

Raymarine®



YACHTSENSE™ DCS

Installation and operation instructions

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Check the Raymarine website for the latest software releases for your product.
www.raymarine.com/software

Product documentation



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Chapter 1: Important information



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).



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.

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.

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.

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: www.raymarine.com/manuals.

Declaration of Conformity

FLIR Belgium BVBA declares that the following products are in compliance with the EMC Directive 2014/30/EU:

- **Master module** — E70592
- **Remote module** — E70593
- **Lo power module** — E70594
- **Hi 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

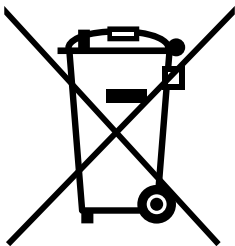
To register your Raymarine product ownership, please visit www.raymarine.com and register online.

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: www.raymarine.eu/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 (www.raymarine.com) to ensure you have the most up-to-date version(s) of the documentation for your product.

Chapter 2: Document and product information

Chapter contents

- [2.1 Product documentation on page 14](#)
- [2.2 Product overview on page 15](#)

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.

- **81394** — YachtSense Digital Control System Installation and Operation Instructions (this document)
- **87407** — YachtSense Digital Control System Mounting Template
- **87291** — Digital Switching (Best practice guide for designers and installers)
- **AS-33472-100** — Molex® MX150L application guide (Molex document containing supplemental information pertaining to the Molex MX150L sealed product line.)

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.

Document conventions

The following conventions are used throughout this document:

System conventions:

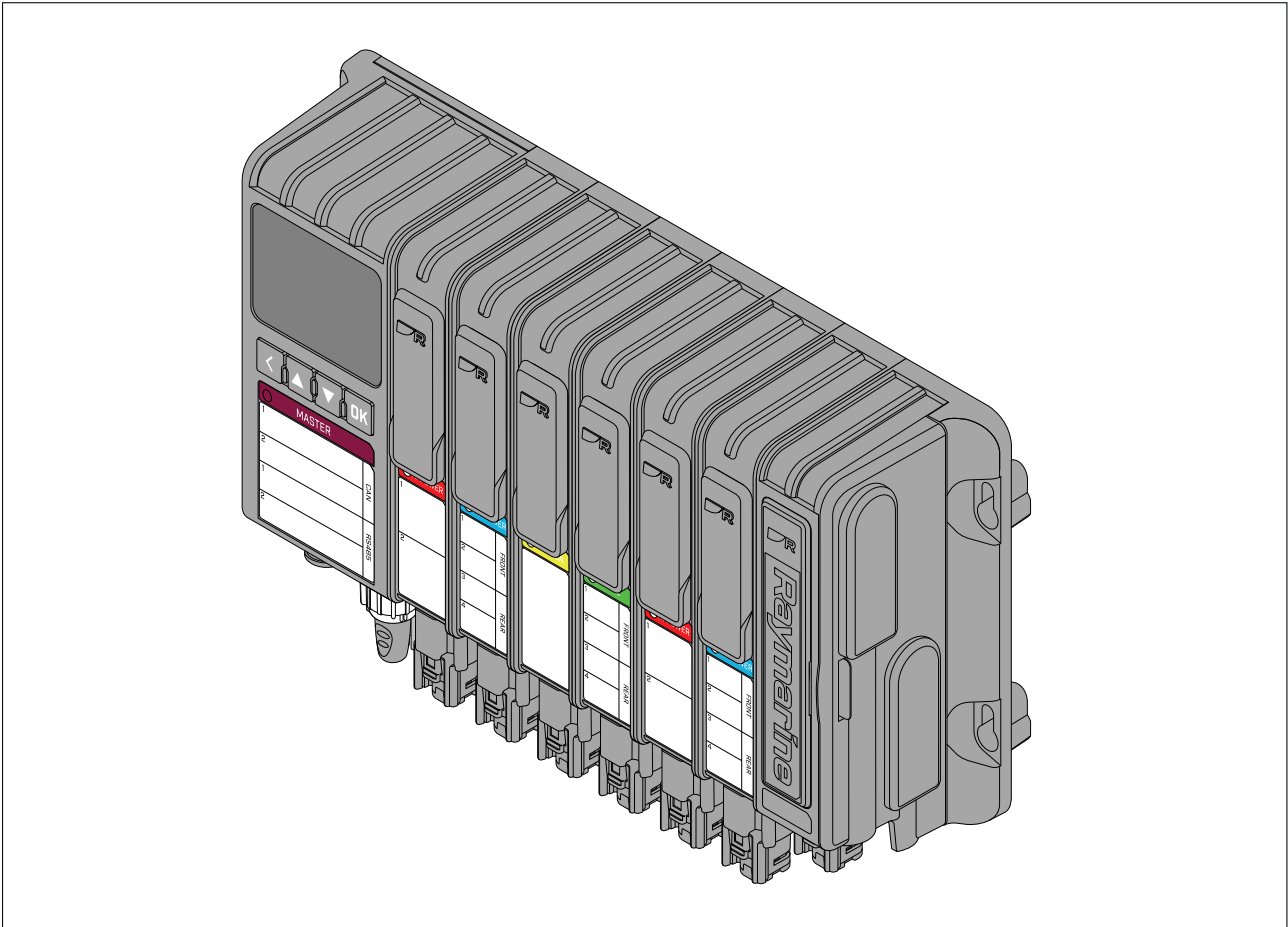
- **YachtSense Digital Control System** Refers to a complete system consisting of 1 Master system and 0 or multiple Remote systems.
- **Master system** — The term Master system is used to refer to the assembly which contains the Master module.
- **Remote system** — The term Remote system is used to refer 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.

2.2 Product overview

The YachtSense™ Digital Control System provides digital monitoring and control of vessel electrical systems.



YachtSense Digital Control System functionality includes:

- Control and monitoring of 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.
- Monitoring of supported SeaTalkng® / NMEA 2000 sensors.
- Control and monitoring of high power devices (up to 20 A).
- Control and monitoring of lower power devices (up to 10 A).
- Control reversible motors (up to 20 A).
- Control of digital and analog output signals (up to 250 mA).
- Monitoring of digital and analog input signals
- Remote control via networked Raymarine Multifunction Displays (MFDs) using customized pages.
- Dedicated LCD screen and button controls included on master and Remote modules for manual override, device diagnostics and channel status.
- Up to 100 A current draw for each system.
- Thermal circuit protection.
- Hard and soft fused module.
- Manual module by-pass.
- Over voltage protection up to 32 V dc

Configuration required

The YachtSense™ Digital Control System's Master module must be configured for your vessel before it can be used.

Note:

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

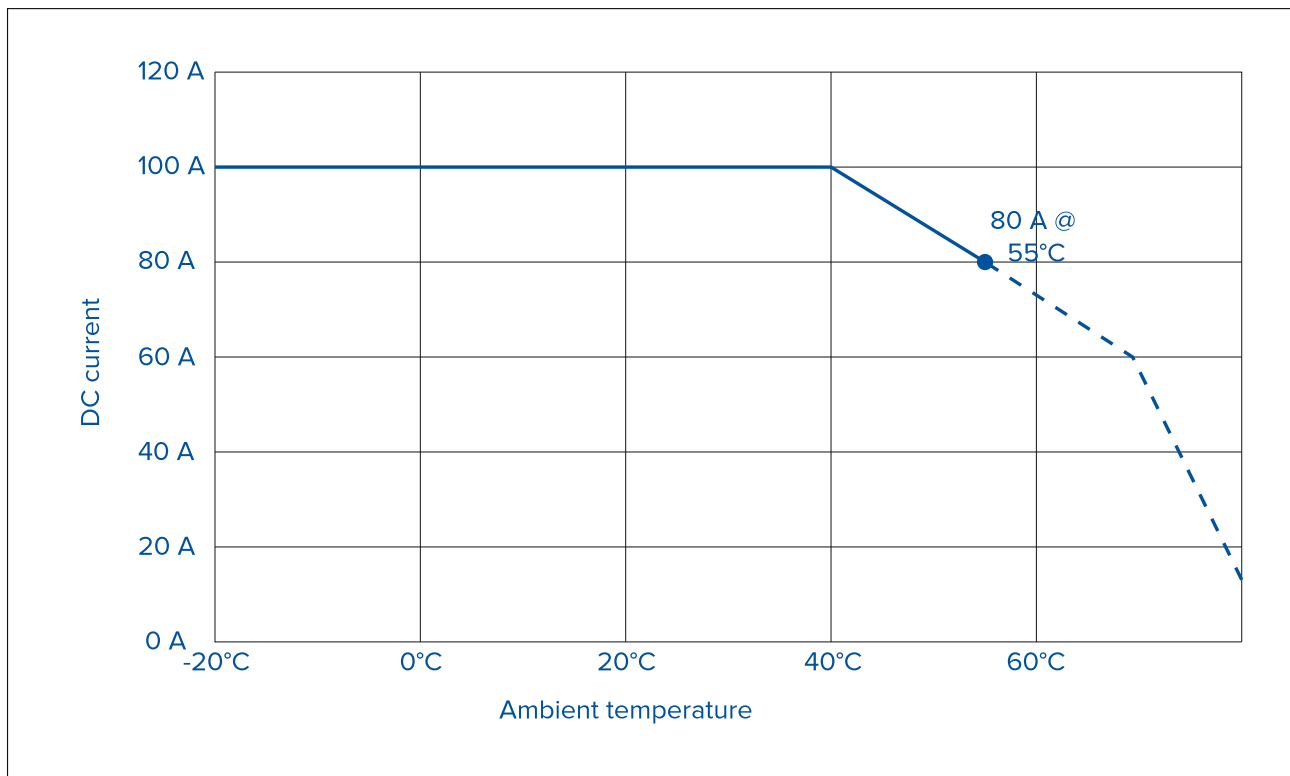
Maximum current / load

The YachtSense™ 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)

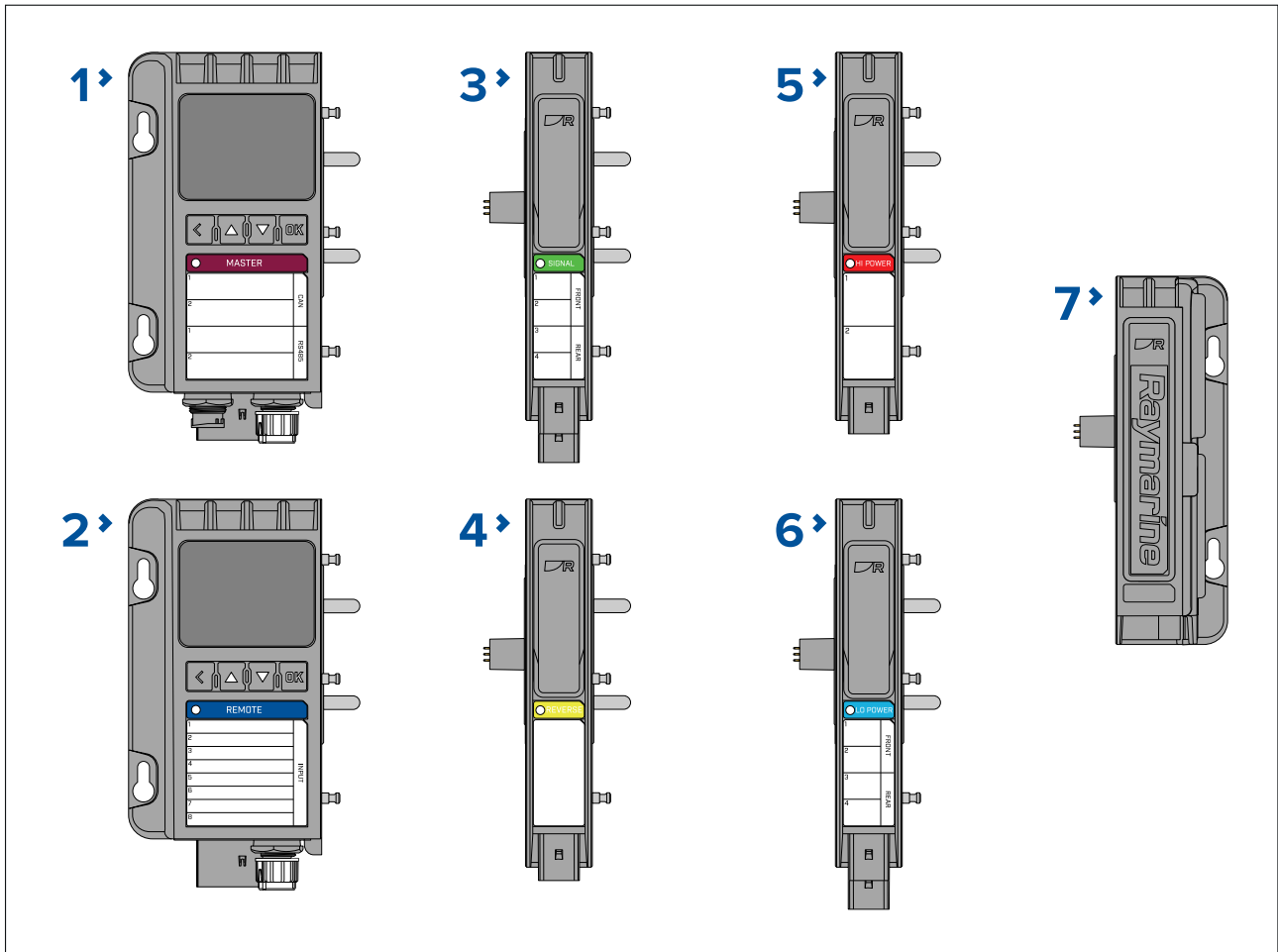


Important:

- 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.

Applicable products

The following YachtSense™ 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 Multifunction display (MFD)
- The Master module is connected to Remote modules via a connection to a SeaTalkng® backbone.
- 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 a connection to a SeaTalkng® backbone.

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 20 A bidirectional channel.

5. **Hi power module (E70595)**

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

6. **Lo power module (E70594)**

- The Lo power module provides 4 x 10 A 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 assembly or Remote system assembly.
- The Power supply module connects to the vessel's power supply and provides power to the system.

System hardware configuration

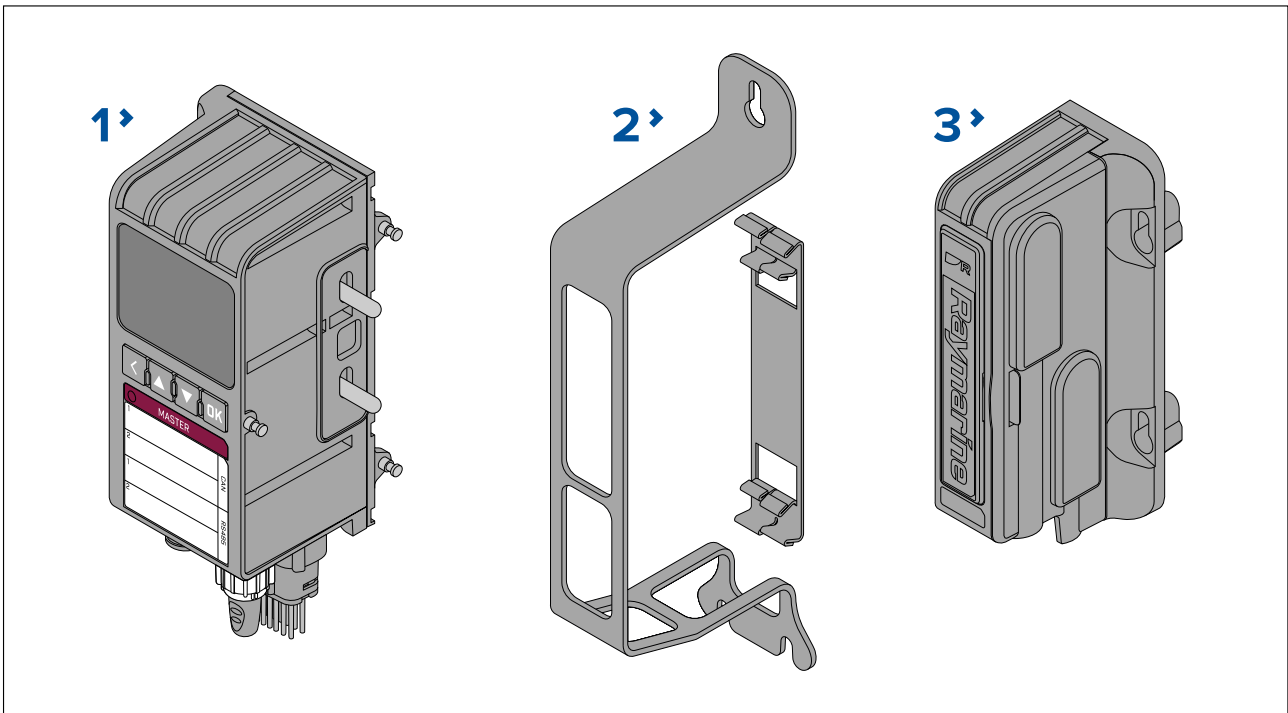
As a minimum the YachtSense™ Digital Control System must consist of a Master system that includes a Master module and a Power supply module.

- The Master module must contain the relevant configuration files for your system.
- Modules must be assembled in configuration order.
- Up to 6 input and output modules can be connected to a Master system.
- The YachtSense 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 system.
- The Master system and Remote systems communicate using a SeaTalkng® backbone.
- The YachtSense Digital Control System can be controlled by compatible Multifunction displays (MFDs) connected via SeaTalkhs® and SeaTalkng®.

Master / Remote module parts supplied

The following parts are supplied in the box.

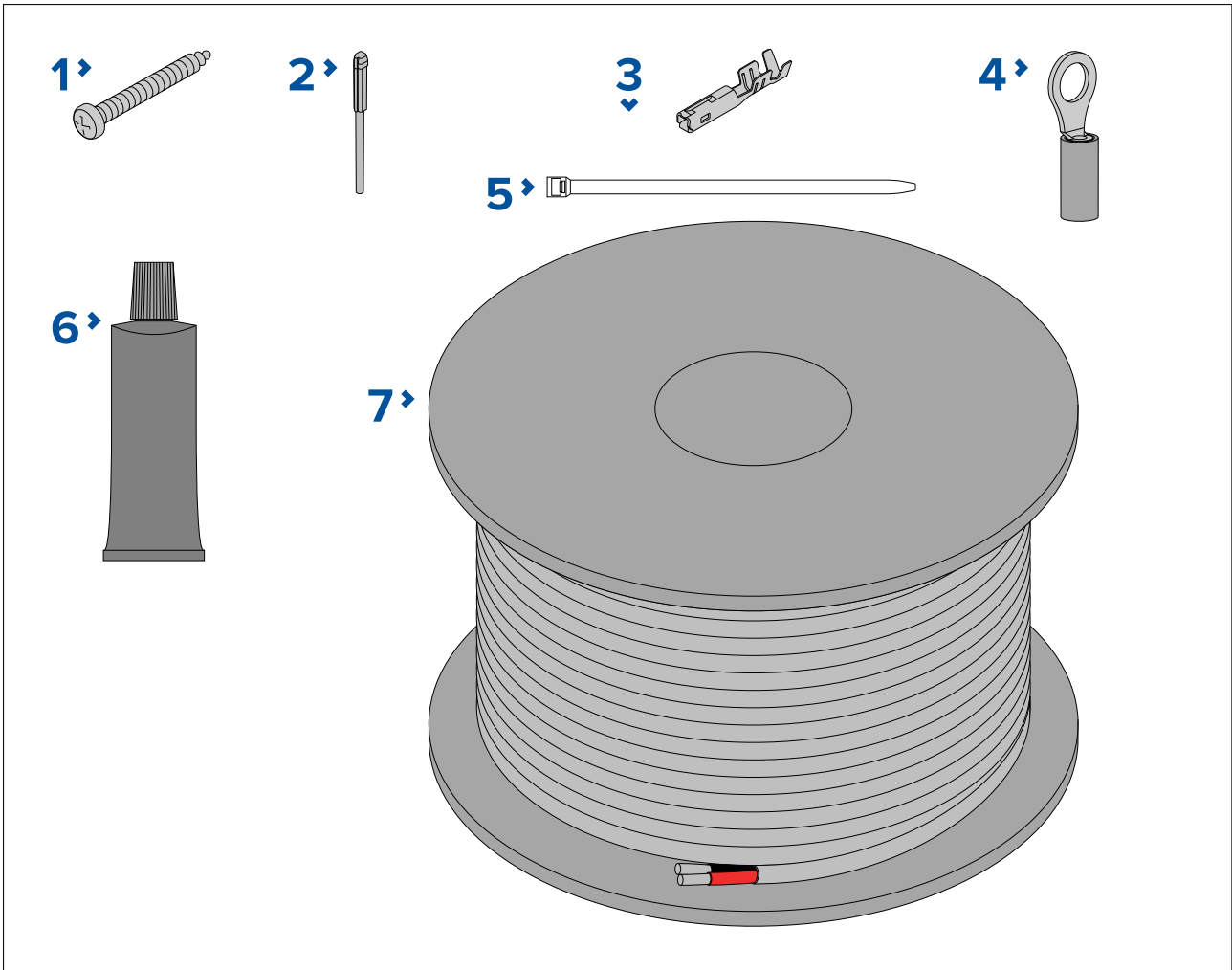
Unpack your product carefully to prevent damage or loss of parts. Check the box contents against the list below. Retain the packaging and documentation for future reference.



1. Master / Remote module (Supplied fitted with SeaTalkng® 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.

Required additional items

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



1. Fixings appropriate for mounting surface and 5 mm (0.2 in) module mounting holes (4 x fixings are required assemblies with less than 4 input / output modules. 7 x fixings are required for assemblies with 4 or more input / output modules.)
2. Molex MX150L seal plugs (34345-0001) (A80624)
3. Molex MX150L female crimps
 - 14-16 AWG: (33001-2003) (A80622)
 - 18-20 AWG (33001-2004) (A80623)
4. 2 x M6 1/4" ring crimps
5. 2 x cable ties (up to 5 mm x 1 mm)
6. Silicone or copper grease
7. 2 core power cable (rated appropriately for the intended installation).

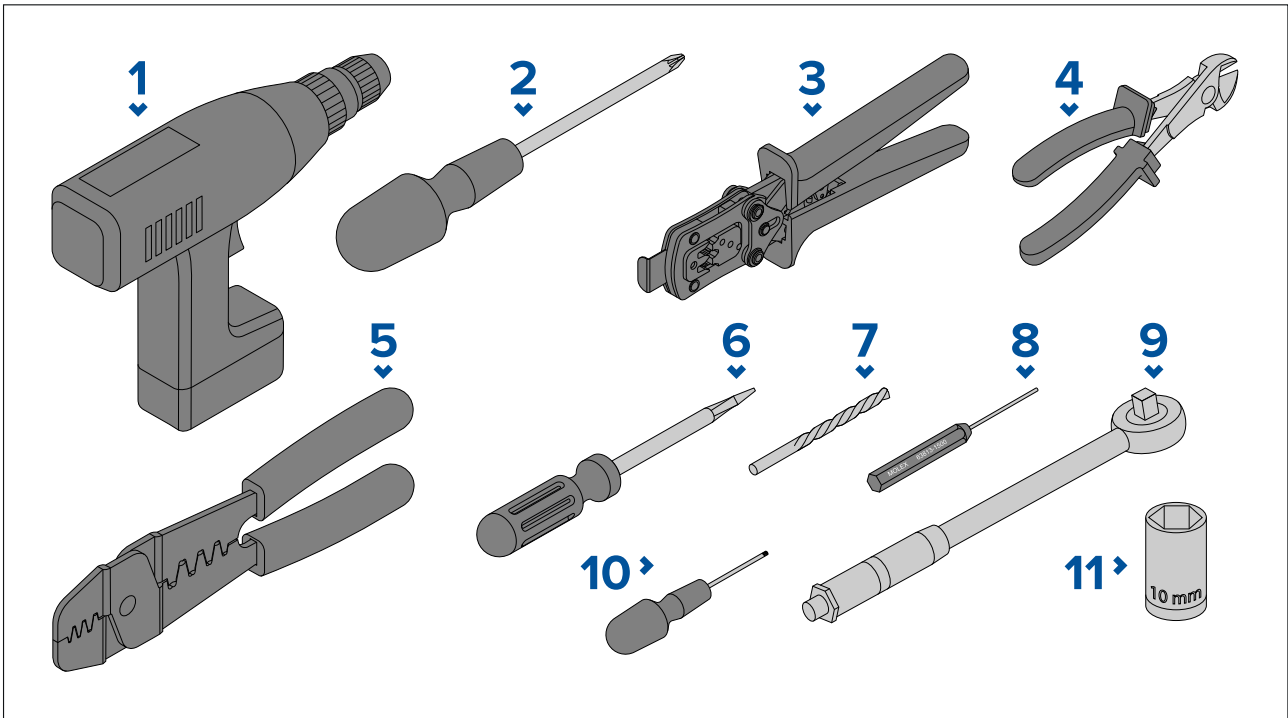
Chapter 3: Installation

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- 3.2 Selecting a location on page 22
- 3.3 Master system and Remote system dimensions on page 24
- 3.4 Camlock system on page 25
- 3.5 Assembling Master or Remote systems on page 25
- 3.6 Mounting options on page 27
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- 3.9 Mounting using the mounting template on page 30

3.1 Tools required

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



1. Power drill
2. Pozi-drive screw driver
3. Molex crimping tool:
 - 14–16 AWG: 63811–5900
 - 18–20 AWG: 63811–6000
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 application tool (63813–1500)
9. Torque wrench
10. T15 Torx drive
11. 10 mm socket

3.2 Selecting a location

Warnings and cautions

Important: Before proceeding, ensure that you have read and understood the warnings and cautions provided in the [Chapter 1 Important information](#) section of this document.

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 (3.3 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 (6.6 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.



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).

