Evolution EV-2

INSTALLATION INSTRUCTIONS

English (en-US)
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Raymarine® BY FLIR®

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Software updates

Important: Check the Raymarine website for the latest software releases for your product.

www.raymarine.com/software

Product handbooks

The latest versions of all English and translated handbooks are available to download in PDF format from the website www.raymarine.com.
Please check the website to ensure you have the latest handbooks.

English (en-US)
Document number: 87181-3
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Contents

Chapter 1: Important information

Warning: Autopilot system Installation

As correct performance of the vessel's steering is critical for safety, we STRONGLY RECOMMEND that an Authorized Raymarine Service Representative fits this product. You will only receive full warranty benefits if you can show that an Authorized Raymarine Service Representative has installed and commissioned this product.

Warning: Maintain a permanent watch

Always maintain a permanent watch, this will allow you to respond to situations as they develop. Failure to maintain a permanent watch puts yourself, your vessel and others at serious risk of harm.

Warning: Ensure safe navigation

This product is intended only as an aid to navigation and must never be used in preference to sound navigational judgment. Only official government charts and notices to mariners contain all the current information needed for safe navigation, and the captain is responsible for their prudent use. It is the user's responsibility to use official government charts, notices to mariners, caution and proper navigational skill when operating this or any other Raymarine product.

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: Product grounding

Before applying power to this product, ensure it has been correctly grounded, in accordance with the instructions provided.

Warning: Positive ground systems

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

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: Power supply voltage

Connecting this product to a voltage supply greater than the specified maximum rating may cause permanent damage to the unit. Refer to the *Technical specification* section for voltage rating.

Caution: Power supply protection

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

Caution: Product cleaning

When cleaning products:

- Lightly rinse or flush with clean, cool fresh water.
- If your product has a display screen, do NOT wipe the screen with a dry cloth, as this could scratch the screen coating.
- Do NOT use: abrasive, acidic, ammonia, solvent of chemical based cleaning products.
- Do NOT use a jet wash.

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 IPX standard (refer to the product's *Technical Specification*), water intrusion and subsequent equipment failure may occur if the product is subjected to commercial 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.

Suppression ferrites

- Raymarine cables may be pre-fitted or supplied with suppression ferrites. These are important for correct EMC performance. If ferrites are supplied separately to the cables (i.e. not pre-fitted), you must fit the supplied ferrites, using the supplied instructions.
- If a ferrite has to be removed for any purpose (e.g. installation or maintenance), it must be replaced in the original position before the product is used.
- Use only ferrites of the correct type, supplied by Raymarine or its authorized dealers.
- Where an installation requires multiple ferrites to be added to a cable, additional cable clips should be used to prevent stress on the connectors due to the extra weight of the cable.

Connections to other equipment

Requirement for ferrites on non-Raymarine cables

If your Raymarine equipment is to be connected to other equipment using a cable not supplied by Raymarine, a suppression ferrite MUST always be attached to the cable near the Raymarine unit.

Declaration of conformity

Raymarine UK Ltd. declares that this product is compliant with the essential requirements of EMC directive 2004/108/EC.

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

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.

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.

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 Handbook information

This handbook describes installation of the Evolution autopilot system.

The handbook includes information to help you:

- plan your autopilot system and ensure you have all the necessary equipment,
- install and connect the EV-1 and ACU (if applicable) as part of the autopilot system,
- obtain support if required.

This and other Raymarine product documentation is available to download in PDF format from www.raymarine.com.

Applicable product

This document covers the following product:

Part number	Name	Description
E70097	EV-2	Attitude Heading Reference Sensor (AHRS) — primary heading sensor and course computer.

Product documentation

The following documentation is applicable to your product:

Evolution EV-2 documentation

Description	Part number
Evolution Drive-By-Wire (DBW) autopilot system Installation instructions Plan and install a DBW autopilot system including an EV-2 AHRS.	87181
EV-1 and EV-2 mounting template Template for surface or wall mounting the EV-1/EV-2 sensor.	87170

ECI-100 documentation

Description	Part number
ECI–100 Installation instructions Installation of an ECI–100 unit and connection to a wider system of marine electronics.	88026 / 87202

Autopilot controller documentation

Commissioning and operating instructions for your autopilot with compatible Autopilot Controllers are shown below:

Description	Part number
p70/p70R installation and operation instructions Installation, commissioning and operation instructions including connection to a wider system of marine electronics.	81355
p70s/p70Rs installation and operation instructions Installation, commissioning and operation instructions including connection to a wider system of marine electronics.	81365
LightHouse™ MFDs Operations and autopilot commissioning instructions including connection to a wider system of marine electronics.	81360

All documents are available to download from the Raymarine website: www.raymarine.com/manuals

SeaTalkng® documentation

Description	Part number
SeaTalkng® reference manual Planning and connection of systems based around the SeaTalkng® network.	81300
SeaTalk — SeaTalkng® converter installation instructions Installation and connection of the SeaTalk — SeaTalkng® converter.	87121

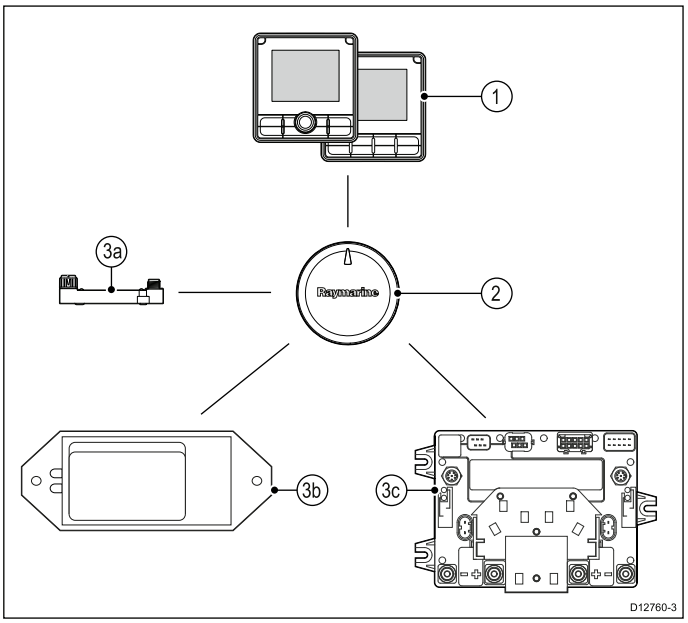
2.2 Product overview

The Evolution EV-2 is a primary heading sensor and course computer, providing autopilot control for vessels fitted with compatible Drive-By-Wire (DBW) steering systems.

In conjunction with a separately supplied interface unit and a compatible autopilot controller, the EV-2 enables you to directly control the vessel's steering system and provide navigation commands, such as navigating to pre-determined tracks and waypoints for example.

The Evolution system provides a number of features to ensure ease of installation and minimal setup:

The Evolution system consists of the following components:



Item	Component	Purpose
1	SeaTalkng® autopilot controller.	A graphical display and interface enabling you to issue navigation and other operational commands to the autopilot system.
2	EV-2 autopilot with Attitude Heading Reference Sensor (AHRS).	The primary heading sensor and course computer, incorporating an attitude 9-axis sensor. This sensor also replaces the fluxgate compass typical in existing autopilot systems.
3a	ECI-100 Engine Control Interface (as supplied separately by Raymarine.	The ECI-100 receives steering control messages from a connected EV-2 and transmits the messages on supported, third party, steering control systems.
3b	Drive interface unit for Volvo Penta EVC systems (as supplied separately by Raymarine).	Houses the main power and drive electronics for direct connection to a Volvo Penta Drive-By-Wire system.
3c	Third-party drive interface unit for SeaStar Solutions / Teleflex Optimus systems (as supplied separately by SeaStar Solutions / Teleflex).	Houses the main power and drive electronics for direct connection to a SeaStar Solutions / Teleflex Optimus Drive-By-Wire system.

The Evolution system provides a number of features to ensure ease of installation and minimal setup:

- **Flexible mounting options** — The EV sensor can be mounted horizontally on a flat deck or alternatively on a bracket, for mounting on a mast, wall or other vertical surface.

Note: The arrow on the front of the EV sensor must be parallel with the centerline of the vessel and pointing towards the vessel's bow.

- **Simple connections** — all Evolution system components are connected using SeaTalkng® and DeviceNet connections.
- **High accuracy** — accurate course-keeping, to within +/- 2 degrees, in all conditions.
- **Built-in heading and attitude sensor** — no additional fluxgate compass required.
- **Automatic setup** — simplified dockside calibration, including automatic compass calibration. The Rudder Gain, Rudder Damping, Counter Rudder, and compass calibration settings required by existing autopilots are no longer necessary.

Required additional components

To complete your autopilot system, you will need the following components and data sources in addition to the Evolution components.

Essential:

- Compatible autopilot controller (See: 3.4 Compatible autopilot controller).
- Drive interface unit (as appropriate for your vessel's drive system):
  - ECI-100
  - SeaStar Solutions / Teleflex Optimus
  - Volvo Penta EVC
- SeaTalkng® backbone.
- DeviceNet cable.

Recommended:

- Compatible speed data source. The autopilot uses speed data when making calculations relating to navigation. As a minimum, this information

must come from a GNSS receiver providing SOG (Speed Over Ground) data, or ideally from a dedicated speed sensor.

