



YACHTSENSE™ DCS

DIGITAL CONTROL SYSTEM

Software version: **v5.1.14**

INSTALLATION & OPERATION INSTRUCTIONS

English (en-US)

Date: 06-2024

Document number: 81394 (Rev 5)

© 2024 Raymarine UK Limited

Raymarine®

Legal notices

Trademark and patents notice

Raymarine, **Tacktick**, **Pathfinder**, **ClearPulse**, **Truzoom**, **SeaTalk**, **SeaTalk^{hs}**, **SeaTalkng**, and **Micronet**, are registered or claimed trademarks of Raymarine Belgium.

FLIR, **Fishidy**, **Fishing Hot Spots**, **YachtSense**, **DockSense**, **LightHouse**, **RangeFusion**, **DownVision**, **SideVision**, **RealVision**, **HyperVision**, **Dragonfly**, **Element**, **Quantum**, **Axiom**, **Instalert**, **Infrared Everywhere**, **The World's Sixth Sense** and **ClearCruise** are registered or claimed trademarks of FLIR Systems, Inc.

All other trademarks, trade names, or company names referenced herein are used for identification only and are the property of their respective owners.

This product is protected by patents, design patents, patents pending, or design patents pending.

Fair Use Statement

You may print no more than three copies of this manual for your own use. You may not make any further copies or distribute or use the manual in any other way including without limitation exploiting the manual commercially or giving or selling copies to third parties.

Content notice

Please ensure that you have obtained this document only from Raymarine®, and that it is the **latest** available version.

There are numerous third-party Internet websites (such as *www.manualslib.com*) hosting Raymarine product manuals. These websites are not authorized by Raymarine® to do so, and are often hosting illegitimate or older versions of Raymarine product manuals, which may contain inaccurate or misleading information.

To obtain the latest official documentation for a Raymarine® product, please visit the official Raymarine® website: <https://bit.ly/rym-docs>

CONTENTS

CHAPTER 1 IMPORTANT INFORMATION.....	9		
Safety warnings	9		
Digital Control System — Terms of Use	9		
Product warnings	10		
Regulatory notices.....	10		
Disclaimer.....	10		
Water ingress	10		
Open source license agreements.....	10		
Declaration of Conformity.....	10		
Warranty registration	11		
Product disposal	11		
IMO and SOLAS.....	11		
Technical accuracy.....	11		
Publication copyright	11		
CHAPTER 2 DOCUMENT INFORMATION.....	12		
2.1 Product documentation	13		
2.2 Document illustrations	13		
2.3 Document conventions.....	13		
CHAPTER 3 SOFTWARE DETAILS	14		
3.1 Applicable software version	15		
3.2 Software upgrades	15		
3.3 Check software version.....	15		
CHAPTER 4 NEW FEATURES	16		
4.1 New software features.....	17		
4.2 System hardware configuration	18		
4.3 Soft fuse rating	18		
4.4 YachtSense DCS-Series app overview.....	19		
4.5 Splitscreen app pages.....	19		
CHAPTER 5 PRODUCT AND SYSTEM OVERVIEW	20		
5.1 Product overview	21		
5.2 Available modules	22		
5.3 System hardware configuration	22		
5.4 Configuration required.....	23		
5.5 Raymarine app configuration required	23		
5.6 Maximum current / load	23		
CHAPTER 6 YACHTSENSE ECOSYSTEM.....	24		
6.1 YachtSense ecosystem.....	25		
6.2 On-boat features.....	25		
6.3 Off-boat premium features	27		
6.4 How to obtain the Raymarine app.....	27		
How to connect guide.....	28		
Connect directly to a chartplotter (MFD).....	28		
Display mirroring (view and control)	28		
Transferring LightHouse charts.....	28		
Chartplotter file transfer	29		
Connect to your YachtSense Link-Series			
YachtSense Link router.....	29		
Geofencing.....	29		
Data view and channel control	30		

User access management	30
Boat alerts	30
Boat systems	31
6.5 Removing a boat system	31
6.6 Removing a router	31
6.7 YachtSense Link-Series YachtSense Link router account transfer / ownership transfer	31
CHAPTER 7 PARTS SUPPLIED	32
7.1 Master and Remote module parts supplied	33
7.2 Input and output module parts supplied	33
7.3 Required additional items	34
CHAPTER 8 PRODUCT DIMENSIONS	35
8.1 Master system and Remote system dimensions	36
CHAPTER 9 LOCATION REQUIREMENTS	37
9.1 Warnings and cautions	38
9.2 EMC installation guidelines	38
9.3 Potential ignition source	38
9.4 Location requirements	38
CHAPTER 10 INSTALLATION	40
10.1 Tools required	41
10.2 Camlock system	41
10.3 Removing covers and fuses	42
10.4 Assembling Master or Remote systems	42
10.5 Mounting options	43
10.6 Fitting the mounting bracket	43
10.7 Mounting system assemblies using the bracket	43

10.8 Mounting without the bracket	44
10.9 Mounting using the mounting template	45

CHAPTER 11 CABLES AND CONNECTIONS — GENERAL INFORMATION

11.1 General cabling guidance	48
Cable types and length	48
Strain relief	48
Cable shielding	48

CHAPTER 12 MODULE CONNECTIONS

12.1 Module to module connections	50
12.2 Master module connections	50
Master module pin out	50
12.3 Remote module connections	51
Remote pin out	51
Digital and analog inputs and outputs example connections	52
12.4 High power module connections	53
Inductive loads	54
12.5 Low power module connections	55
Inductive loads	56
12.6 Reverse power module connections	56
Reversible motor inductive loads	57
12.7 Signal module connections	58
Digital and analog inputs and outputs example connections	58

CHAPTER 13 MODULE FUSES

13.1 Replacing module fuses.....	61
Fuse labeling	61
Spare fuses.....	62
13.2 Fuse by-pass	62
13.3 Removing covers and fuses.....	63
CHAPTER 14 POWER SUPPLY CONNEC-	
TIONS.....	64
14.1 Connecting the power supply	65
Thermal breaker / inline fuse rating	66
Power cable requirements	66
Power distribution.....	66
CHAPTER 15 NETWORK CONNECTIONS	69
15.1 SeaTalk NG connection	70
Connecting SeaTalk NG cables	70
SeaTalk NG power supply.....	70
Inline fuse and thermal breaker ratings.....	71
SeaTalk NG power cables.....	71
SeaTalk NG product loading.....	72
SeaTalk NG power connection point	72
SeaTalk NG system loading.....	72
Power distribution — SeaTalk NG.....	73
Power connection via Autopilot Control Unit	
(ACU-Series)	75
15.2 RayNet network connection	76
Connecting cables.....	76

CHAPTER 16 MOLEX® CONNECTOR	
CONNECTIONS	77
16.1 Molex® connectors	78
16.2 Molex® connector types and keying.....	78
16.3 Removing connectors from modules	78
16.4 Removing seal plugs	79
16.5 Inserting seal plugs	79
16.6 Wiring the connectors.....	79
16.7 Connecting Molex® connectors to	
modules	81
CHAPTER 17 YACHTSENSE DCS-SERIES	
APP	82
17.1 YachtSense DCS-Series app overview.....	83
17.2 YachtSense DCS-Series app menu.....	83
17.3 Splitscreen app pages.....	84
CHAPTER 18 OPERATIONS	85
18.1 Controls.....	86
Sleep mode.....	86
18.2 Default page.....	86
18.3 Menu.....	86
Setting Remote module ID number.....	87
18.4 Channels pages	87
Options menu	88
Manual override	88
Soft fuse rating.....	88
Tripped fuses (soft)	89
18.5 Alerts.....	89

Limp home mode.....	89	22.5 High power module technical specification.....	101
CHAPTER 19 TROUBLESHOOTING	91	22.6 Low power module technical specification.....	101
19.1 Troubleshooting	92	22.7 Signal module technical specification.....	102
19.2 LED diagnostics	92	22.8 Reverse power module technical specification	102
19.3 YachtSense DCS-Series Digital Control System troubleshooting	92	CHAPTER 23 SPARES AND ACCESSORIES	103
19.4 Performing a factory reset.....	93	23.1 YachtSense DCS-Series Digital Control System spares.....	104
19.5 Deleting configuration.....	93	23.2 YachtSense DCS-Series Digital Control System accessories.....	104
CHAPTER 20 MAINTENANCE	94	23.3 RayNet to RayNet cables and connectors.....	105
20.1 Service and maintenance	95	23.4 SeaTalk NG cables and accessories	106
Routine equipment checks.....	95	APPENDIX A NMEA 2000 PGN SUPPORT	111
20.2 Product cleaning	95	APPENDIX B BEST PRACTICES - OVERVIEW.....	112
CHAPTER 21 TECHNICAL SUPPORT.....	96	APPENDIX C SOFTWARE RELEASE HISTORY.....	116
21.1 Raymarine technical support and servicing.....	97	APPENDIX D ETHERNET (IPV4) NETWORKING OF RAYMARINE DEVICES WITH THIRD-PARTY PRODUCTS	118
21.2 Learning resources	98	APPENDIX E DOCUMENT CHANGE HISTORY	121
CHAPTER 22 TECHNICAL SPECIFICATION.....	99		
22.1 System technical specification	100		
System power specification	100		
Environmental specification	100		
22.2 Master module technical specification.....	100		
LCD technical specification.....	100		
22.3 Remote module technical specification.....	100		
LCD technical specification.....	101		
22.4 Power supply module technical specification	101		

CHAPTER 1: IMPORTANT INFORMATION

Safety warnings



Warning: Product installation and operation

- This product must be installed and operated in accordance with the instructions provided. Failure to do so could result in personal injury, damage to your vessel and/or poor product performance.
- Raymarine highly recommends certified installation by a Raymarine approved installer. A certified installation qualifies for enhanced product warranty benefits. Register your warranty on the Raymarine website: www.raymarine.com/warranty



Warning: High voltage

This product contains high voltage. Do NOT remove covers or attempt to access internal components, unless specifically instructed in the documentation provided.



Warning: Switch off power supply

Ensure the vessel's power supply is switched OFF before starting to install this product. Do NOT connect or disconnect equipment with the power switched on, unless instructed in this document.



Warning: Potential ignition source

This product is NOT approved for use in hazardous/flammable atmospheres. Do NOT install in a hazardous/flammable atmosphere (such as in an engine room or near fuel tanks).

Digital Control System — Terms of Use

Important Terms of Use information related to the use of the YachtSense DCS-Series Digital Control System.

It's important that you read and fully understand the information provided in the following section.

RAYMARINE ("RAYMARINE" or "we"), is a company registered in Fareham, United Kingdom as Raymarine UK Limited, Cartwright Drive, Fareham, PO15 5RJ. We hereby wish to provide you with the requirements for using and installing Raymarine's range of Digital Switching module and control interface products, as updated and amended from time to time.

When installing a Digital Switching module and control interface, it is most important to follow best safe practices for the equipment type being controlled on the vessel and its operation and commissioning, to ensure it operates safely in the manner intended. Safety legislation requires that safety risks be assessed and addressed, such that the Digital Switching and equipment being operated or controlled will not put anyone in a position of potential harm or risk of injury.

It is the boat manufacturer's and/or equipment installer's responsibilities to ensure that a full risk assessment of the Digital Switching system design is carried-out, and that the system is rigorously checked during commissioning for correct and safe operation. It is strongly recommended that these actions are carried out by appropriately trained personnel and in accordance with *IEC 61508: Functional Safety of Electrical and Electronic Programmable Equipment*. Particular care should be taken to ensure that appropriate redundancy and localized safety cut-off facilities are built-in to the design of the vessel's systems. More information about IEC 61508 is available at: <http://www.iec.ch/functionalsafety>

A file containing technical information relating to the risk assessment of the equipment, and a commissioning conformity assessment should be produced and maintained by the boat manufacturer and/or equipment installer. This information should be made available for inspection by Raymarine upon reasonable request.

Any future modification or changes to the above equipment installation should be fully risk assessed, validated during commissioning and added to the conformity assessment; careful attention should be made to ensure the changes do not impact any other systems on the vessel.

Product warnings



Warning: Power supply door

The power supply module's door must remain securely closed whilst the system is powered on. If access to the power supply module's power connection compartment is required, switch off the power supply to the system before opening the door.



Warning: Fuse covers

Ensure fuse covers are always fitted.

Caution: Service and maintenance

This product contains no user serviceable components. Please refer all maintenance and repair to authorized Raymarine dealers. Unauthorized repair may affect your warranty.

Regulatory notices

Disclaimer

Raymarine does not warrant that this product is error-free or that it is compatible with products manufactured by any person or entity other than Raymarine.

Raymarine is not responsible for damages or injuries caused by your use or inability to use the product, by the interaction of the product with products manufactured by others, or by errors in information utilized by the product supplied by third parties.

Third-party hardware, such as converters, adapters, routers, switches, Access Points etc., provided by third parties, may be made available directly to you by other companies or individuals under separate terms and conditions, including separate fees and charges. Raymarine UK Ltd or its affiliates have not tested or screened the third-party hardware.

Raymarine has no control over, and is not responsible for:

- (a) the content and operation of such third-party hardware; or
- (b) the privacy or other practices of such third-party hardware.

The fact that Raymarine's documentation may make reference to such third-party hardware does not indicate any approval or endorsement of any such third-party hardware. Raymarine may reference such third-party hardware only as a convenience.

THIS INFORMATION IS MADE AVAILABLE BY Raymarine ON THE BASIS THAT YOU EXCLUDE TO THE FULLEST EXTENT LAWFULLY PERMITTED ALL LIABILITY WHATSOEVER FOR ANY LOSS OR DAMAGE HOWSOEVER ARISING OUT OF THE USE OF THIS INFORMATION OR RELIANCE UPON THIS INFORMATION.

Raymarine does not exclude Raymarine's liability (if any) to you for personal injury or death resulting from Raymarine UK Ltd negligence, for fraud or for any matter which it would be illegal to exclude or to attempt to exclude.

Water ingress

Water ingress disclaimer

Although the waterproof rating capacity of this product meets the stated water ingress protection standard (refer to the product's *Technical Specification*), water intrusion and subsequent equipment failure may occur if the product is subjected to high-pressure washing. Raymarine will not warrant products subjected to high-pressure washing.

Open source license agreements

This product is subject to certain open source license agreements. Copies of the license agreements can be found on the Raymarine website: <https://bit.ly/rym-docs>

Declaration of Conformity

Raymarine UK Limited declares that the following products are in compliance with the EMC Directive 2014/30/EU:

- **Master module** — E70592
- **Remote module** — E70593
- **Low power module** — E70594
- **High power module** — E70595
- **Reverse power module** — E70596
- **Signal module** — E70597

- **Power supply module** — E70604

The original Declaration of Conformity certificate may be viewed on the relevant product page at www.raymarine.com/manuals

Warranty registration

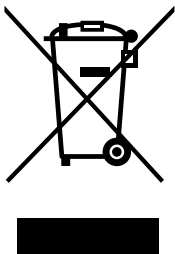
To register your Raymarine product ownership, please visit <https://bit.ly/rym-warranty> and register online.

It is important that you register your product to receive full warranty benefits. Your unit package includes a bar code label indicating the serial number of the unit. You will need this serial number when registering your product online. You should retain the label for future reference.

Product disposal

Dispose of this product in accordance with the WEEE Directive.

The Waste Electrical and Electronic Equipment (WEEE) Directive requires the recycling of waste electrical and electronic equipment which contains materials, components and substances that may be hazardous and present a risk to human health and the environment when WEEE is not handled correctly.



Equipment marked with the crossed-out wheeled bin symbol indicates that the equipment should not be disposed of in unsorted household waste. Local authorities in many regions have established collection schemes under which residents can dispose of waste electrical and electronic equipment at a recycling center or other collection point. For more information about suitable collection points for waste electrical and electronic equipment in your region, refer to the Raymarine website: <https://bit.ly/rym-recycling>

IMO and SOLAS

The equipment described within this document is intended for use on leisure marine boats and workboats NOT covered by International Maritime Organization (IMO) and Safety of Life at Sea (SOLAS) Carriage Regulations.

Technical accuracy

To the best of our knowledge, the information in this document was correct at the time it was produced. However, Raymarine cannot accept liability for any inaccuracies or omissions it may contain. In addition, our policy of continuous product improvement may change specifications without notice. As a result, Raymarine cannot accept liability for any differences between the product and this document. Please check the Raymarine website (<https://bit.ly/raymarine-home>) to ensure you have the most up-to-date version(s) of the documentation for your product.

Publication copyright

Copyright ©2024 Raymarine UK Ltd. All rights reserved. No parts of this material may be copied, translated, or transmitted (in any medium) without the prior written permission of Raymarine UK Ltd.

CHAPTER 2: DOCUMENT INFORMATION

CHAPTER CONTENTS

- [2.1 Product documentation — page 13](#)
- [2.2 Document illustrations — page 13](#)
- [2.3 Document conventions — page 13](#)

2.1 Product documentation

The following documentation is applicable to your product:

This and other Raymarine product documents are available to download in PDF format from www.raymarine.com/manuals.

Applicable Raymarine documents

- **81394** — *YachtSense DCS-Series Digital Control System Installation and Operation Instructions* (this document).
- **87407** — *YachtSense DCS-Series Digital Control System Mounting Template*.
- **87291** — *Digital Switching (Best practice guide for designers and installers)*.

Related Raymarine documents

- **81397** — *YachtSense Link-Series YachtSense Link Router Installation and Operation Instructions*.

Related Third-party documents

AS-33472-100 — *Molex® MX150 Application Guide* (Molex®-produced document containing installation and supplemental information pertaining to the Molex® MX150 sealed connector product line.).

This document is available to download at the following link:

https://tools.molex.com/pdm_docs/as/AS-33472-100-001.pdf

2.2 Document illustrations

Your product and if applicable, its user interface may differ slightly from that shown in the illustrations in this document, depending on product variant and date of manufacture.

All images are provided for illustration purposes only.

2.3 Document conventions

The following conventions are used throughout this document:

System conventions:

- **YachtSense Digital Control System** — Refers to a complete system consisting of one Master system and (optionally) multiple Remote systems.
- **Master system** — The term Master system is used to refer to the assembly which contains the Master module.
- **Remote system** — The term Remote system is used to refer to assemblies which contain a Remote module.

User interface conventions:

- **Highlight** — The term ‘highlight’ refers to using the *[Up]* and *[Down]* buttons to highlight an item.
- **Select** — The term ‘select’ refers to using the *[Up]* and *[Down]* buttons to highlight an item, and then pressing the *[OK]* button to confirm the selection.

CHAPTER 3: SOFTWARE DETAILS

CHAPTER CONTENTS

- [3.1 Applicable software version — page 15](#)
- [3.2 Software upgrades — page 15](#)
- [3.3 Check software version — page 15](#)

3.1 Applicable software version

This document has been updated to reflect YachtSense DCS-Series Digital Control System (DCS) software versions v4.0.426, v4.1.2, v5.0.11 and v5.1.14.

Note:

Software version v5.0.11 has been discontinued and v5.1.14 should be used instead.

For a list of the new features introduced in these software versions, refer to: [p.17 — New software features](#)

3.2 Software upgrades

Upgrading the software of YachtSense DCS-Series Digital Control System is not a user operation.

Software updates for YachtSense DCS-Series Digital Control System will NOT be made available on the Raymarine website.

To request a software upgrade for your system, please raise a support ticket here: <https://customer.flir.com>

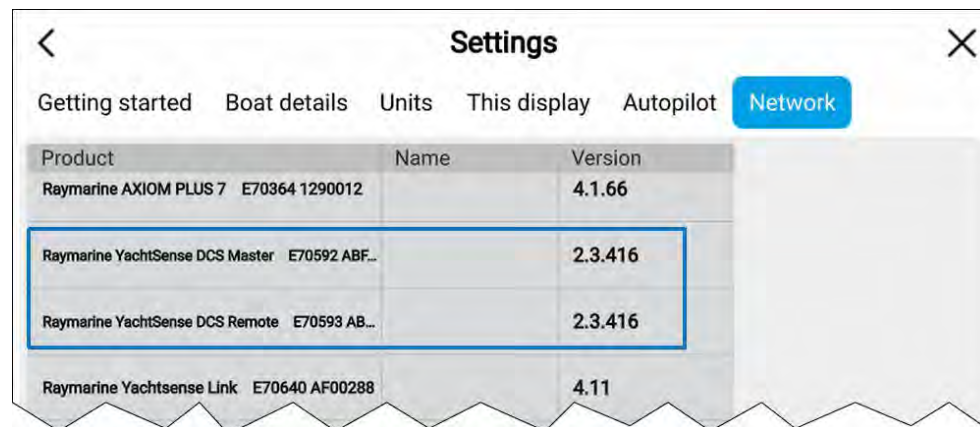
You will be assigned a digital switching representative who will be able to advise you.

3.3 Check software version

The software version of your YachtSense DCS-Series Digital Control System can be checked from a Raymarine chartplotter (MFD) or from the Master or Remote module's user interface.

From a Raymarine chartplotter (MFD)

The software version of Master and Remote modules can be checked from the *[Network]* settings tab: *[Homescreen > Settings > Network]* scroll to the Master or Remote module. The module's software version is displayed in the *[Version]* column.



Product	Name	Version
Raymarine AXIOM PLUS 7	E70364 1290012	4.1.66
Raymarine YachtSense DCS Master	E70592 ABF...	2.3.416
Raymarine YachtSense DCS Remote	E70593 AB...	2.3.416
Raymarine Yachtsense Link	E70640 AF00288	4.11

From a Master or Remote module

The software version can be checked from the *[About this device]* menu. Select *[OK]* to switch on the LCD then select *[OK]* again to open the menu, select *[About this device]* and scroll down to the *[Firmware]* version.

About this device

Serial	ABF3K1R
CAN	213
Firmware	2.3.416
Temp.	37.0°C

CHAPTER 4: NEW FEATURES

CHAPTER CONTENTS

- [4.1 New software features — page 17](#)
- [4.2 System hardware configuration — page 18](#)
- [4.3 Soft fuse rating — page 18](#)
- [4.4 YachtSense DCS-Series app overview — page 19](#)
- [4.5 Splitscreen app pages — page 19](#)

4.1 New software features

The following new features have been added to versions **v4.0.426**, **v4.1.2**, **v5.0.11** and **v5.1.14** of the YachtSense Digital Control System (DCS) software.

Note:

YachtSense DCS-Series Digital Control System software updates can only be performed by Raymarine, or an authorized Raymarine dealer. For more information, refer to: [3.2 Software upgrades](#)

This list includes *new features* only. It does NOT include software maintenance items, such as bug fixes or performance improvements.

Software v5.0.11 (03–2024) / v5.1.14 (06–2024)

Note:

Software version v5.0.11 has been discontinued and v5.1.14 should be used instead.

New feature	More information
Increased the maximum number of channels to 400.	p.18 — System hardware configuration
Soft fuse ratings are now locked by default and cannot be changed by users. Only an authorized dealer can now change soft fuse ratings.	p.18 — Soft fuse rating
Added support for splitscreen app pages on the chartplotter (MFD).	p.19 — Splitscreen pages
Removed the chartplotter (MFD) limitation of the number of simultaneous chartplotters (MFDs) that can display the YachtSense DCS-Series app.	p.19 — YachtSense app overview

New feature	More information
Added watchdog and error signals to Current, Voltage and Resistance input channels.	N/A
Updated Cloud connector software.	N/A

Software v4.1.2 (08–2023)

New feature	More information
“Watchdog” requirement for momentary switches — Implemented a mandatory requirement to include a "Watchdog" control in a boat's digital control system design for all momentary switches, to ensure that, in the event of lock-up or crash on the switch device (whether hardware or software switch), the watchdog signal will cause the channel output to switch off.	p.112 — Best practices

Software v4.0.426 (07–2023)

New feature	More information
Updated Cloud connector software.	N/A
Automatic update of Remote modules — The software in all Remote modules in a YachtSense DCS-Series Digital Control System can now be updated via the Master module; it is no longer necessary to update each Remote module individually.	N/A

Note:

The ability to upgrade Remote modules automatically will only happen for future software upgrades released **after** v4.0.426. Once the Master has been updated to software v4.0.426, all **subsequent** software upgrades to the Master module (after the Master is restarted) will automatically be deployed to any Remote modules that are part of the same YachtSense DCS-Series Digital Control System.

4.2 System hardware configuration

As a minimum the YachtSense DCS-Series Digital Control System must consist of a Master system that includes a Master module and a Power supply module.

- The Master module must contain the relevant configuration files for the system.
- Modules must be assembled in configuration order.
- Up to 6 input and output modules can be connected to a Master module.
- The YachtSense DCS-Series Digital Control System can be expanded to include Remote systems, each Remote system must include as a minimum a Remote module and a Power supply module, but can also include up to 6 input and output modules per assembly.
- The Master system and Remote systems are subject to a maximum current draw of 100A per assembly.
- The entire YachtSense DCS-Series Digital Control System including the Master system and all Remote systems is subject to a maximum of 400 channels.
- The Master system and Remote systems communicate using a SeaTalk NG network.
- The YachtSense DCS-Series Digital Control System can be controlled by compatible Raymarine chartplotters also known as Multifunction displays (MFDs) connected via both Ethernet (RayNet) and SeaTalk NG.
- The YachtSense DCS-Series Digital Control System can be controlled by a mobile device running Raymarine app version 2.0 or later.
- The YachtSense DCS-Series Digital Control System must be configured to enable display of data pages on the Raymarine app.

4.3 Soft fuse rating

Each output channel is configured with a soft (software) fuse rating.

Note:

- For safety reasons, channel soft fuse ratings are locked during configuration and cannot be adjusted by users.
- Soft fuse ratings can only be adjusted by Raymarine authorized engineers.
- Soft fuses tripping suggests an issue with the device connected to that channel.

You can view the soft fuse rating of a channel from the output channel page; Press the *[OK]* button and select *[Fuse rating]* from the *[Options]* menu.

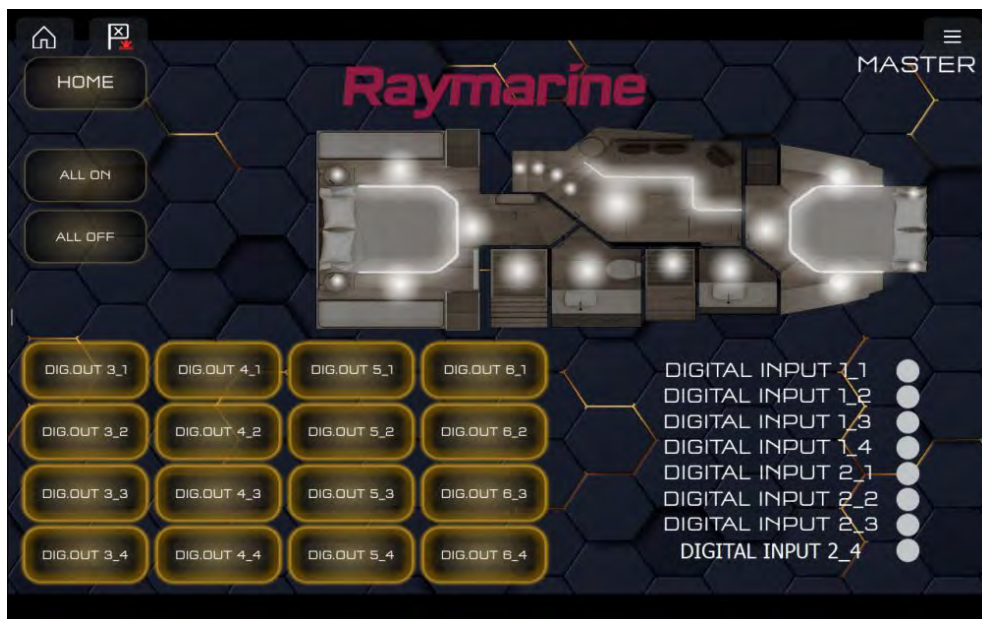
Fuse rating

13.2A

4.4 YachtSense DCS-Series app overview

Control and monitoring of YachtSense DCS-Series Digital Control Systems is achieved using the YachtSense DCS-Series app.

Example YachtSense DCS-Series app page



The *[YachtSense]* app is available on Axiom-Series and Axiom 2-Series chartplotters (MFDs) when a YachtSense Link-Series Digital Control System is detected on the Ethernet network. If the system is not detected then a “not detected” message will be displayed when the app is opened.

The YachtSense DCS-Series app will typically be added to the Homescreen during configuration. Additional app pages with different layouts can be added in the same way as any other Homescreen app page.

The pages available in the YachtSense DCS-Series app are bespoke for each individual installation/configuration.

The pages will include navigation buttons so that all pages can be viewed.

Tripped channels can be viewed from the app menu: *[Menu > Tripped channels]*.

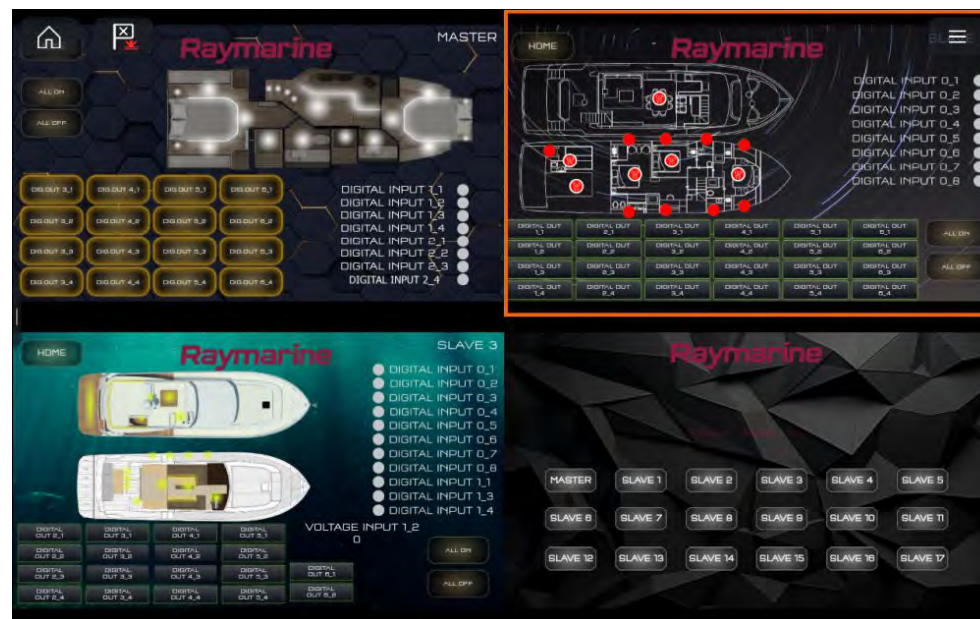
Data overlays can be added to the app from the *[Settings]* menu: *[Menu > Settings > Edit data overlays]*.

New features

4.5 Splitscreen app pages

The YachtSense DCS-Series app can be displayed in Splitscreen and Fullscreen app pages. The YachtSense DCS-Series Digital Control System must be configured to allow use of splitscreen pages.

Example YachtSense quad app page



Splitscreen app pages enable multiple YachtSense DCS-Series Digital Control System pages to be viewed at the same time on the same screen.

Splitscreen app pages also allows YachtSense DCS-Series Digital Control System pages to be viewed at the same time as other MFD apps, such as the Chart or Radar app etc.

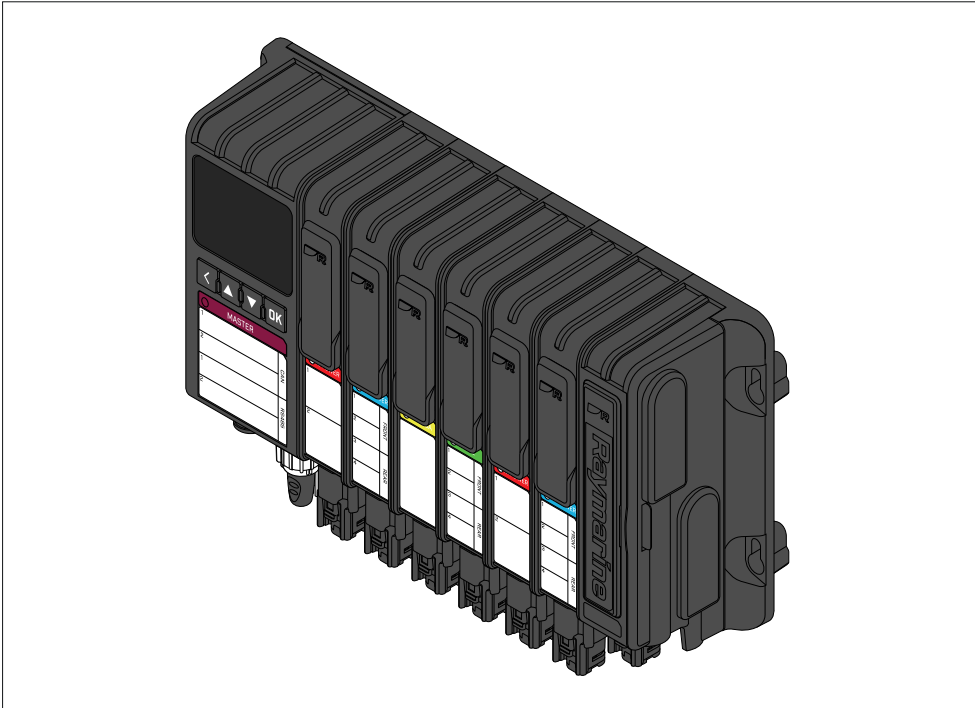
CHAPTER 5: PRODUCT AND SYSTEM OVERVIEW

CHAPTER CONTENTS

- 5.1 Product overview — page 21
- 5.2 Available modules — page 22
- 5.3 System hardware configuration — page 22
- 5.4 Configuration required — page 23
- 5.5 Raymarine app configuration required — page 23
- 5.6 Maximum current / load — page 23

5.1 Product overview

The YachtSense DCS-Series Digital Control System provides digital monitoring and control of vessel electrical systems.



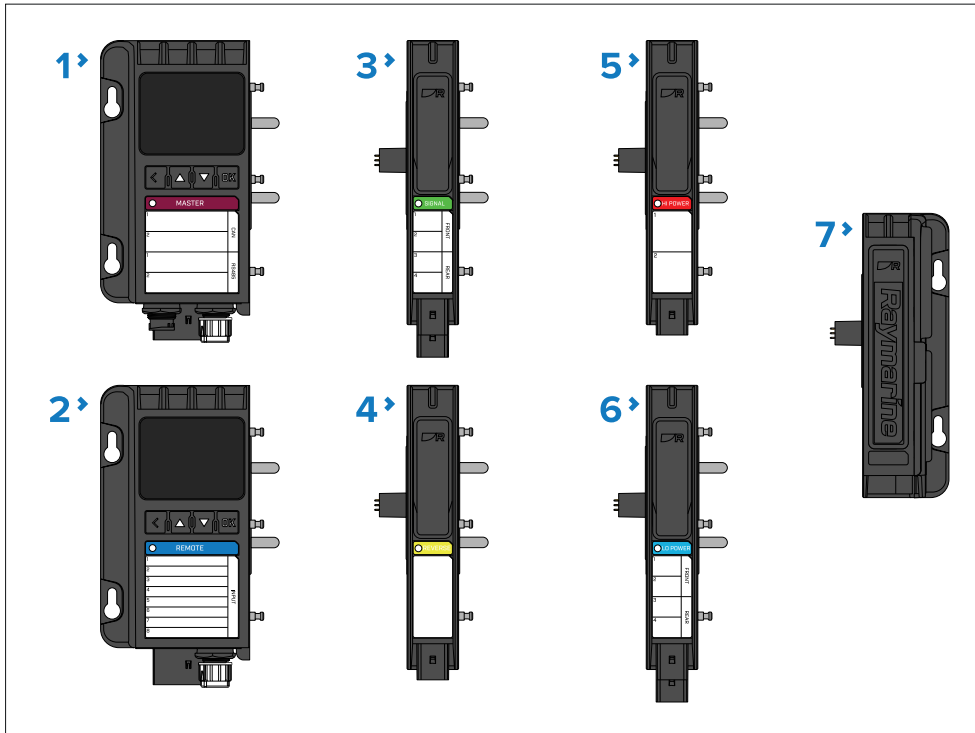
Features:

- Control and monitor supported J1939 and RS-485 OEM smart devices such as air conditioning units and chillers.
- Control devices such as wipers and dimmable LED lighting etc.
- Up to 100A current draw for the Master system and for each Remote system.
- Up to 400 channels per YachtSense DCS-Series Digital Control System.
- Control and monitoring of high power devices (up to 20A).
- Control and monitoring of lower power devices (up to 10A).
- Control reversible motors (up to 20A).
- Control of digital and analog output signals (up to 200mA).

- Monitoring of digital and analog input signals.
- Monitoring of supported SeaTalk NG/NMEA 2000 sensors.
- Remote control via networked Raymarine chartplotters (MFDs) using the YachtSense DCS-Series app.
- Remote control via the Raymarine app when a YachtSense Link-Series YachtSense Link router is connected (Requires Premium subscription to the Premium Raymarine app).
- Dedicated LCD screen and button controls included on Master and Remote modules for manual override, device diagnostics and channel status.
- Thermal circuit protection.
- Hard and soft fused modules.
- Manual module by-pass.
- Over voltage power supply protection up to 32 V dc.