Location requirements

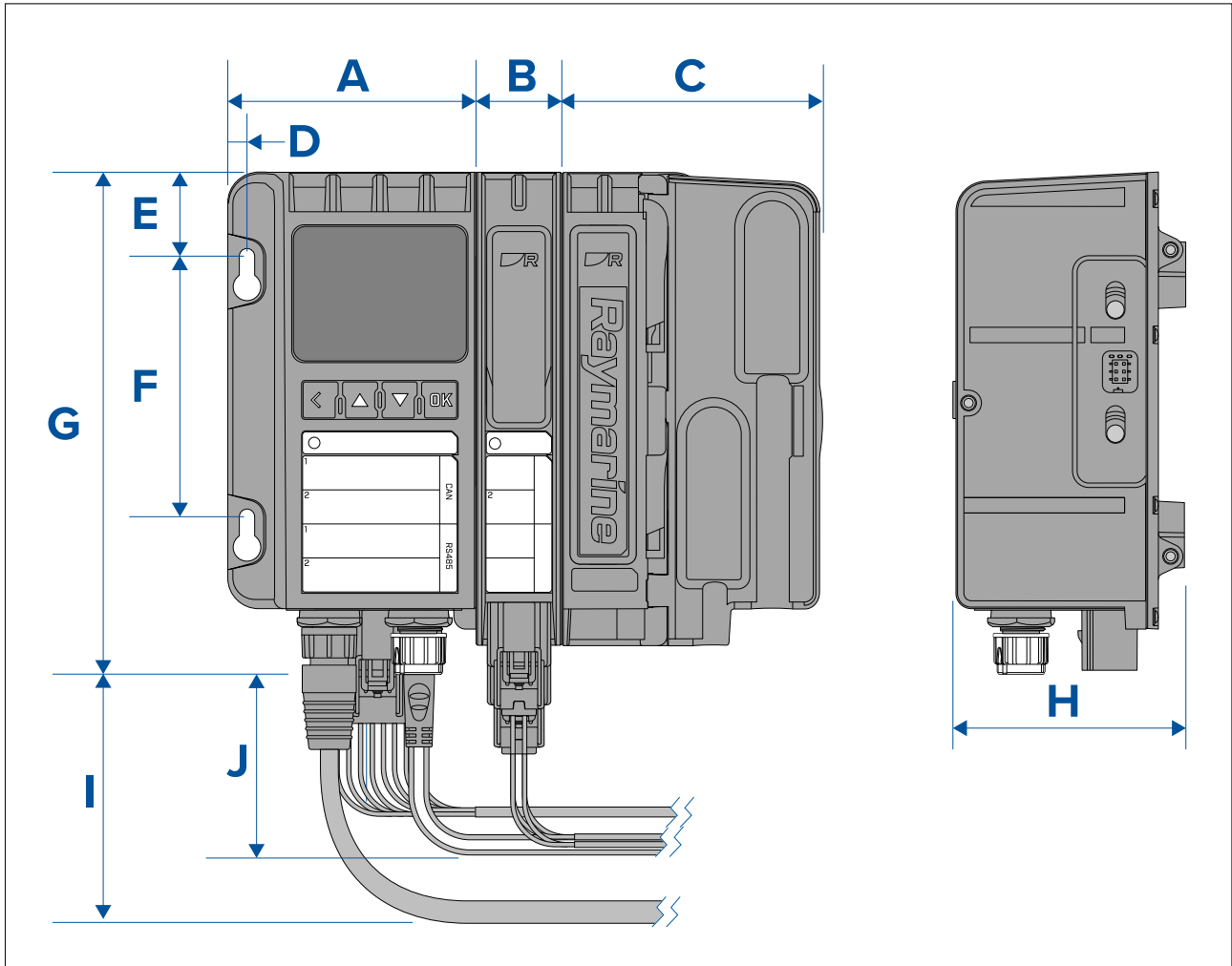
When selecting a location for your product it is important that you comply with the specified location requirements.

Installation location 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 product is mounted in a well ventilated compartment of suitable size.
 - Ensure adequate separation between equipment.
 - Never cover the product.
- **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.
- **Mounting orientation** — The product must be mounted on a vertical surface with the connectors pointing downwards.
- **Cabling** — Ensure the product is mounted in a location which allows proper routing, support and connection of cables:
 - Ensure that specified minimum cable bend radii are adhered to
 - Use cable clips to support cable and prevent stress on connectors
 - If your installation requires suppression ferrites to be added to cables then additional cable clips should be used to support the extra weight of the cable
- **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** — Select a location that is as close as possible to the vessel's DC power source. This will help to keep cable runs to a minimum.

3.3 Master system and Remote system dimensions

Product dimensions for the system are provided below.



A = 81.00 mm (3.19 in)

B = 28.00 mm (1.10 in) per module — minimum = 0 and maximum = 6 (168 mm / 6.61 in)

C = 86.50 mm (3.40 in) Minimum

D = 5.87 mm (0.23 in)

E = 27.50 mm (1.08 in)

F = 85 mm (3.35 in)

G = 165.00 mm (6.50 in)

H = 76.00 mm (2.99 in)

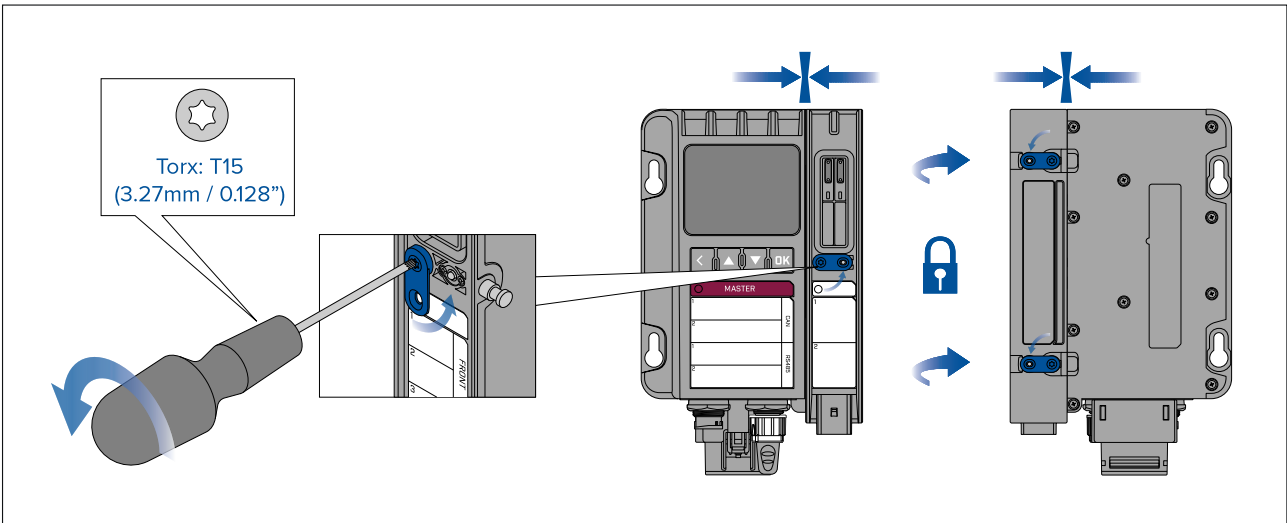
I = 80 mm (3.15 in) Minimum

J = 87 mm (3.43 in) Minimum

3.4 Camlock system

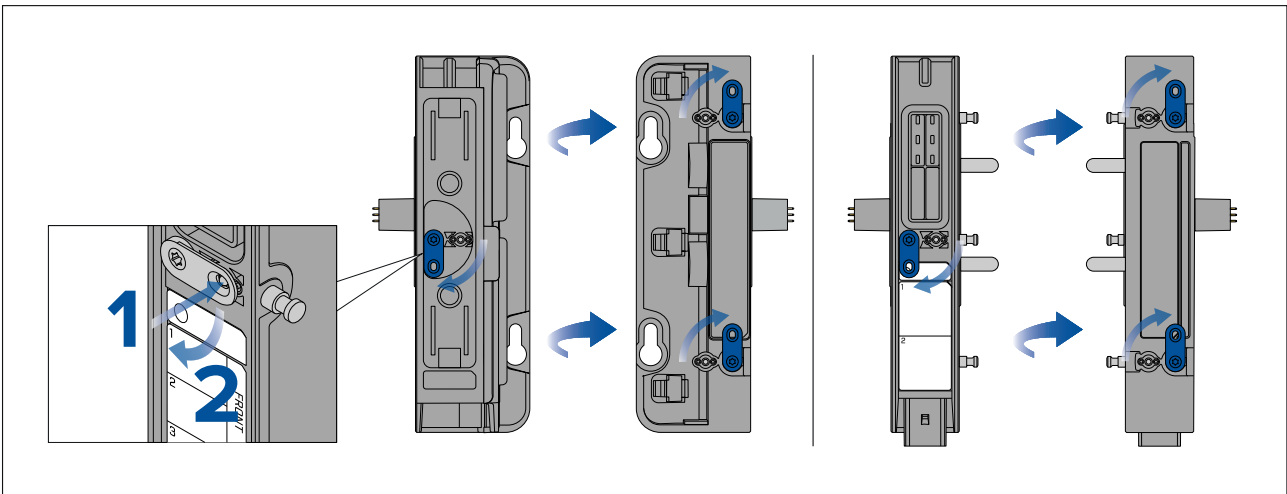
Input and output modules and power supply modules include a camlock system that is used to lock the modules together. The camlock system consists of 3 camlocks on each module, one on the front and 2 on the rear. The modules are supplied with the camlocks in the unlocked position.

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.

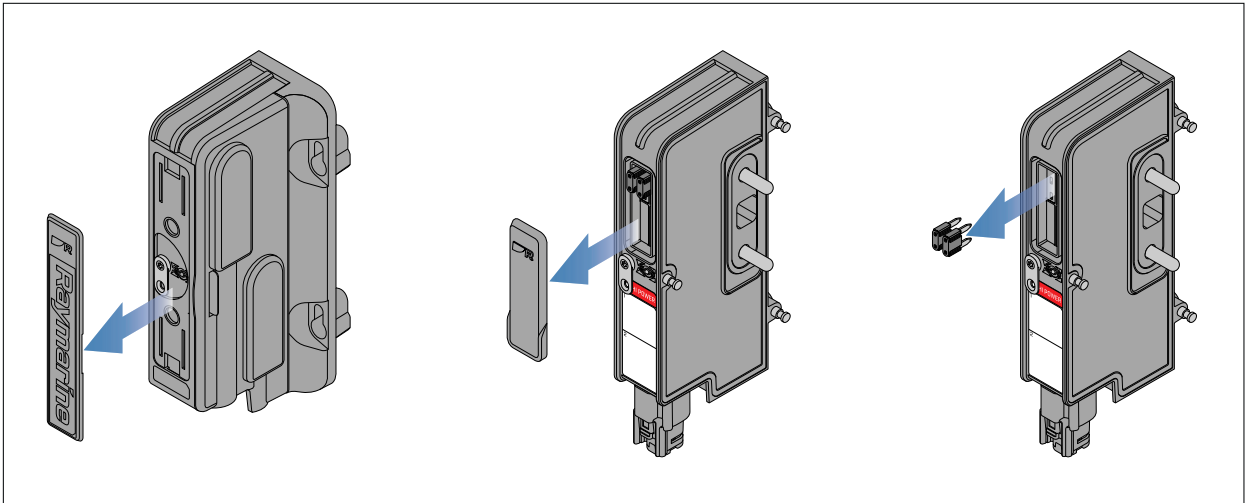
3.5 Assembling Master or Remote systems

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

Important:

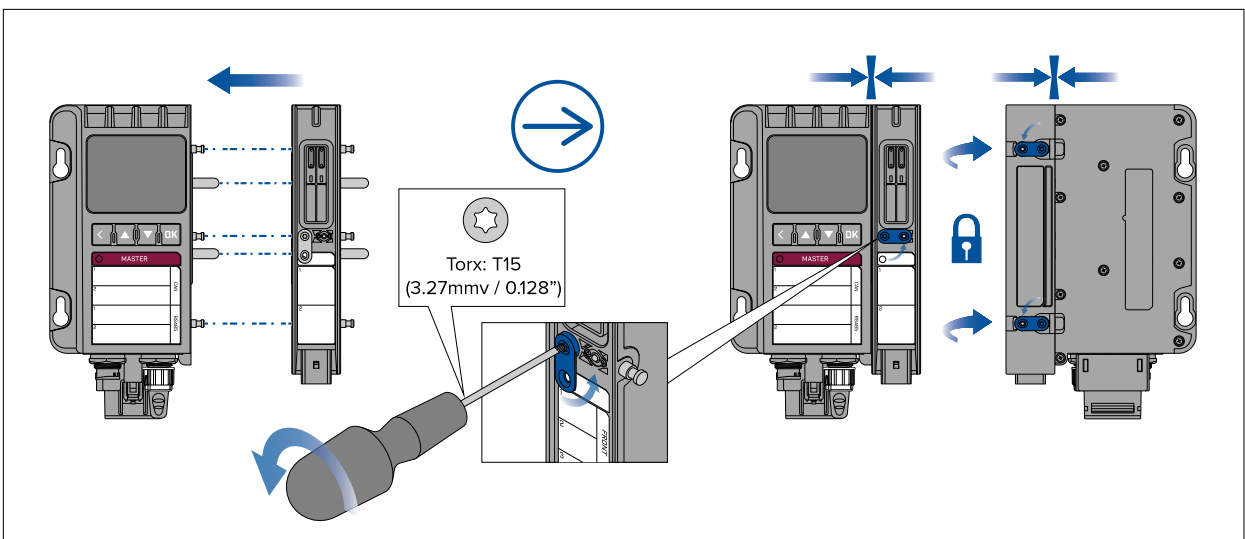
Modules must be assembled in the order that they have been configured.

1. Remove the fuse covers and fuses on all input and output modules and remove the cover on the front of the Power supply module.

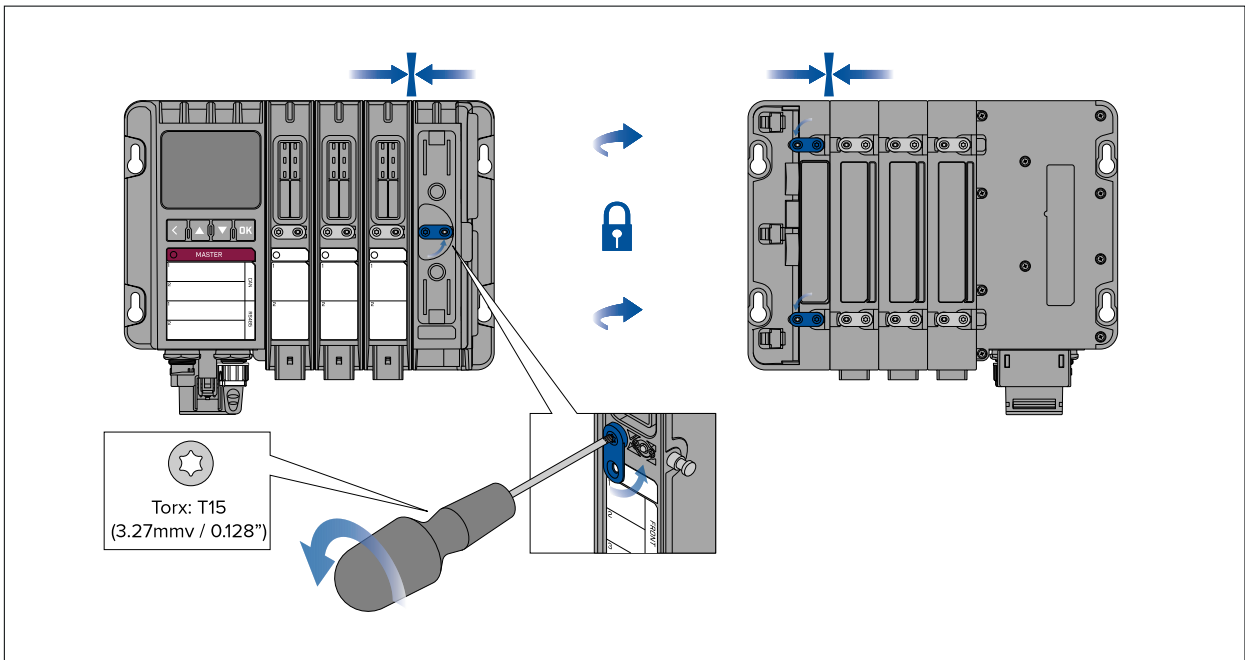


2. Ensure that the camlocks on the front and back of the Input and Output modules and the Power supply module are in the unlocked position.
3. Connect the Input and Output modules to the Master or Remote module in configuration order.
 - i. Connect modules by Lining up the locking pins, power bars and connector slot on the Master or Remote module with the relevant holes and connector on the input / 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 Torx driver to help turn the locking tabs.



4. 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.



3.6 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.

3.7 Mounting using the bracket

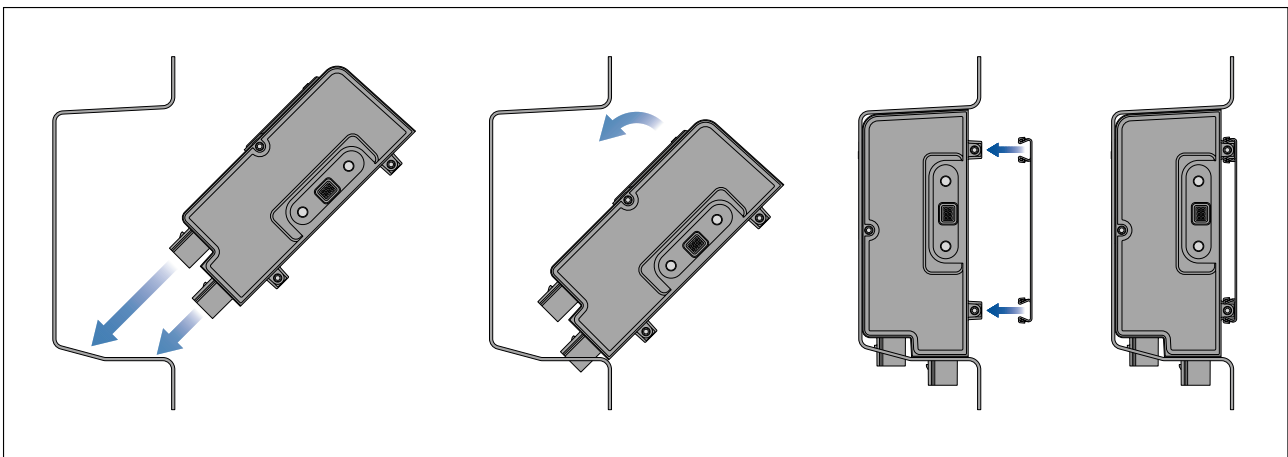
Fitting the mounting bracket

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.



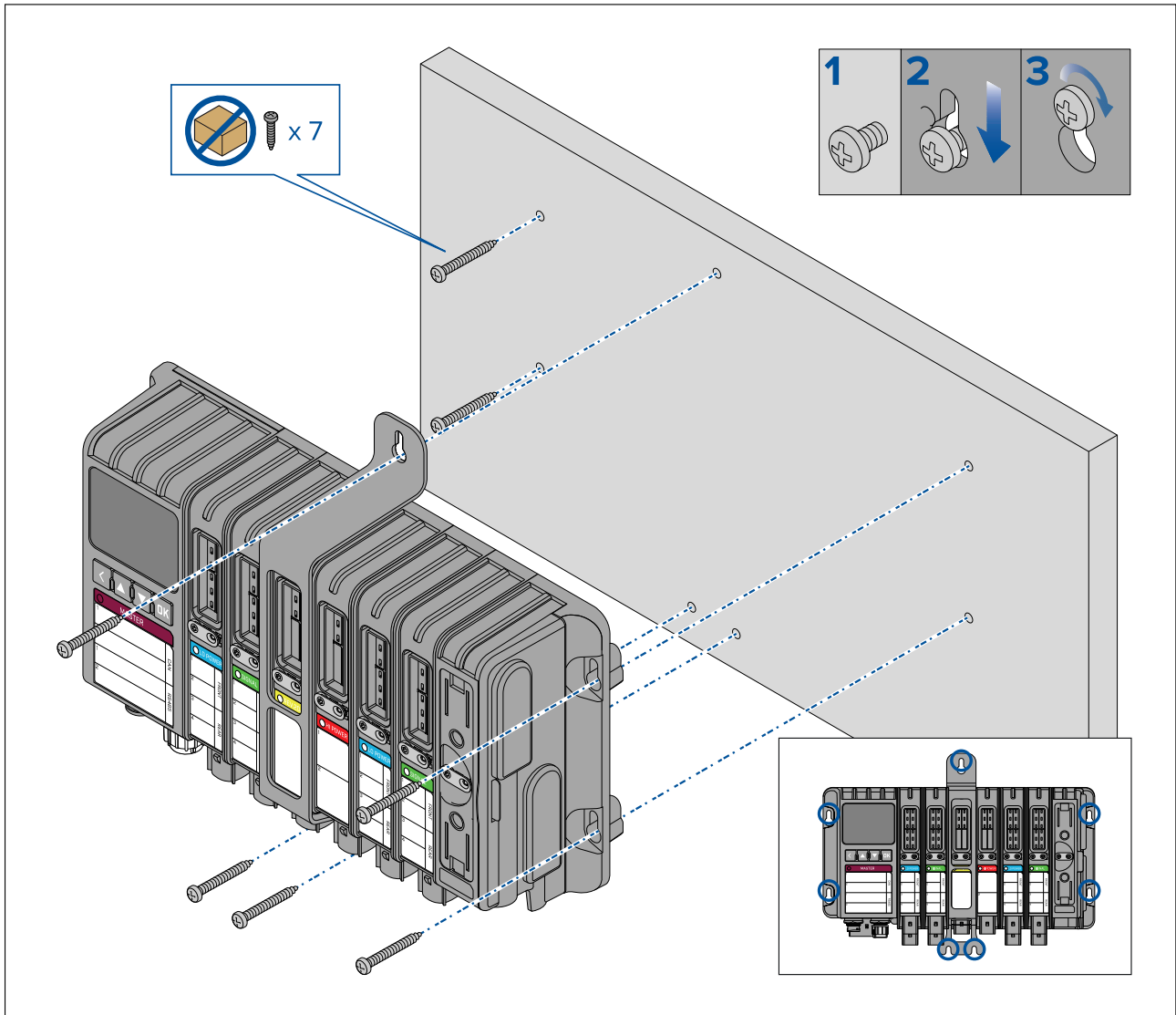
1. Slide the module connector(s) in to the slots in the bottom of the mounting bracket.
2. Push the top of the module into the bracket.
3. Attach the rear shim to the back of the same module that the bracket is attached to.

Mounting systems 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.



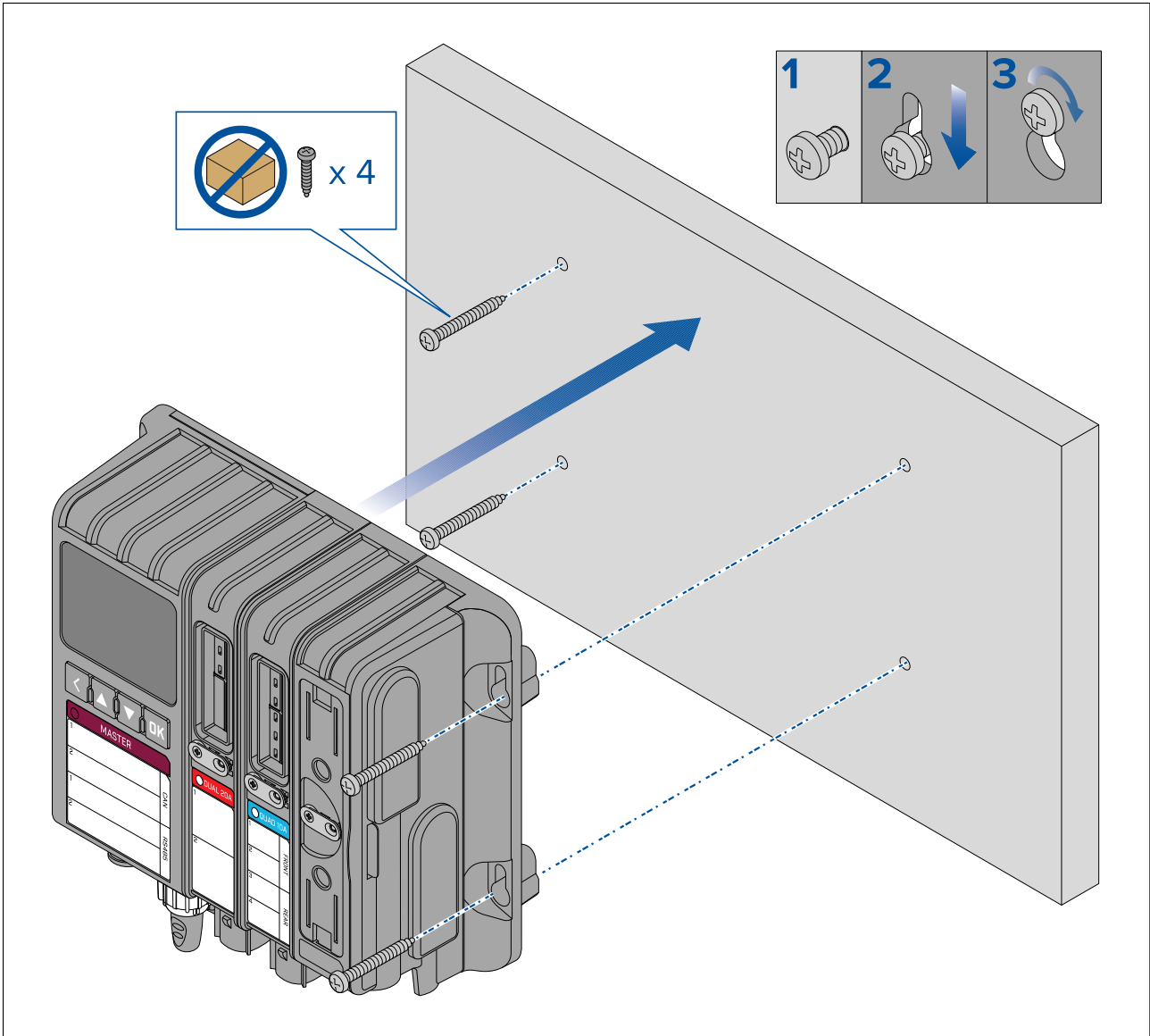
1. Ensure that the mounting location requirements have been met.
2. Hold the assembly in place at the intended location.
3. Mark the location of the 2 holes on the Master module or Remote module (the holes on the left).
4. Place the assembly to one side.
5. Drill the 2 holes in the mounting surface.
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.

3.8 Mounting without the bracket

Follow the steps below to mount Master system assembly and Remote system assemblies.

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.



