





## Datapage and dial colors

Datapage color theme and dial colors can be switched between light and dark.

Color Theme	Dial Color	Example
Light	Light	 A dashboard display with a light gray background and light-colored dials. The speedometer shows 40.1 and the tachometer shows 2.1.
Light	Dark	 A dashboard display with a light gray background and dark-colored dials. The speedometer shows 57.4 and the tachometer shows 1.2.
Dark	Dark	 A dashboard display with a dark gray background and dark-colored dials. The speedometer shows 55.1 and the tachometer shows 1.4.
Dark	Light	 A dashboard display with a dark gray background and light-colored dials. The speedometer shows 54.8 and the tachometer shows 2.1.

## Resetting all datapages

You can reset the datapages in the data application to the factory defaults.

1. Select **Menu**.
2. Select **Reset All Pages**.  
The confirm reset pop up message is displayed.
3. Select **Yes** to reset or **No** to cancel the action.

**Note:** Resetting all pages will restore your pre-configured pages to default settings and remove any custom pages that have been created. Number of engines and maximum RPM settings will not be changed during the reset.



# Chapter 17: Using the fuel manager

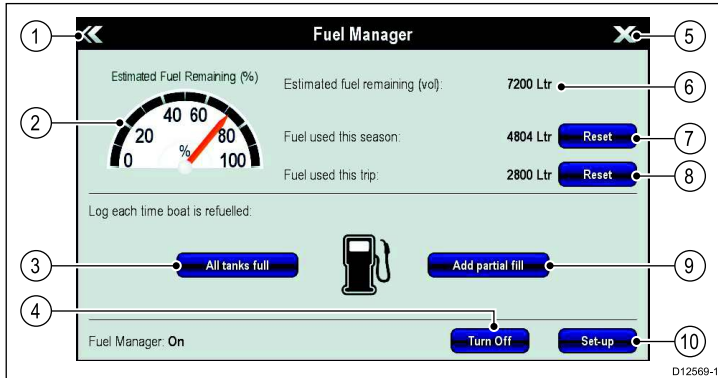
## Chapter contents

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## 17.1 Fuel manager overview

The fuel manager provides an estimate of fuel remaining, and the distance and time which can be travelled before the tanks are empty. In order to calculate these values, you must configure the total capacity of fuel available to the engines and log each time you add fuel. The fuel manager also allows you to set a low fuel warning alarm which is sounded when the vessel's estimated fuel falls below a specified value.

The fuel manager page provides current calculation estimates and controls to enable use of the fuel manager feature.



Item	Option	Description
1	<b>Back</b>	Back to System Set-up menu — New e Series only (For New c Series use the <b>Back</b> button).
2	Estimated fuel remaining (%)	Graphical representation of percentage of fuel remaining in the fuel tank(s).
3	<b>All tanks full</b>	Resets fuel remaining to full tank capacity.
4	<b>Turn On/Off</b>	Turn fuel manager On or Off.
5	<b>Close</b>	Back to Homescreen — New e Series only (For New c Series use the <b>Home</b> button).
6	Estimated fuel remaining (vol)	Volume of fuel remaining in the fuel tank(s).
7	<b>Reset</b> (Fuel used this season.)	Reset the fuel used this season to zero.
8	<b>Reset</b> (Fuel used this trip.)	Reset the fuel used this trip to zero.
9	<b>Add partial fill</b>	Specify fill amount by volume
10	<b>Set-up</b>	Specify settings for fuel manager.

In order to use the fuel manager you must:

- Connect a compatible engine interface to each engine you wish to monitor (to provide fuel flow rate data to the network).
- Enter the total fuel capacity of the vessel's fuel tanks.
- Turn on the fuel manager feature.
- Fill the fuel tanks to full.
- Select 'All tanks full'.
- Log each subsequent fuel fill whether partial or full.

### Note:

Fuel manager estimates the amount of fuel onboard, based on the user logging each time you fill up, the total fuel capacity, and how much fuel is burned by the engine(s). Any incorrect entry could dramatically affect the estimated fuel usage and capacity which could result in a shortage of fuel. This system is not a substitute for other types of fuel calculations.

Total fuel onboard is an estimate and will be inaccurate if fuel fills are not entered, or fuel is used by other sources (e.g. generators etc.). Estimated distance and time to empty will be based on the fuel remaining calculation and values do not include weather/tide effects.

You should not rely on the fuel manager calculations for accurate voyage planning or in emergency and safety critical situations.

## Enabling and disabling fuel manager

To turn the fuel manager on and off follow the steps below.

From the homescreen.

1. Select **Set-up**.
2. Select **Fuel Manager**.
3. Select **Turn On**, or **Turn Off**.

If the fuel manager is currently Off, **Turn On** is displayed. If the fuel manager is currently On, **Turn Off** is displayed.

## Setting up fuel manager

To set up the required settings for the fuel manager follow the steps below.

With the Fuel Manager page displayed:

1. Select **Set-up**.
2. Select **Total Fuel Capacity**.
3. Adjust the value to represent your vessel's total fuel capacity.
4. Select **Back**.
5. Select **Economy Units**.  
A list of available options is displayed:
  - Distance per Volume
  - Volume per Distance
  - Litres per 100km
6. Select the required economy units.
7. Select **Back** to go back to the **Fuel Manager** page.

## Fuel logging

You must ensure **all** fuel fills are recorded using the fuel manager.

From the fuel manager page:

1. When filling the tanks until full select **All tanks full**.  
The estimated fuel remaining is reset to the value of your fuel tanks capacity.
2. When only partially filling the tank make a note of the volume of fuel added to the tank and then select **Add partial fill**.
3. Enter the value noted earlier this will be added to your current fuel remaining figure.

**Note:** It is recommended that you perform an 'All tanks full' fill up as regularly as possible as partial fills will cause a higher cumulative inaccuracy in the provided calculations.

## Setting the low fuel alarm

Using the fuel manager also allows you to set a low fuel alarm which, if activated, is sounded when your vessel's remaining fuel falls to a specified value.

With the fuel manager turned on and set up correctly:

1. From the homescreen select **Set-Up**.
2. Select **Alarms**.
3. Select **Fuel manager**.  
The low fuel alarm settings are displayed.
4. Select **Low Fuel** so that On is highlighted.  
Selecting **Low Fuel** will turn the low fuel alarm On or Off.

5. Select **Fuel Level**.

The fuel level numeric adjust control is displayed.

6. Adjust the fuel level to the required value.

The low fuel alarm will now be sounded when the fuel remaining in the tank falls to the value specified.

**Note:** By default the low fuel alarm is switched off.

### Resetting fuel used readings

You can reset the value of the fuel used this season or fuel used this trip by following the steps below.

From the fuel manager page:

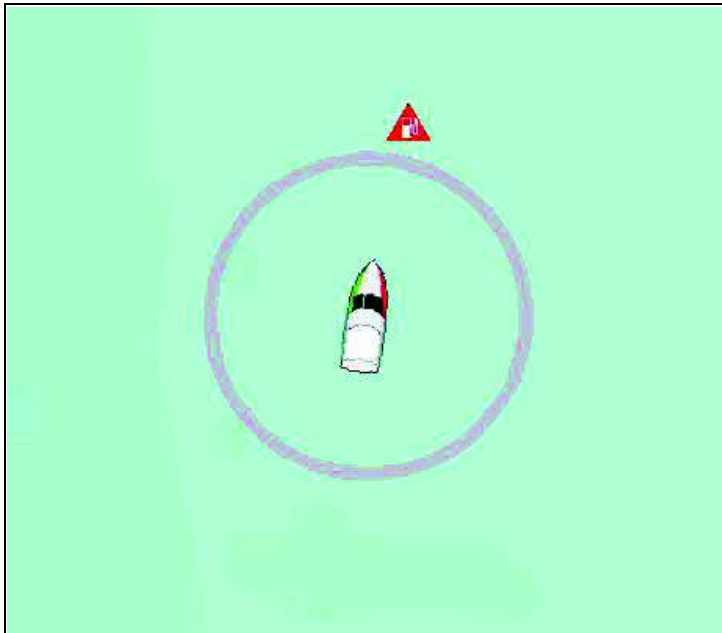
1. Select **Reset** against fuel used this season, or
2. Select **Reset** against fuel used this trip.

The value is set to zero after **Reset** has been selected.

**Note:** Performing a Season reset automatically resets the trip value.

### Fuel range rings

The fuel range ring gives an estimated range that can be reached with the estimated fuel remaining on-board.



The fuel range ring can be displayed graphically in the chart application and indicates an estimated range that can be reached with the:

- Current rate of fuel consumption.
- Estimated fuel remaining on-board.
- Course remaining in a straight line.
- Current speed maintained.

**Note:**

The fuel range ring is an estimated range that can be reached at the current rate of fuel consumption, of the fuel onboard and based on a number of external factors which could either extend or shorten the projected range.

This estimate is based on data received from external fuel management devices, or via the Fuel Manager. It does not take into account prevailing conditions such as tide, current, sea state, wind etc.

You should not rely on the fuel range ring feature for accurate voyage planning or in emergency and safety critical situations.

### Enabling and disabling fuel range ring

From the chart application, in 2D view:

1. Select **Menu**.

2. Select **Presentation**.

3. Select **Layers**.

4. Select **Fuel Range Ring**.

Selecting Fuel Range Ring will switch the function On and Off.



# Chapter 18: Using the weather application (North America only)

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## 18.1 Weather application overview

The weather application overlays historical, live, and forecasted weather graphics on a world map.

The weather application can only be used in North America and its coastal waters.

The weather application graphics and their associated weather data enable you to determine the actual conditions in the vicinity of your vessel, or at a particular location.

Weather forecasts and warnings, detailing both current and predicted conditions, are regularly updated in the weather application.

**Note:** For types of warnings, watches, and advisories, refer to the NOAA website at [www.nws.noaa.gov](http://www.nws.noaa.gov)

### Disclaimer — advisory only

The weather information is subject to service interruptions and may contain errors or inaccuracies and consequently should not be relied upon exclusively. You are urged to check alternate weather information sources prior to making safety related decisions. You acknowledge and agree that you shall be solely responsible for use of the information and all decisions taken with respect thereto. By using this service, you release and waive any claims against Sirius Satellite Radio Inc., WSI, Navcast Incorporated, and Raymarine with regard to this service.

If you do not have the subscription agreement, you may view a copy on the internet at [www.sirius.com/marineweather](http://www.sirius.com/marineweather)

## 18.2 Weather application set up

A number of steps must be completed before you can use the weather application for the first time.

- Your multifunction display must be connected to a Raymarine Sirius weather receiver.
- Identify your Raymarine Sirius weather receiver's electronic serial number (ESN). This information can be obtained from the homescreen **Set-up** menu by selecting the device from the select devices page: **Set-up > Maintenance > Diagnostics > Select Device >**
- Using your ESN contact SiriusXM ([www.siriusxm.com](http://www.siriusxm.com)) to subscribe for Sirius Marine Weather ([www.siriusxm.com/marineweather](http://www.siriusxm.com/marineweather)). When viewing the multifunction display's weather application, the ESN may be accessed from the following menu: **Menu > Sirius ESN.**
- You must be navigating within US coastal waters.
- Your multifunction display must obtain a GPS fix on your vessels location.
- You must specify the weather graphics that you want to display in the weather application.

### Accessing the weather application

To access the weather application on your multifunction display follow the step below:

From the homescreen:



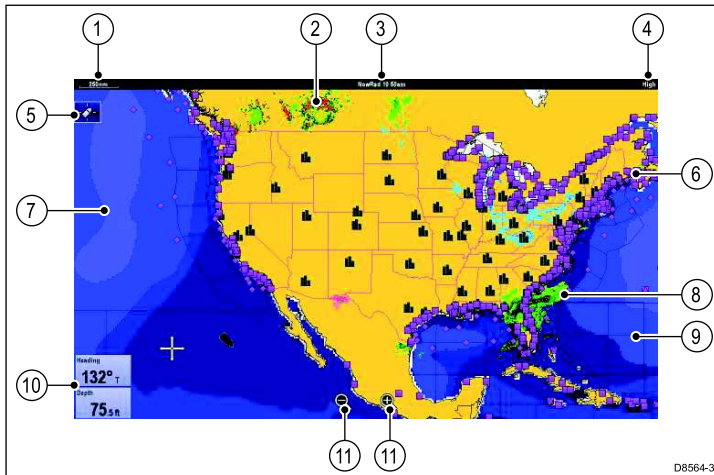
1. Select the **Weather** icon:



# 18.3 Weather application display overview

The weather application displays a range of graphics to indicate weather conditions and forecast information.

The following diagram illustrates the main features of the weather application display:



Item	Description
1	Range
2	Canadian radar
3	Animation and time / date
4	Signal strength
5	Find ship icon
6	Surface observation stations
7	Wave heights
8	NOWRad
9	Marine zones
10	Data overlay cells
11	On-screen Range in and out icons (Touchscreen displays only)

## Weather symbols

The weather application uses a range of graphics and symbols to represent different weather conditions and forecasts.

Symbol	Description
	Storm cast (dark blue) arrows indicating direction and speed of a storm.
	Wave height <ul style="list-style-type: none"> <li>• Highest waves (red)</li> <li>• Intermediate waves (greens)</li> <li>• Lowest waves (blues)</li> </ul>
	Canadian radar (dark greens, yellow, orange and red)

Symbol	Description
	Lightning — a lightning symbol is shown at each cloud-to-ground strike: <ul style="list-style-type: none"> <li>• Light (recorded in last 10–15 minutes.)</li> <li>• Medium (recorded in last 5–10 minutes.)</li> <li>• Dark (recorded in last 0–5 minutes.)</li> </ul> More recent strikes are overlaid over older symbols.
	Wind — Wind symbols show the current wind direction and strength and can be displayed as either an arrow or a wind barb. Wind arrows indicate speed — the larger the arrow, the greater (stronger) the wind speed. Wind barbs give a more precise indication of wind speed as shown in the wind speed symbols section.
	Sea surface temperature (green, yellow and orange) <ul style="list-style-type: none"> <li>• Blue — coldest</li> <li>• green</li> <li>• yellow</li> <li>• orange and red — warmest</li> </ul>
	Surface observation stations (pink) — Current or historical weather data can be viewed at surface observation stations. Not all data is available for all stations.
	Cities — The city symbols enables you to access details of city weather forecasts. Up to 3 forecasts are displayed for each city.
	NOWRad <ul style="list-style-type: none"> <li>• Rain (green, yellow and red.)</li> <li>• Snow (blues)</li> <li>• Mixture (pinks)</li> </ul>

## Storm tracking symbols

The weather application uses a range of symbols to represent different types of storm tracks. The storm tracking function enables you to monitor significant storms in the area.

Examples of significant storms include tropical disturbances, depressions, storms and cyclones, hurricanes, typhoons, and super typhoons.

The weather map displays the track that the storm has taken, its current and forecasted position, the wind radii (current position only), direction, and speed of travel.

Storm tracks are highlighted on the weather map in the form of symbols, as shown below.

Historical (grey)	Current (red)	Forecast (orange)	Description
			Hurricane (Category 1–5)
			Tropical storm
			Tropical disturbance, tropical depression

When a symbol is selected, additional storm information can be accessed by the context menu:

- Storm's name and type.
- Date and time.
- Position, direction and speed.
- Pressure and maximum wind speed and gusts.

## Surface pressure symbols

The weather application uses a range of symbols to represent different surface pressure conditions.

Symbol	Description
	High / low pressure (blue and red)
	Warm front (red)
	Cold front (blue)
	Occluded front (purple)
	Stationary front (red-blue)
	Trough (brown)
	Squall line (red)
	Dry line (red)
	Isobars (grey)

## Surface observation station symbols

The weather application uses a range of symbols to represent different types of surface observation station.

Symbol	Description
	Buoy station
	C-MAN (Coastal-marine automated network)
	WSI (Weather services international)
	NWS (National weather service)

## Wind speed symbols

The weather application uses a range of symbols to represent different wind speeds.

Symbol	Speed	Symbol	Speed	Symbol	Speed
	3–7 kts		8–12 kts		13–17 kts
	18–22 kts		23–27 kts		28–32 kts
	33–37 kts		38–42 kts		43–47 kts
	48–52 kts		53–57 kts		58–62 kts
	63–67 kts		68–72 kts		73–77 kts
	78–82 kts		83–87 kts		88–92 kts
	93–97 kts		98–102 kts		etc.

## Wave information symbols

The weather application uses a range of graphics and symbols to represent different types of wave information.

Symbol	Description
	Wave height — Waves are shown in 16 shades of color from: <ul style="list-style-type: none"> <li>• Reds — Highest waves</li> <li>• Greens — Intermediate waves</li> <li>• Blues — Lowest waves</li> </ul>
	Wave period — wave periods are shown using shades of blue, the darker the shade the shorter gap between successive waves. The wave period detail can be accessed by the context menu <b>View Data</b> option.
	Wave direction — direction of waves is indicated by blue arrows.

## NOWRad precipitation color codes

NOWRad displays the type and level of precipitation:

Color code	Precipitation type	Reflectivity Intensity
Light green	Rain	(15 to 19 dBz)
Medium green	Rain	(20 to 29 dBz)
Dark Green	Rain	(30 to 39 dBz)
Yellow	Rain	(40 to 44 dBz)
Orange	Rain	(45 to 49 dBz)
Light red	Rain	(50 to 54 dBz)
Dark red	Rain	(55+ dBz)
Light blue	Snow	(5 to 19 dBz)
Dark blue	Snow	(20+ dBz)
Light pink	Mixed	(5 to 19 dBz)
Dark pink	Mixed	(20+ dBz)

Reflectivity Intensity	Rainfall (mm/hr)	Rainfall (in/hr)
90	15376.51	599.69
95	31575.91	1231.46
100	64841.98	2528.84
105	133154.6	5193.03
110	273436.4	10664.02

## Selecting weather graphics

From the weather application:

1. Select **Menu**.
2. Select **Display Graphics**.  
The display graphics list is displayed.
3. Select each graphic you want to Show or Hide.
4. Selecting a graphic will switch between Show or Hide.

**Note:** The Wind Vector graphic options are Arrow or Barb.

## Canadian radar precipitation color codes

Canadian radar shows the intensity of precipitation for Canada. Unlike NOWRad, Canadian radar does not show the precipitation type.

Color code	Intensity in mm per hour
Transparent (nothing shown at very low precipitation)	0.00 to 0.20 mm/hr
Light green	0.21 to 1.00 mm/hr
Medium green	1.01 to 4.00 mm/hr
Dark green	4.01 to 12.00 mm/hr
Yellow	12.01 to 24.00 mm/hr
Orange	24.01 to 50.00 mm/hr
Light red	50.01 to 100 mm/hr
Dark red	100.01+ mm/hr

## Reflectivity intensity to rainfall correlation

You can use the table below to correlate reflectivity intensity in dBz to estimated rainfall in millimeters per hour or inches per hour.

Reflectivity Intensity	Rainfall (mm/hr)	Rainfall (in/hr)
5	0.0749	0.0029
10	0.1538	0.0059
15	0.3158	0.0123
20	0.6484	0.0253
25	1.332	0.0519
30	2.734	0.1066
35	5.615	0.219
40	11.53	0.4497
45	23.68	0.9235
50	48.62	1.8963
55	99.85	3.8949
60	205.05	7.9975
65	401.07	15.6424
70	864.68	33.723
75	1775.65	69.252
80	3646.33	142.21
85	7487.83	292.03

## 18.4 Weather map navigation

You can move around the weather map and place waypoints.

When you open the weather application, a world map is displayed. If the system has a position fix for your vessel, the map will be centred on your location. As in the chart application, use the cursor to move around the map and view different locations, and the **Range Control** to zoom in and out. Use the **WPT** button to place waypoints.

**Note:** Waypoints are not displayed in the weather application, to view waypoints you will need to have an active chart application or radar application displayed.



### Locating your vessel

The vessel icon can be repositioned to the center of the screen by following the steps below.

1. Select the Find Ship icon:  located on the left hand side of the screen.

## 18.5 Weather context menu

The weather application includes a context menu which provides positional data and the option to view weather reports from the cursor location.



The context menu provides the following positional data for the cursor location in relation to your vessel:

- Latitude
- Longitude
- Range
- Bearing

Depending on the item or location selected on screen the context menu provides the following options:

- **View Report** — Only available when a city is selected.
- **View Data** — Not available when a city is selected.
- **View Full Report** — Only available when an observation station is selected.

