iTC-5

Installation instructions

ENGLISH
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Raymarine®

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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.

Contents

Chapter 1: Important information

Safety notices

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: Exposed wires

With the cover open the exposed transducer wires provide a potential for electric shock.

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 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.

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: 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.

Declaration of conformity

Raymarine 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.

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.

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

• Raymarine equipment and cables connected to it are:

– At least 1 m (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 7 ft (2 m).

– More than 2 m (7 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

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. Whilst the WEEE Directive does not apply to some Raymarine products, we support its policy and ask you to be aware of how to dispose of this product.

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.

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.
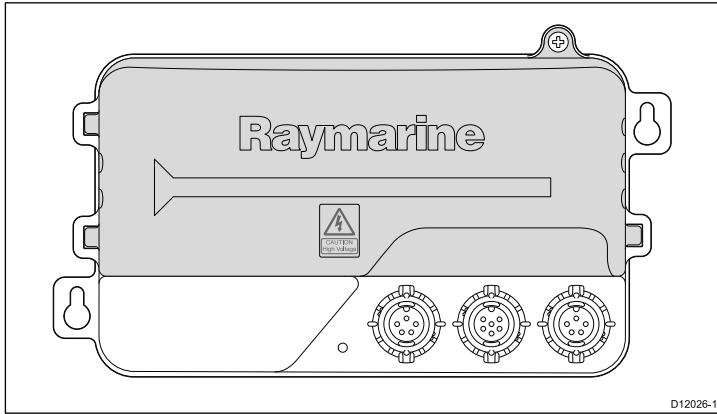
Chapter 2: Planning the installation

Chapter contents

2.1 About the iTC-5 Converter

The iTC-5 converter allows connection of a range of compatible analogue transducers directly to the SeaTalk^ng network.

D12026-1

Supported transducers and data types

The following transducer types are supported by the converter:

- Instrument depth
- Instrument speed and sea temperature
- Raymarine Wind or rotavecta
- Rudder reference
- Fluxgate compass

Note: If there is a fishfinder in the system ensure that it does not operate at the same frequency as the instrument depth transducer.

Supported data types are as follows:

- AWA — Apparent wind angle
- AWS — Apparent wind speed
- Depth
- STW — Speed through water
- Log distance
- Trip distance
- Sea temperature
- Rudder angle
- Vessel Heading

2.2 Handbook information

This handbook describes how to include the iTC-5 converter within a SeaTalk^{ng} network, and connect compatible transducers.

iTC-5 handbooks

Description	Part number
Instrument transducer converter iTC-5 Installation instructions	87138

Additional handbooks

You may also need the additional information included in the SeaTalk^{ng} reference manual. In particular for assistance with:

• constructing the SeaTalk^{ng} network and backbone,

• connecting power, and

• LEN loading calculations.

Description	Part number
SeaTalk^{ng} reference manual	81300

2.3 System examples

The iTC-5 converter can be connected into a SeaTalk^{ng} network, compatible transducers can then be connected directly to the converter.

Basic SeaTalk^{ng} system example

D12033-1
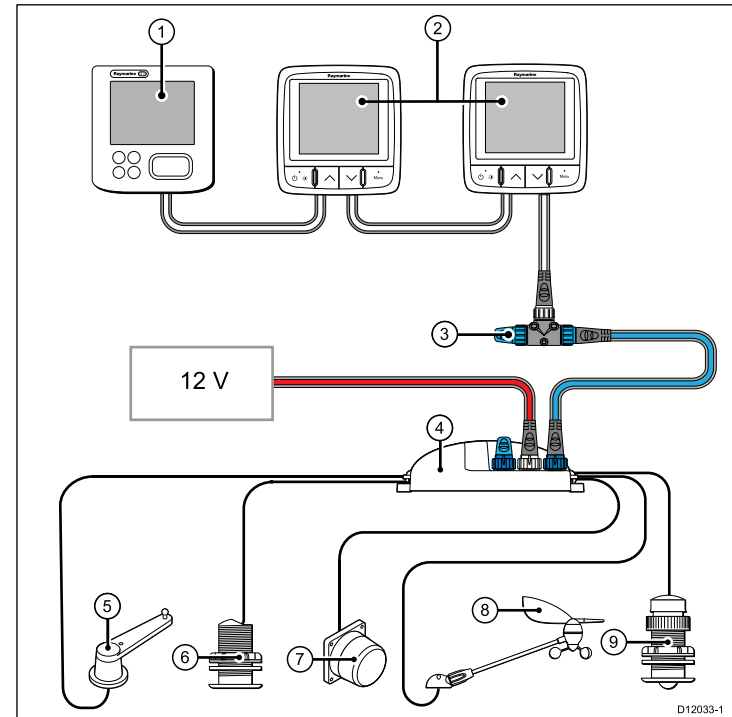
Item	Description
1.	ST70 Instrument display.
2.	2 x i70 Instrument displays.
3.	Terminated SeaTalk^{ng} T-piece connector
4.	Terminated iTC-5
5.	Rudder reference transducer
6.	Depth transducer
7.	Fluxgate compass
8.	Raymarine wind transducer or rotavecta
9.	Speed and sea temperature transducer

