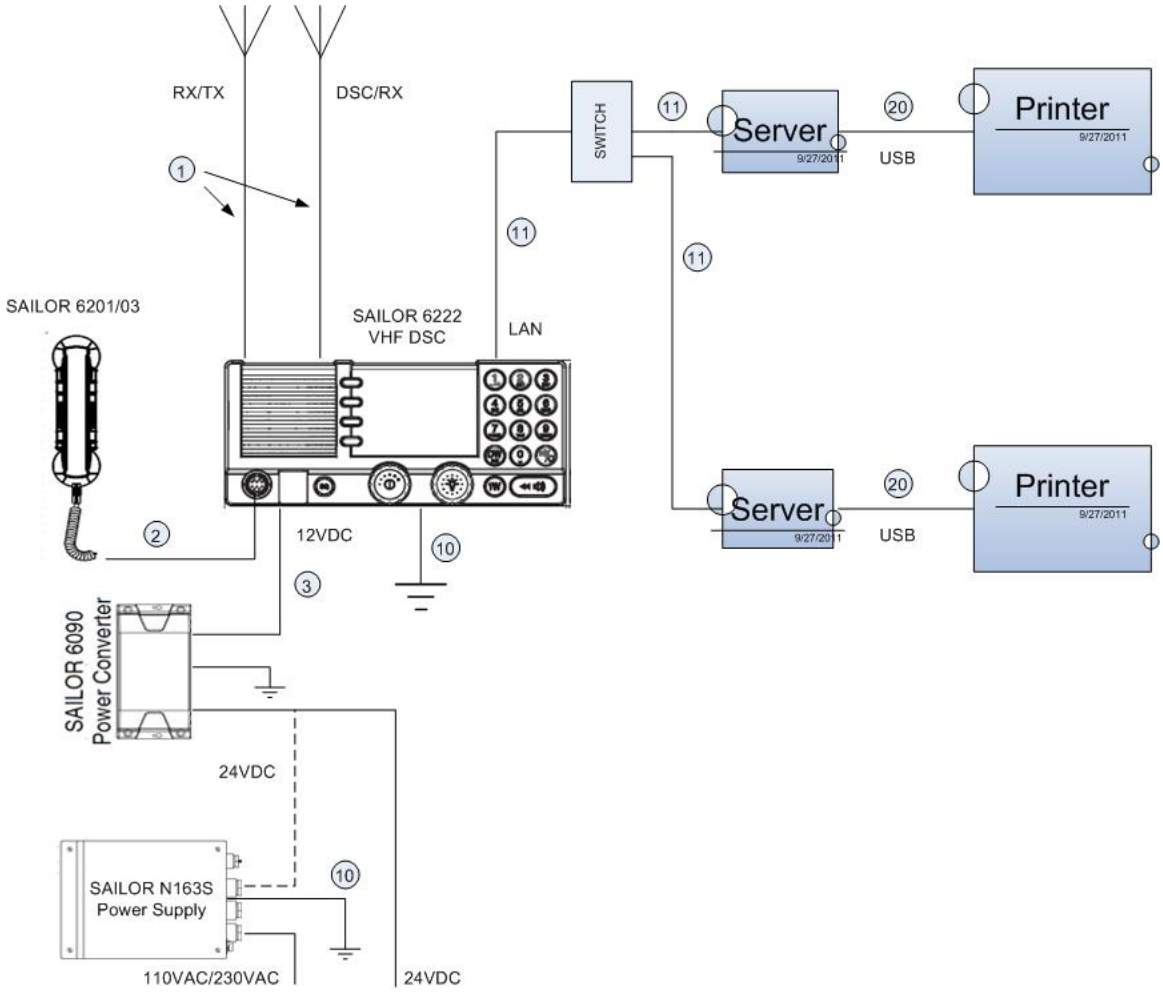


Figure B-25: System configuration: Installation of an additional printer

B.2 Cable requirements

The following cable information relates to the cable numbers in the system configuration drawings on the previous pages.