### Accessing the context menu

You can access the context menu by following the steps below.

1. New e Series or New c Series:
  - i. Selecting a location, object or target on-screen and pressing the **Ok** button.
2. Touchscreen multifunction displays:
  - i. Selecting an object or target on-screen.
  - ii. Selecting and holding on a location on-screen.

## 18.6 Weather information

You can view weather information for:

- a specific location
- a surface observation station (when displayed)
- Cities (when displayed)

### Viewing weather data at a specific location

You can view weather details at a particular location on the world map regardless of the display graphics being shown in your weather application.

From the weather application:

1. Select the location you wish to view weather details for.  
The context menu is displayed.
2. Select **View Data**.  
A weather information page is displayed.

#### Weather information page

When selecting **View Data** from the weather context menu the following information is displayed:

- Zone description
- Zone ID
- Precipitation intensity
- Precipitation type
- Sea surface temperature
- Wind speed
- Wind form
- Wave height
- Wave period
- Wave direction

### Viewing weather station reports

You can view surface observation station reports by following the steps below:

From the weather application, with surface observation stations displayed:

1. Select a surface observation station.  
The weather context menu is displayed.
2. Select **View Full Report**.  
The station report is displayed.

#### Station report

Surface observation station reports contain the following information (when available)

- Station ID, name, type, bearing, time and date
- Air temperature
- Visibility
- Sea pressure
- Wind speed and form
- Sea temperature
- Wave information

### Viewing city weather forecasts

You can view weather forecasts for a particular city by following the steps below:

From the weather application, with cities displayed:

1. Select a city.  
The weather context menu is displayed.
2. Select **View Report**.  
The City forecast is displayed. Up to 3 forecasts are shown.

Using the weather application (North America only)

## 18.7 Weather reports

You can view a number of different weather reports to give you a comprehensive view of the weather.

Your multifunction display shows weather reports for:

- Tropical statements.
- Marine warnings.
- Marine zone forecasts.
- Watchbox warnings.

#### Tropical statements

Tropical statements provide information on tropical weather conditions. This information may not be available in all areas.

#### Marine warnings

You can display a report for the current marine warnings in the US coastal or near shore areas, or for the zone around your cursor or vessel.

#### Marine zone forecasts

These forecasts cover:

- US coastal weather forecasts, offshore forecasts and high seas forecasts, or
- Great lakes forecasts and near shore forecasts, or
- Canadian coastal weather forecasts.

#### Watchbox warnings

When a tornado or thunderstorm warning is received within the specified alert range of your vessel, the system generates a watchbox alert. This alert provides information on the type of warning and validity period. The full watchbox report text is also displayed.

### Displaying weather reports

From the weather application:

1. Select **Menu**.
2. Select **View Report**.
3. Select either **Tropical Statements**, **Marine Warnings**, **Marine Zone Forecasts**, or **Watchbox Warnings**.

The relevant report, warning, or statement is displayed.

### Changing the position of forecasts on the weather map

From the weather application:

1. Select **Menu**.
2. Select **View Report**.
3. Select **Report At**.

Selecting report at will switch between reports from Ship location or Cursor location.

**Note:** You cannot change the position of Tropical Statements or Watchbox Warnings.

### Watchbox alert box

The watchbox alert box is a red polygon which shows the location where severe weather is occurring.

The watchbox alert box shall be displayed if the weather application is displayed, watchbox alerts are On and the watchbox alert area is within the specified range from your vessel, or set to All.

## 18.8 Animated weather graphics

You can view animated weather graphics to provide an indication of changing weather patterns.

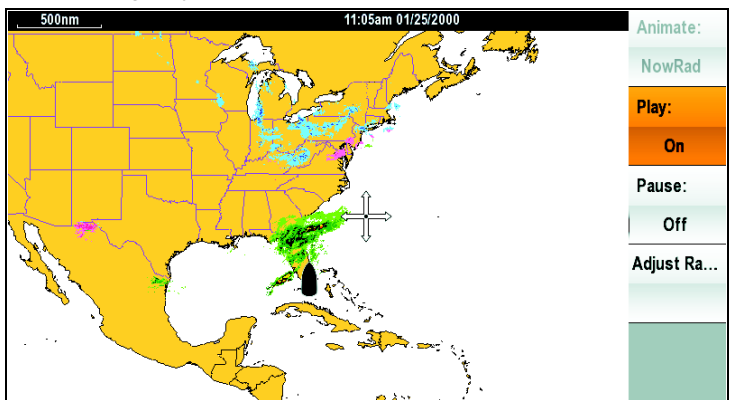
The animated weather option enables you to view an animation from the current time for:

- NOWRad — weather radar
- Wind
- Waves
- Pressure — surface pressure

### Running a weather animation

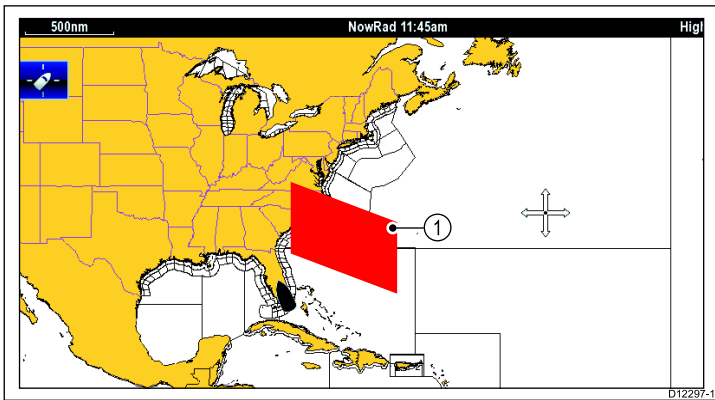
From the weather application:

1. Select **Menu**.
2. Select **Animate Weather**.
3. Select **Animate**.  
A list of animation is displayed.
4. Select the type of animation from the list.
5. Select **Play** so the On is displayed.  
Selecting play will switch between on and off.



**Note:** You cannot display information (by moving the cursor over a symbol) when animation is running. The Range and Rotary controls do however remain operable provided the PAUSE option has not been selected. Ranging / panning will cause the animation to restart.

**Note:** The animation will be switched to Off if the animation menu is closed.



Item	Description
1	Watchbox alert box

### Viewing watchbox alerts

You can view a watchbox alert at any time by following the steps below:

From the weather application with a watchbox alert box displayed.

1. Select the watchbox alert box.  
The context menu is displayed.
2. Select **View Data**.  
The watchbox alert message is displayed.

### Setting watchbox alert range

You can specify the range from your vessel that you wish to receive watchbox alerts from.

From the weather application:

1. Select **Menu**.
2. Select **Watchbox Alerts**.
3. Select the required range, All, or Off if you do not want to receive watchbox alerts.
  - Selecting a range will display watchbox warnings occurring within the specified range.
  - Selecting All will display all watchbox warning regardless of range from your vessel.
  - Selecting Off will stop watchbox alerts.

**Note:** When the watchbox alert setting is set to Off watchbox reports will still be received but you will not be alerted.

## 18.9 Weather application menu options

The following options are available from the weather application menu:

Menu item	Description	Options
<b>Find Ship</b>	Selecting <b>Find Ship</b> will reset the display to show your vessel in the center of the screen.	
<b>Display Graphics</b>	The <b>Display Graphics</b> menu allows to choose what graphics to Show or Hide in the weather application.	<b>Display Graphics</b> <ul style="list-style-type: none"> <li>• Canadian Radar</li> <li>• Cities</li> <li>• Lightning</li> <li>• Marine Zones</li> <li>• NOWRad</li> <li>• Sea Surface Temperature</li> <li>• Storm Cast</li> <li>• Storm Tracks</li> <li>• Surface Pressure</li> <li>• Surface Observation Stations</li> <li>• Wind</li> <li>• Wind Vector — Arrow or Barb</li> <li>• Watchbox</li> <li>• Wave Height</li> <li>• Wave Period</li> <li>• Wave Direction</li> </ul>
<b>Animate Weather</b>	The <b>Animate Weather</b> menu contains the following sub-menus: <ul style="list-style-type: none"> <li>• Animate</li> <li>• Play</li> <li>• Pause</li> <li>• Adjust Range</li> </ul>	<b>Animate:</b> <ul style="list-style-type: none"> <li>• NOWRad</li> <li>• Wind</li> <li>• Wave</li> <li>• Pressure</li> </ul> <b>Play:</b> <ul style="list-style-type: none"> <li>• On</li> <li>• Off</li> </ul> <b>Pause:</b> <ul style="list-style-type: none"> <li>• On</li> <li>• Off</li> </ul> <b>Adjust Range</b> Adjust Range allows you to use the <b>Range Control</b> to zoom in and out.
<b>View Report</b>	The <b>View Report</b> menu allows you to view the different types of weather reports received. You can also select the location of the report.	<b>Report At</b> <ul style="list-style-type: none"> <li>• Ship</li> <li>• Cursor</li> </ul> <b>View Report</b> <ul style="list-style-type: none"> <li>• Tropical Statements</li> <li>• Marine Warnings</li> <li>• Marine Zone Forecasts</li> <li>• Watchbox Warnings</li> </ul>

Menu item	Description	Options
<b>Watchbox Alert</b>	The <b>Watchbox Alerts</b> menu allows you to turn alerts Off, or select a range.	<b>Alert Range</b> <ul style="list-style-type: none"> <li>• Off</li> <li>• 50 nm</li> <li>• 150 nm</li> <li>• 300 nm</li> <li>• 500 nm</li> <li>• All</li> </ul> <div style="border: 1px solid black; padding: 2px; margin-top: 5px;"> <b>Note:</b> Unit of measurement is dependant upon unit set-up choices.         </div>
<b>Data Overlay Set-up</b>	Allows you to set up and display/hide up to 2 data cells in the bottom left corner of the screen: <ul style="list-style-type: none"> <li>• Data Cell 1</li> <li>• Select Data Category</li> <li>• Data Cell 2</li> <li>• Select Data Category</li> </ul>	<b>Data Cell 1</b> <ul style="list-style-type: none"> <li>• On</li> <li>• Off</li> </ul> <b>Select Data Category</b> Allows selection of a data type by category. <b>Data Cell 2</b> <ul style="list-style-type: none"> <li>• On</li> <li>• Off</li> </ul> <b>Select Data Category</b> Allows selection of a data type by category.
<b>Sirius User ID</b>	This option will display your registered Sirius User ID.	

## 18.10 Glossary of weather terms

Term	Definition
Cold front	The boundary between two different air masses where cold air pushes warm air out of the way and brings colder weather.
Cyclone	A large area of low atmospheric pressure, characterized by inward spiralling winds. A "low" also called a "depression". Also the name used for a hurricane in the Indian Ocean and Western Pacific.
Depression	An area of low pressure. Also called a cyclone.
Dry line	A region where there is a strong gradient in dew point temperatures. It is often found in a region where strong thunderstorms develop.
Forecast	Something that tells us what the weather is probably going to be like.
Front	The boundary between two masses of air with different temperatures (i.e. a mass of cold air and a mass of warm air).
High	Also known as an 'anticyclone' an area of high atmospheric pressure with a system of winds rotating outwards. This usually means dry weather. It is the opposite of a 'low'.
High Pressure	A mass of air that presses down strongly on the surface of the Earth because it is being cooled and is therefore more dense.
Hurricane	<p>A violent, spiralling storm that forms over the Atlantic Ocean, with winds over 120 kph. Such storms usually have a lifespan of several days. Also known as a typhoon or tropical cyclone. There are 5 levels of hurricane:</p> <ul style="list-style-type: none"> <li>• <b>Category 1</b> — Winds 74–95 mph (64–82 kt or 119–153 km/hr). Storm surge generally 4–5 ft above normal. No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Some damage to poorly constructed signs. Also, some coastal road flooding and minor pier damage.</li> <li>• <b>Category 2</b> — Winds 96–110 mph (83–95 kt or 154–177 km/hr). Storm surge generally 6–8 feet above normal. Some roofing material, door, and window damage of buildings. Considerable damage to shrubbery and trees with some trees blown down. Considerable damage to mobile homes, poorly constructed signs, and piers. Coastal and low lying escape routes flood 2–4 hours before arrival of the hurricane centre Small craft in unprotected anchorages break moorings.</li> <li>• <b>Category 3</b> — Winds 111–130 mph (96–113 kt or 178–209 km/hr). Storm surge generally 9–12 ft above normal. Some structural damage to small residences and utility buildings with a minor amount of curtain wall failures. Damage to shrubbery and trees with foliage blown off trees and large trees blown down. Mobile homes and poorly constructed signs are destroyed. Low lying escape routes are cut by rising water 3–5 hours before arrival of the centre of the hurricane. Flooding near the coast destroys smaller structures with larger structures damaged by battering from floating debris. Terrain continuously lower than 5 ft above mean sea level may be flooded inland 8 miles (13 km) or more. Evacuation of low lying residences with several blocks of the shoreline may be required.</li> <li>• <b>Category 4</b> — Winds 131–155 mph (114–135 kt or 210–249 km/hr). Storm surge generally 13–18 ft above normal. More extensive curtain wall failures with some complete roof structure failures on small residences. Shrubs, trees, and all signs are blown down. Complete destruction of mobile homes. Extensive damage to doors and windows. Low lying escape routes may be cut by rising water 3–5 hours before arrival of the centre of the hurricane. Major damage to lower floors of structures near the shore. Terrain lower than 10 ft above sea level may be flooded requiring massive evacuation of residential areas as far inland as 6 miles (10 km).</li> <li>• <b>Category 5</b> — Winds greater than 155 mph (135 kt or 249 km/hr). Storm surge generally greater than 18 ft above normal. Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. All shrubs, trees, and signs blown down. Complete destruction of mobile homes. Severe and extensive window and door damage. Low lying escape routes are cut by rising water 3–5 hours before arrival of the centre of the hurricane. Major damage to lower floors of all structures located less than 15 ft above sea level and within 500 yards of the shoreline. Massive evacuation of residential areas on low ground within 5–10 miles (8–16 km) of the shoreline may be required.</li> </ul>
Isobar	A line on a weather map linking areas with equal air pressure.
Lightning	Discharge of static electricity in the atmosphere, usually between the ground and a storm cloud.
Low	Also called a 'depression' this region of low pressure can mean wet weather.
Low Pressure	A mass of air that presses down only weakly on the surface of the Earth's surface as it is warmed and it therefore less dense.
Millibar	A unit used to measure atmospheric pressure.
Occluded Front	An area where warm air is pushed upwards as a cold front overtakes a warm front and pushes underneath it.
Precipitation	Moisture that is released from the atmosphere as rain, drizzle, hail, sleet or snow, as well as dew and fog.
Pressure Centre	A region of high or low pressure.
Squall line	A non-frontal band, or line, of thunderstorms.
Super typhoon	A typhoon that reaches maximum sustained 1 minute surface winds of at least 65 m/s (130 kt, 150 mph). This is the equivalent of a strong category 4 or 5 hurricane in the Atlantic basin or a category 5 severe tropical cyclone in the Australian basin.
Tornado	A funnel shaped whirlwind which extends to the ground from storm clouds.
Tropical cyclone	A low pressure system that generally forms in the tropics. The cyclone is accompanied by thunderstorms and, in the Northern Hemisphere, a counterclockwise circulation of winds near the earth's surface.
Tropical depression	An organized system of clouds and thunderstorms with a defined surface circulation and maximum sustained winds of 38 mph (33 kt) or less.
Tropical storm	An organized system of strong thunderstorms with a defined surface circulation and maximum sustained winds of 39–73 mph (34–63 kt).
Tropics	An area on the Earth's surface that lies between 30° north and 30° south of the equator.
Trough	An elongated area of relatively low atmospheric pressure, usually extending from the centre of a low pressure region.
Typhoon	The name for a tropical storm originating in the Pacific Ocean, usually the China Sea. They are basically the same as the hurricanes of the Atlantic Ocean and the cyclones of the Bay of Bengal.



<b>Term</b>	<b>Definition</b>
Wave cyclone	A storm or low pressure centre that moves along a front.
Wave period	The period is the time gap between successive waves and the longer the period the faster the waves travel.



# Chapter 19: Using the thermal camera application

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## 19.1 Thermal camera application overview

The thermal camera application enables you to control a connected thermal camera and display its image on your multifunction display.

Thermal imaging (also known as infrared) cameras enable you to see clearly in low-light and no-light conditions. For example, a thermal camera can help you navigate at night or identify obstacles in areas of low visibility or even total darkness.

The thermal application enables you to:

- **Control the camera:**
  - Pan.
  - Tilt.
  - Zoom (range).
  - Return camera to “home” (default) position.
  - Set the camera “home” position.
  - Pause the camera image.
  - Toggle between visible light and thermal camera lenses.
  - Toggle surveillance mode.
- **Adjust the camera image:**
  - Color palette.
  - Scene presets.
  - Brightness.
  - Contrast.
  - Color.
  - Video polarity (reverse video color).

### Displaying the thermal camera application

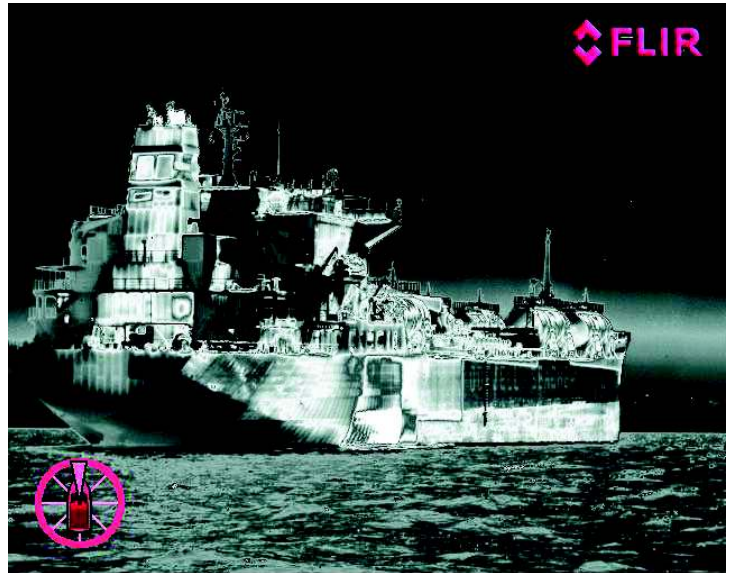
With the home screen displayed:

1. Select a page icon that includes the thermal camera application. The thermal camera application is displayed.

**Note:** If the home screen does NOT include a page icon that features the thermal camera application you will need to create a new page icon featuring the thermal camera application.

## 19.2 Thermal camera image

The thermal camera provides a video image which is shown on your display.



The video feed provides:

- Thermal image
- Status icons / system information (e.g. camera direction and docking mode indicators in the example above).











You should take time to familiarize yourself with the thermal image. This will help you to make the most of your system:

- Consider every object you view in terms of how it will look “thermally” as opposed to how it looks to your eye. For example look for changes caused by the heating effect of the sun. These are particularly evident right after sunset.
- Experiment with white-hot and black-hot (reverse video) modes.
- Experiment by looking for hot objects (such as people) compared to the colder surroundings.
- Experiment with the camera for daytime viewing. The camera can provide improved daytime viewing in environments where traditional video camera performance suffers, such as in shadows or backlit scenes.

### Thermal camera status icons

The thermal camera image includes icons to show the current status of the camera.

Icon	Description
	Camera direction indicator.
	Camera home position.
	Camera paused.
	Scene preset mode for night conditions.
	Scene preset mode for daytime conditions.
	Scene preset mode for night docking.
	Scene preset mode for identifying people or objects in the water.

Icon	Description
	Rear-view mode — image is flipped horizontally.
	Zoom setting: 2x zoom.
	Zoom setting: 4x zoom.
	Single active controller on network.
	Multiple active controllers on network.
	PC / laptop detected on network.
	Point mode enabled.
	Point mode disabled.
	Stabilization Off.
	Stabilization On.

### FFC (Flat Field Correction)

Periodically the camera will perform a Flat Field Correction (FFC). This will fine tune the thermal image to suit the current ambient temperature.

The FFC operation is indicated by a momentary pause and a green rectangle displayed in the upper left of the thermal video image.

## 19.3 Controls overview

The thermal camera application is available on compatible Raymarine multifunction displays and systems. It includes controls for the thermal camera.