Extended SeaTalk^{ng} system example

SeaTalk

SeaTalk^{ng}

12 V
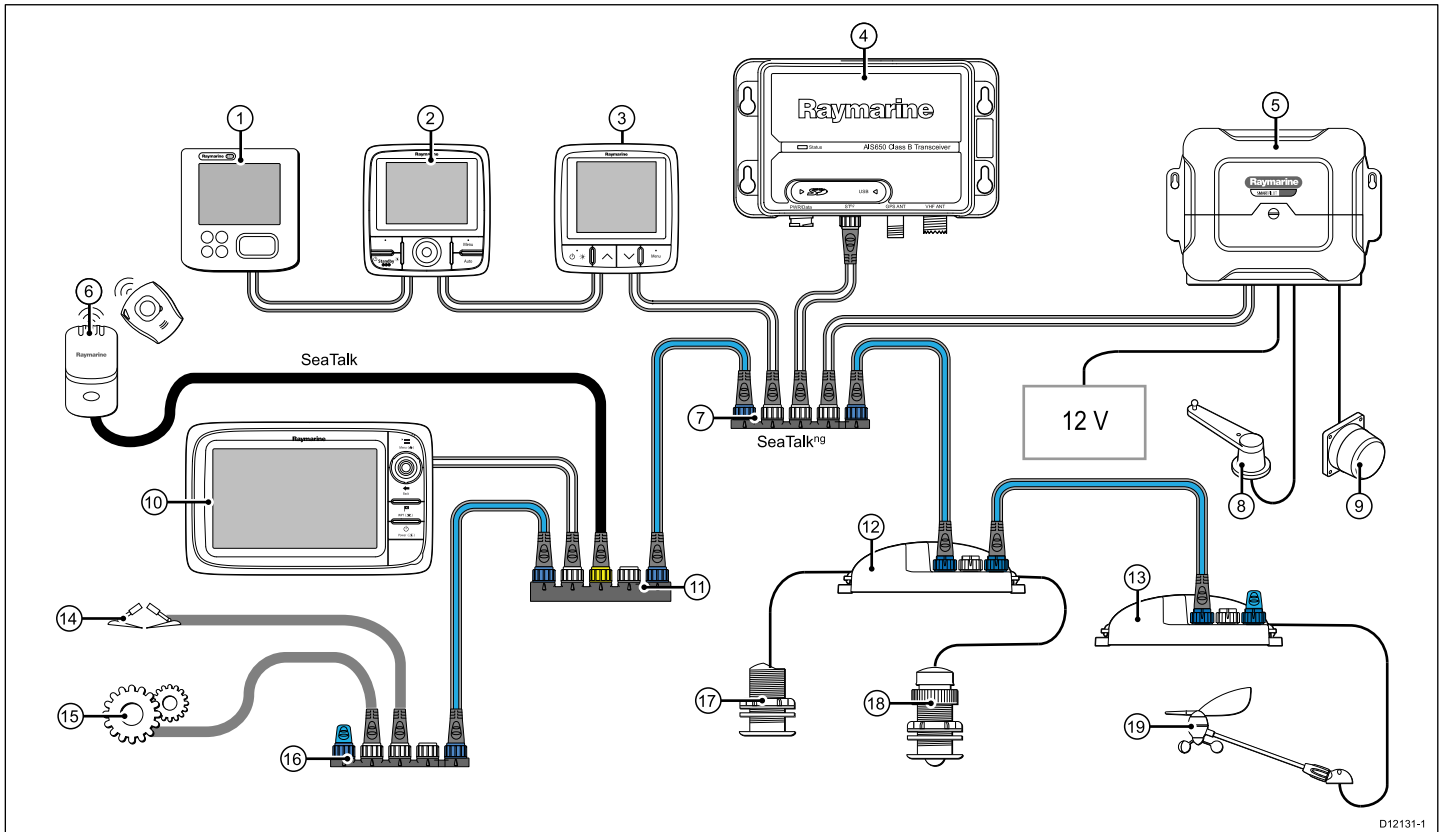
D12131-1

Item	Description
1.	ST70 Instrument display
2.	p70r Pilot Controller
3.	i70 Instrument display
4.	AIS transceiver
5.	SPX course computer (supplying 12 V power to SeaTalkng network.)
6.	Man over board (MOB)
7.	SeaTalkng 5–way connector
8.	Rudder reference transducer (connected via SPX)
9.	Fluxgate compass (connected via SPX)
10.	Multi-Function display with built in GPS
11.	SeaTalk to SeaTalkng converter
12.	iTC-5
13.	Terminated iTC-5
14.	Trim tabs
15.	Engine data (connected via devicenet adaptor)
16.	Terminated SeaTalkng 5–way connector
17.	Depth transducer
18.	Speed and sea temperature transducer
19.	Raymarine wind transducer or rotavecta

Note: In a SPX autopilot system the fluxgate compass and rudder reference transducer must be connected directly to the course computer and not via the iTC-5.
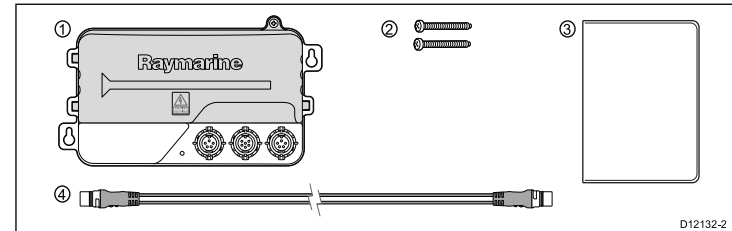
Seatalkng

SeaTalkng (Next Generation) is an enhanced protocol for connection of compatible marine instruments and equipment. It replaces the older SeaTalk and SeaTalk^2 protocols.