- Compatible wind data source (only required for sailing vessels). The autopilot uses wind vane data to steer relative to a specified wind angle. This data must come from an analog wind transducer connected to the SeaTalkng® backbone.

Optional:

- Position data source – The autopilot uses position data when following routes and calculating the optimum course to steer. This data is usually supplied by a GNSS receiver on the SeaTalkng® backbone.

SeaTalkng®

SeaTalkng® (Next Generation) is an enhanced protocol for connection of compatible marine instruments and equipment. It replaces the older SeaTalk and SeaTalk2 protocols.

SeaTalkng® utilizes a single backbone to which compatible equipment connect using a spur. Data and power are carried within the backbone. Devices that have a low draw can be powered from the network, although high current equipment will need to have a separate power connection.

SeaTalkng® is a proprietary extension to NMEA 2000 and the proven CAN bus technology. Compatible NMEA 2000 and SeaTalk and SeaTalk2 devices can also be connected using the appropriate interfaces or adaptor cables as required.

NMEA 2000

NMEA 2000 offers significant improvements over **NMEA 0183**, most notably in speed and connectivity. Up to 50 units can simultaneously transmit and receive on a single physical bus at any one time, with each node being physically addressable. The standard was specifically intended to allow for a whole network of marine electronics from any manufacturer to communicate on a common bus via standardized message types and formats.

Multiple data sources (MDS) overview

When a system includes multiple instances of a data source the preferred data source is selected automatically. The systems preferred source may not be your preferred source, or if you are experiencing a data conflict you can manually select your preferred data source.

MDS enables you to choose a preferred source for the following data types:

- GNSS Position
- GNSS Datum
- Time & Date
- Heading
- Depth
- Speed
- Wind

This exercise would usually be completed as part of the initial installation, or when new equipment is added.

For MDS to be available all products in the system that use the data sources listed above, must be MDS-compliant. The system will report any products that are NOT MDS-compliant. It may be possible to upgrade the software for these products, to make them compliant. Visit the Raymarine website (www.raymarine.com) to obtain the latest software for your products.

If MDS-compliant software is not available for the product and you do NOT want to use the systems preferred data source, you must remove any non-compliant product from the system. You should then be able to select your preferred data source.

Note: Once you have completed setting up your preferred data sources, you may be able to add the non-compliant products back into the system.

Multiple data source exceptions

With the Evolution system, there are a number of important exceptions to the handling of multiple sources of certain types of data.

Specifically:

- **Heading data** — If a non-Evolution source of heading data is designated by the user, the Evolution system components will combine this heading data with its own gyro and accelerometer data, and then use the improved heading data. This combined heading data will also be available to other equipment on the SeaTalkng® bus.
- **Rudder angle data** — Where there are multiple sources of rudder reference information, the Evolution system components will ignore rudder angle inputs from any rudder reference units that are NOT part of the drive system.

Chapter 3: Planning the installation

Chapter contents

3.1 Installation checklist

Installation includes the following activities:

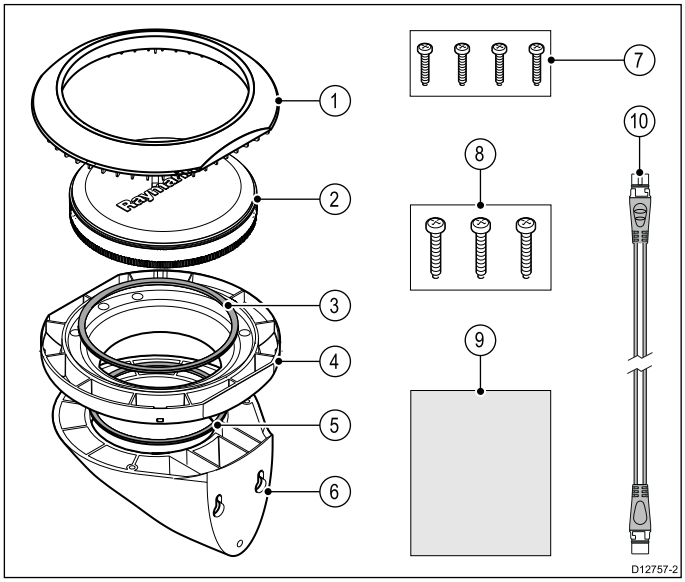
	Installation Task
1	Plan your system.
2	Obtain all required equipment and tools.
3	Site all equipment.
4	Route all cables.
5	Drill cable and mounting holes.
6	Make all connections into equipment.
7	Secure all equipment in place.
8	Power on and test the system.

Schematic diagram

A schematic diagram is an essential part of planning any installation. It is also useful for any future additions or maintenance of the system. The diagram should include:

- Location of all components.
- Connectors, cable types, routes and lengths.

3.2 Parts supplied — EV-1 and EV-2



Item	Description	Quantity
1	Mounting trim.	1
2	EV-1 / EV-2.	1
3	Sealing ring.	1
4	Mounting tray.	1
5	Sealing ring.	1
6	Wall mounting bracket.	1
7	Screws for deck or bracket mounting.	4
8	Screws for wall bracket.	3
9	Document pack.	1
10	1m (3.3ft) SeaTalk^{ng} spur cable.	1

3.3 Software updates

The software running on the product can be updated.

- Raymarine periodically releases software updates to improve product performance and add new features.
- The software on many products can be updated using a connected and compatible multifunction display (MFD).
- Refer to www.raymarine.com/software/ for the latest software updates and the software update procedure for your specific product.

Important:

- To prevent potential software-related issues with your product, always follow the relevant update instructions carefully and in the sequence provided.
- If in doubt as to the correct procedure for updating your product software, refer to your dealer or Raymarine technical support.

Caution: Installing software updates

The software update process is carried out at your own risk. Before initiating the update process ensure you have backed up any important files.

Ensure that the unit has a reliable power supply and that the update process is not interrupted.

Damage caused by incomplete updates are not covered by Raymarine warranty.

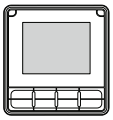
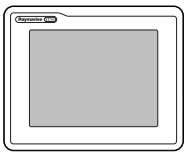
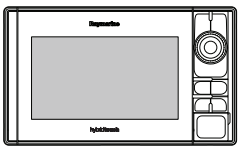
By downloading the software update package, you agree to these terms.

3.4 Compatible autopilot controllers

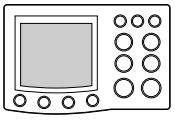
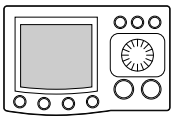
A SeaTalkng® autopilot controller is required to operate your autopilot system. SeaTalk autopilot controller can be used when connected via a SeaTalk to SeaTalkng® converter, but may have limited functionality.

More than 1 autopilot controller can be used to control your autopilot system.

SeaTalkng® Autopilot controllers

	Product name
	p70s
	p70Rs
	p70
	p70R
	ST70
	ST70+
	LightHouse™ MFD

SeaTalk® Autopilot Controllers

	Product name
	ST6002
	ST7002
	ST8002

	Product name
	SmartController (repeat controller only)
	S100 remote (repeat controller only)

3.5 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.

3.6 Selecting a location

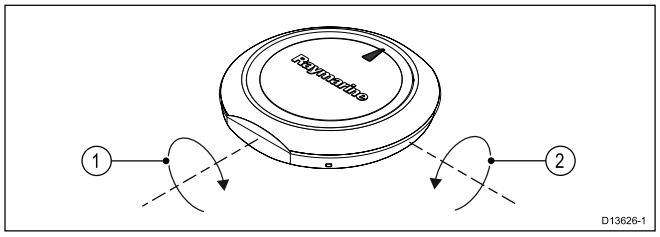
Warning: Potential ignition source

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 — EV–1 and EV–2

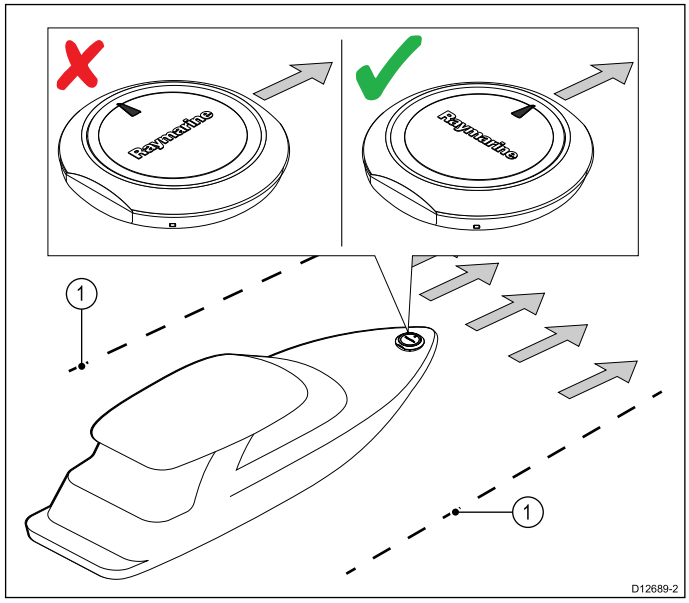
The installation location must take into account the following requirements:

- The unit can be installed above or below decks.
- The unit must be mounted on a horizontal and level surface. The unit may be mounted upright or upside-down, but the unit must be level within **5º** of pitch and **5º** of roll (compared with the vessel's neutral position when at rest and normally loaded).