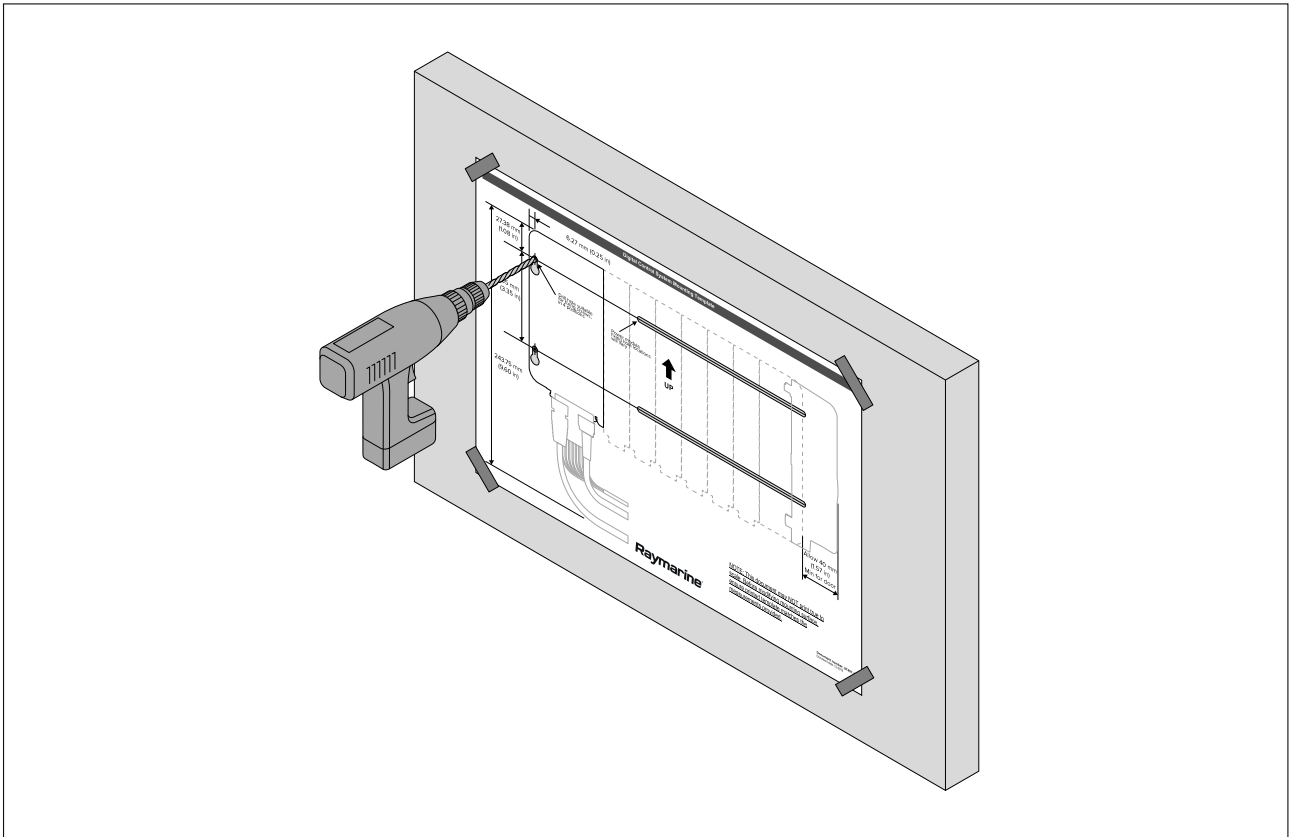
1. Ensure that the mounting location requirements have been met; refer to: [p.23 – Location requirements](#)
2. Hold the assembly in place at the intended location.
3. Mark the location of the 2 holes on the Master module or Remote module (the holes on the left).
4. Place the assembly to one side.
5. 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.

3.9 Mounting using the mounting template

A mounting template is provided which 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 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.23 – 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 holes at the marked locations.
7. Screw in 4 x fixings approximately half way.
8. Place the assembly over all 4 fixings and move the assembly down into the locked position.
9. Fully tighten the 4 fixings.

Chapter 4: Connections

Chapter contents

- 4.1 General cabling guidance on page 32
- 4.2 Module to module connections on page 32
- 4.3 Molex connectors on page 32
- 4.4 Master module connections on page 37
- 4.5 Remote module connections on page 38
- 4.6 Hi power module connections on page 41
- 4.7 Lo power module connections on page 43
- 4.8 Reverse power module connections on page 46
- 4.9 Signal module connections on page 47
- 4.10 Connecting the power supply on page 50
- 4.11 Replacing module fuses on page 54
- 4.12 Fuse by-pass on page 56
- 4.13 SeaTalkng[®] connection on page 56
- 4.14 RayNet network connection on page 63

4.1 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.

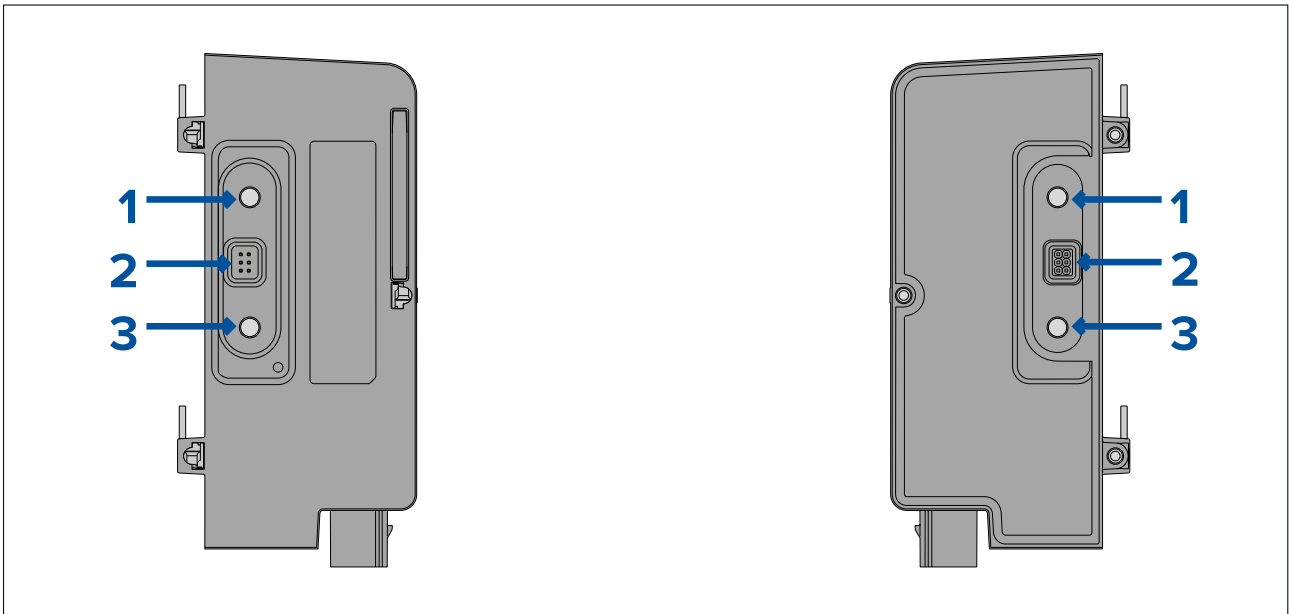


Warning: Positive ground systems

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

4.2 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.



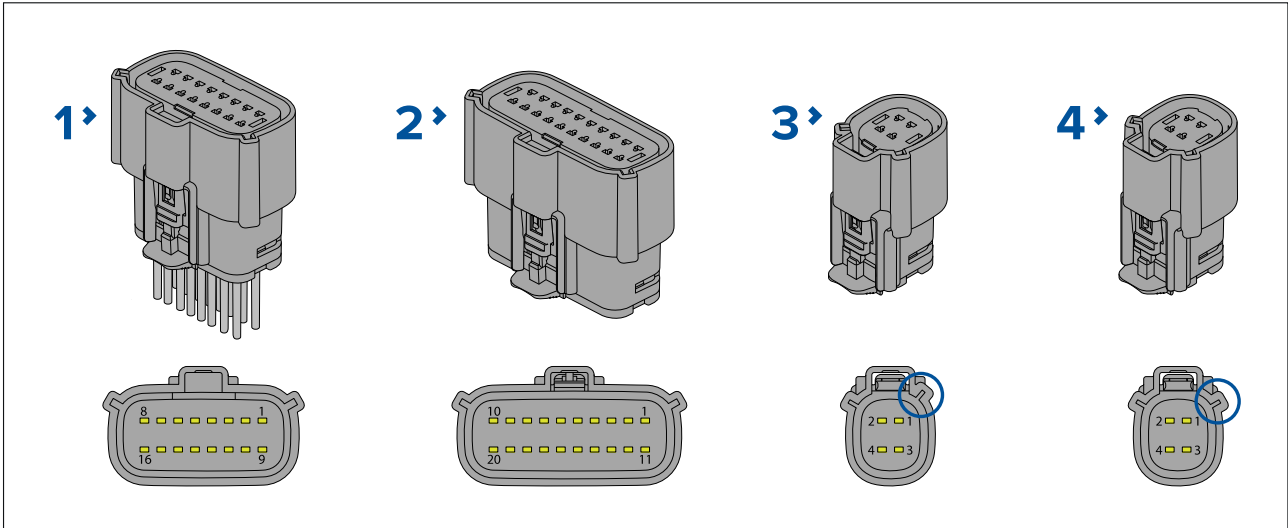
1. **Positive (+) busbar** — Connects directly or via input and output modules to the Power supply module, providing power to the system.
2. **Module communications connection** — Enables communication between modules.
3. **Negative (-) busbar** — Connects directly or via input and output modules to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

4.3 Molex connectors

The YachtSense™ Digital Control System uses Molex® MX150L Industrial sealed connectors. These connectors are designed for the harsh marine environment.

Molex connector types and keying

The types of connectors used and their keying is shown below



1. Master module 16-pin connector (Molex : 33472-1601)
2. Remote module 20-pin connector (Molex : 33472-2001)
3. Signal module 4-pin connector (Molex : 33472-4002)
4. Output module 4-pin connector (Molex : 33472-4001)

Note:

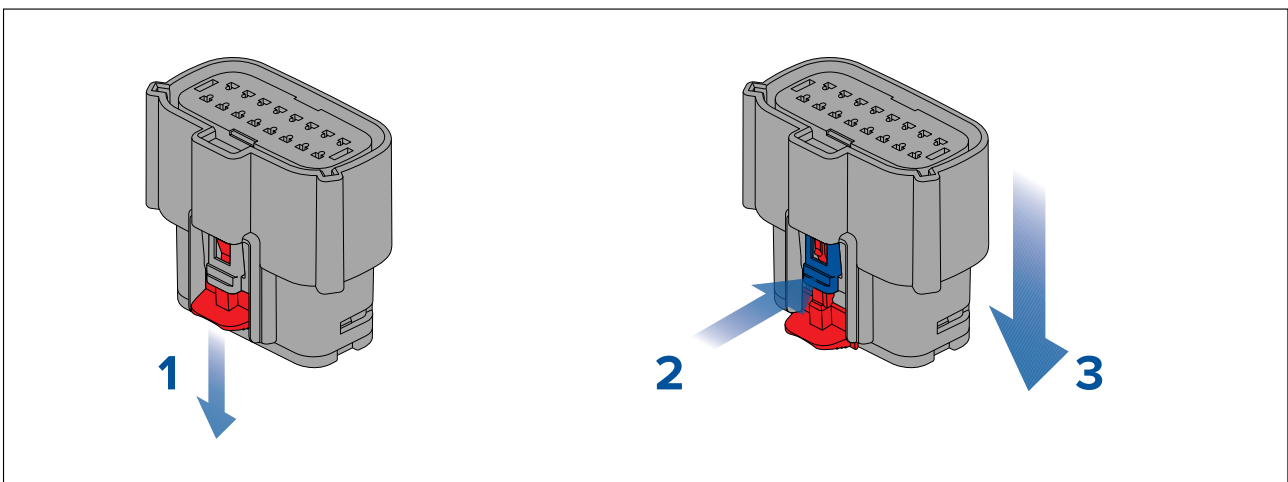
The connectors used for the Signal module and Output modules are keyed differently.

Removing connectors from modules

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

Note:

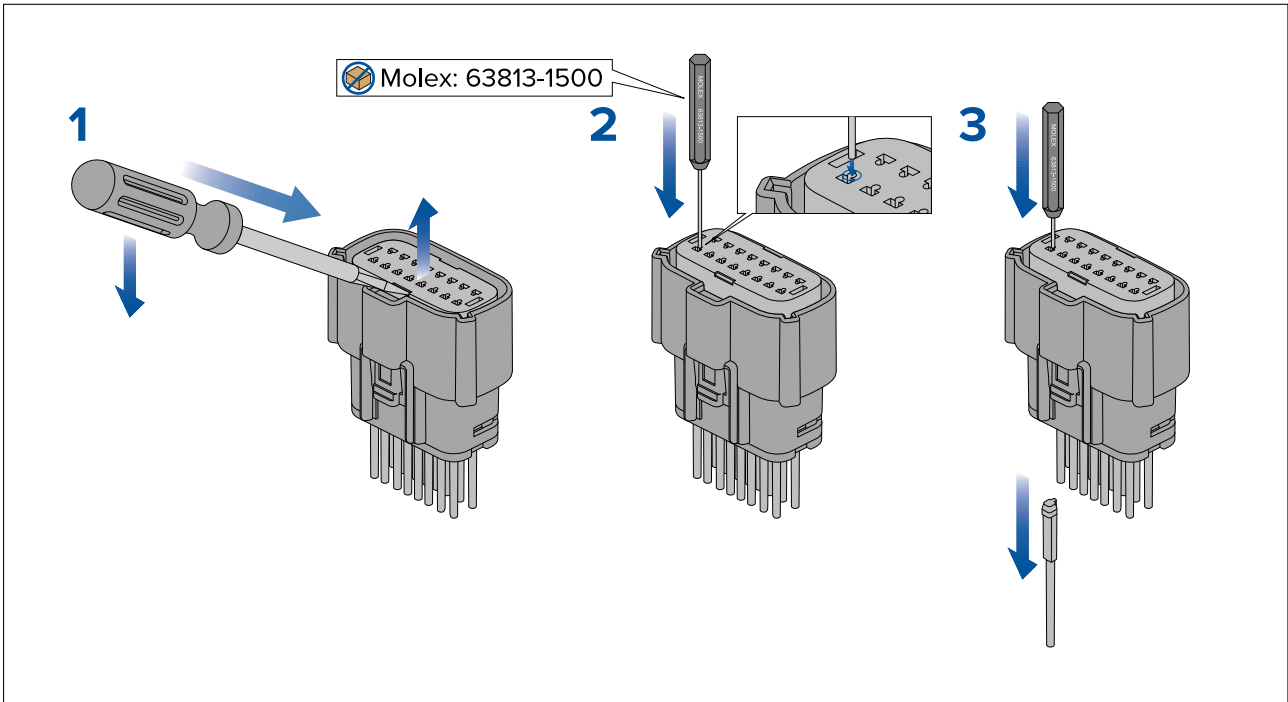
- If your connector does not include the Red locking tag (known as the CPA (Connector Position Assurance)) then ignore step 1.
- The illustration below depicts the Master module connector, however the procedure is the same for any of the Molex connectors used with YachtSense Digital Control System.



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.

Removing seal plugs

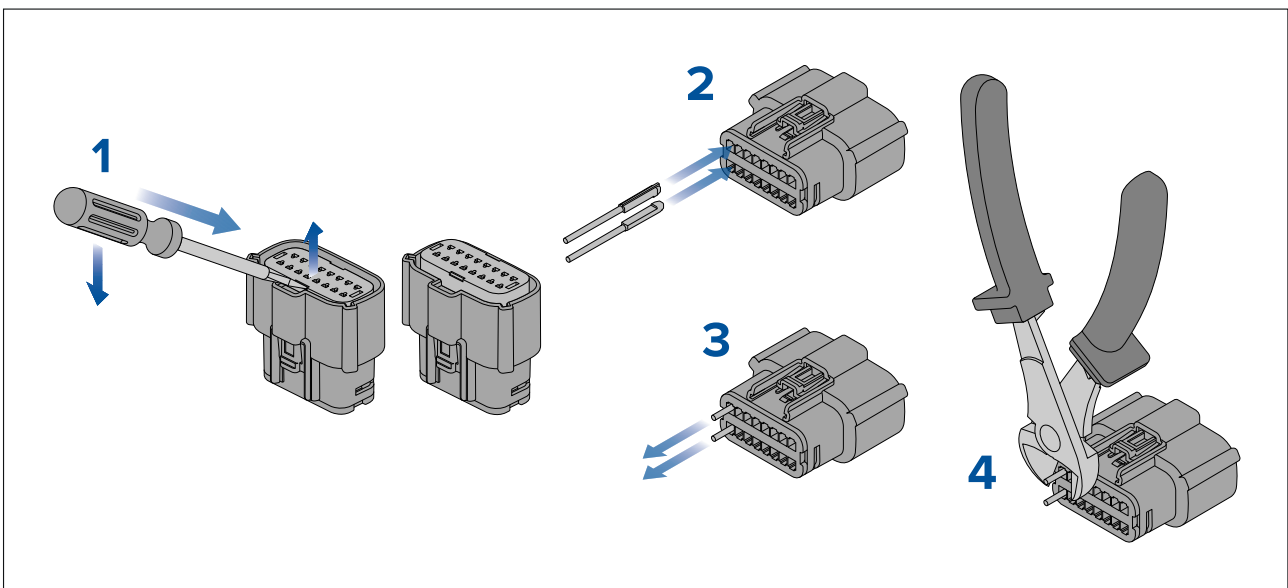
The Molex connector supplied with the Master module is supplied with seal plugs fitted to each of its 16 terminals. To wire the connector the relevant seal plugs will need to be removed. Follow the steps below to remove seal plugs from the Molex connectors.



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 (63813–1500) 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.

Inserting seal plugs

To protect against water ingress, connector terminals that will not be wired require seal plugs (Molex: 34345–0001) 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.

Wiring Molex connectors

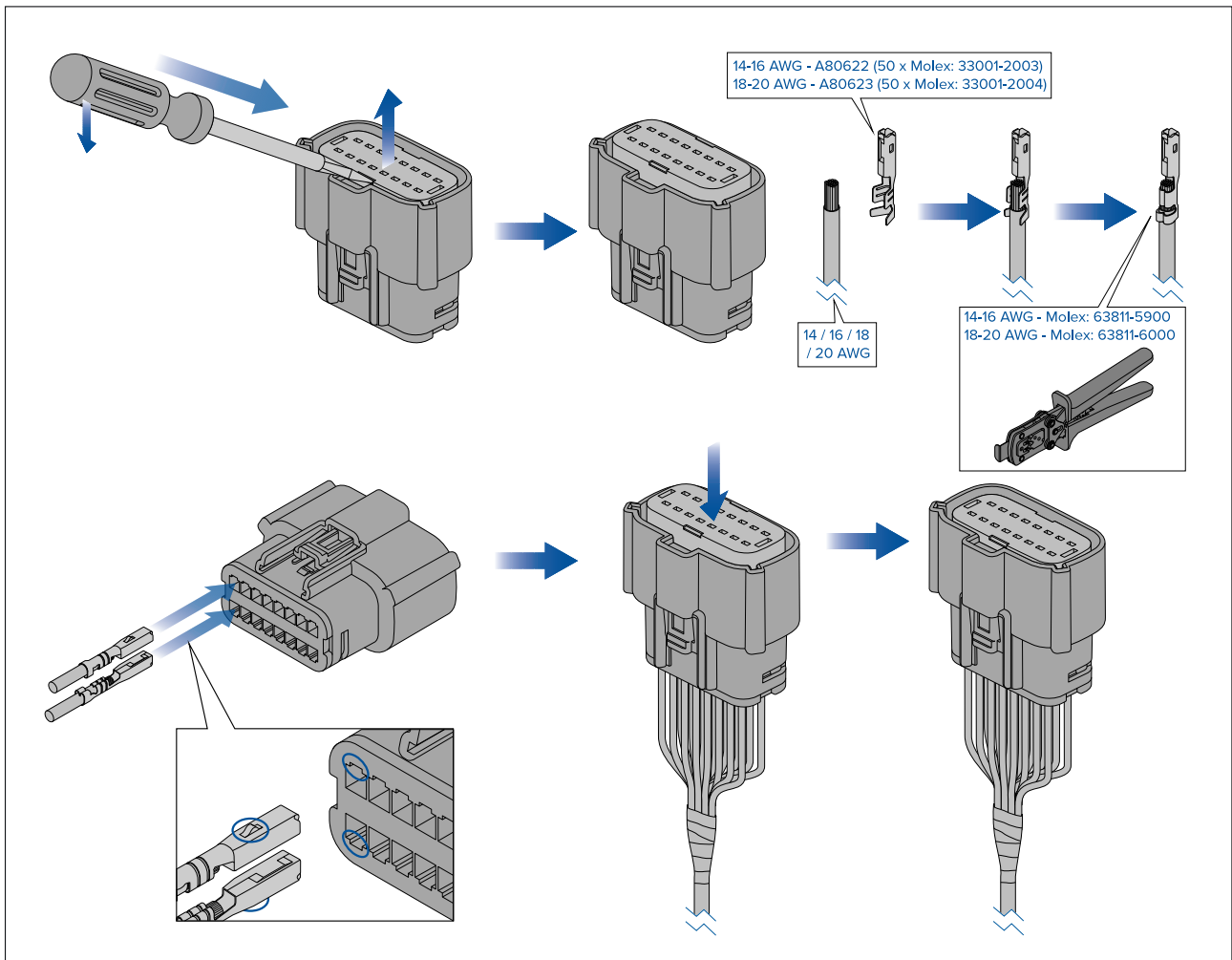
Molex connectors are provided with the master, remote and input and output modules. Follow the instructions below to wire the connector terminals.

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

- For 14 and 16 AWG wire Molex crimps 33001–2003 are required.
- For 18 and 20 AWG wire Molex crimps 33001–2004 are required.

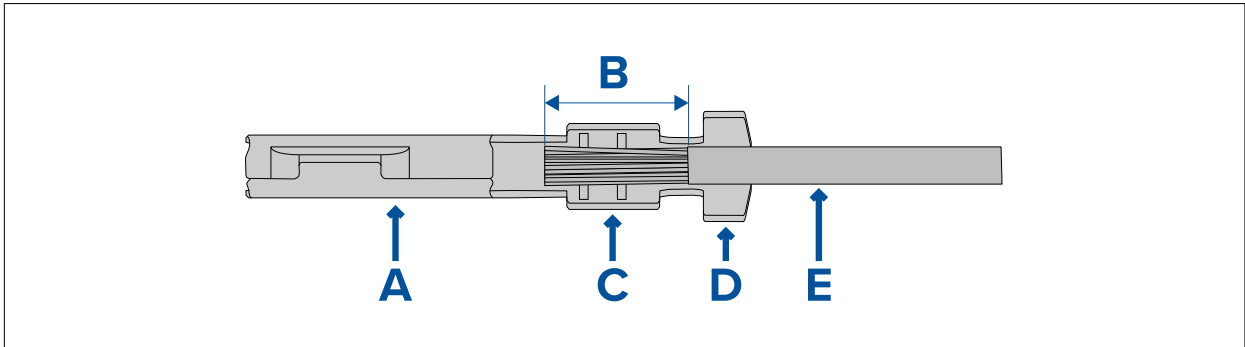
Important:

- To protect against water ingress fit seal plugs (Molex: 34345–0001) 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.34 – 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).

- 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

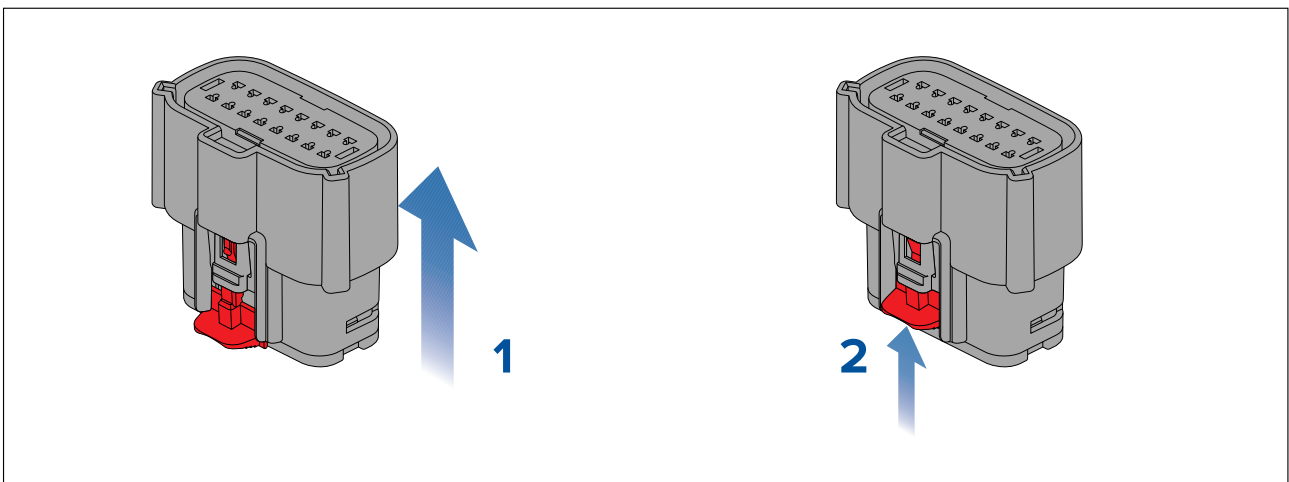
- Using the appropriate crimping tool crimp the wire and connector.
 - 14 – 16 AWG crimps require Molex crimp tool 63811-5900.
 - 18 – 20 AWG crimps require Molex crimp tool 63811-6000.
- Ensuring correct orientation, insert the wire crimp connector into the relevant connector terminal.
- Pull back on the wire to ensure it has locked into place.
- Repeat steps 4 to 8 for each wire that is required.
- 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.
- If required, tape wires together approximately 30 mm (1.18 in) below the bottom of the connector using suitable insulation tape, leave

Connecting Molex connectors to modules

Follow the steps below to connect Molex connectors to modules.

Note:

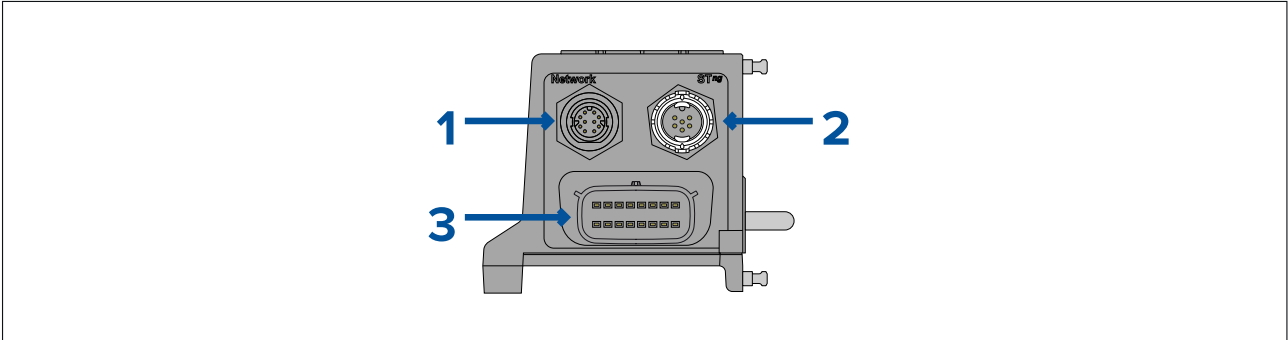
- If your connector does not include the Red locking tag (known as the CPA (Connector Position Assurance) then ignore step 2.
- The illustration below depicts the Master module connector, however the procedure is the same for any of the Molex connectors used with YachtSense Digital Control System.