SeaTalkng utilizes a single backbone to which compatible instruments 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 / SeaTalk^2 devices can also be connected using the appropriate interfaces or adaptor cables as required.

2.4 Pack contents

The iTC-5 converter pack comes with the following items:

D12132-2

Item	Description
1.	iTC-5
2.	Fixing screws x 2
3.	Document pack includes: • Installation instructions • Warranty registration card • Multilingual CD
4.	400mm SeaTalkng spur cable (A06038)

2.5 Tools required

Tools required for installation

D12087-1
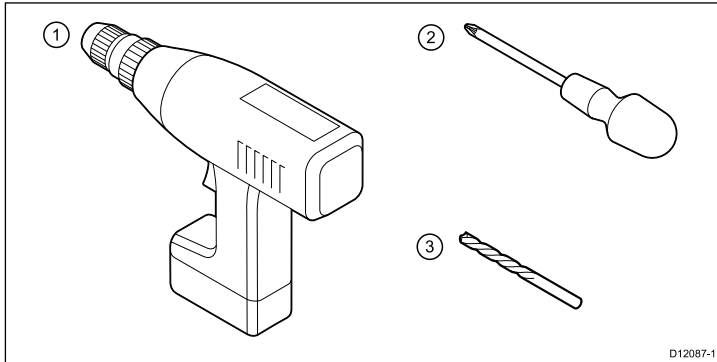
Item	Description
1.	Power Drill
2.	Pozidrive screwdriver
3.	3.2 mm (1/8") drill bit

Chapter 3: Cables and connections

Chapter contents

3.1 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).
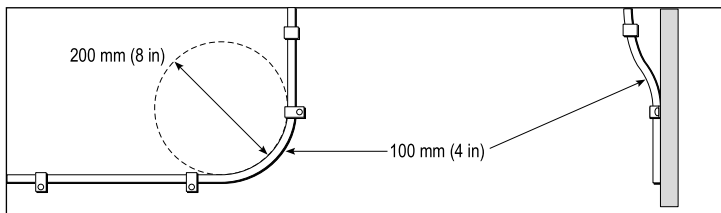
* Protect all cables from physical damage and exposure to heat. Use trunking or conduit where possible. Do NOT run cables through bilges or doorways, or close to moving or hot objects.

* 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.

Circuit isolation

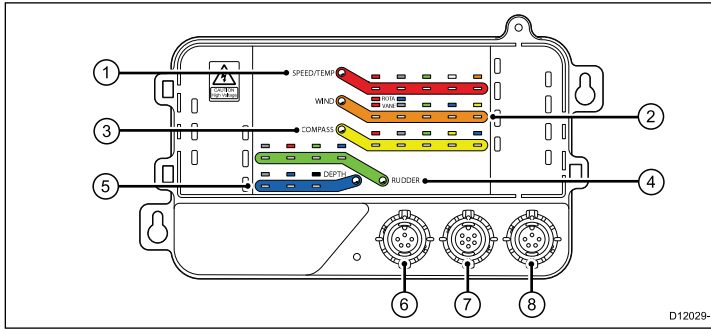Appropriate circuit isolation is required for installations using both AC and DC current:

* Always use isolating transformers or a separate power-inverter to run PC's, processors, displays and other sensitive electronic instruments or devices.

* Always use an isolating transformer with Weather FAX audio cables.

* Always use an isolated power supply when using a 3rd party audio amplifier.

* Always use an RS232/NMEA converter with optical isolation on the signal lines.

* Always make sure that PC's or other sensitive electronic devices have a dedicated power circuit.

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).

3.2 Converter connections

The converter connects in line as part of the SeaTalk^{ng} backbone. It provides connections to enable transducers to be installed onto the SeaTalk^{ng} network.

Item	Description
1.	Red — Speed and sea temperature transducer connection
2.	Orange — Wind transducer and rotavecta connection
3.	Yellow — Fluxgate compass connection
4.	Green — Rudder reference transducer connection
5.	Blue — Depth transducer connection
6.	SeaTalk^{ng} backbone connection
7.	SeaTalk^{ng} spur connection
8.	SeaTalk^{ng} backbone connection