1. Roll
2. Pitch

- The unit can be mounted on a vertical surface such as a bulkhead or mast etc, using the supplied bracket.
- The unit location must be at least 1 m (3 ft.) away from any source of magnetic interference, such as compasses and electrical cables.
- Choose a location where the unit will be safe from physical damage and excessive vibration.
- Choose a location where the unit will not be subjected to a load or force.
- Mount away from any source of heat or potential flammable hazards, such as fuel vapor.
- The unit should be mounted in a location where the diagnostics LED is viewable.
- The unit must be mounted with the LED 'arrow' on the top of the unit pointing towards the vessel's bow and must be in parallel alignment with the longitudinal axis (centerline) of the vessel.



1. Vessel's longitudinal axis.

Compass safe distance

To prevent potential interference with the vessel's magnetic compasses, ensure an adequate distance is maintained from the product.

When choosing a suitable location for the product you should aim to maintain the maximum possible distance from any compasses. Typically this distance should be at least 1 m (3 ft) in all directions. However for some smaller vessels it may not be possible to locate the product this far away from a compass. In this situation, when choosing the installation location for your product, ensure that the compass is not affected by the product when it is in a powered state.

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.

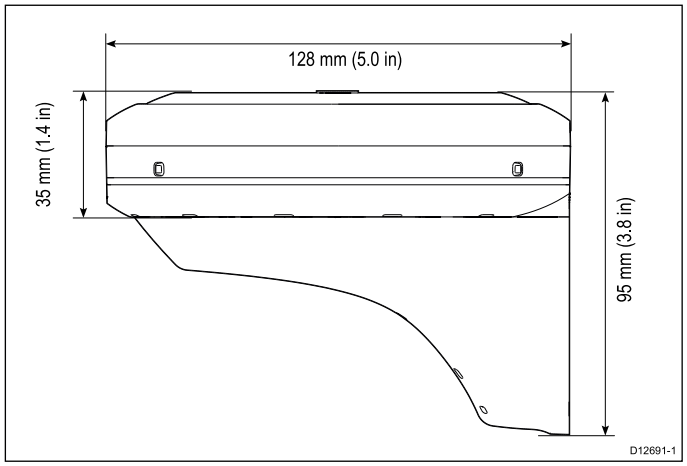
For **optimum** EMC performance we recommend that wherever possible:

- Raymarine equipment and cables connected to it are:
  - At least 1m (3ft) 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 7 ft (2 m).
  - More than 2m (7ft) 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

3.7 Dimensions — EV–1 and EV–2



Chapter 4: Cables and connections

Chapter contents

4.1 General cabling guidance

Cable types and length

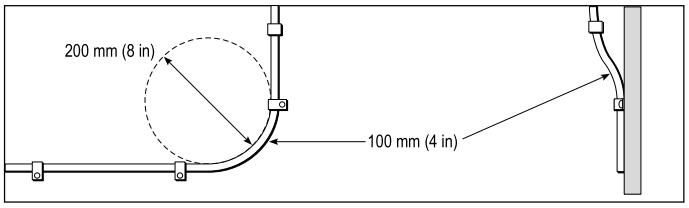
It is important to use cables of the appropriate type and length

- Unless otherwise stated use only standard cables of the correct type, supplied by Raymarine.
- Ensure that any non-Raymarine cables are of the correct quality and gauge. For example, longer power cable runs may require larger wire gauges to minimize voltage drop along the run.

Routing cables

Cables must be routed correctly, to maximize performance and prolong cable life.

- Do NOT bend cables excessively. Wherever possible, ensure a minimum bend diameter of 200 mm (8 in) / minimum bend radius of 100 mm (4 in).



- Protect all cables from physical damage and exposure to heat. Use trunking or conduit where possible. Do NOT run cables through bilges or doorways, or close to moving or hot objects.
- Secure cables in place using tie-wraps or lacing twine. Coil any extra cable and tie it out of the way.
- Where a cable passes through an exposed bulkhead or deckhead, use a suitable watertight feed-through.
- Do NOT run cables near to engines or fluorescent lights.

Always route data cables as far away as possible from:

- other equipment and cables,
- high current carrying AC and DC power lines,
- antennae.

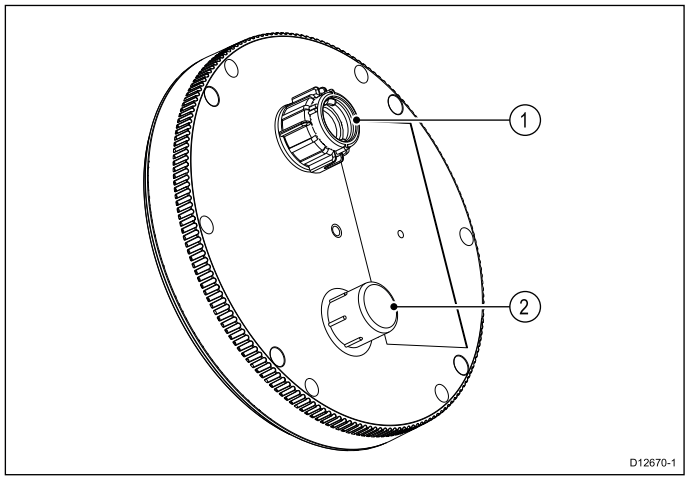
Strain relief

Ensure adequate strain relief is provided. Protect connectors from strain and ensure they will not pull out under extreme sea conditions.

Cable shielding

Ensure that all data cables are properly shielded that the cable shielding is intact (e.g. hasn't been scraped off by being squeezed through a tight area).

4.2 Connections overview — EV-1 and EV-2

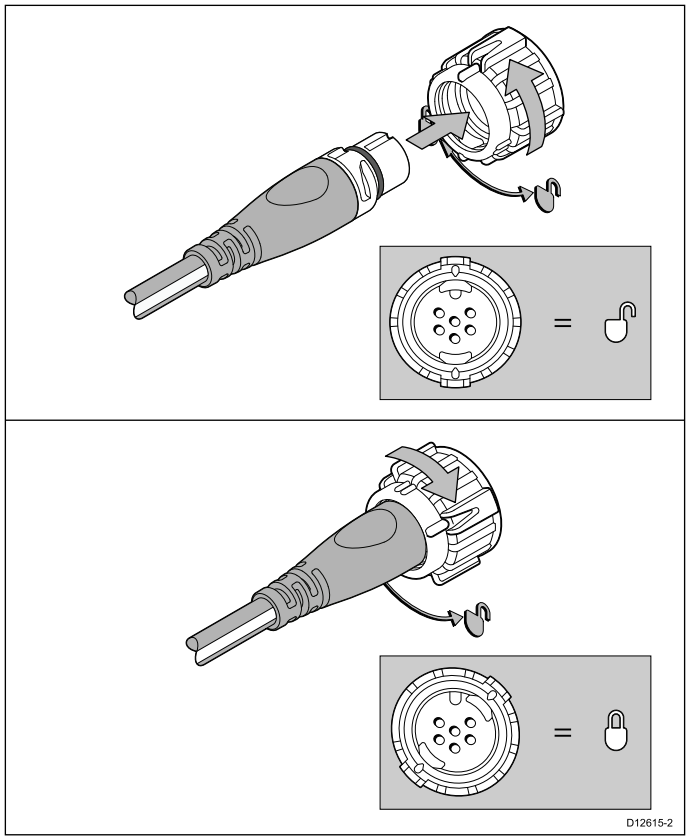


1. SeaTalkng®
2. DeviceNet

Important:

The DeviceNet port is for use with the EV-2 only. Do NOT connect this port on the EV-1 unit.

Connecting SeaTalkng® cables



1. Rotate the locking collar on the unit to the unlocked position.
2. Ensure the cable's connector is correctly oriented.
3. Fully insert the cable connector.
4. Rotate locking collar clockwise (2 clicks) until it is in the locked position.

4.3 Power connection — EV-2

The power for the EV-2 unit is provided by the SeaTalkng® backbone.

- The EV-2 unit must be connected to a spur connection on the SeaTalkng® backbone.
- SeaTalkng® requires ONE 12 V dc power source. This can be provided by a battery.

Note: If your vessel has a 24 V supply a suitable voltage convertor is required.

Warning: Positive ground systems

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

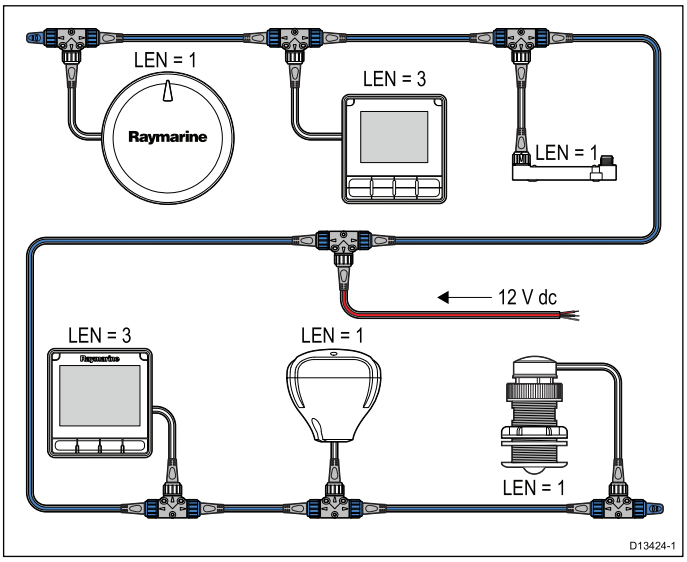
4.4 SeaTalkng® power connection point

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.