Cable	Part number	Description	Specification	Remarks
1		Antenna cable	RG214 or better	
2		Handset cable	1 m, spiraled	Part of handset
3	TT-37-131344	Power cable	1.5 m power cable	Included in 406222A
4	Not a T&T part	3-wire power cable, shielded	Depends on length	24 VDC, 4 A
5	406209-941	5 m cable for SAILOR 6207 Connection Box	10-pole LTW cable with screen	Included in Connection Box 406207A
6	406209-940	5 m cable for bulk mount	10-pole LTW cable with screen	
7			2-pole screened cable for NMEA	
8	406208-941	5 m cable for SAILOR 6208 Connection Box	12-pole LTW cable with screen	Included in Connection Box 406208A
9			2-pole screened cable for loudspeaker	
10		0.3 m	Earth connection	
11		3 m	LAN, Ethernet cable	Shielded
12	406204-940	5 m cable for SAILOR 6204 Control Speaker Microphone	12-pole LTW cable for CAN, with screen	Extension cable with LTW plugs in both ends
13		3 m audio cable	Test cable	
14		1.5 m power cable		
15		Cable for SAILOR 6204 Control Speaker Microphone	2.5 m, spiraled	Part of handset
16		Cable for CAN	Screened with twisted pairs, length and size see cable description for *Cable 16* on page B-33.	Extension cable for CAN bus, see also under cable description for *Cable 16* on page B-33.

Table B-1: Cable overview

Cable	Part number	Description	Specification	Remarks
17	406204-940	As cable (12). Plug for CTRL is removed and wires connected to connection box	12-pole LTW cable with screen	Extension cable with LTW bulk mount plug
18	Not a T&T part.	Extension cable for power supply. Length: max. 5 m	4 leads, screened wires of 0.5 mm^2	
19	Not a T&T part	Extension cable for power supply for SAILOR 6204.	4 leads, screened wires of 4 mm^2 depending on the current and/or cable length.	See cable description.
20	Not a T&T part	USB 2.0 cable		To connect printer server to printer.

Table B-1: Cable overview (Continued)

Cable 1

Cable type: Coax cable RG 214 or better.

Cable 2 (Handset, cable included)

SAILOR 6222 VHF DSC Front connector LTW 10-pin, circular male	Signal designation	Signal description
Pin 1	NC	
Pin 2	NC	
Pin 3	NC	
Pin 4	NC	
Pin 5	MIC+	Microphone signal
Pin 6	Earpiece	Earpiece signal
Pin 7	Hook_PTT	Hook/PTT signal
Pin 8	Battery+ (10.8-15.6 VDC)	Battery supply when radio is on
Pin 9	Internal GND = -Battery	Equipment ground
Pin 10	Internal GND = -Battery	Equipment ground

Table B-2: Cable specifications for cable 2

Cable 3 (Power cable, delivered with 406222A)

Cable type: 3-wire cable.

+ VDC	Red
0 VDC	Blue
ON/OFF	Yellow

Table B-3: Cable specifications for cable 3

Note External power supply input is galvanically isolated from equipment ground reference, i.e. chassis.

Equipment internal power supply reference (-) is at equipment ground reference, i.e. chassis.

Cable 4 (Power cable)

Cable type: 3-wire screened cable. Dimensions depend on the cable length.

Cable 5 (Cable for SAILOR 6207 Connection Box)

Cable type: 10-wire screened cable.

Part number: 406209-941

The cable screen must not touch any metal part of the connection box due to galvanic separation.

SAILOR 6222 VHF DSC ACC connector LTW 10-pin, circular male	Signal designation	Cable pin 406209-941 (5 m)	SAILOR 6207 Connection Box In from VHF	SAILOR 6207 Connection Box Ext. connections	Signal description
Pin 1	NMEA In+	Brown	1-1	2(3)-1	Impedance: 600 Ohm. Max. 2 mA at min. level of 2 V (61162-1)
Pin 2	NMEA In-	Blue	1-2	2(3)-2	
Pin 3	NMEA In-	White	1-3	2(3)-3	Impedance: 600 Ohm. Max. 2 mA at min. level of 2 V
Pin 4	NMEA In+	Green	1-4	2(3)-4	
Pin 5	MIC+	Yellow	1-5	2(3)-5	Microphone signal
Pin 6	Earpiece	Grey	1-6	2(3)-6	Earpiece signal
Pin 7	Hook_PTT	Pink	1-7	2(3)-7	Hook/PTT signal
Pin 8	Battery+ (10.8-15.6 VDC)	Red	1-8	2(3)-8	Battery supply when radio is on

Table B-4: Cable specifications for cable 5

SAILOR 6222 VHF DSC ACC connector LTW 10-pin, circular male	Signal designation	Cable pin 406209-941 (5 m)	SAILOR 6207 Connection Box In from VHF	SAILOR 6207 Connection Box Ext. connections	Signal description
Pin 9	Internal GND = -Battery	Black	1-9	2(3)-9	Equipment ground
Pin 10	Internal GND = -Battery	Orange - SCREEN (Drain)	1-10	2(3)-10	Equipment ground
	Cable screen		1-11	2(3)-11	Cable screen must not touch any metal part of the connection box.
			1-12	2(3)-12	Not in use.