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

4.4 Master module connections

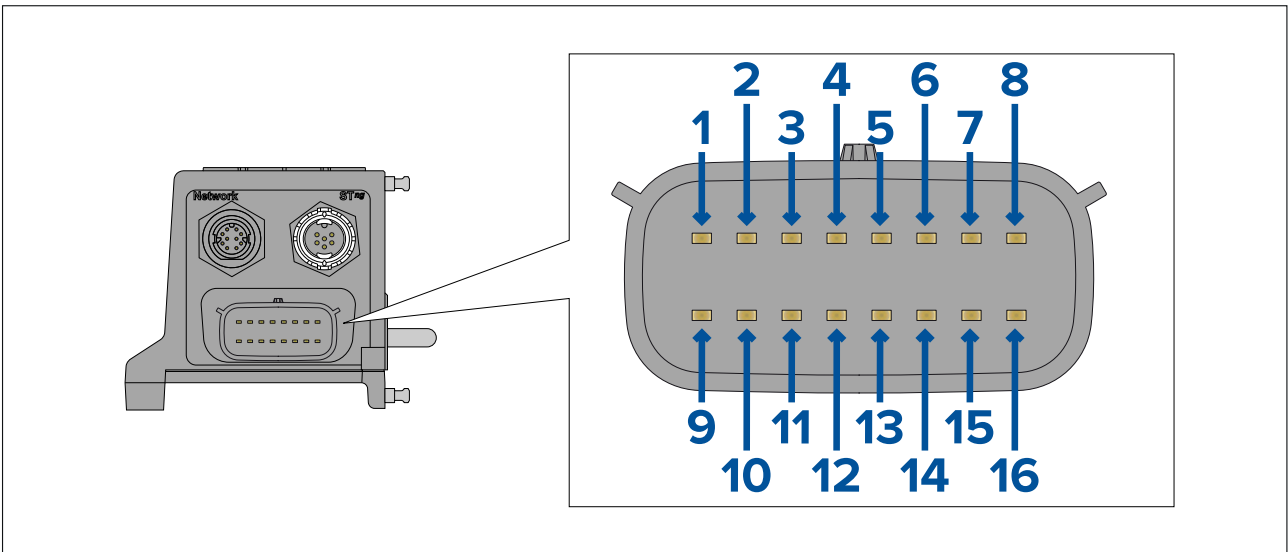
The Master module is the primary control module of the YachtSense™ Digital Control System. The Master module controls all input and output modules connected to it and all Remote systems. It acts as the interface between the system and Multifunction display (MFD) and peripheral remote controllers.



1. RayNet network connection — Connects to MFD or RayNet network switch using a RayNet cable.
2. SeaTalkng® connection — Connects to the SeaTalkng® backbone using SeaTalkng® spur cable and provides communication between Master module, MFD, Remote modules and SeaTalkng® 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)

	Master module signal / pin	Vessel connection signal / pin
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

4.5 Remote module connections

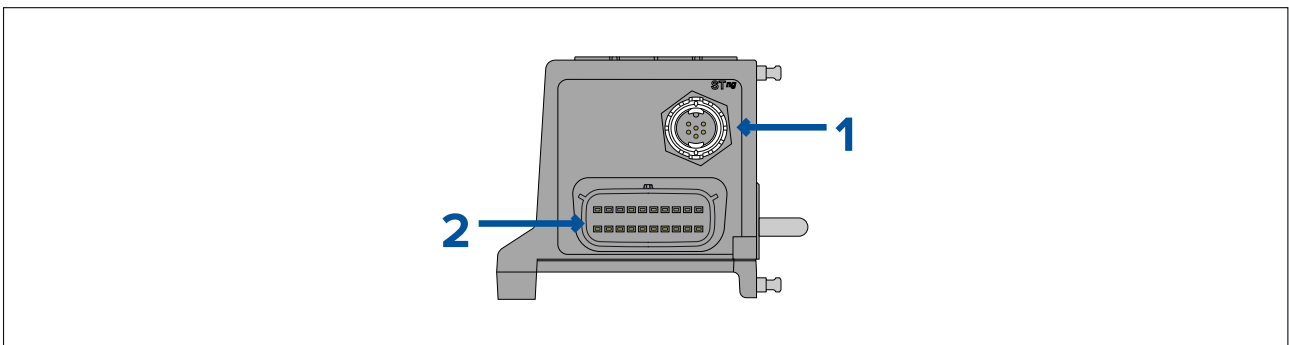
The Remote module allows expansion of the YachtSense™ Digital Control System and includes built in 8 channel input / output connections.

Input channel capabilities:

- Digital and analog connection
- 4–20 mA sensors

Output channel capabilities:

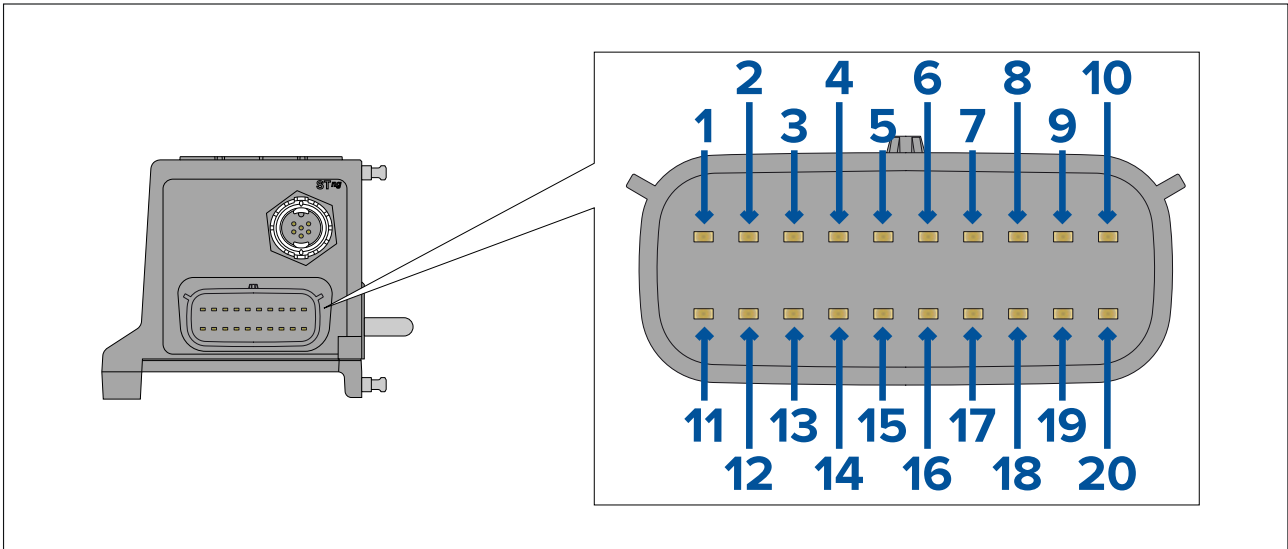
- Up to 250 mA output
- 250 mA maximum per module.
- Voltage protection up to 32 V dc



1. SeaTalkng® connection — Connects to the SeaTalkng backbone using SeaTalkng spur cable. Enables connection to the Master systems and communication with SeaTalkng 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 input and up to 200 mA output channels, commonly used to control switches, sensors, relays and actuators. The module's connector pin out is shown below.



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

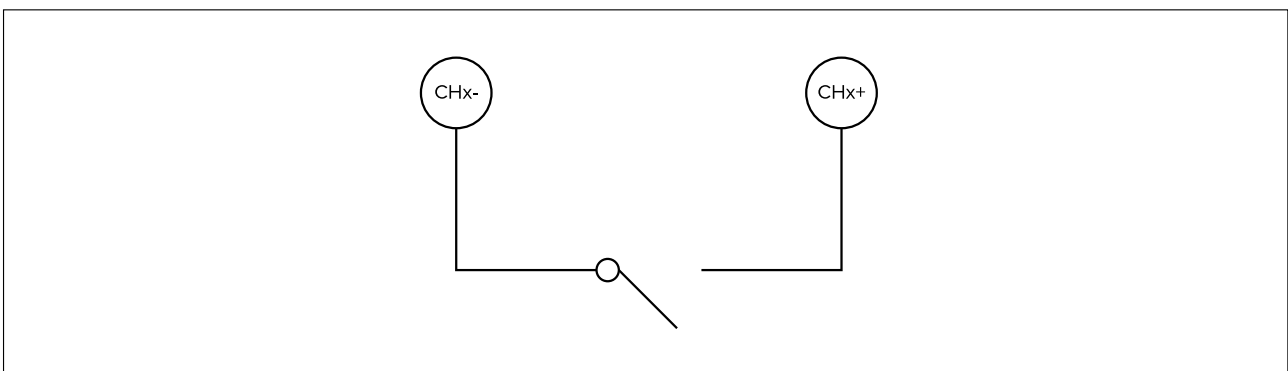
Digital and analog inputs and outputs example connections

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.

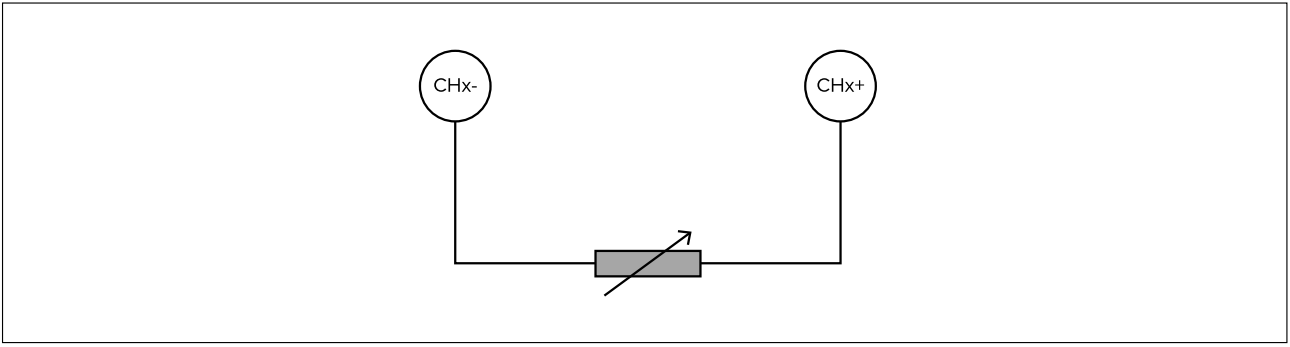
Important:

- 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.

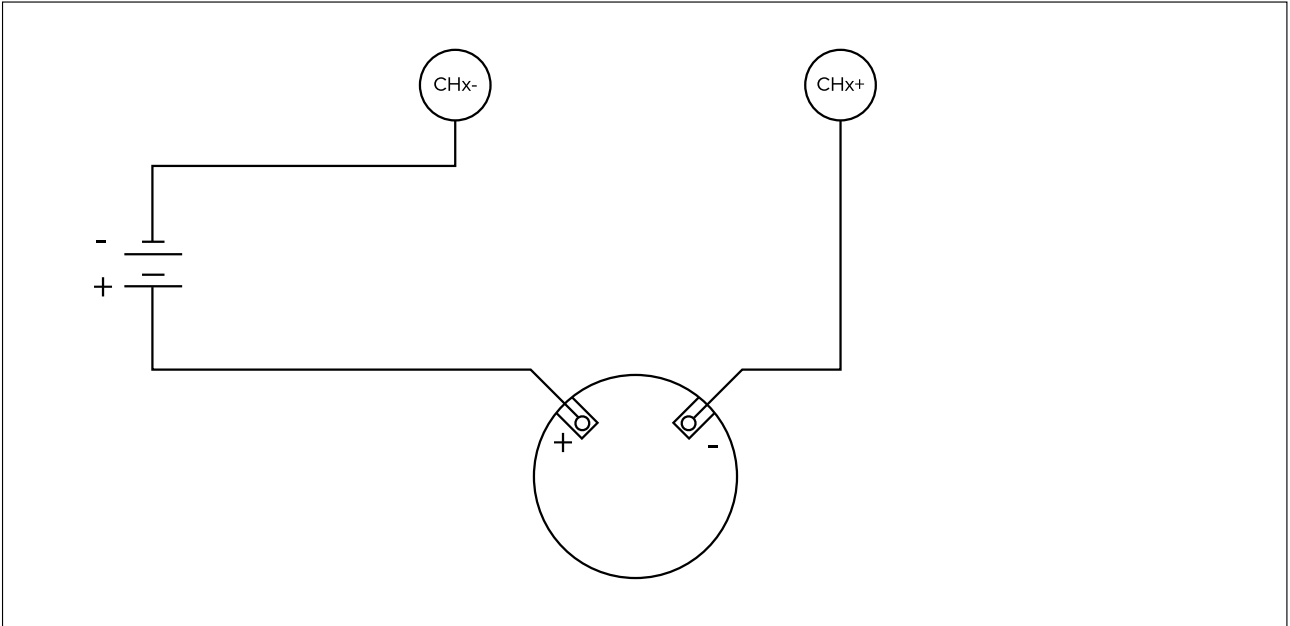
Example — Switch (Digital input)



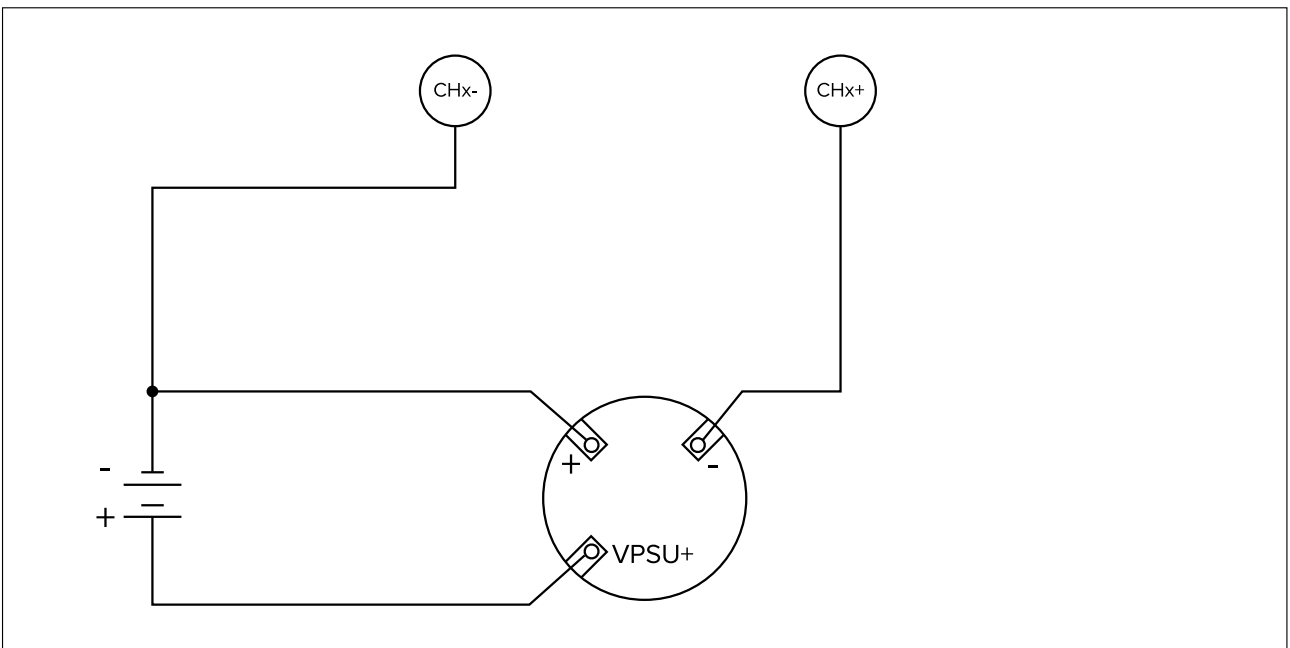
Example — Resistive sensor (Analog input)



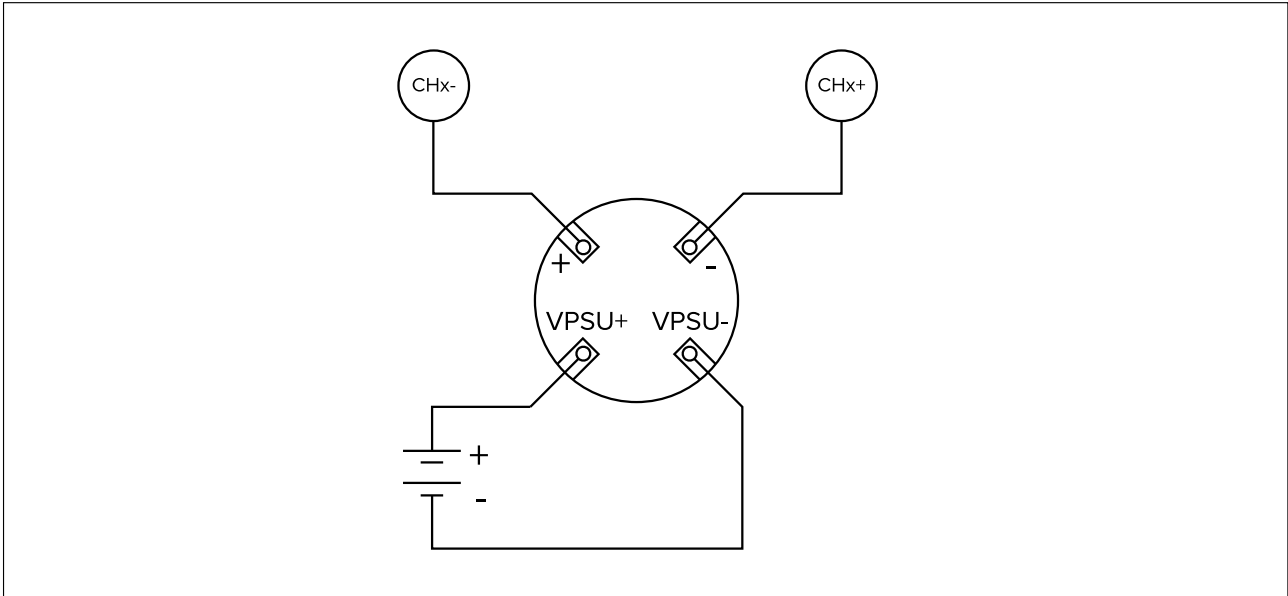
Example — 2 wire 4–20 mA sensors



Example — 3-wire 4–20 mA sensors



Example — 4 wire 4–20 mA sensors



4.6 Hi power module connections

The Hi 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:

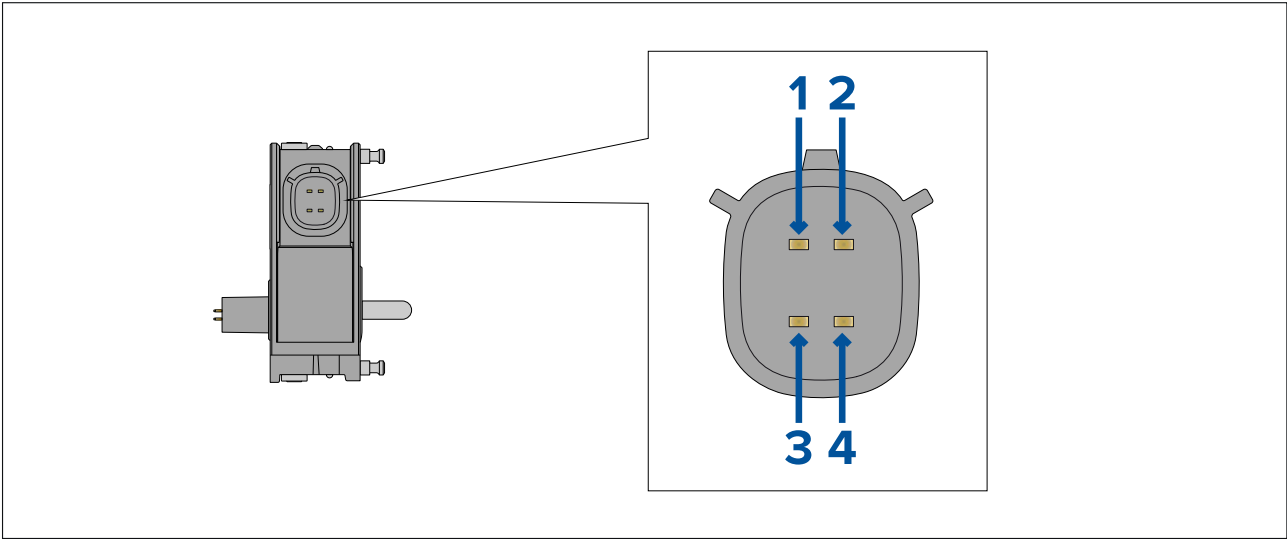
- Up to 20 A draw per channel
- Load current measurement
- Over current protection
- Under current detection
- Soft fuse
- Voltage detection
- Voltage protection up to 32 V dc

Output options:

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

Note:

The Hi power module requires a minimum current draw of 50 mA, If your desired application requires loads of 250 mA or less, consider using the Input/Output on a Remote module or the Signal module, as they have been designed for this purpose.

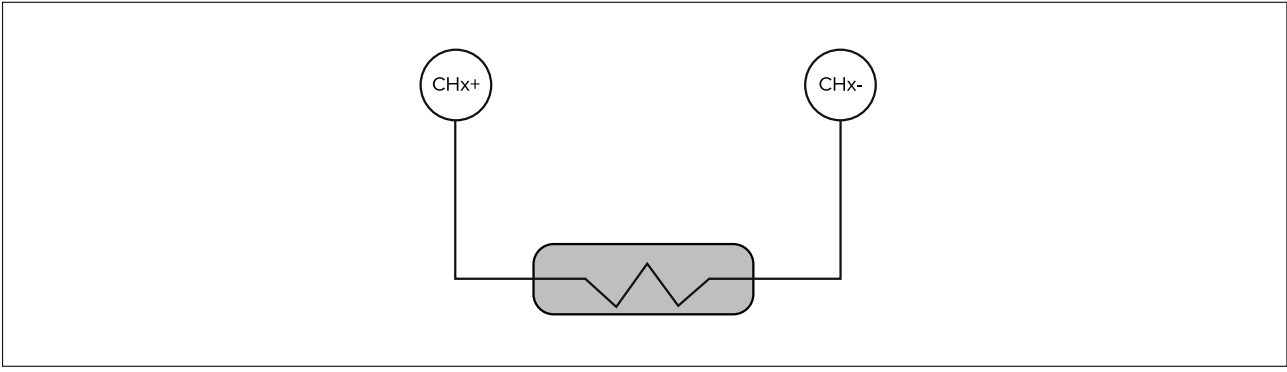


1	CH1+	2	CH2+
3	CH1-	4	CH2-

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.

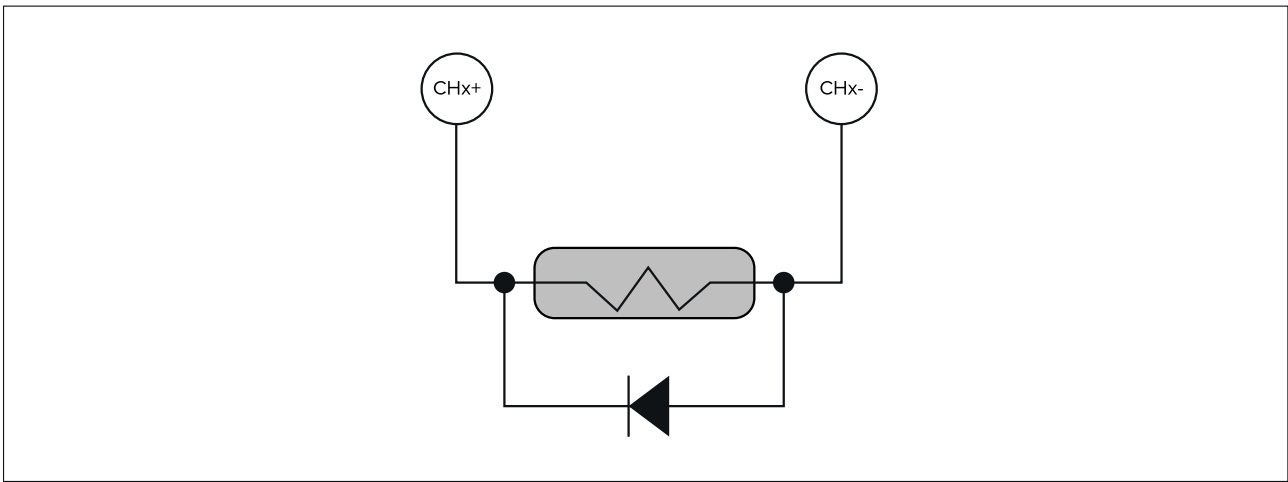
Example — Generic load connection



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 $> 1 \text{ V @ load current}$

4.7 Lo power module connections

The Lo 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:

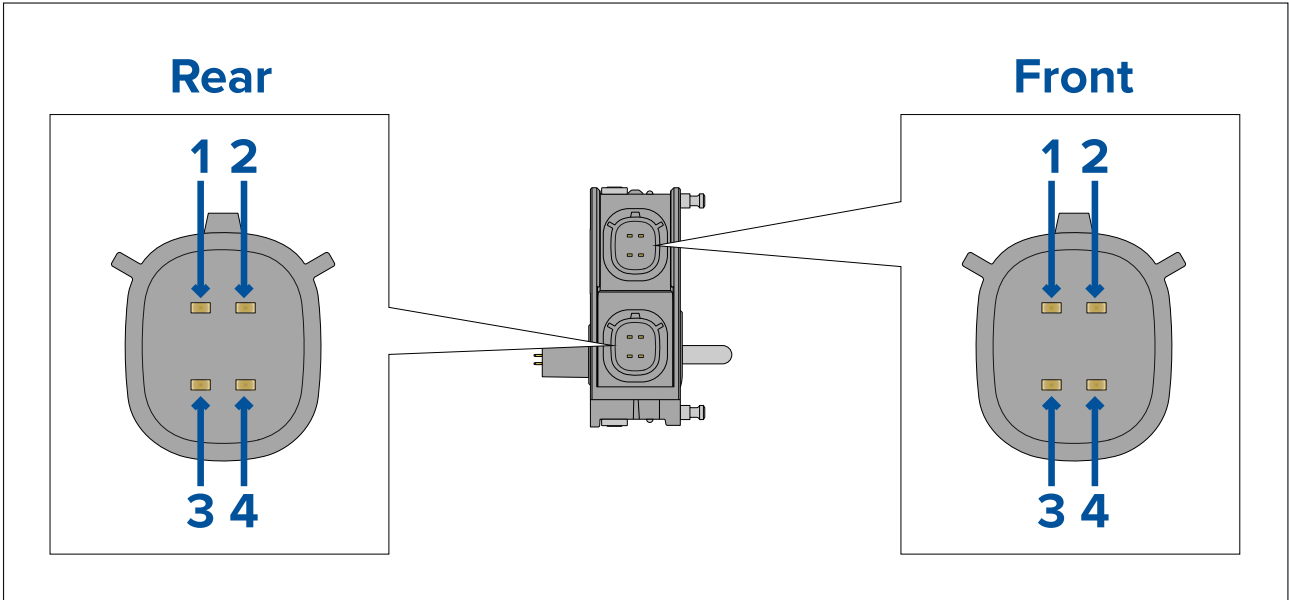
- Up to 10 A draw per channel
- Load current measurement
- Over current protection
- Under current detection
- Soft fuse
- Voltage detection
- Voltage protection up to 32 V dc

Output options:

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

Note:

The Lo power module requires a minimum current draw of 50 mA, If your desired application requires loads of 250 mA or less, then consider using the Input/Output on a Remote module or the Signal module, as they have been designed for this purpose.