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 Load Equivalency Number (LEN) is used to determine the power connection point for the system.



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

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	Thermal breaker rating
5 A	3 A (if only connecting one device)

Note:

The suitable fuse rating for the thermal breaker is dependent on the number of devices you are connecting. If in doubt consult an authorized Raymarine dealer.

SeaTalkng® system loading

The maximum loading / LEN for a SeaTalkng® system depends on the length of the backbone.

Loading type	Backbone length	Total LEN
Unbalanced	20 m (66 ft)	40
Unbalanced	40 m (131 ft)	20
Unbalanced	60 m (197 ft)	14

Loading type	Backbone length	Total LEN
Balanced	60 m (197 ft) or less	100
Balanced	80 m (262 ft)	84
Balanced	100 m (328 ft)	60
Balanced	120 m (394 ft)	50
Balanced	140 m to 160 m (459 ft to 525 ft)	40
Balanced	180 m to 200 m (591 ft to 656 ft)	32

4.5 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:

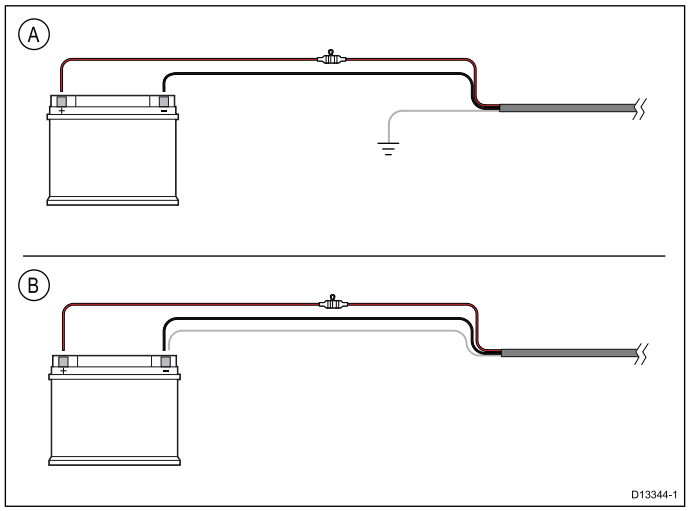
When planning and wiring, take into consideration other products in your system, some of which (e.g. sonar modules) may place large power demand peaks on the vessel's electrical system.

Note:

The information provided below is for guidance only, to help protect your product. It covers common vessel power arrangements, but does NOT cover every scenario. If you are unsure how to provide the correct level of protection, please consult an authorized Raymarine dealer or a suitably qualified professional marine electrician.

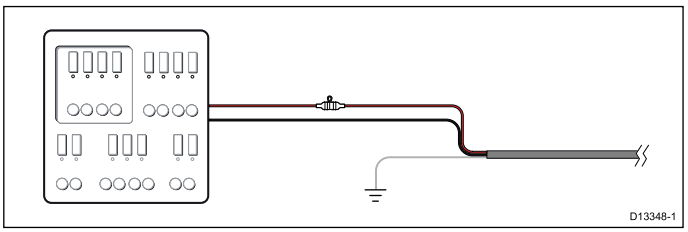
Implementation — direct connection to battery

- SeaTalkng® power cables may be connected directly to the vessel's battery, via a suitably rated fuse or breaker.
- 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.



A	Battery connection scenario A: suitable for a vessel with a common RF ground point. In this scenario, if your product's power cable is supplied with a separate drain wire then it should be connected to the vessel's common ground point.
B	Battery connection scenario B: suitable for a vessel without a common grounding point. In this case, if your product's power cable is supplied with a separate drain wire then it should be connected directly to the battery's negative terminal.

Implementation — connection to distribution panel



- Alternatively, the SeaTalkng® power cable may be 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 by 8 AWG (8.36 mm^2) 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.
- In all cases, observe the recommended breaker / 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.

Important:

Be aware that the suitable fuse rating for the thermal breaker or fuse is dependent on the number of devices you are connecting.

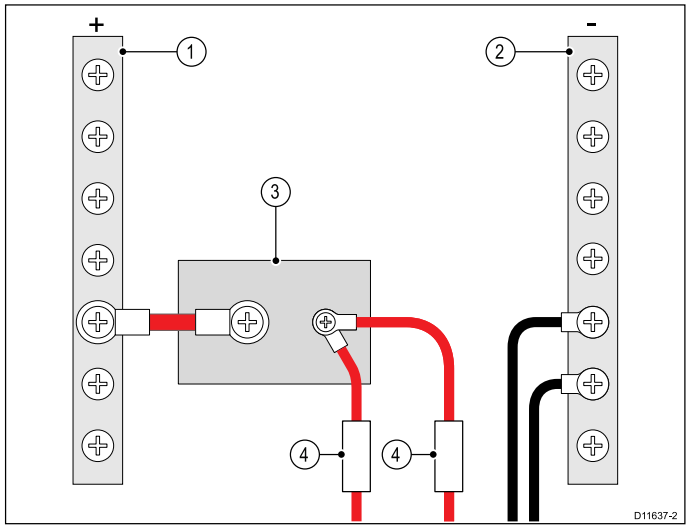
More information

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

Sharing a breaker

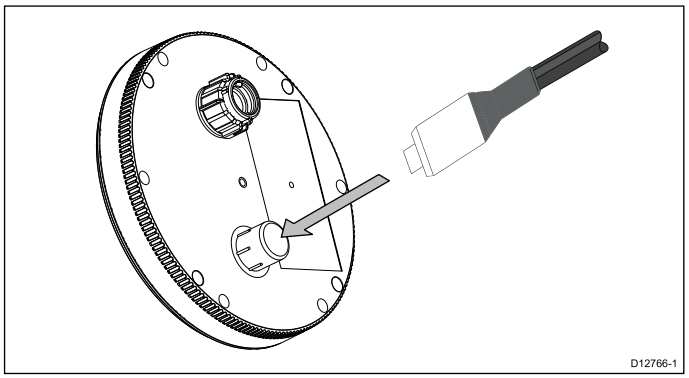
Where more than 1 piece of equipment shares a breaker you must provide protection for the individual circuits. E.g. by connecting an in-line fuse for each power circuit.



1	Positive (+) bar
2	Negative (-) bar
3	Circuit breaker
4	Fuse

Where possible, connect individual items of equipment to individual circuit breakers. Where this is not possible, use individual in-line fuses to provide the necessary protection.

4.6 DeviceNet connection — EV-2

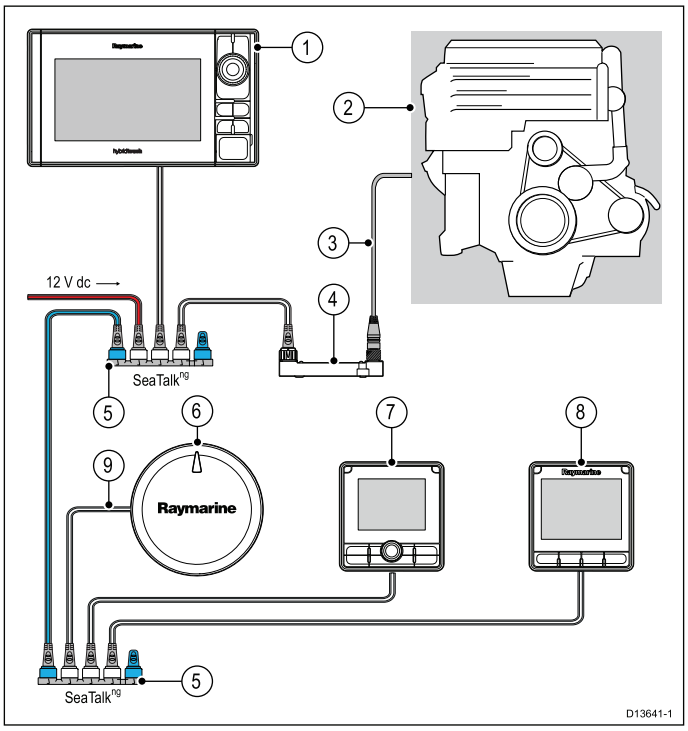


Important: The DeviceNet port is for use with the EV-2 only. Do NOT connect this port on the EV-1 unit.

4.7 ECI-100 unit connection

The ECI-100 can be used to connect the EV-2 to a compatible Drive-by-wire steering system.

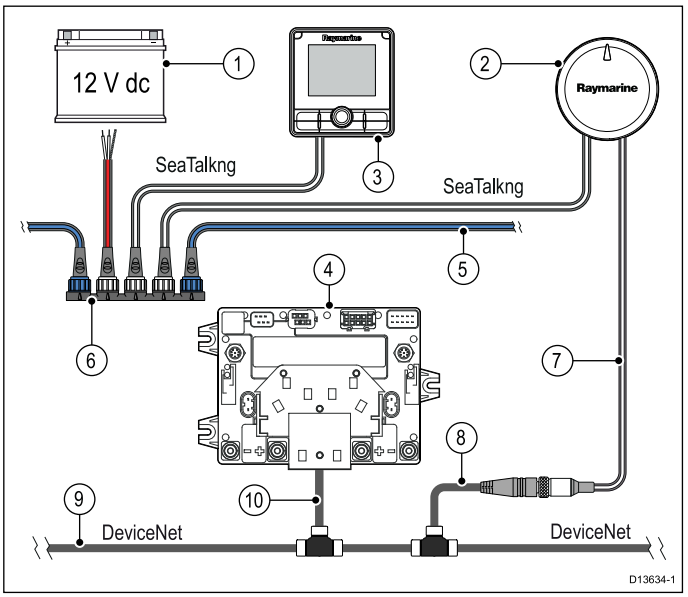
Please refer to the ECI product pages on the Raymarine® website (www.raymarine.com/view/?id=8507) for the latest steering system and engine compatibility information.