### Thermal camera application – hardkey controls

<b>Rotary control</b>	Zoom image in / out.
<b>Joystick / trackpad</b>	<ul style="list-style-type: none"> <li>• Pan and tilt camera</li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p><b>Note:</b> On touchscreen displays you can also use the touchscreen to pan and tilt the camera.</p> </div> <ul style="list-style-type: none"> <li>• Navigate menus</li> </ul>
<b>OK</b>	Confirm menu selection
<b>CANCEL / Back</b>	Cancel selection
<b>RANGE IN / OUT</b>	Zoom image in / out.

### Thermal camera application menu.

The following menu options are available in the thermal camera application.

<b>Activate Camera</b>	Brings the thermal camera out of standby mode. (only available when camera is in standby.)
<b>Pause Image</b>	<ul style="list-style-type: none"> <li>• On</li> <li>• Off (default)</li> </ul>
<b>Camera Home</b>	Select to return the camera to its home position.
<b>Image Options</b>	Select to display the <b>Image Options</b> sub-menu. <ul style="list-style-type: none"> <li>• Color</li> <li>• Scene</li> <li>• Thermal / Visible</li> <li>• Reverse video</li> <li>• Rear View</li> <li>• Surveillance</li> </ul>
<b>Adjust Contrast</b>	Select to display the <b>Adjust Contrast</b> sub-menu. <ul style="list-style-type: none"> <li>• Contrast</li> <li>• Brightness</li> <li>• Color</li> </ul>
<b>Standby</b>	Select to place the camera in to standby mode. (only available when camera is activated.)
<b>Camera Set-up</b>	Select to display the <b>Camera Set-up</b> sub-menu. <ul style="list-style-type: none"> <li>• Set Home Position</li> <li>• Slew Settings</li> <li>• Align Camera</li> <li>• Elev Align:</li> <li>• Surveillance Settings</li> <li>• Default Color</li> <li>• Icon Level</li> <li>• Stabilization Mode</li> <li>• Point Mode</li> <li>• Ball Down Mode</li> <li>• High Power Standby</li> <li>• High Power Torque</li> </ul>

- JCU Icon
- PC Icon
- Restore Factory Defaults
- Calibrate Platform

**Note:** The thermal camera menu options available are dependant on the software version of your multifunction display and thermal camera. If options are different than listed above please refer to the manual that accompanied your thermal camera and / or the installation and operations handbook which accompanied your multifunction display.

## 19.4 Camera control

### Power up and standby

When the breaker connecting power to the camera is switched on, the camera will run a boot up sequence lasting for about 1 minute, after which the camera will be in **Standby** mode.

In order for the camera to operate, you must bring the camera out of standby mode using the camera controls.

#### Thermal camera standby

Standby mode can be used to temporarily suspend the thermal camera's functions when the camera is not needed for a prolonged period.

When in standby mode the camera:

- Does NOT provide a live video image.
- Moves the camera into its "stowed" (parked) position (lens facing down into the camera base) to protect the camera optics.
- Engages its pan / tilt motors to hold the camera in place in rough seas.

**Note:** The "stowed" (parked) position can be configured using the camera's setup menu.

#### Enabling and disabling thermal camera standby

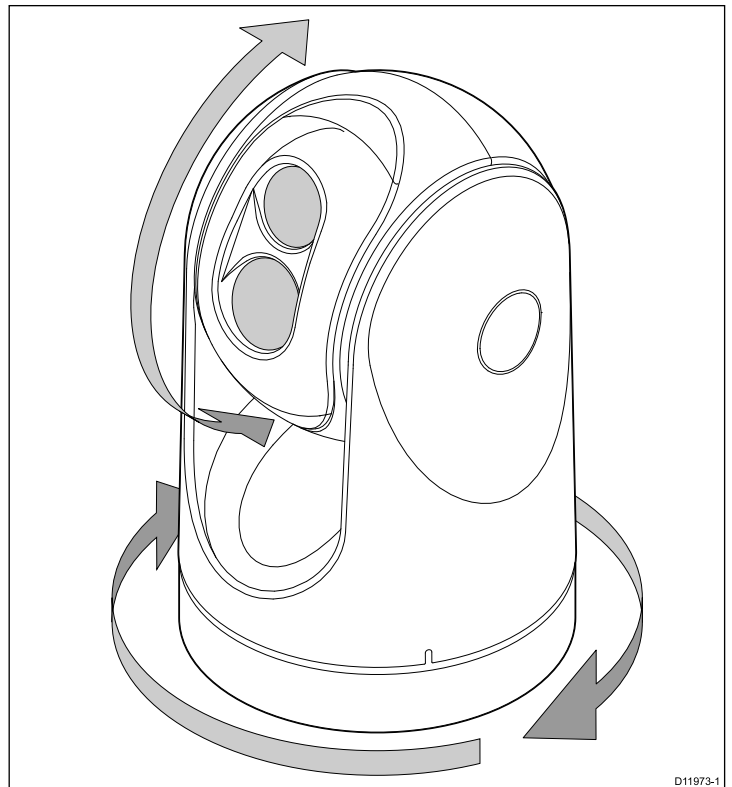
With the thermal camera application displayed:

1. Select **Menu**.
2. Use the **Standby** menu item to switch the camera in and out of standby mode.

**Note:** You can also use any of the camera controls in the thermal camera application to "wake" the camera from standby mode.

### Pan, tilt and zoom

The camera controls allow for pan and tilt (elevation) of the camera, as well as zoom (magnification) of the thermal image.



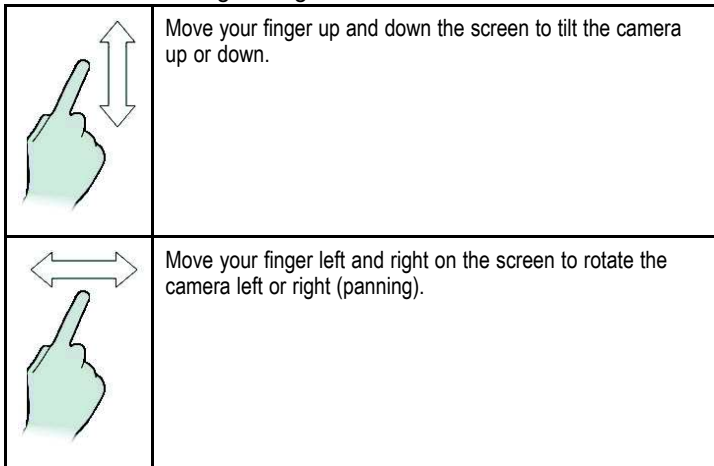
- Pan continuously through 360°.
- Tilt (elevate) to  $\pm 90^\circ$  relative to the horizon.
- Zoom (magnify) the thermal camera image.

**Note:** Stabilized variants of the T-Series thermal cameras include a continuous zoom function, non-stabilized variants can switch between x2 and x4 magnification.



## Panning and tilting, and the thermal image

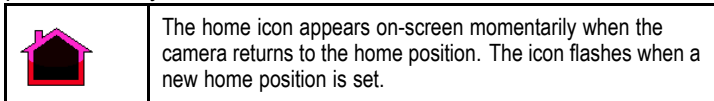
On a New e Series multifunction display you can pan and tilt the thermal camera image using the touchscreen.



## Thermal camera home position

The home position is a preset position for the camera.

The home position usually defines a useful reference point — for example, straight ahead and level with the horizon. You can set the home position as required and to return the camera to the home position at any time.



### Resetting the thermal camera to the home position

In the thermal camera application:

1. Select **Menu**.
2. Select **Camera Home**.

The camera returns to its currently defined home position, and the “Home” icon appears on-screen momentarily.

### Setting the thermal camera home position

With the thermal camera application displayed:

1. Use the joystick or touchscreen to move the camera to the desired position.
2. Select **Menu**.
3. Select **Camera Set-up**.
4. Select **Set Home Position**.

The “Home” icon flashes on-screen to indicate that a new home position has been set.

## Pausing the thermal camera image

With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Pause Image**.

## Thermal camera surveillance mode

In surveillance mode the camera pans left and right continuously.

The camera continues to pan until surveillance mode is disabled, or the camera controls are used to move the camera. When this occurs the camera does not automatically resume surveillance mode and the mode must be enabled again if required.

### Enabling and disabling thermal camera surveillance mode

With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Image Options**.
3. Use the **Surveillance** menu item to select the On or Off option, as appropriate.

### Surveillance mode settings

The scan width and scan speed can be adjusted.

#### Scan Width

Using the thermal camera application

The scan width determines the distance that the camera pans left and right when in surveillance mode.

#### Scan Speed

The scan speed determines the speed at which the camera pans left and right when in surveillance mode.

#### Setting scan width

The surveillance mode scan width can be adjusted by following the steps below.

From the thermal camera application:

1. Select **Menu**.
2. Select **Camera Set-up**.
3. Select **Surveillance Settings**.
4. Select **Scan Width**.

The scan width options will be displayed:

- **Narrow** — The camera will scan approximately 20° left and right of the center (40° total).
- **Medium** — The camera will scan approximately 40° left and right of the center (80° total).
- **Wide** — The camera will scan approximately 80° left and right of the center (160° total).

5. Select the required option.

#### Setting scan speed

The surveillance mode scan speed can be adjusted by following the steps below.

From the thermal camera application:

1. Select **Menu**.
2. Select **Camera Set-up**.
3. Select **Surveillance Settings**.
4. Select **Scan Speed**.

The scan speed options will be displayed:

- **Slow**
- **Medium**
- **Fast**

5. Select the required option.

## Thermal camera stabilization

The Raymarine T470SC and T473SC thermal cameras includes a mechanical stabilization feature.

The mechanical stabilization feature improves image stability by compensating for vessel motion and keeping the camera aimed at the point of interest. Mechanical stabilization has two aspects: horizontal (azimuth) and vertical (elevation). By default, mechanical stabilization is set to on, which provides the best on-the-water performance particularly when the vessel is underway and traveling on rough water or in swell conditions. You can disable or enable stabilization whenever you want. When you enable full stabilization (horizontal and vertical), the Stabilization On (no wave) icon flashes. It does not display continually, since this is the normal mode of operation. If you disable stabilization, the Stabilization Off (wave) icon remains on the screen to make you aware that the motion of the vessel can affect the camera performance. This is not a normal mode of operation. Stabilization is automatically turned off when the camera is stowed, but the system restores your setting when the camera is powered on. You can turn off the horizontal (pan) stabilization while retaining the tilt stabilization by enabling point mode.

### Enabling / Disabling stabilization

Stabilization is enabled by default. You can enable or disable stabilization at any time by following the steps below.

From the thermal camera application

1. Select **Menu**.
2. Select **Camera Set-up**.
3. Select **Stabilization Mode**.

Selecting Stabilization mode switches stabilization On and Off.

## Thermal camera point mode

Point mode is only applicable to thermal cameras which have mechanical stabilization.

Enabling point mode only has significance when stabilization is enabled. Enabling point mode turns off the horizontal (pan) stabilization while retaining the vertical (tilt) stabilization. This can be helpful when you want to use the thermal camera as an aide to navigation and keep the camera pointing in the same position relative to the vessel as it turns. For example, you may have stabilization enabled and have set the camera to point straight ahead relative to the front of the vessel. If the vessel is turned at a sharp angle under these conditions, the camera sensor will not follow the direction of the vessel. Enabling point mode keeps the camera in sync with the vessel direction while maintaining a stable elevation position. When point mode is enabled, a lock icon displays. The camera's azimuth position is now locked to the base. When you disable point mode, the unlock icon displays momentarily. The camera always starts up with point mode disabled.

### Enabling / Disabling point mode

Point mode is disabled by default. With Stabilization enabled you can also enable point mode at any time by following the steps below.

From the thermal camera application:

1. Select **Menu**.
2. Select **Camera Set-up**.
3. Select **Point Mode**.

Selecting point mode switches point mode On and Off.

## 19.5 Image adjustments

### Adjusting the thermal camera image





With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Adjust Contrast**.
3. Select the Contrast, Brightness, or Color option as appropriate. The relevant numeric adjust control is displayed.
4. Adjust the value as required.
5. Select **Back** or **Ok** to confirm the new value.

### Thermal camera scene presets

Scene presets enable you to quickly select the best image setting for the current environmental conditions.

During normal operation the thermal camera automatically adjusts itself to provide a high-contrast image optimized for most conditions. The Scene presets provide 4 additional settings that may provide better imagery in certain conditions. The 4 modes are:

	<b>Night Running</b> — scene preset mode for night conditions.
	<b>Day Running</b> — scene preset mode for daytime conditions.
	<b>Night Docking</b> — scene preset mode for night docking.
	<b>Search</b> — scene preset mode for identifying people or objects in the water.

Although the preset names indicate their intended use, varying environmental conditions might make another setting more preferable. For example, the night running scene preset might also be useful while in a harbor. You may find it beneficial to experiment with the different scene presets to discover the best preset to use for different conditions.

### Changing the thermal camera scene preset

With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Image Options**.
3. Use the **Scene** menu item to switch between the available scene presets, as appropriate.

### Thermal camera color modes

A range of color modes are available to help you distinguish objects on-screen in different conditions.

Changing the color mode switches the thermal camera image between a greyscale mode and 1 or more color modes. There are 5 color modes available.

The factory default color mode is red, which may improve your night vision. This default mode can be changed if required using the camera's on-screen **Video Setup** menu.

**Note:** If you have the Disable Color Thermal Video option selected in the camera's on-screen **Video Setup** menu, only 2 color modes are available — greyscale and red.

### Changing the thermal camera color mode

With the thermal camera application displayed:

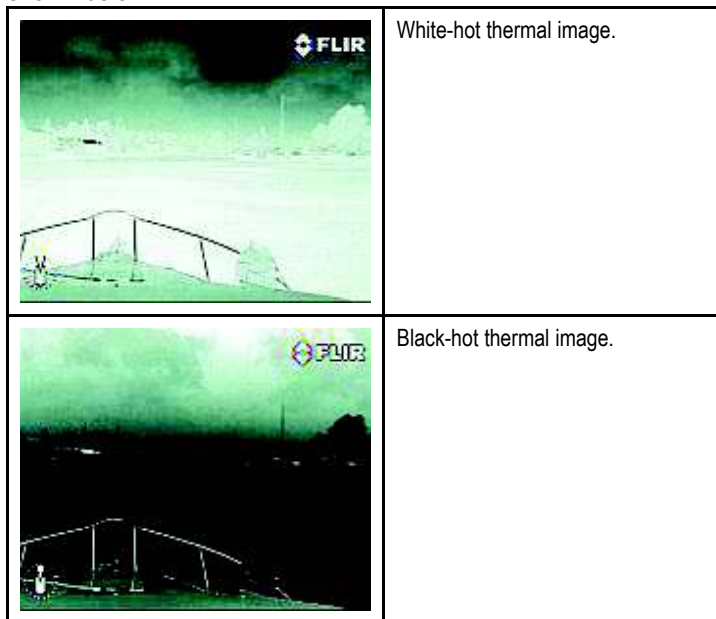
1. Select **Menu**.
2. Select **Image Options**.
3. Use the **Colour** menu item to switch between the available color palettes, as appropriate.



## Thermal camera reverse video

You can reverse the polarity of the video image to change the appearance of objects on-screen.

The reverse video option (video polarity) switches the thermal image from white-hot (or red-hot if the color mode setting is active) to black-hot. The difference between white-hot and black-hot is shown below:



You may find it useful to experiment with this option to find the best setting to suit your needs.

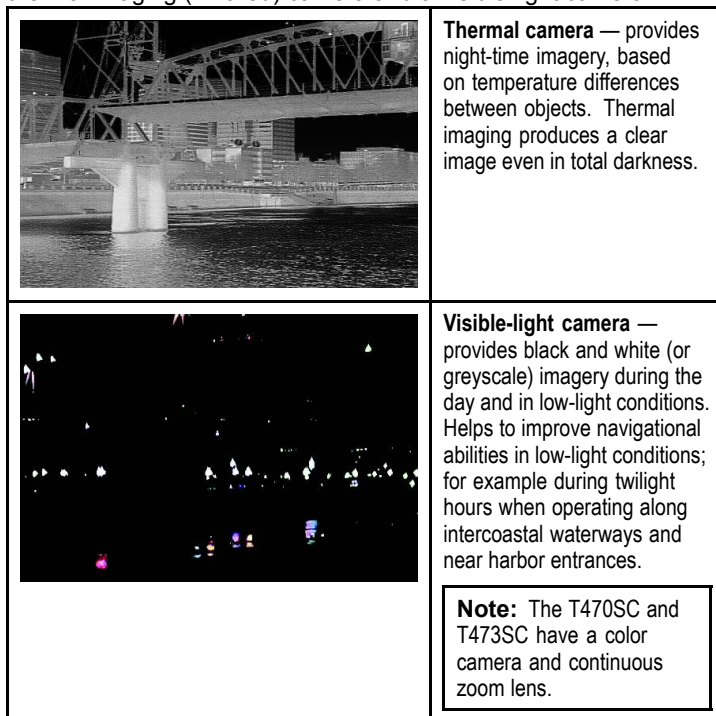
### Enabling thermal camera reverse video

With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Image Options**.
3. Select **Reverse Video**.

## Thermal and visible-light operation

“Dual payload” thermal cameras are equipped with 2 cameras — a thermal imaging (infrared) camera and a visible-light camera.



### Switching between thermal and visible-light camera lenses

With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Image Options**.
3. Use the **Image Type** menu item to switch between IR and Visible Light views, as appropriate.

## Thermal camera rear view mode

The rear view mode flips the video image horizontally, providing a “mirror image”.

This is useful for example in instances where the camera is rear-facing and you are viewing the image on a forward-facing monitor.

### Enabling thermal camera rear view mode

With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Image Options**.
3. Select **Rear View**.

## Slew to Cue

Slew to cue is a feature which maintains a selected position or object in the thermal cameras field of view. Slew to Cue options are available in the chart and radar applications as target context menu items.

**Note:** Heading data must be available on the system for Slew to Cue to work correctly.

For details on how to select a target to ‘slew to’ refer to the radar and chart sections of your manual.

The thermal camera can also automatically slew to:

- MOB target
- Dangerous AIS target
- Dangerous MARPA target

Options to enable or disable the automatic slew options are available in the thermal camera application

### Setting the camera's height above sea level

To ensure that the thermal camera's alignment can be set correctly the height of the camera above sea level must be set.

From the thermal camera application:

1. Select **Menu**.
2. Select **Camera Set-up**.
3. Select **Slew Settings**.  
The Slew settings page is displayed.
4. Select **Camera height above sea level**.  
The Camera height above sea level pop up is displayed.
5. Adjust the value to the required setting.

### Aligning the thermal camera horizontally

If you find that slew to cue objects are consistently too far left or right on the screen then you can make fine adjustments to the cameras alignment by following the steps below.

From the thermal camera application:

1. Select **Menu**.
2. Select **Camera Set-up**.
3. Select **Align camera**.  
The Align camera to boat pop up is displayed.
4. Adjust the value to the required setting.  
This value will adjust the camera's offset position to port or starboard.

### Aligning the thermal cameras elevation

If you find that slew to cue objects are consistently too low or high on the screen then you can make fine adjustments to the cameras alignment by following the steps below.

From the thermal camera application:

1. Select **Menu**.
2. Select **Camera Set-up**.
3. Select **Elev Align**.  
The Align camera to boat pop up is displayed.
4. Adjust the value to the required setting.  
This value will adjust the camera's offset position to port or starboard.

### Enabling / disabling automatic slew to cue

From the thermal camera application:

1. Select **Menu**.

2. Select **Camera Set-up**.

3. Select **Slew Settings**.

The Slew settings page is displayed which includes the following auto slew options:

- Auto Slew to MOB
- Auto Slew to Dangerous AIS target
- Auto Slew to Dangerous MARPA target

4. Select the relevant option.

Selecting an option from the list will switch the auto slew option for that item On or Off.