Front connector

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

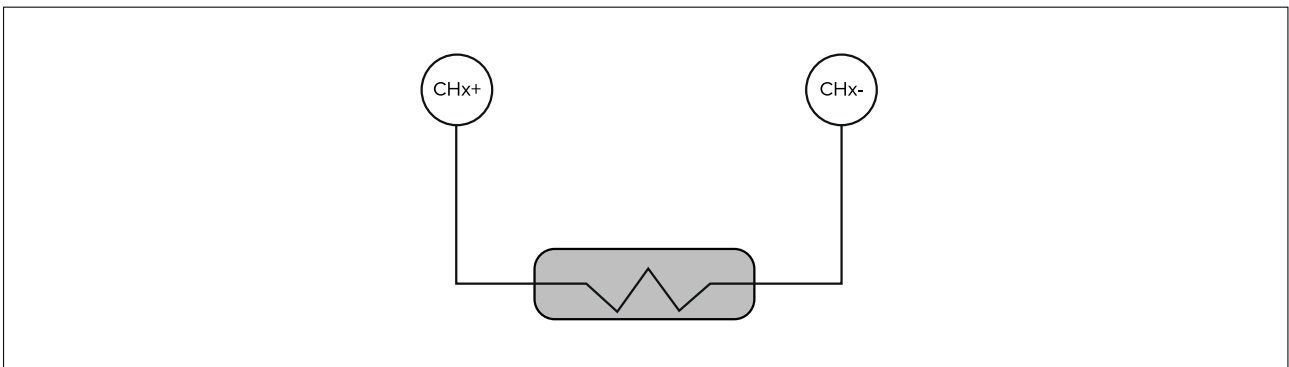
Rear connector

1	CH3+	2	CH4+
3	CH3-	4	CH4-

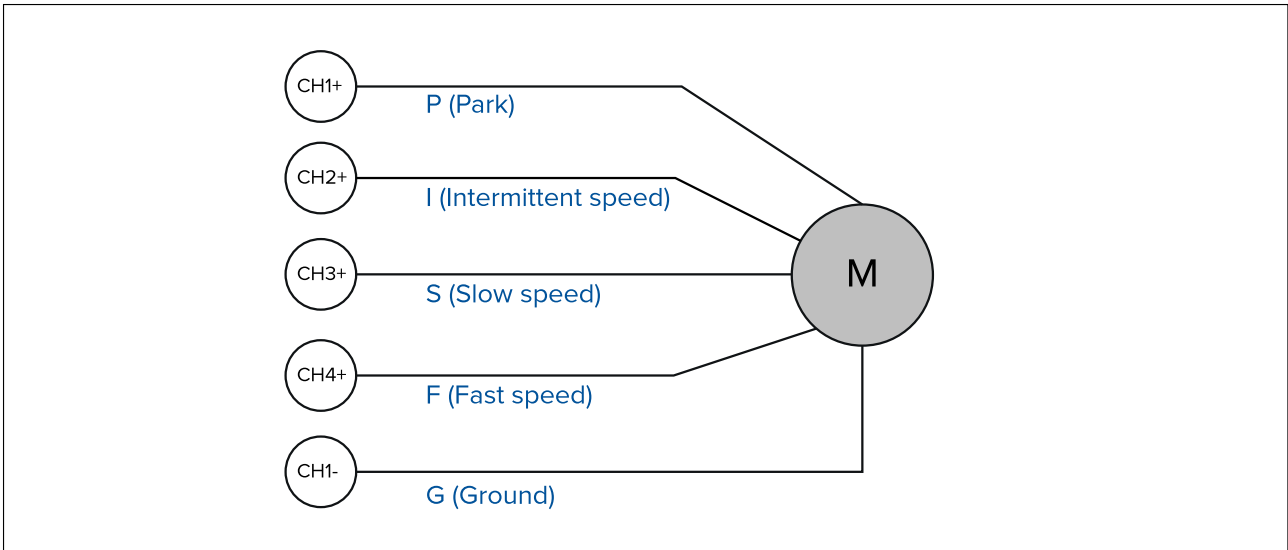
Important:

- 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



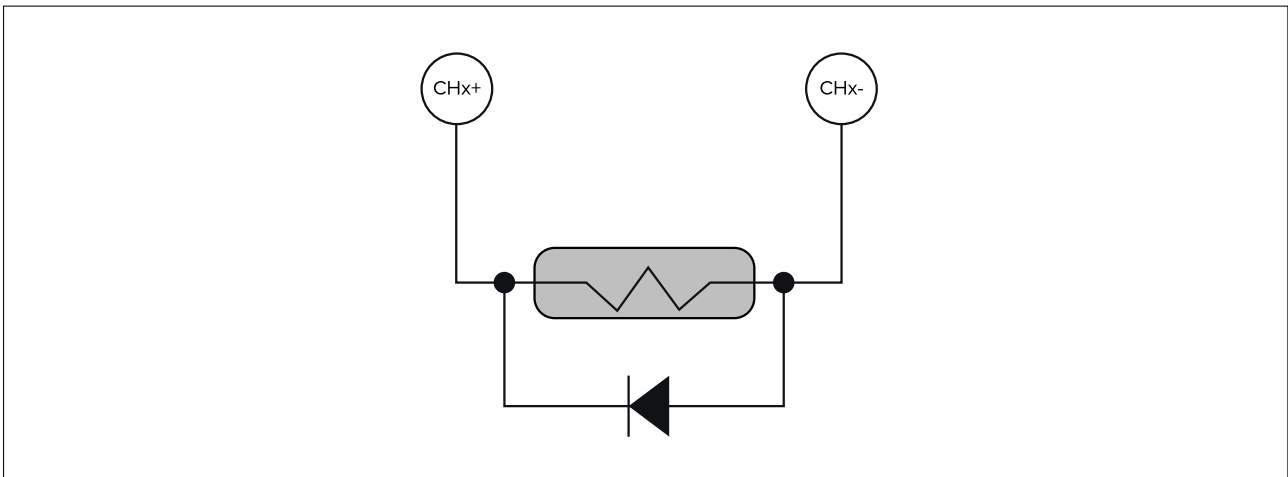
- P** – Park position
- I** – Intermittent speed
- S** – Slow speed
- F** – Fast speed
- G** – Ground

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 $> 1 \text{ V @ load current}$

4.8 Reverse power module connections

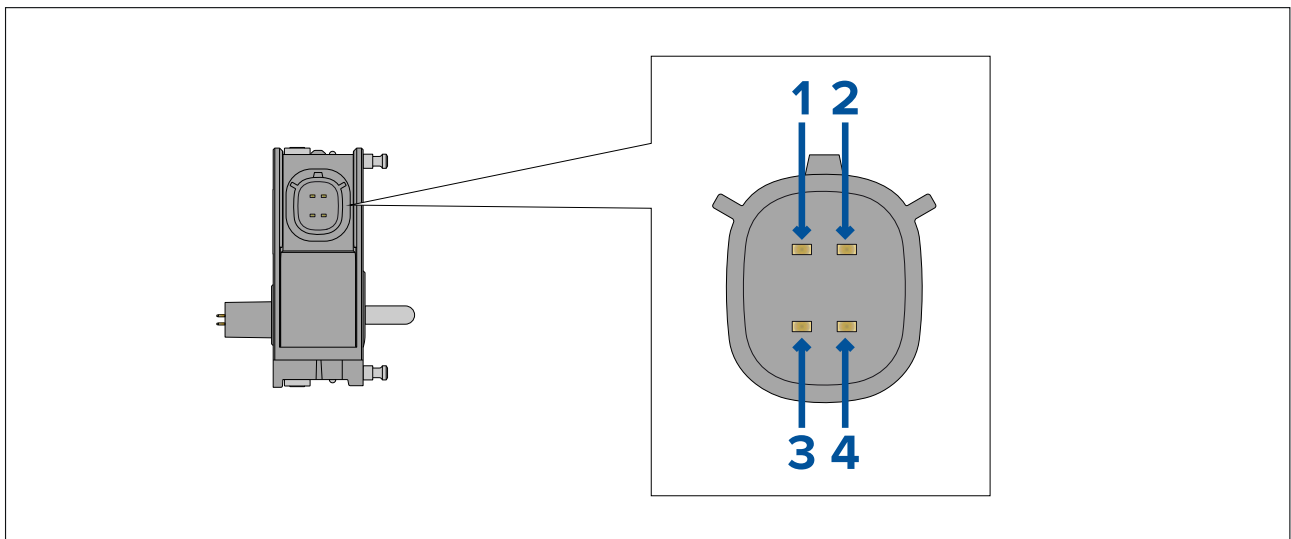
The Reverse power module is a digital output module, and can be used to drive devices such as hydraulic pumps or actuators which require the motor to drive forwards and in reverse.

Channel capabilities:

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

Operation modes:

- Forward
- Reverse
- Braking
- Free wheeling



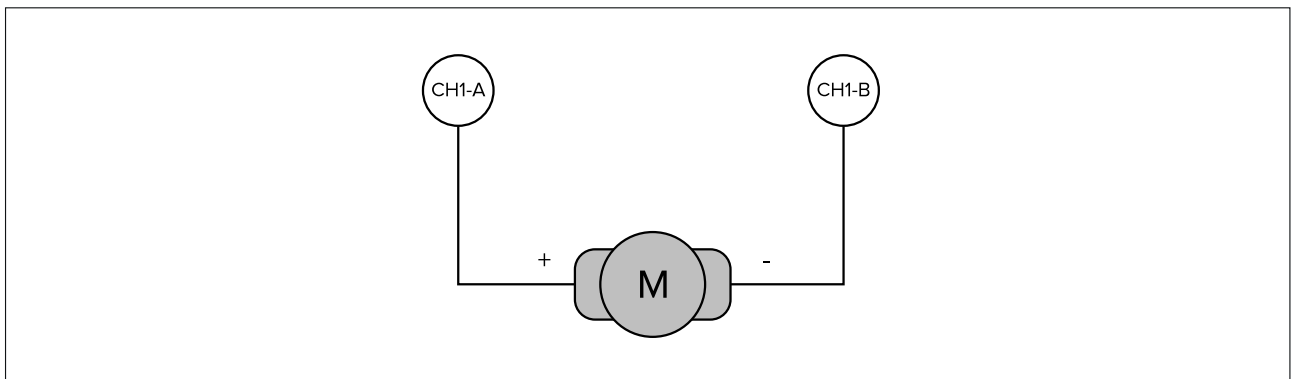
1	CH1 A	2	CH1 B
3	Not connected	4	Not connected

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

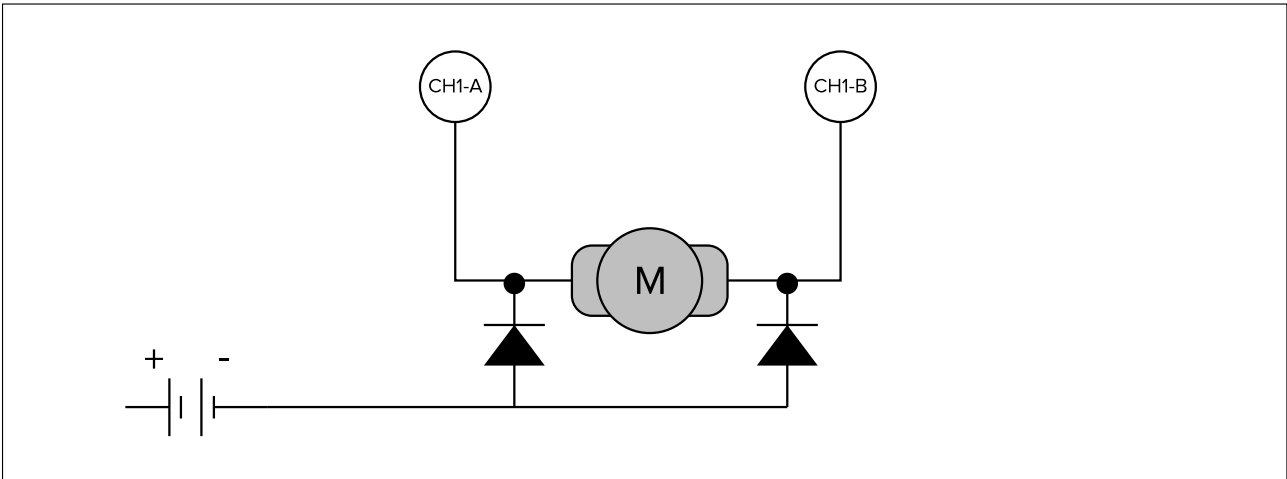


Reversible motor inductive loads

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.

4.9 Signal module connections

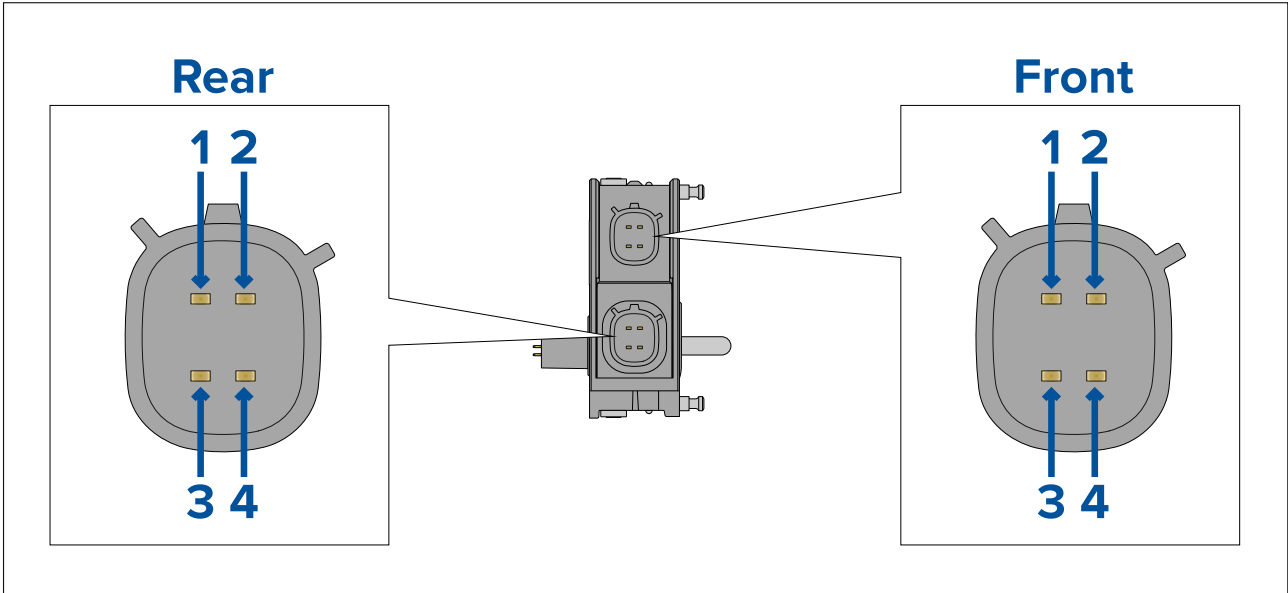
The Signal module is an 4 channel digital / analog input and up to 200 mA output module. Commonly used to control switches, sensors, relays and actuators.

Input channel capabilities:

- Digital and analog connection
- 4–20 mA sensors

Output channel capabilities:

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



Front connector

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

Rear connector

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

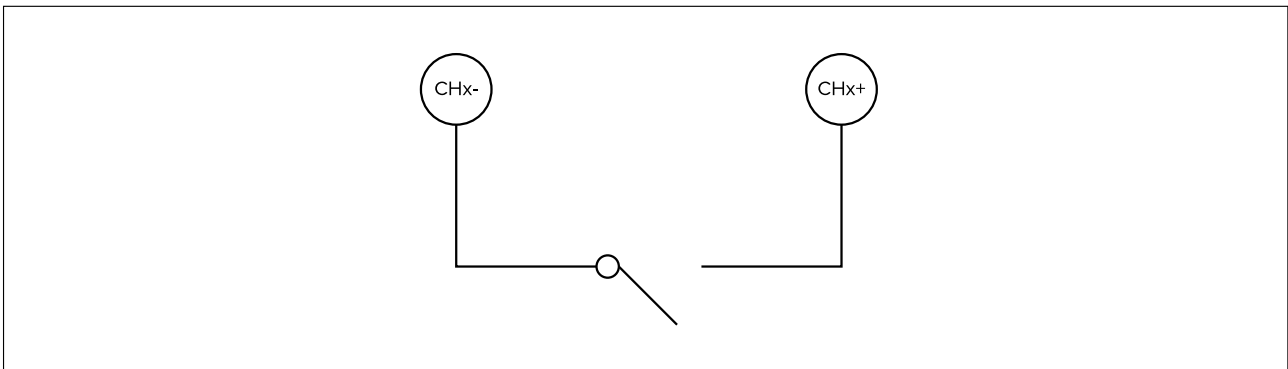
Digital and analog inputs and outputs example connections

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.

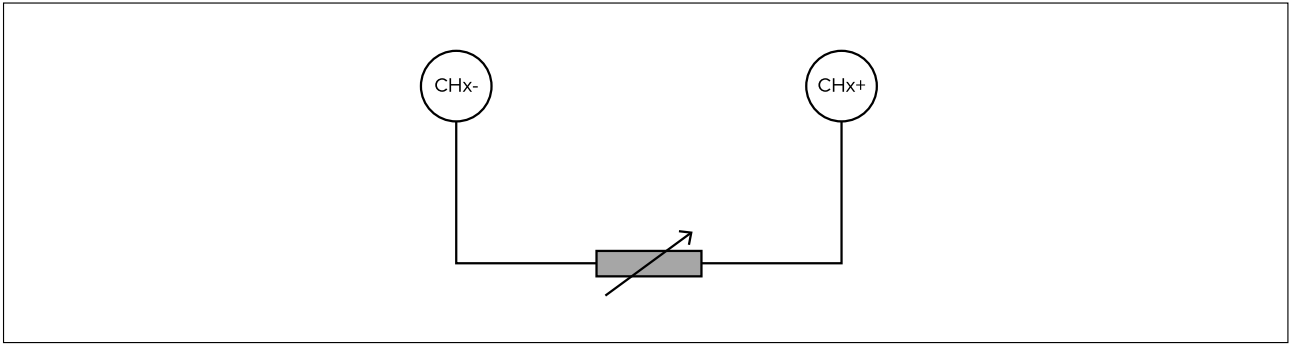
Important:

- 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.

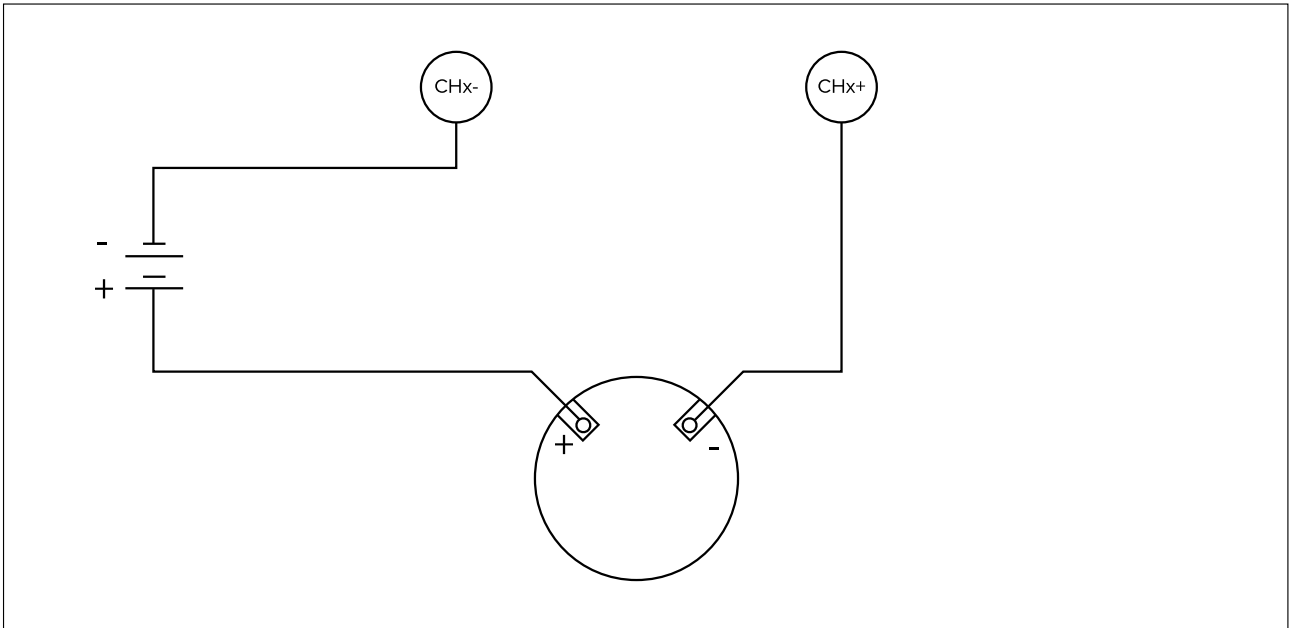
Example — Switch (Digital input)



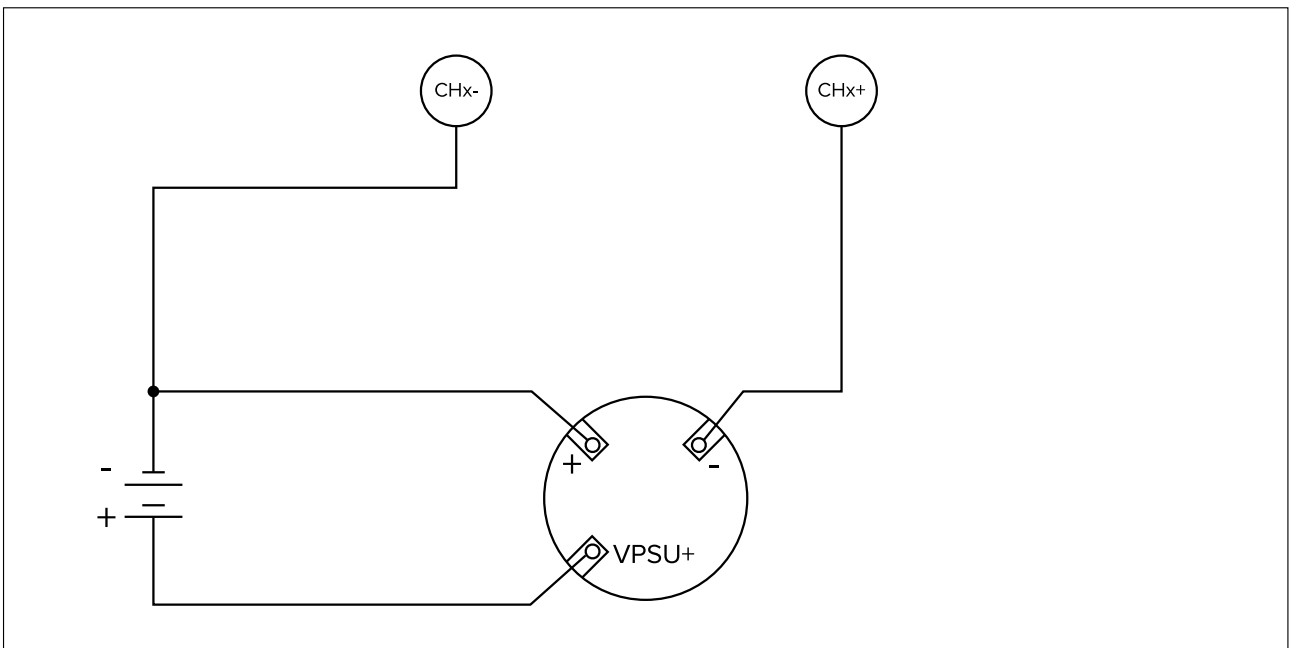
Example — Resistive sensor (Analog input)



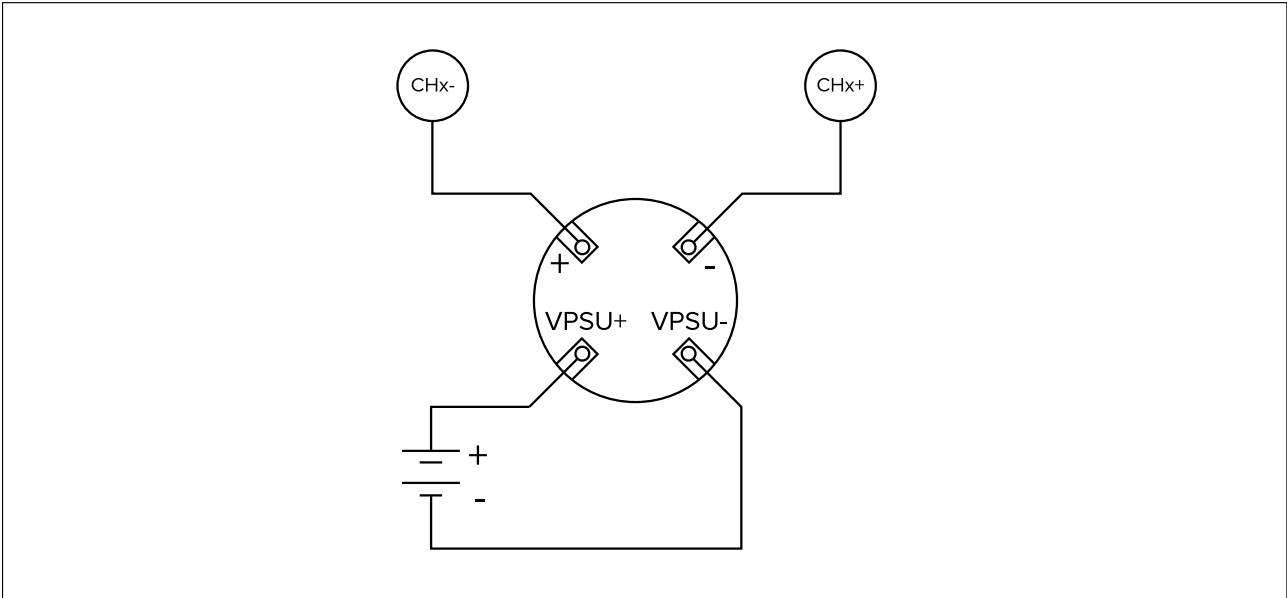
Example — 2 wire 4–20 mA sensors



Example — 3-wire 4–20 mA sensors



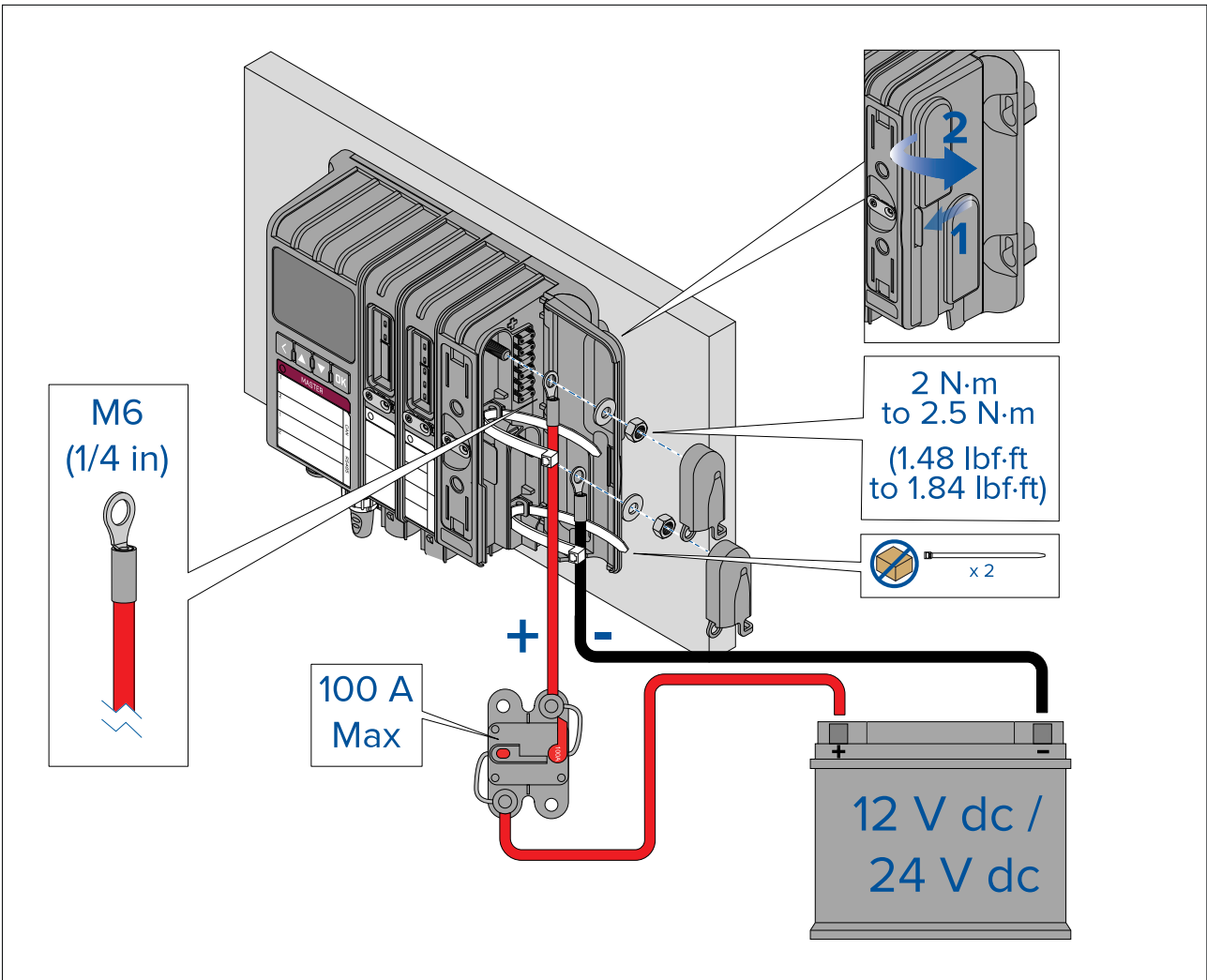
Example — 4 wire 4–20 mA sensors



4.10 Connecting the power supply

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

- An appropriate 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 washer 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.
Appropriate sized cable for the system's current draw and distance from the power source should be used.
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 2 to 2.5 nm using a torque wrench and 10 mm (1/2 in) socket.