5.2 Available modules

The following YachtSense DCS-Series Digital Control System modules are available:



1. Master module (E70592)

- The Master module is required for all installation scenarios and is supplied with a Power supply module (E70604).
- The Master module can be controlled using a networked chartplotter (MFD) or the Raymarine app.
- The Master module is connected to Remote modules via connection to a SeaTalk NG network.
- The Master module includes 2 x J1939 connections, 2 x RS-485 connections.

2. Remote module (E70593)

- Remote modules are supplied with a Power supply module (E70604).
- Remote modules include 8 x digital or analog input / output channels.

- Remote modules are connected to a Master module via connection to a SeaTalk NG network.

3. Signal module (E70597)

- The Signal module provides 4 x digital or analog input/output channels.

4. Reverse power module (E70596)

- The Reverse power module provides 1 x 20A bidirectional channel.

5. High power module (E70595)

- The High power module provides 2 x 20A output channels.

6. Low power module (E70594)

- The Low power module provides 4 x 10A output channels.

7. Power supply module (E70604)

- The Power supply module is supplied when purchasing a Master module or Remote module.
- The Power supply module is connected on the end of the Master system and Remote system assemblies.
- The Power supply module connects to the vessel's power supply and provides power to the assembly.

5.3 System hardware configuration

As a minimum the YachtSense DCS-Series Digital Control System must consist of a Master system that includes a Master module and a Power supply module.

- The Master module must contain the relevant configuration files for the system.
- Modules must be assembled in configuration order.
- Up to 6 input and output modules can be connected to a Master module.
- The YachtSense DCS-Series Digital Control System can be expanded to include Remote systems, each Remote system must include as a minimum a Remote module and a Power supply module, but can also include up to 6 input and output modules per assembly.
- The Master system and Remote systems are subject to a maximum current draw of 100A per assembly.

- The entire YachtSense DCS-Series Digital Control System including the Master system and all Remote systems is subject to a maximum of 400 channels.
- The Master system and Remote systems communicate using a SeaTalk NG network.
- The YachtSense DCS-Series Digital Control System can be controlled by compatible Raymarine chartplotters also known as Multifunction displays (MFDs) connected via both Ethernet (RayNet) and SeaTalk NG.
- The YachtSense DCS-Series Digital Control System can be controlled by a mobile device running Raymarine app version 2.0 or later.
- The YachtSense DCS-Series Digital Control System must be configured to enable display of data pages on the Raymarine app.

5.4 Configuration required

The Master module must be configured for your vessel before it can be used.

The configuration will map the system's channels to your vessel's wiring system and also provide the digital switching pages for Raymarine MFDs and the Raymarine app.

Note:

Configuration is not covered by this document and must only be performed by an approved Raymarine dealer.

5.5 Raymarine app configuration required

If your system was installed prior to release of the Raymarine app version 2.0 then extra configuration and software upgrade will be required to enable Remote control via the Raymarine app.

Contact the system installer or organization responsible for your current configuration for advice.

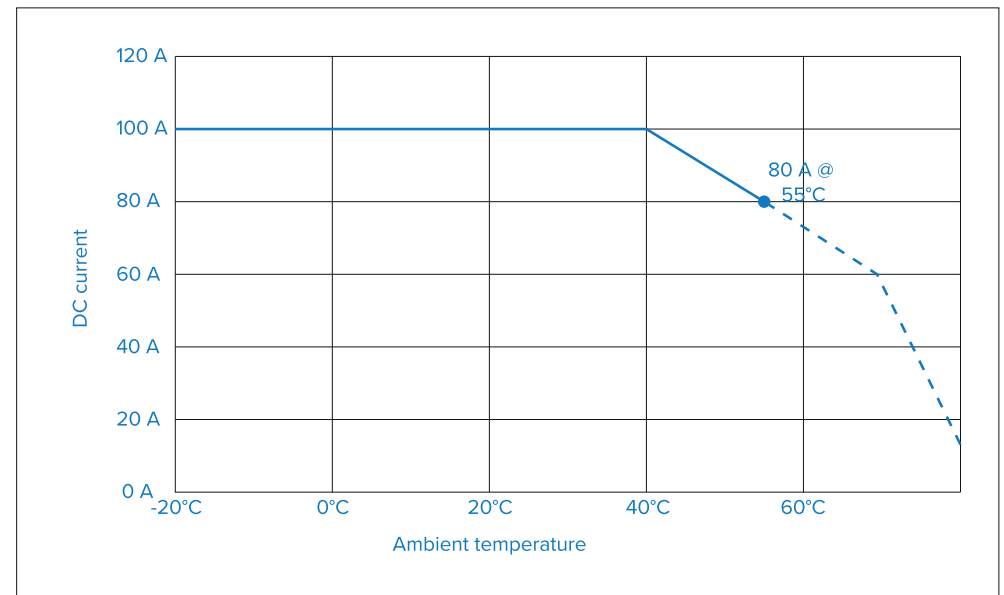
5.6 Maximum current / load

The YachtSense DCS-Series Digital Control System includes thermal protection that will reduce the maximum current available based on the systems's ambient temperature.

Note:

The graph below shows the maximum current based on ambient temperature, when the system is in continuous use. For shorter duty cycles there will be less of a reduction in available current at higher temperatures.

Maximum current (100% duty cycle)



Important:

- To protect your vessel and connected equipment, modules will shut down if their internal temperature exceeds 85°C.
- If your system will exceed these limits please consult Raymarine technical support for assistance.

CHAPTER 6: YACHTSENSE ECOSYSTEM

CHAPTER CONTENTS

- [6.1 YachtSense ecosystem — page 25](#)
- [6.2 On-boat features — page 25](#)
- [6.3 Off-boat premium features — page 27](#)
- [6.4 How to obtain the Raymarine app — page 27](#)
- [6.5 Removing a boat system — page 31](#)
- [6.6 Removing a router — page 31](#)
- [6.7 YachtSense Link-Series YachtSense Link router account transfer / ownership transfer — page 31](#)

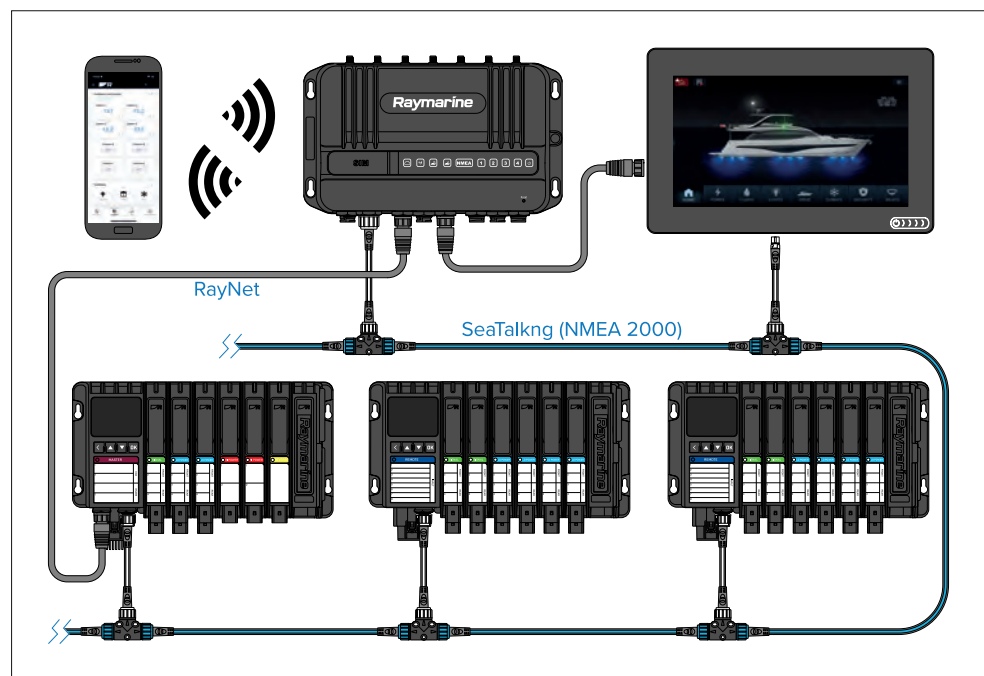
6.1 YachtSense ecosystem

YachtSense is Raymarine's digital vessel monitoring and control solution. The YachtSense ecosystem enables on and off-boat monitoring and control of connected vessel systems and data.

On-boat monitoring and control can be achieved using Raymarine Axiom-Series and Axiom 2-Series chartplotters (MFDs) or the Raymarine app installed on a mobile phone or tablet.

Off-boat (remote) monitoring and control can be achieved using the Raymarine app running on a compatible mobile phone or tablet. Off-boat monitoring and control also requires:

- A Premium subscription to the Raymarine app.
- Your system to have an active Internet connection.



The full YachtSense ecosystem consists of:

- YachtSense Link-Series YachtSense Link router
- YachtSense DCS-Series Digital Control System, running Release 2 software (or later)
- Raymarine app.

YachtSense ecosystem

- Premium app subscription (required for off-boat connectivity).
- Axiom-Series/Axiom 2-Series chartplotter (MFD).

Note:

- The YachtSense Link-Series YachtSense Link router **must** be connected to the same SeaTalk NG backbone as the YachtSense DCS-Series Digital Control System, and any chartplotters (MFDs).
- The router **must** also have a RayNet connection to the YachtSense DCS-Series Digital Control System's Master module, and any chartplotters (MFDs).

6.2 On-boat features

The YachtSense ecosystem provides a number of “on-boat” features that can be used whilst onboard your vessel.

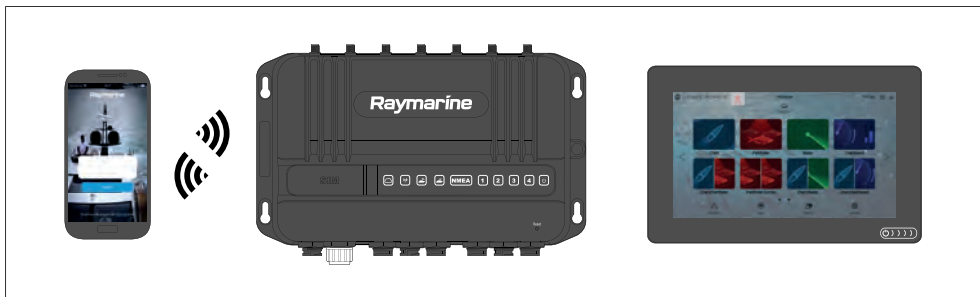
Raymarine app connected directly to a chartplotter (MFD)



The following features are available when using the Raymarine app on a mobile device that is connected directly to an Axiom-Series/Axiom 2-Series chartplotter's (MFD's) Wi-Fi Access Point:

- Stream and control the display.
- Download and transfer LightHouse charts to a memory card, or the chartplotter's (MFD's) internal storage.
- Transfer files such as backups of waypoints and settings, images or videos between your mobile device and the chartplotter (MFD).
- View NMEA 2000 data.

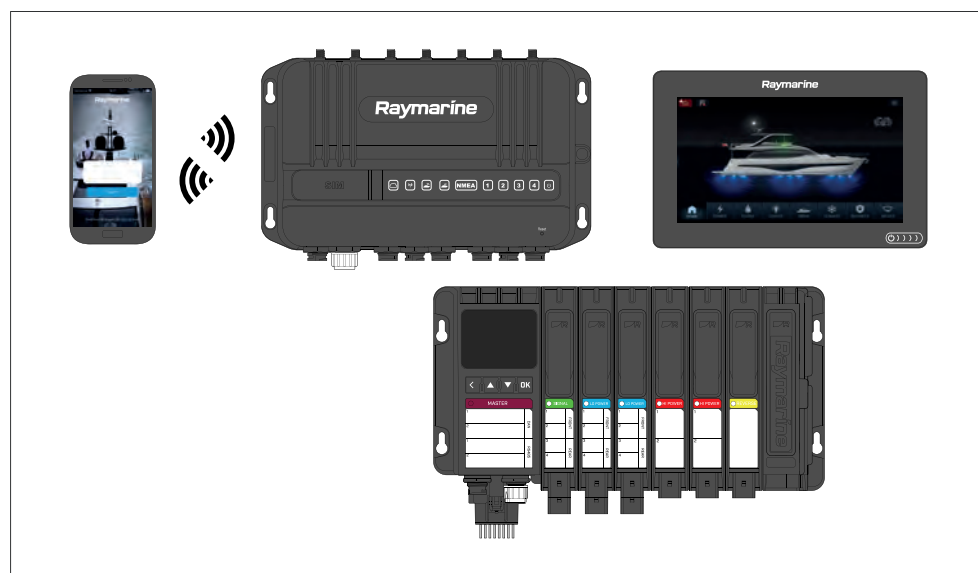
Raymarine app connected to a YachtSense Link-Series YachtSense Link router



The following features are available when using the Raymarine app on a mobile device that is connected to the YachtSense Link-Series YachtSense Link router's Wi-Fi Access Point:

- Stream and control any chartplotter (MFD) on the network.
- Download and transfer LightHouse charts to a memory card or the chartplotter's (MFD's) internal storage.
- Transfer files such as backups of waypoints and settings, images or videos between your mobile device and the chartplotter (MFD).
- View NMEA 2000 data.
- Voltage monitoring of devices connected to the router's input channels. The router's web interface can also be used to monitor input channels.
- Control of devices connected to the router's output channels. The router's web interface can also be used to control output channels.

Raymarine app connected to a YachtSense Link-Series YachtSense Link router with a YachtSense DCS-Series Digital Control System



The following features are available when using the Raymarine app on a mobile device that is connected to the YachtSense Link-Series YachtSense Link router's Wi-Fi Access Point on systems that include a YachtSense DCS-Series Digital Control System:

- Stream and control any chartplotter (MFD) on the network.
- Download and transfer LightHouse charts to a memory card or to the chartplotter's (MFD's) internal storage.
- Transfer files such as waypoint and settings backups, images or videos between your mobile device and the chartplotter (MFD).
- View NMEA 2000 data. (The range of data that can be viewed is dependent on the specific configuration and design of your YachtSense ecosystem and the associated Raymarine app.)
- Voltage monitoring of devices connected to the router's input channels. The router's web interface can also be used to monitor input channels.
- Control of devices connected to the router's output channels. The router's web interface can also be used to control output channels.
- Monitoring and control of vessel systems and devices connected to the YachtSense DCS-Series Digital Control System input and output channels

(input and output channels can also be monitored and controlled using a chartplotter (MFD), or directly from the Master or Remote module).

Note:

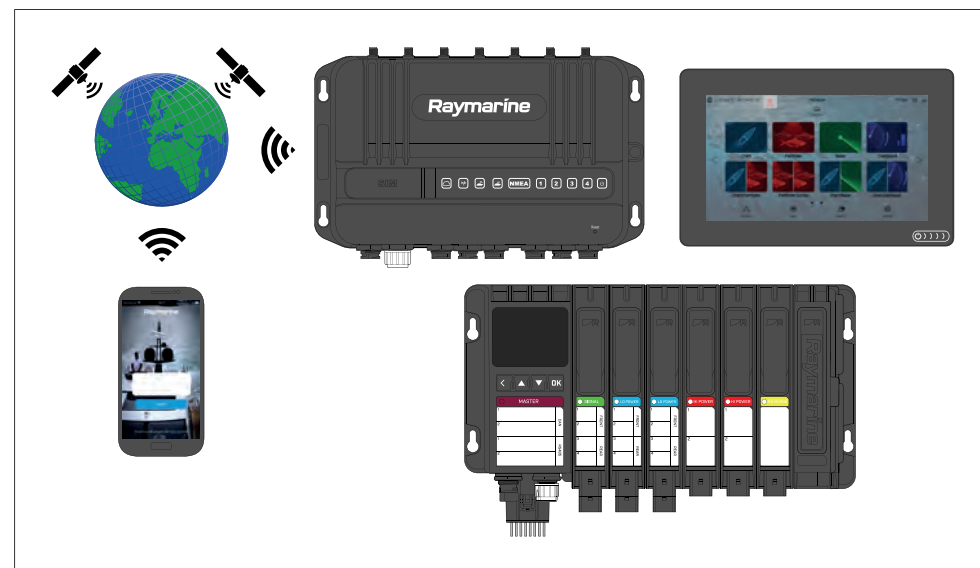
The YachtSense DCS-Series Digital Control System requires a specific configuration and app page design for the Raymarine app. Contact an authorized Raymarine dealer or the organization that configured your system for advice.

6.3 Off-boat premium features

The YachtSense ecosystem provides a number of premium “off-boat” features, which can be used whilst away from your vessel.

Note:

- Off-boat features require a YachtSense Link-Series YachtSense Link router and a valid premium subscription to the Raymarine app.
- Off-boat features require the system to have an active Internet connection.
- YachtSense DCS-Series Digital Control System requires a specific configuration and app page design for the Raymarine app. App software Release 2 (or later) is required.



Whilst off-boat you can:

- Monitor your vessel’s location using the app’s geofence features.
- View NMEA 2000 data. (The range of data that can be viewed is dependent on the specific configuration and design of your YachtSense ecosystem and the associated Raymarine app.)
- Voltage monitoring of devices connected to the router’s input channels.
- Control of devices connected to the router’s output channels.
- Monitoring and control of vessel systems and devices connected to the YachtSense DCS-Series Digital Control System input and output channels.

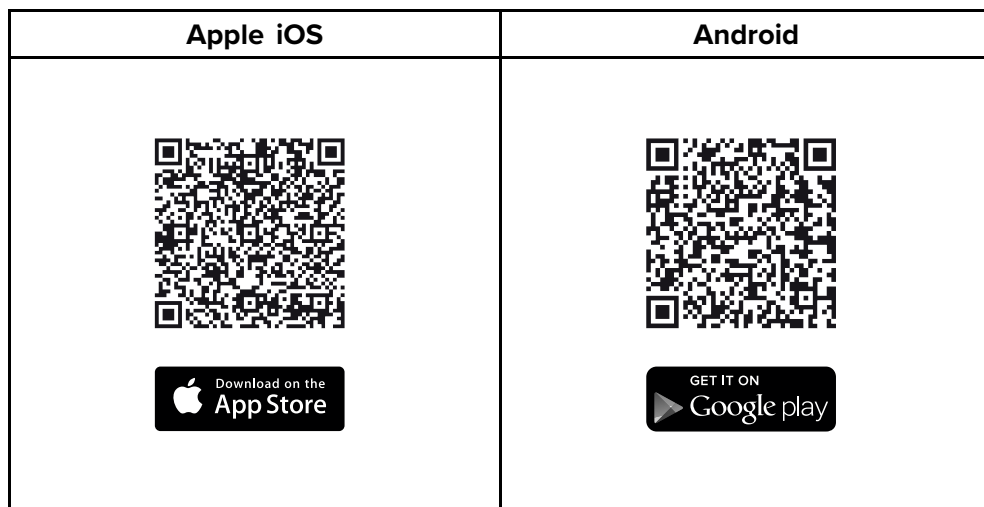
Note:

If the router is in *[Low power mode]* only a Cellular connection can be used to wake the router remotely.

6.4 How to obtain the Raymarine app

The Raymarine app is available for Android and Apple iOS devices, and can be installed on your mobile device from the relevant app store.

To obtain the Raymarine app from the relevant app store for your device, point your mobile device’s camera at one of the following QR codes:



Once you've installed the app, you will need to create a Raymarine account to log in to the app.

How to connect guide

If the app is not currently connected to a boat system, the *[How to connect]* option is available in the app to guide you through setting up a boat system and connecting to your chartplotter (MFD) or YachtSense Link-Series YachtSense Link router.

Connect directly to a chartplotter (MFD)

You must be connected directly to the chartplotter's (MFD's) Wi-Fi connection.

If your display does not have an Internet connection, you must log in to the Raymarine app first before switching network.

If your display does not have a connection to the Internet, when you connect to it, your mobile device may automatically revert to its previous network. If you try to connect again a notification is displayed. Select *[Connect]* or *[Connect anyway]*.

When you are connected to a chartplotter (MFD), you can:

- [Start display mirroring](#)
- [View data](#)
- [Transfer files](#)
- [Transfer LightHouse charts](#)

When connecting directly to a chartplotter (MFD) it must be configured to allow Wi-Fi sharing: *[Homescreen > Settings > This display > Wi-Fi Sharing]*.

Display mirroring (view and control)

You can view and control your chartplotter (MFD) from the Raymarine app.

Chartplotters (MFDs) will be available under *[Display mirroring]* in the *[Control]* tab when connected to the same Wi-Fi network as your mobile device. Select a chartplotter (MFD) to initiate display mirroring.

Display mirroring is always available when you are connected to the Router's Wi-Fi connection or to a chartplotter's (MFD's) Wi-Fi connection.

Transferring LightHouse charts

The Raymarine app can be used to redeem LightHouse chart vouchers and to download and transfer the charts directly to your chartplotter (MFD).

Note:

To download LightHouse charts to a memory card you must first purchase a pre-formatted LightHouse charts MicroSD card (part number: R70795 or R70838), and insert it into your chartplotter (MFD) before starting the transfer process.

1. Select the *[Management]* icon located at the bottom of the screen.
2. Select *[Charts]*.

If you have already purchased charts, they will be listed in the *[My charts]* menu. Otherwise, the *[Chart catalog]* is displayed where you can search for charts and redeem voucher codes.

3. Select the chart that you want to download, using the *[My charts]* menu.
4. Follow the onscreen instructions to download your charts.

During the download process, you will be able to group chart regions, Add [Streets & POI] and [Aerial photo] areas, and select a storage location.

Note:

Chart downloads have large file sizes and may take some time to download and transfer.

Chartplotter file transfer

File transfer between chartplotter (MFD) and your mobile device is available using the *[Chartplotter file transfer]* option in the *[Management]* tab.

If this is the first time that the file transfer has been attempted, you will need to confirm access from the chartplotter (MFD).

You can select a chartplotter (MFD) and then browse internal and external storage for either a file to be copied to your mobile device, or a location to upload a file from your mobile device.

Selecting a file from your chartplotter (MFD) provides the following related options:

- View the file
- Copy the file.
- Share the file.

You can also upload a file from your mobile device to your chartplotter (MFD) by selecting *[Upload a file here]*.

Note:

You cannot use the Raymarine app to delete files that are stored on your chartplotter (MFD).

Connect to your YachtSense Link-Series YachtSense Link router

After setting up your YachtSense Link-Series YachtSense Link router and configuring its wireless networks (Wi-Fi and/or cellular (mobile) connections) you can use the Raymarine app to create a boat system and register your router to your Raymarine account. Registering allows off boat monitoring and control of compatible systems connected to your router.

Note:

- You cannot register a router that is already registered to a different account.
- If your mobile device is already connected to a boat system it must be disconnected before another boat system can be added.
- The premium subscription features can only be used on 2 boat systems at a time.

The registration process includes:

1. Connecting your mobile device to your YachtSense Link-Series YachtSense Link router's Wi-Fi connection.
2. Creating a boat system by entering your boat's name.
3. Scanning the router's QR code to register the router to your account. The QR code can be found on the label on the side of your router or on the Info page of the router's web interface.

When connected to the router you can:

- [Create geofences](#)
- [View data](#)
- [Control digital switching input and output channels](#)
- [Start display mirroring](#)
- [Transfer files](#)
- [Transfer LightHouse charts](#)

Geofencing

A Geofence is a security feature that alerts you if your boat leaves or enters a chosen area.

When a geofence alert is triggered a notification will be sent to the cellular telephone number specified in the *[Boat alerts]* settings.

Geofencing is available with a premium Raymarine app subscription.

Geofence

When your boat system includes a YachtSense Link-Series YachtSense Link router you can set up geofences.

1. Select *[+ Add new geofence]* from the Geofence tab.
2. Select *[Radius]*.

A geofence circle is placed over your vessel.

3. Increase or decrease the geofence radius by selecting the circle and dragging towards or away from your vessel's location.

*Alternatively you can use the *[+]* (plus) and *[-]* (minus) buttons to fine tune the circle radius.*

4. Select the *[Name]* field to customize the geofence name.
5. Enable the *[Boat leaves location]* and/or *[Boat enters location]* toggle switches as appropriate for your needs.
6. If desired, change the color of the geofence by selecting the colored circle in the color area.
7. Select *[Create]* from the top of the screen.

Multiple geofences can be created. The geofence circle radius can be adjusted or can be disarmed by selecting the relevant geofence details located at the bottom of the screen.

Temporary mooring

You can also create temporary mooring geofences for short stay stops.

Temporary mooring geofences are only triggered when your vessel exits a geofence circle, and are automatically deleted when it is disarmed.

You can only have one temporary mooring geofence active at any one time. Creating a second temporary mooring geofence will replace the first geofence.

Data view and channel control

Depending on your system's configuration, you can use the app to view live data and control certain channels.

- A data page can be created in the app to view compatible data which is available on your network.

Note: When the device running the Raymarine app (e.g. smartphone / tablet) is connected directly to a chartplotter (MFD), the data items available will be limited. Connecting to a YachtSense Link-Series YachtSense Link router will provide the maximum available data items.

- When connected to a boat system that includes a YachtSense Link-Series YachtSense Link router you can view the status of the input channels and switch the output channels on and off from the *[Control]* tab. If the channel has been disabled in the router's web interface, it will not be shown in the app.
- When your boat system includes both a YachtSense Link-Series YachtSense Link router and a YachtSense DCS-Series Digital Control System, the status and control of the input and output channels is available from the *[Control]* tab.

- When you have an active premium Raymarine app subscription and your boat system includes both a YachtSense Link-Series YachtSense Link router and a YachtSense DCS-Series Digital Control System, the status and control of the input and output channels can be accessed remotely when you are away from your boat.

Note:

In order for YachtSense DCS-Series Digital Control System controls to be available on the app, your YachtSense DCS-Series Digital Control System configuration must include the necessary app page layouts. If required, please contact your YachtSense DCS-Series Digital Control System installer, who will need to create an updated configuration for your system.

Viewing NMEA 2000 data

To create a data page for NMEA 2000 data, follow the steps below.

1. Select *[Add data]* from the Data tab.
2. Select a data category and then select the relevant data item.
3. To add more data items, select the *[+]* (plus) icon and repeat steps 2 and 3.
4. When finished, select *[Done]*.

To delete a data item, press and hold and then drag it to the *trash bin* icon at the bottom of the screen.

You can add or change data items at any time by selecting the *[Edit]* icon, located at the top of the data page.

User access management

You can log out / in to your account, edit your user account details or update your premium plan subscription by selecting the profile icon on the right side of the side menu.

Boat alerts

Alerts raised by your system can be viewed in the app by selecting *[Boat alerts]* from the side menu.

You can also enter a cellular telephone number to automatically receive boat alerts on your mobile device remotely.

The cellular telephone number can be entered by selecting the settings icon from the *[Boat alerts]* menu.

Boat systems

You can create up to 10 boat systems on the Raymarine app. With an active premium Raymarine app subscription up to 2 boat systems can be configured to receive premium features.

6.5 Removing a boat system

A boat system can be removed from the Raymarine app following the steps below:

1. Select the menu icon located on the left of the screen to open the side menu.
2. Select and hold on the boat system of the boat you want to remove.

If you have more than one boat set up, you will first need to select the relevant boat system from the dropdown list.

3. Select *[Delete]* and then confirm the deletion.
4. Select *[Delete]* again to confirm.
5. Select *[OK]*.
6. You must also unsync the chartplotter (MFD) from the Raymarine app by accessing the *[My data]* menu on your chartplotter (MFD) and selecting *[Mobile sync]* and *[Cancel Raymarine app sync]*.

The boat system and all of its devices are now removed from your app. If the deleted boat system included a YachtSense Link-Series YachtSense Link router then the router will also be deregistered (offboarded) from your account and can now be registered (onboarded) again to the same account, or to a different account.

Note:

The router must be power cycled before it can be registered (onboarded) again.

6.6 Removing a router

You can remove (deregister) a YachtSense Link-Series YachtSense Link router from a boat system using the Raymarine app.

1. Select the menu icon located on the left of the screen to open the side menu.

2. If you have more than one boat system, select the relevant boat system that the router is connected to.
3. Select the *[YachtSense Link]* router.
4. Select *[Remove]*.
5. Confirm by selecting *[Remove]*.
6. You must also unsync the chartplotter (MFD) from the Raymarine app by accessing the *[My data]* menu on your chartplotter (MFD) and selecting *[Mobile sync]* and *[Cancel Raymarine app sync]*.

The router is now removed from the boat system and deregistered (offboarded) from your account. The router can now be registered (onboarded) again to the same account, or to a different account.

Note:

The router must be power cycled before it can be registered (onboarded) again.

6.7 YachtSense Link-Series YachtSense Link router account transfer / ownership transfer

YachtSense Link-Series YachtSense Link routers can only be registered to one account at a time.

To register the router to a different account it must first be deregistered from the existing account.

Attempts to register a router that is already registered will fail.

If you receive a message when trying to register your router that states it is already registered to another account, you will need to contact the previous owner and ask them to deregister the router from their account.

If you cannot contact the previous owner, Raymarine technical support may be able to contact them on your behalf.

In most cases if the previous owner cannot be reached or is unwilling to deregister the router from their account, it will NOT be possible for you to register the router.

If you purchased the router new, via either a third party reseller or as a refurbished unit, and you receive a message that your router is already registered to an account, you should return it to the seller for a refund or exchange and let them know that it is already registered to another account.

CHAPTER 7: PARTS SUPPLIED

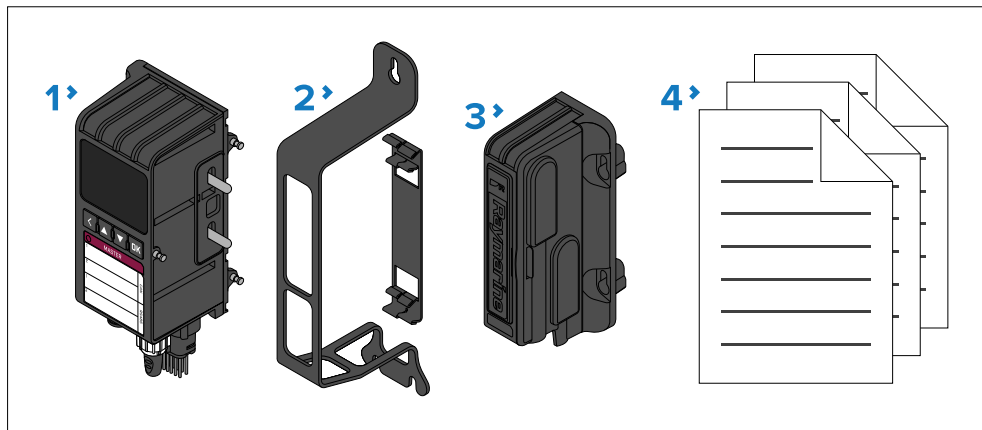
CHAPTER CONTENTS

- 7.1 Master and Remote module parts supplied — page 33
- 7.2 Input and output module parts supplied — page 33
- 7.3 Required additional items — page 34

7.1 Master and Remote module parts supplied

The following parts are supplied in the box.

Unpack your product carefully to prevent damage or loss of parts. Check the box contents against the list below. Retain the packaging and documentation for future reference.

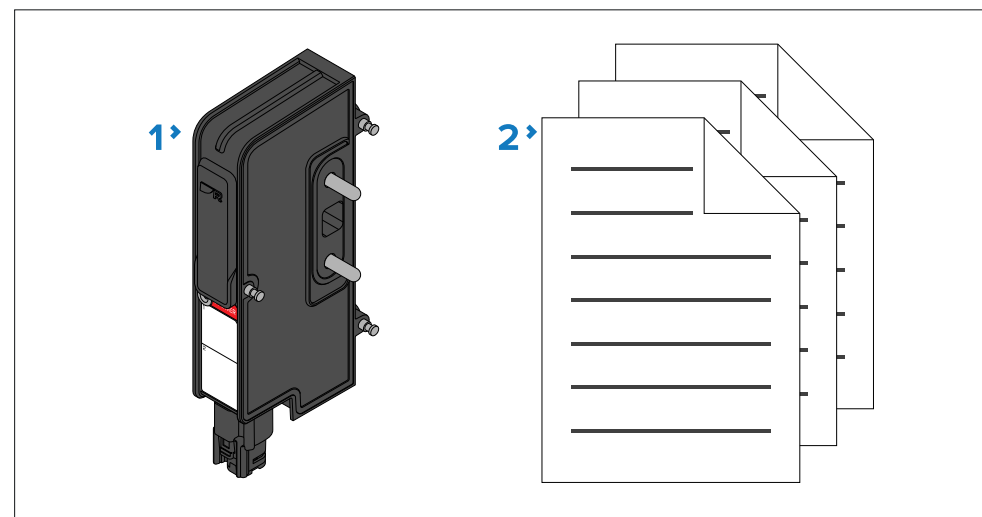


1. Master / Remote module (Supplied fitted with SeaTalk NG blanking plug and Molex® connector)
2. Mounting bracket and rear shim (Supplied for mounting assemblies with 4 or more input / output modules)
3. Power supply module
4. Documentation pack

7.2 Input and output module parts supplied

The following parts are supplied when purchasing input and output modules:

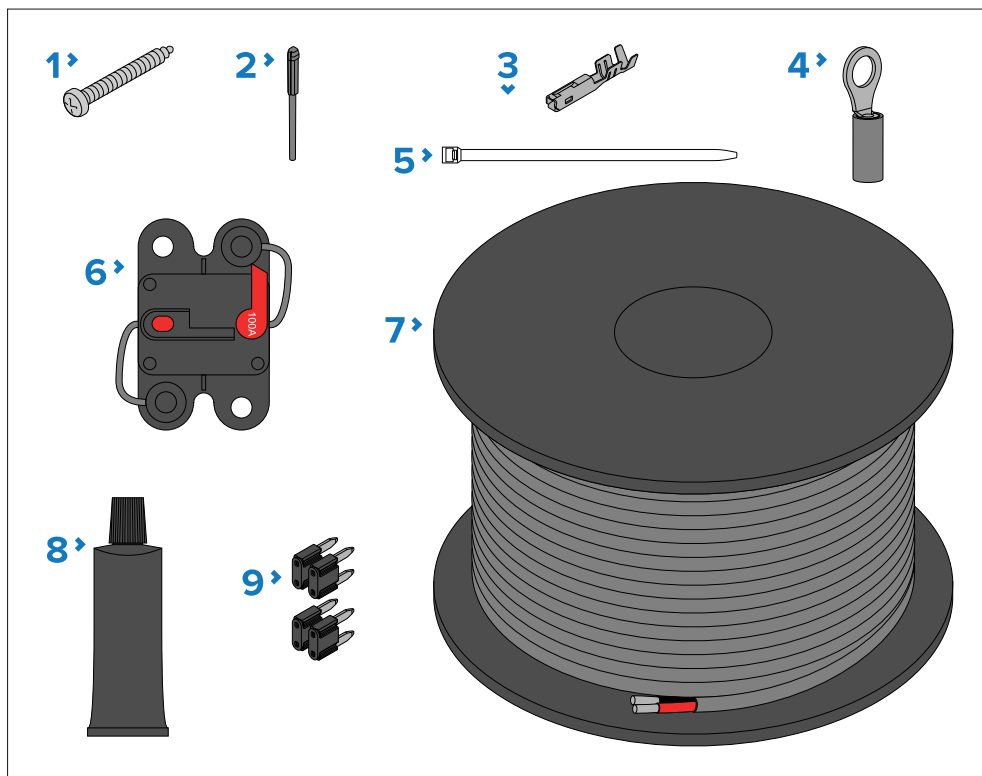
Unpack your product carefully to prevent damage or loss of parts. Check the box contents against the list below. Retain the packaging and documentation for future reference.



1. Input or output modules (All modules are Supplied fitted with Raymarine connector(s) Output modules are supplied with fuses fitted).
2. Documentation pack

7.3 Required additional items

The following additional items are required when installing a YachtSense DCS-Series Digital Control System.



4. 2 x M6 1/4" ring crimps.
5. 2 x cable ties (up to 5 mm x 1 mm).
6. Dedicated thermal breaker for each Master and Remote system.
7. 2 core power cable (rated appropriately for the intended installation).
8. Silicone or copper grease.
9. Appropriately-rated micro blade fuses.

Note:

- Output modules are supplied with micro-blade fuses fitted to each channel. The fuses are rated for the channel's maximum load capacity.
- It is important that the fitted fuse rating reflects the load of the channel. Where the actual channel load is less than the maximum load capacity of the channel, the fuse should be replaced by an appropriately-rated fuse.

1. Fixings appropriate for mounting surface and 5 mm (0.2 in) module mounting holes. (4 x fixings are required for assemblies with less than 4 input / output modules. 7 x fixings are required for assemblies with 4 or more input / output modules.)
2. Molex® MX150 sealed cavity plugs (Molex® part number: 343450001) (Raymarine part number: A80624).
3. Molex® MX150 female terminal crimps:
 - 14–16 AWG: (Molex® part number: 330012003) (Raymarine part number: A80622).
 - 18–20 AWG (Molex® part number: 330012004) (Raymarine part number: A80623).