## 19.6 Camera set-up menu

<b>Set Home Position</b>	Sets the camera's current position as the <b>Camera Home</b> position.	
<b>Slew Settings</b>	Provides automatic slew options and camera alignment settings.	<ul style="list-style-type: none"> <li>• Auto Slew to MOB</li> <li>• Auto Slew to dangerous AIS target</li> <li>• Auto Slew to dangerous MARPA target</li> <li>• Camera height above sea level</li> </ul>
<b>Align Camera</b>	Enables changes to camera's horizontal alignment.	
<b>Elev Align</b>	Enables changes to camera's elevation (vertical) alignment.	
<b>Surveillance Settings</b>	Enables you to set the speed and width the camera will scan when in surveillance mode.	<ul style="list-style-type: none"> <li>• Scan Width</li> <li>• Scan Speed</li> </ul>
<b>Default Color</b>	Enables selection of default color palette.	<ul style="list-style-type: none"> <li>• Red</li> <li>• Greyscale</li> <li>• Glowbow</li> <li>• Rainbow</li> <li>• Fusion</li> </ul>
<b>Icon Level</b>	Enables selection of level of icons displayed on-screen.	<ul style="list-style-type: none"> <li>• None</li> <li>• Minimal</li> <li>• All</li> </ul>
<b>Stabilization Mode</b>	Enables and disables stabilization mode.  <b>Note:</b> Only available on stabilized variants of the T-Series cameras.	<ul style="list-style-type: none"> <li>• On (default)</li> <li>• Off</li> </ul>
<b>Point Mode</b>	Enables and disables point mode.	<ul style="list-style-type: none"> <li>• On</li> <li>• Off (default)</li> </ul>
<b>Ball Down Mode</b>	This options should be enables when the camera is mounted upside down in the 'ball down' configuration.	<ul style="list-style-type: none"> <li>• On</li> <li>• Off (default)</li> </ul>
<b>High Power Standby</b>	This option controls the amount of power used to hold the camera in position while it is in standby mode. With the setting enabled the camera will consume more power, but will help ensure that the camera is held in place in rough seas.	<ul style="list-style-type: none"> <li>• On (default)</li> <li>• Off</li> </ul>

<b>High Power Torque</b>	This option controls the amount of power used to hold the camera steady when in use. With the setting enabled the camera will consume more power, but will help ensure that the camera is held in place in rough seas. The High Power Torque mode may be useful for power boats that operate at higher speeds and experience high impact environments, and can accept higher power consumption.	<ul style="list-style-type: none"> <li>• On (default)</li> <li>• Off</li> </ul>
<b>JCU Icon</b>	Shows or hides the on-screen JCU connected icon.	<ul style="list-style-type: none"> <li>• On (default)</li> <li>• Off</li> </ul>
<b>PC Icon</b>	Shows or hides the on-screen PC connected icon.	<ul style="list-style-type: none"> <li>• On (default)</li> <li>• Off</li> </ul>
<b>Restore Factory Defaults</b>	Enables you to restore the camera's settings to factory default values.	
<b>Calibrate platform</b>	The calibrate platform option re-initializes the pan and tilt mechanism in the thermal camera.	

## High power and high torque modes

Camera State	Camera setting	Dual payload	Single payload
Standby	<ul style="list-style-type: none"> <li>• High Power Mode ON</li> <li>• High Torque Mode ON</li> </ul>	22 W	17.4 W
Standby	<ul style="list-style-type: none"> <li>• High Power Mode OFF</li> <li>• High Torque Mode ON</li> </ul>	8 W	7.4 W
Standby	<ul style="list-style-type: none"> <li>• High Power Mode ON</li> <li>• High Torque Mode OFF</li> </ul>	13 W	13 W
Awake	<ul style="list-style-type: none"> <li>• High Power Mode OFF</li> <li>• High Torque Mode OFF</li> </ul>	8 W	7.4 W
Awake	<ul style="list-style-type: none"> <li>• High Power Mode ON or OFF</li> <li>• High Torque Mode ON</li> </ul>	30 W	19.4 W
Awake	<ul style="list-style-type: none"> <li>• High Power Mode ON or OFF</li> <li>• High Torque Mode OFF</li> </ul>	20 W	16.5 W



# Chapter 20: Using the camera application

## Chapter contents

- [20.1 Camera application overview on page 230](#)

## 20.1 Camera application overview

You can view a camera or a video feed which is connected directly to your multifunction display using the video input(s) or IP camera feeds which are available on your network.

The camera application can be set to cycle through all available feeds.

If supported by your camera, you can adjust the brightness, contrast, color and aspect ratio of the video image. PAL / NTSC is selected automatically.

The following image shows an example of a camera feed displayed in the camera application:



**Note:** Your multifunction display must be powered up before power is applied to any networked IP cameras, this is to enable your multifunction display to assign the IP camera(s) a valid IP address.

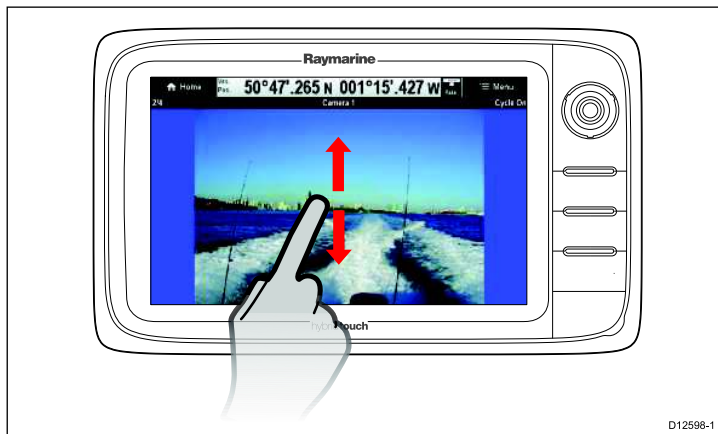
**Note:** If your IP camera(s) are not detected by your multifunction display, try power cycling the IP camera(s) whilst leaving your multifunction display powered up.

**Note:** For information on connecting the camera / video source and compatible video formats, refer to the *Cables and connections* section.



### Changing the camera / video feed

On a New a Series or New e Series display, if more than 1 feed is available you can change which feed is displayed on the screen using touch.



From the Camera application.

1. Touch and swipe your finger up to move to the next video feed.
2. Touch and swipe your finger down to display the previous video feed.



### Changing the camera / video feed

On a New c Series or New e Series display, if more than 1 feed is available you can change which feed is displayed on the screen using the Joystick.

From the Camera application

1. Move the **Joystick Down** to display the next video feed.

2. Move the **Joystick Up** to display the previous video feed.

## Changing the camera / video feed using the menu

On all display variants, when more than 1 feed is available, you can change which feed is displayed on the screen using the menu.

From the Camera application with a camera / video feed displayed:

1. Select **Menu**.
2. Select **Camera**.
3. Select the camera feed you want to display on the screen.

## Camera cycling

When multiple camera / video feeds are available the camera application can be set up to automatically cycle through the available feeds at a specified time interval.

With camera cycling turned on the camera application will cycle through the available video input(s) on the display and available networked IP camera feeds. The feeds will be cycled in the order they appear in the Camera selection menu: **Menu > Camera**. Direct video input feeds will appear first and then any networked IP camera feeds. When the final feed in the list has been displayed the camera application will loop back to the first feed in the list.

Camera cycling will cycle through the multifunction displays available video input(s) even if no feed is connected to the input(s). Where no feed is present on a video input, during cycling the video input feed will appear as a blue screen. You can choose whether or not the video input(s) appear during camera cycling.

The time interval that each feed is displayed for, before switching to the next feed can be adjusted.

### Turning on camera cycling

To turn on the camera cycling feature follow the steps below.

From the camera application:

1. Select **Menu**.
2. Select **Camera Cycling**.
3. Select **Camera Cycling** so that On is highlighted.

Selecting Camera Cycling will switch cycling On and Off.

The camera application will now cycle through all available feeds at the defined time interval.

### Setting the time interval for camera cycling

The time interval that each video feed is displayed for can be set by following the steps below.

From the camera application, with Camera cycling turned on:

1. Select **Menu**.
2. Select **Camera Cycling**.
3. Select **Cycle interval**.  
The cycle interval numeric adjust control is displayed.
4. Adjust the setting to the required time interval.

During camera cycling each feed is displayed for the time specified before changing to the next feed.

### Showing or hiding video input feeds during camera cycling

By default your multifunction displays video input(s) are shown during cycling, even if no feed is connected to the input(s). You can choose whether video input(s) appear during camera cycling by following the steps below.

From the camera application:

1. Select **Menu**.
2. Select **Camera Cycling**.
3. Select the **Include <Camera Name>** option for the video input you want to Show or Hide.

Selecting **Include <Camera Name>** option will switch between showing or hiding the video input during camera cycling.

**Note:** In the steps above **<Camera Name>** represents the default feed name provided by the connected device or the custom name which can be assigned to the feed.

### Turning off camera cycling

You can turn off camera cycling using the methods detailed below.

From the camera application, with camera cycling turned on:

1. Select **Menu > Camera Cycling > Camera Cycling** so that Off is highlighted, or
2. Change the camera / video feed manually as described earlier in this section, or
3. Press the **Back** button (applicable to New c Series and New e Series only).

## Naming camera / video feeds

To aid selection of feeds you can name each feed.

From the Camera application:

1. Select the feed you want to name so that it is displayed on the screen.
2. Select **Menu**.
3. Select **Edit Name**.  
The on-screen keyboard is displayed.
4. Enter the name you want the feed to be called.
5. Select **SAVE** to save the new name for the feed.

The name of the feed is displayed in the camera application's status bar.

## Adjusting the video image

If supported by your connected camera / video input device or networked IP camera, you can adjust the video image.

With a video feed displayed in the camera application:

1. Select **Menu**.
2. Select **Contrast, Brightness, or Color**, as appropriate.  
The numeric adjust control is displayed.
3. Adjust the level to the required setting.

## Selecting the aspect ratio

If supported by your connected camera / video input device or networked IP camera, you can manually change the aspect ratio between 4:3 and 16:9.

From the camera application with a feed displayed:

1. Select **Menu**.
2. Select **Aspect ratio** so that 4:3 or 16:9 is selected as required.





# Chapter 21: Using mobile applications

## Chapter contents

- [21.1 Raymarine mobile apps on page 234](#)
- [21.2 Enabling Wi-Fi on page 235](#)
- [21.3 Enabling mobile apps on page 235](#)
- [21.4 Setting up Wi-Fi security on page 236](#)
- [21.5 Selecting a Wi-Fi channel on page 236](#)

## 21.1 Raymarine mobile apps

Raymarine mobile apps enable viewing and control of your multifunction display via a compatible mobile device, using a Wi-Fi connection.

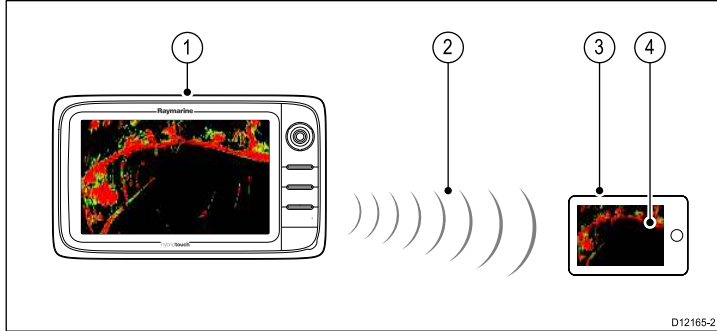
Raymarine currently offers the following mobile apps:

- **RayView**
- **RayRemote**
- **RayControl**

**Note:** Your multifunction display must have software version V3.15 or later in order to use mobile apps.

### RayView

This app enables you to stream what you see on your multifunction display to a compatible smartphone or tablet device, using a Wi-Fi connection.

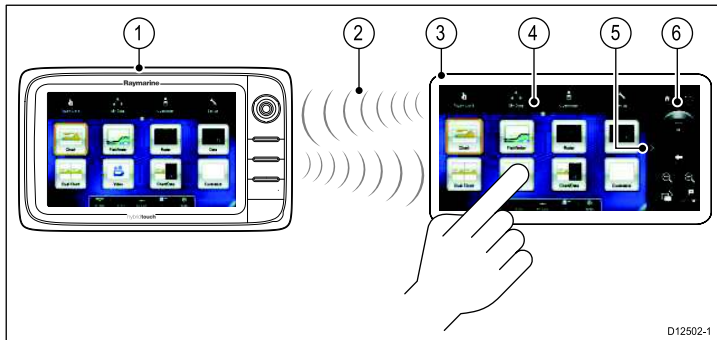


1. Multifunction display.
2. Wi-Fi connection (1 way – streaming only).
3. Compatible device.
4. “RayView” video streaming app.

### RayControl

— This app enables you to stream and remotely control your multifunction display from a compatible tablet device, using a Wi-Fi connection.

**Note:** For safety reasons pilot controls and power button options are not available remotely.

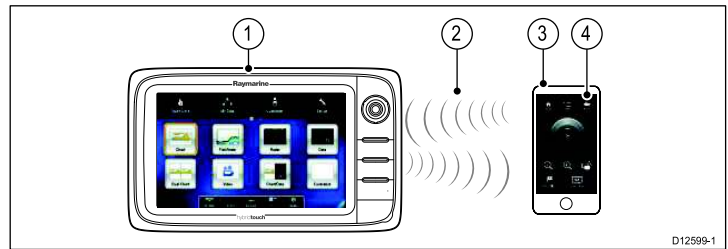


1. Multifunction display.
2. Wi-Fi connection (2 way – streaming and remote control).
3. Compatible tablet.
4. “RayControl” streaming and remote control app.
5. “RayControl” controls access (Touch the arrow to access controls).
6. “RayControl” remote controls

### RayRemote

This app enables you to stream or control your multifunction display remotely from a compatible smartphone, using a Wi-Fi connection.

**Note:** RayRemote is able to switch between displaying the remote controls or the video stream.



1. Multifunction display.
2. Wi-Fi connection (2 way – streaming or remote control).
3. Compatible smartphone.
4. RayRemote app

To use Raymarine mobile apps you must first:

- Download and install the required app from the relevant app store.
- Enable Wi-Fi in the System Settings on the multifunction display.
- Enable Wi-Fi on your compatible device.
- Select the Raymarine Wi-Fi connection from the list of available Wi-Fi networks on your compatible device.
- Enable the relevant type of connection (i.e. Viewing or Remote Control) in the System Settings on the multifunction display.

### Mobile app compatibility

The Raymarine mobile apps are compatible with the following devices.

Device	Operating system
iPhone 4 or later	iOS
iPad 2 or later	iOS
Android smartphone	Android V2.2.2 or greater with 1GHz or greater processor
Android tablet	Android V2.2.2 or greater with 1GHz or greater processor
Kindle Fire	Android \ amazon

## 21.2 Enabling Wi-Fi

With the homescreen displayed:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **Wireless Connections**.
4. Select **Wi-Fi > ON**.

## 21.3 Enabling mobile apps

Raymarine mobile apps must be enabled on your multifunction display before you can stream video or remote control your multifunction display via a tablet or smartphone device.

With the homescreen displayed:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **Wireless Connections**.
4. Select **Mobile apps**.
5. Select **Viewing only** to enable video streaming only, or
6. Select **Remote Control** to enable remote control and video streaming using.
7. Launch the relevant Raymarine mobile app on your tablet or smartphone device and follow the on-screen instructions.

## 21.4 Setting up Wi-Fi security

You can encrypt the Wi-Fi connection on the multifunction display to prevent unauthorized devices from accessing the connection. The default encryption is WPA2.

With the homescreen displayed:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **Wireless Connections**.
4. Select **Wi-Fi > On**.
5. Select **Wi-Fi Name** and specify the SSID. This should be a memorable word and must be unique to each multifunction display in your system.  
By default the SSID is the serial number of the multifunction display.
6. Select **W-iFi Security** and specify the type of encryption you want to use — None, WPA only, WPA 2 only (default), or WPA/WPA 2.

### Note:

- Raymarine strongly recommends the use of the **WPA2** security setting.
- Selecting **None** for your WiFi Security will leave your WiFi open and allow anyone with a WiFi enabled device access to your system.

7. It is recommended that the default **WiFi Passphrase** is NOT changed.

**Note:** Once WiFi security is set up on the multifunction display you must specify the same SSID and password credentials on your iPhone or iPad before wireless video streaming can be used.

## Changing the default passphrase

It is recommended that the default passphrase is not changed, however if you do need to change the passphrase follow the steps below:

From the Wireless Connections menu: **Set-up > System Settings > Wireless Connections**

1. Select **Wi-Fi Passphrase**.  
The on-screen keyboard will be displayed, showing the current passphrase.
2. Use **DEL** to delete the current passphrase.
3. Enter a new passphrase.

**Note:** Ensure the passphrase you choose is 'strong' by using a combination of upper/lower case letters, numbers and special characters. The passphrase can be between 8 and 63 characters in length with longer passphrases being more secure.

4. Select **SAVE** to save the new passphrase.

## 21.5 Selecting a Wi-Fi channel

By default the multifunction display automatically selects an available Wi-Fi channel. If you're experiencing difficulties with wireless video streaming it may be necessary to manually specify a Wi-Fi channel for both the multifunction display and the device you want to stream video to.

With the homescreen displayed:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **Wireless Connections**.
4. Select **Wi-Fi > On**.
5. Select **Wi-Fi Channel**.
6. Select one of the listed channels.

# Chapter 22: Media player application

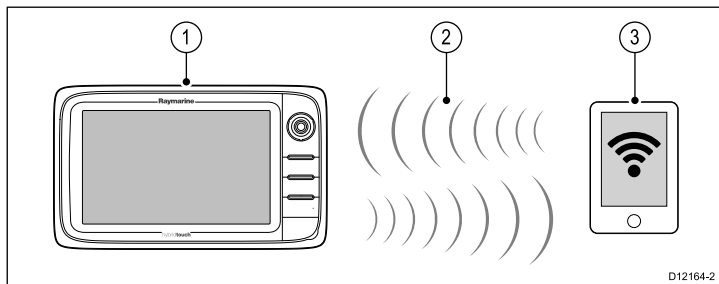
## Chapter contents

- [22.1 Media player connection on page 238](#)
- [22.2 Enabling Bluetooth on page 238](#)
- [22.3 Pairing a Bluetooth media player on page 239](#)
- [22.4 Enabling audio control on page 239](#)
- [22.5 !\[\]\(2824aab9645d9fab95bae27ff6828dab\_img.jpg\) Media player controls on page 240](#)
- [22.6 !\[\]\(0fbf3ad74a6c8dc44ba9ea17fc2aca5e\_img.jpg\) Media player controls using a remote control on page 240](#)
- [22.7 Unpairing a Bluetooth device on page 241](#)

## 22.1 Media player connection

You can use your multifunction display to wirelessly control a Bluetooth-compatible media player (such as a smartphone).

The media player must be compatible with the Bluetooth AVRCP protocol (version 2.1 or higher).



1. Multifunction display.
2. Bluetooth connection.
3. Bluetooth-compatible media player.

To use this feature you must first:

- Enable Bluetooth in the System Settings on the multifunction display.
- Enable Bluetooth on the media player device.
- Pair the media player device with the multifunction display.
- Enable Audio Control in the System Settings on the multifunction display.
- Connect an RCU-3 remote and assign the shortcut key to Start/Stop audio playback (Only required on a New c Series display).

**Note:** If your media player does not include built-in speakers it may be necessary to connect the media player's audio output to an external audio system or a pair of headphones. For more information refer to the instructions that accompany the media player device.

## 22.2 Enabling Bluetooth

With the homescreen displayed:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **Wireless Connections**.
4. Select **Bluetooth > On**.

## 22.3 Pairing a Bluetooth media player

With the homescreen displayed and Bluetooth turned on:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **Wireless Connections**.
4. Select **New Bluetooth Connection**.  
A message is displayed prompting you to put your media player device into discovery mode.
5. Ensure Bluetooth is enabled on your external media player device and ensure it is ready to be paired. For more information, consult the instructions that accompany the device.
6. On the multifunction display, select **OK** in the message dialog.  
The multifunction display will search for active Bluetooth devices.
7. Select **Stop Discovery** when your device appears in the list.
8. Select the media player device in the list.  
A pairing request message is displayed on the external media device.
9. On the external media device, select Pair (or equivalent) to accept the pairing request message.  
The multifunction display shows a message asking you to confirm the Pairing code.
10. If the pairing code displayed on the multifunction display matches the code displayed on the external media device, select **OK** on the multifunction display. If the code does NOT match, repeat steps 4 to 8.
11. If the pairing was successful the multifunction display will confirm the pairing.  
The external media device is now paired with the multifunction display.