Table B-4: Cable specifications for cable 5

Cable 6

Connection cable for bulkhead mount, 5 m.

Part number: 406209-940

Same pin configuration as cable 5.

Cable 7

2-wire screened cable for NMEA (GPS connection).

Cable 8 (AUX)

Part number: 406208-941

SAILOR 6222 VHF DSC AUX connector LTW 12-pin, circular male	Signal designation	Cable pin 406208-941 (5 m)	SAILOR 6208 Conn. Box In from VHF	SAILOR 6208 Conn. Box Out of box	SAILOR 6208 Conn. Box Out of box	Signal description	Ships cable 6 twisted pairs overall screen
Pin 1	Shield/GND	Brown	J1-1	J2-1	J3-1	Equipment ground	paired with no. 8
Pin 2	Lo Power	Blue	J1-2	J2-2	J3-2	Low power forced control. Active when connected to ground	paired with no. 3
Pin 3	NMEA+ In	White	J1-3	J2-3	J3-3	Impedance: 600 Ohm. Max. 2 mA at min. level of 2 V	paired with no. 2
Pin 4	NMEA- In	Green	J1-4	J2-4	J3-4		paired with no. 7
Pin 5	AUX	Yellow	J1-5	J2-5	J3-5	Open Collector output. Closing on event predefined through service programming[a]	paired with no. 6
Pin 6	DSC Call	Grey	J1-6	J2-6	J3-6	Open Collector output. Closing on incoming DSC call (see footnote)	paired with no. 5
Pin 7	DSC Alarm	Pink	J1-7	J2-7	J3-7	Open Collector output. Closing on incoming DSC alert (see footnote)	paired with no. 4
Pin 8	Battery-	Red	J1-8	J2-8	J3-8	Battery GND	paired with no. 1
Pin 9	Ext. Speaker+	Black	J1-9	J2-9	J3-9	VHF radio external speaker output, nom. 6 W into 8 Ohm	paired with no. 10
Pin 10	Ext. Speaker+	Orange	J1-10	J2-10	J3-10		paired with no. 9
Pin 11	VDR+	Purple	J1-11	J2-11	J3-11	Mixed RX/TX audio output for recording. Galvanically isolated, balanced signal, 0 dBm into 600 Ohm	paired with no. 12
Pin 12	VDR-	Light green	J1-12	J2-12	J3-12		paired with no. 11

Table B-5: Cable specifications for cable 8 (AUX)

a. 24 VDC, max. 100 mA

CAN cable (Cable 8 - CTRL)

Part number: 406208-941

SAILOR 6222 VHF DSC CTRL connector LTW 12-pin, circular male	Signal designation	Cable pin 406208-941 (5 m)	SAILOR 6208 Conn. Box In from VHF	SAILOR 6208 Conn. Box Out of box	SAILOR 6208 Conn. Box Out of box	Signal description	Ships cable 6 twisted pairs overall screen
Pin 1	Shield/GND	Brown	J1-1	J2-1	J3-1	Equipment ground	paired with no. 8
Pin 2	Battery-	Blue	J1-2	J2-2	J3-2	Battery -	paired with no. 3
Pin 3	Battery+	White	J1-3	J2-3	J3-3	10.8-15.6 VDC from VHF radio	paired with no. 2
Pin 4	Battery+	Green	J1-4	J2-4	J3-4	10.8-15.6 VDC from VHF radio	paired with no. 7
Pin 5	CAN_H	Yellow	J1-5	J2-5	J3-5	CAN bus data	paired with no. 6
Pin 6	CAN_L	Grey	J1-6	J2-6	J3-6		paired with no. 5
Pin 7	Battery-	Pink	J1-7	J2-7	J3-7	Battery -	paired with no. 4
Pin 8	ON/OFF from CSM	Red	J1-8	J2-8	J3-8	ON/OFF signal from Control Speaker Microphone	paired with no. 1
Pin 9	RX+	Black	J1-9	J2-9	J3-9	RX telephony (out)	paired with no. 10
Pin 10	RX-	Orange	J1-10	J2-10	J3-10		paired with no. 9
Pin 11	TX+	Purple	J1-11	J2-11	J3-11	TX telephony (in)	paired with no. 12
Pin 12	TX-	Light green	J1-12	J2-12	J3-12		paired with no. 11

Table B-6: Cable specifications for cable 8 (CTRL)

Cable 11

LAN connection.