SeaTalk^{ng} connections

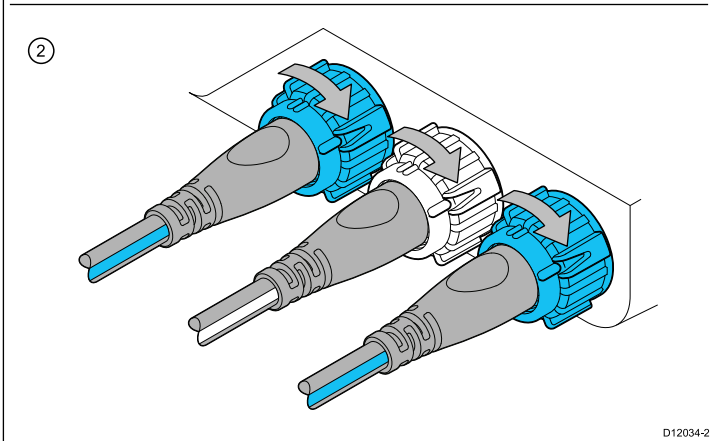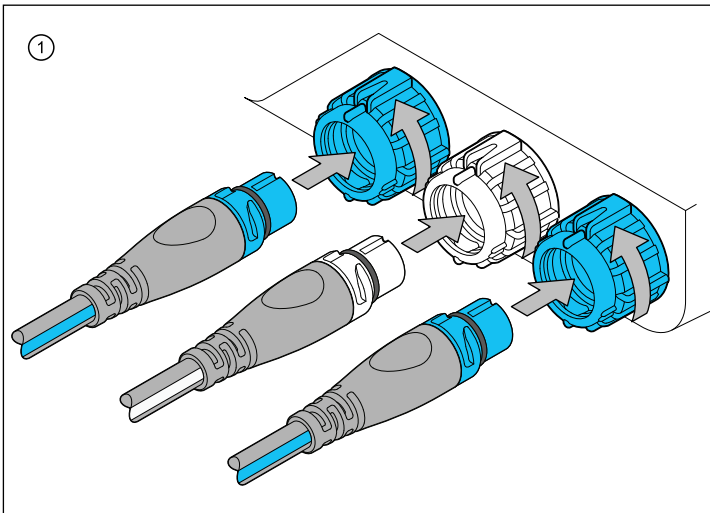The iTC-5 converter has 2 x backbone connectors and 1 x spur connector.

SeaTalk^{ng} backbone connectors

The backbone connectors enable the converter to be connected in line as part of the SeaTalk^{ng} backbone.

SeaTalk^{ng} spur connector

The spur connector enables connection of another SeaTalk^{ng} device, or connection to a suitable 12 V dc power supply.

D12034-2

Connecting SeaTalk^{ng} cables

1. Rotate the locking collar on the back of the unit to the UNLOCKED position.
2. Ensure the spur cable end connector is correctly oriented.
3. Fully insert the cable connector.
4. Rotate locking collar clockwise (2 clicks) until it snaps into the LOCKED position.

Transducer connections

The iTC-5 allows connection of 5 transducers onto your SeaTalk^{ng} network.
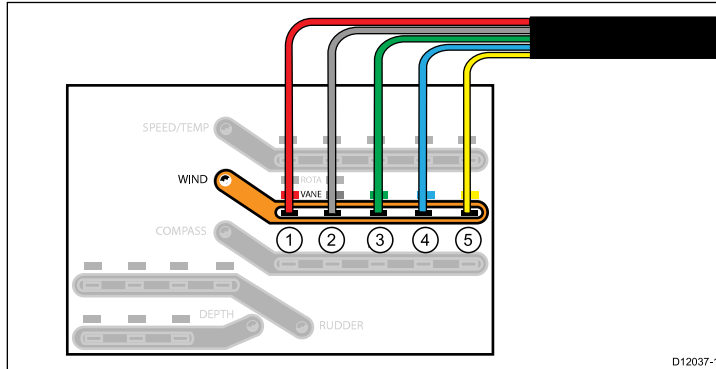
Speed and sea temperature transducer connections
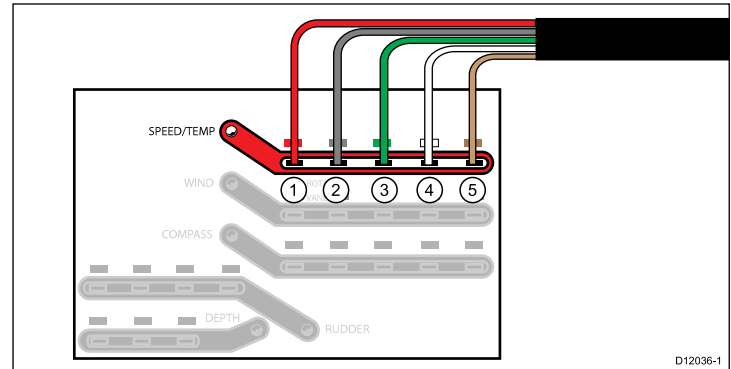
D12036-1

Item	Cable color	Signal name
1.	Red	Speed V+
2.	Screen	Speed 0V (shield)
3.	Green	Speed (signal)

Item	Cable color	Signal name
4.	White	Temperature (signal)
5.	Brown	Temperature 0V

Wind connections

D12037-1

Item	Cable color	Signal name
1.	Red	Wind V+
2.	Screen	Wind 0V (shield)
3.	Green	Sine wind direction
4.	Blue	Cosine wind direction
5.	Yellow	Anemometer (signal)