## 22.4 Enabling audio control

With the homescreen displayed:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **Wireless Connections**.
4. Select **Connection Manager**.
5. Select the media player device in the list.
6. Select **Audio Control > On**.

## 22.5 Media player controls

Touchscreen multifunction displays enable you to use the on-screen media player controls to control the audio playing on your external media player.



1. Touch this icon to display the audio controls.
2. Previous track.
3. Play track.
4. Pause track.
5. Next track.

Selecting **Back** will hide the audio controls.

## 22.6 Media player controls using a remote control

You can control audio wirelessly using a Raymarine RCU-3 remote control unit.

The Shortcut key on the RCU-3 must be set to Start/Stop audio playback, refer to the *Using a Remote control* section for further details.

1. Press **UP** arrow for next track.
2. Press **DOWN** arrow for previous track.
3. Press **SHORTCUT** button to play/pause audio.

**Note:** On New c Series multifunction displays, whilst the audio controls appear on the screen you cannot interact with them. To control audio you must use a connected RCU-3.



## 22.7 Unpairing a Bluetooth device

If you are experiencing problems when attempting to use a Bluetooth device with the multifunction display it may be necessary to unpair the device (and any other paired Bluetooth devices) and then retry the pairing procedure.

With the homescreen displayed:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **Wireless Connections**.
4. Select **Connection Manager**.
5. Select the media player device in the list.
6. Select **Unpair / Forget this device**.



# Chapter 23: Using a remote control

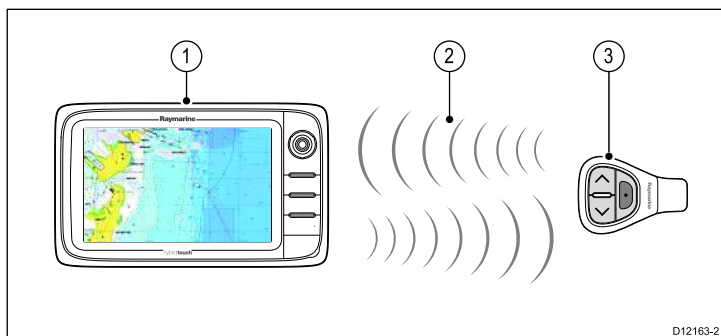
## Chapter contents

- [23.1 Remote control connection on page 244](#)
- [23.2 Pairing the remote and configuring the UP and DOWN buttons on page 244](#)
- [23.3 Operating principles on page 245](#)
- [23.4 Customizing the SHORTCUT button on page 245](#)
- [23.5 Remote control functions on page 246](#)
- [23.6 Reconnecting the RCU on page 247](#)

## 23.1 Remote control connection

You can control the multifunction display wirelessly using a Raymarine remote control unit.

The remote control uses a Bluetooth wireless connection.



1. Multifunction display.
2. Bluetooth connection.
3. Raymarine Bluetooth remote control (for example, RCU-3).

To use the remote control you must first:

- Enable Bluetooth in the System Settings on the multifunction display.
- Pair the remote control unit with the multifunction display.

## 23.2 Pairing the remote and configuring the UP and DOWN buttons

The remote control unit must be “paired” with the multifunction display that you want to control. On your multifunction display, with the homescreen displayed:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **Wireless Connections**.
4. Select **Bluetooth > On**.
5. Select **New Bluetooth Connection**.  
A pop-up message will be displayed to confirm that the device you are connecting to is discoverable.
6. Select **Ok** to confirm.  
A list of discovered devices is displayed.
7. On your **remote control unit**, hold down the UP and DOWN buttons together for 10 seconds.
8. Select the remote control unit in the list of devices.
9. When prompted, press the arrow button on your remote that you wish to be configured as the UP button. The other arrow button will automatically be configured as the DOWN button.  
If the pairing was successful a “Pairing Success” message will be displayed. If a “Pairing Failure” or “Pairing Timeout” message is displayed, repeat steps 1 to 8.

## 23.3 Operating principles

Remote control operating principles.

- Only 1 multifunction display may be operated by a remote control unit at any one time. You cannot pair a multifunction display to more than 1 remote control at the same time.
- The 3 buttons on the remote control unit have different functions depending on the CONTEXT in which you are using it. For example, in the chart application the buttons control different functions than they do in the homescreen.
- All functions are accessed using a combination of the 3 buttons. For some functions you must press a button MOMENTARILY. You can also HOLD a button for continuous response (for example, continuous ranging in the chart application).
- The main methods of operation involve the use of the **UP** and **DOWN** "arrow" buttons to highlight different on-screen options. The **SHORTCUT** button is used to select (execute) them.
- During the pairing process you must define which of the arrow buttons you want to be the "UP" button.
- The **SHORTCUT** button is customizable and can be configured to operate one of a number of functions, using the System Settings menu on your multifunction display.

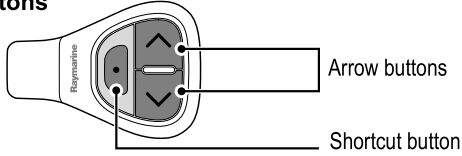
## 23.4 Customizing the SHORTCUT button

On your multifunction display, with the homescreen displayed:

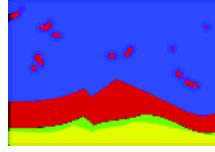
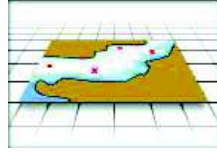
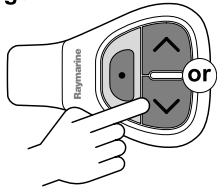
1. Select **Set-up**.
2. Select **System Settings**.
3. Select **External Devices**.
4. Select **Remote Control**.
5. Select **Customize shortcut key**.
6. Select the function that you want to assign to the **SHORTCUT** key.

## 23.5 Remote control functions

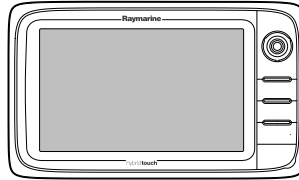
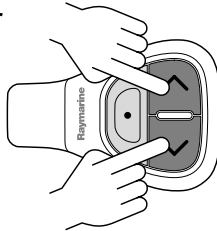
### Buttons



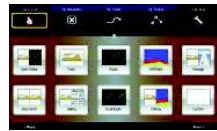
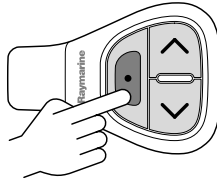
### Range



### Pair



### Select

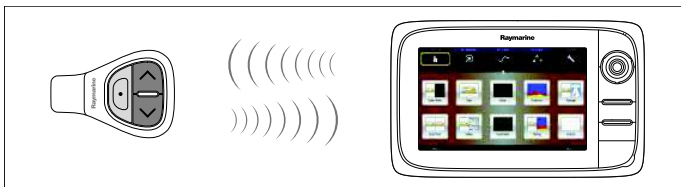


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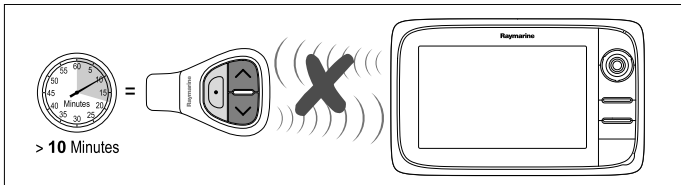
	Button	Application where function available:				
		Chart	Radar	Fishfinder	Weather	Homescreen
<b>Default functions:</b>						
Range / zoom.	<ul style="list-style-type: none"> <li>Press UP or DOWN arrow for momentary response.</li> <li><b>Hold</b> UP or DOWN arrow for continuous response.</li> </ul>	✓	✓	✓	✓	✗
Open homescreen.	Shortcut: <b>Hold</b>	✓	✓	✓	✓	✗
Select application in homescreen (in left-to-right, top-to-bottom order).	<ul style="list-style-type: none"> <li>Press UP or DOWN arrow for momentary response.</li> <li><b>Hold</b> UP or DOWN arrow for continuous response.</li> </ul>	✗	✗	✗	✗	✓
Toggle menu items and options in dialogs and prompts (in left-to-right, top-to-bottom order).	<ul style="list-style-type: none"> <li>Press UP or DOWN arrow for momentary response.</li> <li><b>Hold</b> UP or DOWN arrow for continuous response.</li> </ul>	✓	✓	✓	✓	✓
Place waypoint at vessel position.	Shortcut	✓	✓	✓	✓	✗
Media player control (requires a Bluetooth media player paired to the multifunction display).	<ul style="list-style-type: none"> <li>Press UP / DOWN arrow for next / previous track.</li> <li>Press <b>SHORTCUT</b> button for play / pause.</li> </ul>	✓	✓	✓	✓	✓
<b>Customizable functions:</b>						
Open homescreen.	SHORTCUT	✓	✓	✓	✓	✗
Switch active application (only available when multiple applications are displayed).	SHORTCUT	✓	✓	✓	✓	✗

## 23.6 Reconnecting the RCU

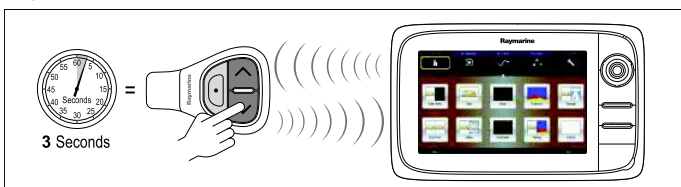
1. When you pair the RCU-3 with a multifunction display a wireless connection is established.



2. When you power off the multifunction display it loses its connection with the RCU-3 after 10 minutes.



3. To restore the connection between the 2 units, press and hold any button on the RCU-3 for at least 3 seconds.



**Note:** You will also need to reconnect the RCU-3 as described above if you disable and then re-enable the Bluetooth connection on the multifunction display at any time.





# Chapter 24: DSC VHF radio integration

## Chapter contents

- [24.1 Using a DSC VHF radio with your display on page 250](#)
- [24.2 Enabling DSC VHF radio integration on page 250](#)

## 24.1 Using a DSC VHF radio with your display

You can connect your DSC VHF radio to your multifunction display and show distress message information and GPS position data for other vessels.

Connecting a DSC VHF radio to your multifunction display provides the following additional functionality:

- **Distress Messages** — when your DSC VHF radio receives a DSC message or alarm from another DSC VHF radio-equipped vessel, the vessel identification (MMSI), GPS position, and time of distress message is displayed on your multifunction display. With the distress message displayed you can use the buttons provided to: clear the message, place a waypoint on the chart at the GPS position of the distressed vessel, or immediately start navigating (GOTO) to the GPS position of the distressed vessel.
- **Position Data** — the “Position Request” button on your DSC VHF radio enables you to send and receive GPS position data to and from other vessels equipped with a DSC VHF radio.

For information on installing and operating your DSC VHF radio, refer to the handbook that accompanies the radio.

The following image shows an example of a distress message displayed on a multifunction display:



## 24.2 Enabling DSC VHF radio integration

With the homescreen displayed:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **DSC Alerts > ON**.

**Note:** DSC VHF distress messages are only displayed for radios connected via NMEA 0183. DSC VHF distress messages are NOT displayed for SeaTalk radios connected to the display via the SeaTalk to SeaTalkng converter.

# Chapter 25: Customizing your display

## Chapter contents

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- [25.3 Units set-up on page 254](#)
- [25.4 Time and Date set-up on page 255](#)
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- [25.6 Data cell and databar customization on page 258](#)
- [25.7 System set-up menus on page 262](#)

## 25.1 Language selection

The system can operate in the following languages:

English (US)	English (UK)	Arabic
Chinese	Croatian	Danish
Dutch	Finnish	French
German	Greek	Italian
Japanese	Korean	Norwegian
Polish	Portuguese (Brazilian)	Russian
Spanish	Swedish	Turkish

With the homescreen displayed:

1. Select **Customize**.
2. Select **Language**.
3. Select from the languages available.

## 25.2 Boat details

You can customize various aspects of the display's functions to make them specific to your vessel.

Menu item	Description	Options
<b>Boat Type</b>	<p>You can change the appearance of the vessel in the chart application. Select the option that most closely resembles the type and size of your vessel.</p> <div style="border: 1px solid black; padding: 5px;"> <p><b>Note:</b> When boat type is selected during the initial set up of the multifunction display the boat type shall determine the datapage configuration in the data application.</p> </div>	<ul style="list-style-type: none"> <li>• Power Cruiser 1 (default)</li> <li>• Power Cruiser 2</li> <li>• Power Cruiser 3</li> <li>• Inboard Speed Boat</li> <li>• Outboard Speed Boat</li> <li>• Workboat</li> <li>• RIB</li> <li>• Sail Cruiser</li> <li>• Race Sail</li> <li>• Catamaran</li> <li>• Sport Fishing</li> <li>• Pro Fishing</li> </ul>
<b>Minimum Safe Depth</b>	<p>Allows you to specify the hull clearance required by your vessel. Hull clearance information is used by the tide graphs in the chart application to display the times at which the tide will go above or below a safe depth for your vessel's hull. If the tidal water depth is too low for your hull you risk damaging or grounding your vessel.</p> <div style="border: 1px solid black; padding: 5px;"> <p><b>Note:</b> Raymarine recommends adding some contingency from the actual hull clearance to the value selected.</p> </div>	<ul style="list-style-type: none"> <li>• 1.0 to 33.0 (if Depth Units preferences set to Feet)</li> <li>• 0.5 to 10.0 (if Depth Units preferences set to Meters)</li> <li>• 0.1 to 5.0 (if Depth Units preferences set to Fathoms)</li> </ul>
<b>Total Fuel Capacity</b>	<p>Allows you to specify the total fuel capacity of your vessel, this is required in order to enable the fuel manager function.</p>	

### Customizing the vessel icon

With the homescreen displayed:

1. Select **Customize**.
2. Select **Boat Details**.
3. Select **Boat Type**.
4. Select the icon that most closely resembles your vessel type and size.

### Setting the vessel minimum safe depth

With the homescreen displayed:

1. Select **Customize**.
2. Select **Boat Details**.
3. Select **Min. Safe Depth**.
4. Adjust the setting as appropriate.

**Note:** The units for the depth measurement are based on those specified in the **Homescreen > Customize > Units Set-up > Depth Units** menu.

## 25.3 Units set-up

You can specify your preference for the units of measurement that will be used in all applications.

Menu item	Description	Options
<b>Distance Units</b>	The units of measure that will be used in all applications for the display of all values related to distance.	<ul style="list-style-type: none"><li>• Nautical Miles</li><li>• Statute Miles</li><li>• Kilometers</li></ul>
<b>Speed Units</b>	The units of measure that will be used in all applications for the display of all values related to speed.	<ul style="list-style-type: none"><li>• Knots</li><li>• MPH (Miles Per Hour)</li><li>• KPH (Kilometers Per Hour)</li></ul>
<b>Depth Units</b>	The units of measure that will be used in all applications for the display of all values related to depth.	<ul style="list-style-type: none"><li>• Feet</li><li>• Meters</li><li>• Fathoms</li></ul>
<b>Temperature Units</b>	The units of measure that will be used in all applications for the display of all values related to temperature.	<ul style="list-style-type: none"><li>• Fahrenheit</li><li>• Celsius</li></ul>
<b>Pressure Units</b>	The units of measure that will be used in all applications for the display of all values related to pressure.	<ul style="list-style-type: none"><li>• Bar</li><li>• PSI</li><li>• Kilopascals</li></ul>
<b>Volume Units</b>	The units of measure that will be used in all applications for the display of all values related to volume.	<ul style="list-style-type: none"><li>• US Gallons</li><li>• Imperial Gallons</li><li>• Litres</li></ul>

### Specifying preferred units of measurement

1. Select **Customize**.
2. Select **Units Set-up**.
3. Select the type of measurement you want to change (for example, Distance Units).
4. Select the preferred type of unit (for example, Statute Miles).

## 25.4 Time and Date set-up

You can specify your preference for the way that time and date will appear in all applications.

Menu item	Description	Options
<b>Date Format</b>	Allows you to specify the preferred format for the display of date information in all applications.	<ul style="list-style-type: none"><li>• MM:DD:YY (Month, Day, Year)</li><li>• DD:MM:YY (Day, Month, Year)</li></ul>
<b>Time Format</b>	Allows you to specify the preferred format for the display of time information in all applications.	<ul style="list-style-type: none"><li>• 12hr</li><li>• 24hr</li></ul>
<b>Local Time: UTC</b>	Allows you to specify the local time zone that will be used, in terms of an offset from UTC (Universal Coordinated Time), in 0.5 hour increments.	<ul style="list-style-type: none"><li>• -13 to +13 hours (in 0.5 hour increments)</li></ul>

## 25.5 Display preferences

You can specify your preference for general display behavior.

Menu item	Description	Options
<b>Key Beep</b>	An audible sound can be made each time a button is pressed or the touchscreen is used.	<ul style="list-style-type: none"> <li>• ON (default)</li> <li>• OFF</li> </ul>
<b>Cursor Autohide</b>	If set to On, the cursor will be automatically hidden after a period of no movement. If set to Off, the cursor will persist on the screen until moved.	<ul style="list-style-type: none"> <li>• ON</li> <li>• OFF (default)</li> </ul>
<b>Range Controls</b>	<p>On a New e Series display you can specify whether the Chart, Radar and Weather application display the on-screen range in and range out icons.</p> <div style="border: 1px solid black; padding: 5px;"> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>• On-screen range controls are not available on a New c Series display.</li> <li>• On-screen range controls cannot be hidden on a New a Series display.</li> </ul> </div>	<ul style="list-style-type: none"> <li>• Show (default)</li> <li>• Hide</li> </ul>
<b>Shared Brightness</b>	You can set up shared brightness groups (or “zones”) to adjust the brightness on multiple units simultaneously.	<p><b>Share Brightness</b></p> <ul style="list-style-type: none"> <li>• ON (default)</li> <li>• OFF</li> </ul> <p><b>Brightness Group</b></p> <ul style="list-style-type: none"> <li>• Helm 1 (default)</li> <li>• Helm 2</li> <li>• Cockpit</li> <li>• Flybridge</li> <li>• Mast</li> <li>• Group 1</li> <li>• Group 2</li> <li>• Group 3</li> <li>• Group 4</li> <li>• Group 5</li> </ul>
<b>Screenshot File</b>	<p>Enables you to specify the default SD card slot for screen capture images.</p> <div style="border: 1px solid black; padding: 5px;"> <p><b>Note:</b> This option is not available on New a Series displays.</p> </div>	<ul style="list-style-type: none"> <li>• MicroSD 1</li> <li>• MicroSD 2</li> </ul>

### On-screen range controls

You can enable and disable on-screen range controls on a New e Series display by following the steps below.

From the homescreen:

1. Select **Customize**.
2. Select **Display Preferences**.
3. Select **Range Controls**.

Selecting Range Controls will switch between showing and hiding the on-screen range controls.

Once compatible units are added to a shared brightness group, any brightness adjustment made to any of the units in the group is also reflected in all other units in that group. An on-screen single brightness control is available for controlling any units in the brightness group:

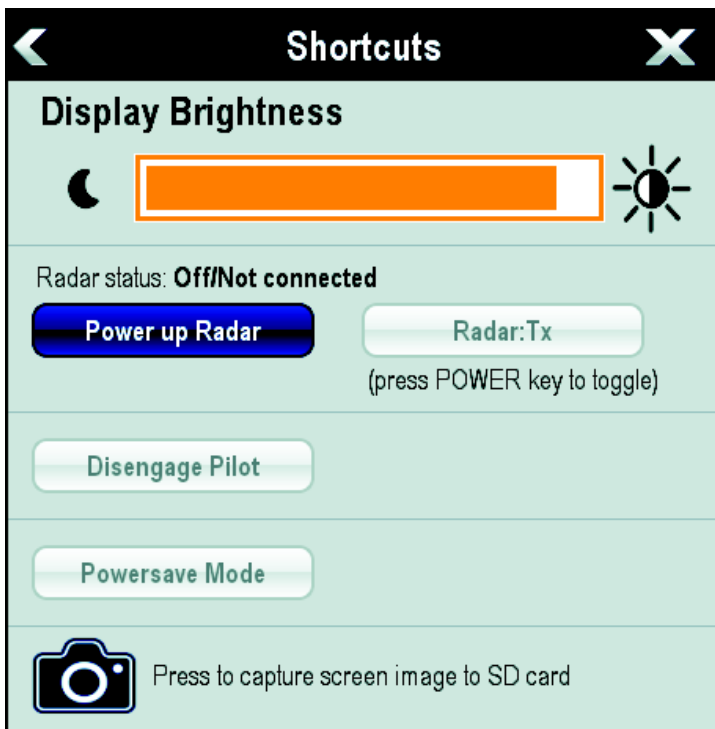
### Shared brightness

You can set up shared brightness groups to adjust the brightness on multiple units simultaneously.