1. MFD
2. Vessel engine/steering system
3. Engine specific adaptor cable
4. ECI-100
5. SeaTalkng® 5–way block
6. EV-2
7. SeaTalkng® Pilot controller
8. SeaTalkng® Instrument display
9. SeaTalkng® spur cable (connecting EV-2 to the SeaTalkng® backbone).

4.8 Drive interface unit connection — SeaStar Solutions / Teleflex Optimus

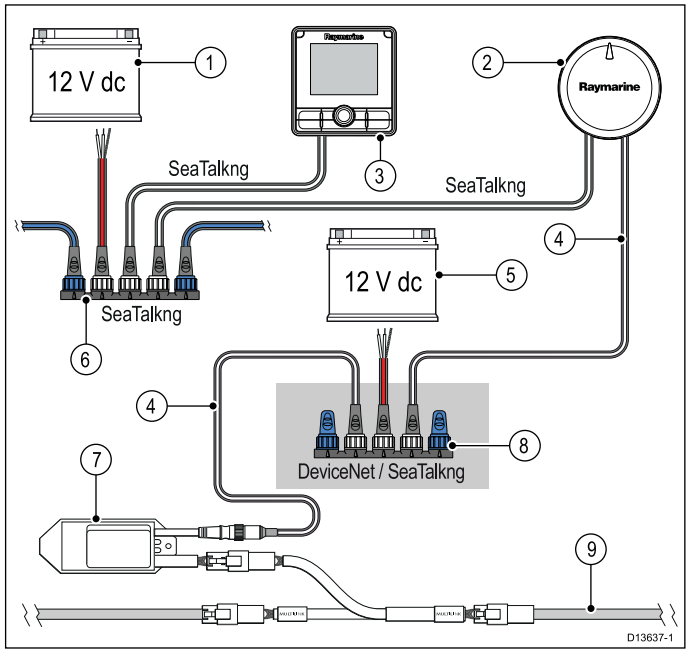
The EV-2 connects to a SeaStar Solutions / Teleflex Optimus drive interface unit via DeviceNet connections.



1. 12 V dc power supply (providing power to SeaTalkng®.)
2. EV-2
3. Autopilot controller
4. SeaStar Solutions / Teleflex Optimus drive interface unit (as supplied by SeaStar Solutions / Teleflex or dealer.)
5. SeaTalkng® backbone
6. SeaTalkng® 5–way block
7. DeviceNet cable (female) (as supplied by SeaStar Solutions / Teleflex or dealer.)
8. DeviceNet spur cable (as supplied by SeaStar Solutions / Teleflex or dealer.)
9. DeviceNet backbone/bus
10. DeviceNet spur cable (as supplied by SeaStar Solutions / Teleflex or dealer.)

4.9 Drive interface unit connection — Volvo Penta EVC

The EV-2 connects to a Volvo Penta EVC drive interface unit via DeviceNet connections.



1. 12 V dc power supply (providing power to SeaTalkng®.)
2. EV-2
3. Autopilot controller
4. DeviceNet adaptor cables (female) (as supplied with Raymarine DeviceNet cable kit.)
5. 12 V dc power supply (providing power to the Volvo Penta EVC interface unit.)
6. SeaTalkng® 5–way block
7. Volvo Penta EVC drive interface unit (available separately.)
8. Dedicated SeaTalkng® backbone (providing power to the Volvo Penta EVC drive interface.)
9. Engine CAN bus

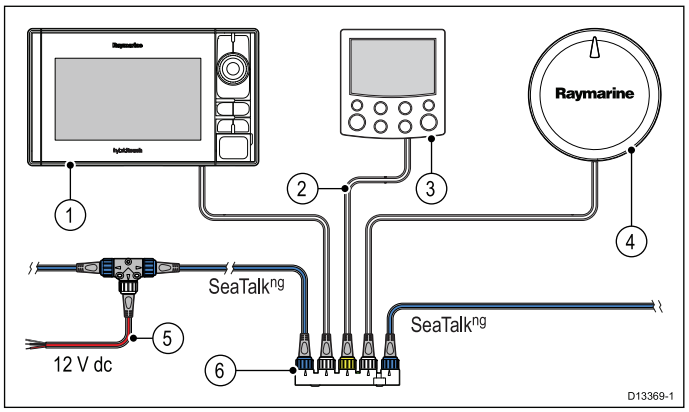
Power connection — Volvo Penta EVC interface

The EVC interface unit requires a 12 V power source, which must be provided to the EVC unit via a battery.

- If your vessel has a 24 V supply a suitable voltage convertor is required.
- The power source must be protected by a 5 A fuse or a circuit breaker providing equivalent protection.
- The EVC interface unit must be connected to a 12 V dc power source via a dedicated SeaTalkng® backbone.
- The supplied DeviceNet to SeaTalkng® adaptor cable must be used to connect the EVC interface unit to the dedicated SeaTalkng® backbone. This cable carries both data and power signals to the EVC unit.

4.10 SeaTalk® pilot controller connection

The SeaTalk® to SeaTalkng® converter can be used to enable control of SeaTalkng® autopilots using legacy SeaTalk® pilot controllers. Other SeaTalk® devices can be connected to the SeaTalkng® backbone in the same way.



1. SeaTalkng® MFD (MFDs require a separate power supply.)
2. SeaTalk® to SeaTalkng® adaptor cable (A22164)
3. SeaTalk® pilot controller (powered from the SeaTalkng® backbone.)
4. SeaTalkng® autopilot
5. SeaTalkng® 12 V dc power supply connection
6. SeaTalk® to SeaTalkng® converter

Chapter 5: Installation

Chapter contents

5.1 EV-2 Installation

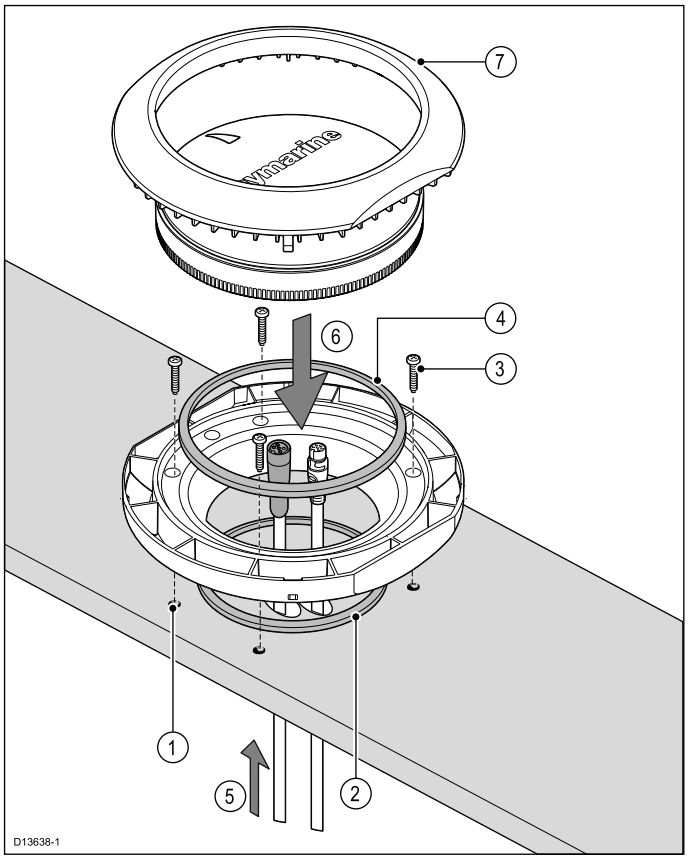
Surface mounting the EV-2

The supplied Deck mounting kit is used to surface mount the unit.

Ensure that the chosen location meets the product's location requirements, see 3.6 **Selecting a location** for details.

Important:

The installation must only be performed with the vessel either on a hard standing, or tied-up alongside a pontoon or berth.

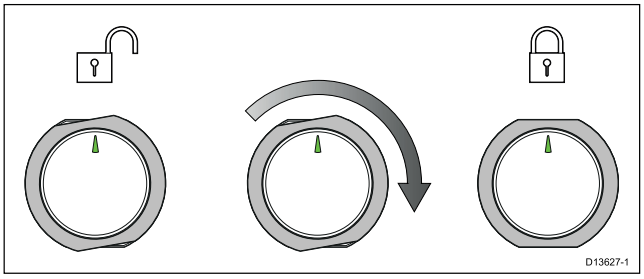


1. Using the Mounting tray template (87170), drill 4 holes in the mounting surface, plus a 22 mm (7/8 in) hole for the SeaTalkng® cable.
2. Place the small sealing ring in the groove located on the bottom of the Mounting tray.
3. Secure the tray to the mounting surface using the 4 x fixings, supplied.
4. Place the large sealing ring into the groove on the upper side of the Mounting tray.
5. Pull the SeaTalkng® and DeviceNet cables through the mounting surface hole and the Mounting tray. Plug in the cable connectors on the underside of the unit and secure as follows:
   - SeaTalkng® cable — secure by rotating the locking collar clockwise 2 clicks.
   - DeviceNet cable — secure by turning the cable connector's collar clockwise until tight.
6. Insert the unit into the mounting tray, ensuring the tabs in the Mounting tray are slotted into the grooves around the edge of the unit.