Ethernet cable with screen and RJ45 shielded plugs.

Pin number	Pin function	Wire color
1	Tx+	white/orange
2	Tx-	orange
3	Rx+	white/green
4	Not connected	blue
5	Not connected	white/blue
6	Rx-	green
7	Not connected	white/brown
8	Not connected	brown

Table B-7: Pin allocation, LAN connector

Cable 16

The CAN bus cable must be of a paired and twisted type designed for the purpose. The CAN bus cable can handle signals up to 100 m away from the VHF to further Control Speaker Microphones (CSM).

Only 1 CSM can be connected to the VHF with a CAN bus cable of max 100 m if the cable dimension is 0.5mm^2 of each cord. Other combinations with more CSMs must be calculated seriously before installing the cable. If more CSMs are connected, the CAN cable of 0.5mm^2 can handle the signals up to max. 100 m. The only restriction is the power supply for the connected CSMs.

The voltage drop along the cable increases with the length of the cable. Separate supply cables can be installed in parallel with the CAN cable to reduce voltage drop in long cables. The maximum allowed voltage drop from VHF to CSM is 2 VDC. It means 1 VDC forward and 1 VDC return.

Max current consumption for each CSM is 0.5A.

Formula to calculate DC resistance in a wire:

$$R = 0,017 \times L / a$$

L = length of wire one way, in metre
a = cross section of the wire in mm^2

Contact your local dealer for further information for correct installation.

Cable 17: CAN cable for bulk head installation.

Same cable as cable 12, but the plug is removed and the wires are connected to the connection box.

Same pin configuration as cable 8. See *Cable specifications for cable 8 (CTRL)* on page B-32.

Cable 18

Cable between the connection box and terminals to extend the power supply wires.

4 leads, screened wires of 0.5mm^2. Supply for 6204 CSM for extended CAN BUS connections.

Cable 19

The voltage drop along the cable increases with the length of the cable. Separate supply cables can be installed in parallel with the CAN cable to reduce voltage drop in long cables. The maximum allowed voltage drop from VHF to CSM is 2 VDC. It means 1 VDC forward and 1 VDC return.

The maximum current consumption for each CSM is 0.5 A.

Formula to calculate DC resistance in a wire:

$$R = 0,017 \times L/a$$

L = length of wire one way, in metre
a = cross section of the wire in mm^2

For best EMC performance, place the supply cables in parallel with CAN cable

Contact your local dealer for further information for correct installation.

Cable 20

Standard USB 2.0 cable to connect printer server and printer.

A

ACC	Accessories

C

CAN	Controller-Area Network. A message based protocol designed to allow microcontrollers and devices to communicate with each other within a vehicle without a host computer.
CSM	Control Speaker Microphone
CTRL	Control

D

DSC	Digital Selective Calling

G

GGA	NMEA sentence, essential fix data which provide 3D location and accuracy data.
GLL	NMEA sentence, Geographic Latitude and Longitude
GNS	NMEA sentence,
GPS	Global Positioning System

L

LAN	Local Area Network ,
LTW	LTW Technology is a professional designer and manufacturer of waterproof connectors.
LWE	Light Weight Ethernet
LWE	Light Weight Ethernet UdP Broadcast

M

MMSI	Maritime Mobile Service Identity. A series of nine digits which are sent in digital form over a radio frequency channel in order to uniquely identify ship stations, ship earth stations, coast stations, coast earth stations, and group calls. These identities are formed in such a way that the identity or

part thereof can be used by telephone and telex subscribers connected to the general telecommunications network to call ships automatically.

N

NMEA — National Marine Electronics Association, specification for communication between marine electronic devices

R

RMC — NMEA sentence, version of essential gps position, velocity, time data.

U

USB — Universal Serial Bus. A specification to establish communication between devices and a host controller (usually personal computers). USB is intended to replace many varieties of serial and parallel ports. USB can connect computer peripherals such as mice, keyboards, digital cameras, printers, personal media players, flash drives, and external hard drives.

UTC — Coordinated Universal Time. The International Atomic Time (TAI) with leap seconds added at irregular intervals to compensate for the Earth's slowing rotation. Leap seconds are used to allow UTC to closely track UT1, which is mean solar time at the Royal Observatory, Greenwich.

V

VDR — Voyage Data Recorder, a data recording system designed for all vessels required to comply with the IMO's International Convention SOLAS Requirements in order to collect data from various sensors on board the vessel.

VHF — Very High Frequency

VSWR — Voltage Standing Wave Ratio,

Z

ZDA — NMEA sentence, date and time.

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