The following units are compatible with shared brightness groups:

- New c Series multifunction displays.
- New e Series multifunction displays.
- i50
- i60
- i70
- p70 / p70R pilot controllers
- ST70
- ST70+





Multiple brightness groups can be configured. This can reflect the physical location of the units on your vessel if required. For example, the units at your helm can be set to one group, and the units on the flybridge can be set to a different group. In this example, any brightness adjustments made to a unit at the helm would be automatically reflected in the other units at the helm but not on the flybridge.

The shared brightness function requires the following:

- All units must be compatible with the shared brightness function (see list of compatible units above).
- Before a unit can respond to a shared brightness adjustment it must be assigned to the relevant **Brightness Group**.
- A single unit can only belong to one brightness group at any one time.
- The **Share brightness** setting must be set to On for all units in the brightness group.
- When setting up a brightness group an initial **Sync brightness** operation must be performed, with all the displays in that group powered on, to configure the display brightness of all units in the group.

## Setting up shared brightness

With the homescreen displayed:

1. Select **Customize**.
2. Select **Display Preferences**.
3. Select **Shared Brightness**.
4. Select the On option for the **Shared brightness** menu item.
5. Select **Brightness Group**.
6. Select an appropriate brightness group.
7. Repeat the process for the other displays you want in the brightness group. If the display is not a multifunction display, refer to the documentation that accompanies the unit for instructions on setting-up shared brightness.
8. Once all required displays have been added to the same brightness group, select **Sync Brightness** on the multifunction display.  
A shared brightness message is displayed.
9. Ensure all displays in the brightness group are powered on.
10. Select **Sync**.

When completed a message is displayed confirming that shared brightness has been configured.

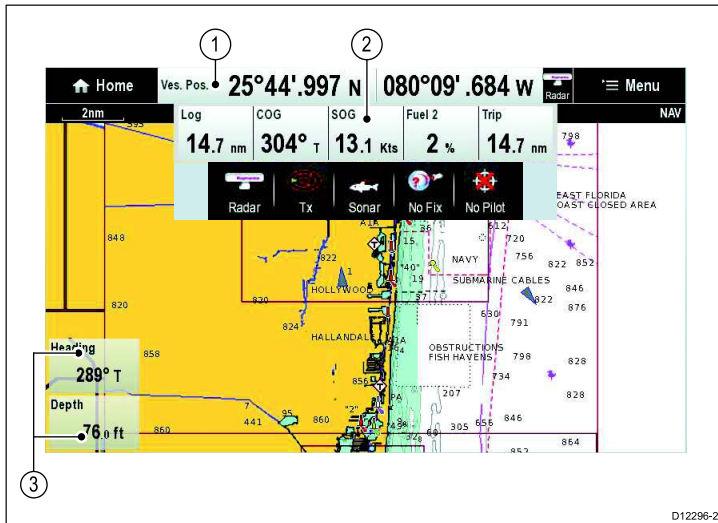
Once shared brightness has been successfully configured, changing the brightness of any display in that brightness group will automatically change the brightness of all displays in that group.

## 25.6 Data cell and databar customization

You can customize the data displayed in on-screen cells with a wide range of data.

Customizable data is displayed in the databar, extended databar (HybridTouch displays only) or data cells areas of the screen. The databar, extended databar and data cells are available in all applications.

The 3 areas of the screen where customizable data is displayed are illustrated and described below:



1. **Databar** — permanently displayed at the top of the screen in the chart, radar, fishfinder, and weather applications. The databar contains data cells that can be customized to display data from a wide range of categories.
2. **Expanded Databar** — (HybridTouch displays only) displayed when you touch the databar. Additional data cells can be displayed, from a wide range of data categories. The expanded databar is displayed until the screen is touched again. You can display the status icons below the expanded databar. This provides status information for external equipment:
3. **Data overlay cells** — up to 2 data cells can be displayed. Each cell can display one item of data from the available data categories. Data is displayed on-screen permanently.

### Customizing data overlay cells

In the chart, radar, fishfinder, or weather application:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Data Overlay Set-up**.
4. To customize Data Cell 1, select **Data Cell 1 > ON**.
5. To customize Data Cell 2, select **Data Cell 2 > ON**.
6. Choose the **Select Data Cell 1** or **Select Data Cell 2** menu item, as appropriate.
7. Select the category that reflects the type of data you want to display in the cell. For example, Depth data.
8. Select the data item.  
The data you selected is displayed on-screen in the appropriate data overlay cell.

### Customizing the databar

From the homescreen:

1. Select **Customize**.
2. Select **Databar Set-up**.
3. Select **Edit Databar**.
4. In the databar, select the cell that you want to change.  
The Select Data Category menu will be displayed.
5. Select the category that reflects the type of data you want to display in the cell. For example, Depth data.
6. Select the data item.  
The data you selected is displayed on-screen in the appropriate cell.
7. Select **Home** or **Back** when completed.

### Displaying status icons in the databar

Touchscreen multifunction displays enable you to display status icons in the databar.

From the homescreen:

1. Select **Customize**.
2. Select **Databar Set-up**.
3. Select **Status Icon Bar** so that On is highlighted.

The status icons are now displayed below the expanded databar.

## List of data items

Depending on connected devices the categories of data available to display in the data application, data overlay, databar, and expanded databar are shown below.

The following table shows the data items available by category.

Data Category	Description	Data Item	Digital	Dial	Graphical
<b>Boat</b>	Types of data generated by your vessel. For example, tank levels.	Fresh Water	✓	✓	✗
		Grey Water	✓	✓	✗
		Black Water	✓	✓	✗
		Live Well	✓	✓	✗
		Trim Tabs (Only available in the Data application.)	✗	✗	✓
<b>Depth</b>	Depth data.	Depth	✓	✗	✗
<b>Distance</b>	Types of data related to distance travelled by your vessel. For example, trip distance.	Log & Trip	✓	✗	✗
		Log	✓	✗	✗
		Trip	✓	✗	✗
		Ground Log, Trip	✓	✗	✗
		Ground Log	✓	✗	✗
		Ground Trip 1	✓	✗	✗
		Ground Trip 2	✓	✗	✗
		Ground Trip 3	✓	✗	✗
		Ground Trip 4	✓	✗	✗
<b>Engine</b>	Types of data generated by engines. For example, oil pressure.	RPM	✓	✓	✗
		Coolant Temperature	✓	✓	✗
		Coolant Pressure	✓	✓	✗
		Oil Pressure	✓	✓	✗
		Boost Pressure	✓	✓	✗
		Alternator	✓	✓	✗
		Engine Load	✓	✓	✗
		Engine Hours	✓	✗	✗
		Engine Tilt	✓	✗	✗

Data Category	Description	Data Item	Digital	Dial	Graphical
Fuel	Types of data related to the fuel system. For example, fuel levels.  <b>Note:</b> The options displayed are dependant on the number of engines set in the data application.	Fuel Level 1 (vol)	✓	✗	✗
		Fuel Level 2 (vol)	✓	✗	✗
		Fuel Level 3 (vol)	✓	✗	✗
		Fuel Level 1 (%)	✓	✓	✗
		Fuel Level 2 (%)	✓	✓	✗
		Fuel Level 3 (%)	✓	✓	✗
		Total Fuel	✓	✓	✗
		Total Fuel Flow	✓	✗	✗
		Total Engine Economy	✓	✗	✗
		Estimated Fuel Remaining	✓	✗	✗
		Estimated Distance to Empty	✓	✗	✗
		Estimated Time to Empty	✓	✗	✗
		Fuel Used (trip)	✓	✗	✗
		Fuel Used (season)	✓	✗	✗
Environment	Environmental-related data. For example, air temperature.	Pressure	✓	✗	✗
		Air Temperature	✓	✗	✗
		Set & Drift	✓	✗	✗
		App Wind Chill	✓	✗	✗
		True Wind Chill	✓	✗	✗
		Humidity	✓	✗	✗
		Dew Point	✓	✗	✗
		Sea Temperature	✓	✗	✗
GPS	GPS-related data. For example, vessel position.	Vessel Position	✓	✗	✗
		COG & SOG	✓	✗	✗
		COG	✓	✗	✗
		SOG	✓	✗	✗
Heading	Heading-related data. For example, locked heading.	Heading	✓	✗	✗
		Locked Heading	✓	✗	✗

Data Category	Description	Data Item	Digital	Dial	Graphical
Navigation	Types of data related to navigation. For example, bearing to waypoint.	Cursor Position (Only available in the Databar and data overlay.)	✓	✗	✗
		Cursor info	✓	✗	✗
		Cross Track Error	✓	✗	✗
		Rolling Road (Only available in the Data application.)	✗	✗	✓
		Compass	✗	✓	✗
		Target Position	✓	✗	✗
		Bearing to Waypoint	✓	✗	✗
		Distance to Waypoint	✓	✗	✗
		WPT TTG	✓	✗	✗
		Waypoint Info	✓	✗	✗
Pilot	Pilot-related data. For example, rudder.	Rudder	✓	✗	✗
Speed	Speed-related data. For example, VMG (Velocity Made Good) to Waypoint.	Speed	✓	✗	✗
		VMG to Waypoint	✓	✗	✗
Time	Time-related data. For example, local time.	Local Time	✓	✗	✗
		Local Date	✓	✗	✗
Wind	Wind-related data. For example, VMG (Velocity Made Good) to Windward.	TWS & TWA	✓	✗	✗
		AWS & AWA	✓	✗	✗
		GWS & GWD	✓	✗	✗
		VMG to Windward	✓	✗	✗
None					

**Note:** The engine data category shown above will contain one set of data items per engine.

## 25.7 System set-up menus

The system set-up menus enable you to configure your display and connected external devices.

The following menus are available:

Menu item	Description	Notes
<b>Alarms</b>	Enables you to configure all the different types of alarms produced by the display and connected equipment.	
<b>Pilot Controls</b>	Displays the Pilot Control dialog.	Only available when a Raymarine autopilot is detected on the system and <b>Autopilot Control</b> is set to On.
<b>Fuel Manager</b>	Displays the Fuel manager page	
<b>Audio Controls</b>	Displays the audio controls pop-up. <div style="border: 1px solid black; padding: 2px; margin-top: 5px;"><b>Note:</b> Not available on New c Series displays.</div>	Only available when connected to an audio device via bluetooth.
<b>Ground Trip Resets</b>	Resets the chosen ground trip distance counter to zero.	
<b>System Settings</b>	Enables you to configure the settings for external devices connected to the display.	
<b>Maintenance</b>	Provides diagnostic information. Also enables you to designate the data master and reset the display to factory settings.	

## Alarms menu

Menu item	Description	Options
<b>MOB Data Type</b>	Determines whether Position or Dead Reckoning (DR) data is displayed. Assuming that your vessel and the MOB are subject to the same tide and wind effects, the Dead Reckoning setting normally gives a more accurate course.	<ul style="list-style-type: none"> <li>• Dead Reckoning</li> <li>• Position (default)</li> </ul>
<b>Alarm Clock</b>	When set to On, an alarm is triggered at the time you specify for the Alarm Clock Time setting.	<p><b>Alarm Clock</b></p> <ul style="list-style-type: none"> <li>• Off (default)</li> <li>• On</li> </ul> <p><b>Alarm Clock Time</b></p> <ul style="list-style-type: none"> <li>• 00:00 (default)</li> <li>• 00.01 to 24:00 hrs</li> </ul>
<b>Anchor Drift</b>	When set to On, the Anchor Drift alarm is triggered when your vessel drifts from your anchor position by more than the distance you specify for the Anchor Drift Range setting.	<p><b>Anchor Drift</b></p> <ul style="list-style-type: none"> <li>• Off (default)</li> <li>• On</li> </ul> <p><b>Anchor Drift Range</b></p> <ul style="list-style-type: none"> <li>• 0.01 — 9.99 nm (or equivalent units)</li> </ul>
<b>Countdown Timer</b>	When set to On, counts down the time period you specify for the Timer Period setting, and triggers an alarm when zero is reached.	<p><b>Countdown Timer</b></p> <ul style="list-style-type: none"> <li>• Off (default)</li> <li>• On</li> </ul> <p><b>Timer Period</b></p> <ul style="list-style-type: none"> <li>• 00h00m (default)</li> <li>• 00h01m to 99h59m</li> </ul>
<b>AIS Targets</b>	When set to On, the alarm for Dangerous Targets is enabled. This option is only available when an AIS unit is detected. Refer to the AIS section for details.	<p><b>Dangerous Targets</b></p> <ul style="list-style-type: none"> <li>• On (default)</li> <li>• Off</li> </ul>
<b>Engine Alarms</b>	When set to On then warning alarms from connected engine management systems will be displayed on the multifunction display.	<p><b>Engine Alarms</b></p> <ul style="list-style-type: none"> <li>• On (default)</li> <li>• Off</li> </ul>
<b>Fishfinder Deep</b>	<p>If this option is set to On, an alarm is triggered when the depth exceeds the value that you specify. This option is only available when a sonar module is detected.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> The Fishfinder Deep alarm limit cannot be set to a value less than the Shallow Limit.</p> </div>	<p><b>Fishfinder Deep</b></p> <ul style="list-style-type: none"> <li>• Off (default)</li> <li>• On</li> </ul> <p><b>Deep Limit</b></p> <ul style="list-style-type: none"> <li>• 2 ft (or equivalent units) to the maximum of the transducer range</li> </ul>
<b>Fishfinder Shallow</b>	<p>If this option is set to On, an alarm is triggered when the depth drops below the value that you specify. This option is only available when a sonar module is detected.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> The Fishfinder Shallow alarm limit cannot be set to a value greater than the Deep Limit.</p> </div>	<p><b>Fishfinder Shallow</b></p> <ul style="list-style-type: none"> <li>• Off (default)</li> <li>• On</li> </ul> <p><b>Shallow Limit</b></p> <ul style="list-style-type: none"> <li>• 2 ft (or equivalent units) to the maximum of the transducer range</li> </ul>
<b>Fish</b>	<p>If the Fish alarm and fish depth limits alarm are set to On, a warning sounds is triggered if any target meets the sensitivity level and is within the Shallow Fish Limit and Deep Fish Limit that you specify. The following items are available in the sub-menu:</p> <ul style="list-style-type: none"> <li>• <b>Fish</b> — Switches fish alarm On and Off.</li> <li>• <b>Fish Sensitivity</b> — If the Fish alarm is set to On, an alarm is triggered when the fish return strength reaches the sensitivity that you specify.</li> <li>• <b>Fish Depth Limits</b> — Switches depth limits On and Off.</li> <li>• <b>Shallow Fish Limit</b> — Specifies the lower value for the Fish Alarm Depth Limit.</li> </ul>	<p><b>Fish</b></p> <ul style="list-style-type: none"> <li>• Off (default)</li> <li>• On</li> </ul> <p><b>Fish Sensitivity</b></p> <ul style="list-style-type: none"> <li>• 1 to 10</li> </ul> <p><b>Fish Depth Limits</b></p> <ul style="list-style-type: none"> <li>• On</li> <li>• Off (default)</li> </ul>

Menu item	Description	Options
	<ul style="list-style-type: none"> <li>• <b>Deep Fish Limit</b> — Specifies the upper value for the Fish Alarm Depth Limit.</li> </ul>	<p><b>Shallow Fish Limit</b></p> <ul style="list-style-type: none"> <li>• 2 ft (or equivalent units) to the maximum of the transducer range</li> </ul> <p><b>Deep Fish Limit</b></p> <ul style="list-style-type: none"> <li>• 2 ft (or equivalent units) to the maximum of the transducer range</li> </ul>
<b>Fuel Manager</b>	In the fuel manager alarm options you can switch the low fuel warning alarm on or off and specify the fuel level at which the alarm is triggered.	<p><b>Low Fuel</b></p> <ul style="list-style-type: none"> <li>• On</li> <li>• Off (default)</li> </ul> <p><b>Fuel Level</b></p> <ul style="list-style-type: none"> <li>• 0 to 99999</li> </ul>
<b>Guard Zone</b>	The Guard Zone feature in the radar application triggers an alarm when a target is within a specified zone. You can adjust the sensitivity of the alarm. Ensure that the sensitivity is not set too low, or targets may be missed and the alarm will not be triggered.	<p><b>Guard Zone Sensitivity</b></p> <ul style="list-style-type: none"> <li>• 1% to 100%</li> </ul>
<b>Off Track</b>	When set to On, during active navigation an alarm is triggered when your vessel steers off-track more than the value you specify for the Off Track XTE setting.	<p><b>Off Track Alarm</b></p> <ul style="list-style-type: none"> <li>• Off (default)</li> <li>• On</li> </ul> <p><b>Off Track XTE</b></p> <ul style="list-style-type: none"> <li>• 0.01 to 9.99 nm (or equivalent units)</li> </ul>
<b>Sea Temperature</b>	When set to On, triggers an alarm when the sea temperature is equal to or lower than the limit you specify for the Lower Temp Limit or equal to or greater than the limit you specify for the Upper Temp Limit setting.	<p><b>Sea Temperature</b></p> <ul style="list-style-type: none"> <li>• Off (default)</li> <li>• On</li> </ul> <p><b>Lower Temp Limit</b></p> <ul style="list-style-type: none"> <li>• 60 degrees fahrenheit (or equivalent units)</li> <li>• -09.9 to +99.7 degrees fahrenheit (or equivalent units)</li> </ul> <p><b>Upper Temp Limit</b></p> <ul style="list-style-type: none"> <li>• 75 degrees fahrenheit (or equivalent units)</li> <li>• -09.7 to 99.9 degrees fahrenheit (or equivalent units)</li> </ul>
<b>Waypoint Arrival</b>	When you arrive at a waypoint, an alarm is triggered. This setting allows you to specify the distance from the target waypoint at which the alarm is triggered. The units used for this setting are based on the units you specify for distance in the Units Set-up menu.	0.01 to 9.99 nm (or equivalent units)



## Ground trip resets menu

This menu enables you to resets the chosen ground trip distance counter to zero.

Menu item	Description
Ground Trip 1 Reset	Resets the ground trip 1 distance counter to zero.
Ground Trip 2 Reset	Resets the ground trip 2 distance counter to zero.
Ground Trip 3 Reset	Resets the ground trip 3 distance counter to zero.
Ground Trip 4 Reset	Resets the ground trip 4 distance counter to zero.

## System settings menu

Menu item	Description	Options
Autopilot Control	Enables and disables autopilot controls from your multifunction display.	<ul style="list-style-type: none"> <li>On</li> <li>Off</li> </ul>
DSC Alerts	Enables and disables DSC radio alerts on your multifunction display.	<ul style="list-style-type: none"> <li>On</li> <li>Off</li> </ul>
GPS Set-up	Provides GPS setting options.	<ul style="list-style-type: none"> <li>View Satellite Status</li> <li>Differential GPS</li> <li>COG/SOG Filter</li> <li>Restart GPS</li> </ul>
Internal GPS	Switches the multifunction displays internal GPS On or Off.  <b>Note:</b> The Internal GPS option is not available on the e165 multifunction display.	<ul style="list-style-type: none"> <li>On</li> <li>Off</li> </ul>
Data Sources	Enables selection of preferred sources of data for connected equipment.  <b>Note:</b> The Data Sources menu is only available on displays set as Data Master.	<ul style="list-style-type: none"> <li>GPS</li> <li>GPS Datum</li> <li>Time and Date</li> <li>Heading</li> <li>Depth</li> <li>Speed</li> <li>Wind</li> </ul>
External Devices	Enables set-up of compatible externally connected devices.	Refer to the <i>External devices menu</i> section of the manual.
Wireless Connections	Provides access to the Wi-Fi and bluetooth connection options.	Refer to the <i>Wireless connections menu</i> section of the manual.
NMEA Set-up	Enables you to configure settings for NMEA devices.	Refer to the <i>NMEA set-up menu</i> section of the manual.
System Preferences	Enables you to configure system settings	Refer to the <i>System preferences menu</i> section of the manual.
Simulator	Switches simulator mode On or Off.	<ul style="list-style-type: none"> <li>Off</li> <li>On</li> <li>On (Demo movie)</li> </ul>

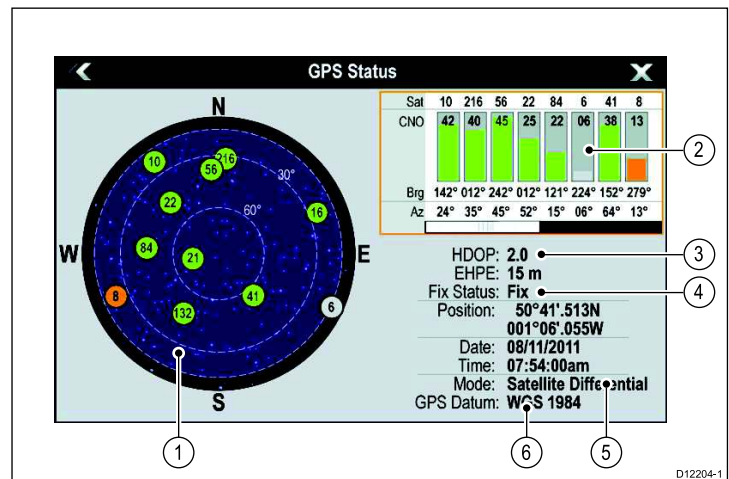
### GPS setup

The GPS setup options enable you to configure a connected GPS receiver.