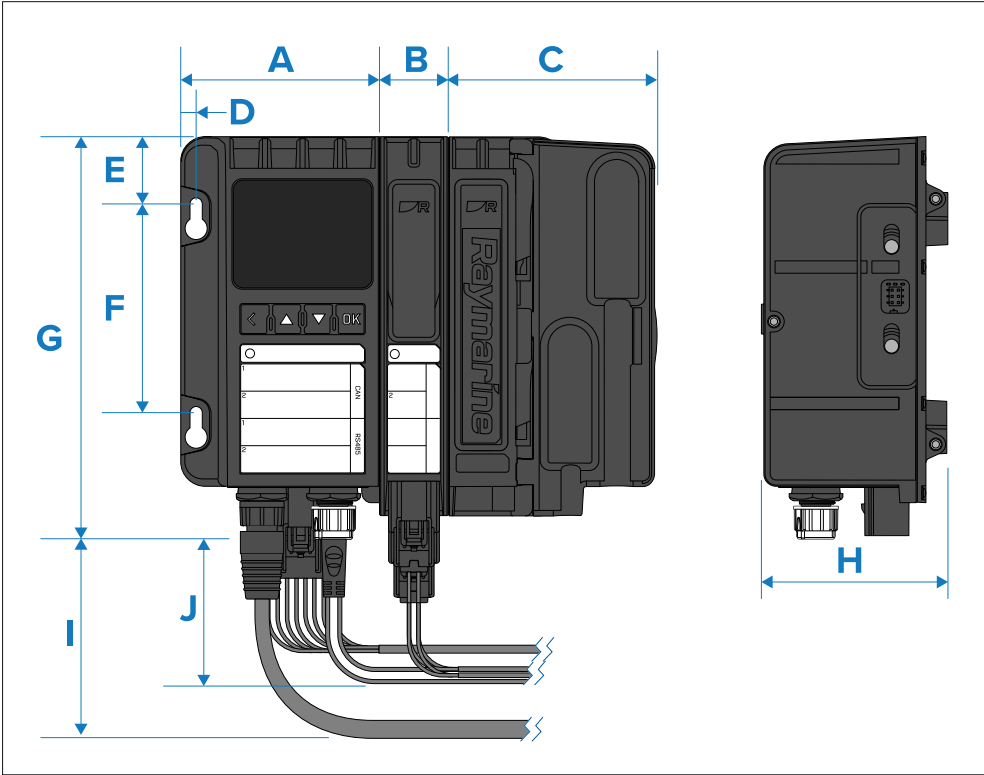
CHAPTER 8: PRODUCT DIMENSIONS

CHAPTER CONTENTS

- [8.1 Master system and Remote system dimensions — page 36](#)

8.1 Master system and Remote system dimensions

Product dimensions for the system assemblies are provided below.



Description	
F	85.00 mm (3.35 in)
G	165.00 mm (6.50 in)
H	76.00 mm (2.99 in)
I	87.00 mm (3.43 in) Minimum for Master system.
J	80.00 mm (3.15 in) Minimum for Remote system.

Description	
A	81.00 mm (3.19 in)
B	28.00 mm (1.10 in) per module: • Minimum = 0 modules • Maximum = 6 modules – Approximately 168.00 mm (6.61 in)
C	86.50 mm (3.40 in) Minimum to account for door opening.
D	5.87 mm (0.23 in)
E	27.50 mm (1.08 in)

CHAPTER 9: LOCATION REQUIREMENTS

CHAPTER CONTENTS

- 9.1 Warnings and cautions — page 38
- 9.2 EMC installation guidelines — page 38
- 9.3 Potential ignition source — page 38
- 9.4 Location requirements — page 38

9.1 Warnings and cautions

Important:

Before proceeding, ensure that you have read and understood the warnings and cautions provided in the following section of this document:

[p.9 — Important information](#)

9.2 EMC installation guidelines

Raymarine equipment and accessories conform to the appropriate Electromagnetic Compatibility (EMC) regulations, to minimize electromagnetic interference between equipment and minimize the effect such interference could have on the performance of your system.

Correct installation is required to ensure that EMC performance is not compromised.

Note:

In areas of extreme EMC interference, some slight interference may be noticed on the product. Where this occurs the product and the source of the interference should be separated by a greater distance.

For **optimum** EMC performance we recommend that wherever possible:

- Raymarine equipment and cables connected to it are:
 - At least 1 m (3.28 ft) from any equipment transmitting or cables carrying radio signals e.g. VHF radios, cables and antennas. In the case of SSB radios, the distance should be increased to 2 m (6.6 ft).
 - More than 2 m (6.56 ft) from the path of a Radar beam. A Radar beam can normally be assumed to spread 20 degrees above and below the radiating element.
- The product is supplied from a separate battery from that used for engine start. This is important to prevent erratic behavior and data loss which can occur if the engine start does not have a separate battery.
- Raymarine specified cables are used.
- Cables are not cut or extended, unless doing so is detailed in the installation manual.

Note:

Where constraints on the installation prevent any of the above **recommendations**, always ensure the maximum possible separation between different items of electrical equipment, to provide the best conditions for EMC performance throughout the installation.

9.3 Potential ignition source

This product is NOT approved for use in hazardous/flammable atmospheres. Do NOT install in a hazardous/flammable atmosphere (such as in an engine room or near fuel tanks).

9.4 Location requirements

When selecting a location for your product it is important that you comply with the specified location requirements.

Aspects of the installation location that can impact product life and performance are:

- **Water ingress** — The product should be mounted below decks, in a protected area away from prolonged and direct exposure to rain and salt spray.
- **Ventilation** — To ensure adequate airflow:
 - Ensure that the product is mounted in a well-ventilated compartment of suitable size.
 - Ensure adequate separation between product and other equipment.
 - Never cover the product.
- **Mounting orientation** — The product must be mounted on a vertical surface with the connectors pointing downwards.
- **Mounting surface** — Ensure product is adequately supported on a secure vertical surface. Do not mount the product in a location which may damage the structure of the vessel.
- **Cabling** — Ensure the product is mounted in a location which allows proper routing, support and connection of cables:

- For all cables, ensure that the recommended minimum cable bend radius is adhered to.
- Use cable clips to support cables and prevent stress on connectors.
- If your installation requires suppression ferrites to be added to cables, additional cable clips should be used to support the extra weight of the ferrites.
- **Electrical interference** — Select a location that is far enough away from devices that may cause interference, such as motors, generators and radio transmitters / receivers.
- **Power supply** — To keep cable runs to a minimum, select a location that is as close as possible to the vessel's DC power source.

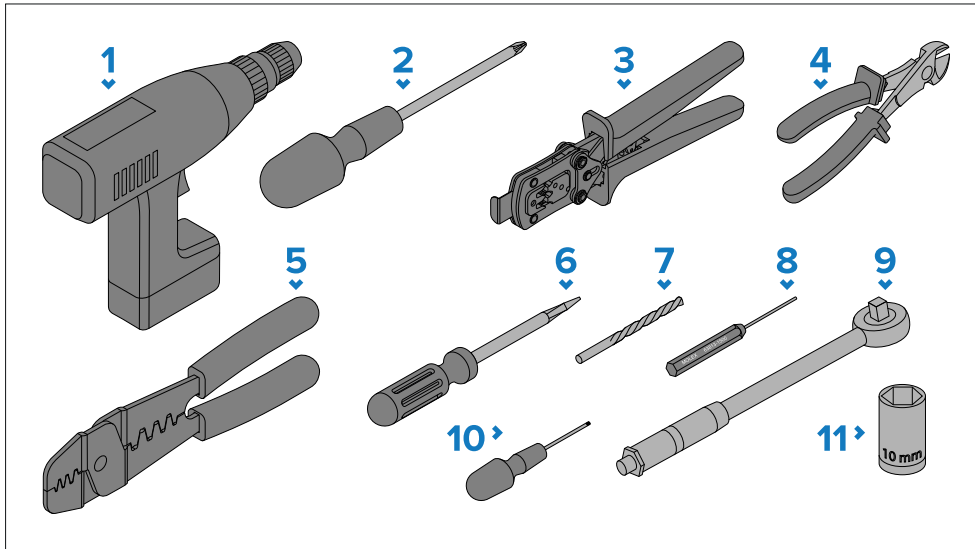
CHAPTER 10: INSTALLATION

CHAPTER CONTENTS

- 10.1 Tools required — page 41
- 10.2 Camlock system — page 41
- 10.3 Removing covers and fuses — page 42
- 10.4 Assembling Master or Remote systems — page 42
- 10.5 Mounting options — page 43
- 10.6 Fitting the mounting bracket — page 43
- 10.7 Mounting system assemblies using the bracket — page 43
- 10.8 Mounting without the bracket — page 44
- 10.9 Mounting using the mounting template — page 45

10.1 Tools required

The following tools are required to install and connect a YachtSense DCS-Series Digital Control System to a vessel's electrical system.

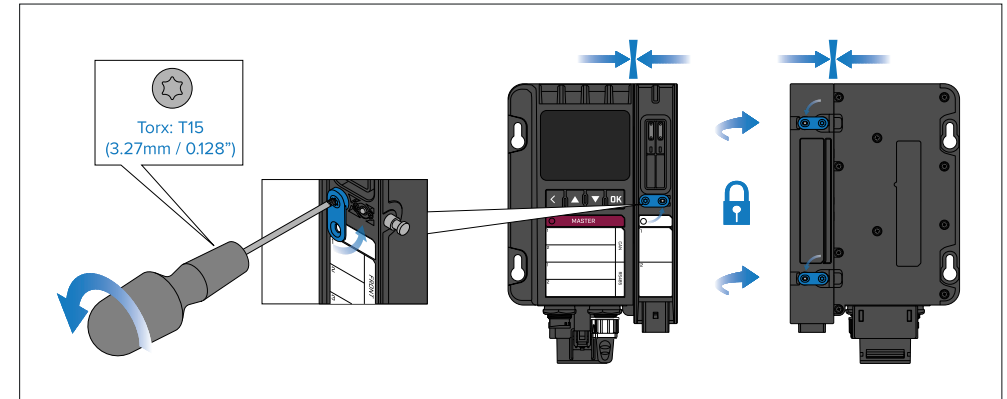


1. Power drill
2. Pozzi-drive screw driver
3. (Molex® 14–22 AWG hand crimp tool (Molex® part number: 640160133))
4. Wire cutters / strippers
5. Electrical crimp tool (suitable for M6 closed-barrel crimp ring terminals)
6. Flat blade screwdriver
7. Drill bit (suitable for fixings and mounting surface)
8. Molex® 1.50 mm (0.59 in) diameter extraction tool, (part number: 638131500)
9. Torque wrench
10. T15 Torx drive
11. 10 mm socket

10.2 Camlock system

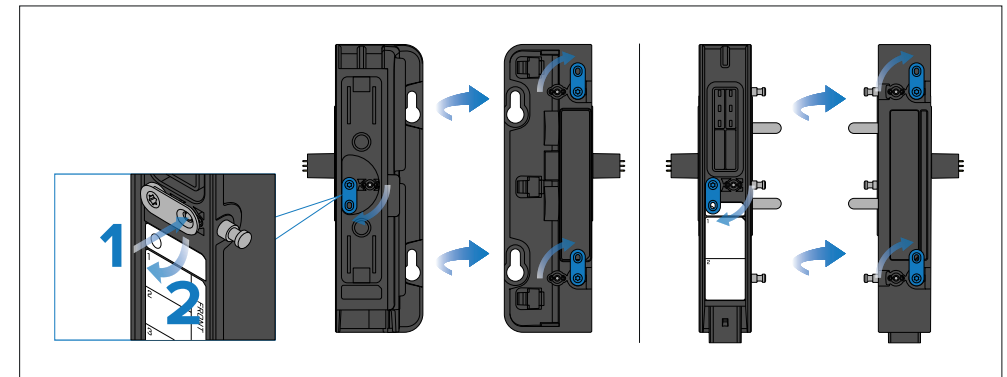
Input and output modules and power supply modules include a camlock system that is used to lock the modules together. The camlock system consists of 3 camlocks on each module, one on the front and 2 on the rear. The modules are supplied with the camlocks in the unlocked position.

Locking the modules



Lock the modules in position one at a time. Hold the modules together, ensuring there is no gap between modules and use a T15 size torxs driver to turn the camlock counter-clockwise into the locked position.

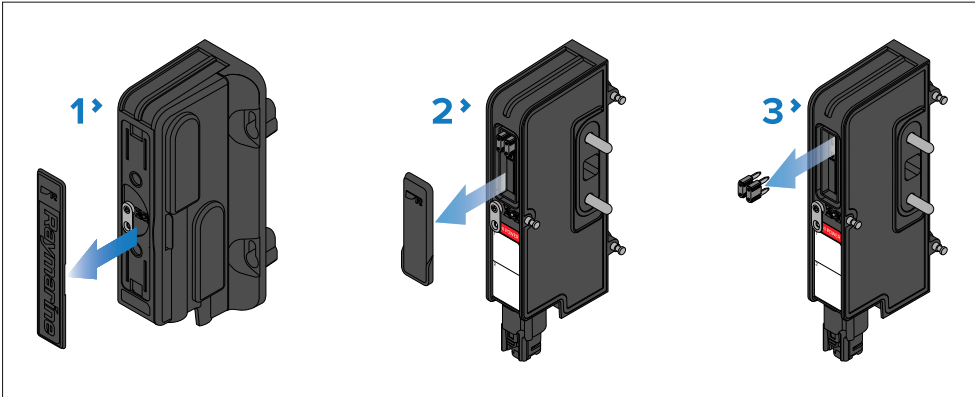
Unlocking the modules



Push in the center pin and turn the camlock clockwise so that the camlock on the front of the module is pointing down and the camlocks on the rear of the module are pointing up. If the camlocks are stiff use a T15 size torxs driver to turn the camlocks.

10.3 Removing covers and fuses

Before assembling the Master and Remote systems the fuses covers and fuses should be removed.



1. Remove the cover from the Power supply module.
2. Remove the covers from the output modules.
3. Remove the fuses from the output modules.

The fuses and covers are replaced after installation is complete and all connections have been made. For fuse replacement details refer to: [p.61 — Replacing module fuses](#)

10.4 Assembling Master or Remote systems

The method for assembling Master systems and Remote systems is the same.

Important:

- Modules must be assembled in the order that they have been configured.
- The maximum number of input/output modules per Master or Remote system is 6.

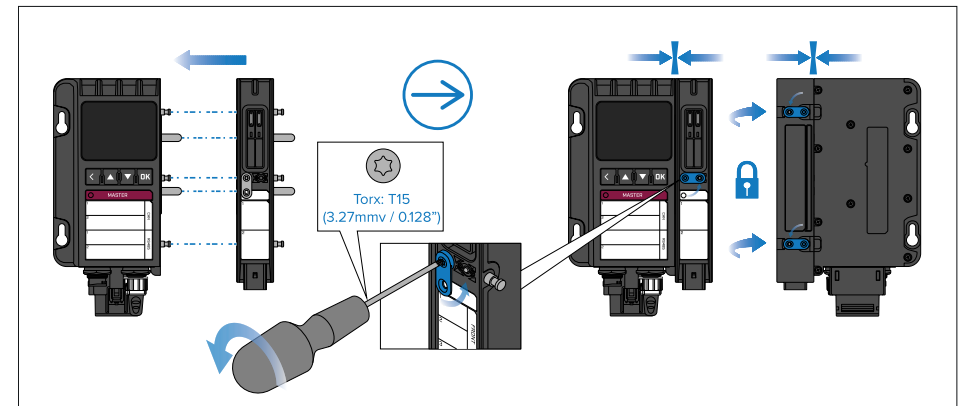
Note:

Raymarine recommends that modules are placed in order of their potential maximum current draw, with the lowest placed closer to the Master or Remote module and the highest placed closer to the Power supply module.

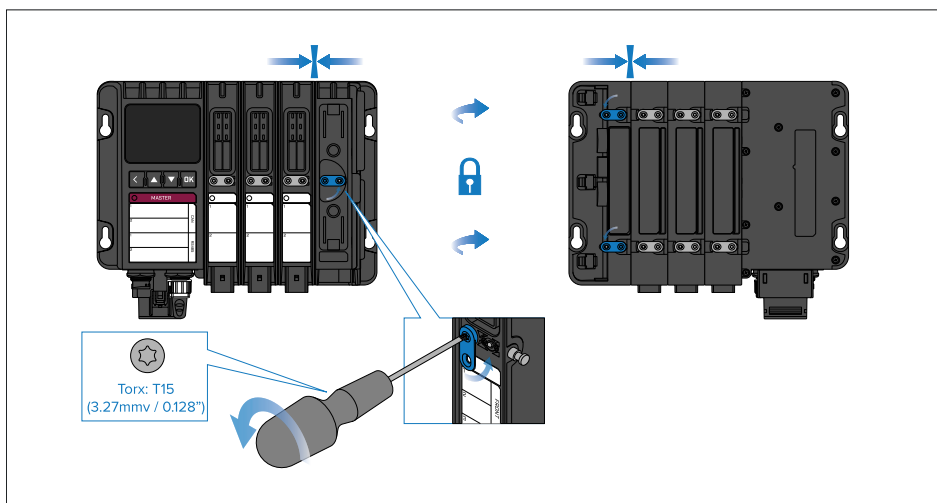
Example: Master/Remote module > Signal module(s) > Low power module(s) > High power module(s) > Reversing module(s) > Power supply module.

1. Ensure that the camlocks on the front and back of the input and output modules and the power supply module are in the unlocked position.
2. Connect the input and output modules to the Master or Remote module in configuration order.
 - i. Connect modules by lining up the locking pins, power bars and connector slot on the Master or Remote module with the relevant holes and connector on the input or output module and slot into place.
 - ii. Secure the modules by holding the modules together and then turning all the camlocks counter-clockwise until they are locked in position by the center pin.

Use a T15 size Torxs driver to help turn the locking tabs.



3. Connect the power supply module to the end of the Master system assembly or Remote system assembly following the same instructions as the step above.



10.5 Mounting options

Depending on module configuration Master and Remote systems can be mounted with or without the included mounting bracket.

When a Master system or Remote system includes 4 or more input / output modules extra mounting support is required. The supplied mounting bracket and rear shim should be used.

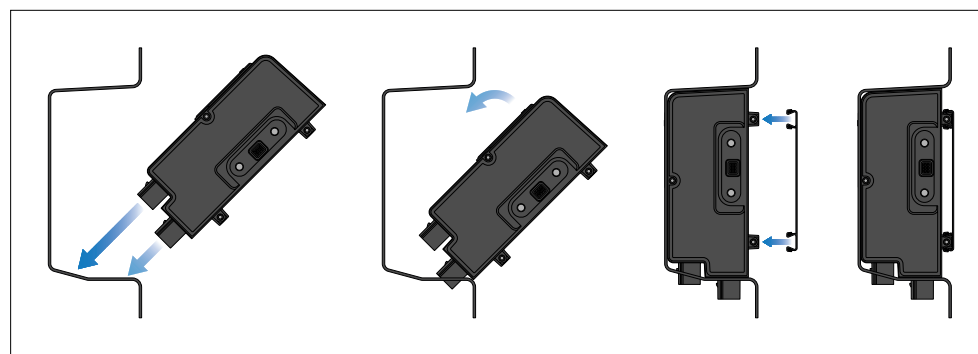
10.6 Fitting the mounting bracket

Master systems and Remote systems are supplied with a mounting bracket and rear shim. Systems that contain more than 4 input / output modules require the mounting bracket and rear shim to be fitted to a module in the middle of the system assembly.

The mounting bracket and rear shim should be fitted to the system assembly after all modules have been connected and the camlocks have been engaged.

Note:

So that the connection of the rear shim can be shown clearly the illustration below shows the bracket being fitted to a single module.



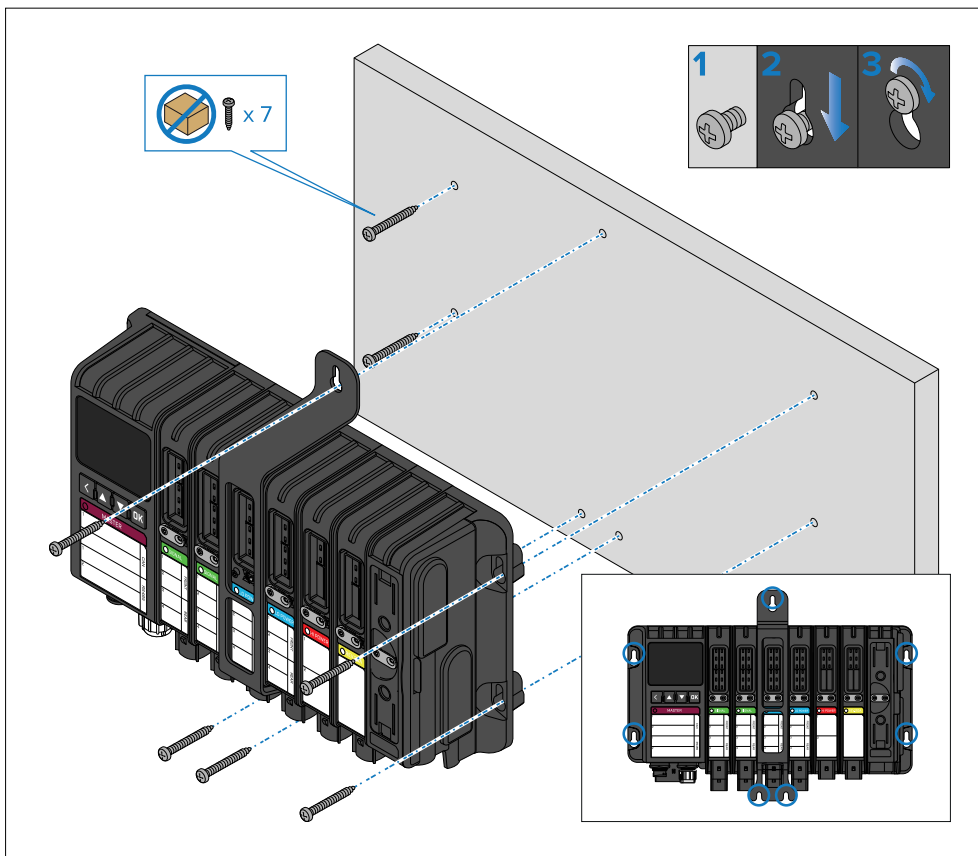
1. Slide the module connector(s) in to the slots in the bottom of the mounting bracket.
2. Push the top of the module into the bracket.
3. Attach the rear shim to the back of the same module that the bracket is attached to.

10.7 Mounting system assemblies using the bracket

Follow the steps below to mount Master system assembly and Remote system assemblies that include 4 or more input / output modules.

Important:

- To help prevent water ingress, systems must be mounted vertically with the connectors facing down.
- Use 7 x fixings, not supplied, appropriate for the intended mounting surface. The fixings should be appropriate width for the 5 mm (0.2 in) module mounting holes.



1. Ensure that the mounting location requirements have been met.
2. Hold the assembly in place at the intended location.
3. Mark the location of the 2 holes on the Master module or Remote module (the holes on the left).
4. Place the assembly to one side.
5. Drill the 2 holes in the mounting surface.
6. Screw in 2 x fixings approximately half way.
7. Place the assembly over the 2 fixings and move down to the locked position.
8. Use a spirit level to ensure the assembly is level and then mark the position of the 3 mounting holes in the mounting bracket and the 2 mounting holes in the Power supply module.
9. Remove the assembly and drill the 5 holes in the mounting surface.

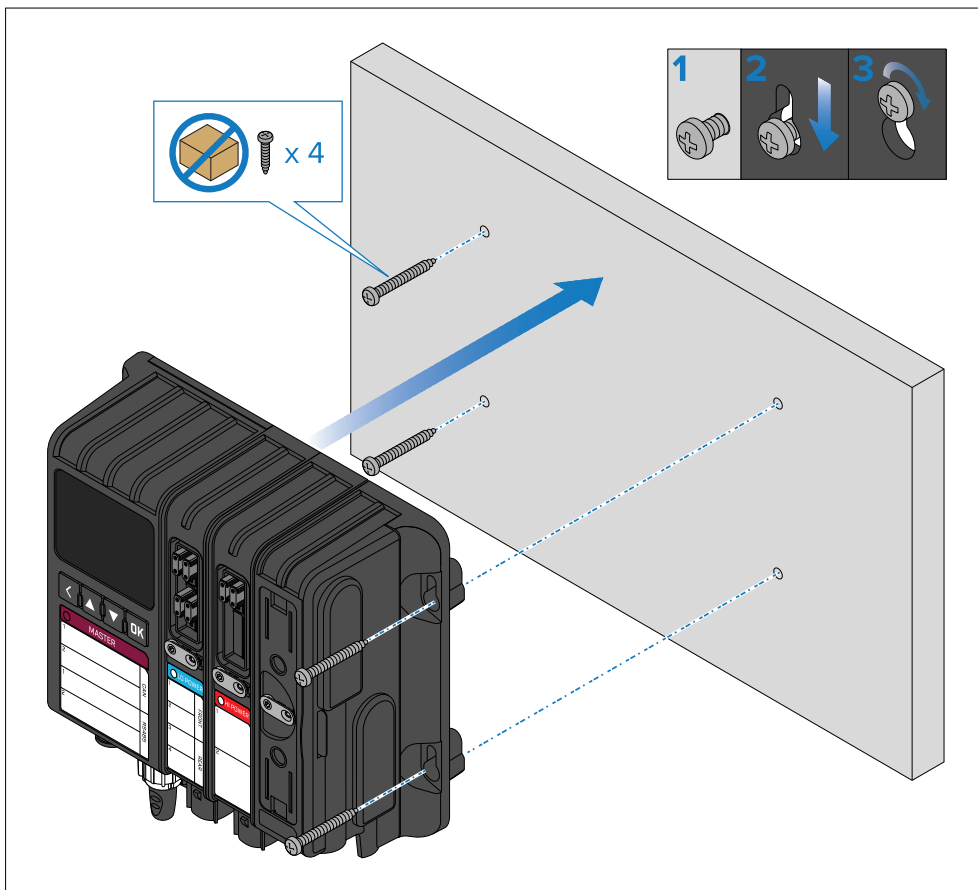
10. Screw in the remaining 5 fixings approximately half way.
11. Place the assembly over all fixings and move the assembly down into the locked position.
12. Fully tighten all fixings.

10.8 Mounting without the bracket

Follow the steps below to mount a Master system assembly and Remote system assemblies that include less than 4 input / output modules..

Important:

- To help prevent water ingress, systems must be mounted vertically with the connectors facing down.
- Use 4 x fixings, not supplied, appropriate for the intended mounting surface. The fixings should be appropriate width for the 5 mm (0.2 in) module mounting holes.



1. Ensure that the mounting location requirements have been met; refer to: [p.38 — Location requirements](#)
2. Hold the assembly in place at the intended location.
3. Mark the location of the 2 holes on the Master module or Remote module (the holes on the left).
4. Place the assembly to one side.
5. Drill the 2 holes in the mounting surface.
6. Screw in 2 x fixings approximately half way.
7. Place the assembly over the 2 fixings and move down to the locked position.
8. Use a spirit level to ensure the assembly is level and then mark the position of the 2 mounting holes in the Power supply module.

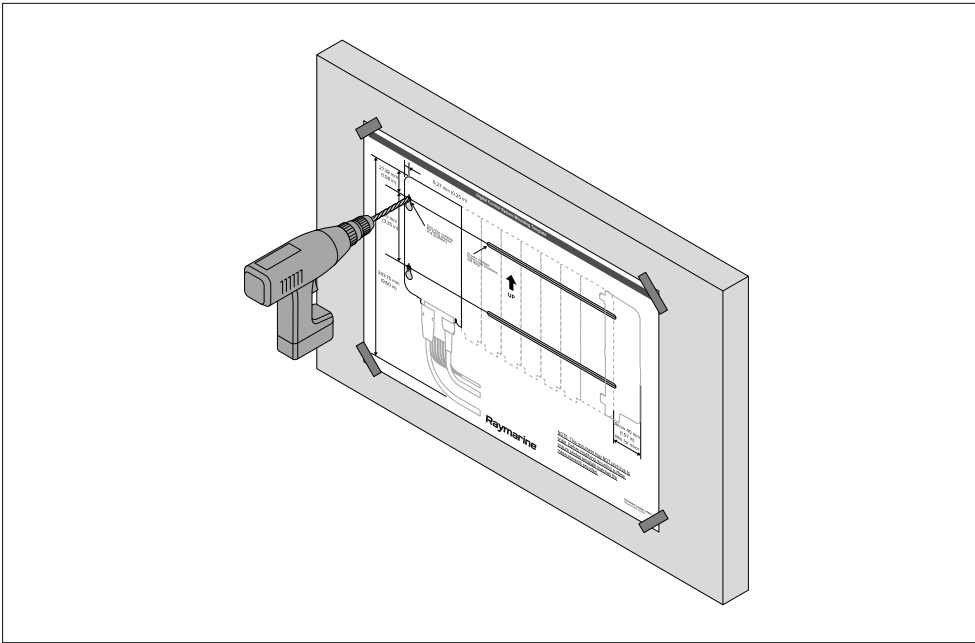
9. Remove the assembly and drill the 2 holes in the mounting surface.
10. Screw in the remaining 2 x fixings approximately half way.
11. Place the assembly over all 4 fixings and move the assembly down into the locked position.
12. Fully tighten the 4 fixings.

10.9 Mounting using the mounting template

A supplied mounting template can aid installation in confined or difficult to reach places.

Important:

- To help prevent water ingress, systems must be mounted vertically with the connectors facing down.
- Use fixings (not supplied) appropriate for the intended mounting surface. The fixings should be appropriate width for the 5 mm (0.2 in) module mounting holes.
- Either 4 or 7 fixings are required. 4 for assemblies with less than 4 input / output modules and 7 fixings for assemblies with 4 or more input / output modules (4 for the assembly mounting holes and 3 for the mounting bracket).



1. Ensure that the mounting location requirements have been met; refer to: [p.38 — Location requirements](#)
2. Place the mounting template on a flat surface and ensure it is not creased or folded.
3. Place the assembly on the mounting template and line up the mounting holes in the Master module or Remote module with the relevant mounting holes on the template.
4. Ensuring the assembly is level on the template, mark the location of the 2 mounting holes in the Power supply module on the mounting template.
5. Secure the mounting template in the required location using adhesive tape.
6. Drill 4 or 7 holes at the marked locations.
7. Screw in 4 or 7 fixings approximately half way.
8. Place the assembly over all the fixings and move the assembly down into the locked position.
9. Fully tighten the fixings.

CHAPTER 11: CABLES AND CONNECTIONS — GENERAL INFORMATION

CHAPTER CONTENTS

- [11.1 General cabling guidance — page 48](#)

11.1 General cabling guidance

Cable types and length

It is important to use cables of the appropriate type and length.

- Unless otherwise stated only use cables supplied by Raymarine.
- Where it is necessary to use non-Raymarine cables, ensure that they are of correct quality and gauge for their intended purpose. (e.g.: longer power cable runs may require larger wire gauges to minimize voltage drop along the run).

Strain relief

Use adequate strain relief for cabling to ensure that connectors are protected from strain and will not pull out under extreme sea conditions.

Cable shielding

Ensure that cable shielding is not damaged during installation and that all cables are properly shielded.



Warning: Positive ground systems

Do not connect this unit to a system which has positive grounding.

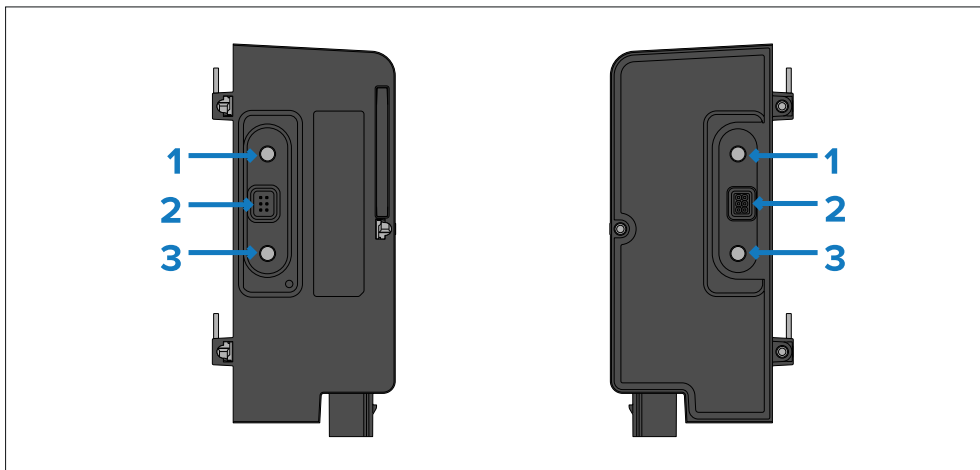
CHAPTER 12: MODULE CONNECTIONS

CHAPTER CONTENTS

- 12.1 Module to module connections — page 50
- 12.2 Master module connections — page 50
- 12.3 Remote module connections — page 51
- 12.4 High power module connections — page 53
- 12.5 Low power module connections — page 55
- 12.6 Reverse power module connections — page 56
- 12.7 Signal module connections — page 58

12.1 Module to module connections

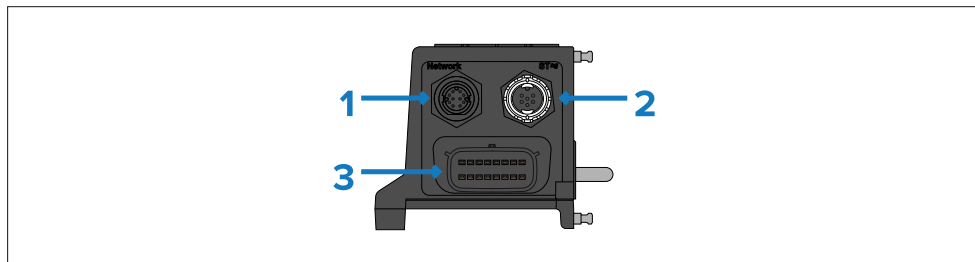
When the modules are connected together power is supplied via the bus bars and communications via the module communications connector. These connections are made when the modules are locked together.



1. **Positive (+) busbar** — Connects directly or via input and output modules to the Power supply module, providing power to the system.
2. **Module communications connection** — Enables communication between modules.
3. **Negative (-) busbar** — Connects directly or via input and output modules to the Power supply module, providing power to the system.

12.2 Master module connections

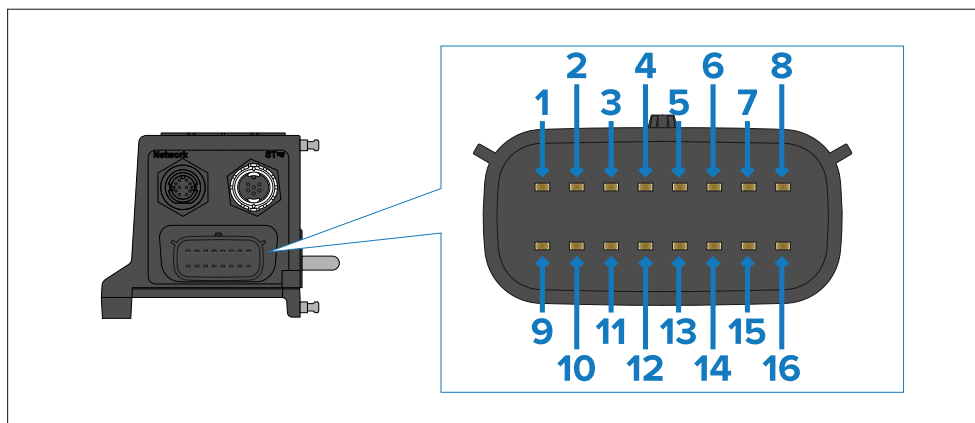
The Master module is the primary control module of the YachtSense DCS-Series Digital Control System. The Master module controls all input and output modules connected to it and any Remote systems. It acts as the interface between the system and the chartplotter (MFD) and peripheral remote controllers.



1. **RayNet network connection** — Connects to the chartplotter (MFD) or RayNet network switch using a RayNet cable.
2. **SeaTalk NG connection** — Connects to the SeaTalk NG backbone using SeaTalk NG spur cable and provides communication between Master module, chartplotter (MFD), Remote modules and SeaTalk NG sensors.
3. **16 pin CANBUS / serial connection** — Connects to J1939 and RS-485 devices using the 16-pin connection.

Master module pin out

The 16 pin connector on the Master module allows connection to 2 x J1939 and 2 x RS-485 devices. The module's connector pin out is shown below:



	Master module signal / pin	Vessel connection signal / pin
1	CAN1 High	CAN1 / J1939 H
2	CAN1 Ground	CAN1 / J1939 GRD (0 V)
3	CAN2 High	CAN2 / J1939 H
4	RS-485 2 Positive	RS-485 Data2 +
5	RS-485 1 Ground	RS-485 Data1 GRD (0 V)
6	RS-485 1 Positive	RS-485 Data1 +
7	Not connected	Not applicable
8	Do not connect	Not applicable
9	CAN1 Low	CAN1 / J1939 L
10	CAN2 Ground	CAN2 / J1939 GRD (0 V)
11	CAN2 Low	CAN2 / J1939 L
12	RS-485 2 Negative	RS-485 Data2 -
13	RS-485 2 ground	RS-485 Data2 GRD (0 V)
14	RS-485 1 Negative	RS-485 Data1 -
15	Not connected	Not applicable
16	Do not connect	Not applicable

12.3 Remote module connections

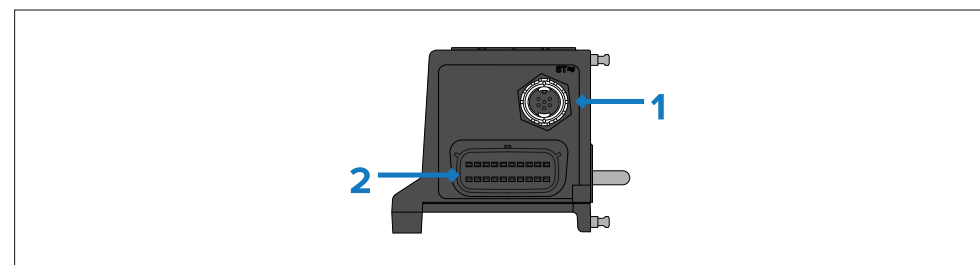
The Remote module allows expansion of the YachtSense DCS-Series Digital Control System and includes built in 8 channel input / output connections.