Rotavecta connections

D12038-1
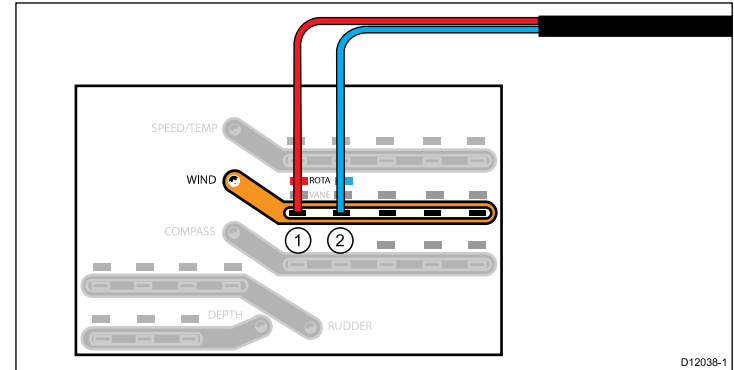
Item	Cable color	Signal name
1.	Red	Rotor +
2.	Blue	Rotor −

Fluxgate compass connections

D12039-1
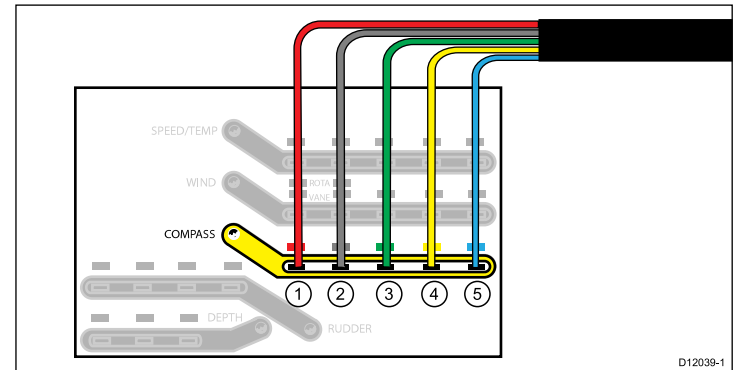
Item	Cable color	Signal name
1.	Red	V ref
2.	Screen	0V (shield)
3.	Green	Sense B
4.	Yellow	Sense A
5.	Blue	Drive

Rudder reference connections

D12040-1
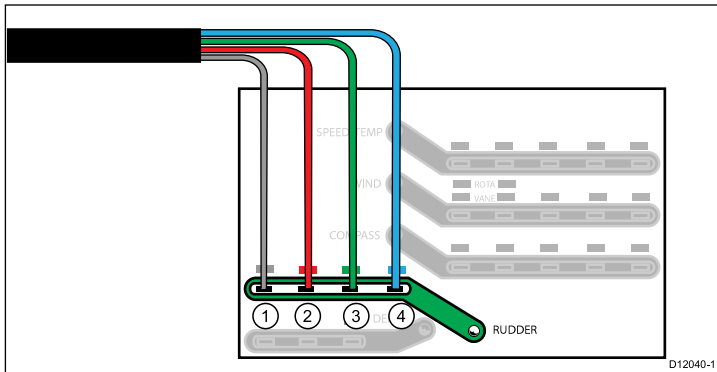
Item	Cable color	Signal name
1.	Screen	0V (shield)
2.	Red	V+
3.	Green	0V
4.	Blue	Rudder (signal)

Depth transducer connections

D12035-1
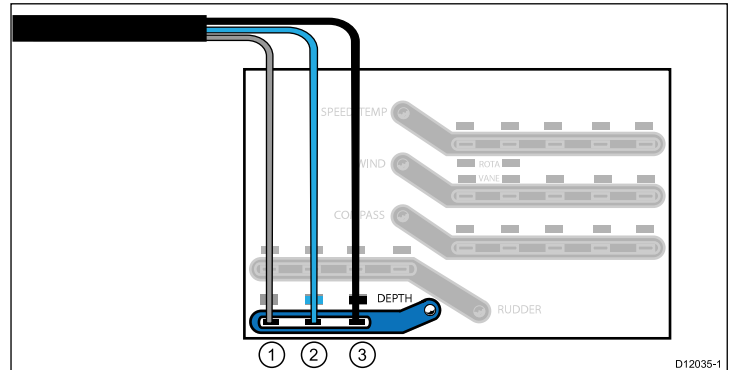
Item	Cable color	Signal name
1.	Screen	0V (shield)
2.	Blue	Piezoceramic +
3.	Black	Piezoceramic –

⚠️ **Warning: iTC-5 High voltage**

Do not touch exposed transducer wires whilst the converter is powered on and the cover is open.

Making transducer connections

1. Ensure power supply is switched off.
2. Crimp / solder 1/8th (4mm) female spade terminals to the end of each wire on the transducer cable, ensuring no exposed wire.
3. Unscrew the cover retention screw.
4. Open the cover
5. Connect spade terminals as shown in **Transducers connections** section.

6. Ensure spade terminals are fully pushed home and that terminals do not touch.
7. Secure cables into their runs.
8. Close the cover and retighten the cover retention screw.
9. Switch on the power supply.

Transducer cable lengths

The table below shows the cable lengths supplied with transducers.