The Global Positioning System (GPS) is used to position your vessel on the chart. You can set up your GPS receiver and check its status from the GPS Status option in the **System Settings** menu. For each tracked satellite, the screen provides the following information:

- Satellite number.
- Signal strength bar.

- Status.
- Azimuth angle.
- Elevation angle.
- A sky-view to show the position of tracked satellites.



Item	Description
1	<b>Sky view</b> — a visual representation of the position of tracked satellites.
2	<b>Satellite status</b> — displays the signal strength and status of each satellite identified in the sky view diagram on the left of the screen. The colored bars have the following meanings: <ul style="list-style-type: none"> <li>Grey = searching for satellite.</li> <li>Green = satellite in use.</li> <li>Orange = tracking satellite.</li> </ul>
3	<b>Horizontal Dilution of Position (HDOP)</b> — a measure of GPS accuracy, calculated from a number of factors including satellite geometry, system errors in the data transmission and system errors in the GPS receiver. A higher figure signifies a greater positional error. A typical GPS receiver has an accuracy of between 5 and 15 m. As an example, assuming a GPS receiver error of 5 m, an HDOP of 2 would represent an error of approximately 15 m. Please remember that even a very low HDOP figure is NO guarantee that your GPS receiver is providing an accurate position. If in doubt, check the displayed vessel position in the chart application against your actual proximity to a known charted object.
4	<b>Fix status</b> — indicates the actual mode the GPS receiver is reporting (No Fix, Fix, D Fix or SD Fix).
5	<b>Mode</b> — the mode currently selected by the GPS receiver.
6	<b>Datum</b> — The GPS receiver's datum setting affects the accuracy of the vessel position information displayed in the chart application. In order for your GPS receiver and multifunction display to correlate accurately with your paper charts, they must be using the same datum.

The accuracy of the GPS receiver depends on the parameters detailed above, especially the azimuth and elevation angles which are used in triangulation to calculate your position.

### Multiple data sources (MDS) overview

Installations that include multiple instances of data sources can cause data conflicts. An example is an installation featuring more than one source of GPS data.

MDS enables you to manage conflicts involving the following types of data:

- GPS Position.
- Heading.
- Depth.
- Speed.
- Wind.

Typically this exercise is completed as part of the initial installation, or when new equipment is added.

This menu enables you to select the external sensors and devices that will provide data to the display.

### Auto / manual selection

Each dialog enables you to view and select your preferred data source. selection of data source can be manual or set to automatic:

- **Auto** — the display will automatically select a device and attempt to resolve any data conflicts that may occur where there is more than one source of data for that particular data source (for example, multiple GPS receivers).

If this exercise is NOT completed the system will automatically attempt to resolve data conflicts. However, this may result in the system choosing a source of data that you do not want to use.

If MDS is available the system can list the available data sources and allow you to select your preferred data source. For MDS to be available all products in the system that use the data sources listed above must be MDS-compliant. The system can list any products that are NOT compliant. It may be necessary to upgrade the software for these non-compliant products to make them compliant. Visit the Raymarine website ([www.raymarine.com](http://www.raymarine.com)) to obtain the latest software for your products. If MDS-compliant software is not available and you do NOT want the system to automatically attempt to resolve data conflicts, any non-compliant product(s) can be removed or replaced to ensure the entire system is MDS-compliant.

### Data sources menu

- **Manual** — once the display has performed a search for connected devices you can manually select the preferred device from the list.

**Note:** Selecting the **Auto** option may result in the system choosing a source of data that you do not want to use.

### Device selection

Menu item	Description
GPS	Enables you to search for any externally-connected GPS devices, and select the one you want to use.
GPS Datum	In order for your GPS receiver and multifunction display to correlate accurately with your paper charts, they must be using the same datum. This option enables you to choose the data source for this datum.
Time and Date	Enables you to select the device you want to use for the time and date information used by the display.
Heading	Enables you to select the device you want to use for heading data.
Depth	Enables you to select the device you want to use for depth data.
Speed	Enables you to select the device you want to use for speed data.
Wind	Enables you to select the device you want to use for wind data.

### External devices menu

This menu enables you to configure the external devices connected to the display.

Menu item	Description	Notes
Fishfinder Set-up	Enables you to select an external transducer and configure the options for the unit, such as depth offset. Also enables you to configure the options for an internal or external sonar module.	For an explanation of these options refer to the <i>Transducer set-up menu options</i> described in the Fishfinder section of this document.
Radar Set-up	Enables you to make radar scanner adjustments, such as tune adjust and time transmit.	For an explanation of these options refer to the <i>Scanner set-up menu options</i> described in the Radar section of this document.
AIS Unit Set-up	Enables you to configure additional functions for AIS units, such as Silent Mode. This menu item is only available when an AIS unit is detected or when Simulator mode is On.	For an explanation of these options refer to the <i>AIS menu options</i> described in the AIS section of this document.
Remote Control	Enables you to customize certain controls for Raymarine Bluetooth remote control units (for example, RCU-3).	For an explanation of these options refer to the <i>Remote Control</i> section of this document.
Transducers Set-up	Displays a list of connected transducers which you can select and calibrate.	
Weather Set-up	Enables you to select the bus your weather receiver is connected to: <ul style="list-style-type: none"> <li>• SeaTalk<sup>hs</sup></li> <li>• SeaTalk<sup>ng</sup></li> </ul>	

## Connections menu

This menu enables you to connect wireless Bluetooth and Wi-Fi devices to the display.

Menu item	Description	Options
Bluetooth	Enable or disable Bluetooth on the display.	<ul style="list-style-type: none"> <li>• On</li> <li>• Off (default)</li> </ul>
Wi-Fi	Enable or disable Wi-Fi on the display.	<ul style="list-style-type: none"> <li>• On</li> <li>• Off (default)</li> </ul>
Connection Manager	<p>Provides a list of Bluetooth devices in range. When you highlight a connection in the list and press OK, the following options are available:</p> <ul style="list-style-type: none"> <li>• <b>Unpair / Forget this device</b> — Disconnect the device and remove it from the connection list. If you unpair a device in this way you must re-pair the device if you want to connection it again to the multifunction display.</li> <li>• <b>Audio Control</b> — If this option is set to On, you can control the audio for a compatible wireless media player, from the multifunction display.</li> </ul>	<ul style="list-style-type: none"> <li>• Unpair / Forget this device</li> <li>• Audio control On / Off.</li> </ul>
New Bluetooth Connection	Selecting this menu item initiates the Bluetooth pairing process. This is necessary for connecting a wireless remote control unit or media player device to the multifunction display.	
Wi-Fi Name	Enables you to specify an SSID (WiFi Name) for connecting WiFi devices using an encrypted connection. If you want to prevent unauthorized devices from connecting to your display you must specify the same SSID for both the multifunction display and the wireless device you want to connect to the display.	
Wi-Fi Security	You can encrypt the WiFi connection on the multifunction display to prevent unauthorized devices from accessing the connection. This menu item enables you to select the type of WPA (WiFi Protected Access) encryption you want to use. WPA2 provides stronger security than WPA.	<ul style="list-style-type: none"> <li>• None</li> <li>• WPA Only</li> <li>• WPA 2 Only. (default)</li> <li>• WPA / WPA2.</li> </ul>
Wi-Fi Passphrase	Enables you to specify a password for the WiFi connection. If you want to prevent unauthorized devices from connecting to your display you must specify the same password for both the multifunction display and the wireless device you want to connect to the display.	
Wi-Fi Channel	By default the multifunction display automatically selects an available WiFi channel. If you're experiencing difficulties with wireless video streaming it may be necessary to manually specify a WiFi channel for both the multifunction display and the device you want to stream video to.	<ul style="list-style-type: none"> <li>• 1 (default)</li> <li>• 2</li> <li>• 3</li> <li>• 4</li> <li>• 5</li> <li>• 6</li> <li>• 7</li> <li>• 8</li> <li>• 9</li> <li>• 10</li> <li>• 11</li> </ul>
Mobile apps	<p>Enables you to select the type of mobile app in use:</p> <ul style="list-style-type: none"> <li>• Viewing only — RayView</li> <li>• Remote Control — RayRemote or RayControl</li> </ul>	<ul style="list-style-type: none"> <li>• Off (default)</li> <li>• Viewing only</li> <li>• Remote Control</li> </ul>

## NMEA Set-up menu

This menu enables you to configure settings for NMEA devices.

Menu item	Description	Options
Bridge NMEA Heading	If set to ON, NMEA heading data will be bridged onto the SeaTalk data bus, and will be sent to all NMEA-connected devices. If set to OFF, NMEA heading data will NOT be bridged onto the SeaTalk bus. An example of a use for this setting is when using MARPA with an external fast heading sensor, in which case you	<ul style="list-style-type: none"> <li>• On</li> <li>• Off (default)</li> </ul>

Menu item	Description	Options
	should set this option to OFF to ensure that all NMEA-connected units receive heading data from the external heading sensor.	
<b>NMEA Output Settings</b>	Allows you to enable or disable the individual NMEA "sentences" that are sent by the multifunction display to any devices connected the NMEA output port.	<ul style="list-style-type: none"> <li>• APB</li> <li>• BWC</li> <li>• BWR</li> <li>• DBT</li> <li>• DPT</li> <li>• GGA</li> <li>• GLL</li> <li>• GSA</li> <li>• GSV</li> <li>• MTW</li> <li>• MWV</li> <li>• RMA</li> <li>• RMB</li> <li>• RMC</li> <li>• RSD</li> <li>• RTE</li> <li>• TTM</li> <li>• VHW</li> <li>• VLW</li> <li>• VTG</li> <li>• WPL</li> <li>• ZDA</li> </ul>
<b>NMEA Input Port 1</b>	Enables you to specify the appropriate port speed for the equipment connected to NMEA Input port 1. Use the AIS 38400 option for AIS receivers.	<ul style="list-style-type: none"> <li>• NMEA 4800</li> <li>• AIS 38400</li> </ul>
<b>NMEA Input Port 2</b>	Enables you to specify the appropriate port speed for the equipment connected to NMEA Input port 2. Use the AIS 38400 option for AIS receivers.	<ul style="list-style-type: none"> <li>• NMEA 4800</li> <li>• AIS 38400</li> </ul>

### System preferences menu

Menu item	Description	Options
<b>Bearing mode</b>	Determines how all bearing and heading data is displayed in. This does not affect how the chart or radar displays are drawn.	<ul style="list-style-type: none"> <li>• True (default)</li> <li>• Magnetic</li> </ul>
<b>Variation Source</b>	This setting compensates for the naturally occurring offset of the earth's magnetic field. When set to Auto, the system automatically compensates, and displays the compensation value in brackets. To enter your own compensation value, use the Manual option, then specify the value using the Manual Variation setting (see below). This value is also transmitted to any other connected Raymarine instruments.	<ul style="list-style-type: none"> <li>• Auto (compensation value displayed) (default)</li> <li>• Manual</li> </ul>
<b>Manual Variation</b>	When the Variation Source menu item is set to Manual (see above), you use the Manual Variation setting to specify the compensation value that you want to use.	<ul style="list-style-type: none"> <li>• Range: 0 to 30 degrees, East or West</li> <li>•</li> </ul>
<b>System Datum</b>	<p>In order for your GPS receiver and multifunction display to correlate accurately with your paper charts, they must be using the same datum.</p> <p>The default datum for your multifunction display is WGS1984. If this is not the datum used by your paper charts, you can change the datum used by your multifunction display.</p> <p>When you change the datum for your multifunction display, the chart grid will subsequently move according to the new datum, and the latitude / longitude of the cartographic features will also change accordingly. Your multifunction display will attempt to set up any GPS receiver to the new datum, as follows:</p> <ul style="list-style-type: none"> <li>• The internal GPS receiver will automatically correlate each time you change the datum.</li> </ul>	

Menu item	Description	Options
	<ul style="list-style-type: none"> <li>• If you have a Raymarine GPS receiver using SeaTalk or SeaTalk<sup>ng</sup>, it will automatically correlate each time you change the datum on the multifunction display.</li> <li>• If you have a Raymarine GPS receiver using NMEA 0183, or a third-party GPS receiver, you must correlate it separately.</li> </ul> <p>It may be possible to use your multifunction display to correlate an NMEA 0183 GPS receiver. From the homescreen go to <b>Set-up &gt; System settings &gt; GPS Set-up &gt; View Satellite Status</b>. If the datum version is displayed, it may be possible to change it. From the homescreen go to <b>Set-up &gt; System settings &gt; Data Sources &gt; GPS Datum</b>.</p> <div style="border: 1px solid black; padding: 5px;"> <p><b>Note:</b> Raymarine recommends that you check the displayed vessel position in the chart application against your actual proximity to a known charted object. A typical GPS has an accuracy of between 5 and 15 m.</p> </div>	

## Maintenance menu

This menu provides access to systems settings reset and diagnostics.

Menu item	Description	Options
<b>Touchscreen Alignment</b>	<p>If the touchscreen is misaligned to your touch, you can realign it to improve the accuracy. Realignment involves a simple exercise to align an on-screen object with your touch. For best results, perform this exercise when your vessel is anchored or moored.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> The Touchscreen alignment option is not required on New c Series displays.</p> </div>	
<b>Data Master</b>	Any system containing more than one networked multifunction display must have a designated data master. The data master is the display which serves as a primary source of data for all displays, it also handles all external sources of information.	
<b>Compatibility</b>	Compatibility mode should be used when connecting the display to a system which includes any of the following Raymarine multifunction displays: E90W, E120W, E140W or a G-Series (GPM400) system. Not all functions will be available refer to the <i>Network constraints</i> sections.	<ul style="list-style-type: none"> <li>• On</li> <li>• Off</li> </ul>
<b>System Settings Reset</b>	This option resets your menu options, datapages, and databar settings to factory default. It will NOT affect your waypoints, routes, or tracks data.	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>
<b>System Settings and Data Reset</b>	In addition to the settings reset detailed above, performing a settings and data reset will also remove ALL waypoints, routes, and tracks data.	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>
<b>Diagnostics</b>	<p>Diagnostics provides detailed information on the multifunction display and connected devices. The range of information available includes product serial number, software version, and network status. When you select the Diagnostics menu item the multifunction display scans for any connected equipment and enables you to select the product you want to view. You can also save the diagnostics information to a memory card. This is particularly useful for sending detailed information to Raymarine Customer Support in the event of a technical issue.</p> <p>The Interfaces option allows to view statistics and buffer information for NMEA ports 1 and 2 and SeaTalk<sup>ng</sup>.</p> <p>The Sirius options allows you to view received messages, memory and errors.</p>	<ul style="list-style-type: none"> <li>• Select Device</li> <li>• Sirius</li> <li>• Save Logs</li> <li>• Erase Logs</li> <li>• Interfaces</li> </ul>

## Diagnostics menu

If you encounter problems with your multifunction display or peripheral devices you can use the Diagnostics menu to view information about your device and connected equipment.

<b>Select Device</b>	Enables you to a list of all devices connected to the SeaTalk <sup>hs</sup> network. You can also select an item in the list to view further details for that device.	<ul style="list-style-type: none"> <li>• Device</li> <li>• Serial No.</li> <li>• Network</li> <li>• Software</li> </ul>
<b>Sirius</b>	If connected to a Sirius weather receiver this option enables you to view Sirius weather statistics.	
<b>Save Logs</b>	Allows you to save error logs to SD card for troubleshooting purposes.	
<b>Erase Logs</b>	Selecting this option will erase any crash logs on the device.	
<b>Interfaces</b>	Enables viewing of statistics and viewing and recording of buffers on NMEA inputs and the SeaTalk <sup>ng</sup> bus. On New c Series and New e Series displays you can also choose which SD card slot the buffer will be recorded too.	<ul style="list-style-type: none"> <li>• NMEA 1</li> <li>• NMEA 2</li> <li>• SeaTalk<sup>ng</sup></li> <li>• Record File</li> </ul>

# Chapter 26: Maintaining your display

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- [26.2 Cleaning on page 272](#)

## 26.1 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.

### 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.

## 26.2 Cleaning

Best cleaning practices.

When cleaning this product:

- Do NOT wipe the display screen with a dry cloth, as this could scratch the screen coating.
- Do NOT use abrasive, or acid or ammonia based products.
- Do NOT use a jet wash.

### Cleaning the display case

The display unit is a sealed unit and does not require regular cleaning. If it is necessary to clean the unit, follow this basic procedure:

1. Switch off the power to the display.
2. Wipe the display with a clean, soft cloth (a microfibre cloth is ideal).
3. If necessary, use isopropyl alcohol (IPA) or a mild detergent to remove grease marks.

**Note:** Do NOT use IPA or any other solvent or detergent on the screen itself.

**Note:** In certain conditions, condensation may appear inside the display screen. This will not harm the unit, and can be cleared by powering on the display for a short time.

### Cleaning the display screen

A coating is applied to the display screen. This makes it water repellent, and prevents glare. To avoid damaging this coating, follow this procedure:

1. Switch off the power to the display.
2. Rinse the screen with fresh water to remove all dirt particles and salt deposits.
3. Allow the screen to dry naturally.
4. If any smears remain, very gently wipe the screen with a clean microfibre cleaning cloth (available from an opticians).



# Chapter 27: Troubleshooting

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## 27.1 Troubleshooting

The troubleshooting information provides possible causes and corrective action required for common problems associated with marine electronics installations.

All Raymarine products are, prior to packing and shipping, subjected to comprehensive test and quality assurance programs. However, if you experience problems with the operation of your product this section will help you to diagnose and correct problems in order to restore normal operation.

If after referring to this section you are still having problems with your unit, please contact Raymarine Technical Support for further advice.

## 27.2 Power up troubleshooting

Problems at power up and their possible causes and solutions are described here.

Problem	Possible causes	Possible solutions
The system (or part of it) does not start up.	Power supply problem.	Check relevant fuses and breakers.
		Check that the power supply cable is sound and that all connections are tight and free from corrosion.
		Check that the power source is of the correct voltage and sufficient current.

## 27.3 Radar troubleshooting

Problems with the radar and their possible causes and solutions are described here.

Problem	Possible causes	Possible solutions
No Data or No scanner message	Radar scanner power supply	Check that the scanner power supply cable is sound and that all connections are tight and free from corrosion.
		Check relevant fuses and breakers.
		Check power source is of the correct voltage and sufficient current (using voltage booster if appropriate).
	SeaTalk <sup>hs</sup> / RayNet network problem	Check that the Scanner is correctly connected to a Raymarine network switch or SeaTalk <sup>hs</sup> crossover coupler (as applicable).
		Check the status of the Raymarine network switch.
		Check that SeaTalk <sup>hs</sup> / RayNet cables are free from damage.
Software mismatch between equipment may prevent communication.	Contact Raymarine technical support.	
Switch at scanner pedestal in OFF position	Ensure scanner pedestal switch is in ON position.	
Radar will not initialize (Voltage control module (VCM) stuck in "sleep mode")	Intermittent or poor power connection	Check power connection at VCM. (Voltage at input = 12 / 24 V, Voltage at output = 40 V)
The bearing of a target on the radar screen is incorrect.	The radar bearing alignment requires correcting.	Check and adjust radar bearing alignment.