Input channel capabilities:

- Digital and analog connection.
- 4–20mA sensors.

Output channel capabilities:

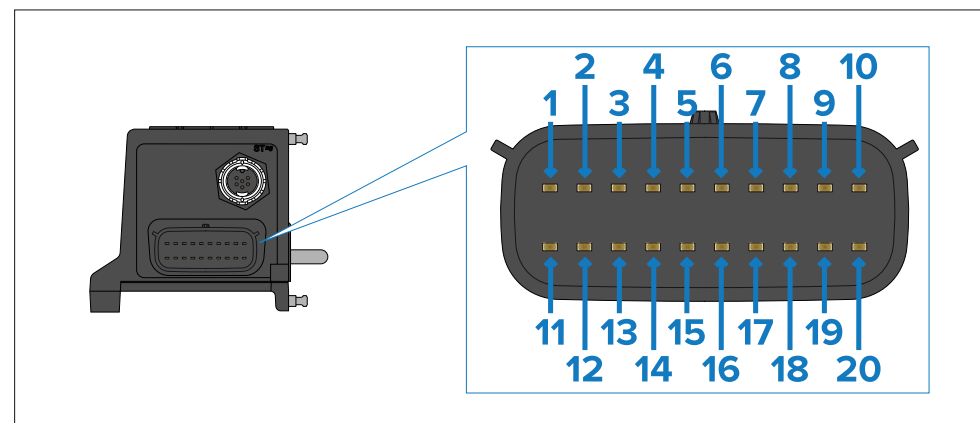
- Up to 200mA output
- 200mA maximum per module.
- Voltage protection up to 32 V dc



1. SeaTalk NG connection — Connects to the SeaTalk NG backbone using SeaTalk NG spur cable. Enables connection to the Master systems and communication with SeaTalk NG sensors.
2. 20-pin input / output connection — Connects to low power input and output devices using the 20-pin connection.

Remote pin out

The 20 pin connector on the Remote module allows connection of up to 8 digital / analog inputs and up to 200mA output channels, commonly used to control switches, sensors, relays and actuators. The module's connector pin out is shown below.



Signal	Signal
1 IO CH1 +	11 CH1 -
2 IO CH2 +	12 CH2 -
3 IO CH3 +	13 CH3 -
4 IO CH4 +	14 CH4 -

Signal		Signal	
5	IO CH5 +	15	CH5 -
6	IO CH6 +	16	CH6 -
7	IO CH7 +	17	CH7 -
8	IO CH8 +	18	CH8 -
9	Not connected	19	Not connected
10	Do not connect	20	Do not connect

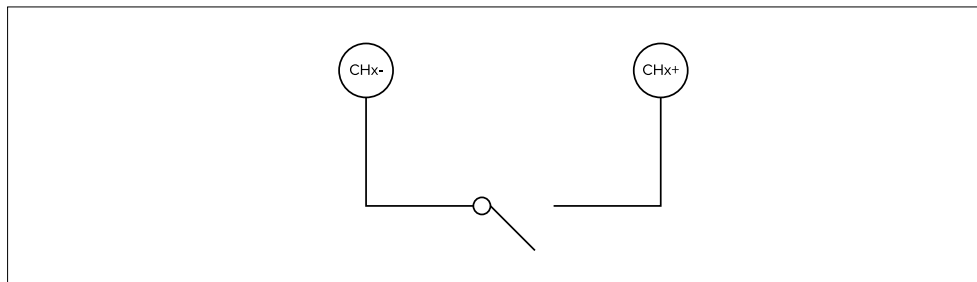
Digital and analog inputs and outputs example connections

The Remote module and Signal module can be used to control and or monitor digital and analog inputs / outputs such as switches, resistive sensors, pressure sensors secondary batteries etc.

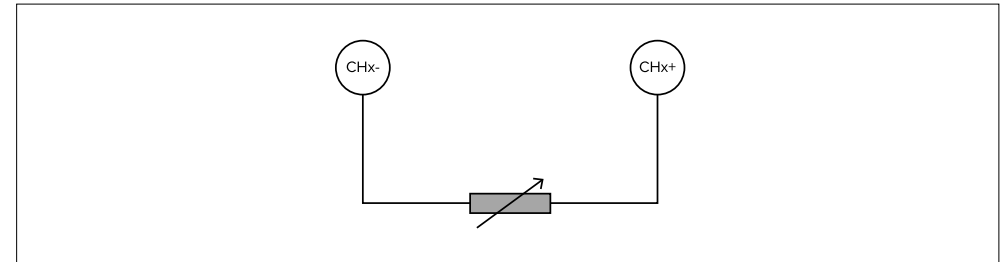
Important:

- The negative power cable (0 V return) of the system must be connected to the same battery negative as all input and output devices that are being controlled or monitored by that system.
- Each load must have both a supply and return connection to the module.

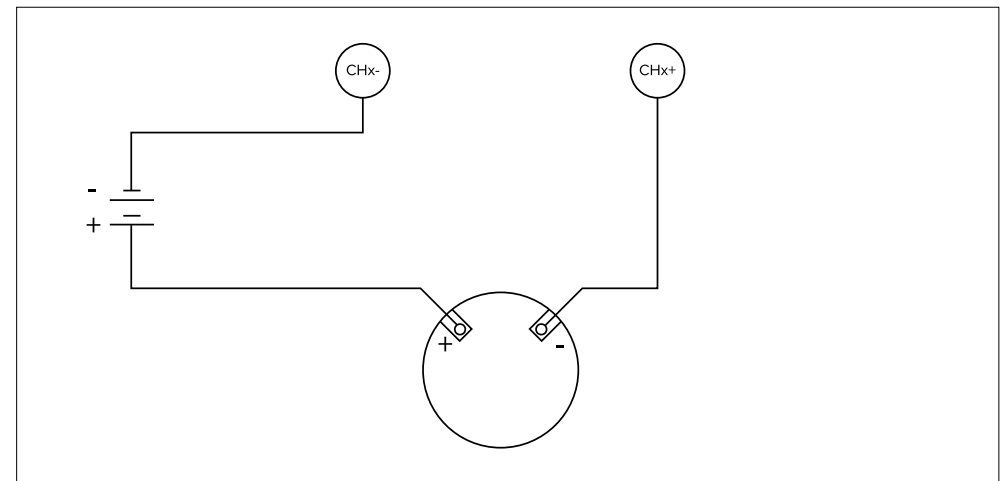
Example — Switch (Digital input)



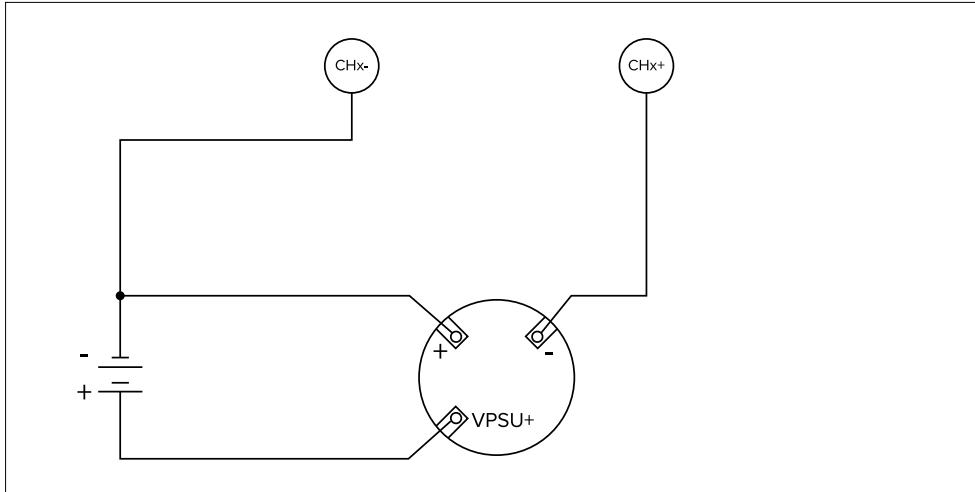
Example — Resistive sensor (Analog input)



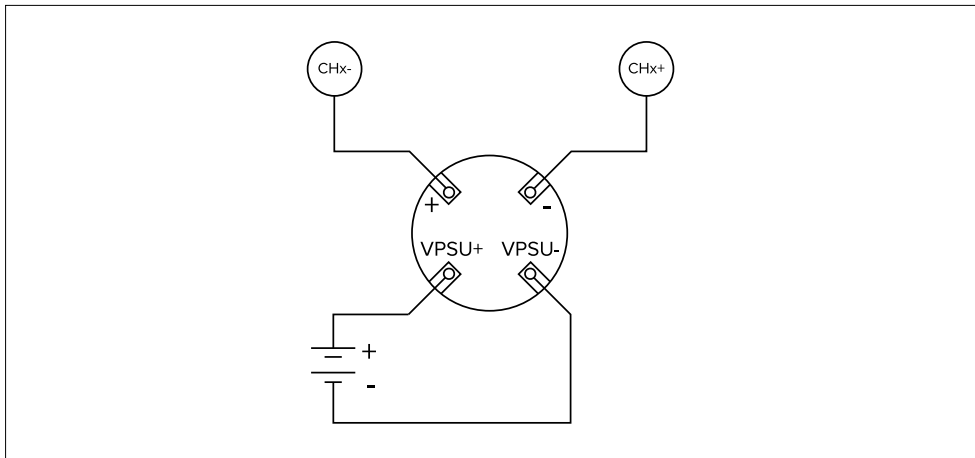
Example — 2 wire 4–20mA sensors



Example — 3-wire 4–20mA sensors



Example — 4 wire 4–20mA sensors



12.4 High power module connections

The High power module is a digital output module and can be used to drive high powered electrical loads such as pumps, fans, heaters, refrigerators and Hi-Fi equipment etc.

Channel capabilities:

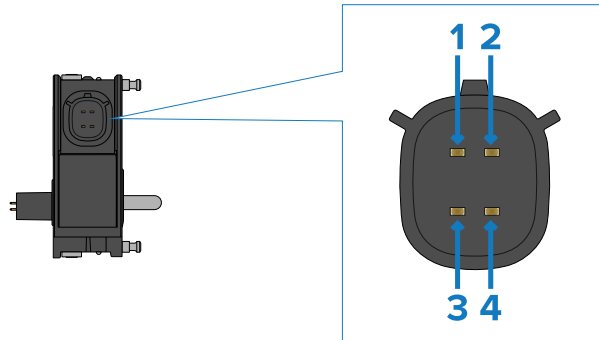
- Up to 20A draw per channel
- Load current measurement
- Over current protection
- Under current detection
- Soft fuse
- Voltage detection
- Voltage protection up to 32 V dc

Output options:

- Resistive load
- Inductive load (external fly-back diode required)
- Incandescent lamp driver
- PWM mode
- Low load detection

Note:

The High power module requires a minimum current draw of 50mA. If your desired application requires loads of 200mA or less, consider using the Input/Output on a Remote module or the Signal module, as they have been designed for this purpose.

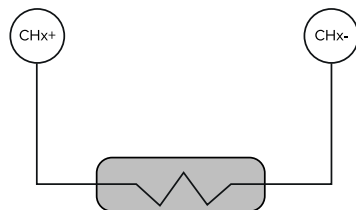


Signal	Signal
1 CH1+	2 CH2+
3 CH1-	4 CH2-

Important:

- The negative power cable (0 V return) of the system must be connected to the same battery negative as all input and output devices that are being controlled or monitored by that system.
- Each load must have both a supply and return connection to the module.

Example — Generic load connection

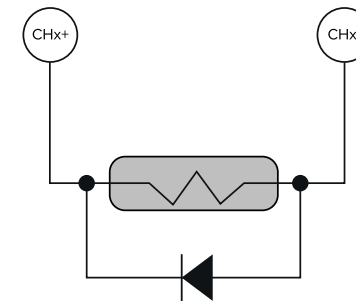


Inductive loads

Whilst inductive loads such as motors, relays and solenoids etc. are energized they store energy, when switched off the stored energy must be safely discharged. Unless the connected load specifically states that it includes an internal flyback/freewheel diode then an external diode must be fitted.

Note:

Failure to fit the diode will result in permanent damage to the module.



Important:

When connecting the diode ensure that:

- The diode is placed directly across the load
- The wire length is kept to an absolute minimum.
- The wire gauge is the same as the wire gauge used for the load.

Diode requirements:

- DC blocking voltage $V_{RM} \geq 60 \text{ V}$
- Average rectified output current $I_O \geq \text{Load current amps}$
- Forward voltage drop $> 1 \text{ V @ load current}$

12.5 Low power module connections

The Low power module is a digital output module and can be used to drive lower-powered electrical loads, such as lights, wipers, motors and other electronic devices.

Channel capabilities:

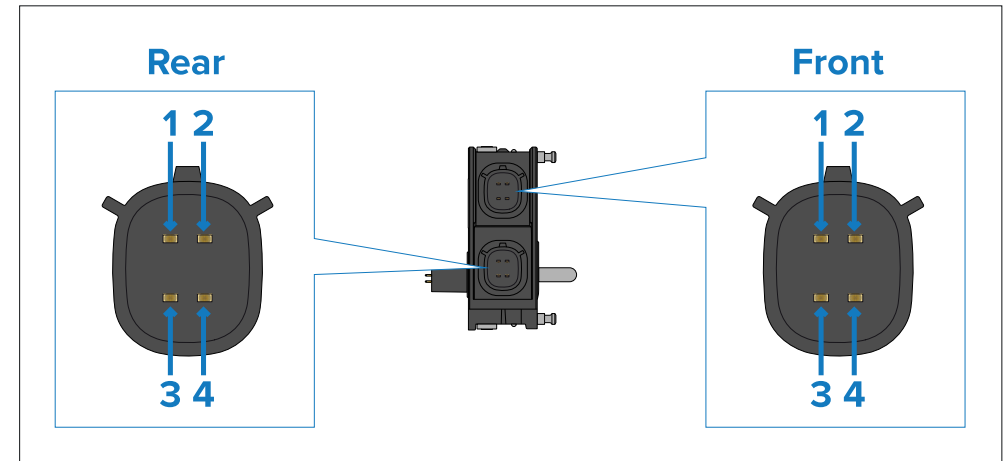
- Up to 10A current draw per channel
- Load current measurement
- Over current protection
- Under current detection
- Soft fuse
- Voltage detection
- Voltage protection up to 32 V dc

Output options:

- Resistive load
- Inductive load (external fly-back diode required)
- Incandescent lamp driver
- PWM mode
- Low load detection

Note:

The Low power module requires a minimum current draw of 50mA. If your desired application requires loads of 200mA or less, then consider using the Input/Output channels on a Remote module or the Signal module, as they have been designed for this purpose.

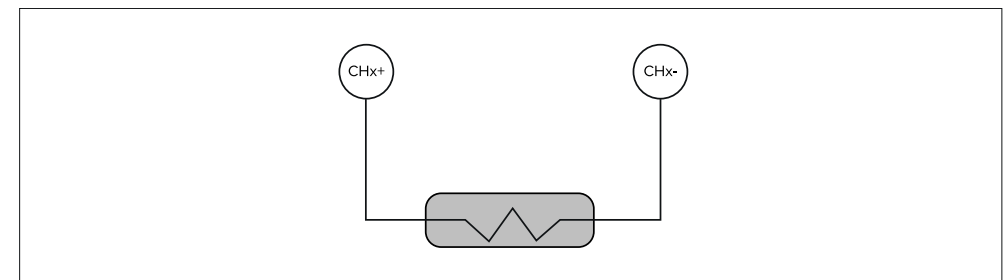


Rear connector		Front connector	
1	CH3+	1	CH1+
2	CH4+	2	CH2+
3	CH3-	3	CH1-
4	CH4-	4	CH2-

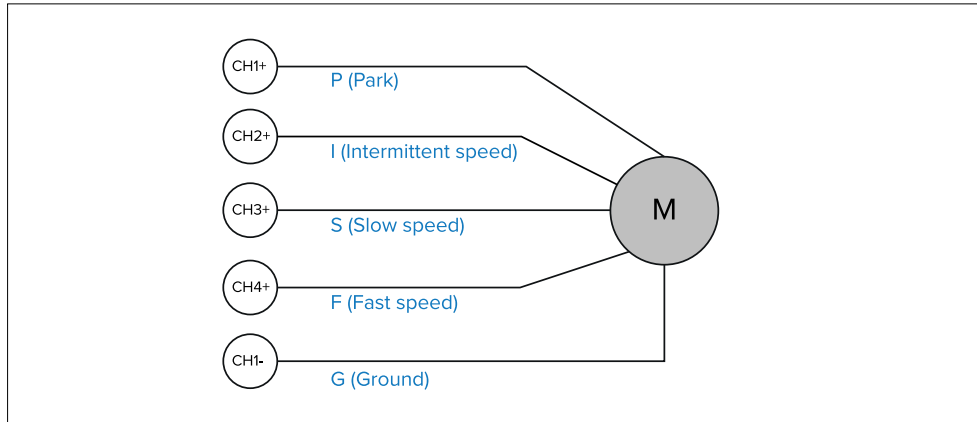
Important:

- The negative power cable (0 V return) of the system must be connected to the same battery negative as all input and output devices that are being controlled or monitored by that system.
- Each load must have both a supply and return connection to the module.

Example — Generic load connection



Example — Wiper motor connection



P — Park position

I — Intermittent speed

S — Slow speed

F — Fast speed

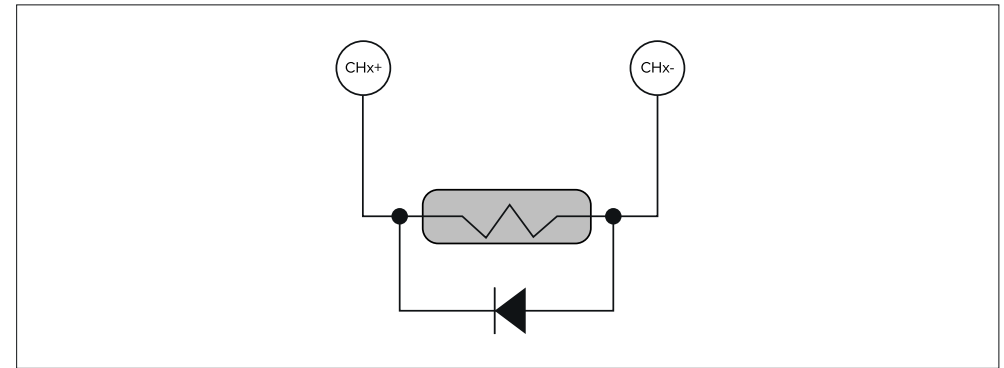
G — Ground

Inductive loads

Whilst inductive loads such as motors, relays and solenoids etc. are energized they store energy, when switched off the stored energy must be safely discharged. Unless the connected load specifically states that it includes an internal flyback/freewheel diode then an external diode must be fitted.

Note:

Failure to fit the diode will result in permanent damage to the module.



Important:

When connecting the diode ensure that:

- The diode is placed directly across the load
- The wire length is kept to an absolute minimum.
- The wire gauge is the same as the wire gauge used for the load.

Diode requirements:

- DC blocking voltage $V_{RM} \geq 60 \text{ V}$
- Average rectified output current $I_O \geq \text{Load current amps}$
- Forward voltage drop $> 1 \text{ V @ load current}$

12.6 Reverse power module connections

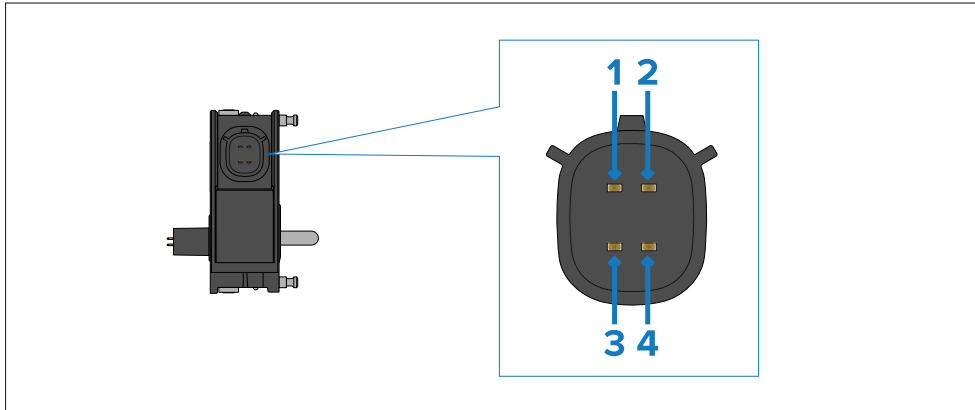
The Reverse power module is a digital output module, and can be used to drive devices such as hydraulic pumps or actuators which require the motor to drive forwards and in reverse.

Channel capabilities:

- 20A reversible drive module
- Over current protection
- Under current detection
- Voltage protection up to 32 V dc

Operation modes:

- Forward
- Reverse
- Braking
- Free wheeling



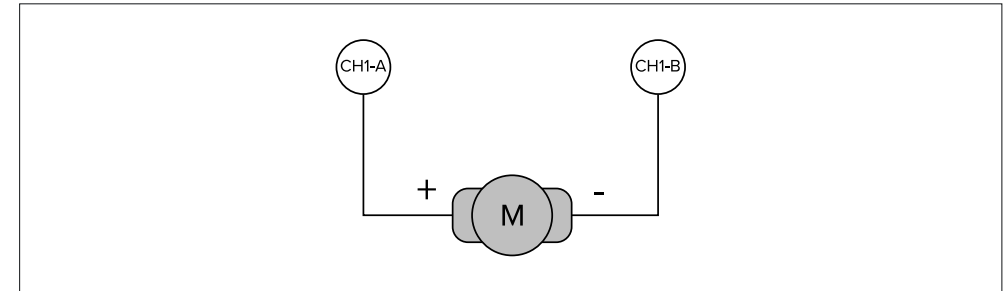
Signal	Signal
1 CH1 A	2 CH1 B
3 Not connected	4 Not connected

The module's default channel direction is CH1-A to positive and CH1-B to negative.

Important:

- The negative power cable (0 V return) of the system must be connected to the same battery negative as all input and output devices that are being controlled or monitored by that system.
- Each load must have both a supply and return connection to the module.

Example — Motor connection

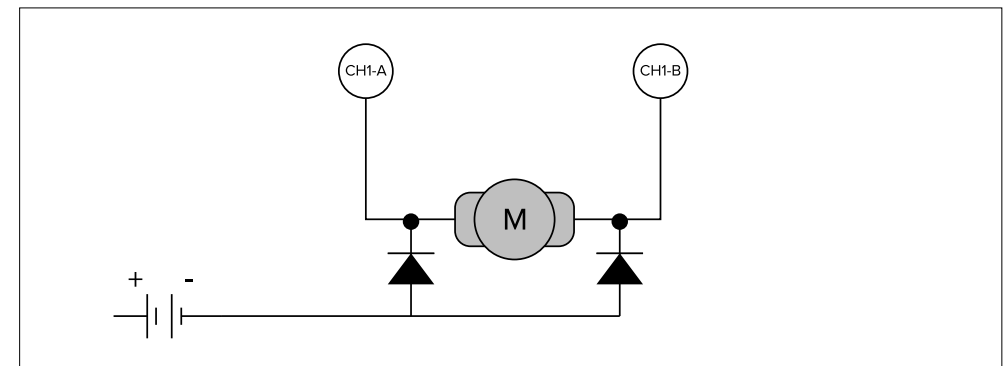


Reversible motor inductive loads

Whilst reversible motors are energized they store energy, when switched off the stored energy must be safely discharged. Unless the connected load specifically states that it includes internal flyback/freewheel diodes then external diodes must be fitted.

Note:

Failure to fit the diodes will result in permanent damage to the module.



Diode requirements:

- DC blocking voltage $V_{RM} \geq 60 \text{ V}$
- Average rectified output current $I_O \geq \text{Load current amps}$
- Forward voltage drop $> 1 \text{ V @ load current}$

Important:

When connecting the diodes ensure that:

- A diode is placed directly before and after the load
- The wire length is kept to an absolute minimum.
- The wire gauge is the same as the wire gauge used for the load.
- The diodes are connected to the power supply negative (-) terminal.

12.7 Signal module connections

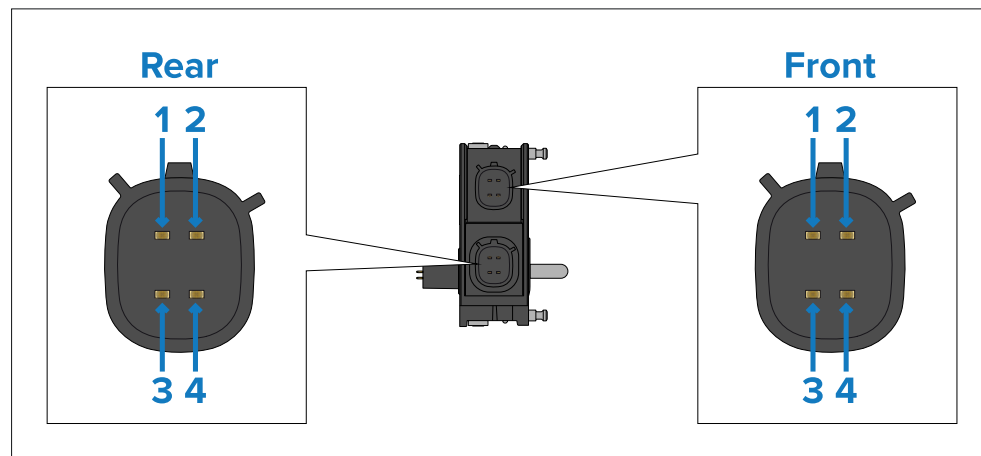
The Signal module is an 4 channel digital / analog input and up to 200mA output module. Commonly used to control switches, sensors, relays and actuators.

Input channel capabilities:

- Digital and analog connection
- 4–20mA sensors

Output channel capabilities:

- Up to 200mA output per channel
- 200mA maximum per module.
- Voltage protection up to 32 V dc



Rear connector

- | | Rear connector |
|---|----------------|
| 1 | CH3+ (signal) |
| 2 | CH4+ (signal) |
| 3 | CH3- (return) |
| 4 | CH4- (return) |

Front connector

- | | Front connector |
|---|-----------------|
| 1 | CH1+ (signal) |
| 2 | CH2+ (signal) |
| 3 | CH1- (return) |
| 4 | CH2- (return) |

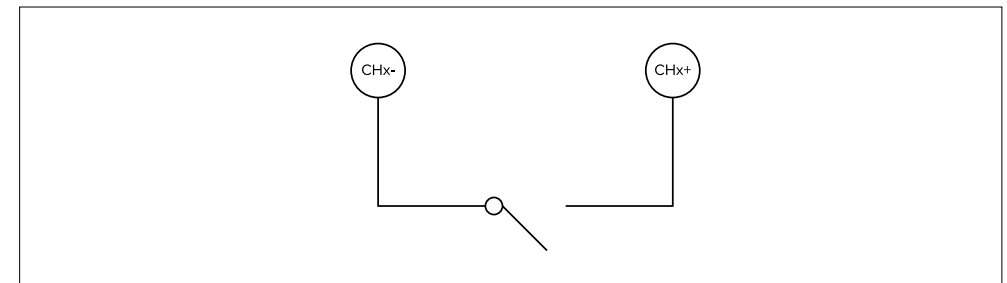
Digital and analog inputs and outputs example connections

The Remote module and Signal module can be used to control and or monitor digital and analog inputs / outputs such as switches, resistive sensors, pressure sensors secondary batteries etc.

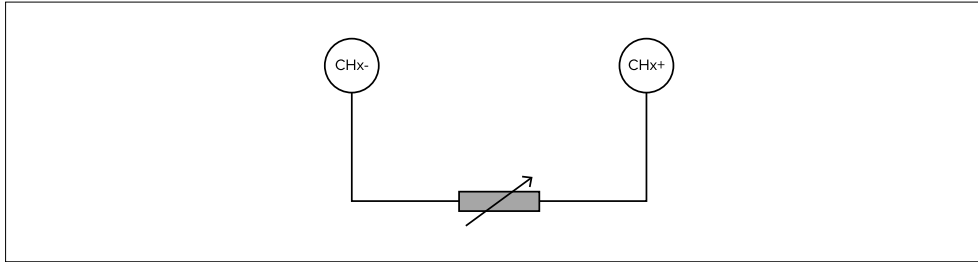
Important:

- The negative power cable (0 V return) of the system must be connected to the same battery negative as all input and output devices that are being controlled or monitored by that system.
- Each load must have both a supply and return connection to the module.

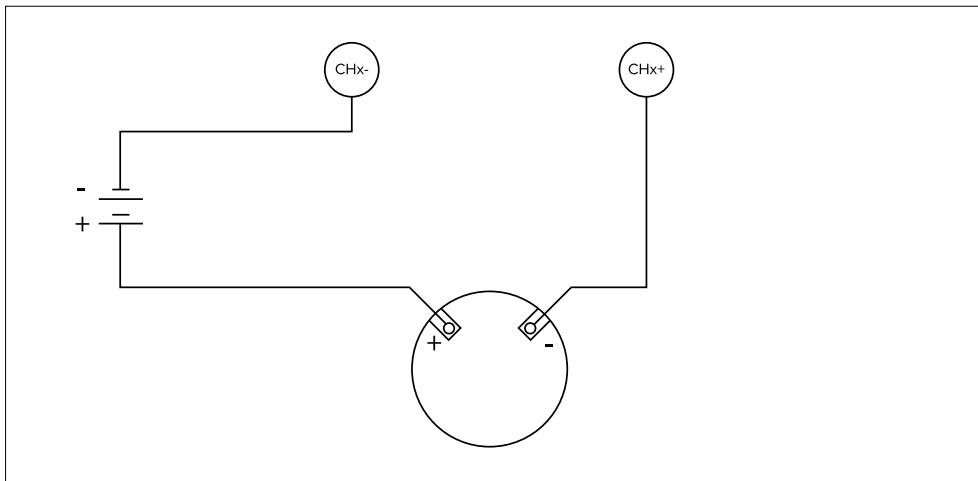
Example — Switch (Digital input)



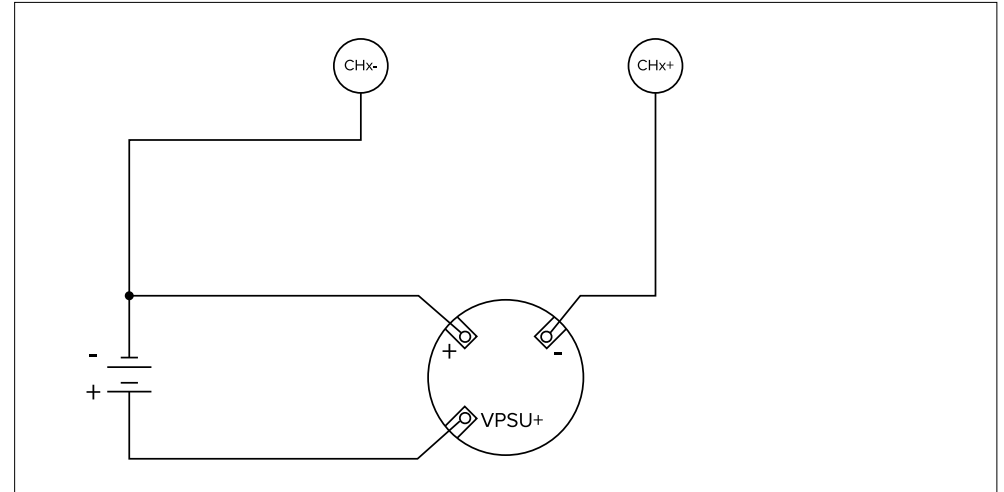
Example — Resistive sensor (Analog input)



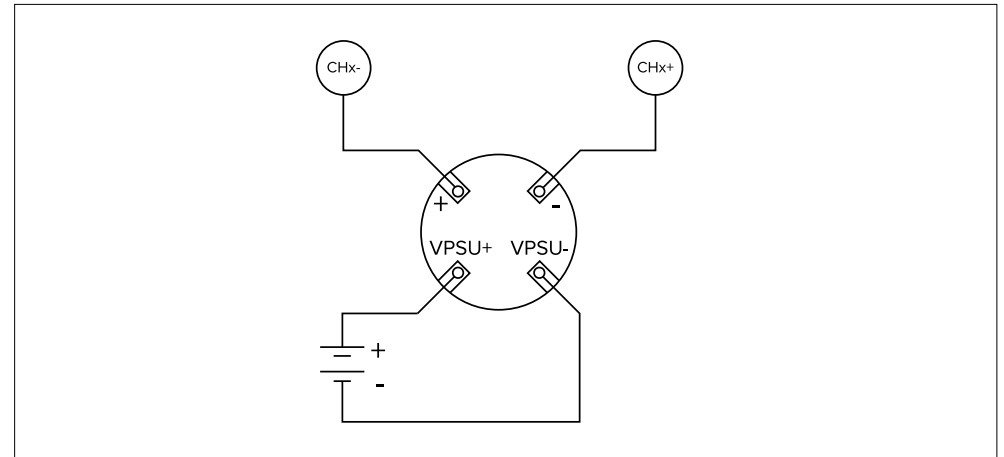
Example — 2 wire 4–20mA sensors



Example — 3-wire 4–20mA sensors



Example — 4 wire 4–20mA sensors



CHAPTER 13: MODULE FUSES

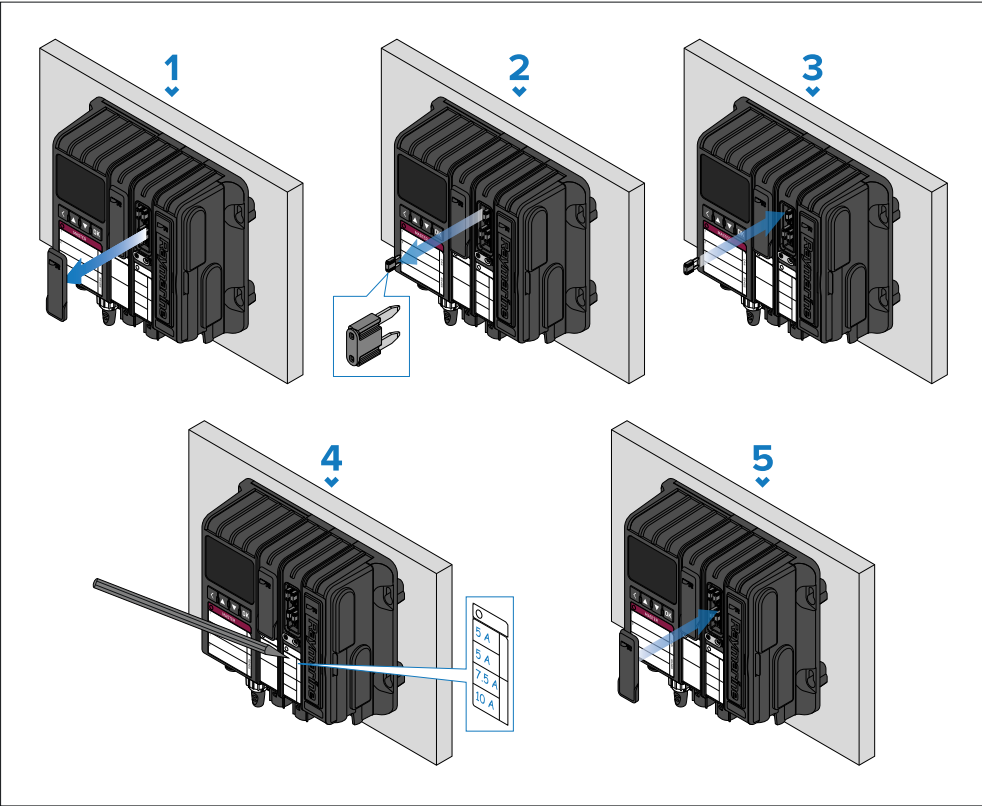
CHAPTER CONTENTS

- 13.1 Replacing module fuses — page 61
- 13.2 Fuse by-pass — page 62
- 13.3 Removing covers and fuses — page 63

13.1 Replacing module fuses

Output modules are supplied with micro blade fuses fitted to each channel. The fuses are maximum rated for the channel's maximum load capacity.

Note:
It is important that the fitted fuse rating reflects the load of the channel. Where the actual channel load is less than the maximum load capacity the fuse should be replaced by an appropriately rated fuse.