Transducer	Cable length
Speed and sea temperature	14 m
Wind	30 m / 50 m
Rotavecta	20 m
Fluxgate compass	9.1 m
Rudder reference	9.1 m
Depth	9 m / 14 m / 20 m

Note: Do not extend transducer cable lengths.

Chapter 4: Location and mounting

Chapter contents

4.1 Unit dimensions

iTC-5 Dimensions
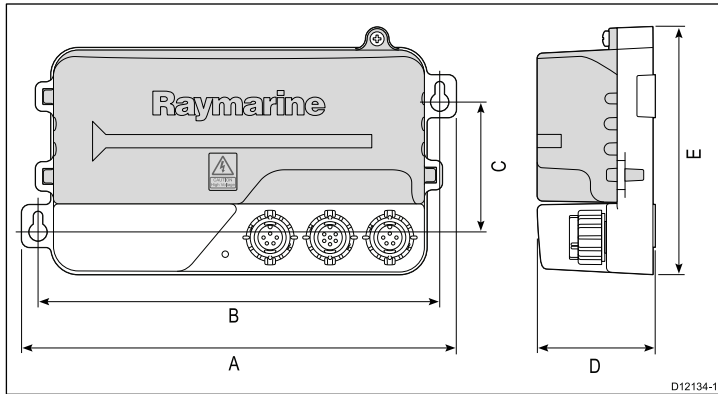
Item	Dimension
A	163.5 mm (6.44 in)
B	151.1 mm (5.95 in)
C	48.85 mm (1.92 in)
D	44.3 mm (1.74 in)
E	93.1 mm (3.66 in)

4.2 Mounting

The converter is designed to be surface mounted.

Before mounting the converter ensure that you have:

• Selected a suitable location where the converter is:

  – Reasonably well protected from physical damage.

  – maintained in a dry condition, where there is no likelihood of the converter being splashed.

  – At least 230 mm (9 in) from the compass.

  – At least 500 mm (20 in) from radio equipment.

• Identified the cable connection and route that the cable will take.

Note: The unit must be mounted vertically with the connectors facing outwards.

D12041-1

1. Ensure power supply is switched off.
2. Check the selected location for the unit, a clear, flat area is required, which is safe to have screws fitted to.
3. Offer up the converter against the selected location and mark the surface through the mounting holes on the converter.
4. Drill 2 holes as marked out above.
5. Secure the screws to the mounting surface, ensuring sufficient thread remains to allow the converter to be mounted.
6. Mount the converter and slide down to secure in the mounting holes.
7. Tighten the screws to lock the converter into position.
8. Remove converter cover.
9. Connect required transducer and SeaTalk^{ng} cables.

10. Replace converter cover, ensuring that the transducer cables are placed into the relevant cable guides as shown below
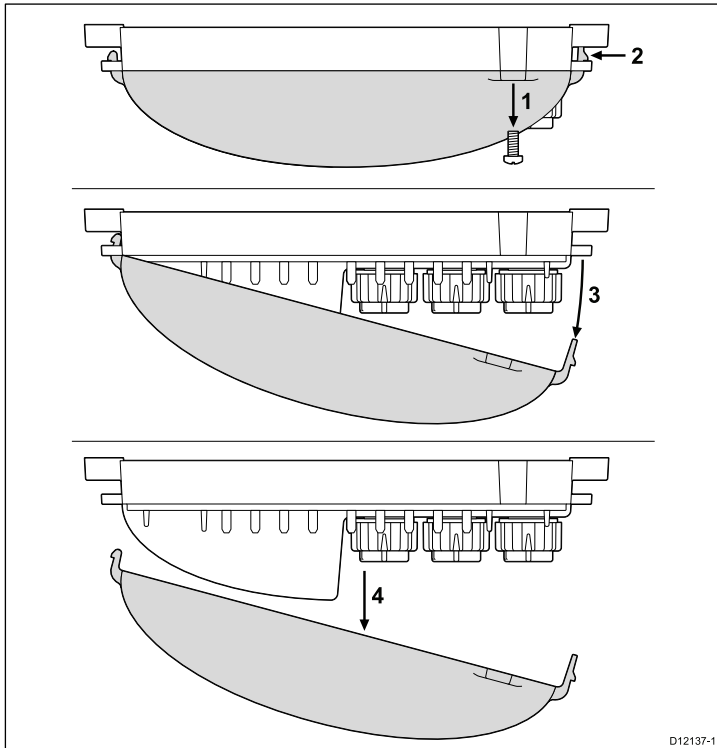11. Switch on power supply and check system.

Transducer cable guides

D12308-1
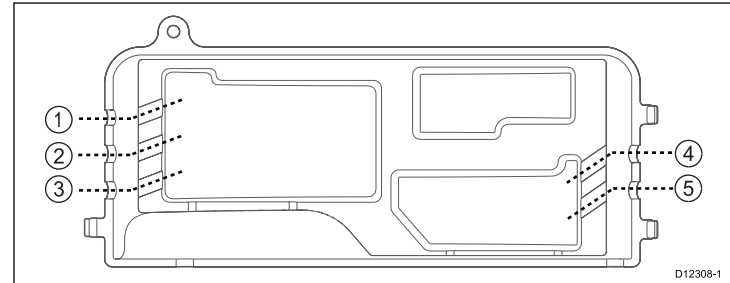
Item	Description
1	Speed and sea temperature transducer cable guide.
2	Wind transducer / Rotavecta cable guide.
3	Fluxgate compass cable guide.
4	Rudder reference transducer cable guide.
5	Depth transducer cable guide.