Important:

The unit must be mounted with the LED 'arrow' in parallel alignment with the longitudinal axis (centerline) of the vessel and be pointing towards the vessel's bow.

7. Place the Mounting trim over the unit slightly offset, and then twist the Mounting trim clockwise until it locks into position.

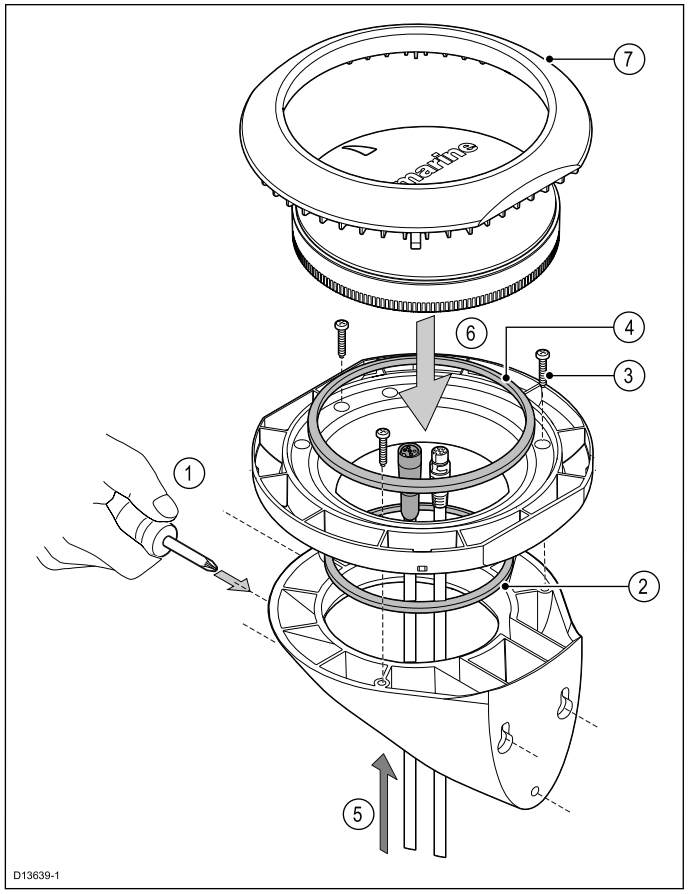


Bracket mounting the EV-2

The supplied Deck mounting kit is used to mount the unit on a vertical surface.

Ensure that the chosen location meets the product's location requirements, see 3.6 **Selecting a location** for details.

Important: The installation must only be performed with the vessel either on a hard standing, or tied-up alongside a pontoon or berth.



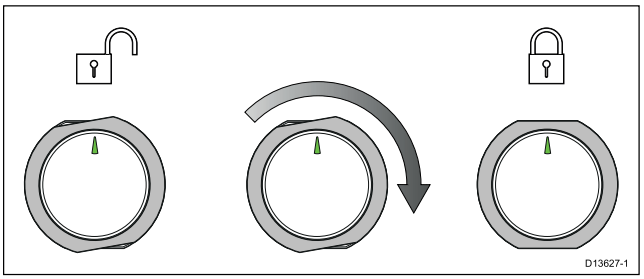
1. Use the Mounting bracket template (87170) to drill 3 pilot holes in the vertical mounting surface. Secure the mounting bracket to the surface using the supplied screws.

2. Place the small sealing ring in the groove located on the bottom of the Mounting tray.
3. Secure the tray to the bracket using 3 of the supplied screws, in the positions indicated in the illustration above.
4. Place the large sealing ring into the groove on the upper side of the Mounting tray.
5. Pull the SeaTalkng® and DeviceNet cables through the mounting surface hole and the Mounting tray. Plug in the cable connectors on the underside of the unit and secure as follows:
   - SeaTalkng® cable — secure by rotating the locking collar clockwise 2 clicks.
   - DeviceNet cable — secure by turning the cable connector's collar clockwise until tight.
6. Insert the unit into the mounting tray, ensuring the tabs in the Mounting tray are slotted into the grooves around the edge of the unit.

Important:

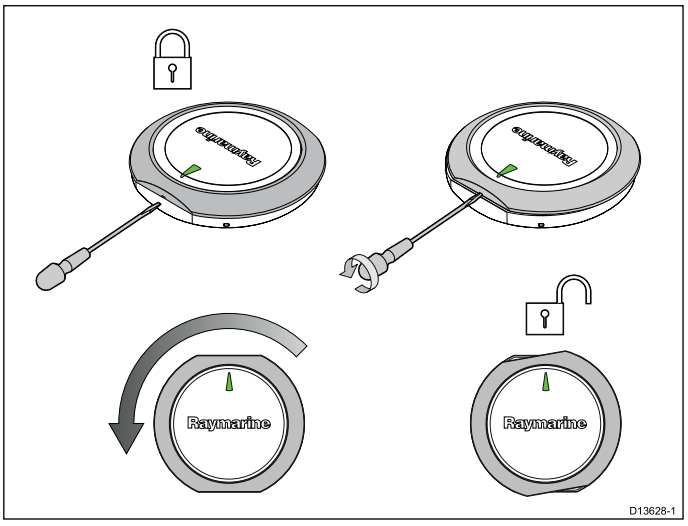
The unit must be mounted with the LED 'arrow' in parallel alignment with the longitudinal axis (centerline) of the vessel and be pointing towards the vessel's bow.

7. Place the Mounting trim over the unit slightly offset, and then twist the Mounting trim clockwise until it locks into position.



Releasing the unit from the adaptor

Follow the steps below to release the unit from the Mounting adaptor.



1. Insert the flat of a small flat blade screw driver, or similar tool into the release hole located on the flat edge of the mounting adaptor and twist the screw driver 90°, so that there is a small gap between the Mounting trim and Mounting tray.

Important: To help prevent scratching the product, cover the tip of your screw driver with a small piece of insulation tape.

2. Twist the Mounting trim counter-clockwise approximately 10° and then lift away from the unit.

Chapter 6: System checks and troubleshooting

Chapter contents

6.1 Post-installation checks

These checks should be carried out after installation, and prior to the commissioning of the autopilot system.

1. Switch on power to the autopilot system and associated equipment.
   - *ACU (for EV-1 systems only)*
   - *Autopilot controller*
   - *SeaTalkng® backbone (if this has its own power supply)*
2. Check that the autopilot controller powers up. If the display is blank press and hold the **Power** button for 2 seconds.
3. Check the display for error messages that could indicate a problem with the installation.

   For assistance with diagnosing faults:
   - *Refer to the troubleshooting information supplied with the product, or*
   - *contact Raymarine customer support*

6.2 Autopilot system setup

Important: Before using the autopilot system it is essential that it is properly commissioned in accordance with the setup instructions.

1. Perform an initial power-on test to ensure all components are working correctly.
2. Refer to the latest version of your compatible Autopilot Controller's user documentation for detailed instructions on how to commission your Evolution autopilot system.

6.3 Alarms

Alarms are raised by the autopilot system to alert you to mechanical and electrical conditions requiring your attention.

The Evolution components transmit alarm alerts on the SeaTalkng® network for display on autopilot controllers and MFDs, along with an audible alert. The Evolution components stop raising an alarm when the alarm condition ceases or the alarm is acknowledged on the autopilot controller or MFD. If the alarm is safety-critical it will be raised again after a timed delay.

Unless otherwise stated in the table below, you should respond to alarms by selecting **OK** or **Acknowledge** on your autopilot controller or MFD.

Alarm Message	Possible causes	Solution
OFF COURSE	Autopilot has deviated from planned course.	Check your vessel position and if necessary take manual control to steer the vessel back on course.
WIND SHIFT	Autopilot is unable to maintain navigation to the current wind angle.	
LOW BATTERY	Power supply voltage has dropped below acceptable limits. Caused by low battery voltage or voltage drop at the ACU unit (EV-1 systems only), due to poor connections or inadequate wiring.	Acknowledge the alarm and then start the engine to recharge the battery. If problem persists, check wiring connections and that the quality and gauge of wiring is adequate for the current draw of the drive unit.
LARGE XTE	Large cross-track error. The autopilot has deviated more than expected from a planned course.	Check your vessel position and if necessary take manual control to steer the vessel back on course.
CU DISCONNECTED	The autopilot control head has been disconnected.	• Check the physical cables and connections between the autopilot control head and the SeaTalkng® system. Also between the EV-1 / EV-2 and the SeaTalkng system. • If the autopilot control head is connected via a SeaTalk® to SeaTalkng® converter, check the converter is using the latest software version.
AUTO RELEASE	Possible fault with rudder reference unit. Alternatively, if your autopilot system includes a stern I/O drive, you have taken manual control of the steering while the pilot is in Auto mode.	• Check rudder reference unit connections. • For systems using the Volvo Penta EVC drive interface unit, check the unit is operating correctly.
WAYPOINT ADVANCE	The autopilot has steered the vessel to the current waypoint.	Acknowledge the turn to the next waypoint.
DRIVE STOPPED	• Motor / steering has not moved within 20 seconds of a course change command. • The autopilot is unable to turn the rudder (either because the weather load on the helm is too high, or if the rudder position sensor has passed beyond the preset rudder limits or rudder end-stops. • Autopilot resets due to an external event (such as use of the sleep switch, or faulty wiring causing the autopilot components to power cycle). • Autopilot resets due to software error.	• Check the rudder reference unit has been installed correctly to reflect the limits and end-stops of the vessel's rudder system. • For EV-1 systems, check ACU drive output voltage and drive and clutch voltage output (if applicable). • For EV-1 systems, check all connections to ACU. • Check all connections to drive unit. • Check that the drive unit operates and is not stalled. • Check steering system is secure.