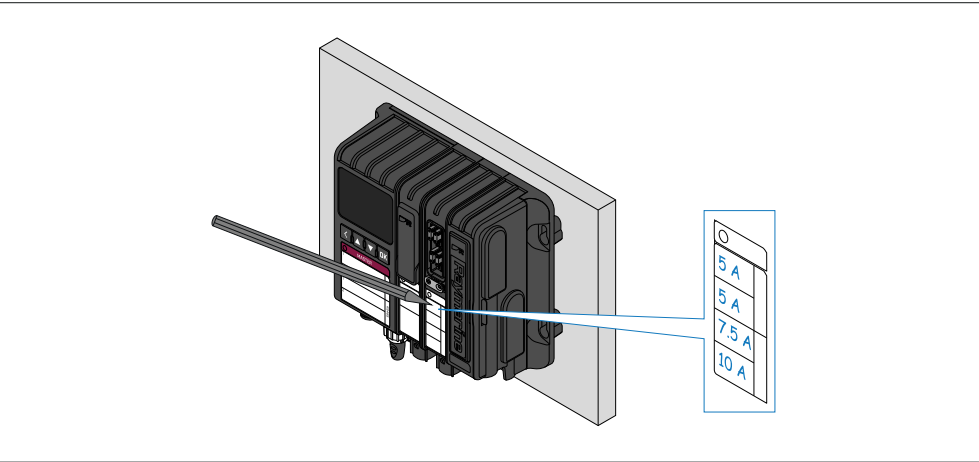
1. Remove the fuse cover.
2. Using a non-conductive (e.g.: plastic) fuse puller or tweezers remove the fitted fuse.
3. Replace the fuse with an appropriately rated fuse for the channel load.
4. Make a note of the rating of the fitted fuses on the module's front label.

Module fuses

5. Fit the fuse cover, ensuring an even seal all around its edge.

Fuse labeling

During installation the fuses for each module in the system must be checked to ensure that the fuses are appropriately rated for each channel's current draw. Ensure that if required, the fuses are changed to reflect the actual current draw of the devices connected to each channel. It is also important to make a note of the ratings of the fitted fuses, using the label provided on the front of each module.



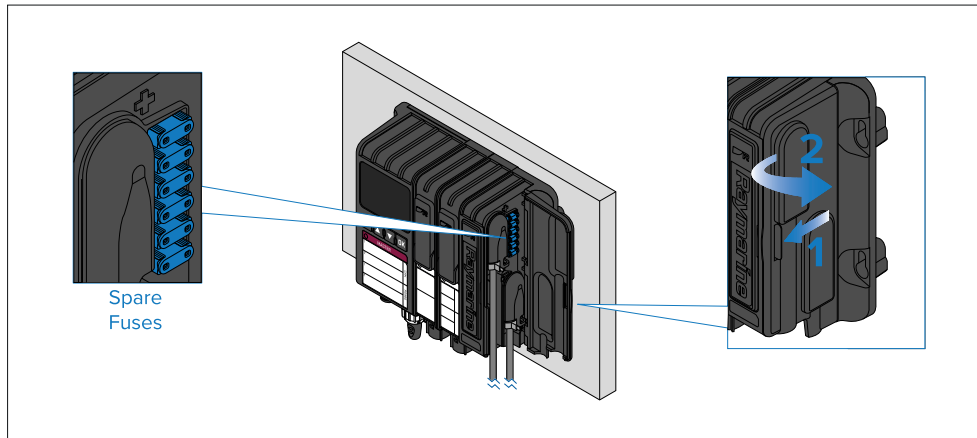
Noting the rating on the module will make it easier to identify the correct rating in the event of fuse replacement.
For reference, the fuses supplied and fitted to each power module type at the factory are as follows:

Module	Fuse rating
Low power (E70594)	15A
High power (E70595)	30A
Reverse power (E70596)	30A

Important:
For safety reasons, do NOT exceed the fuse values listed in the table above.

Spare fuses

The Power supply module is supplied with spare fuses that are located in the power connection compartment.



Important:

When replacing fuses ensure that the replacement fuse is rated the same as the fuse being replaced.

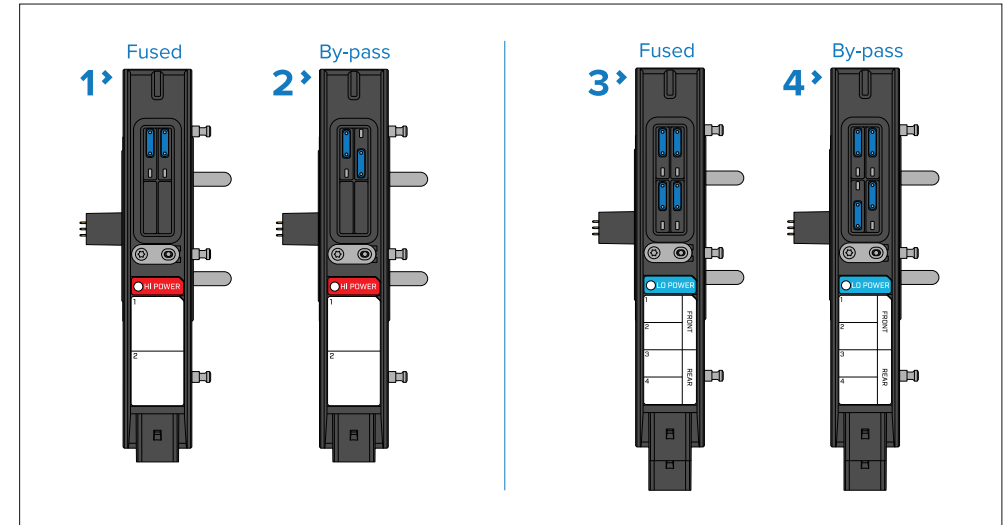
13.2 Fuse by-pass

If a High power module channel or Low power module channel fails and all efforts to restore have been unsuccessful then the module channel can be temporarily by-passed.

Note:

- Fuse by-pass should only be used in critical situations for a limited time.
- The Signal module and Reverse power module do not include the by pass function.

Fuse bypass examples



1. High power module, both channels fused.
2. High power module, channel 2 in by-pass mode
3. Low power module, all channels fused.
4. Low power module, channel 3 in by-pass mode

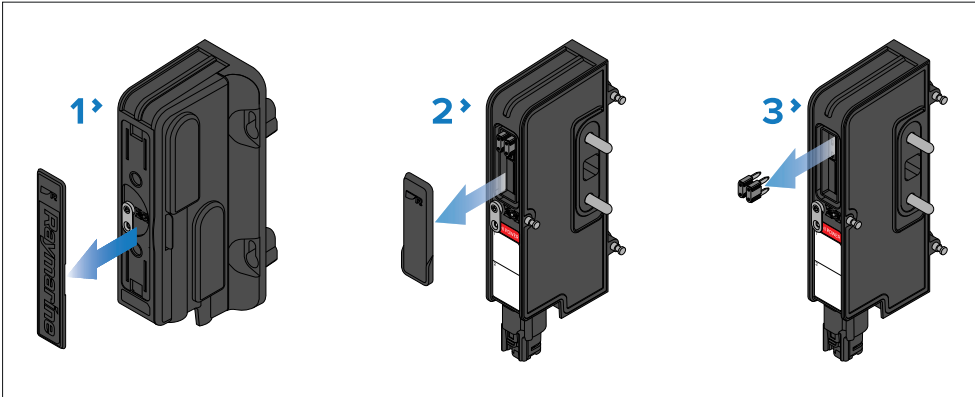


Warning: Fuse covers

Ensure fuse covers are always fitted.

13.3 Removing covers and fuses

Before assembling the Master and Remote systems the fuses covers and fuses should be removed.



1. Remove the cover from the Power supply module.
2. Remove the covers from the output modules.
3. Remove the fuses from the output modules.

The fuses and covers are replaced after installation is complete and all connections have been made. For fuse replacement details refer to:

[p.61 — Replacing module fuses](#)

CHAPTER 14: POWER SUPPLY CONNECTIONS

CHAPTER CONTENTS

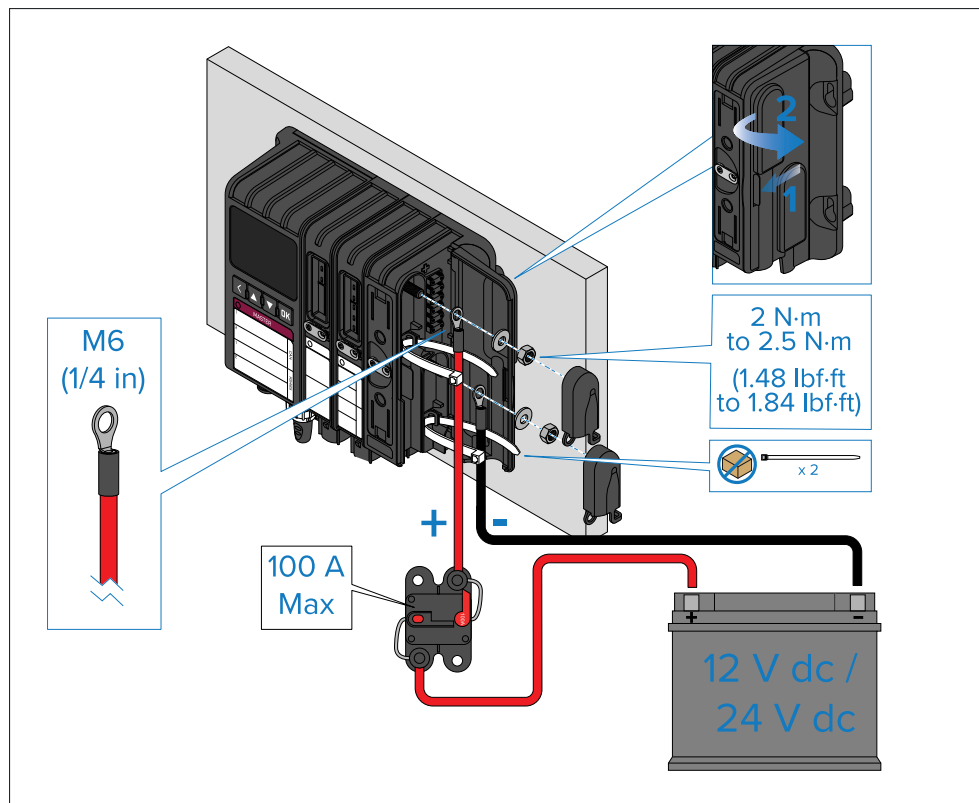
- [14.1 Connecting the power supply — page 65](#)

14.1 Connecting the power supply

The Power supply module is supplied with the Master module and Remote modules, and provides power to the system and connected devices.

Note:

An appropriately-rated 2-core power cable is required.



1. Ensure the power supply source is switched off.
2. Open the door on the side of the Power supply module by pulling the tab forwards whilst opening the door.
3. Remove the protective covers from the power connection studs, leaving them attached to the Power supply module.

Important:

The protective covers are attached to the Power supply module by lanyards. Do NOT disconnect the protective covers from the Power supply module.

4. Remove the nuts and washers from the power connection studs.
5. Feed cable ties (not supplied) through the cable tie slots.

2 x cable ties up to 5 mm x 1 mm in size can be used.

6. Crimp M6 (1/4 in) ring crimps to the end of the positive and negative power supply cables.

An appropriately sized cable should be used, based on the system's current draw and distance from the power source.

7. Slide the power cable's ring crimps over the power connection studs and secure using the washers and nuts. The nuts should be tightened to a torque of 2 to 2.5 N·m (1.48 to 1.84 lbf·ft), using a torque wrench and 10 mm (1/2 in) socket.

Important:

To prevent potential damage to the module, do not over-tighten the fixings.

8. Secure power cables using the cable ties, and then trim cable tie ends.
9. Apply silicone or copper grease to the exposed power connections.

Important:

Do NOT use mineral-based greases or anti-seize (such as *Denso* paste), as this can damage the module's plastic housing.

10. Replace protective covers and close the Power supply module door.
11. Use an appropriately-rated waterproof thermal circuit breaker or inline fuse (100A maximum), fitted to the **positive** power supply cable.

Important:

Do NOT switch on the power supply until ALL fuses have been checked and fitted.



Warning: Power supply door

The power supply module's door must remain securely closed whilst the system is powered on. If access to the power supply module's power connection compartment is required, switch off the power supply to the system before opening the door.

Caution: Power supply protection

When installing this product ensure the power source is adequately protected by means of a suitably-rated fuse or thermal circuit breaker.

Thermal breaker / inline fuse rating

It is recommended that a thermal circuit breaker is fitted to the positive power supply cable. Alternatively a suitably-rated inline fuse can be used.

Power supply

The rating for the thermal circuit breaker / fuse should be based on the total current draw of your system.

The Master system and Remote systems are each capable of drawing up to a maximum of 100A.

Module

Each output channel should be fused with a fuse rated appropriately for the current draw of that channel.

Important:

Each output module is supplied with the maximum rated fuse for the channel (e.g.: The High power module is supplied with a 30A fuse fitted to each channel). Ensure that if required, the fuses are changed to reflect the actual current draw of the devices connected to each channel.

Power cable requirements

A 2-core power cable is required. The gauge of the power cable will be determined by the system's distance from the power supply, the total current draw of the system, and the vessel's voltage.

The following requirements need to be taken into account when selecting a power cable:

- The gauge of the power cable needs to be calculated based on the supply voltage, current draw of the system and connected devices, and the required length of cable.
- The Power supply module can accept cable up to 4 AWG (25 mm²) and some instances of 2 AWG (35 mm²).
- M6 (1/4 in) crimp rings should be crimped to the Power supply module end of the cables.
- The power supply end of the cable should be connected via the vessel's main power distribution point or directly to a battery.
- An appropriately-rated inline thermal circuit breaker or fuse must be connected to the positive cable.
- There should be a continuous minimum voltage of 10.8 V dc on a 12 V system, and 21.6 V dc on a 24 V system at the end of the cable where it connects to the product. (Do not assume that a flat battery is at 0 V dc. Due to the discharge profile and internal chemistry of batteries, the current drops much faster than the voltage. A "fully flat" battery still shows a positive voltage of up to 11 V dc, even if it doesn't have enough current to power your device.)

Power distribution

Recommendations and best practice.

- The product is NOT supplied with a power cable. An appropriately rated 2 core power cable is required.
- Refer to the *Power connection* section for more information on how to identify where to connect the power cable on your product.
- See below for more information on implementation for some common power distribution scenarios:

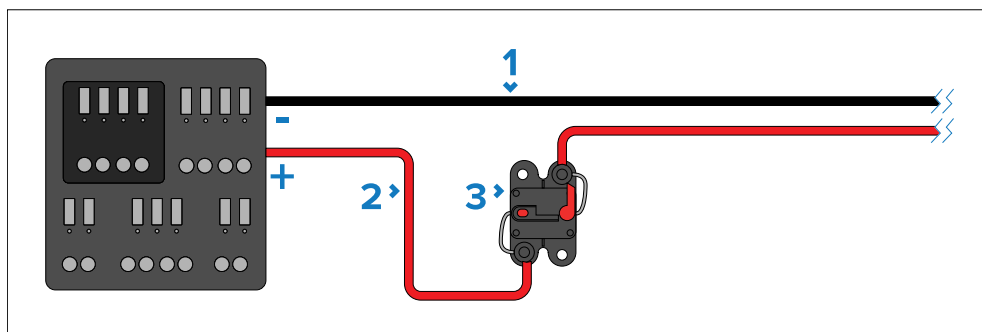
Important:

Ensure that the negative power cable (0 V return) of the system is connected to the same battery negative as all input and output devices that are being controlled or monitored by that system.

Note:

- When planning and wiring, take into consideration other products in your system, some of which (e.g. sonar modules) may place large power demand peaks on the vessel's electrical system, which may impact the voltage available to other products during the peaks.
- The information provided below is for guidance only, to help protect your product. It covers common vessel power arrangements, but does NOT cover every scenario. If you are unsure how to provide the correct level of protection, please consult an authorized dealer or a suitably qualified professional marine electrician.

Implementation — connection to distribution panel



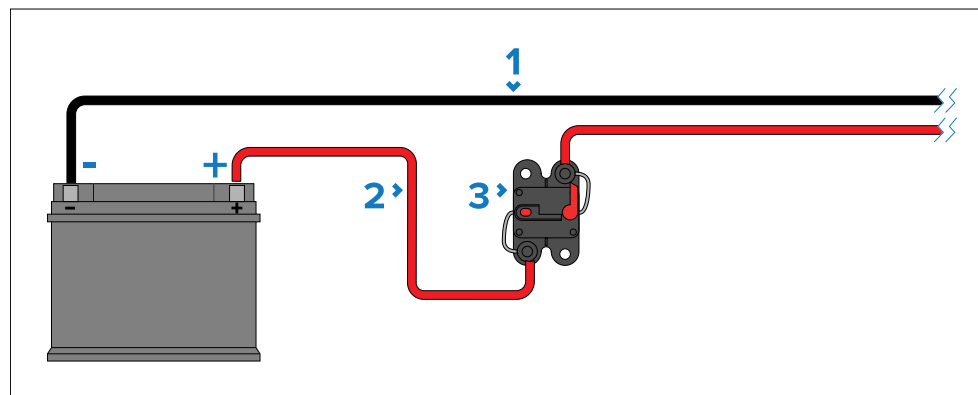
1. Power supply negative (-) Black wire
 2. Power supply positive (+) Red wire
 3. Waterproof thermal circuit breaker or inline fuse (rating determined by system current draw).
- It is recommended that the supplied power cable is connected to a suitable breaker or switch on the vessel's distribution panel or factory-fitted power distribution point.

Power supply connections

- The distribution point should be fed from the vessel's primary power source.

Implementation — direct connection to battery

- Where connection to a power distribution panel is not possible, the power cable supplied with your product may be connected directly to the vessel's battery, via a suitably rated fuse or breaker.



1. Power supply negative (-) Black wire
2. Power supply positive (+) Red wire
3. Waterproof thermal circuit breaker or inline fuse (rating determined by system current draw).

More information

It is recommended that best practice is observed in all vessel electrical installations, as detailed in the following standards:

- BMEA Code of Practice for Electrical and Electronic Installations in Boats
- NMEA 0400 Installation Standard
- ISO 13297: Small craft — Electrical systems — Alternating and direct current installations
- ISO 10133: Small craft — Electrical systems — Extra-low-voltage d.c. installations
- ABYC E-11 AC & DC Electrical Systems on Boats
- ABYC A-31 Battery chargers and Inverters

- ABYC TE-4 Lightning Protection



Warning: Positive ground systems

Do not connect this unit to a system which has positive grounding.

CHAPTER 15: NETWORK CONNECTIONS

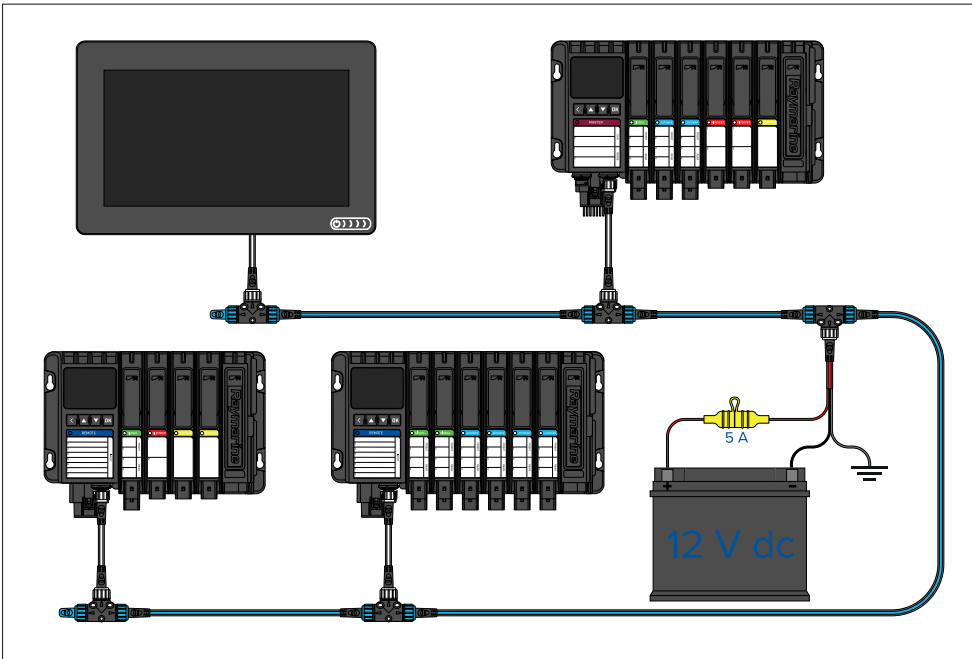
CHAPTER CONTENTS

- [15.1 SeaTalk NG connection — page 70](#)
- [15.2 RayNet network connection — page 76](#)

15.1 SeaTalk NG connection

The Master module must be connected to a chartplotter (MFD) via a SeaTalk NG backbone. Remote modules must be connected to the Master module via the same SeaTalk NG backbone. Depending on the complexity of the system, the SeaTalk NG backbone may need to be a dedicated backbone for your YachtSense DCS-Series Digital Control System.

Example — Dedicated SeaTalk NG system



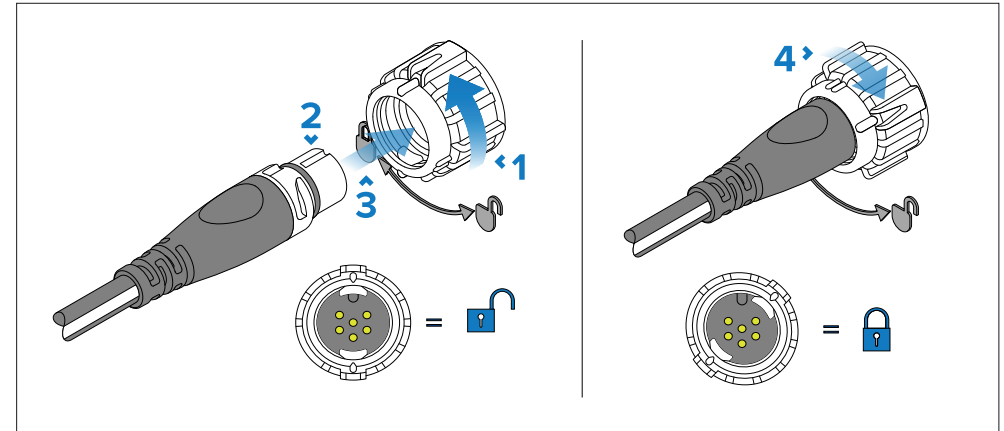
Note:

For simplicity, the example above shows a SeaTalk NG network dedicated to YachtSense DCS-Series Digital Control System, however other SeaTalk NG devices can be connected.

Note:

The illustration above shows only the dedicated power supply for the SeaTalk NG network. Additionally, the chartplotter (MFD) and each Master system and Remote system require their own power supplies.

Connecting SeaTalk NG cables



1. Rotate your product's SeaTalk NG connector locking collar counter clockwise, so that the connector is in the unlocked position.
2. Ensure the cable's connector is correctly oriented (groove pointing up).
3. Fully insert the cable connector.
4. Rotate the locking collar clockwise (2 clicks) until it is in the locked position.

SeaTalk NG power supply

A SeaTalk NG backbone requires a single 12 V dc power supply. Power can be supplied to the SeaTalk NG backbone by one of the following methods:

- (1) Direct connection to a 12 V dc battery using an inline 5 amp fuse.
- Connection to a 12 V dc distribution panel using a 3 amp thermal breaker.
- (2) Connection to the SeaTalk NG connector of an Autopilot Control Unit (ACU-Series) (not ACU-SeriesACU-100 or ACU-SeriesACU-150), or an SPX-Series course computer (not SPX-Series-5).
- For 24 V vessels, connection must be via a 5 amp, regulated, continuous 24 V dc to 12 V dc converter.

Note:

- ⁽¹⁾ The battery used for starting the vessel's engine(s) should NOT be used to power the SeaTalk NG backbone, as this can cause sudden voltage drops when the engines are started.
- ⁽²⁾ The ACU-Series ACU-100, ACU-Series ACU-150 or SPX-Series-5 cannot be used to power the SeaTalk NG backbone.
- The ACU-Series's/SPX-Series's SeaTalk NG connector includes a power switch that must be in the On position to provide power to the backbone.

Inline fuse and thermal breaker ratings

The SeaTalk NG network's power supply requires a suitably-rated inline fuse or thermal breaker to be fitted.

Inline fuse rating	Thermal breaker rating
5A	3A (refer to note below)

Note:

The suitable fuse rating for the thermal breaker is dependent on:

1. How many devices you have connected to your SeaTalk NG network, and;
2. How many devices are sharing the same thermal breaker that your SeaTalk NG network is connected to.



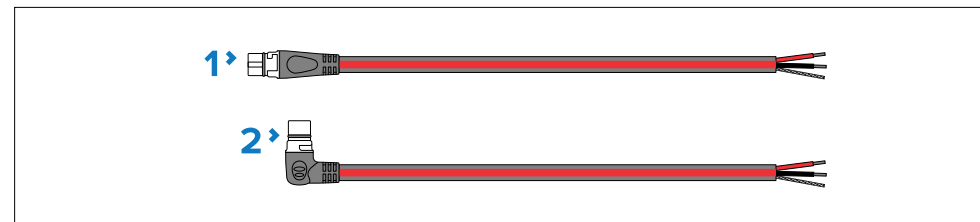
Warning: 12 Volt dc only

This product must ONLY be connected to a 12 V dc power source.

SeaTalk NG power cables

The following SeaTalk NG power cables can be used to connect the backbone to your chosen **12 V dc** power supply:

Direct connection cables



1. Standard (straight) SeaTalk NG power cable, 2 m (6.6 ft) (part number: **A06049**).
2. Elbow (right-angled) SeaTalk NG power cable, 2 m (6.6 ft) (part number: **A06070**).

Wiring

- **+ Red (positive) wire** — connects to the battery or distribution panel positive terminal. A waterproof fuse holder with 5 A inline fuse (not supplied) must be fitted to this red wire.
- **– Black (negative) wire** — connects to battery or distribution panel negative terminal.
- **Drain wire** — connects to the vessel's RF common ground point (if available), or the battery's negative (-) terminal.

Autopilot Control Unit connection cable



1. ACU-Series/SPX-Series autopilot to SeaTalk NG spur cable, 0.3 m (1.0 ft) (part number **R12112**). Connects the course computer to the SeaTalk NG backbone. This connection can also be used to provide 12 V dc power to the SeaTalk NG backbone.

SeaTalk NG product loading

The number of products that can be connected to a SeaTalk NG backbone depends on the current draw of each product and the physical length of the backbone cabling.

NMEA 2000 Load Equivalency Numbers (LEN) are used to express the amount of current that is drawn from SeaTalk NG products (**1 LEN = 50 mA**). The LEN for each product can be found in the product's *Technical Specification*.

Products which have a dedicated power supply connection that are connected to the SeaTalk NG backbone will still have an LEN rating. This is because the product's NMEA 2000/SeaTalk NG internal transceiver will still be powered by the SeaTalk NG backbone.

LENs are used to determine the power connection point for the SeaTalk NG backbone.

SeaTalk NG power connection point

The point along the backbone where the power connection should be made is based on the length of the backbone.

Note:

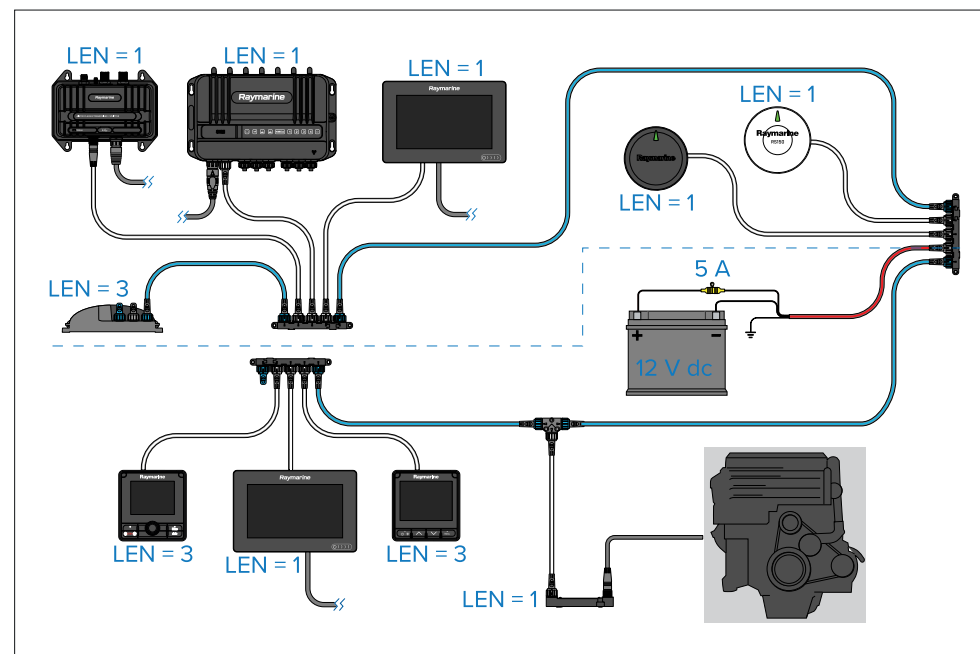
- A 12 V dc power supply must be connected to a *white* spur SeaTalk NG connection on the backbone.
- Do NOT connect the power connection to a *blue* SeaTalk NG backbone connector.
- **With the exception of** the iTC-5 and the backbone itself, do NOT connect the power supply directly to a product's *white* SeaTalk NG spur connector.

Small systems

If the backbone length is 60 m (197 ft) or less, the power connection may be made at any point in the backbone.

Large systems

If the backbone length is greater than 60 m (197 ft), the power connection should be made at a point that creates a balanced current draw from each side of the backbone. Load Equivalency Numbers (LEN) are used to determine the power connection point for the system.



In the example above, the system has an overall LEN of 16, so the optimum connection point would be to have a loading of 8 LEN either side of the connection point.

SeaTalk NG system loading

The maximum loading (LEN) for a SeaTalk NG system depends on the length of the backbone.

Unbalanced system loading:

- **Backbone Length:** 0 m (0 ft) to 20 m (66 ft) — **Maximum LEN:** 40
- **Backbone Length:** > 20 m (66 ft) to 40 m (131 ft) — **Maximum LEN:** 20
- **Backbone Length:** > 40 m (131 ft) to 60 m (197 ft) — **Maximum LEN:** 14

Balanced system loading:

- **Backbone Length:** 0 m (0 ft) to 60 m (197 ft) — **Maximum LEN:** 100
- **Backbone Length:** > 60 m (197 ft) to 80 m (262 ft) — **Maximum LEN:** 84
- **Backbone Length:** > 80 m (262 ft) to 100 m (328 ft) — **Maximum LEN:** 60
- **Backbone Length:** > 100 m (328 ft) to 120 m (394 ft) — **Maximum LEN:** 50

- **Backbone Length:** > 120 m (394 ft) to 160 m (525 ft) — **Maximum LEN:** 40
- **Backbone Length:** > 160 m (525 ft) to 200 m (656 ft) — **Maximum LEN:** 32

Power distribution — SeaTalk NG

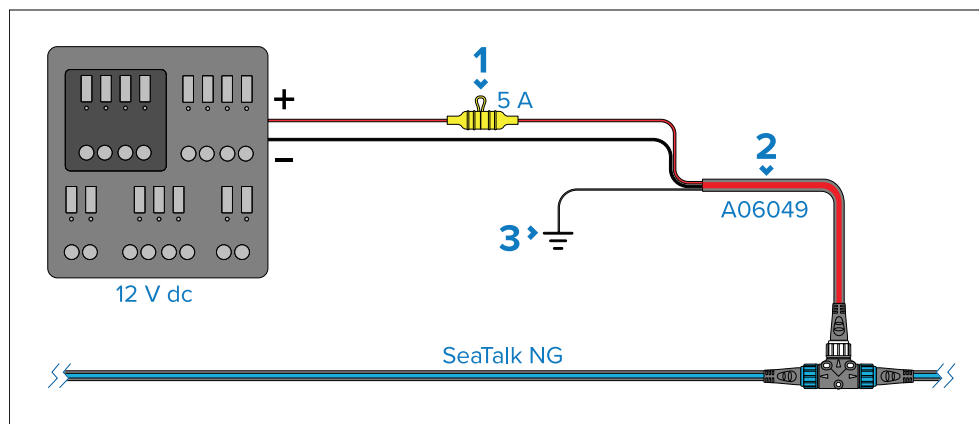
Recommendations and best practice.

- Only use approved SeaTalk NG power cables. Do NOT use a power cable designed for, or supplied with, a different product.
- See below for more information on implementation for some common power distribution scenarios.

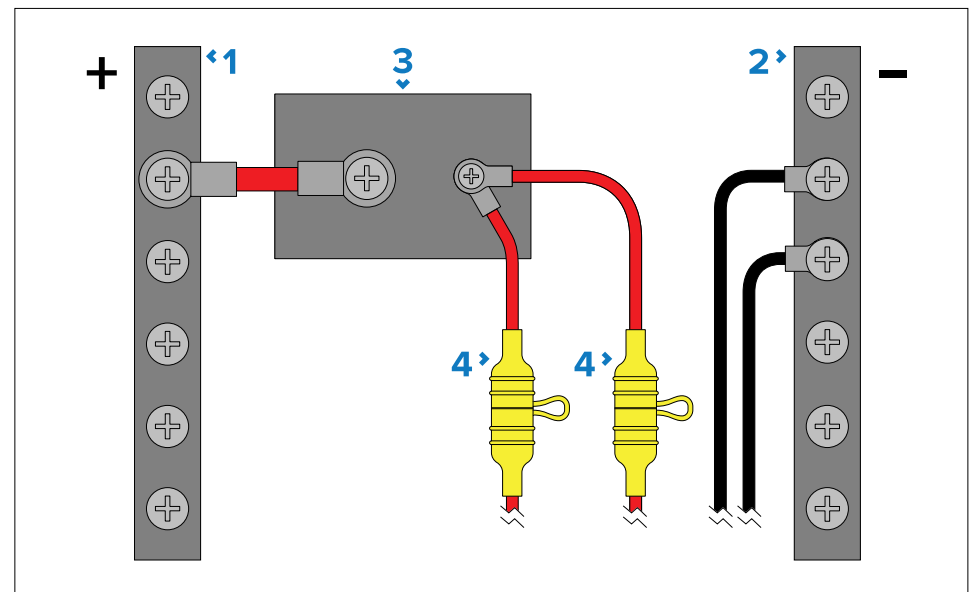
Important:

- When planning and wiring, take into consideration other products in your system, some of which (e.g. sonar modules) may place large power demand peaks on the vessel's electrical system, which may impact the voltage available to other products during the peaks.
- The information provided below is for guidance only, to help protect your product. It covers common vessel power arrangements, but does NOT cover every scenario. If you are unsure how to provide the correct level of protection, please consult an authorized Raymarine dealer or a suitably qualified professional marine electrician.

Implementation — connection to distribution panel (recommended)



1. Waterproof fuse holder with 5 A inline fuse must be fitted (not supplied).
 2. SeaTalk NG power cable.
 3. RF Ground connection point for drain wire.
- Ideally, the SeaTalk NG power cable should be connected to a suitable breaker or switch on the vessel's distribution panel or factory-fitted power distribution point. It is recommended that a 5 A inline fuse is fitted to the red (positive) wire of the SeaTalk NG power cable.
 - The distribution point should be fed from the vessel's primary power source by 8 AWG (8.36 mm²) cable.
 - Ideally, all equipment should be wired to individual suitably-rated thermal breakers or fuses, with appropriate circuit protection. Where this is not possible and more than one item of equipment shares a breaker, use individual in-line fuses for each power circuit to provide the necessary protection.



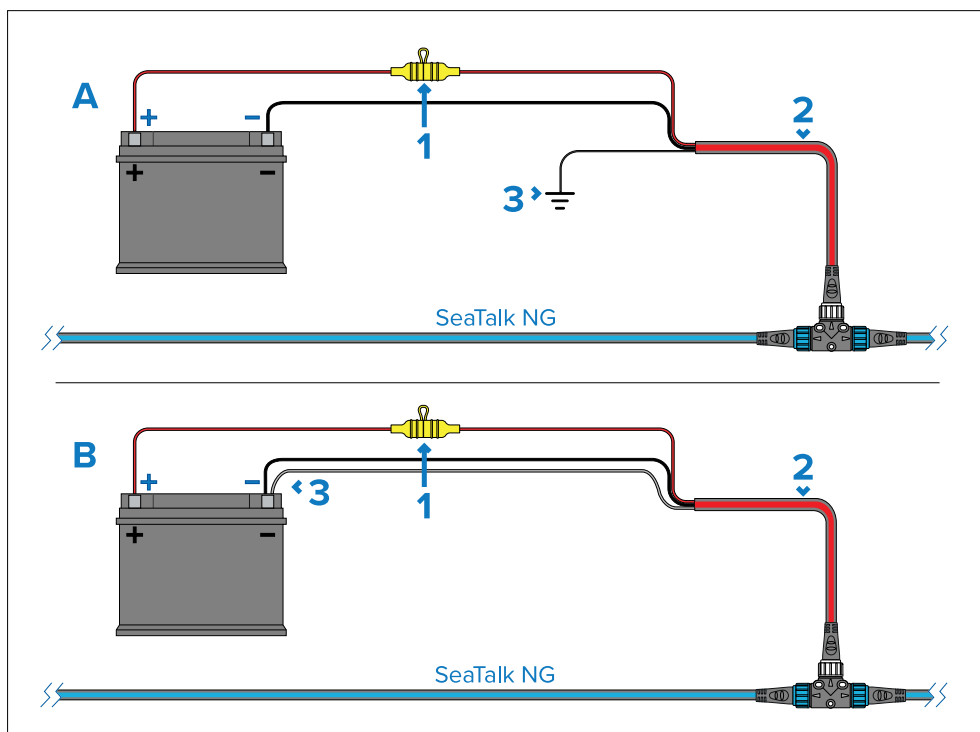
1. Positive (+) bar
2. Negative (-) bar
3. Circuit breaker
4. Waterproof fuse holder with 5 A inline fuse must be fitted (not supplied).