4.3 Removing the front cover

D12137-1

1. Unscrew the front cover retaining screw.
2. Push in the cover clip located on the right hand side.
3. Pull the right hand side of the cover away from the unit slightly.
4. Pull the left hand side of the cover away from the unit.
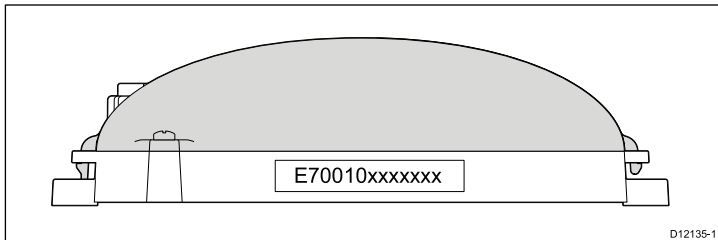
Cover replacement is a reversal of cover removal.

Chapter 5: System checks and troubleshooting

Chapter contents

5.1 Serial number location

Each converter bears a unique serial number, the serial number label can be found on the top side of the converter.

The serial number is required for calibration purposes and so must be retained. Spare serial number labels are provided in the box which can be placed at the users discretion.

5.2 Typical system checks

After connection of the converter it is advisable to perform checks on the converter and connected transducers.

Typical checks should include:

• **Check converter's LED status**. If functioning correctly the converters status LED should be on.

• **Check transducers calibration settings**. Wind, speed and sea temperature, depth etc. Ensure that instrument data is accurate and is available at all appropriate displays and instruments.

• **Check transducer LED status**. If transducers are not functioning correctly remove the converters front cover to access the transducers LED status indicator.

• **Autopilot check**. Check that the autopilot operates as expected and that heading and rudder information is available at all appropriate displays and instruments.

> **Note:** On autopilot systems the rudder reference and fluxgate compass should be connected directly to the course computer.

All checks should be performed in a safe and familiar environment and in accordance with the instructions supplied with each product.

5.3 iTC-5 LED Status indicators

The LED status indicators show the status of the connected transducers and the SeaTalk^{ng} network.

The converter has 6 LED status indicators:

D12133-1
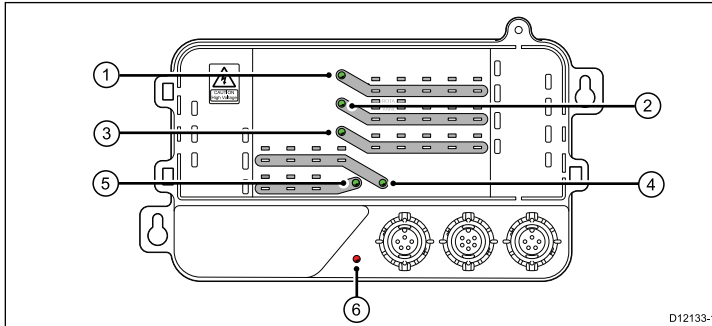
Item	LED Indicator
1.	Speed and sea temperature transducer
2.	Wind transducer or rotavecta
3.	Fluxgate compass
4.	Rudder reference transducer
5.	Depth transducer
6.	SeaTalk^{ng}

Warning: iTC-5 High voltage

Do not touch exposed transducer wires whilst the converter is powered on and the cover is open.

iTC-5 converter LED indications

The sequence of the LED provides the user with an indication of the status of connected transducers and the connection to the SeaTalkng network.
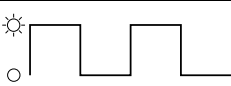
LED indicator	LED on	Slow continuous pulse	Rapid continuous pulse	Short intermittent pulse	LED off
SeaTalkng	Healthy	Software download	Low bus voltage	No communications / fault	No SeaTalkng power
Speed and sea temperature	Connected	Vessel speed pulse time-out	Lost valid signal (temperature)	Not connected	
Windvane & anemometer	Connected	Wind speed pulse time-out	Lost valid signal (windvane)	Not connected	
Rotavecta	Connected			Not connected	
Compass	Connected		Lost valid signal	Not connected	
Rudder	Connected		Lost valid signal	Not connected	
Depth	Connected	Searching for lock		Not connected	

Viewing the LED status indicators

The SeaTalkng LED status indicator is located on the front of the converter to the left of the SeaTalkng connectors. In order to view the transducer LED status indicators you need to open the top cover of the converter whilst the power is switched on.

1. Remove the front cover following the steps provided in the **Removing the front cover** section.

5.4 System data troubleshooting

Aspects of the installation can cause problems with the data shared between connected equipment. Such problems, their possible causes and solutions are described here.