Important:

Over tightening may cause damage to the module.

8. Secure power cables using the cable ties and 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 (100 A maximum) fitted to the positive power supply cable.

Note:

Do NOT switch on the power supply until 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.

Each Master or Remote system is capable of drawing up to a maximum of 100 A.

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 Dual Power supply module is supplied with a 20 A 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 supply voltage, current draw of the system and connected devices and the required length of the 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:

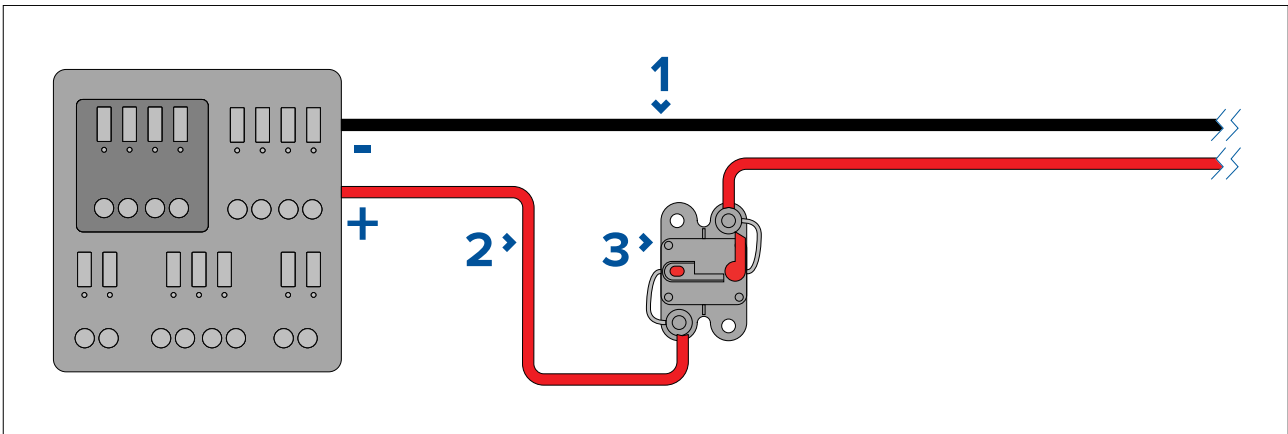
Important:

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.

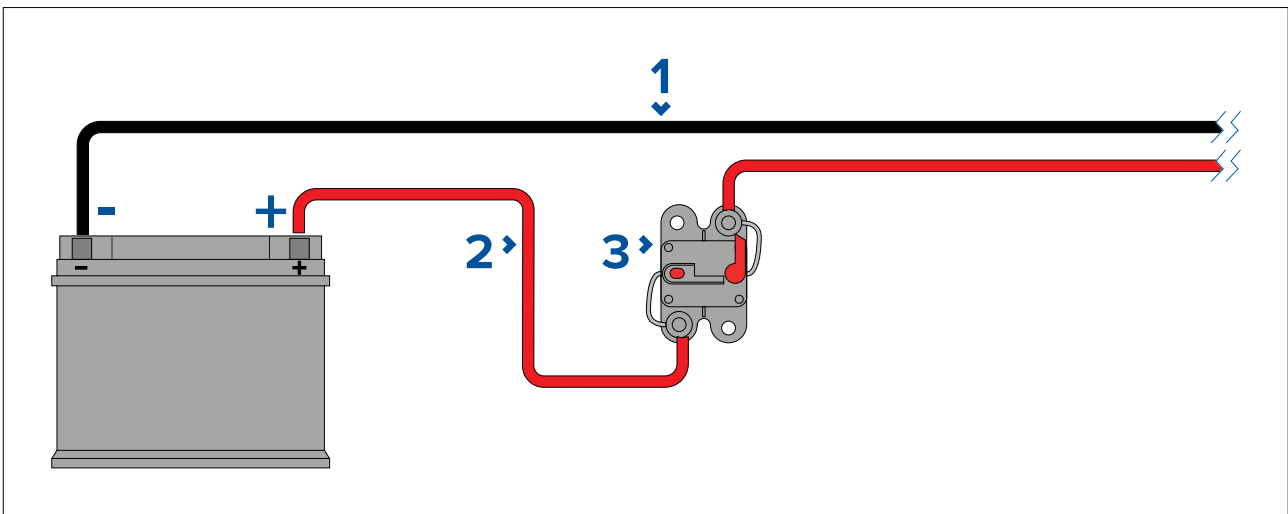
Implementation — connection to distribution panel



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.
 - 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
- 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

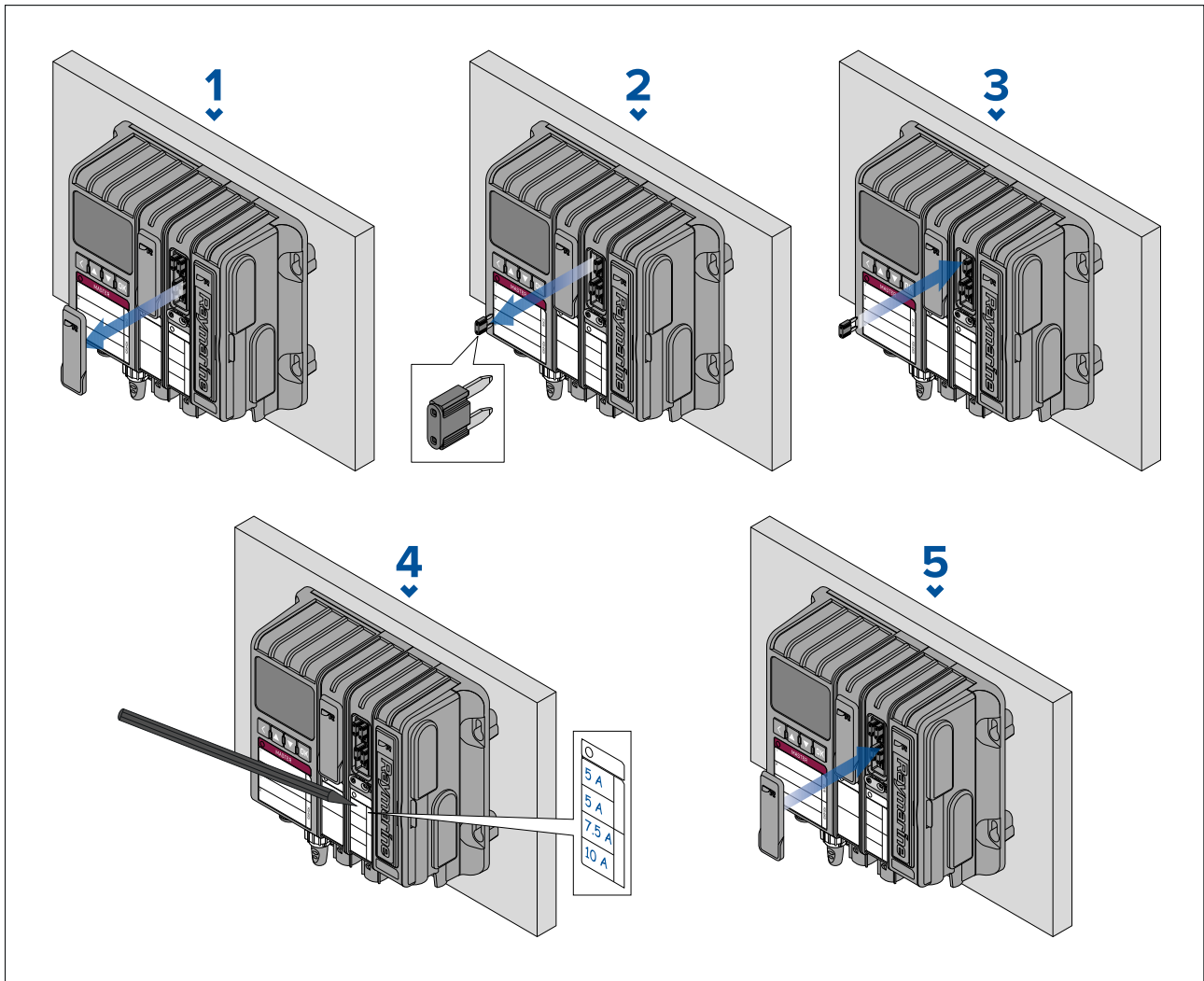
Do not connect this unit to a system which has positive grounding.

4.11 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:

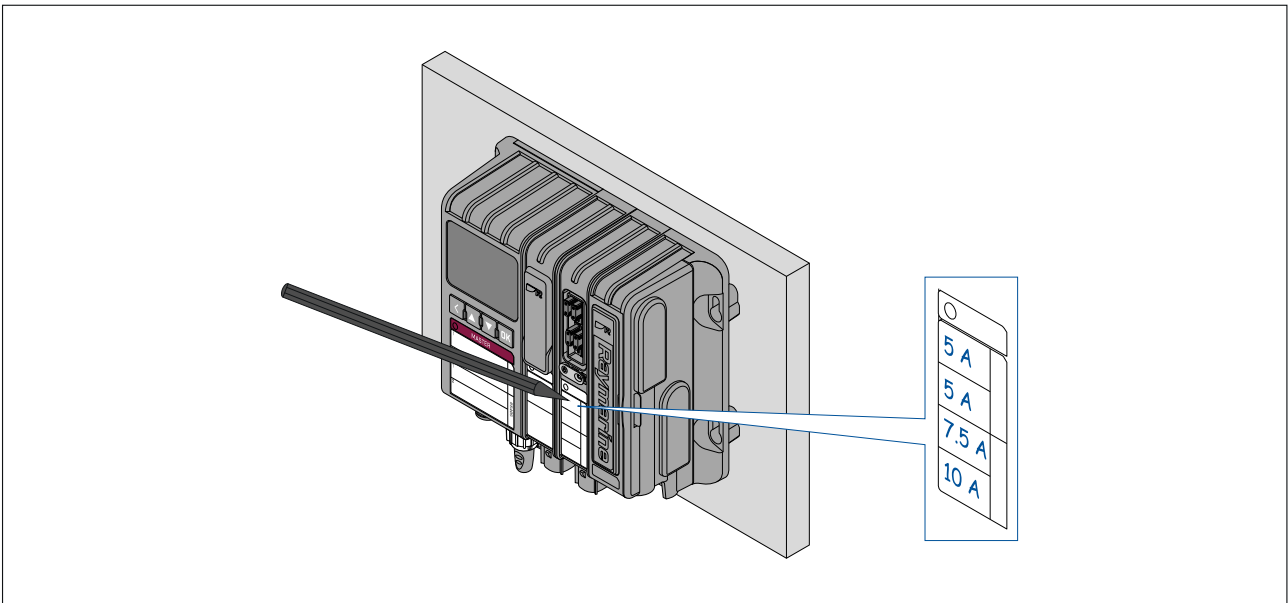
It is important that the fitted fuse rating reflects the load of the channel. Where the actual channel load is less than the maximum load capacity the fuse should be replaced by an appropriately rated fuse.



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.
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:

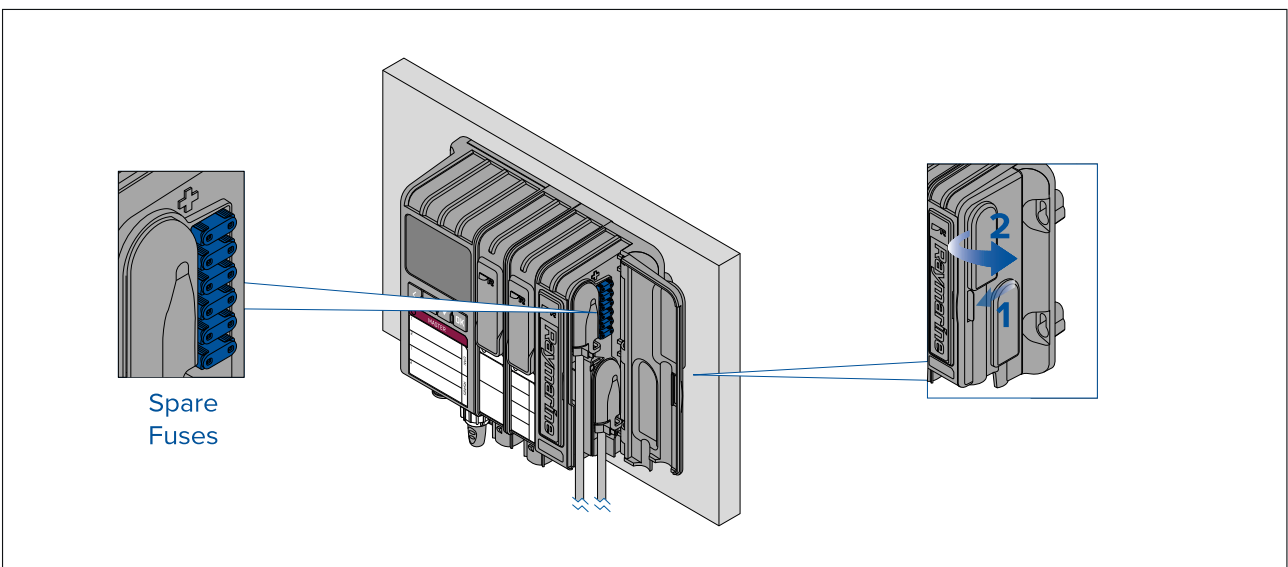
Part number	Power module type	Rating
E70594	Lo Power	15 A
E70595	Hi Power	30 A
E70596	Reverse Power	30 A

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.

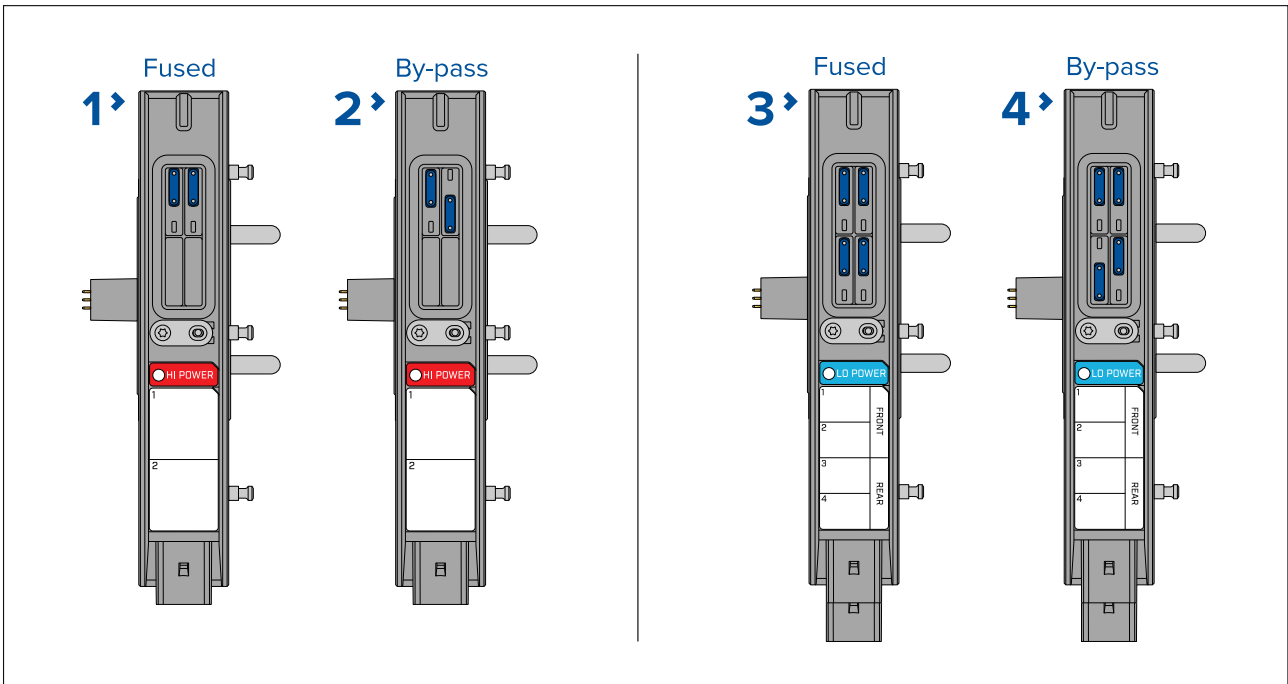
4.12 Fuse by-pass

If a Hi power module channel or Lo 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 module do not include the by pass function.

Fuse bypass examples



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



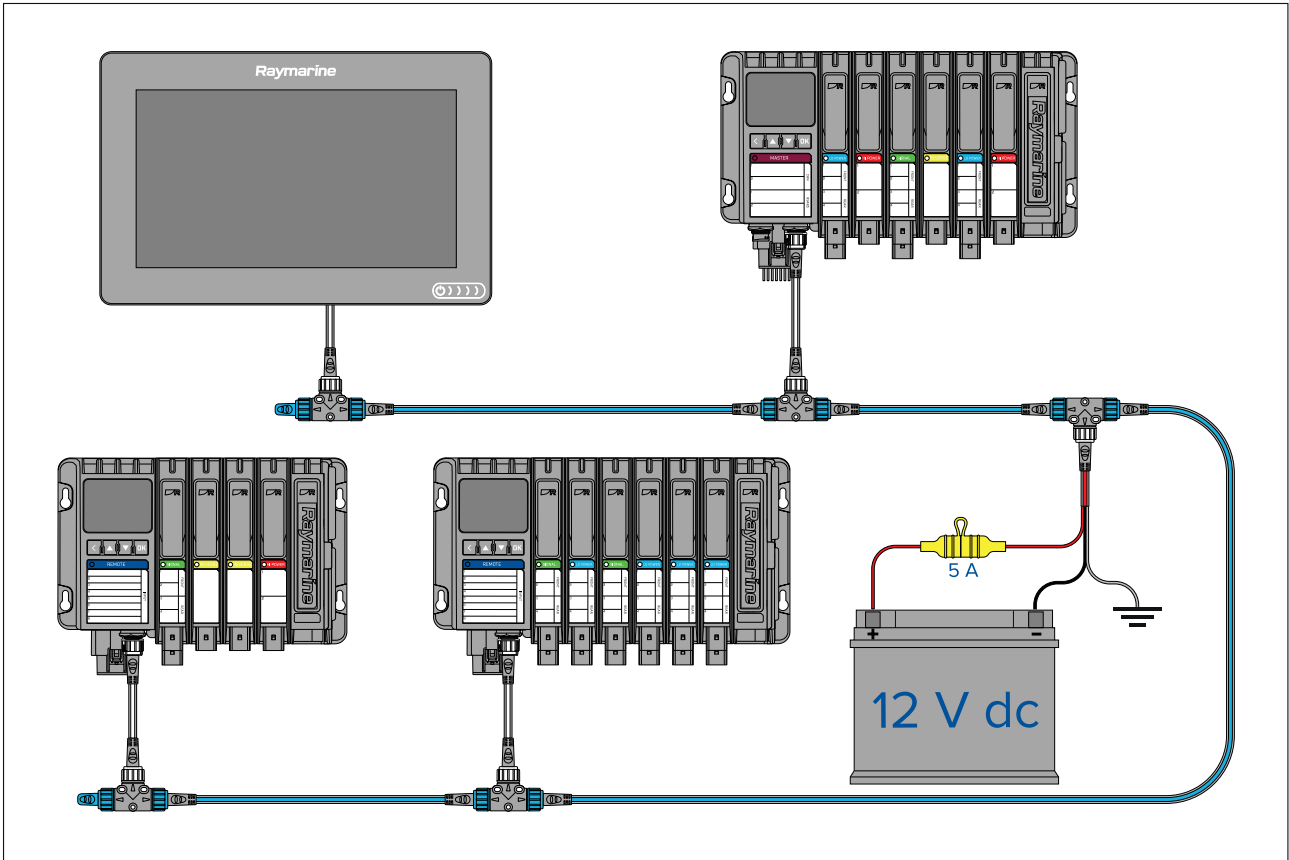
Warning: Fuse covers

Ensure fuse covers are always fitted.

4.13 SeaTalkng[®] connection

The Master module must be connected to an MFD via a SeaTalkng backbone. Remote modules must be connected to the Master module via the same SeaTalkng backbone. Depending on the complexity of the system, the SeaTalkng backbone may need to be a dedicated backbone for your YachtSense Digital Control System only.

Example — Dedicated SeaTalkng® system



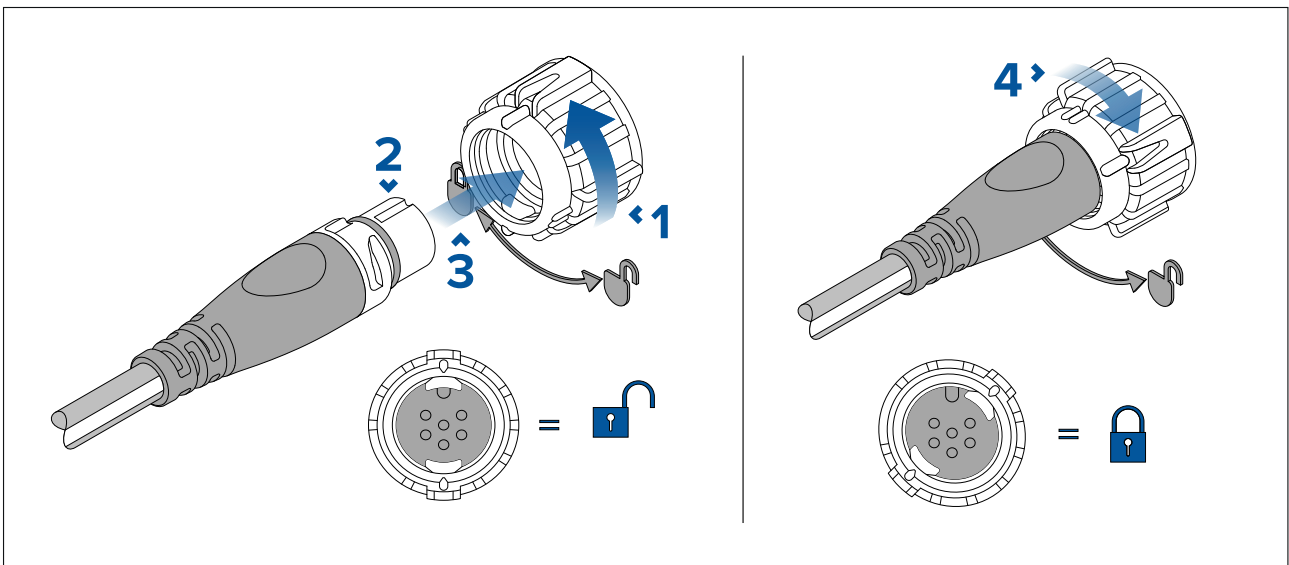
Note:

For simplicity, the example above shows a SeaTalkng network dedicated to YachtSense Digital Control System, however other SeaTalkng devices can be connected.

Note:

The illustration above shows only the dedicated power supply for the SeaTalkng network. Additionally, the MFD and the YachtSense Digital Control System Master module each require their own power supplies.

Connecting SeaTalkng® cables



1. Rotate your product's SeaTalkng® 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.

SeaTalkng® power supply

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

- ⁽¹⁾direct connection to a 12 V dc battery
- connection via a 12 V dc distribution panel
- ⁽²⁾via an Autopilot Control Unit (ACU) (not ACU-100 or 150), or an SPX course computer (not SPX-5) that is connected to the SeaTalkng® backbone.
- for 24 V vessels, 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 SeaTalkng® backbone, as this can cause sudden voltage drops when the engines are started.
- ⁽²⁾The ACU-100, ACU-150 or SPX-5 products cannot be used to power the SeaTalkng® backbone.

The SeaTalkng® power cable (A06049) is used to connect the SeaTalkng backbone to your chosen 12 V dc power supply.

SeaTalkng® product loading

The number of products that can be connected to a SeaTalkng® 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 SeaTalkng® products (1 LEN = 50 mA) The LEN for each product can be found in the product's Technical Specification.