Important:

Observe the recommended fuse / breaker ratings provided in the product's documentation, however be aware that the suitable fuse / breaker rating is dependent on the number of devices being connected.

Implementation — direct connection to battery

- Where connection to a power distribution panel is not possible, the power cable may be connected to the vessel's battery.
- You **MUST** fit a 5 A inline fuse between the red wire and the battery's positive terminal.
- If you need to extend the length of the power cable, ensure you use suitably rated cable and that sufficient power (12 V dc) is available at the SeaTalk NG backbone's power connection.



1. Waterproof fuse holder with 5 A inline fuse must be fitted (not supplied).
2. SeaTalk NG power cable.

3. Connection point for drain wire.

Battery connection scenario A:

Suitable for a vessel with a common RF ground point. In this scenario, the power cable's drain wire should be connected to the vessel's common RF ground point.

Battery connection scenario B:

Suitable for a vessel without a common RF ground point. In this scenario the power cable's drain wire should be connected directly to the battery's negative terminal.

SeaTalk NG Power cable extension

If you need to extend the length of the SeaTalk NG power cable, ensure you use suitably-rated cable, and that sufficient power is available at the SeaTalk NG backbone's power connection point:

- For power cable extensions, a **minimum** wire gauge of 16 AWG (1.31 mm²) is recommended. For cable runs longer than 15 m (49.2 ft), you may need to consider a thicker wire gauge (e.g. 14 AWG (2.08 mm²), or 12 AWG (3.31 mm²).
- To ensure power cables (including any extension) are of a sufficient gauge, ensure that there is a continuous **minimum** voltage of **10.8 V dc** at the end of the cable where it enters the product's power connector, even with a fully flat battery at 11 V dc. (Do not assume that a flat battery is at 0 V dc. Due to the discharge profile and internal chemistry of batteries, the current drops much faster than the voltage. A "fully flat" battery still shows a positive voltage, even if it doesn't have enough current to power your device.)

Important:

Be aware that some products in your system (such as sonar modules) can create voltage peaks at certain times, which may impact the voltage available to other products during the peaks.

More information

It is recommended that best practice is observed in all vessel electrical installations, as detailed in the following standards:

- BMEA Code of Practice for Electrical and Electronic Installations in Boats

- NMEA 0400 Installation Standard
- ISO 13297: Small craft — Electrical systems — Alternating and direct current installations
- ISO 10133: Small craft — Electrical systems — Extra-low-voltage d.c. installations
- ABYC E-11 AC & DC Electrical Systems on Boats
- ABYC A-31 Battery chargers and Inverters
- ABYC TE-4 Lightning Protection



Warning: 12 Volt dc only

This product must **ONLY** be connected to a 12 V dc power source.



Warning: Product grounding

Before applying power to this product, it **MUST** be correctly grounded, in accordance with the instructions provided.



Warning: Positive ground systems

Do not connect this unit to a system which has positive grounding.

Power connection via Autopilot Control Unit (ACU-Series)

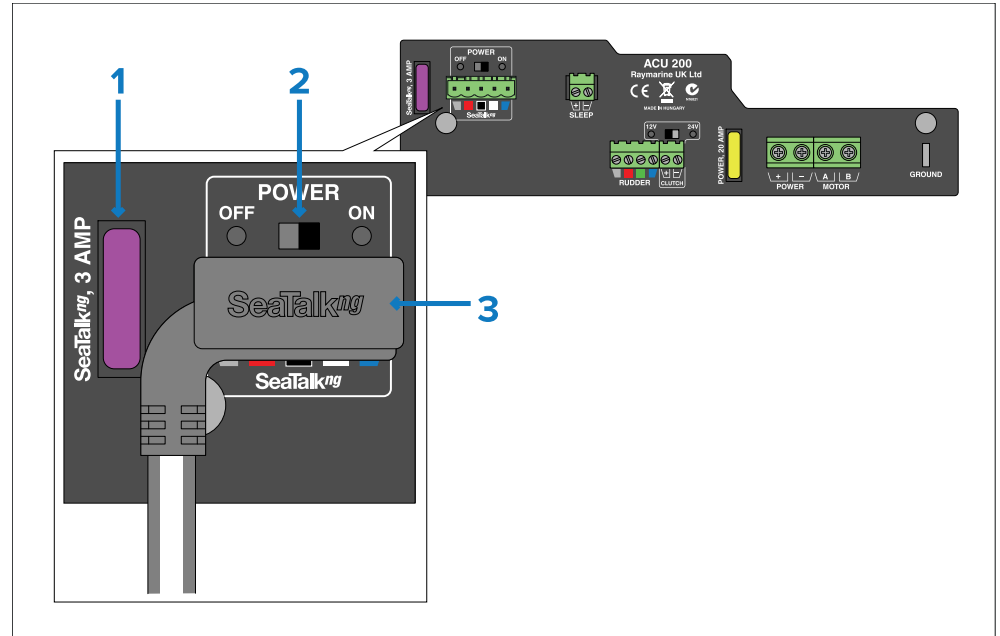
The SeaTalk NG backbone can be supplied 12 V dc power from a compatible Raymarine Autopilot Control Unit (ACU-Series).

Important:

The SeaTalk NG backbone must have a single power supply connection. If your SeaTalk NG backbone is supplied power directly from a battery or distribution panel, then you must ensure that the SeaTalk NG power switch on your ACU-Series is switched Off.

Note:

ACU-100, ACU-150 and SPX-5 autopilot control units cannot supply power to the SeaTalk NG backbone.



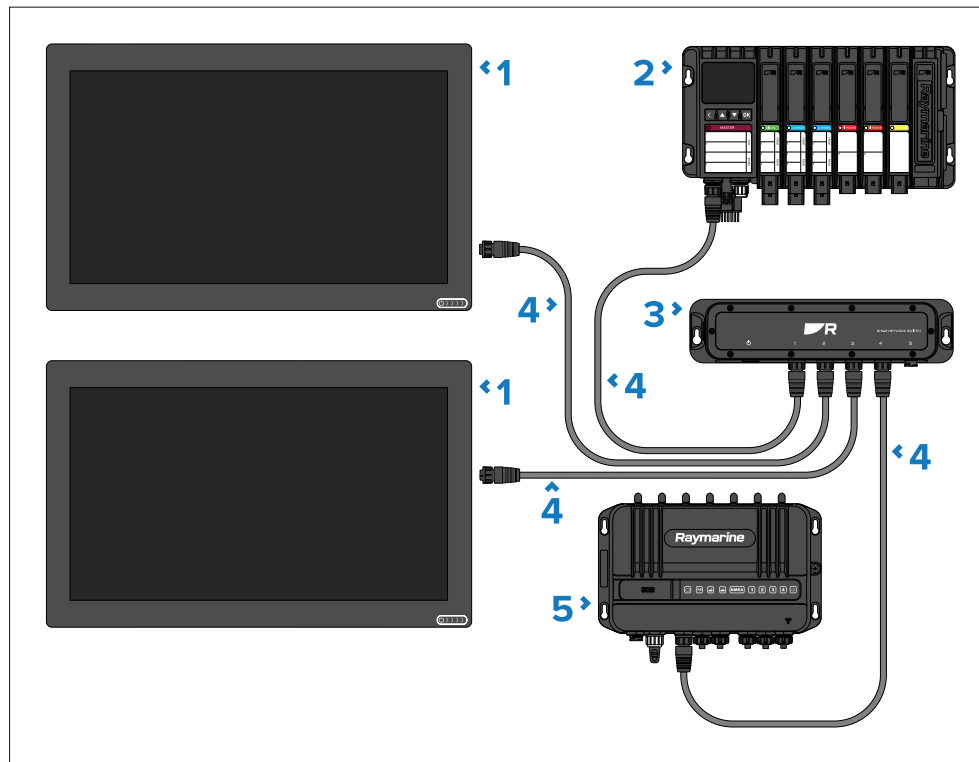
1. Fuse for SeaTalk NG power supply.
2. Power switch for SeaTalk NG power supply:
 - a. Select the *[OFF]* position if your SeaTalk NG backbone is supplied power directly from a battery or distribution panel.
 - b. Select the *[ON]* position if your SeaTalk NG backbone is supplied power by the ACU-Series.
3. ACU-Series/SPX-Series autopilot to SeaTalk NG spur cable (part number: R12112).

15.2 RayNet network connection

The Master module communicates with Raymarine Axiom-Series and Axiom 2-Series chartplotters (MFDs) using the RayNet connection.

Note:

- The example below uses a network switch, however the Master module can also be connected directly to a chartplotter's (MFD's) RayNet network connection.
- In addition to the RayNet network connection the chartplotter (MFD) must also be on the same SeaTalk NG backbone as the Master module.
- In addition to the RayNet network connection the YachtSense Link-Series YachtSense Link router must also be on the same SeaTalk NG backbone as the Master module.



1. Axiom-Series/Axiom 2-Series MFDs.

2. YachtSense DCS-Series Digital Control System — Master system.
3. RayNet network switch
4. RayNet network cabling.
5. YachtSense Link-Series YachtSense Link router.

Connecting cables

Follow the steps below to connect the cable(s) to your product.

1. Ensure that the vessel's power supply is switched off.
2. Ensure that the device being connected has been installed in accordance with the installation instructions supplied with that device.
3. Ensuring correct orientation, push cable connectors fully onto the corresponding connectors.
4. Engage any locking mechanism to ensure a secure connection (e.g.: turn locking collars clockwise until tight, or in the locked position).
5. Ensure any bare ended wire connections are suitably insulated to prevent shorting and corrosion due to water ingress.

CHAPTER 16: MOLEX® CONNECTOR CONNECTIONS

CHAPTER CONTENTS

- 16.1 Molex® connectors — page 78
- 16.2 Molex® connector types and keying — page 78
- 16.3 Removing connectors from modules — page 78
- 16.4 Removing seal plugs — page 79
- 16.5 Inserting seal plugs — page 79
- 16.6 Wiring the connectors — page 79
- 16.7 Connecting Molex® connectors to modules — page 81

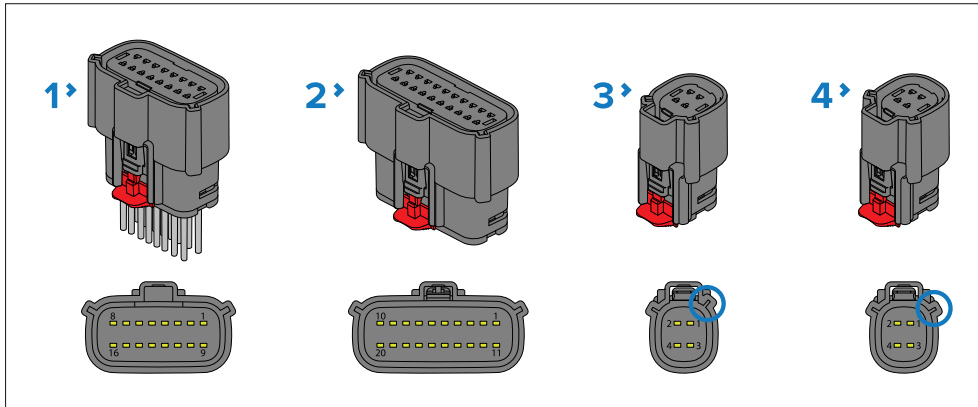
16.1 Molex® connectors

The YachtSense DCS-Series Digital Control System uses Molex® MX150 Industrial sealed connectors.

These connectors are designed for the harsh marine environment.

16.2 Molex® connector types and keying

The types of connectors used and their keying is shown below



1. Master module 16-pin connector (Molex® part number: 334721601)
2. Remote module 20-pin connector (Molex® part number: 334722001)
3. Signal module 4-pin connector (Molex® part number: 334724002)
4. Output module 4-pin connector (Molex® part number: 334724001)

Note:

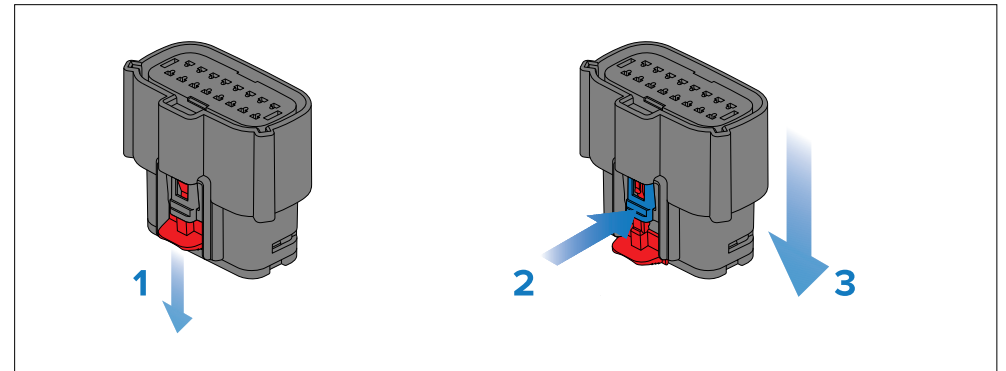
The connectors used for the Signal module and Output modules are keyed differently.

16.3 Removing connectors from modules

Connectors are supplied fitted to the modules, to remove the connector from the module follow the steps below.

Note:

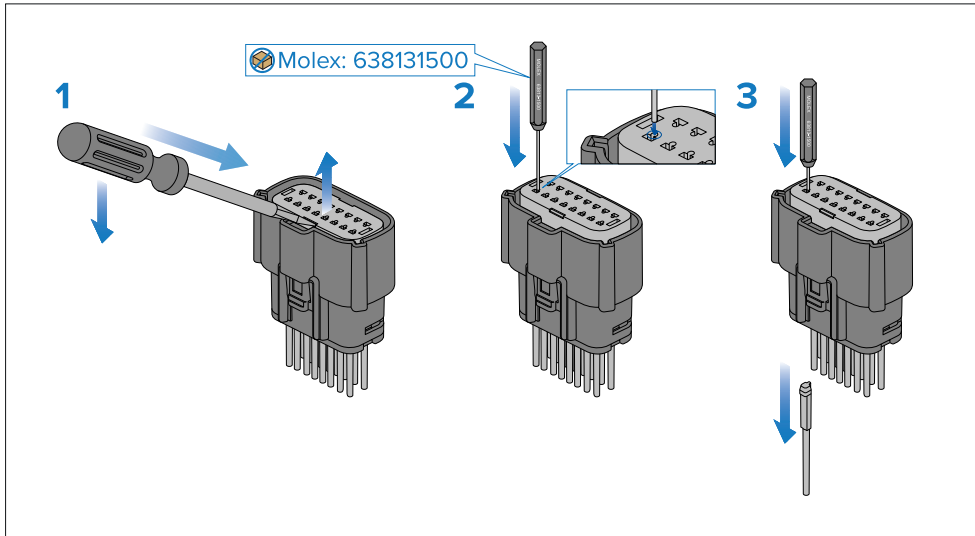
- If your connector does not include the Red locking tag (known as the CPA (Connector Position Assurance)) then ignore step 1.
- The illustration below depicts the Master module connector, however the procedure is the same for any of the Molex® connectors used with YachtSense DCS-Series (Digital Control System).



1. If required, pull the Red locking tag down into the unlocked position.
2. Press the latch in.
3. Whilst the latch is pressed pull the connector straight down away from the module.

16.4 Removing seal plugs

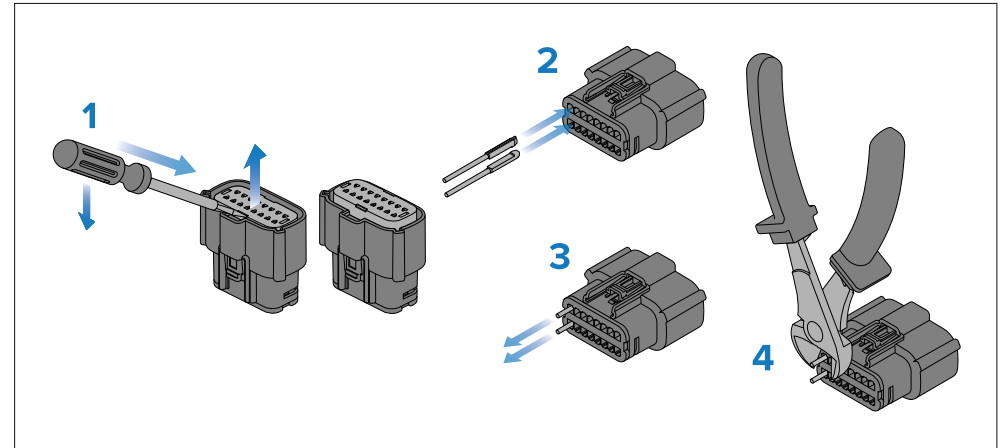
The connector supplied with the Master module is supplied with seal plugs fitted to each of its 16 terminals. To wire the connector the relevant seal plugs will need to be removed. Follow the steps below to remove seal plugs from the connectors.



1. Insert a small flat blade screwdriver into the pry point and using the connector housing as a pivot point, pry out the connector insert, known as the TPA (Terminal Position Assurance), until it reaches the pre-lock position.
2. Insert the 1.50 mm (0.59 in) diameter Molex® tool (part number: 638131500) into the terminal service hole adjacent to the relevant terminal.
3. Push the tool straight down, applying pressure to release the seal plug and remove the seal plug from the rear face of the connector.

16.5 Inserting seal plugs

To protect against water ingress, connector terminals that will not be wired require seal plugs (Molex® part number: 343450001) to be fitted.



Important:

- Ensure seal plugs are fitted and trimmed before wiring the connector terminals.

1. If required, insert a small flat blade screwdriver into the pry point and using the connector housing as a pivot point, pry out the connector insert, known as the TPA (Terminal Position Assurance), until it reaches the pre-lock position.
2. Ensuring correct orientation, insert the seal plug into the rear face of the connector.
3. Pull back on the seal plug to ensure it has locked into place.
4. Trim the end of the seal plug, protruding from the back of the connector.
5. Repeat steps 2 to 4 for each terminal that will not be wired.

16.6 Wiring the connectors

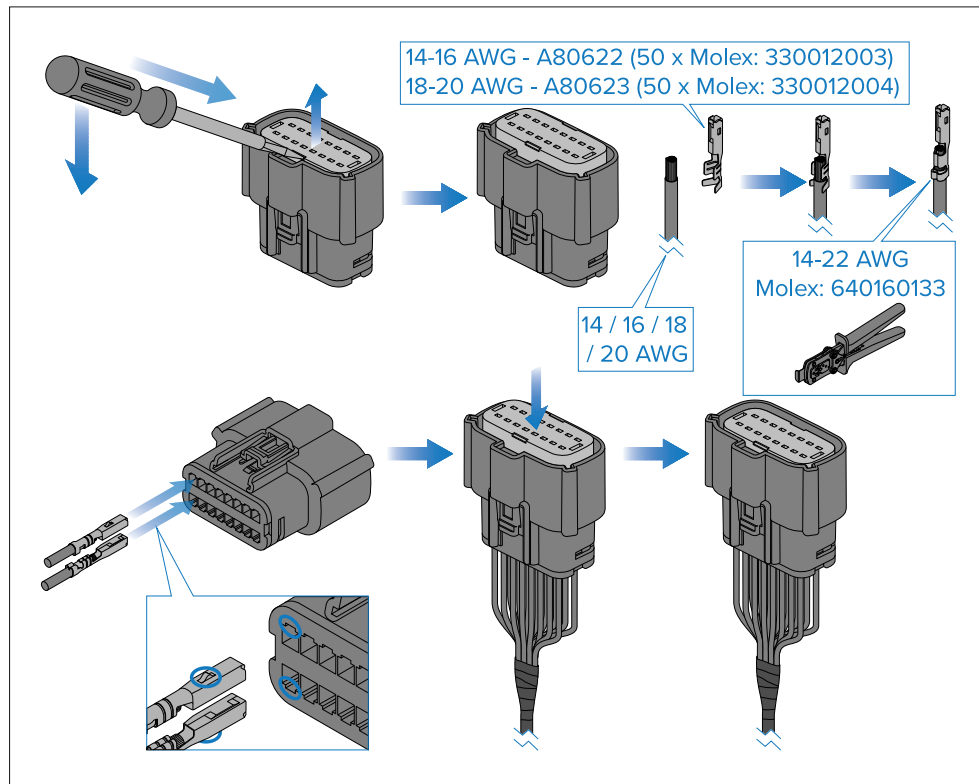
Follow the instructions below to wire the connector terminals.

When wiring the connector the appropriate size female receptacle crimps are required:

- For 14 and 16 AWG wire Molex® crimps 330012003 are required.
- For 18 and 20 AWG wire Molex® crimps 330012004 are required.

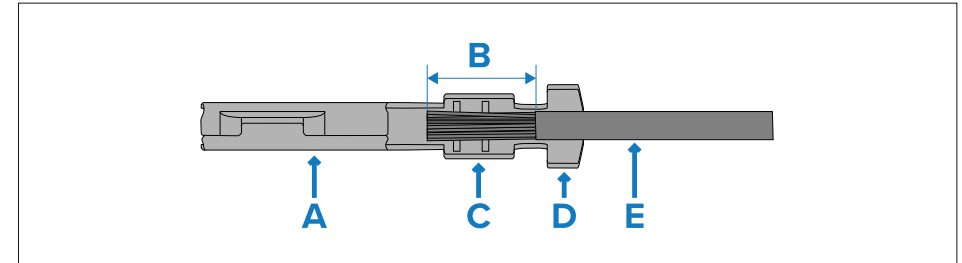
Important:

- To protect against water ingress fit seal plugs (Molex® part number: 343450001) to any unused terminals.
- Ensure seal plugs are fitted and trimmed before fitting wiring the connector terminals.



1. Disconnect the connector from the module.
2. If, required, insert a small flat blade screwdriver into the pry point and using the connector housing as a pivot point, pry out the connector insert, known as the TPA (Terminal Position Assurance), until it reaches the pre-lock position.

3. Ensure seal plugs have been fitted to any terminals that will not be wired. For instructions on inserting seal plugs see: [p.79 — Inserting seal plugs](#)
4. Prepare each wire by stripping the insulation by 4.70 mm (0.19 in) to 5.60 mm (0.22 in).
5. Place the wire in a female receptacle crimp so that the exposed copper is level with the end of the conductor crimp and the insulation protrudes slightly from the end of the insulation crimp.



- A — Female crimp connector
- B — Exposed copper – 4.70 mm (0.19 in) to 5.60 mm (0.22 in).
- C — conductor crimp
- D — Insulator crimp
- E — Wire insulation

6. Using an appropriate crimping tool, crimp the connector.

(Molex® 14–22 AWG hand crimp tool (Molex® part number: 640160133))

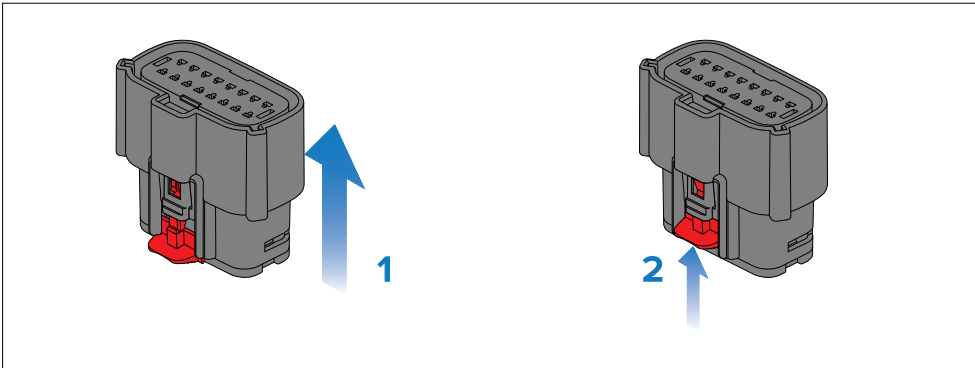
7. Ensuring correct orientation, insert the wire crimp connector into the relevant connector terminal.
8. Pull back on the wire to ensure it has locked into place.
9. Repeat steps 4 to 8 for each wire that is required.
10. Once all wires and any seal plugs have been inserted, push down on the connector insert (known as the TPA (Terminal Position Assurance) until it clicks and reaches the locked position.
11. If required, tape wires together approximately 30 mm (1.18 in) below the bottom of the connector using suitable insulation tape, leave

16.7 Connecting Molex® connectors to modules

Follow the steps below to connect Molex® connectors to modules.

Note:

- If your connector does not include the Red locking tag (known as the CPA (Connector Position Assurance)) then ignore step 2.
- The illustration below depicts the Master module connector, however the procedure is the same for any of the connectors used with YachtSense DCS-Series Digital Control System.



1. Ensuring correct orientation push the connector straight up into the relevant connection on the bottom of the module.
2. Push the Red locking tag up into the locked position.

CHAPTER 17: YACHTSENSE DCS-SERIES APP

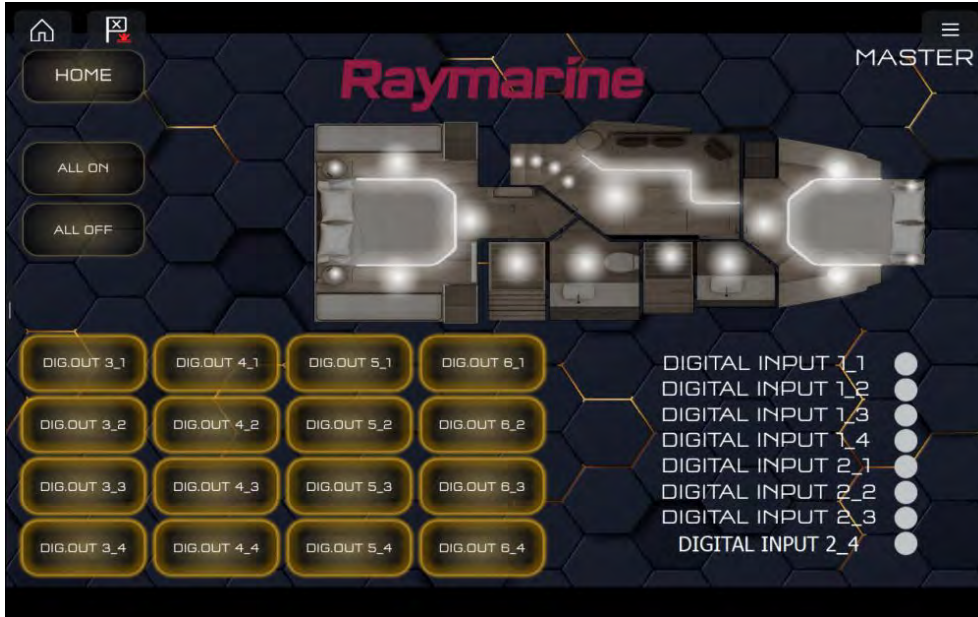
CHAPTER CONTENTS

- [17.1 YachtSense DCS-Series app overview — page 83](#)
- [17.2 YachtSense DCS-Series app menu — page 83](#)
- [17.3 Splitscreen app pages — page 84](#)

17.1 YachtSense DCS-Series app overview

Control and monitoring of YachtSense DCS-Series Digital Control Systems is achieved using the YachtSense DCS-Series app.

Example YachtSense DCS-Series app page



The *[YachtSense]* app is available on Axiom-Series and Axiom 2-Series chartplotters (MFDs) when a YachtSense Link-Series Digital Control System is detected on the Ethernet network. If the system is not detected then a “not detected” message will be displayed when the app is opened.

The YachtSense DCS-Series app will typically be added to the Homescreen during configuration. Additional app pages with different layouts can be added in the same way as any other Homescreen app page.

The pages available in the YachtSense DCS-Series app are bespoke for each individual installation/configuration.

The pages will include navigation buttons so that all pages can be viewed.

Tripped channels can be viewed from the app menu: *[Menu > Tripped channels]*.

Data overlays can be added to the app from the *[Settings]* menu: *[Menu > Settings > Edit data overlays]*.

YachtSense DCS-Series app

17.2 YachtSense DCS-Series app menu



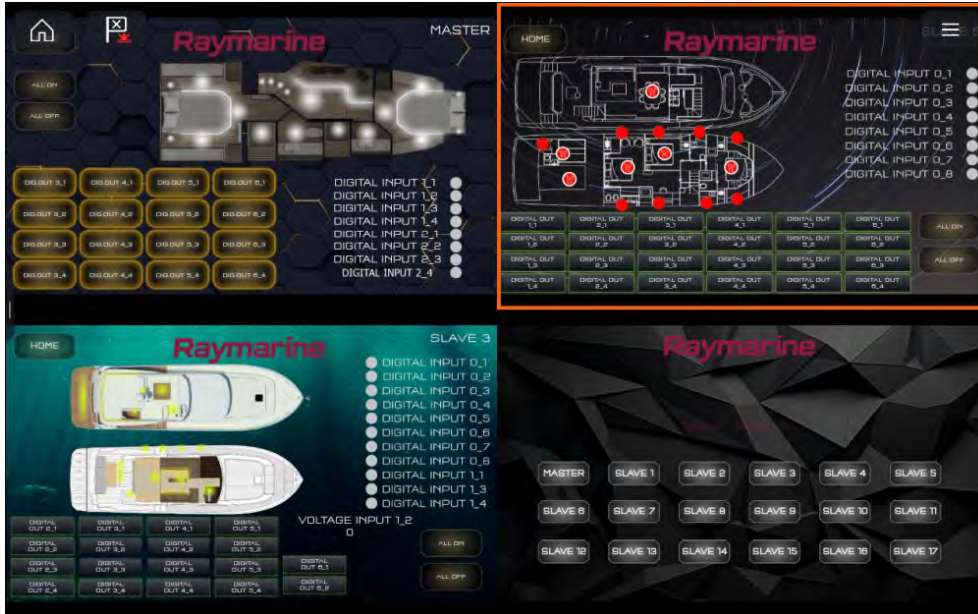
Tripped channels can be viewed from the app menu: *[Menu > Tripped channels]*.

Data overlays can be added to the app from the *[Settings]* menu: *[Menu > Settings > Edit data overlays]*.

17.3 Splitscreen app pages

The YachtSense DCS-Series app can be displayed in Splitscreen and Fullscreen app pages. The YachtSense DCS-Series Digital Control System must be configured to allow use of splitscreen pages.

Example YachtSense quad app page



Splitscreen app pages enable multiple YachtSense DCS-Series Digital Control System pages to be viewed at the same time on the same screen.

Splitscreen app pages also allows YachtSense DCS-Series Digital Control System pages to be viewed at the same time as other MFD apps, such as the Chart or Radar app etc.

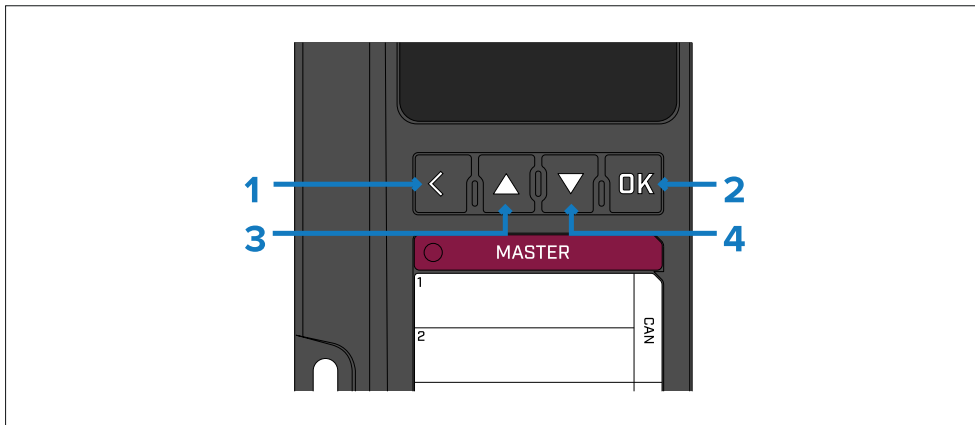
CHAPTER 18: OPERATIONS

CHAPTER CONTENTS

- 18.1 Controls — page 86
- 18.2 Default page — page 86
- 18.3 Menu — page 86
- 18.4 Channels pages — page 87
- 18.5 Alerts — page 89

18.1 Controls

Master and Remote modules have the following control buttons:



1. *[Back]*— Select to go back to the previous screen.
2. *[OK]*— Open menus or confirm menu selection or value adjustment.
3. *[Up]*— Move up through lists or channel pages.
4. *[Down]*— Move down through lists or channel pages.

Sleep mode

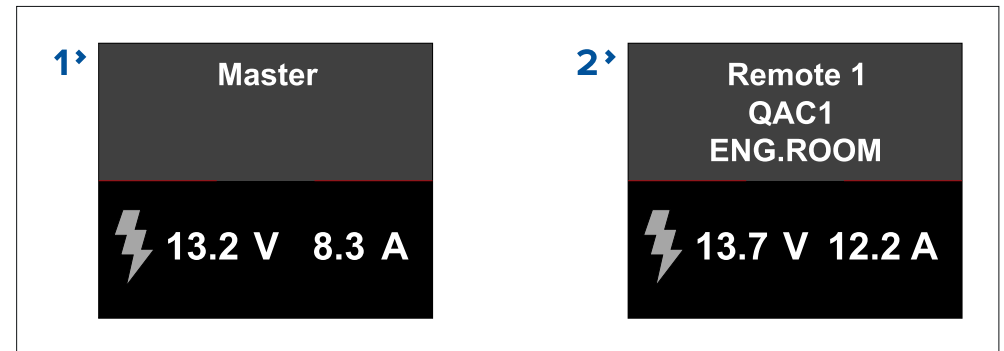
To save power the screen of Master and Remote modules will turn off after 60 seconds of inactivity.

When the display is in sleep mode it can be turned back on by pressing the *[OK]* button.

The screen will not enter sleep mode if the Fuse rating adjustment or setting Unit ID pages are displayed.

18.2 Default page

After power up the default page is displayed.



1. Default screen on Master module.
2. Default screen on Remote module.

The default page displays the Master system's / Remote system's voltage and current. The Remote module's default page will also display the ID of the Remote module.

18.3 Menu

System information, channel status and alert information and related settings can be accessed from the menu.

The menu is accessed by pressing the *[OK]* button from the default screen. The following options are available from the Master / Remote module menu:

- *[About this device]* menu provides the following information about the module:
 - ID
 - Location
 - Serial number
 - CAN bus number
 - IP address (Master module only)
 - Firmware version
 - Temperature

Use the *[Up]* and *[Down]* buttons to cycle through the available data.

- *[Channels]* menu:
 - Displays channel pages.
- *[Alerts]* menu:
 - Provides a list of all active alerts.
- *[Connected remotes]* menu:
 - Provides a list of all connected Remote systems and their locations.

Note: Available on Master modules only.

- *[Unit ID]* menu:
 - Assign, unassign or change the Remote module's ID.

Note: Available on Remote modules only.

- *[Help]* menu:
 - Provides a QR code to the full installation and operation instructions/

Setting Remote module ID number

During initial installation Remote modules must have the correct Unit ID assigned.

With the Default screen displayed on the Remote module:

1. Press the *[OK]* button to open the menu.
2. Select *[Unit ID]*.
3. Select *[Assign ID number]* or *[Change ID number]*.
4. Use the *[Up]* and *[Down]* buttons to select the correct ID number for the Remote module.

Important:

The ID number can be set to any number between 1 and 254 but MUST correspond to the unit ID assigned during configuration.

5. Press the *[OK]*.

The Remote module will reboot and the new ID will be assigned.

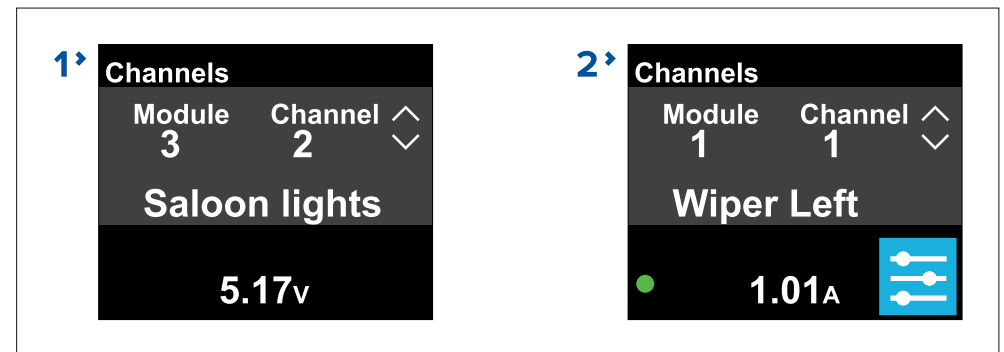
18.4 Channels pages

A channel's current status can be viewed from the Channels pages. The Master module can view all channels including the channels of Remote systems. The Remote module can view the channels of the modules it has connected to it.

Channels pages can be accessed from the menu: *[Menu > Channels]*.

You can cycle through each module and their channels using the *[Up]* and *[Down]* buttons.

Example input and output channel pages



1. Input channel pages provide the following information relevant to the channel being viewed:
 - Module number
 - Channel number
 - Channel name
 - Channel voltage
2. Output channel pages provide the following information relevant to the channel being viewed:
 - Module number
 - Channel number
 - Channel name
 - Channel current draw
 - Channel on/off indicator (Green if channel is on)
 - Options menu

Options menu

The options menu is available on channel pages of output modules: The options menu will only be available from the Master or Remote module that is connected (i.e.: in the same assembly) to the output module.

From an output channel page press the *[OK]* button to access the *[Options menu]*.