Alarm Message	Possible causes	Solution
NO RUDDER REFERENCE	No rudder reference unit is detected, or the rudder reference unit has turned outside its operational range (50 degrees).	If a rudder reference unit is installed, check the wiring. Inspect the unit for possible damage.
STALL DETECTED	Motor speed dropped too low for given course change or motor stalling. This can be caused by a faulty drive unit or steering fault. Alternatively, the steering hard-over time may be too slow.	• Check that the drive unit operates and is not stalled. • Check the steering hard-over time.
CLUTCH OVERLOAD	The clutch for the drive system is demanding a greater power output than is supported by the clutch power output of the Evolution components.	Refer to the clutch power output ratings provided in the Installation instructions for the relevant Evolution components, and ensure the clutch for the drive unit does not exceed this power output.
CURRENT OVERLOAD	Serious drive failure; the drive is demanding too much electrical current due to short-circuit or jamming. Caused by a faulty drive unit or motor, or wiring short-circuit. Alternatively, a fault in the steering system may be causing the drive unit to lock-up.	Check the drive unit.
ROUTE COMPLETE	Your vessel has arrived at the end of the current route.	No action required.
NO DATA	• The autopilot is in Wind Vane mode and has not received wind angle data for 32 seconds. • The autopilot is in Track mode and is not receiving navigation data, or the rudder position sensor is receiving a low-strength signal. This will clear when the signal improves.	Check the connections to the wind transducer, multifunction display, and autopilot control head (as appropriate).
PILOT STARTUP	Autopilot components are initializing.	Some components may take a moment to startup.
NO WIND DATA	The autopilot is in Wind Vane mode and has not received wind angle data for 32 seconds.	Check the connections to the wind transducer.
NO SPEED DATA	The autopilot has not received speed (STW or SOG) data for 10 seconds, while in Auto mode.	Check the connections to the speed transducer. Pilot does not require speed data in order to operate. However, it does enhance the overall performance when in Auto mode.
NO COMPASS	The EV-1 or EV-2 is not receiving heading data.	• Check the connections to the EV-1 / EV-2. • Power cycle the EV-1 / EV-2, by removing and then reconnecting the SeaTalkng® cable.
RATEGYRO FAIL	The internal rate gyro on the EV-1 or EV-2 unit has developed a fault. This will be evident as a compass issue and could cause the compass heading to deviate or lock-up.	If the problem persists, contact your local Raymarine service center.
MOTOR POWER SWAPPED	On the Evolution ACU unit, the motor cables are connected to the power terminals, and vice versa.	Switch off the power to the unit and reconnect correctly.
NO GPS DATA	A source of GPS data is not connected to the SeaTalkng® system.	Check connections to the GPS data source.

Alarm Message	Possible causes	Solution
JOYSTICK FAULT	A fault has occurred with the joystick. This alarm applies only to autopilot systems that include a joystick controller.	Check the connections to, and operation of the joystick.
NO IPS (NO DRIVE DETECTED)	Loss of communications between the EV-1 and ACU, or EV-2 and drive interface unit.	Check all physical data connections between these devices, as appropriate.
PILOT RESET NORMAL (UNEXPECTED HARDWARE RESET)	• Autopilot resets due to an external event (such as use of the sleep switch, or faulty wiring causing the autopilot components to power cycle).	Check all system wiring, especially power-related wiring.
PILOT RESET EXCEPTION (UNEXPECTED SOFTWARE RESET)	The EV-1 / EV-2 software has detected a fault it cannot recover from, and has reset the pilot.	Wait approximately 1 minute for the EV-1 / EV-2 to reset and re-initialize.

6.4 LED indications — EV-2

LED color	LED code		Status	Action required
		Solid green	Normal operation.	• None (normal power up takes <1 minute.)
		Long flash green on (x1), long flash off. Cycle repeats after 2 seconds.	Unit is initializing; no pilot or compass functions currently available.	• None (normal power up takes <1 minute.)
		Long flash green on (x2), long flash off. Cycle repeats after 8 seconds.	No DeviceNet connection.	• Ensure network is powered. • Ensure network cable and connections are secure and free from damage. • If problem persists contact Raymarine technical support.
		Short flash green on (x7), long flash off. Cycle repeats after 9 seconds.	DeviceNet connected but not receiving data.	• If problem persists contact Raymarine technical support.
		Short flash red on (x2), long flash off. Cycle repeats after 4 seconds.	No SeaTalk^{ng} connection.	• Ensure network is powered. • Ensure network cable and connections are secure and free from damage. • If problem persists contact Raymarine technical support.
		Short flash red on (x7), long flash off. Cycle repeats after 9 seconds.	SeaTalk^{ng} connected but not receiving data.	• If problem persists contact Raymarine technical support.

Chapter 7: Maintenance

Chapter contents

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.

7.2 Routine equipment checks

Raymarine strongly recommends that you complete a number of routine checks to ensure the correct and reliable operation of your equipment.

Complete the following checks on a regular basis:

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

7.3 Product cleaning

Best cleaning practices.

When cleaning products:

- Lightly rinse or flush with clean, cool fresh water.
- If your product has a display screen, do NOT wipe the screen with a dry cloth, as this could scratch the screen coating.
- Do NOT use: abrasive, acidic, ammonia, solvent of chemical based cleaning products.
- Do NOT use a jet wash.

Chapter 8: Technical support

Chapter contents

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 the menus within your product.

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.

Region	Tele-phone	E-mail
United Kingdom (UK), EMEA, and Asia Pacific	+44 (0)1329 246 932	emea.service@raymarine.com
United States (US)	+1 (603) 324 7900	rm-usrepair@flir.com

Web support

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

- **Manuals and Documents** — http://www.raymarine.com/manuals
- **FAQ / Knowledgebase** — http://www.raymarine.com/knowledgebase
- **Technical support forum** — http://forum.raymarine.com
- **Software updates** — http://www.raymarine.com/software

Telephone and e-mail support

Region	Tele-phone	E-mail
United Kingdom (UK), EMEA, and Asia Pacific	+44 (0)1329 246 777	support.uk@raymarine.com
United States (US)	+1 (603) 324 7900 (Toll-free: +800 539 5539)	support@raymarine.com
Australia and New Zealand	+61 2 8977 0300	aus.support@raymarine.com (Raymarine subsidiary)
France	+33 (0)1 46 49 72 30	support.fr@raymarine.com (Raymarine subsidiary)
Germany	+49 (0)40 237 808 0	support.de@raymarine.com (Raymarine subsidiary)
Italy	+39 02 9945 1001	support.it@raymarine.com (Raymarine subsidiary)
Spain	+34 96 2965 102	sat@azimut.es (Authorized Raymarine distributor)
Netherlands	+31 (0)26 3614 905	support.nl@raymarine.com (Raymarine subsidiary)
Sweden	+46 (0)317 633 670	support.se@raymarine.com (Raymarine subsidiary)
Finland	+358 (0)207 619 937	support.fi@raymarine.com (Raymarine subsidiary)
Norway	+47 692 64 600	support.no@raymarine.com (Raymarine subsidiary)
Denmark	+45 437 164 64	support.dk@raymarine.com (Raymarine subsidiary)
Russia	+7 495 788 0508	info@mikstmarine.ru (Authorized Raymarine distributor)

Viewing product information

With your MFD Homescreen displayed:

1. Select **Set-up**.
2. Select **Maintenance**.
3. Select **Diagnostics**.
4. Select **Select Device**.
5. Select the relevant product from the list.

The Diagnostics page is displayed.

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: • http://www.youtube.com/user/RaymarineInc
	Video Gallery: • http://www.raymarine.co.uk/view/?id=2679
	Product Support videos: • http://www.raymarine.co.uk/view/?id=4952

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

FAQs and Knowledge Base

Raymarine has produced an extensive set of FAQs and a Knowledge Base to help you find more information and troubleshoot any issues.