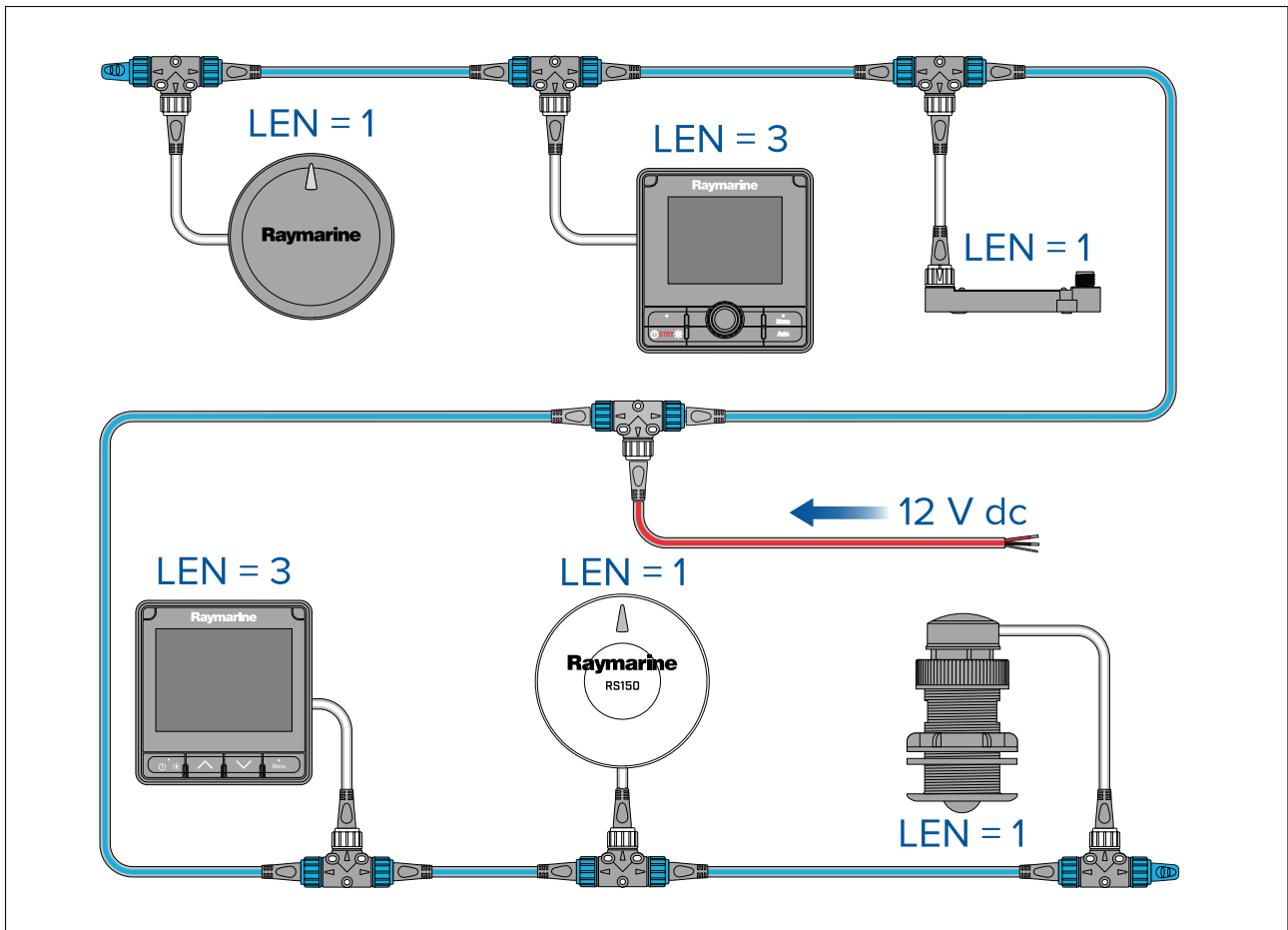
LENs are used to determine the power connection point for the SeaTalkng® backbone.

SeaTalkng® power connection point

The 12 V dc power supply is connected to a spur connection on the SeaTalkng® backbone.

Large systems

If the backbone length is greater than 60 m (197 ft), the power connection point should be connected at a point that creates a balanced current draw from each side of the backbone. The NMEA 2000 Load Equivalency Number (LEN) is used to determine the power connection point for the backbone.



In the example above the backbone has an overall LEN of 10, so the optimum connection point would be to have 5 LEN either side of the connection point.

Small systems

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

SeaTalkng[®] system loading

The maximum loading / LEN for a SeaTalkng[®] 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

In-line fuse and thermal breaker ratings

The SeaTalkng[®] network's power supply requires an in-line fuse or thermal breaker to be fitted.

- In-line fuse rating: 5 A
- Thermal breaker rating : 3 A (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 SeaTalkng® network; and 2) How many devices are sharing the same thermal breaker that your SeaTalkng® network is connected to.

Power distribution — SeaTalkng®

Recommendations and best practice.

- Only use approved SeaTalkng® 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.

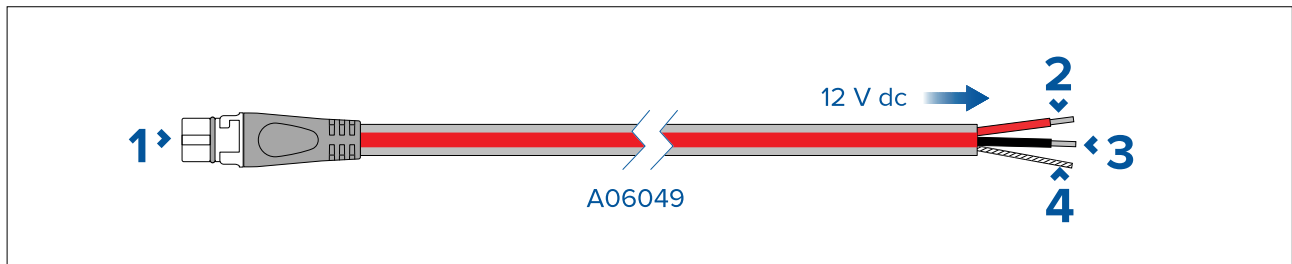
Important:

- 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.

SeaTalkng® power cable (A06049)

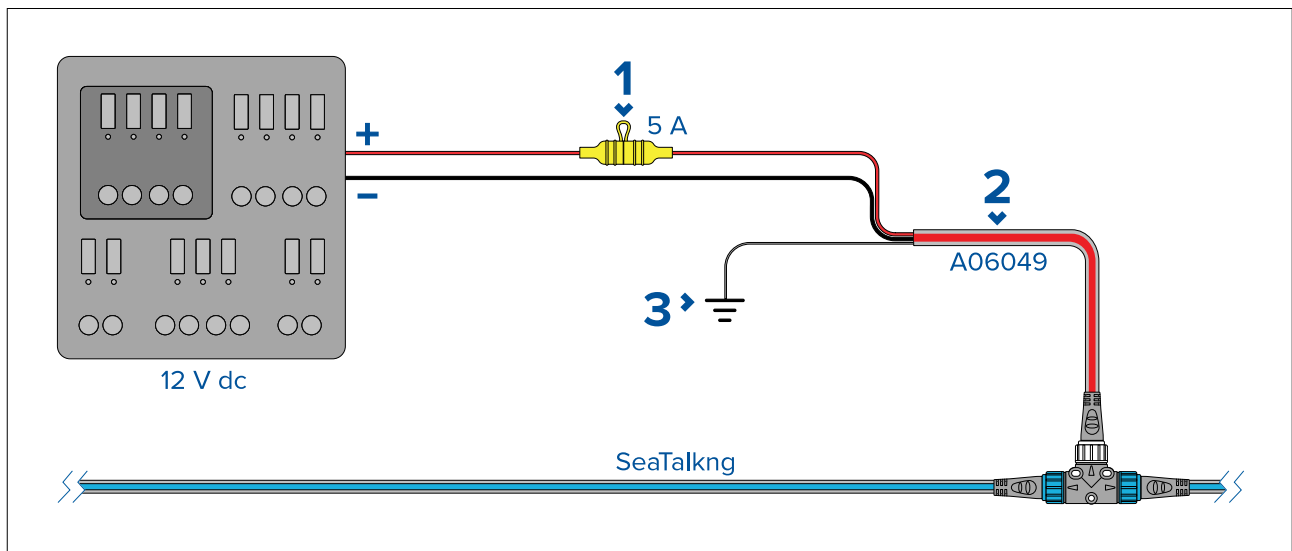
When powering the SeaTalkng® bus (backbone or 5-way connector) from a battery or distribution panel, the A06049 power cable must be used.

All 3 cores of the cable must be connected correctly:

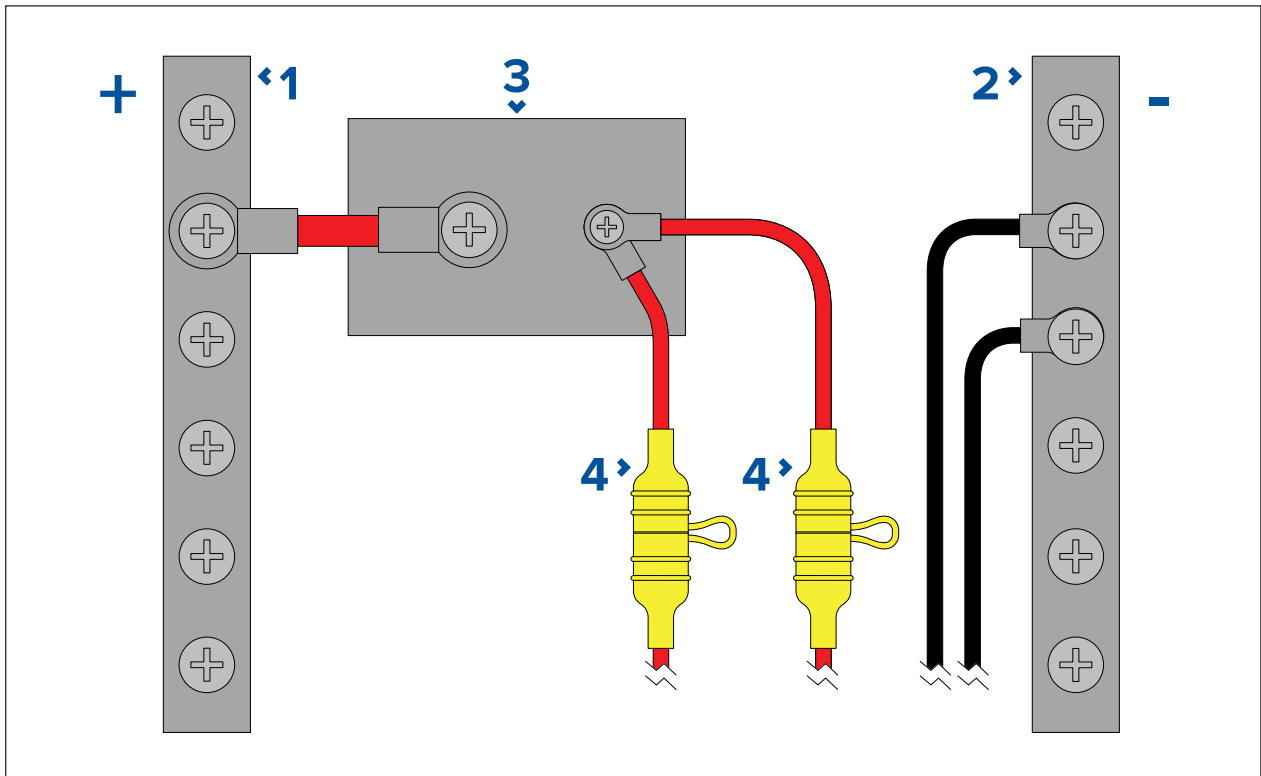


1. SeaTalkng® spur connector — connects to spur connection on the SeaTalkng® network.
2. + Red (positive) wire — connects to battery or distribution panel positive terminal.
3. – Black (negative) wire — connects to battery or distribution panel negative terminal.
4. Ground wire connects to RF ground point, if no ground point is available connect to the battery negative (-) terminal.

Implementation — connection to distribution panel



1. Waterproof fuse holder with 5 A inline fuse must be fitted (not supplied).
 2. SeaTalkng[®] power cable.
 3. RF Ground connection point for drain wire.
- Ideally, the SeaTalkng[®] 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 SeaTalkng[®] 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 1 item of equipment shares a breaker, use individual in-line fuses for each power circuit to provide the necessary protection.



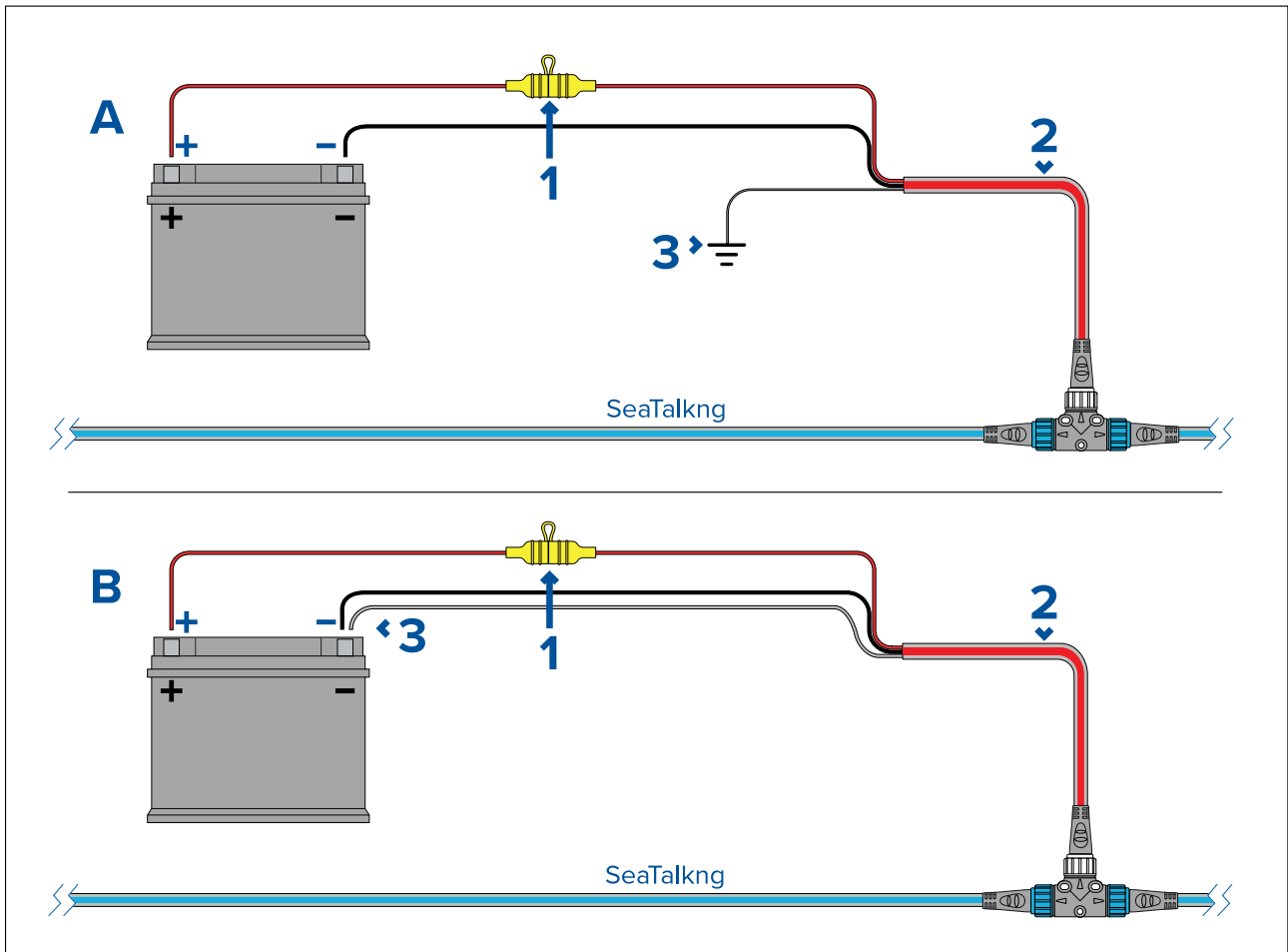
1. Positive (+) bar
2. Negative (-) bar
3. Circuit breaker
4. Waterproof fuse holder with 5 A inline fuse must be fitted (not supplied).

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

- SeaTalkng[®] 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 suitably rated fuse or breaker between the red wire and the battery's positive terminal.
- Refer to the inline fuse ratings provided in the product's documentation.
- 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 SeaTalkng[®] backbone's power connection.



1. Waterproof fuse holder with 5 A inline fuse must be fitted (not supplied).
2. SeaTalkng[®] power cable.
3. Drain wire connection point.

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.

SeaTalkng[®] Power cable extension

If you need to extend the length of the SeaTalkng[®] power cable, ensure you use suitably rated cable and that sufficient power is available at the SeaTalkng[®] 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 meters, you may need to consider a thicker wire gauge (e.g. 14 AWG (2.08 mm²), or 12 AWG (3.31 mm²)).
- An important requirement for all lengths of power cable (including any extension) is to ensure that there is a continuous **minimum** voltage at the product's power connector of 10.8 V dc, with a fully flat battery at 11 V dc.

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

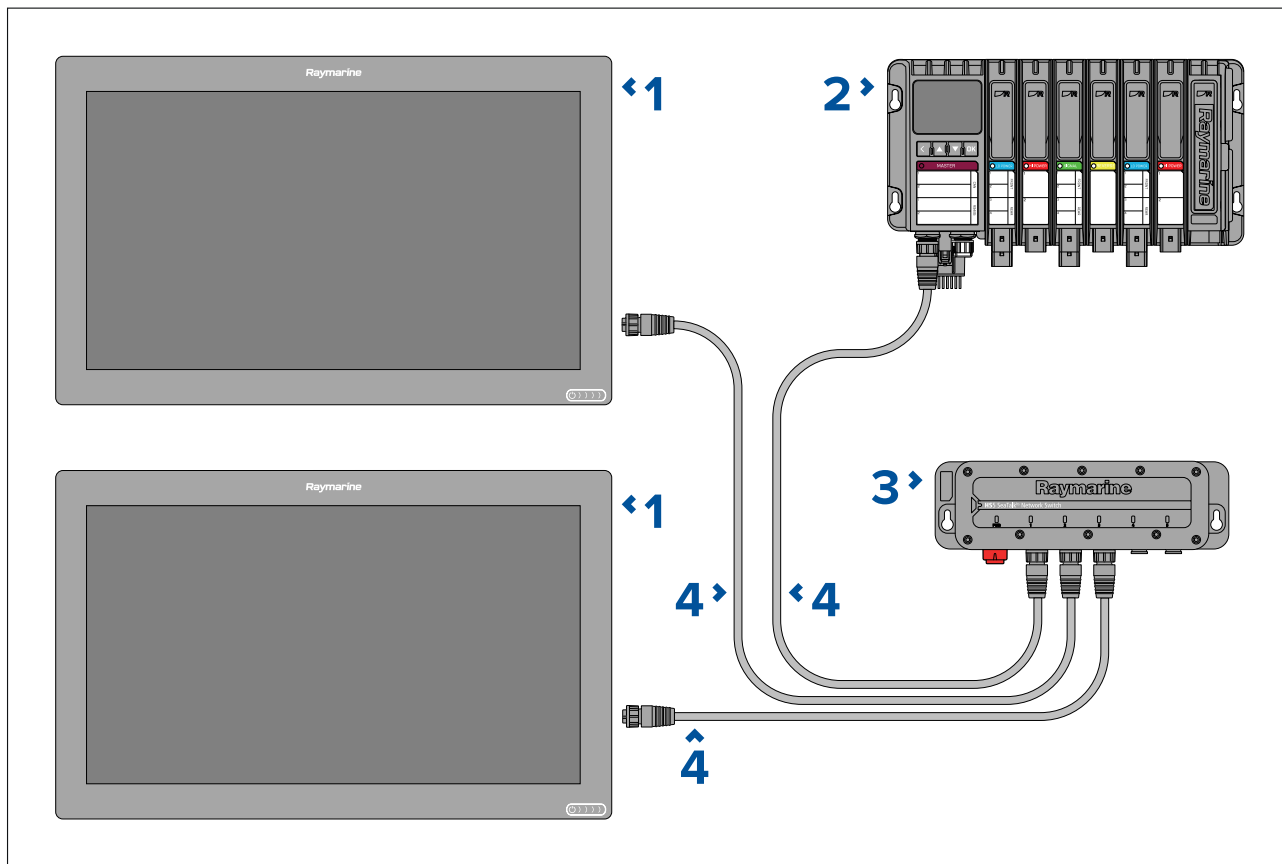
- ABYC E-11 AC & DC Electrical Systems on Boats
- ABYC A-31 Battery chargers and Inverters
- ABYC TE-4 Lightning Protection

4.14 RayNet network connection

The Master module communicates with Raymarine Axiom™ series MFDs using the SeaTalkhs® network.

Note:

- The example below uses a network switch, however the Master module can also be connected directly to an MFD's RayNet network connection.
- In addition to the RayNet network connection the MFD must also be on the same SeaTalkng backbone as the Master module.



1. Raymarine Axiom™ series MFD e.g.: Axiom XL
2. YachtSense Digital Control System — Master system.
3. Raymarine HS5 RayNet network switch
4. RayNet SeaTalkhs® network cables.

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.

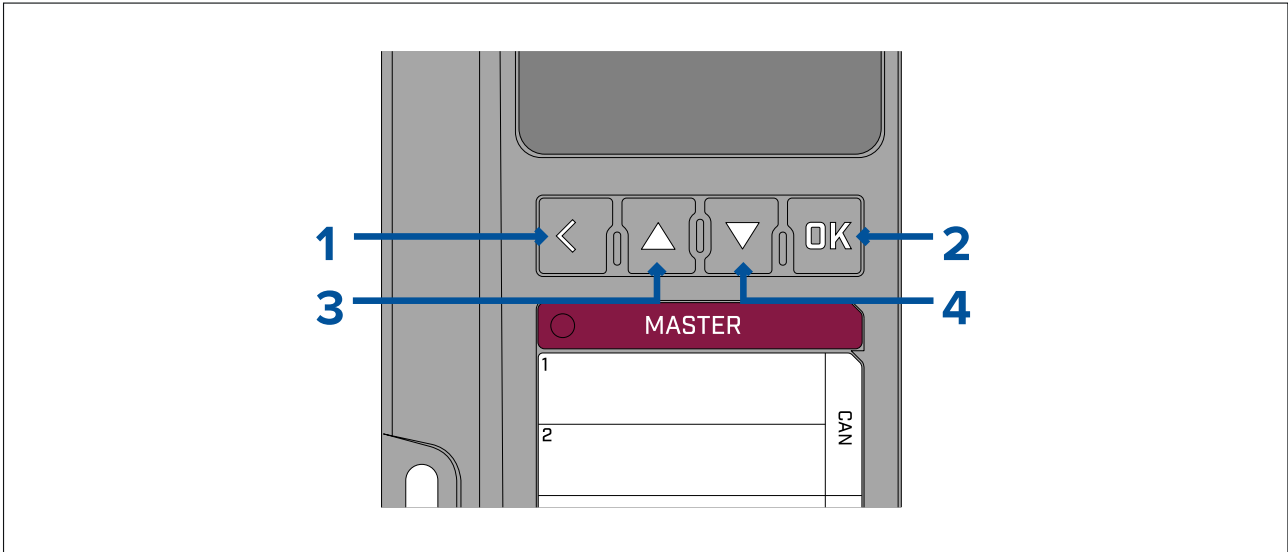
Chapter 5: Operations

Chapter contents

- [5.1 Controls on page 66](#)
- [5.2 Default page on page 66](#)
- [5.3 Menu on page 67](#)
- [5.4 Channels pages on page 67](#)
- [5.5 Alerts on page 70](#)

5.1 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

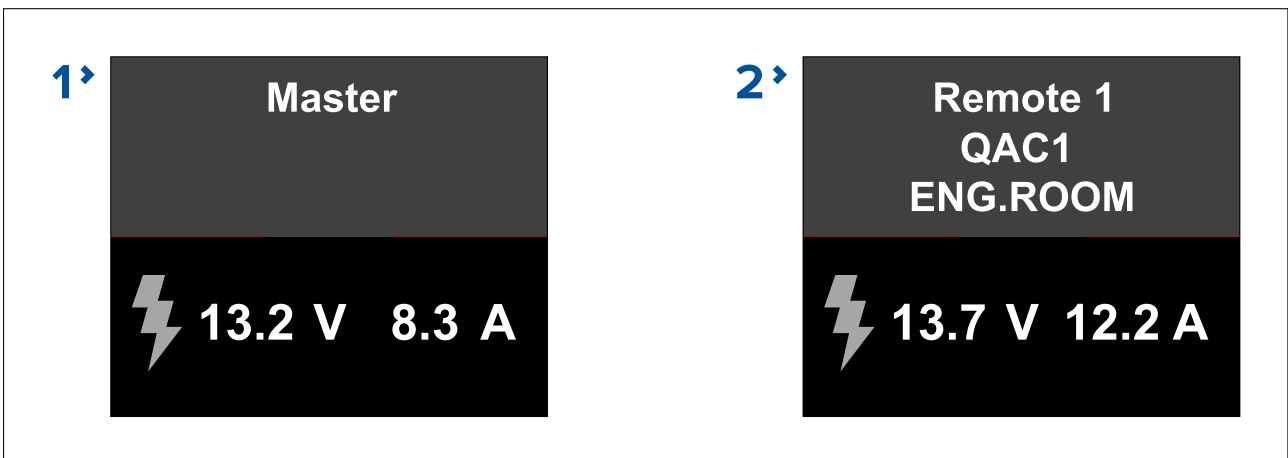
To save power the screen of Master and Remote modules will turn off after 60 seconds of inactivity.

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.

5.2 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.

5.3 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.