Available options:

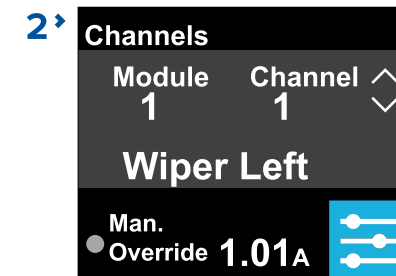
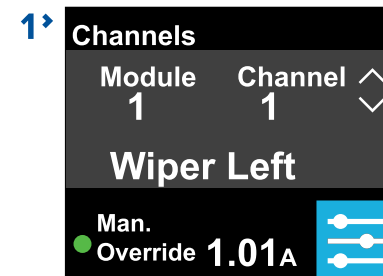
- *[Force on (override)]*.
 - Available when channel is set to automatic or if channel has been set to Force off.
 - Selecting will force the channel on.
- *[Force off (override)]*.
 - Available when channel is set to automatic or if channel has been set to Force on.
 - Selecting will force the channel off.
- *[Exit override]*.
 - Available when channel has been forced on or off/
 - Selecting will exit the override and return to automatic operation.
- *[Fuse rating:]*.
 - Selecting will show the channel's soft fuse rating.

Manual override

Output channels can be manually overridden, e.g.: forced on or forced off from the Master or Remote module's display.

Note:

Forced manual override should only be used for as long as it takes to make the situation safe, the connected device should then be switched off and any fault fixed before using the device again.



1. Forced on (override) — Channel status indicator is on (Green).
2. Forced off (override) — Channel status indicator is off (Gray).

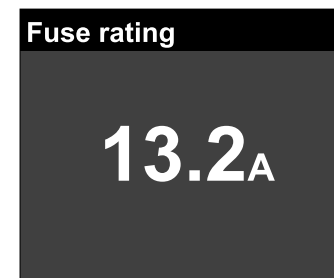
Soft fuse rating

Each output channel is configured with a soft (software) fuse rating.

Note:

- For safety reasons, channel soft fuse ratings are locked during configuration and cannot be adjusted by users.
- Soft fuse ratings can only be adjusted by Raymarine authorized engineers.
- Soft fuses tripping suggests an issue with the device connected to that channel.

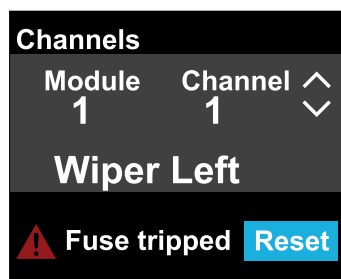
You can view the soft fuse rating of a channel from the output channel page; Press the *[OK]* button and select *[Fuse rating]* from the *[Options]* menu.



Tripped fuses (soft)

If a soft fuse is tripped then a notification is displayed on the relevant output channel page.

The notification replaces the channel's current draw and option menu icon.



The tripped fuse can be reset by pressing the *[OK]* button.

Important:

If fuse tripping persists, consult an authorized Raymarine dealer or Raymarine technical support to help fix the problem, as this suggests an issue with a connected device.

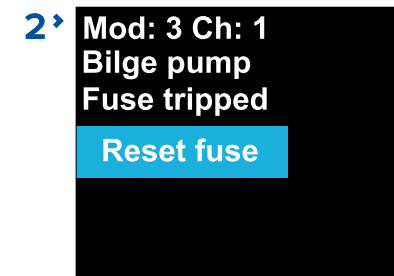
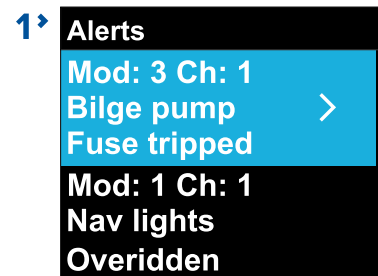
18.5 Alerts

When an alert occurs a notification is displayed on the default page of the Master or Remote module that is directly connected to the module(s) that has channel(s) with active alerts.



1. When a single alert is active the screen will identify the module number, channel number and channel name where the alert originated and also the type of alert.
2. When multiple alerts are active the screen will display the number of active alerts.

A list of all active alerts can be viewed in the alerts list: *[Menu > Alerts]*.



1. Alerts list
2. Alert details page

Cycle through the active alerts using the *[Up]* and *[Down]* buttons.

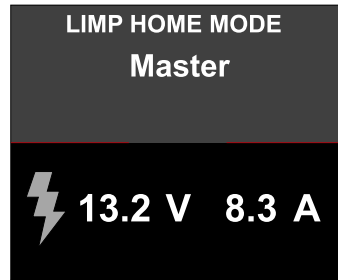
Pressing the *[OK]* button will display the details page for the highlighted alert.

Pressing the *[OK]* button on the alert details page will action the stated option, e.g.: Reset, Exit override etc. and dismiss the active alert.

Limp home mode

Limp home mode is designed to enable you to safely complete your voyage in the unlikely event that there is a communications error between your Master system and Remote systems.

When the system enters Limp home mode a message is displayed at the top of the screen on all Master and Remote systems.



CHAPTER 19: TROUBLESHOOTING

CHAPTER CONTENTS

- 19.1 Troubleshooting — page 92
- 19.2 LED diagnostics — page 92
- 19.3 YachtSense DCS-Series Digital Control System troubleshooting — page 92
- 19.4 Performing a factory reset — page 93
- 19.5 Deleting configuration — page 93

19.1 Troubleshooting

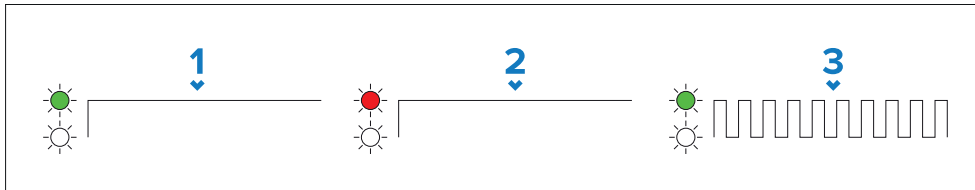
The troubleshooting section provides possible causes and the corrective action required for common problems that are associated with the installation and operation of your product.

Before packing and shipping, all Raymarine products are subjected to comprehensive testing and quality assurance programs. If you do experience problems with your product, this section will help you to diagnose and correct problems to restore normal operation.

If after referring to this section you are still having problems with your product, please refer to the *Technical support* section of this manual for useful links and Raymarine technical support contact details.

19.2 LED diagnostics

The status of each module can be determined by the LED color/flash sequence.



- Green on:**
 - Master/Remote module — Configured correctly
 - Input/Output module — Channel on
- Red on:**
 - Master/Remote module — Limp home mode active
 - Input/Output module — Channel tripped
- Green quick flash:**
 - Software update in progress.

19.3 YachtSense DCS-Series Digital Control System troubleshooting

Error messages

No modules detected message displayed

The Master or Remote module cannot detect the other modules in the system.

- Power down the system.
- Check the condition of the Master system or Remote system that is displaying the message. Ensure that all modules are connected securely and are free from damage.
- Damaged modules must be replaced before using the system again.
- Power on the system.
- If problem persists, contact YachtSense DCS-Series technical support for assistance.

Channel not configured message displayed.

The channel is not configured

- If the channel was previously working try power cycling the system.
- If problem persists, contact YachtSense DCS-Series technical support for assistance.

Unit overheated message displayed.

The unit has exceeded its normal operating temperature range.

- Ensure system has adequate ventilation.
- Check connected devices and ensure correct operation.
- If problem persists, contact YachtSense DCS-Series technical support for assistance.

19.4 Performing a factory reset

You can reset Master and Remote modules back to their factory default settings. The module's configuration will be maintained after the reset is performed.

Important:

Before resetting a Remote module ensure you know its original ID number as this will require setting manually after the reset.

1. Select *[About this device]* from the menu.
The device information page is displayed
2. Press and hold the *[Back]*, *[Up]* and *[OK]* buttons simultaneously for approximately 10 seconds.
The maintenance menu is displayed.
3. Select *[Factory reset]*.
4. Press the *[OK]* button to reset the module.

The module will be reset to its factory default settings.

2. Press and hold the *[Back]*, *[Up]* and *[OK]* buttons simultaneously for approximately 15 seconds.
The Maintenance menu will be displayed.
3. Select *[Delete configuration]*.
4. Press the *[OK]* button to wipe the system's configuration.

19.5 Deleting configuration

Deleting the configuration will remove the configuration from all modules, leaving them unusable.

Important:

- **Deleting configuration will render your YachtSense DCS-Series Digital Control System unusable and may invalidate your product warranty.**
- This procedure should only be carried out by persons authorized to do so by Raymarine.
- This procedure cannot be undone.
- The system will require re-configuration by an authorized Raymarine dealer before it can be used again.

1. Select *[About this device]* from the menu.
The device information page is displayed

CHAPTER 20: MAINTENANCE

CHAPTER CONTENTS

- 20.1 Service and maintenance — page 95
- 20.2 Product cleaning — page 95

20.1 Service and maintenance

This product contains no user serviceable components. Please refer all maintenance and repair to authorized Raymarine dealers. Unauthorized repair may affect your warranty.



Warning: High voltage

This product contains high voltage. Adjustments require specialized service procedures and tools only available to qualified service technicians. There are no user serviceable parts or adjustments. The operator should never remove the cover or attempt to service the product.

Routine equipment checks

It is recommended that you perform the following routine checks, on a regular basis, to ensure the correct and reliable operation of your equipment:

- Examine all cables for signs of damage or wear and tear.
- Check that all cables are securely connected.

20.2 Product cleaning

Best cleaning practices.

When cleaning products:

- Switch off power supply.
- Use a clean damp cloth to wipe clean.
- Do NOT use: abrasive, acidic, ammonia, solvent or other chemical based cleaning products.
- Do NOT use a jet wash.

CHAPTER 21: TECHNICAL SUPPORT

CHAPTER CONTENTS

- 21.1 Raymarine technical support and servicing — page 97
- 21.2 Learning resources — page 98

21.1 Raymarine technical support and servicing

Raymarine provides a comprehensive product support service, as well as warranty, service, and repairs. You can access these services through the Raymarine website, telephone, and e-mail.

Product information

If you need to request service or support, please have the following information to hand:

- Product name.
- Product identity.
- Serial number.
- Software application version.
- System diagrams.

You can obtain this product information using diagnostic pages of the connected display.

Servicing and warranty

Raymarine offers dedicated service departments for warranty, service, and repairs.

Don't forget to visit the Raymarine website to register your product for extended warranty benefits: <https://www.raymarine.com/en-us/support/product-registration>

United Kingdom (UK), EMEA, and Asia Pacific:

- E-Mail: emea.service@raymarine.com
- Tel: +44 (0)1329 246 932

United States (US):

- E-Mail: rm-usrepair@flir.com
- Tel: +1 (603) 324 7900

Web support

Please visit the "Support" area of the Raymarine website for:

- **Manuals and Documents** — <http://www.raymarine.com/manuals>
- **Technical support forum** — <https://raymarine.custhelp.com/app/home>
- **Software updates** — <http://www.raymarine.com/software>

Worldwide support

Technical support

United Kingdom (UK), EMEA, and Asia Pacific:

- Help desk: <https://raymarine.custhelp.com/app/home>
- Tel: +44 (0)1329 246 777

United States (US):

- Help desk: <https://raymarine.custhelp.com/app/home>
- Tel: +1 (603) 324 7900 (Toll-free: +800 539 5539)

Australia and New Zealand (Raymarine subsidiary):

- E-Mail: aus.support@raymarine.com
- Tel: +61 2 8977 0300

France (Raymarine subsidiary):

- E-Mail: support.fr@raymarine.com
- Tel: +33 (0)1 46 49 72 30

Germany (Raymarine subsidiary):

- E-Mail: support.de@raymarine.com
- Tel: +49 40 237 808 0

Italy (Raymarine subsidiary):

- E-Mail: support.it@raymarine.com
- Tel: +39 02 9945 1001

Spain (Authorized Raymarine distributor):

- E-Mail: sat@azimut.es
- Tel: +34 96 2965 102

Netherlands (Raymarine subsidiary):

- E-Mail: support.nl@raymarine.com
- Tel: +31 (0)26 3614 905

Sweden (Raymarine subsidiary):

- E-Mail: support.se@raymarine.com
- Tel: +46 (0)317 633 670

Finland (Raymarine subsidiary):

- E-Mail: support.fi@raymarine.com
- Tel: +358 (0)207 619 937

Norway (Raymarine subsidiary):

- E-Mail: support.no@raymarine.com
- Tel: +47 692 64 600

Denmark (Raymarine subsidiary):

- E-Mail: support.dk@raymarine.com
- Tel: +45 437 164 64

Russia (Authorized Raymarine distributor):

- E-Mail: info@mikstmarine.ru
- Tel: +7 495 788 0508

21.2 Learning resources

Raymarine has produced a range of learning resources to help you get the most out of your products.

Video tutorials

Raymarine official channel on YouTube

- <http://www.youtube.com/user/RaymarineInc>

Training courses

Raymarine regularly runs a range of in-depth training courses to help you make the most of your products. Visit the Training section of the Raymarine website for more information:

- <http://www.raymarine.co.uk/view/?id=2372>

Technical support forum

You can use the Technical support forum to ask a technical question about a Raymarine product or to find out how other customers are using their Raymarine equipment. The resource is regularly updated with contributions from Raymarine customers and staff:

- <https://raymarine.custhelp.com/app/home>

CHAPTER 22: TECHNICAL SPECIFICATION

CHAPTER CONTENTS

- [22.1 System technical specification — page 100](#)
- [22.2 Master module technical specification — page 100](#)
- [22.3 Remote module technical specification — page 100](#)
- [22.4 Power supply module technical specification — page 101](#)
- [22.5 High power module technical specification — page 101](#)
- [22.6 Low power module technical specification — page 101](#)
- [22.7 Signal module technical specification — page 102](#)
- [22.8 Reverse power module technical specification — page 102](#)

22.1 System technical specification

System power specification

Nominal supply voltage:	12 V dc / 24 V dc
Operating voltage range:	8 V dc to 32 V dc
Maximum output current:	100A per Master system / Remote system

Environmental specification

Operating temperature range:	-25°C (-13°F) to 55°C (131°F)
Storage temperature range:	-30°C (-22°F) to 70°C (158°F)
Humidity:	up to 93% @ 40°C
Water ingress protection:	IPx6

22.2 Master module technical specification

Power specification

Nominal supply voltage:	12 V dc / 24 V dc
Operating voltage range:	8 V dc to 32 V dc
Module current draw:	350mA

Data connections

Network (control)	1 x RayNet Ethernet connector 10/100/1,000 Mb/s
SeaTalk NG/NMEA 2000	1 x SeaTalk NG connector
CANBUS / Serial	2 x J1939 connections via 16-pin Molex® MX150 connector 2 x RS-485 connections via 16-pin Molex® MX150 connector
Module communications	Internal 6-pin connection.

Physical data

Module Dimensions: H/W/D (not including busbars):	165 mm (6.50 in) x 81.00 mm (3.19 in) x 75.50 mm (2.97 in)
Weight:	0.37 Kg (0.78 lb)

LCD technical specification

Size (diagonal):	1.8 in
Type:	TFT LCD (LED backlight)
Color depth:	RGB
Resolution:	128 x 160
Ratio:	5:4
Illumination:	225
Viewing angle:	L: 65° / R: 65° / T: 40° / B 65°

22.3 Remote module technical specification

Power specification

Nominal supply voltage:	12 V dc / 24 V dc
Operating voltage range:	8 V dc to 32 V dc
Module current draw:	200mA
Maximum output current:	1.6A (200mA per channel)

Data connections

SeaTalk NG/NMEA 2000	1 x SeaTalk NG connector
Input / output connections	8 x 200mA output channels via 20-pin Molex® MX150 connector
Module communications	Internal 6-pin connection.

Physical data

Module Dimensions: H/W/D (not including busbars):	165 mm (6.50 in) x 81.00 mm (3.19 in) x 75.50 mm (2.97 in)
Weight:	0.35 Kg (0.77 lb)

LCD technical specification

Size (diagonal):	1.8 in
Type:	TFT LCD (LED backlight)
Color depth:	RGB
Resolution:	128 x 160
Ratio:	5:4
Illumination:	225
Viewing angle:	L: 65° / R: 65° / T: 40° / B 65°

22.4 Power supply module technical specification

Power specification

Nominal supply voltage:	12 V dc / 24 V dc
Operating voltage range:	8 V dc to 32 V dc
Thermal / circuit breaker rating	100A maximum
Maximum current draw:	100A

Connections

Power supply connection	Positive and minus M6 threaded studs
Module communications	Internal 6–pin connections.
Busbar system power connection	Positive and negative busbar connections.

Physical data

Module Dimensions: H/W/D (not including busbars):	155 mm (6.10 in) x 47.00 mm (1.85 in) x 77.50 mm (3.05 in)
Weight:	0.30 Kg (0.66 lb)

22.5 High power module technical specification

Power specification

Nominal supply voltage:	12 V dc / 24 V dc
Operating voltage range:	8 V dc to 32 V dc
Maximum output current:	40A (20A per channel)
Minimum output current:	50mA per channel

Data connections

High power connections:	2 x 20A output channels
Module communications:	Internal 6–pin connection.

Physical data

Module Dimensions: H/W/D (not including busbars):	160 mm (6.30 in) x 28.00 mm (1.10 in) x 76.50 mm (3.01 in)
Weight:	0.26 Kg (0.57 lb)

22.6 Low power module technical specification

Power specification

Nominal supply voltage:	12 V dc / 24 V dc
Operating voltage range:	8 V dc to 32 V dc
Maximum output current:	40A (10A per channel)
Minimum output current:	50mA

Data connections

Low power connections:	4 x 10A output channels
Module communications:	Internal 6–pin connection.

Physical data

Module Dimensions: H/W/D (not including busbars):	172 mm (6.77 in) x 28.00 mm (1.10 in) x 76.50 mm (3.01 in)
Weight:	0.27 Kg (0.60 lb)

22.7 Signal module technical specification

Power specification

Nominal supply voltage:	12 V dc / 24 V dc
Operating voltage range:	8 V dc to 32 V dc
Maximum output current:	800mA (200mA per channel)

Data connections

Signal connections	4 x digital / analog input channels / 200mA output
Module communications	Internal 6-pin connection.

Physical data

Module Dimensions: H/W/D (not including busbars):	172 mm (6.77 in) x 28.00 mm (1.10 in) x 76.50 mm (3.01 in)
Weight:	0.22 Kg (0.49 lb)

22.8 Reverse power module technical specification

Power specification

Nominal supply voltage:	12 V dc / 24 V dc
Operating voltage range:	8 V dc to 32 V dc
Maximum output current:	20A

Data connections

Reversible connection	1 channel reversible power
Module communications	Internal 6-pin connection.

Physical data

Module Dimensions: H/W/D (not including busbars):	160 mm (6.30 in) x 28.00 mm (1.10 in) x 76.50 mm (3.01 in)
Weight:	0.26 Kg (0.57 lb)

CHAPTER 23: SPARES AND ACCESSORIES

CHAPTER CONTENTS

- 23.1 YachtSense DCS-Series Digital Control System spares — page 104
- 23.2 YachtSense DCS-Series Digital Control System accessories — page 104
- 23.3 RayNet to RayNet cables and connectors — page 105
- 23.4 SeaTalk NG cables and accessories — page 106

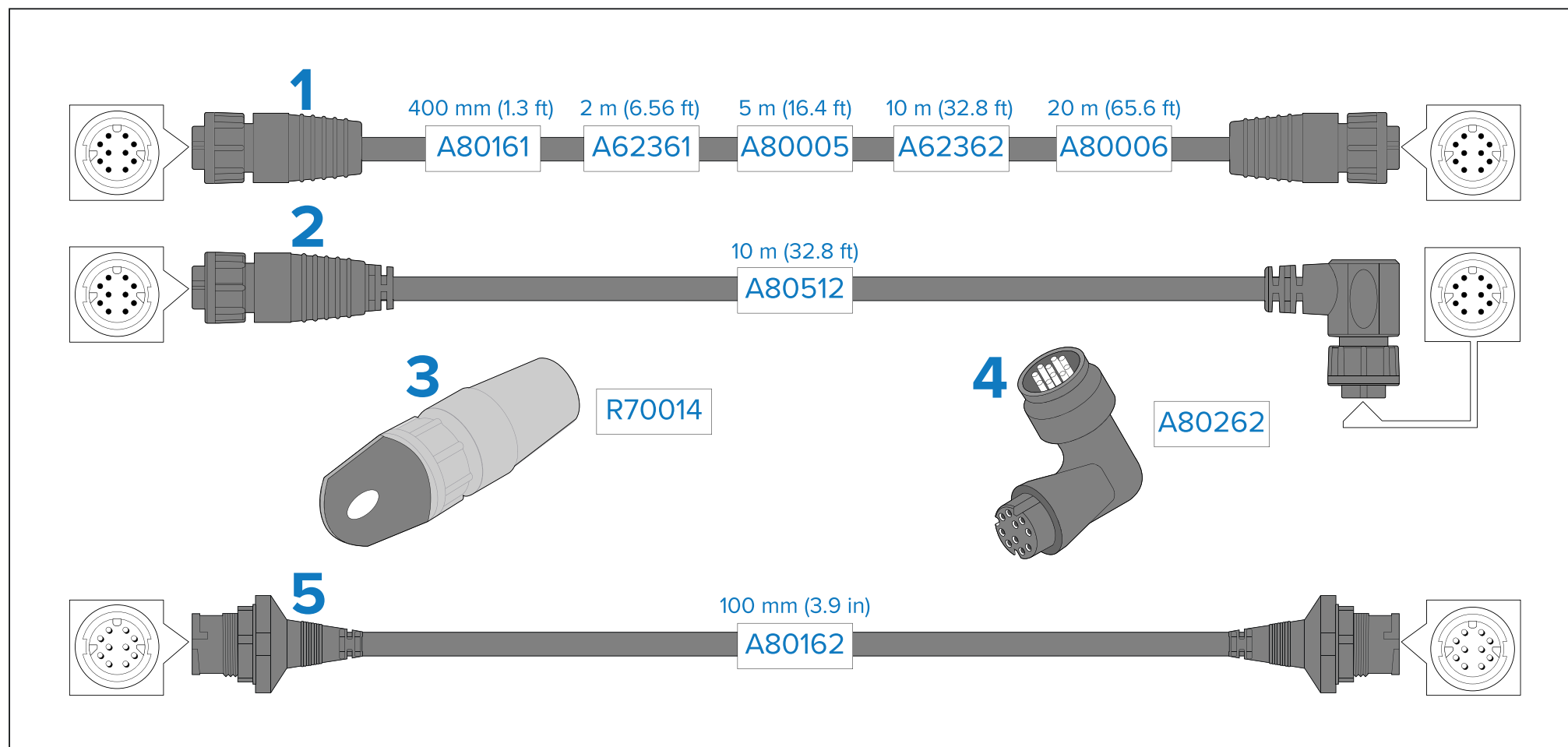
23.1 YachtSense DCS-Series Digital Control System spares

- Replacement Master module — R70805
- Replacement Power supply module — R70966
- Replacement Remote module — R70806

23.2 YachtSense DCS-Series Digital Control System accessories

- Pack of 50 Molex® MX150 Sealed cavity plugs (Molex® part number: 343450001) — Raymarine part number: A80624
- Pack of 50 14-16 AWG (Molex® MX150 part number: 330012003) female crimp terminals — Raymarine part number: A80622
- Pack of 50 18-20 AWG (Molex® part number: 330012004) female crimp terminals — Raymarine part number: A80623

23.3 RayNet to RayNet cables and connectors



1. Standard RayNet connection cable with a RayNet (female) socket on both ends.
2. Right-angle RayNet connection cable with a straight RayNet (female) socket on one end, and a right-angle RayNet (female) socket on the other end. Suitable for connecting at 90° (right angle) to a device, for installations where space is limited.
3. RayNet cable puller (5 pack).
4. RayNet to RayNet right-angle coupler / adapter. Suitable for connecting RayNet cables at 90° (right angle) to devices, for installations where space is limited.
5. Adapter cable with a RayNet (male) plug on both ends. Suitable for joining (female) RayNet cables together for longer cable runs.

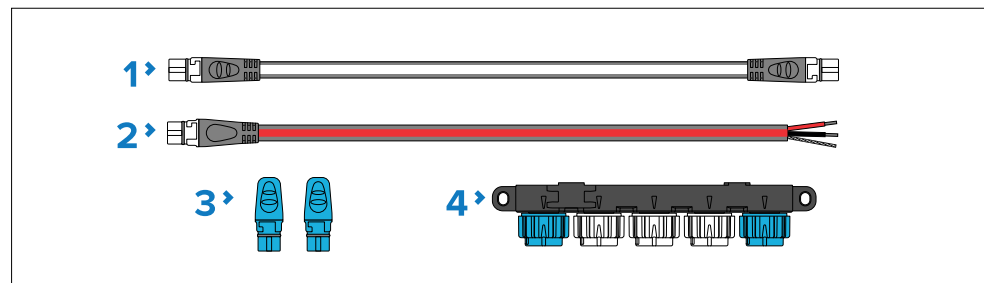
23.4 SeaTalk NG cables and accessories

SeaTalk NG cables and accessories for use with compatible products.

SeaTalk NG kits

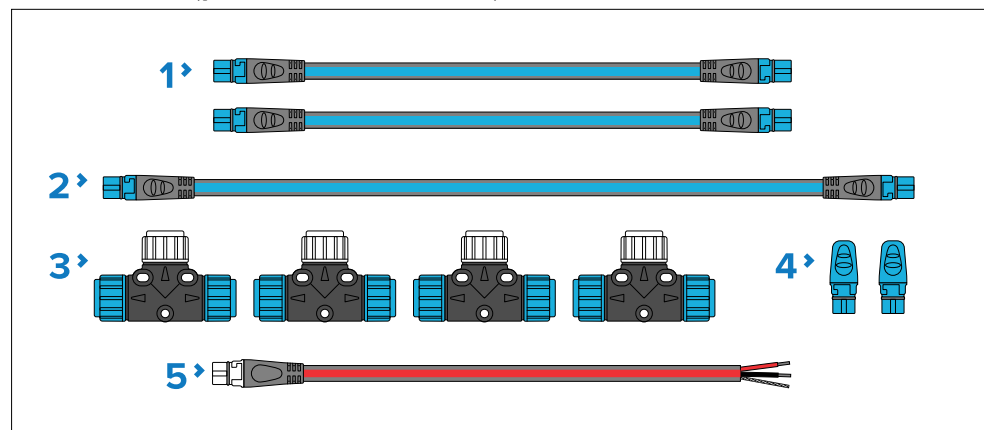
SeaTalk NG kits enable you to create a simple SeaTalk NG backbone.

Starter kit (part number: T70134) consists of:



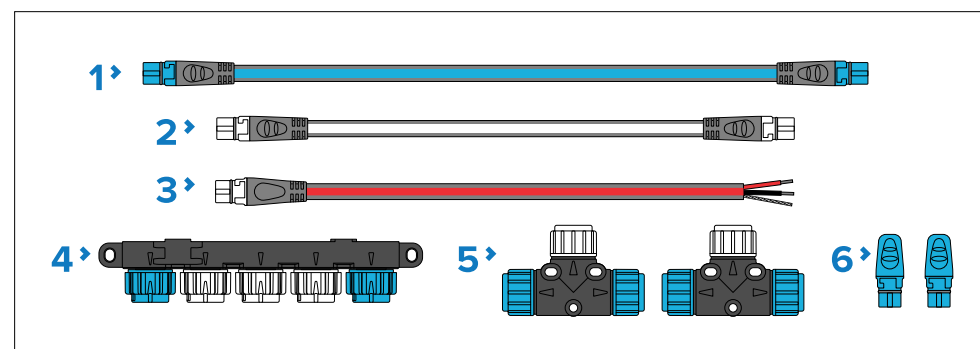
- 1 x Spur cable 3 m (9.8 ft) (part number: **A06040**). Used to connect device to the SeaTalk NG backbone.
- 1 x Power cable 2 m (6.6 ft) (part number: **A06049**). Used to provide 12 V dc power to the SeaTalk NG backbone.
- 2 x Backbone terminators (part number: **A06031**). Terminators must be fitted to both ends of the SeaTalk NG backbone.
- 1 x 5-Way connector (part number: **A06064**). Each connector block allows connection of up to 3 SeaTalk NG devices. Multiple connector blocks can be 'daisy chained' together.

Backbone kit (part number: A25062) consists of:



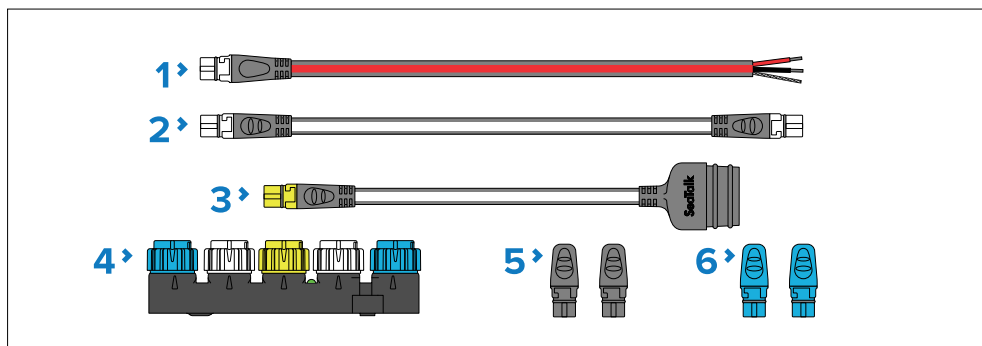
- 2 x Backbone cables 5 m (16.4 ft) (part number: **A06036**). Used to create and extend the SeaTalk NG backbone.
- 1 x Backbone cable 20 m (65.6 ft) (part number: **A06037**). Used to create and extend the SeaTalk NG backbone.
- 4 x T-piece (part number: **A06028**). Each T-piece allows connection of one SeaTalk NG device. Multiple T-pieces can be 'daisy chained' together.
- 2 x Backbone terminators (part number: **A06031**). Terminators must be fitted to both ends of the SeaTalk NG backbone.
- 1 x Power cable 2 m (6.6 ft) (part number: **A06049**). Used to provide 12 V dc power to the SeaTalk NG backbone.

Evolution-Series autopilot cable kit (part number: R70160) consists of:



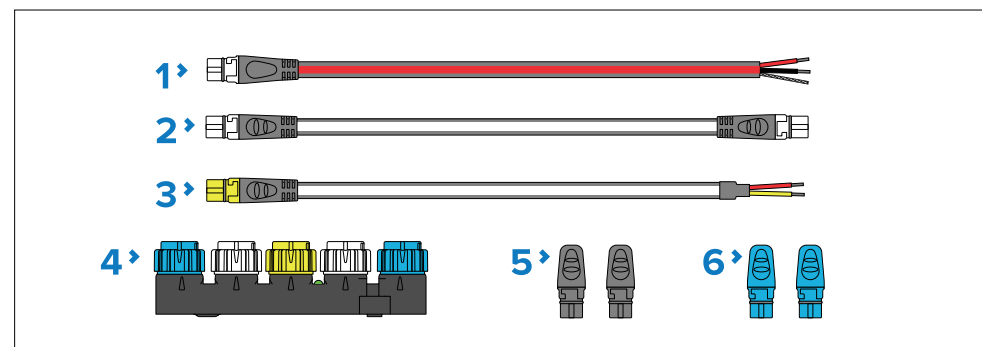
- 1 x Backbone cable 5 m (16.4 ft) (part number: **A06036**). Used to create and extend the SeaTalk NG backbone.
- 1 x Spur cable 1 m (3.3 ft) (part number: **A06040**). Used to connect device to the SeaTalk NG backbone.
- 1 x Power cable 2 m (6.6 ft) (part number: **A06049**). Used to provide 12 V dc power to the SeaTalk NG backbone.
- 1 x 5-Way connector (part number: **A06064**). Each connector block allows connection of up to 3 SeaTalk NG devices. Multiple connector blocks can be 'daisy chained' together.
- 2 x T-pieces (part number: **A06028**). Each T-piece allows connection of one SeaTalk NG device. Multiple T-pieces can be 'daisy chained' together.
- 2 x Backbone terminators (part number: **A06031**). Terminators must be fitted to both ends of the SeaTalk NG backbone.

SeaTalk 1 to SeaTalk NG converter kit (part number: **E22158**) consists of:



1. 1 x Power cable 2 m (6.6 ft) (part number: **A06049**). Used to provide 12 V dc power to the SeaTalk NG backbone.
2. 1 x Spur cable 1 m (3.3 ft) (part number: **A06039**). Used to connect a device to the SeaTalk NG backbone.
3. 1 x SeaTalk 1 (3 pin) to SeaTalk NG adapter cable 0.4 m (1.3 ft) (part number: **A22164**). Used to connect SeaTalk 1 devices to the SeaTalk NG backbone via the SeaTalk 1 to SeaTalk NG converter.
4. 1 x SeaTalk 1 to SeaTalk NG converter (part number: **E22158**). Each converter allows connection of one SeaTalk 1 device and up to 2 SeaTalk NG devices.
5. 2 x Spur blanking plugs (part number: **A06032**). Used to cover unused spur connections in 5-way blocks, T-piece connectors and SeaTalk 1 to SeaTalk NG converter.
6. 2 x Backbone terminators (part number: **A06031**). Terminators must be fitted to both ends of the SeaTalk NG backbone.

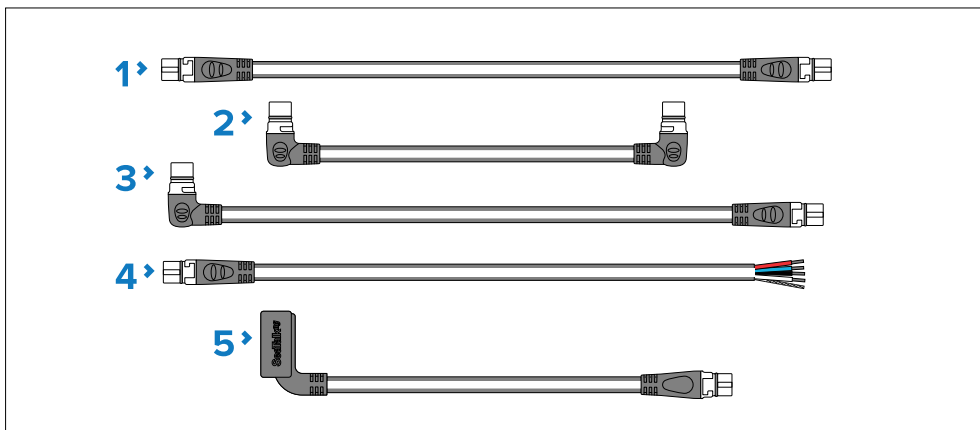
NMEA 0183 VHF 2-wire to SeaTalk NG converter kit (part number: E70196) consists of:



1. 1 x Power cable 2 m (6.6 ft) (part number: **A06049**). Used to provide 12 V dc power to the SeaTalk NG backbone.
2. 1 x Spur cable 1 m (3.3 ft) (part number: **A06039**). Used to connect a device to the SeaTalk NG backbone.
3. 1 x NMEA 0183 VHF stripped-end (2-wire) to SeaTalk NG adapter cable 1 m (3.3 ft) (part number: **A06071**). Used to connect an NMEA 0183 VHF radio to the SeaTalk NG backbone via the NMEA 0183 to SeaTalk NG converter.
4. 1 x SeaTalk 1 to SeaTalk NG converter (part number: **E22158**). Each converter allows connection of one SeaTalk 1 device and up to 2 SeaTalk NG devices.
5. 2 x Spur blanking plugs (part number: **A06032**). Used to cover unused spur connections in 5-way blocks, T-piece connectors, and the SeaTalk 1 to SeaTalk NG converter.
6. 2 x Backbone terminators (part number: **A06031**). Terminators must be fitted to both ends of the SeaTalk NG backbone.

SeaTalk NG spur cables

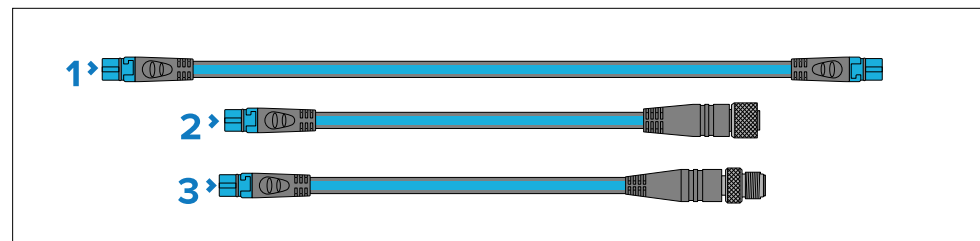
SeaTalk NG spur cables are required to connect devices to the SeaTalk NG backbone.



1. SeaTalk NG spur cables:
 - Spur cable 0.4 m (1.3 ft) (part number: **A06038**).
 - Spur cable 1 m (3.3 ft) (part number: **A06039**).
 - Spur cable 3 m (9.8 ft) (part number: **A06040**).
 - Spur cable 5 m (16.4 ft) (part number: **A06041**).
2. Elbow (right-angled) to elbow (right-angled) spur cable 0.4 m (1.3 ft) (part number: **A06042**). Used in confined spaces where a straight spur cable will not fit.
3. Elbow (right-angled) to straight spur cable 1 m (3.3 ft) (part number: **A06081**). Used in confined spaces where a straight spur cable will not fit.
4. SeaTalk NG to stripped-end spur cables (connects compatible products that do not have a SeaTalk NG connector, such as transducer pods):
 - SeaTalk NG to stripped-end spur cable 1 m (3.3 ft) (part number: **A06043**)
 - SeaTalk NG to stripped-end spur cable 3 m (9.8 ft) (part number: **A06044**)
5. ACU-Series / SPX-Series autopilot to SeaTalk NG spur cable 0.3 m (1.0 ft) (part number **R12112**). Connects the course computer to the SeaTalk NG backbone. This connection can also be used to provide 12 V dc power to the SeaTalk NG backbone.