- http://www.raymarine.co.uk/knowledgebase/

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 Technical specification — EV-1 and EV-2

Nominal supply voltage	12 V (powered by SeaTalkng® system).
Operating voltage range	10.8 V to 15.6 V dc.
Power consumption (taken from SeaTalkng® system)	30 mA.
SeaTalkng® LEN (Load Equivalency Number)	1
Sensors	• 3-axis digital accelerometer. • 3-axis digital compass. • 3-axis gyro digital angular rate sensor.
Data Connections	• SeaTalkng®. • NMEA 2000 DeviceNet (EV-2 only; port not used on EV-1 unit).
Environmental	**Installation environment** • Operating temperature: -20 ºC to +55 ºC (-4 ºF to +131 ºF). • Storage temperature: -30 ºC to +70 ºC (-22°F to +158°F). • Relative humidity: max 93%. • Waterproof rating: IPX 6.
Dimensions	• Diameter: 140 mm (5.5 in). • Depth (including mounting enclosure): 35 mm (1.4 in). • Depth (including wall bracket): 95 mm (3.8 in).
Weight	0.29 kg (0.64 lbs)
EMC compliance	• Europe: 2004/108/EC. • Australia and New Zealand: C-Tick, Compliance Level 2.

Chapter 10: Spares and accessories

Chapter contents

10.1 Spare parts

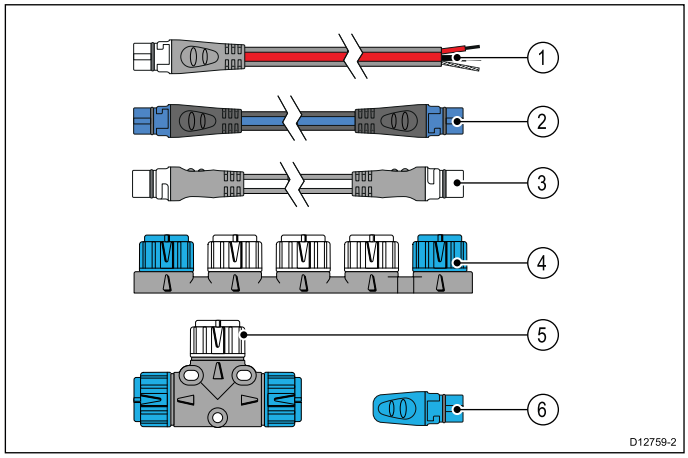
Item	Part number	Notes
SeaTalkng cable kit	R70160	Consists of: • SeaTalkng power cable 0.4 m (1.3 ft) (quantity: 1). • SeaTalkng backbone cable 5 m (16.4 ft) (quantity: 1). • SeaTalkng spur cable 0.4 m (1.3 ft) (quantity: 1). • SeaTalkng 5–way connector block (quantity: 1). • SeaTalkng T-piece connector (quantity: 2). • SeaTalkng terminator (quantity: 2).
DeviceNet cable kit	R70192	Consists of: • DeviceNet adaptor cable (female) (quantity: 2). • SeaTalkng power cable (quantity: 1). • SeaTalkng terminator (quantity: 2).
Sealing ring pack	R70161	
EV-1 / EV-2 wall bracket	R70162	
Deck mounting kit	A80437	Consists of: • Mounting adaptor (clamshell) • Riser • Wall bracket • Sealing rings • Fixings

10.2 Evolution SeaTalkng cable kit

A SeaTalkng cable kit is available for Evolution components.

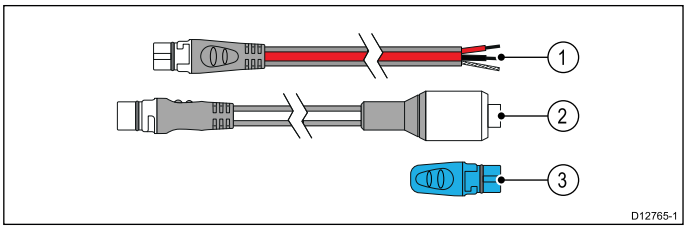
This cable kit provides the cables required to make all the SeaTalkng connections for some typical Evolution systems. The kit is supplied with certain Evolution systems. The kit is also available as an optional accessory, part number **R70160**. If you require additional SeaTalkng cables or accessories to complete your installation, refer to 10.4 **SeaTalkng® cables and accessories** for a list of part numbers.

Cable kit contents



Item	Description	Quantity	Length
1	SeaTalkng power cable.	1	0.4 m (1.3 ft)
2	SeaTalkng backbone cable	1	5 m (16.4 ft)
3	SeaTalkng spur cable.	1	0.4 m (1.3 ft)
4	SeaTalkng 5-way connector block.	1	—
5	SeaTalkng T-piece.	2	—
6	SeaTalkng terminator.	2	—

10.3 Parts supplied — DeviceNet cable kit



Item	Description	Quantity
1	SeaTalkng power cable 0.4 m (1.3 ft).	1
2	DeviceNet / SeaTalkng adaptor cable (Female).	2
3	SeaTalkng terminator.	2

10.4 SeaTalkng® cables and accessories

SeaTalkng cables and accessories for use with compatible products.

Description	Part No	Notes
SeaTalkng starter kit	T70134	Includes: • 1 x 5 Way connector (A06064) • 2 x Backbone terminator (A06031) • 1 x 3 m (9.8ft) spur cable (A06040) • 1 x Power cable (A06049)
SeaTalkng Backbone Kit	A25062	Includes: • 2 x 5m (16.4ft) Backbone cable (A06036) • 1 x 20m (65.6ft) Backbone cable (A06037) • 4 x T-piece (A06028) • 2 x Backbone terminator (A06031) • 1 x Power cable (A06049)
SeaTalkng 0.4m (1.3ft) spur	A06038	
SeaTalkng 1 m (3.3ft) spur	A06039	
SeaTalkng 3 m (9.8ft) spur	A06040	
SeaTalkng 5 m (16.4ft) spur	A06041	
SeaTalkng 0.4 m (1.3 ft) elbow spur	A06042	
SeaTalkng 0.4m (1.3ft) backbone	A06033	
SeaTalkng 1 m (3.3ft) backbone	A06034	
SeaTalkng 3 m (9.8ft) backbone	A06035	
SeaTalkng 5 m (16.4ft) backbone	A06036	
SeaTalkng 9 m (29.5ft) backbone	A06068	
SeaTalkng 20 m (65.6ft) backbone	A06037	
SeaTalkng to bare ends 1 m (3.3ft) spur	A06043	

Description	Part No	Notes
SeaTalkng to bare ends 3 m (9.8ft) spur	A06044	
SeaTalkng Power cable	A06049	
SeaTalkng Terminator	A06031	
SeaTalkng T-piece	A06028	Provides 1 x spur connection
SeaTalkng 5–way connector	A06064	Provides 3 x spur connections
SeaTalkng backbone extender	A06030	
SeaTalk to SeaTalkng converter kit	E22158	Allows the connection of SeaTalk devices to a SeaTalkng system.
SeaTalkng Inline terminator	A80001	Provides direct connection of a spur cable to the end of a backbone cable. No T-piece required.
SeaTalkng Blanking plug	A06032	
ACU / SPX SeaTalkng spur cable 0.3 m (1.0 ft)	R12112	Connects an SPX course computer or an ACU to a SeaTalkng backbone.
SeaTalk (3 pin) to SeaTalkng adaptor cable 0.4m (1.3ft)	A06047	
SeaTalk to SeaTalkng spur 1 m (3.3ft) spur	A22164	
SeaTalk2 (5 pin) to SeaTalkng adaptor cable 0.4m (1.3ft)	A06048	
DeviceNet adaptor cable (Female)	A06045	Allows the connection of NMEA 2000 devices to a SeaTalkng system.
DeviceNet adaptor cable (Male)	A06046	Allows the connection of NMEA 2000 devices to a SeaTalkng system.
DeviceNet adaptor cable (Female) to bare ends.	E05026	Allows the connection of NMEA 2000 devices to a SeaTalkng system.
DeviceNet adaptor cable (Male) to bare ends.	E05027	Allows the connection of NMEA 2000 devices to a SeaTalkng system.

Appendix A NMEA 2000 sentences (PGNs) — EV-1 and EV-2

EV-1 and EV-2 support the following NMEA 2000 sentences.

Message number	Message description	Transmit	Receive
59392	ISO Acknowledgment	●	
59904	ISO Request	●	●
60928	ISO Address Claim	●	●
65240	ISO Commanded address		●
126208	NMEA - Request group function	●	●
126208	NMEA - Command group function	●	●
126208	NMEA - Acknowledge group function	●	●
126464	PGN List	●	●
126996	Product information: • NMEA 2000 Database Version • NMEA Manufacturer's Product Code • NMEA Manufacturer's Model ID • Manufacturer's Software Version Code • Manufacturer's Model Version • Manufacturer's Model Serial Code • NMEA 2000 Certification Level • Load Equivalency	●	
127245	Rudder angle	●	●
127250	Vessel heading	●	●
127258	Magnetic Variation		●
128259	Speed Through Water (STW) (Referenced)		●
129026	Course Over Ground (COG) and Speed Over Ground (SOG) rapid update		●
129029	GNSS position data: • Date • Time • Lattitude • Longitude		●
129283	Cross track error		●
129284	Navigation data (for following routes): • Active Leg Distance To Waypoint (DTW) • Course / Bearing reference • Perpendicular Crossed • Arrival Circle Entered • Calculation Type • Estimated Time of Arrival (ETA) • Estimated Date of Arrival • Active Leg Bearing Origin to Destination (BOD) • Active Leg Bearing To Waypoint (BTW)		●

Message number	Message description	Transmit	Receive
	• Active Leg Origin Waypoint ID • Active Waypoint ID • Destination Waypoint Latitude • Destination Waypoint Longitude • Waypoint closing velocity		
129285	Active Waypoint data		●
130306	Wind data		●

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Owner notes:

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