Problem	Possible causes	Possible solutions
Instrument, engine or other system data is unavailable at all displays.	Data is not being received at the display.	Check the data bus (e.g. SeaTalk^{ng}) wiring and connections.
		Check the overall integrity of the data bus (e.g. SeaTalk^{ng}) wiring.
		If available refer to the reference guide for the data bus. (e.g. SeaTalk^{ng} reference manual)
	Data source (e.g ST70 instrument or engine interface) is not operating.	Check the source of the missing data (e.g. ST70 instrument or engine interface).
		Check the power to the SeaTalk bus.
		Refer to the manufacturer's handbook for the equipment in question.
	Software mismatch between equipment may prevent communication.	Contact Raymarine technical support.
Instrument or other system data is missing from some but not all displays.	Network problem	Check that all required equipment is connected to the network..
		Check the status of the Raymarine network Switch.
		Check that SeaTalk^{hs}/ RayNet cables are free from damage.
	Software mismatch between equipment may prevent communication.	Contact Raymarine technical support

5.5 Raymarine customer support

Raymarine provides a comprehensive customer support service. You can contact customer support through the Raymarine website, telephone and email. If you are unable to resolve a problem, please use any of these facilities to obtain additional help.

Web support

Please visit the customer support area of our website at:

www.raymarine.com

This contains Frequently Asked Questions, servicing information, e-mail access to the Raymarine Technical Support Department and details of worldwide Raymarine agents.

Telephone and email support

In the USA:

- **Tel:** +1 603 324 7900
- **Toll Free:** +1 800 539 5539
- **Email:** Raymarine@custhelp.com

In the UK, Europe, the Middle East, or Far East:

- **Tel:** +44 (0)13 2924 6777
- **Email:** ukproduct.support@raymarine.com

Product information

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

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

You can obtain this product information using the menus within your product.

5.6 Technical specification

Nominal supply voltage	12 V dc
Operating voltage range	9 — 16 V dc
Current	<150 mA peak operating current
Power consumption	Typical: 1.5 W
LEN (Refer to SeaTalk^{ng} reference manual for further information).	3
Environmental	Installation environment • Operating temperature = −15ºC to +55ºC • Storage temperature = −25ºC to +70ºC • Relative humidity: max 95% • Splash proof to IPX2
Data connections	• SeaTalk^{ng} backbone • 1 x SeaTalk^{ng} spur • 5 x transducer connections with spade terminals
Conformance	• Europe: 2004/108/EC • Australia and New Zealand: C-Tick, Compliance Level 2

5.7 NMEA2000 sentences

The converter supports the following NMEA2000 sentences.

Protocol	PGN	PGN name	Receive	Transmit
NMEA2000	59904	ISO request	•	
NMEA2000	59932	ISO acknowledge		•
NMEA2000	60928	Address claim	•	•
NMEA2000	65240	ISO commanded address	•	
NMEA2000	126464	Transmission PGN list		•
NMEA2000	126464	Received PGN list		•
NMEA2000	126996	Product information		•
NMEA2000	126208	Acknowledge group function		•
NMEA2000	126208	Command group function	•	
NMEA2000	126208	Request group function	•	
NMEA2000	127245	Rudder		•

Protocol	PGN	PGN name	Receive	Transmit
NMEA2000	128259	Speed, water referenced		•
NMEA2000	128267	Depth		•
NMEA2000	128275	Distance log		•
NMEA2000	130306	Wind data		•
NMEA2000	127250	Vessel heading		•
NMEA2000	130310	Environmental parameters		•
NMEA2000	130312	Temperature		•

Chapter 6: Options and accessories

Chapter contents

6.1 Spares

The following spares are available for your converter:

Product number	Description
A08002	Spare top cover

6.2 SeaTalk^{ng} cables and accessories

SeaTalk^{ng} cables and accessories for use with compatible products.

Description	Part No	Notes
Backbone Kit	A25062	Includes: • 2 x 5 m (16.4 ft) Backbone cable • 1 x 20 m (65.6 ft) Backbone cable • 4 x T-piece • 2 x Backbone terminator • 1 x Power cable
SeaTalk^{ng} 0.4 m (1.3 ft) spur	A06038	
SeaTalk^{ng} 1 m (3.3 ft) spur	A06039	
SeaTalk^{ng} 3 m (9.8 ft) spur	A06040	
SeaTalk^{ng} 5 m (16.4 ft) spur	A06041	
SeaTalk^{ng} 0.4 m (1.3 ft) backbone	A06033	
SeaTalk^{ng} 1 m (3.3 ft) backbone	A06034	
SeaTalk^{ng} 3 m (9.8 ft) backbone	A06035	

Description	Part No	Notes
SeaTalkng 5 m (16.4 ft) backbone	A06036	
SeaTalkng 9 m (29.5 ft) backbone	A06068	
SeaTalkng 20 m (65.6 ft) backbone	A06037	
SeaTalkng to bare ends 1 m (3.3 ft) spur	A06043	
SeaTalkng to bare ends 3 m (9.8 ft) 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
SeaTalk to SeaTalkng converter	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	

Description	Part No	Notes
SeaTalk (3 pin) to SeaTalkng adaptor cable 0.4 m (1.3 ft)	A06047	
SeaTalk2 (5 pin) to SeaTalkng adaptor cable 0.4 m (1.3 ft)	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.	E52027	Allows the connection of NMEA 2000 devices to a SeaTalkng system.

Owner notes:

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