SeaTalk NG backbone cables

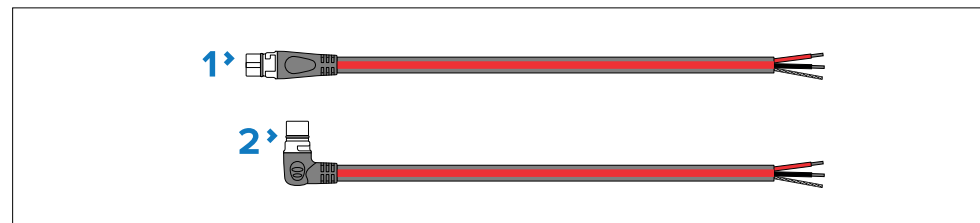
SeaTalk NG backbone cables are used to create or extend a SeaTalk NG backbone.



1. Backbone cables:
 - Backbone cable 0.4 m (1.3 ft) (part number: **A06033**).
 - Backbone cable 1 m (3.3 ft) (part number: **A06034**).
 - Backbone cable 3 m (9.8 ft) (part number: **A06035**).
 - Backbone cable 5 m (16.4 ft) (part number: **A06036**).
 - Backbone cable 9 m (29.5 ft) (part number: **A06068**).
 - Backbone cable 20 m (65.6 ft) (part number: **A06037**).
2. SeaTalk NG to DeviceNet (female) Backbone cable 0.4 m (1.3 ft) (part number: **A80675**)
3. SeaTalk NG to DeviceNet (male) Backbone cable 0.4 m (1.3 ft) (part number: **A80674**)

SeaTalk NG power cables

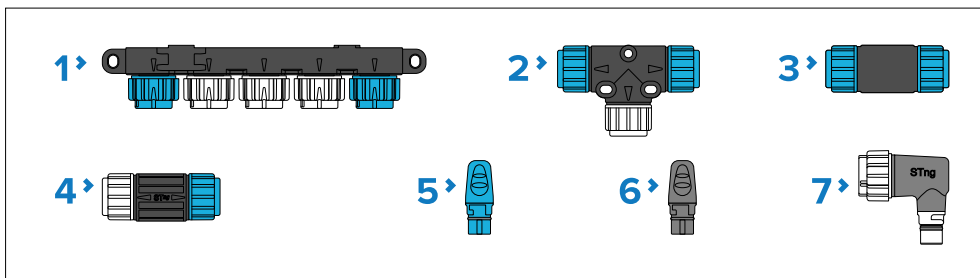
SeaTalk NG power cables are used to provide the SeaTalk NG backbone with a single 12 V dc power source. The power connection must include a 5 amp inline fuse (not supplied).



1. Power cable (straight) 2 m (6.6 ft) (part number: **A06049**).
2. Elbow (right-angled) power cable 2 m (6.6 ft) (part number: **A06070**).

SeaTalk NG connectors

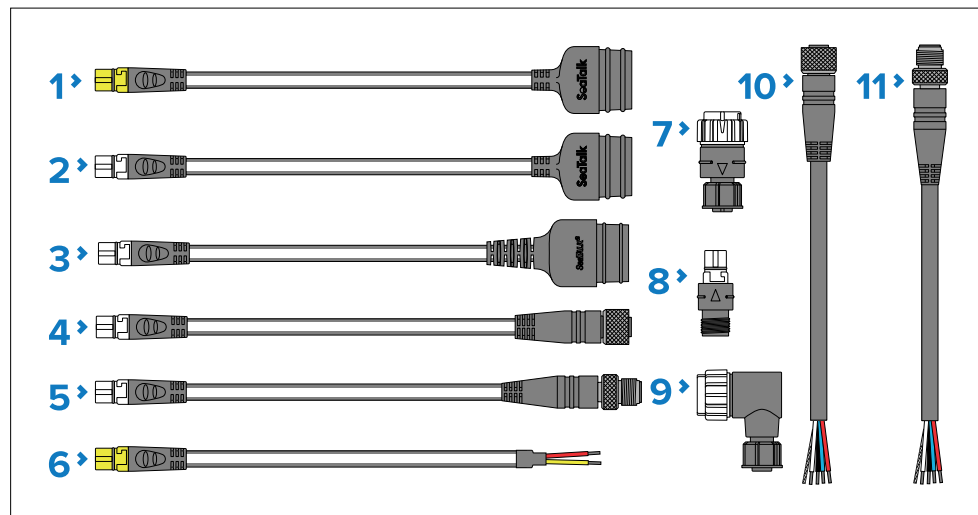
SeaTalk NG connectors are used to connect SeaTalk NG devices to the SeaTalk NG backbone and to create and extend the backbone.



1. 5-Way connector (part number: **A06064**). Each connector block allows connection of up to 3 SeaTalk NG devices. Multiple connector blocks can be 'daisy chained' together.
2. T-piece (part number: **A06028**). Each T-piece allows connection of one SeaTalk NG device. Multiple T-pieces can be 'daisy chained' together.
3. Backbone extender (part number: **A06030**). Used to connect 2 backbone cables together.
4. Inline terminator (part number: **A80001**). Used to connect a spur cable and SeaTalk NG device at the end of a backbone instead of a backbone terminator.
5. Backbone terminator (part number: **A06031**). Terminators must be fitted to both ends of the SeaTalk NG backbone.
6. Spur blanking plug (part number: **A06032**). Used to cover unused spur connections in 5-Way blocks, T-piece connectors, or the SeaTalk 1 to SeaTalk NG converter.
7. Elbow (right-angled) spur connector (part number: **A06077**). Used in confined spaces where a straight spur cable will not fit.

SeaTalk NG adaptors and adaptor cables

SeaTalk NG adaptor cables are used to connect devices designed for different CAN Bus backbones (e.g.: SeaTalk 1 or DeviceNet) to the SeaTalk NG backbone.



1. SeaTalk 1 (3 pin) to SeaTalk NG converter cable 1 m (3.3 ft) (part number: **A22164 / A06073**). Can be used to connect a SeaTalk 1 device to a SeaTalk NG backbone via the SeaTalk 1 to SeaTalk NG converter, or to connect a SeaTalk NG product directly to a SeaTalk 1 network.
2. SeaTalk 1 (3 pin) to SeaTalk NG adaptor cable 0.4 m (1.3 ft) (part number: **A06047**). Can be used to connect a SeaTalk 1 device to a SeaTalk NG backbone via the SeaTalk 1 to SeaTalk NG converter, or to connect a SeaTalk NG product directly to a SeaTalk 1 network.
3. SeaTalk 2 (5 pin) to SeaTalk NG adaptor cable 0.4 m (1.3 ft) (part number: **A06048**). Used to connect SeaTalk 2 devices or networks to a SeaTalk NG backbone.
4. SeaTalk NG to DeviceNet (female) adaptor cables connect NMEA 2000 devices that use a DeviceNet connector to the SeaTalk NG backbone, or connects SeaTalk NG devices to an NMEA 2000 network. The following cables are available:
 - SeaTalk NG to DeviceNet (female) adaptor cable 0.4 m (1.3 ft) (part number: **A06045**).
 - SeaTalk NG to DeviceNet (female) adaptor cable 1 m (3.3 ft) (part number: **A06075**).
5. SeaTalk NG to DeviceNet (male) adaptor cables. Connect NMEA 2000 devices that use a DeviceNet connector to the SeaTalk NG backbone, or connect SeaTalk NG devices to an NMEA 2000 network. The following cables are available:

- SeaTalk NG to DeviceNet (male) adaptor cable 0.1 m (0.33 ft) (part number: **A06078**).
 - SeaTalk NG to DeviceNet (male) adaptor cable 0.4 m (1.3 ft) (part number: **A06074**).
 - SeaTalk NG to DeviceNet (male) adaptor cable 1 m (3.3 ft) (part number: **A06076**).
 - SeaTalk NG to DeviceNet (male) adaptor cable 1.5 m (4.92 ft) (part number: **A06046**).
6. NMEA 0183 stripped-end (2-wire) to SeaTalk NG adapter cable 1 m (3.3 ft) (part number: **A06071**). Used to connect an NMEA 0183 VHF radio to the SeaTalk NG backbone via the NMEA 0183 to SeaTalk NG converter.
 7. SeaTalk NG (male) to DeviceNet (female) adaptor (**A06082***).
 8. SeaTalk NG (female) to DeviceNet (male) adaptor (**A06083***).
 9. SeaTalk NG (male) to DeviceNet (female) elbow (right-angled) adaptor (**A06084***).
 10. DeviceNet (female) to stripped-end adaptor cable (0.4 m (1.3 ft)) (part number: **E05026**).
 11. DeviceNet (male) to stripped-end adaptor cable (0.4 m (1.3 ft)) (part number: **E05027**).

Important:

* Do NOT connect the A06082, A06083, or A06084 adaptors directly to a backbone. Only connect as part of a **spur** connection between backbone and device.

Appendix A NMEA 2000 PGN support

Administration PGNs

- **59392** — ISO Acknowledge (Receive / Transmit)
- **59904** — ISO Request (Receive / Transmit)
- **60160** — ISO Transport protocol, data transfer (Receive)
- **60416** — ISO Transport protocol, connection management — BAM group function (Receive)
- **60928** — Address claim (Receive / Transmit)
- **65240** — ISO Commanded address (Receive)
- **126208** — Request group message (Receive)
- **126208** — Command group message (Receive)
- **126208** — Acknowledge group message (Transmit)
- **126464** — PGN transmit and receive list (Transmit)
- **126993** — Heartbeat (Transmit)
- **126996** — Product information (Transmit)
- **126998** — Configuration information (Transmit)

Data PGNs

Note:

The configuration of each individual system will determine the data PGNs that are supported.

Appendix B Best Practices - Overview

This section contains important information and best practice recommendations related to the design and implementation of Digital Control Systems.

The details are intended to be general guidance for marine digital switching systems and may contain details that are not applicable to your particular installation.

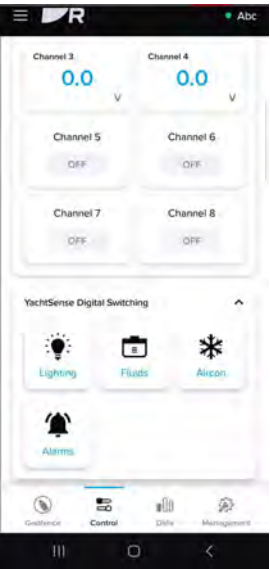
Human factors in system design

The best practice recommendations in this section cover design considerations based on human factors.

Human factors is a discipline concerned with understanding how people interact with systems, and designing user interfaces that facilitate safe and efficient control and monitoring of those systems.

When designing the user interfaces for a digital switching system, you are able to choose from a number of different switching mechanisms. Any one, or a combination of, the following switching mechanisms may be available:

Switching mechanism	Description
	Soft-switches on a touchscreen multifunction display (MFD) Soft switches include on/off buttons, toggle buttons, option buttons, sliders and momentary buttons).
	Buttons on a SeaTalk NG/NMEA 2000 keypad.
	

Switching mechanism	Description
	Remote switching using an app or a web interface (running on a smart phone or tablet), or by sending a GSM SMS text message.
	Short-range wireless switches.
	Traditional push-button switches (including momentary, latching, and rotary switches).

The choice of switching mechanism depends on:

- the type of equipment or system being switched
- the physical environment and location of both the switched equipment and the switch
- the capabilities of the user operating the switch

- a requirement to display status information for the switched equipment or system
- the relationship, if any, between the switched item and other items or systems

Introduction to touchscreen multifunction displays (MFDs)

Raymarine touchscreen multifunction displays (MFDs) provide a powerful and flexible method for utilizing soft-switches and bespoke graphical user interfaces to control and monitor vessel systems with digital switching.

Touchscreen displays enable intuitive and efficient interactions with vessel systems, and allow for highly contextual presentation of controls and status information.

However, touchscreen displays may not always be appropriate as the primary means to control certain vessel systems or equipment. The detailed design of individual touchscreen displays can also cause problems for users unless individual screen-designs and the components they comprise (for example, soft-buttons, gauges, and background images) are carefully built and tested.

When designing a digital switching system that uses an MFD to control and monitor vessel systems, consider the following best practice recommendations.

Best practice: consider chartplotter (MFD) environmental conditions

Environmental conditions where the chartplotter (MFD) is located may affect usability. For example:

- Rain, sea spray, condensation, or sweat may make the chartplotter (MFD) slippery or difficult to read, and could result in unintentional commands.
- Excessive vibration or sudden motion (caused by other equipment, or a high sea state) may prevent users from interacting with the chartplotter (MFD) using precise actions.
- Direct sunlight may make it difficult to read and interact with the display.
- In low temperatures, users may need to wear gloves, impacting the usability of the touchscreen.

To facilitate the safe and effective use of a touchscreen display in a variety of conditions:

- Where possible, provide chartplotters (MFDs) with physical protection from the environment.
- Ensure that soft-buttons and associated icons and text are sufficiently large, and have adequate contrast.

- Consider further distinguishing between important soft-buttons by using different button shapes, and contrasts.
- Allow sufficient space between active parts of the touchscreen (for example, between individual soft-buttons), to reduce the likelihood that users will touch a button inadvertently.
- Remember that certain types of control may be difficult to use in some conditions. For example, don't use a slider control that requires a precise swiping action as the only means to control a critical system.
- Implement a "long press" feature to protect all buttons controlling important systems or equipment. For example, enforce a three-second press before a soft-button signals that AC shore-power is to be connected or disconnected from the vessel's electrical system.

Note: Where rapid operation or power-down of equipment may be required in an emergency, don't enforce a "long press". Also consider providing a physical switch in addition to soft buttons on a chartplotter (MFD) (see [Best practice: when to provide physical switches](#)).

Best practice: consider chartplotter (MFD) context

Contextual placement of touchscreen displays may affect usability. For example:

- Locating a display where it is likely to be knocked or bumped could result in unintentional switching actions.
- A display that is grouped with other controls (for example, an array of physical switches) will form an automatic association between the grouped controls for users.

When locating touchscreen displays:

- Consider the context of the display with respect to other user controls, and with the user's position while operating the display.
- Where space is limited and accidental touchscreen presses may be hard to avoid, consider safeguarding the touchscreen with appropriately positioned physical barriers.
- Consider the context of the display with respect to the systems or equipment under control. In some cases (for example, moving equipment), maintaining line-of-sight between the user operating the chartplotter (MFD) and the controlled equipment is important.

Best practice: consider user capabilities for MFDs

User capabilities should be considered when designing touchscreen displays. For example:

- Sight problems, such as reduced visual acuity, or color-blindness, may make it difficult for some users to operate touchscreen displays effectively.
- Lack of experience with touchscreen displays may cause additional problems for some users.

To assist users:

- Ensure that soft-buttons and associated icons and text are sufficiently large, and have adequate contrast.
- Consider further distinguishing between important soft-buttons by using different button shapes, and contrasts.
- Do not rely solely on color to distinguish between important system conditions (for example, the operating status of a bilge pump). Colorblind users may find it difficult to use systems that rely on visual cues based solely on color.

Best practice: when to provide physical switches

Although well designed touchscreen displays offer intuitive, flexible, and compact switching solutions for multiple vessel systems and equipment, some cases are better implemented with (or supplemented with) physical switches, including NMEA 2000 keypads.

Consider that touchscreen displays:

- lack tactile feedback
- are sensitive to accidental touches
- can be hard to use in adverse environmental conditions (rain, rough sea state)
- can be hard to use when wearing gloves
- may require additional touches (for example, using menus and page jumps) to reveal the required control button
- may be hard to navigate quickly, especially in emergency situations, or by users unfamiliar with the installation

If the user needs to switch systems or equipment in response to urgent conditions, or repeatedly operate a switch while looking away from the touchscreen display, consider providing a physical switch in place of (or in addition to) a soft-button on a touchscreen.

Physical switches are also recommended when it is important that the switch location maintains the operator's line-of-sight with the switched-equipment.

Some examples where provision of a physical switch is recommended:

- operating the vessel's horn
- operating internal lighting positioned to illuminate bridge controls
- operating an emergency stop feature (for example, to immediately stop a moving piece of equipment that is within the switch operator's line of sight)

Best practice: use switch-guards for critical circuits

For cases where inadvertent use of a switch could impact the safety of the vessel or its occupants, ensure that the switch is guarded.

For example, a switch controlling power to a primary DC bus on the vessel should be guarded to prevent accidental powering down of multiple systems. Similarly, a soft-switch on a touchscreen display that operates a moving item of equipment (such as a powered hatch cover), should be designed with a software guard.

For physical switches, install a purpose-built guard (such as an integral flip-cover).

For soft-switches on a touchscreen display, consider implementing:

- a "long press" feature. For example, enforce a three-second press before a soft-switch signals that AC shore-power is to be connected or disconnected from the vessel's electrical system.
- a confirmation message that the user must acknowledge to complete the action (for example, "Power-off the primary DC bus? <Yes>/<No>").
- an access code (PIN code) that the user must enter before gaining access to a soft switch.

Best practice: use of latched and unlatched switches

The choice of a latched or unlatched (momentary) switch to control a particular system or piece of equipment may have a direct impact on user safety.

Always consider the nature of the equipment under control when deciding which type of switch to use:

- A latched switch may be appropriate when a continuously closed (or open) switch-state is unlikely to impact user or vessel safety.

Note: Remember that a physically latched switch **cannot be overridden** by other switches within the digital switching system.

- Use an unlatched (momentary) switch for moving equipment that may present an entrapment hazard.

Appendix C Software release history

The list below is a cumulative list of the software releases, since the initial release (v1.1.363; March 2021).

Note:

YachtSense DCS-Series Digital Control System software updates can only be performed by Raymarine, or an authorized Raymarine dealer. For more information, refer to: [p.15 — Software upgrades](#)

This list includes *new features* only. It does NOT include software maintenance items, such as bug fixes or performance improvements.

Software v5.0.11 (03–2024) / v5.1.14 (06–2024)

New feature	More information
Increased the maximum number of channels to 400.	p.22 — System hardware configuration
Soft fuse ratings are now locked by default and cannot be changed by users. Only an authorized dealer can now change soft fuse ratings.	p.88 — Soft fuse rating
Added support for splitscreen app pages on the chartplotter (MFD).	p.84 — Splitscreen pages
Removed the chartplotter (MFD) limitation of the number of simultaneous chartplotters (MFDs) that can display the YachtSense DCS-Series app.	p.83 — YachtSense app overview
Updated Cloud connector software.	N/A

Software v4.1.2 (08–2023)

New feature	More information
“Watchdog” requirement for momentary switches — Implemented a mandatory requirement to include a "Watchdog" control in a boat's digital control system design for all momentary switches, to ensure that, in the event of lock-up or crash on the switch device (whether hardware or software switch), the watchdog signal will cause the channel output to switch off.	p.112 — Best practices

Software v4.0.426 (07–2023)

New feature	More information
Updated Cloud connector software.	N/A
Automatic update of Remote modules — The software in all Remote modules in a YachtSense DCS-Series Digital Control System can now be updated via the Master module; it is no longer necessary to update each Remote module individually.	N/A

Note:

The ability to upgrade Remote modules automatically will only happen for future software upgrades released **after** v4.0.426. Once the Master has been updated to software v4.0.426, all **subsequent** software upgrades to the Master module (after the Master is restarted) will automatically be deployed to any Remote modules that are part of the same YachtSense DCS-Series Digital Control System.

Software v3.0.424 (05–2023)

New feature	More information
Improvements to device communications in high traffic SeaTalk NG networks.	N/A
Resolved issue causing Limp home mode.	N/A

Software v2.4.420 (09–2022)

New feature	More information
Updated Cloud connector software.	N/A
Improved internal module communications.	N/A
Improved cloud onboarding process.	N/A

Software v2.3.416 (06–2022)

New feature	More information
Improved cloud onboarding process.	N/A

Software v2.2.415 (06–2022)

New feature	More information
Added support for Raymarine app and cloud connectivity.	N/A
Added support for secondary Master module where extra RS-485/J1939 ports are required.	N/A

Software v1.4.367 (09–2021)

New feature	More information
Improved support for larger systems.	N/A

Software v1.3.366 (05–2021)

New feature	More information
Added ability to read Master battery voltage.	N/A
Various software improvements.	N/A

Software v1.1.363 (03–2012)

- Initial release.

Appendix D Ethernet (IPv4) networking of Raymarine devices with third-party products

Raymarine uses a custom Ethernet (IPv4) networking configuration. Use the following information to help you understand how Raymarine's Ethernet (IPv4) implementation interacts with third-party Ethernet (IPv4) devices on your vessel, such as routers, switches, Access Points (APs) etc.

Important:

- Third-party networking products such as routers, switches, and Access Points (APs) *may* work when connected to Raymarine networks, when configured correctly. However, correct operation is not guaranteed. It's important to refer to the instructions provided by the relevant third-party device manufacturer, to ensure that your intended use of a third-party device is consistent with the device's design intent.
- Raymarine does not warrant that Raymarine products are compatible with products manufactured by any person or entity other than Raymarine.
- When using third-party products in your Raymarine electronics network, you should be aware of, and understand, the concepts and limitations described in the following Disclaimer: [p.10 — Disclaimer](#)

Overview

- Ethernet (IPv4) networking is a method for interconnecting multiple electronic devices, allowing many devices to function in a network and share data using only a single RJ45 or RayNet connection for each device.
- In order to function correctly, every Ethernet (IPv4) device (whether Raymarine or third-party) must have a unique IP address allocated to it, and it must not conflict with that of any other device.
- IPv4 addresses can be centrally-allocated to devices either **automatically**, using a method known as *DHCP* (Dynamic Host Configuration Protocol), or **manually** (i.e. allocated a static IP address). The most common method for allocating IPv4 addresses on vessel electronics networks is *DHCP*. In this configuration, the *server* device is known as a *DHCP server*.

Client / Server device	Example(s)
Raymarine IPv4 DHCP client	• Radar scanner (e.g. <i>Quantum</i>) • Sonar module (e.g. <i>CP470</i>) • IP camera (e.g. <i>CAM300</i>)
Raymarine IPv4 DHCP server and self-addressing device	• Chartplotter (MFD), running LightHouse 3 or LightHouse 4 (e.g. Axiom-Series) • Marine Router (e.g. YachtSense Link-Series YachtSense Link)
Third-party IPv4 DHCP client	IP camera
Third-party IPv4 DHCP server	• Router • Switch • Access Point (AP)

Note:

The DHCP server maintains a pool of IP addresses and “leases” an address to any DHCP-enabled client, when the client device first powers up and announces its presence on the network. Because the IP addresses are dynamic (leased) rather than static (permanently assigned), addresses no longer in use are automatically returned to the DHCP server's pool, for subsequent reallocation.

It's also possible to have multiple DHCP servers issuing addresses on an IPv4 network, but to avoid addressing conflicts, all DHCP servers must be carefully configured to only allocate IP addresses in distinct address ranges. The *subnet mask* must also be carefully configured, to ensure that devices can correctly communicate with one another.

Implementation

- Raymarine Ethernet (IPv4) devices expect to use a private **Raymarine IPv4 network**, which is designed to be internal to the vessel only. Raymarine has carefully chosen a specific IP address range (**198.18.0.0/21**) to ensure that it does not interfere with any external IP address ranges, or other legacy and real-world addressing constraints (including but not limited to marina Wi-Fi networks).

Note: Raymarine's IP address range is for **local traffic** within the **vessel's private Raymarine network only**, and does NOT traverse across Raymarine products to external networks, or to the Internet.

- In a Raymarine Ethernet (IPv4) network, IP addresses are self-allocated by certain Raymarine equipment in the following range: **198.18.0.32 to 198.18.3.255** (inclusive). **You must avoid placing any devices in this range using manual (static) IP addresses.**
- Whether your network includes only Raymarine Ethernet (IP) devices, or a mixture of Raymarine and third-party Ethernet (IPv4) devices, you have 3 options for configuring the Ethernet (IPv4) network and managing the IP addresses for your devices:
 1. Use a Raymarine device as the sole DHCP server to allocate IP addresses automatically to all Raymarine and third-party Ethernet (IPv4) devices on the network. **For the purposes of simplicity and reliability, this is the recommended option for most vessels.** The following Raymarine devices can act as DHCP servers:
 - a. **Raymarine chartplotter (MFD)**, running LightHouse 3 or LightHouse 4; or:
 - b. **Raymarine YachtSense Link-Series YachtSense Link router**

Note: If both a Raymarine chartplotter (MFD) and YachtSense Link-Series YachtSense Link router are present in the same network, the YachtSense Link-Series YachtSense Link router MUST be configured as the DHCP server for that network. To facilitate this, the Raymarine chartplotter's (MFD's) DHCP setting defaults to *Automatic* as standard. On power up, if the YachtSense Link-Series YachtSense Link router is detected on the Ethernet network, any chartplotters (MFDs) in the network will disable their own *DHCP Server*, to permit the YachtSense Link-Series YachtSense Link router to manage the network's IP addresses. Only Raymarine chartplotters (MFDs) running LightHouse 4 are compatible with the YachtSense Link-Series YachtSense Link router. Additionally, the most recent versions of the LightHouse 4 and YachtSense Link software must be used.

2. Use a third-party Ethernet (IPv4) device (such as a router or Access Point) to allocate IP addresses automatically, as a sole *DHCP server*. To do this, refer to the *Configuring a third-party router as DHCP server* section, below.

Note: Any Raymarine LightHouse 3 or LightHouse 4 chartplotters (MFDs) will still self-allocate their own IP address, even if a third-party DHCP server is being used to allocate IP addresses to other Raymarine or non-Raymarine *DHCP client* devices (Camera, Radar, Sonar etc.) on the network.

3. Manually configure static IP addresses for your devices. The address range **198.18.0.32 to 198.18.3.255** (inclusive) is used by Raymarine equipment, and any other third-party equipment on the network should not be set to a static IP address in this range. It should instead be set elsewhere in the 198.18.0.0/21 range.

Adding third-party devices to your Raymarine Ethernet (IP) network

- It is recommended that any third-party products connecting to a Raymarine Ethernet (IPv4) network (e.g., a third-party IP camera) are configured as DHCP clients, so that they automatically get allocated a correct IP address within the range used by the **Raymarine IPv4 network**. If this is not possible, (for example, in the scenario that your third-party IP Camera requires a static IP address), you should configure the product to have a static IP address within the following range: **198.18.0.1 to 198.18.0.31** (inclusive).
- Any third-party router in your network should be performing IPv4 *Network Address Translation* (NAT) from the private address to another one on an upstream interface.

Configuring a third-party router as DHCP server

In the scenario that you wish to use a third-party DHCP server to allocate the IP addresses for your vessel's IPv4 network, use the following information to help you configure the third-party DHCP server to work with Raymarine Ethernet (IPv4) client devices:

1. Configure the third-party DHCP server / router to use Raymarine's subnet details, which are as follows:
 - a. Set the DHCP server's IP address to **198.18.0.1**
 - b. Set the *netmask* to /21, i.e. **255.255.248.0**
 - c. Set the DHCP range from **198.18.4.0 to 198.18.7.254** (inclusive). If this is not possible, ensure that the address range is smaller than this (but within the range of **198.18.4.0 to 198.18.7.254** (inclusive)).

- d. The address range **198.18.0.32 to 198.18.3.255** (inclusive) is used by Raymarine equipment, and therefore you must ensure that any other third-party equipment on the network is NOT set to a static IP address in this range.
2. It may be necessary to set the DHCP setting for **all** of the chartplotters (MFDs) on the vessel to *[Off]*. However, the default option (*[Auto]*) will likely work fine in many cases. If for any reason the third-party DHCP server starts up after the chartplotter (MFD) starts up, the user should manually set the chartplotter's (MFD's) DHCP switch to *[Off]*. This is because, when the chartplotter (MFD) starts up, its DHCP *[Auto]* feature tries to detect if another DHCP server is already present on the network.
3. In case of failure of the third-party device, the chartplotters (MFDs) can be easily configured to be the DHCP server again, by setting the chartplotter's (MFD's) DHCP setting back to *[Auto]*.

Adding third-party Wi-Fi Access Points / Wi-Fi routers to your Raymarine Ethernet (IPv4) network

- There is a large volume of multicast IPv4 traffic on the Raymarine Ethernet (IPv4) network. Many consumer Wi-Fi Access Points / Wi-Fi routers simply bridge all multicast traffic from the Ethernet interface to the Wi-Fi interface when there are connected Wi-Fi clients. This will result not only in poor Wi-Fi performance but also in a reduction of usable Wi-Fi spectrum to other Wi-Fi users and vessels in the vicinity. If using a third-party Wi-Fi Access Point or Wi-Fi router, Raymarine recommends that *IGMP Snooping* is enabled on the third-party device, and additional checks are performed, in order to ensure that your device is not bridging any unexpected multicast traffic to its Wi-Fi interface from the Raymarine Ethernet (IPv4) network.
- Raymarine's YachtSense Link-Series YachtSense Link router is pre-configured with IGMP Snooping enabled, and therefore does not bridge internal multicast traffic on the wired network to the Wi-Fi network. No additional configuration is required in this respect.

Appendix E Document change history

Document and software version	Document changes
81394 (Rev 5) Date: 06-2024 Software: v5.1.14	- Added cloud connector update to list of new features. - Added watchdogs for current, voltage and resistance channels to new features table. - Updated to include references to software v5.1.14. - Added note regarding v5.0.11 being discontinued.
81394 (Rev 4) Date: 03-2024 Software: v4.0.426, v4.1.2 & v5.0.11	Updates to reflect software v5.0.11: - Updated to include new maximum channel count of 400. - Updated soft fuse details to reflect that values are locked and cannot be changed by the user. - Added new YachtSense DCS-Series app chapter. Updates to reflect software v4.1.2: “Watchdog” requirement for momentary switches — Implemented a mandatory requirement to include a "Watchdog" control in a boat's YachtSense DCS-Series Digital Control System design for all momentary switches, to ensure that, in the event of lock-up or crash on the switch device (whether hardware or software switch), the watchdog signal triggers the channel output to switch off. Updates to reflect software v4.0.426: - Updated to reflect the new feature in v4.0.426, which allows the software in all Remote modules in a single YachtSense DCS-Series Digital Control System to be updated via the Master module; it is no longer necessary to update each Remote module individually. Additional updates:

Document and software version	Document changes
	- Updated new features list. - Added New features chapter. - Removed data PGNs from appendix, as PGN support is dependent on configuration. - Added Software release history to appendix. - Updated hyperlink for software support requests. - Corrected Molex® connector references (MX150L is now MX150). - Digital Control System Terms of Use added to front matter. - Digital Control System Best practices information added to Appendix. - Other minor formatting and editorial changes. - Updated document change history. - Changed signal module's current from 250mA to 200mA. - Removed Guest account details for the Raymarine app.
81394 (Rev 3) Date: 07-2022 Software: v2.3.416	- Restructured chapters. - Added YachtSense ecosystem chapter. - Added YachtSense Link-Series YachtSense Link instructions to related documents. - Added remote control via Raymarine app to product overview and applicable products. - Updated parts supplied and added parts supplied for I/O modules. - Added YachtSense Link-Series YachtSense Link router to RayNet network connection details. - Added software version and new features details.

Document and software version	Document changes
81394 (Rev 2)	• Added details for upgrading software and checking software version. • Updated front matter legal notices and moved copyright notice to important information chapter.
Date: 04-2021	First public release.
Software: v1.4.367	

Index

A

Accessories	104
Network cables	105
RayNet cables	105
SeaTalk NG adaptor cables	109
SeaTalk NG backbone cables	108
SeaTalk NG cables	106
SeaTalk NG connectors	108
SeaTalk NG kits	106
SeaTalk NG Power cables	108
SeaTalk NG spur cables	107
Account transfer	31
Additional items	34
Alert details	89
Alert notifications	89
Alerts list	89
Applicable products	22
Assembly	42

B

Backbone length, SeaTalk NG	72
Busbar	50
By-pass	62

C

Cable	
Protection	48
Strain relief	48
Cabling	38
Camlock	42
Camlock locking	41
Camlock unlocking	41
CANBUS	50
Channel by-pass	62
Channels pages	87
Cleaning	95

Connecting cables	76
Connections	
4–20mA sensor	52, 59
Analog input	52, 59
Battery	67, 74
Digital input	52, 58
Distribution panel	67, 73
General cabling guidance	48
Input / output	51, 58
J1939	50
Loads	55
Master module	50
MFD	25
Module to module	50
Molex	78, 81
Motor	57
Power	70, 72, 75
Power connections	
Power distribution	73
Power supply	65
RayNet	76
Remote module	51
Reverse power	57
RS-485	50
SeaTalk NG	70
YachtSense System	25
Connections Output	
High power	54
ConnectionsOutput	
Low power	55
Contact details	97
Control buttons	86

D

Declaration of Conformity	10
Default page	86
Diagnostics	92
Dimensions	36
Distribution panel connection	73
Document conventions	13
Documentation	

Installation instructions	13
Mounting template.....	13
Operation instructions	13

E

Electrical interference.....	39
Electromagnetic Compatibility.....	38
EMC, <i>See</i> Electromagnetic Compatibility	
Environmental specification	100
Ethernet.....	118

F

Firmware, <i>See</i> Software version	
Flyback/freewheel diode	54, 56–57
Fuse	
Labeling	61
Tripped	89
Fuse by-pass	62
Fuse rating.....	88

H

High power module.....	22, 54
------------------------	--------

I

Inductive loads	54, 56–57
Installation	
Best practice.....	67
IP networking.....	118

J

J1939	50
-------------	----

L

LCD specification	100–101
LED	92

Limp home mode	89
Load connection.....	54
Load equivalency number	72
Location requirements	
General	38
Low power module.....	22, 55

M

Maintenance.....	10, 95
Manual override	88
Master module.....	18, 22, 50
Pin out.....	50
Master system	13, 18, 23
Maximum current.....	23
Module fuse.....	61–62, 66
Molex.....	34
Connector types	78
Crimp tool	41
Crimps.....	80
Inserting connectors	81
Removing connectors.....	78
Seal plugs	79
Tools	41
Wiring.....	80
Mounting	44–45
Mounting bracket	43–44
Mounting orientation	38
Mounting surface.....	38
Mounting template	46
Multifunction Display (MFD).....	18, 23

N

Network length,	
SeaTalk NG.....	72
Networking (IP)	
Overview.....	118
New features	17
NMEA 2000.....	111
LEN	72

O

Offboarding	31
Operating temperature.....	100
Options menu.....	88
Output	54–55, 57
Override	88

P

Parts supplied.....	33
Input and output modules.....	33
PGNs	111
Power	
Battery connection.....	67, 74
Distribution	66
Distribution panel.....	67, 73
Sharing a breaker	73
Power cable.....	66
Power cable extension	74
Power connection point	72
Power specification	100
Power supply.....	39, 66
Power supply module.....	18, 22, 65
Product dimensions.....	36
Product loading	72
Product overview.....	21
Product recycling (WEEE)	11
Product support.....	97

R

Raymarine app	18, 23
Configuration	23
RayNet.....	118
cables	105
RayNet network	50
Remote module.....	18, 22, 51
Pin out.....	51
Remote system.....	13, 18, 23
Reverse power module	22, 57
Routine checks.....	95
RS-485.....	50

S

Seal plugs.....	79
SeaTalk NG	70, 73
Adaptor cables	109
Backbone cables	108
Connection	50–51
Connectors	108
Kits	106
LEN	72
Load equivalency number	72
Power.....	70, 72, 75
Power cables	71, 108
Spur cables.....	107
System loading	72
SeaTalk NG cables	106
Serial connection.....	50
Service Center.....	97
Servicing.....	10, 95
Signal module.....	22, 58
Sleep mode	86
Soft fuse	88
Soft fuse rating	18, 88
Software	
Applicable version	15
Software upgrades	15
Software version.....	15
Spares	104
Specification	
Dimensions	36
Status.....	92
Storage temperature	100
Support forum	98
System assembly.....	42
System configuration.....	18, 22

T

Technical specification	99–102
Technical support.....	97–98
Terms of Use	9
Thermal circuit breaker	66
Thermal protection	23

Tools required	41
Training courses	98
Transfer ownership.....	31
Tripped fuse	89
Troubleshooting	92

V

Ventilation	38
-------------------	----

W

Warranty	11, 97
Water ingress	38
Water ingress protection	100
WEEE Directive	11

Y

YachtSense	
Digital Control System	19, 84
Off-boat features.....	27
On-boat features.....	25
YachtSense app	19, 83
YachtSense Digital Control System	13
YachtSense ecosystem	25
YachtSense Link Router	13



Raymarine (UK / EU)

Marine House, Cartwright Drive,
Fareham, Hampshire.
PO15 5RJ.
United Kingdom.

Tel: (+44) (0)1329 246 700

www.raymarine.co.uk

Raymarine (US)

110 Lowell Road,
Hudson, NH 03051.
United States of America.

Tel: (+1) 603-324-7900

www.raymarine.com



Raymarine®