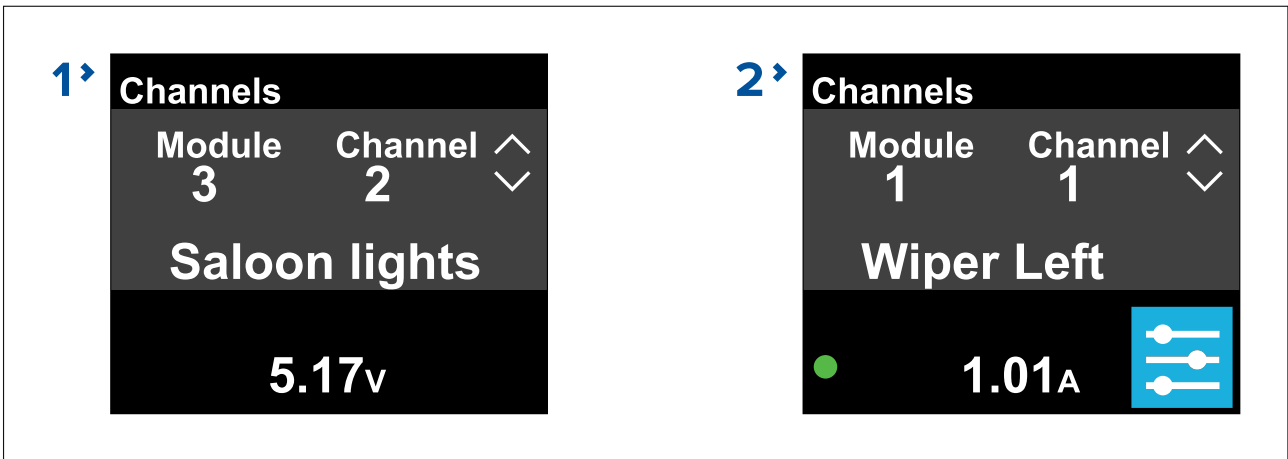
5.4 Channels pages

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:

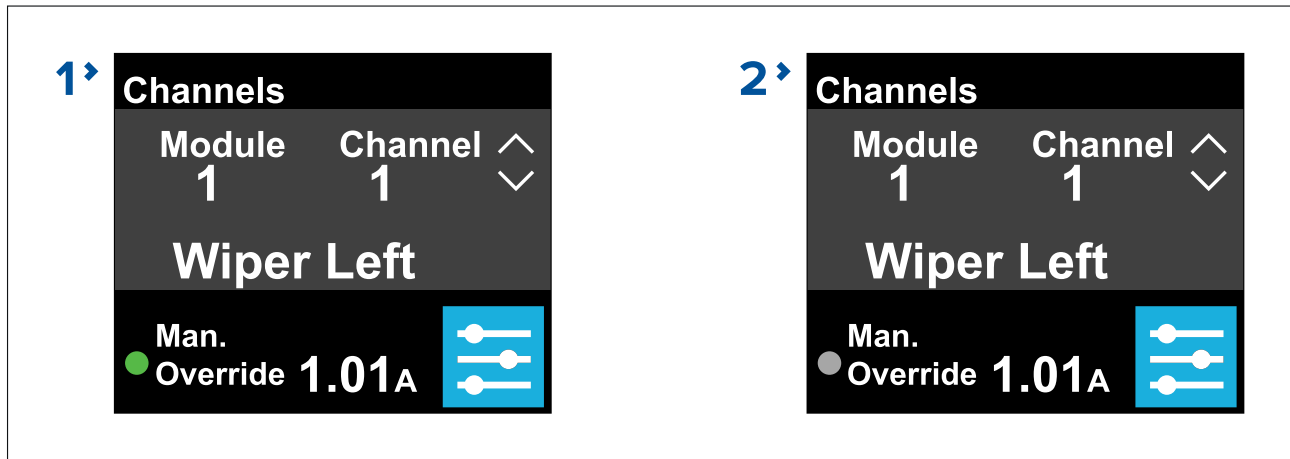
- **Force on (override):**
 - Available when channel is set to automatic or if channel has been set to Force off.
 - Selecting will force the channel on.
- **Force off (override):**
 - Available when channel is set to automatic or if channel has been set to Force on.
 - Selecting will force the channel 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 enable adjustment of 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).

Fuse rating (soft)

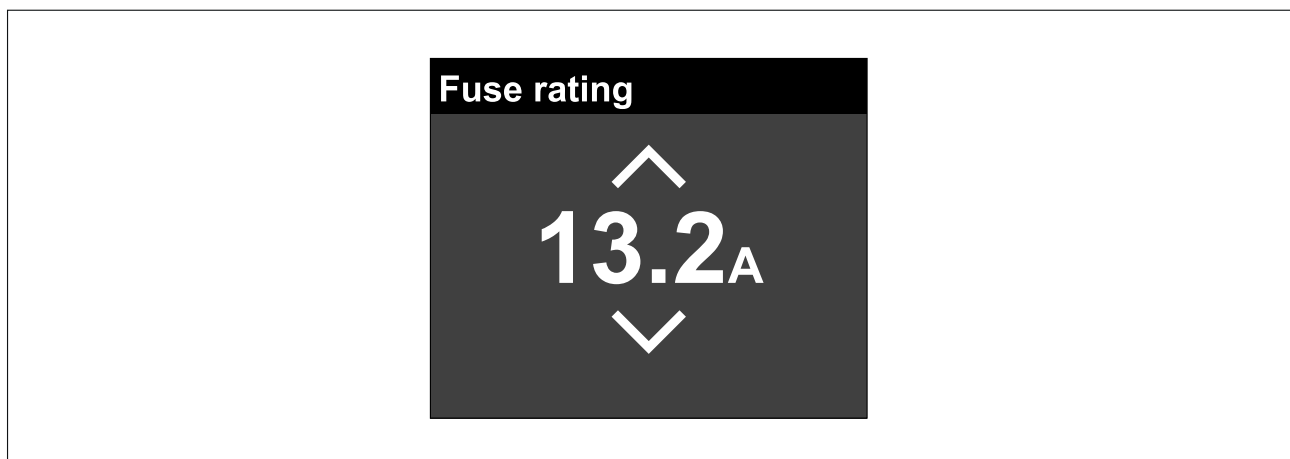
Each output channel is configured with a soft fuse rating.

Note:

- Do NOT change fuse rating level without first consulting a Raymarine certified engineer.
- Soft fuse ratings are configured during installation and should not require adjustment. If soft fuses are tripping then this suggests an issue with the connected device.

If required, the soft fuse rating can be adjusted.

The Fuse rating adjustment page can be accessed from the output channel page by pressing the **OK** button and selecting Fuse rating from the Options menu.



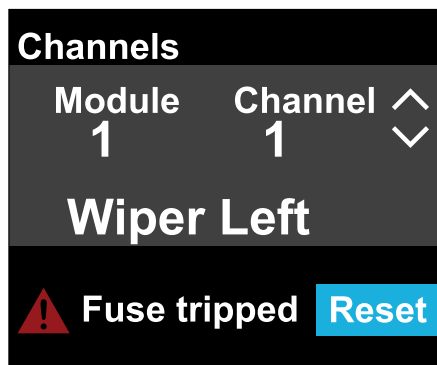
The soft fuse rating can be adjusted using the **Up** and **Down** buttons.

Once the desired fuse rating is selected press the **OK** button to save the new fuse rating.

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.



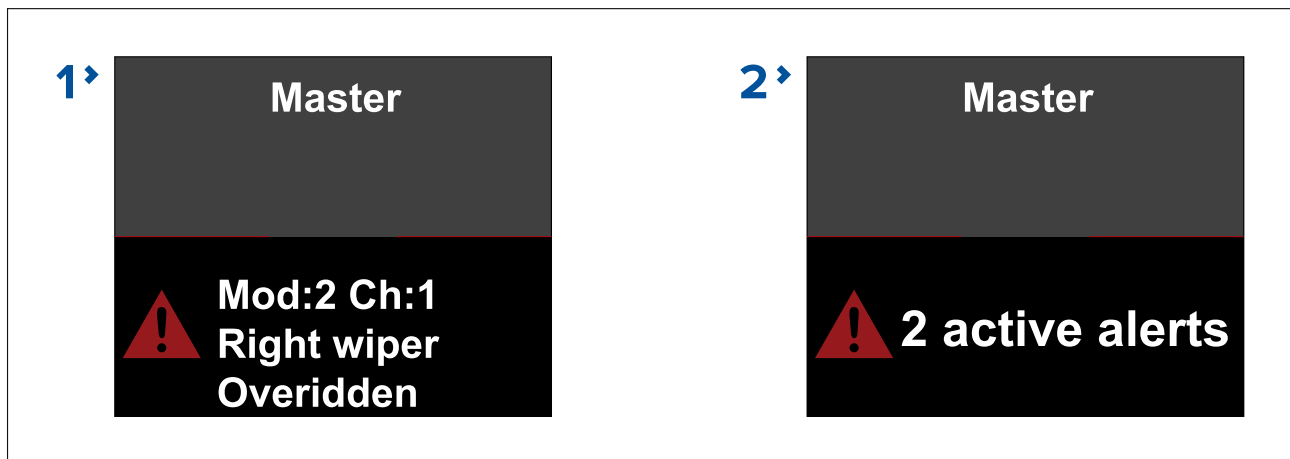
The tripped fuse can be reset by pressing the **OK** button.

Important:

If fuse tripping persists, consult a Raymarine certified engineer to help fix the problem. as this suggests an issue with a connected device.

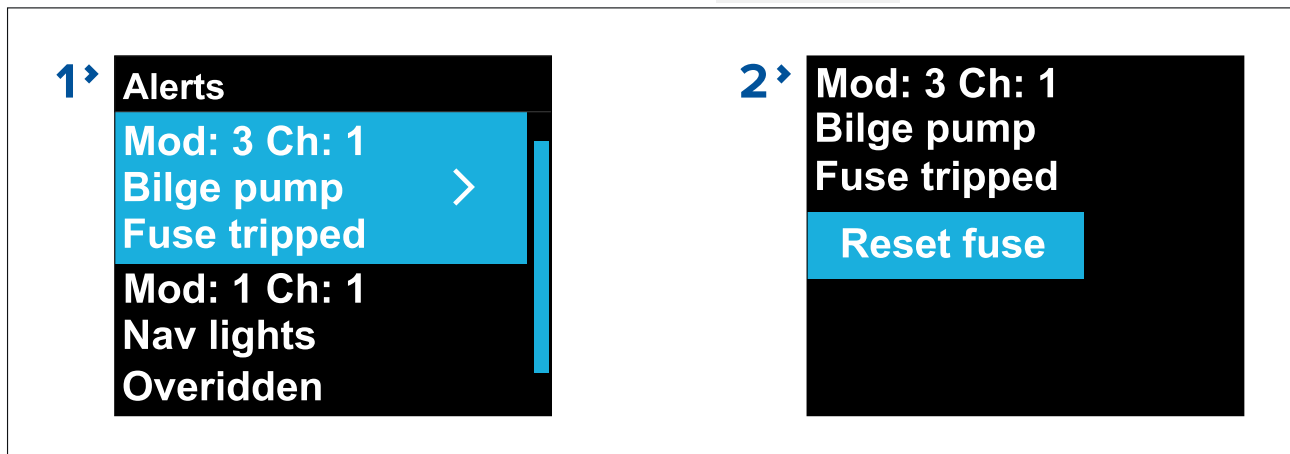
5.5 Alerts

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.

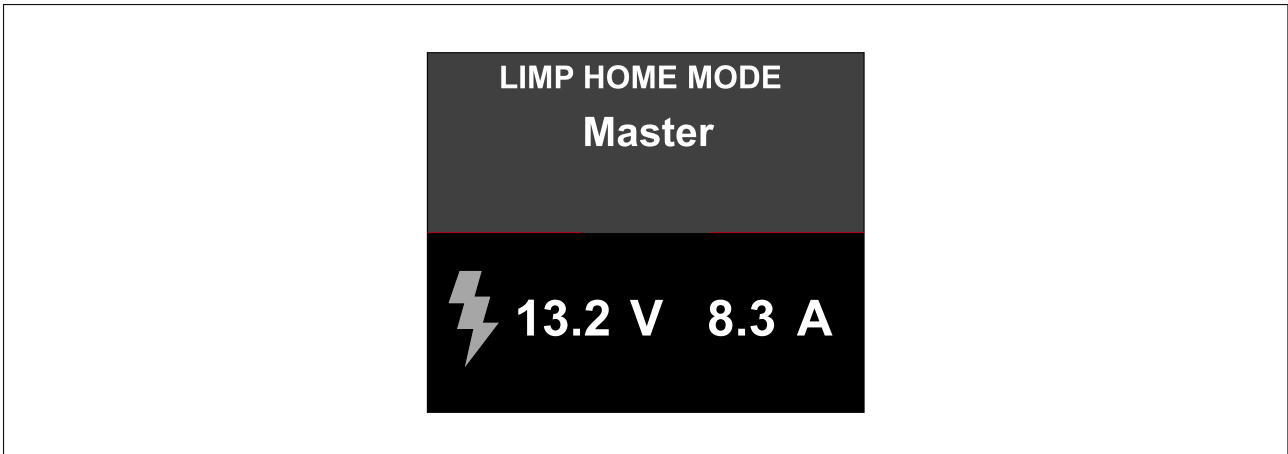
Pressing the **OK** button will display the details page for the highlighted alert.

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 6: Troubleshooting

Chapter contents

- [6.1 Troubleshooting on page 74](#)
- [6.2 LED diagnostics on page 74](#)
- [6.3 YachtSense Digital Control System troubleshooting on page 74](#)
- [6.4 Performing a factory reset on page 75](#)
- [6.5 Deleting configuration on page 75](#)

6.1 Troubleshooting

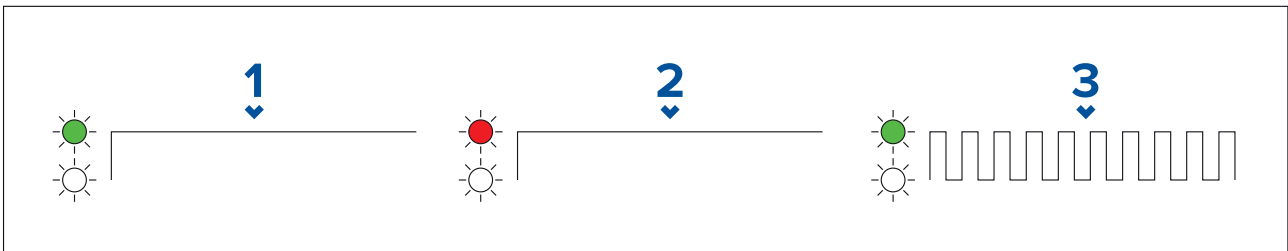
The troubleshooting information provides possible causes and corrective action required for common problems associated with installation and operation of your product.

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 in order 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 Product Support contact details.

6.2 LED diagnostics

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



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

6.3 YachtSense Digital Control System troubleshooting

Error messages

No modules detected message displayed

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

1. Power down the system.
2. 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.
3. Damaged modules must be replaced before using the system again.
4. Power on the system.
5. If problem persists, contact Raymarine Product Support for assistance.

Channel not configured message displayed.

The channel is not configured

1. If the channel was previously working try power cycling the system.
2. If problem persists, contact Raymarine Product Support for assistance.

Unit overheated message displayed.

The unit has exceeded its normal operating temperature range.

1. Ensure system has adequate ventilation.
2. Check connected devices and ensure correct operation.
3. If problem persists, contact Raymarine Product Support for assistance.

6.4 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.

6.5 Deleting configuration

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

Important:

- **Deleting configuration will render your YachtSense Digital Control System unusable and may invalidate your product warranty.**
- This procedure should only be carried out by Raymarine certified engineers.
- This procedure cannot be undone.
- The system will require re-configuration by a Raymarine approved dealer before it can be used again.

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 15 seconds.
The Maintenance menu will be displayed.
3. Select **Delete configuration**.
4. Press the **OK** button to wipe the system's configuration.

Chapter 7: Maintenance

Chapter contents

- 7.1 Service and maintenance on page 78
- 7.2 Product cleaning on page 78

7.1 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.

7.2 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 8: Technical support

Chapter contents

- 8.1 Raymarine product support and servicing on page 80
- 8.2 Learning resources on page 81

8.1 Raymarine product 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 MFD.

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:

<http://www.raymarine.co.uk/display/?id=788>.

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** — <http://forum.raymarine.com>
- **Software updates** — <http://www.raymarine.com/software>

Worldwide support

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

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

United States (US):

- Help desk: <https://raymarine.custhelp.com/app/ask>
- 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

8.2 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:

- [YouTube](#)

LightHouse™ 3 tips and tricks:

- [Raymarine website](#)

Video Gallery:

- [Raymarine website](#)

Note:

- Viewing the videos requires a device with an Internet connection.
- Some videos are only available in English.

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:

- <http://forum.raymarine.com>

Chapter 9: Technical specification

Chapter contents

- 9.1 System technical specification on page 84
- 9.2 Master module technical specification on page 84
- 9.3 Remote module technical specification on page 85
- 9.4 Power supply module technical specification on page 85
- 9.5 Hi power module technical specification on page 86
- 9.6 Lo power module technical specification on page 86
- 9.7 Signal module technical specification on page 86
- 9.8 Reverse power module technical specification on page 87

9.1 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:	100 A 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

9.2 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:	350 mA

Data connections

Network (control)	1 x RayNet type SeaTalkhs™ connector 10/100/1,000 Mbits/s
SeaTalkng® / NMEA 2000	1 x SeaTalkng® connector
CANBUS / Serial	<ul style="list-style-type: none">• 2 x J1939 connections via 16-pin Molex MX150L connector• 2 x RS-485 connections via 16-pin Molex MX150L 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°

9.3 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:	250 mA
Maximum output current:	2 A (250 mA per channel)

Data connections

SeaTalkng [®] / NMEA 2000	1 x SeaTalkng [®] connector
Input / output connections	8 x 250 mA output channels via 20-pin Molex MX150L 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°

9.4 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
Fuse / circuit breaker rating	100 A maximum
Maximum current draw:	100 A

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)

9.5 Hi 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:	40 A (20 A per channel)
Minimum output current:	50 mA per channel

Data connections

Hi power connections:	2 x 20 A 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)

9.6 Lo 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:	40 A (10 A per channel)
Minimum output current:	50 mA

Data connections

Lo power connections:	4 x 10 A 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)

9.7 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:	1 A (250 mA per channel)

Data connections

Signal connections	4 x digital / analog input channels / 250 mA 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)

9.8 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:	20 A

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 10: Spares and accessories

Chapter contents

- [10.1 YachtSense Digital Control System spares on page 90](#)
- [10.2 YachtSense Digital Control System accessories on page 90](#)
- [10.3 RayNet to RayNet cables and connectors on page 91](#)
- [10.4 SeaTalkng® cables and accessories on page 92](#)

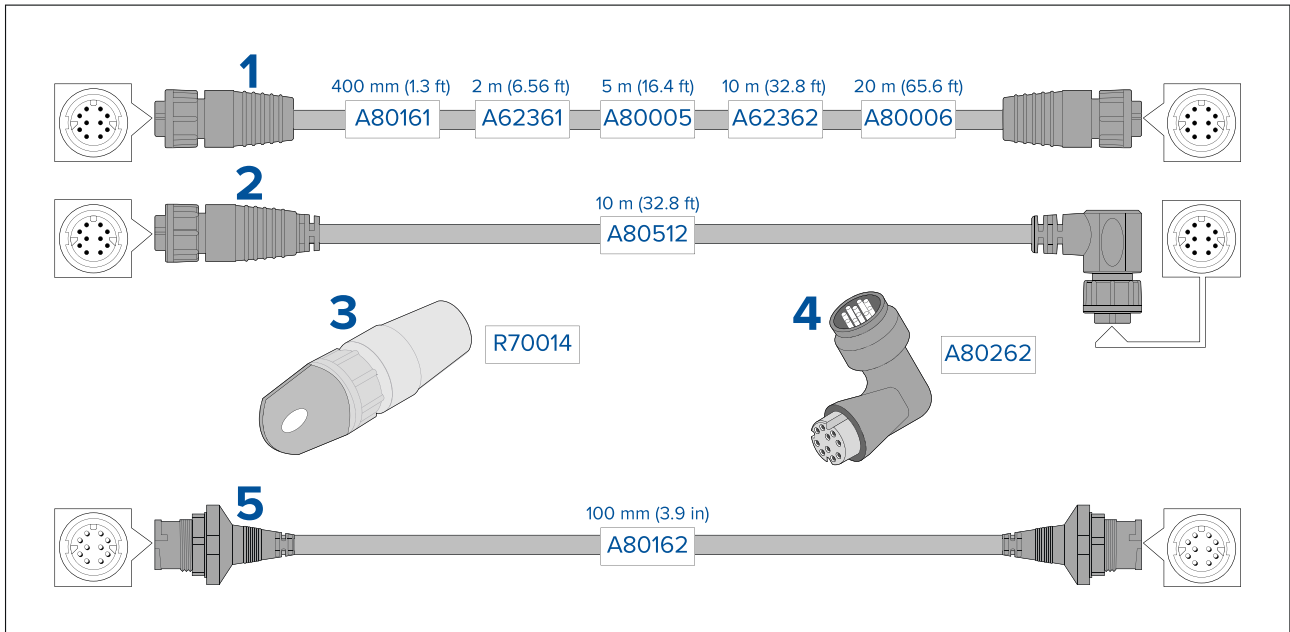
10.1 YachtSense Digital Control System spares

- Replacement Master module — R70805
- Replacement Power supply module — E70604
- Replacement Remote module — R70806

10.2 YachtSense Digital Control System accessories

- Pack of 50 MX150L Seal plugs (34345–0001) — A80624
- Pack of 50 14–16 AWG MX150L (33001–2003) female crimp terminals — A80622
- Pack of 50 18–20 AWG MX150L (33001–2004) female crimp terminals — A80623

10.3 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. 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 / adaptor. 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.

10.4 SeaTalkng[®] cables and accessories

SeaTalkng[®] cables and accessories for use with compatible products.

SeaTalkng kits

SeaTalkng kits enable you to create a simple SeaTalkng backbone.

- **Starter kit — T70134**
 - 1 x 5 Way connector (**A06064**)
 - 2 x Backbone terminator (**A06031**)
 - 1 x 3 m (9.8 ft) spur cable (**A06040**)
 - 1 x Power cable (**A06049**)
- **Backbone Kit — A25062**
 - 2 x 5 m (16.4 ft) Backbone cable (**A06036**)
 - 1 x 20 m (65.6 ft) Backbone cable (**A06037**)
 - 4 x T-piece (**A06028**)
 - 2 x Backbone terminator (**A06031**)
 - 1 x Power cable (**A06049**)
- **SeaTalk to SeaTalkng[®] converter kit — E22158**
 - SeaTalk to SeaTalkng[®] converter.
 - 1 x Power cable (**A06049**)
 - 2 x Backbone terminator (**A06031**)
 - 2 x Spur blanking plug (**A06032**)
 - 1 x 3 m (9.8 ft) spur cable (**A06040**)
 - SeaTalk to SeaTalkng[®] spur cable 1 m (3.3 ft) (**A22164**)

SeaTalkng spur cables and connectors

SeaTalkng spur cables are required to connect products to the SeaTalkng backbone.

Cables:

- Spur cable 0.4 m (1.3 ft) — **A06038**
- Spur cable 1 m (3.3 ft) — **A06039**
- Spur cable 3 m (9.8 ft) — **A06040**
- Spur cable 5 m (16.4 ft) — **A06041**
- Elbow spur cable 0.4 m (1.3 ft) — **A06042**
- SeaTalkng[®] to bare wire spur cable 1 m (3.3 ft) — **A06043**
- SeaTalkng[®] to bare wire spur cable 3 m (9.8 ft) — **A06044**
- ACU / SPX SeaTalkng[®] spur cable 0.3 m (1.0 ft) — **R12112**

Connectors

- Right angled (90°) spur connector — **A06077**

SeaTalkng backbone cables and connectors

SeaTalkng backbone cables are used to create or extend a SeaTalkng backbone.

Cables:

- Backbone cable 0.4 m (1.3 ft) — **A06033**
- Backbone cable 1 m (3.3 ft) — **A06034**
- Backbone cable 3 m (9.8 ft) — **A06035**
- Backbone cable 5 m (16.4 ft) — **A06036**
- Backbone cable 9 m (29.5 ft) — **A06068**
- Backbone cable 20 m (65.6 ft) — **A06037**

Connectors:

- Terminator — **A06031**
- T-piece (1 x spur connection) — **A06028**

- 5-way connector block (3 x spur connections) — **A06064**
- Backbone extender — **A06030**
- Spur blanking plug — **A06032**
- Inline terminator — **A80001** — Provides direct connection of a spur cable to the end of a backbone cable. No T-piece required.

SeaTalkng power cables

SeaTalkng power cables are used to provide the backbone and connected devices with power.

- SeaTalkng Power cable 1 m (3.3 ft) — **A06049**

DeviceNet power cables

DeviceNet power cables are used to provide the backbone and connected devices with power.

- DeviceNet Power cable 2 m (6.6 ft) — **A80692**

SeaTalk to SeaTalkng adaptor cables

SeaTalk to SeaTalkng adaptor cables enable connection of older SeaTalk product to the SeaTalkng backbone, alternatively they can be used to connect SeaTalkng product to older SeaTalk networks.

- SeaTalk (3 pin) to SeaTalkng[®] adaptor cable 0.4 m (1.3 ft) — **A06047**
- SeaTalk to SeaTalkng[®] spur cable 1 m (3.3 ft) — **A22164**
- SeaTalk2 (5 pin) to SeaTalkng[®] adaptor cable 0.4 m (1.3 ft) — **A06048**

DeviceNet to SeaTalkng adaptor cables

DeviceNet to SeaTalkng adaptor cables enable connection of products that use the NMEA 2000 DeviceNet connector to the SeaTalkng backbone, alternatively they can be used to connect a SeaTalkng product to an NMEA 2000 DeviceNet backbone.

- SeaTalkng[®] to DeviceNet (Female) adaptor cable 0.4 m (1.3 ft) — **A06045**
- SeaTalkng[®] to DeviceNet (Male) adaptor cable 0.4 m (1.3 ft) — **A80674**
- SeaTalkng[®] to DeviceNet (Female) adaptor cable 1 m (3.3 ft) — **A06075**
- SeaTalkng[®] to DeviceNet (Male) adaptor cable 1.5 m (4.92 ft) — **A06046**
- SeaTalkng[®] to DeviceNet (Male) adaptor cable 1 m (3.3 ft) — **A06076**
- SeaTalkng[®] to DeviceNet (Male) adaptor cable 0.1 m (0.33 ft) — **A06078**
- SeaTalkng[®] to DeviceNet (Female) right-angled adaptor (this is an adaptor plug only; not a cable) — **A06084**
- DeviceNet (Female) to bare wires adaptor cable (0.4 m (1.3 ft) — **E05026**
- DeviceNet (Male) to bare wires adaptor cable (0.4 m (1.3 ft) — **E05027**

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

- **126992** — System time (Receive)
- **127245** — Rudder (Receive)
- **127250** — Vessel heading (Receive)
- **127257** — Attitude (Receive)
- **127488** — Engine parameters, rapid update (Receive)
- **127489** — Engine parameters, dynamic (Receive)
- **127493** — Transmission parameters, dynamic (Receive)
- **127496** — Trip fuel consumption, vessel (Receive)
- **127497** — Trip fuel consumption, engine (Receive)
- **127501** — Binary switch status (Receive/Transmit)
- **127502** — Switch bank control (Receive/Transmit)
- **127503** — AC input status DEPRECATED (Receive)
- **127504** — AC output status DEPRECATED (Receive)
- **127505** — Fluid level (Receive/Transmit)
- **127506** — DC detailed status (Receive)
- **127507** — Charger status DEPRECATED (Receive)
- **127508** — Battery status (Receive/Transmit)
- **127509** — Inverter status DEPRECATED (Receive)
- **128259** — Speed water referenced (Receive)
- **128267** — Water depth (Receive)
- **129026** — COG & SOG rapid update (Receive)
- **129029** — GNSS position data (Receive)
- **129033** — Local time offset (Receive)
- **129044** — Datum (Receive)
- **130306** — Wind data (Receive)
- **130310** — Environmental parameters DEPRECATED (Receive)
- **130311** — Environmental parameters DEPRECATED (Receive)
- **130312** — Temperature DEPRECATED (Receive/Transmit)
- **130313** — Humidity (Receive)
- **130314** — Actual pressure (Receive/Transmit)
- **130576** — Trim ab status (Receive/Transmit)

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