## 27.4 GPS troubleshooting

Problems with the GPS and their possible causes and solutions are described here.

Problem	Possible causes	Possible solutions
"No Fix" GPS status icon is displayed.	Geographic location or prevailing conditions preventing satellite fix.	Check periodically to see if a fix is obtained in better conditions or another geographic location.
	GPS connection fault.	Ensure that external GPS connections and cabling are correct and fault free.
	External GPS antenna in poor position. For example: <ul style="list-style-type: none"><li>• Below decks.</li><li>• Close proximity to transmitting equipment such as VHF radio.</li></ul>	Ensure GPS antenna has a clear view of the sky.
	GPS installation problem.	Refer to the installation instructions.

**Note:** A GPS Status screen is available within the Setup menu of Raymarine multifunction displays. This provides satellite signal strength and other relevant information.

## 27.5 Sonar troubleshooting

Problems with the sonar and their possible causes and solutions are described here.

Problem	Possible causes	Possible solutions
Sonar data not available on multifunction display.	Unit power supply fault.	Check the unit power supply and cables.
	Other unit fault.	Refer to the instructions supplied with the unit.
	SeaTalk <sup>hs</sup> / RayNet network problem.	Check that the unit is correctly connected to a Raymarine network SeaTalk <sup>hs</sup> switch or crossover coupler (as applicable).
		Check the status of the Raymarine network switch (if applicable).
		Check that SeaTalk <sup>hs</sup> / RayNet cables are free from damage.
Software mismatch between equipment may prevent communication.	Contact Raymarine technical support.	
Problematic depth readings or sonar image.	Gain or Frequency settings may be inappropriate for present conditions.	Check the sonar presets, gain and frequency settings.
	Unit power supply fault	Check the voltage from the power supply, if this is too low it can affect the transmitting power of the unit.
	Unit cable fault.	Ensure that the power, transducer and all other cables to the unit are properly connected and free from damage.
	Transducer fault	Check that the transducer is mounted correctly and is clean.
		If you have a transom-mount transducer, check that the transducer hasn't kicked up due to hitting an object.
	Other unit fault.	Refer to the instructions supplied with the unit.
	Vessel stationary	Fish arches are not displayed if the vessel is stationary, fish will appear on the display as straight lines.
	High vessel speed	Turbulence around the transducer may be confusing the unit.
Scroll speed set to zero	Adjust scroll speed	
Incorrect speed reading	Paddle wheel fault	Check that the paddle wheel is clean.
	No speed offset set	Add speed offset.
	Incorrect calibration	Re-calibrate equipment

## 27.6 Thermal camera troubleshooting

Problems with the thermal camera and their possible causes and solutions are described here.

Problem	Possible causes	Possible solutions
Video not displayed.	Camera is in Standby mode.	The camera will not display video if it is in Standby mode. Use the camera controls (either the thermal camera application or JCU) to "wake" the camera from standby.
	Problem with the thermal camera video connections.	<ul style="list-style-type: none"> <li>• Check thermal camera video cables are sound and properly connected.</li> <li>• Ensure that the video is connected into video input 1 at the multifunction display or GVM.</li> <li>• Ensure that the correct video input is selected at the display.</li> </ul>
	Problem with power supply to the camera or JCU (if used as the primary controller)	<ul style="list-style-type: none"> <li>• Check the power connections to the camera and JCU / PoE injector (if used).</li> <li>• Ensure that the power switch / breaker is on.</li> <li>• Check the fuse / breaker state.</li> </ul>
Cannot control thermal camera from Raymarine display or keyboard.	Thermal camera application is not running.	Ensure the thermal camera application is running on the multifunction display (as oppose to the video application which does not have camera controls).
Erratic or unresponsive controls.	Network problem.	Check that the controller and thermal camera are correctly connected to the network. (Note: This may be a direct connection or via a Raymarine network switch.)
		Check the status of the Raymarine network switch.
		Check that SeaTalk <sup>hs</sup> / RayNet cables are free from damage.
	Control conflict, e.g. caused by multiple users at different stations.	Ensure that no other controllers are in use at the same time.
Problem with the controller.	Check power / network cabling to the controller and PoE injector (PoE only used with optional Joystick Control Unit).	
	Check other controllers if available. If other controllers are operating this will eliminate the possibility of a more fundamental camera fault.	
Cannot switch between thermal and visible (VIS / IR) video image .	Camera is not a dual payload model.	Only "dual payload" (dual lens) thermal cameras support VIS / IR switching.
	VIS / IR cable not connected.	Ensure that the VIS / IR cable is connected from the camera to the Raymarine system. (The IR-only cable does not support switching).
Noisy image.	Poor quality or faulty video cable.	Ensure that the video cable is no longer than necessary. The longer the cable is (or the smaller the wire gauge / thickness), the more severe the losses become. Use only high quality shielded cable suitable for a marine environment.
	Cable is picking up electromagnetic interference (EMI) from another device.	<ul style="list-style-type: none"> <li>• Ensure you are using a high quality shielded cable.</li> <li>• Ensure proper cable separation, for example do not run data and power cables in close proximity with each other.</li> </ul>
Image too dark or too light.	Display brightness is set too low.	Use the brightness controls at the display to adjust accordingly.
	The contrast or brightness settings in the thermal camera application are set too low.	Use the appropriate menu in the thermal camera application to adjust the contrast and brightness of the image.
	The Scene Mode is not appropriate for the current conditions.	A particular environment may benefit from a different Scene Mode setting. For example, a very cold background (such as the sky) could cause the camera to use a wider temperature range than appropriate. Use the <b>SCENE</b> button.
Image freezes momentarily.	FFC (Flat Field Correction).	The image will pause momentarily on a periodic basis during the Flat Field Correction (FFC) cycle. Just prior to the FFC, a small green square will appear in the upper left corner of the screen.
Image is inverted (upside down).	Camera "Ball down" setting is incorrect.	Ensure that the Ball down setting within the thermal camera system setup menu is set correctly.

## 27.7 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 <sup>®</sup> ) wiring and connections.
		Check the overall integrity of the data bus (e.g. SeaTalk <sup>®</sup> ) wiring.
		If available refer to the reference guide for the data bus. (e.g. SeaTalk <sup>®</sup> 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 <sup>hs</sup> / RayNet cables are free from damage.
	Software mismatch between equipment may prevent communication.	Contact Raymarine technical support



## 27.8 Video troubleshooting

Problems with the video inputs and their possible causes and solutions are described here.

Problem	Possible causes	Possible solutions
No signal message on screen (video image not displayed)	Cable or connection fault	Check that the connections are sound and free from corrosion.

## 27.9 Wi-Fi troubleshooting

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

Problem	Possible causes	Possible solutions
No wireless connection.	Tablet / smartphone does not have a wireless connection established with the multifunction display.	Ensure that Wi-Fi is enabled on the multifunction display ( <b>Homescreen: &gt; Set-Up &gt; System Settings &gt; Wireless Connections &gt; Wi-Fi &gt; On</b> ).
		Ensure that the "Wi-Fi" option is enabled on the iPhone (available from the phone's Settings menu).
		Ensure that the Raymarine connection is selected as the W-iFi network. If a passcode has been specified for the multifunction display's Wi-Fi connection ensure that the same passcode is entered into the iPhone when prompted.
No Raymarine app on device	Tablet / smartphone does not have Raymarine app installed and running.	Download the required Raymarine app from the relevant application store. Start the Raymarine app on your device.
	Mobile applications are NOT enabled on the multifunction display.	Enable "Viewing only" or "Remote Control" ( <b>Homescreen: &gt; Set-Up &gt; System Settings &gt; Wireless Connections &gt; Mobile Apps</b> ).
Raymarine app runs slowly or not at all.	Device not compatible with Raymarine app	Recommended device requirements: <ul style="list-style-type: none"> <li>• iOS Devices = Best performance achieved on iPhone 4 or later and iPad 2 or later.</li> <li>• Android/Kindle Fire = Best performance achieved with 1GHz processor and better and running 2.2.2. or later.</li> </ul>
	MFD software incompatible with mobile application	Ensure your MFD contains software application version 3.15 or later.
No waypoint / routes synchronization with Navionic Marine app.	Smartphone / tablet does not have "Navionics Marine" app installed and running.	Download the "Navionics Marine" app from the relevant app store. Start the "Navionics Marine" app on the device.
	Chart application is not running on the multifunction display.	Start the chart application on the multifunction display.
Weak or intermittent Wi-Fi signal.	Interference from other wireless devices in the vicinity.	Multiple wireless devices running simultaneously (such as laptops, phones, and other wireless devices) can sometimes cause wireless signal conflicts. Temporarily disable each wireless device in turn until you have identified the device causing the interference.
Smartphone / tablet can no longer connect to the internet or receive e-mails after using a Raymarine mobile app.	Device still connected to the multifunction display.	Ensure the access point on your device is switched back to your previous access point (e.g. the marina Wi-Fi).

## 27.10 Bluetooth troubleshooting

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

Problem	Possible causes	Possible solutions
No wireless connection.	iPhone does not have a Bluetooth connection established with the multifunction display.	Ensure that Bluetooth is enabled on the multifunction display ( <b>Homescreen: &gt; Set-Up &gt; System Settings &gt; Connections &gt; Bluetooth &gt; On</b> ).
		Ensure that the "Bluetooth" option is enabled on the iPhone (available from the phone's Settings / General menu).
		Ensure that the Bluetooth device is paired with the multifunction display that you want to use it with. To do this: <b>Homescreen: &gt; Set-Up &gt; System Settings &gt; Connections &gt; New Bluetooth Connection</b> .
No media player control.	Media player device is not compatible with the Bluetooth AVRCP protocol (version 2.1 or higher).	Check the Bluetooth AVRCP compatibility with the device manufacturer. If the device is not Bluetooth AVRCP compatible then it is not suitable for wireless use with the multifunction display.
	"Audio Control" is NOT enabled on the multifunction display.	Enable "Audio Control" ( <b>Homescreen: &gt; Set-Up &gt; System Settings &gt; Connections &gt; Connections Manager &gt; Audio Control &gt; On</b> ).
Weak or intermittent Bluetooth signal.	Interference from other wireless devices in the vicinity.	Multiple wireless devices running simultaneously (such as laptops, phones, and other wireless devices) can sometimes cause wireless signal conflicts. Temporarily disable each wireless device in turn until you have identified the device causing the interference.

## 27.11 Touchscreen troubleshooting

Problems with the touchscreen and their possible causes and solutions are described here.

<b>Problem</b>	<b>Possible causes</b>	<b>Possible solutions</b>
Touchscreen does not operate as expected	Touch lock is enabled	Use the Trackpad to turn off the touch lock on the home screen.
	Screen is not being operated with bare fingers, for example gloves are being worn	Bare fingers must make contact with the screen for correct operation. Alternatively you may use conductive gloves.
	Touchscreen requires calibration	Use the setup menus to calibrate the touchscreen.
	Saltwater deposits on the screen	Carefully clean and dry the screen in accordance with the instructions provided.

## 27.12 Miscellaneous troubleshooting

Miscellaneous problems and their possible causes and solutions are described here.

Problem	Possible causes	Possible solutions
Display behaves erratically: <ul style="list-style-type: none"> <li>• Frequent unexpected resets.</li> <li>• System crashes or other erratic behavior.</li> </ul>	Intermittent problem with power to the display.	Check relevant fuses and breakers.
		Check that the power supply cable is sound and that all connections are tight and free from corrosion.
		Check that the power source is of the correct voltage and sufficient current.
	Software mismatch on system (upgrade required).	Go to <a href="http://www.raymarine.com">www.raymarine.com</a> and click on support for the latest software downloads.
	Corrupt data / other unknown issue.	Perform a factory reset. <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p><b>Important:</b> This will result in the loss of any settings and data (such as waypoints) stored on the product. Save any important data to a memory card before resetting.</p> </div>



# Chapter 28: Technical support

## Chapter contents

- [28.1 Raymarine customer support on page 288](#)
- [28.2 Third-party support on page 288](#)

## 28.1 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](http://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:** [support@raymarine.com](mailto:support@raymarine.com)

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

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

## Viewing product information

With the homescreen displayed:

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

## 28.2 Third-party support

Contact and support details for third-party suppliers can be found on the appropriate websites.

### Navionics

[www.navionics.com](http://www.navionics.com)

### Sirius

[www.sirius.com](http://www.sirius.com)



# Chapter 29: Technical specification

## Chapter contents

- [29.1 Technical specification on page 290](#)

## 29.1 Technical specification

### New a Series physical specifications

<b>Dimensions</b>	<ul style="list-style-type: none"> <li>Width: 163.57 mm (6.44 in)</li> <li>Height (NOT including bracket): 143.47 mm (5.65 in)</li> <li>Height (including bracket): 162.72 mm (6.41 in)</li> <li>Depth (NOT including cables): 74.1 mm</li> <li>Depth (including cables): 167.5 mm (6.6 in)</li> </ul>
<b>Weight (bare unit)</b>	0.715 kg (1.58 lbs)

### e7 / e7D Physical specifications

<b>Dimensions</b>	<ul style="list-style-type: none"> <li>Width: 233 mm (9.17 in.)</li> <li>Height (NOT including bracket): 145 mm (5.71 in.)</li> <li>Height (including bracket): 180 mm (7.09 in.)</li> <li>Depth (NOT including cables): 64 mm (2.52 in.)</li> <li>Depth (including cables): 160 mm (6.29 in.)</li> </ul>
<b>Weight (bare unit)</b>	<b>e7</b> <ul style="list-style-type: none"> <li>1.465 kg (3.23 lb.)</li> </ul> <b>e7D</b> <ul style="list-style-type: none"> <li>1.550 kg (3.42 lb.)</li> </ul>
<b>Weight (boxed unit)</b>	<b>e7</b> <ul style="list-style-type: none"> <li>2.385 kg (5.26 lb.)</li> </ul> <b>e7D</b> <ul style="list-style-type: none"> <li>2.423 kg (5.34 lb.)</li> </ul>

### e95 / e97 / c95 / c97 Physical specifications

<b>Dimensions</b>	<ul style="list-style-type: none"> <li>Width: 290 mm (11.42 in.)</li> <li>Height (NOT including bracket): 173 mm (6.81 in.)</li> <li>Height (including bracket): 212 mm (8.35 in.)</li> <li>Depth (NOT including cables): 64 mm (2.52 in.)</li> <li>Depth (including cables): 160 mm (6.29 in.)</li> </ul>
<b>Weight (bare unit)</b>	<b>e95 / c95</b> <ul style="list-style-type: none"> <li>2.165 kg (4.77 lb.)</li> </ul> <b>e97 / c97</b> <ul style="list-style-type: none"> <li>2.265 kg (4.99 lb.)</li> </ul>
<b>Weight (boxed unit)</b>	<b>e95 / c95</b> <ul style="list-style-type: none"> <li>3.540 kg (7.8 lb.)</li> </ul> <b>e97 / c97</b> <ul style="list-style-type: none"> <li>3.635 kg (8 lb.)</li> </ul>

## e125 / e127 / c125 / c127 Physical specifications

<b>Dimensions</b>	<ul style="list-style-type: none"> <li>Width: 354 mm (13.94 in.)</li> <li>Height (NOT including bracket): 222 mm (8.74 in.)</li> <li>Height (including bracket): 256 mm (10.08 in.)</li> <li>Depth (NOT including cables): 69 mm (2.72 in.)</li> <li>Depth (including cables): 160 mm (6.29 in.)</li> </ul>
<b>Weight (bare unit)</b>	<b>e125 / c125</b> <ul style="list-style-type: none"> <li>3.320 kg (7.32 lb.)</li> </ul> <b>e127 / c127</b> <ul style="list-style-type: none"> <li>3.450 kg (7.6 lb.)</li> </ul>
<b>Weight (boxed unit)</b>	<b>e125 / c125</b> <ul style="list-style-type: none"> <li>4.955 kg (10.9 lb.)</li> </ul> <b>e127 / c127</b> <ul style="list-style-type: none"> <li>5.070 kg (11.18 lb.)</li> </ul>

### e165 Physical specifications

<b>Dimensions</b>	<ul style="list-style-type: none"> <li>Width: 426 mm (16.8 in)</li> <li>Height (NOT including bracket): 281.4 mm (11.1 in)</li> <li>Height (including bracket): 295 mm (11.6 in)</li> <li>Depth (NOT including cables): 68.4 mm (2.7 in)</li> <li>Depth (including cables): 176.6 mm (7 in)</li> </ul>
<b>Weight (bare unit)</b>	5.6 kg (12.3lb)

### New a Series power specification

<b>Nominal supply voltage</b>	12 V dc
<b>Operating voltage range</b>	10.8 V dc to 15.6 V dc
<b>Fuse / Breakers</b>	The unit includes an internal fuse. It is recommended that you fit an additional thermal breaker or fuse at the distribution panel. The suitable fuse rating for the thermal breaker is dependent on the number of devices you are connecting. In doubt consult an authorized Raymarine dealer
<b>Power consumption</b>	• 33.6 W Max (at full brightness)
<b>LEN (Refer to Seataalk<sup>®9</sup> reference manual for further information).</b>	1

### e7 / e7D Power specification

<b>Nominal supply voltage</b>	13.8 V dc
<b>Operating voltage range</b>	10.2 to 15.6 V dc
<b>Fuse / Breakers</b>	In-line fuse (fitted within power cable) <ul style="list-style-type: none"> <li>7 A. (Standard 20 mm glass fuse)</li> </ul>
<b>Power consumption (at full brightness)</b>	13.2 W
<b>LEN (Refer to Seataalk<sup>®9</sup> reference manual for further information).</b>	1

## e95 / e97 / e125 / e127 / c95 / c97 / c125 / c127 power specification

Nominal supply voltage	12/24 V dc
Operating voltage range	10.8V dc to 31.2V dc
Fuse / Breakers	In-line fuse (fitted within power cable) • 7 A. (Standard 20 mm glass fuse)
Power consumption (at full brightness)	• e95 / e97 / c95 / c97 = 16W Max. • e125 / e127 / c125 / c127 =36W Max.
LEN (Refer to Seataalk <sup>ng</sup> reference manual for further information).	1

## e165 power specification

Nominal supply voltage	12/24 V dc
Operating voltage range	10.8V dc to 31.2V dc
Fuse / Breakers	In-line fuse (fitted within power cable) • 7 A. (Standard 20 mm glass fuse)
Power consumption	• 45 W Max (at full brightness)
LEN (Refer to Seataalk <sup>ng</sup> reference manual for further information).	1

## Environmental specification

Environmental specifications below apply to all display variants

Operating temperature	-25 °C to +55 °C (-13 °F to 131 °F)
Storage temperature	-30 °C to +70 °C (-22 °F to 158 °F)
Relative humidity	Maximum 75%
Waterproof rating	• IPX6 and IPX7 • IPX6 (e165 only)

## New a Series display specification

Size	5.7 in
Type	TFT backlit LED
Color depth	24-bit
Resolution	640 x 480 VGA
Aspect	4:3
Viewing angle	• Left / Right: 60 degrees • Top / Bottom: 60 / 50 degrees
Maximum allowable wrongly illuminated pixels	5

## e7 / e7D Display specification

Size	7 in.
Type	TFT backlit LED
Color depth	24-bit
Resolution	800 x 480 pixels (WVGA)
Viewing angle	• Left / Right: 70 degrees • Top / Bottom: 70 / 50 degrees

## e95 / e97 / c95 / c97 Display specification

Size	9 in.
Type	TFT backlit LED
Color depth	24-bit
Resolution	800 x 480 pixels (WVGA)
Viewing angle	• Left / Right: 80 degrees • Top / Bottom: 80 / 60 degrees

## e125 / e127 / c125 / c127 Display specification

Size	12 in.
Type	TFT backlit LED
Color depth	24-bit
Resolution	1280 x 800 pixels (WXGA)
Viewing angle	• Left / Right: 80 degrees • Top / Bottom: 80 / 60 degrees

## e165 Display specification

Size	15.4 in.
Type	TFT backlit LED
Color depth	24-bit
Resolution	1280 x 800 pixels (WXGA)
Aspect ratio	16:9
Viewing angle	• Left / Right: 80 degrees • Top / Bottom: 70 degrees
Maximum allowable wrongly illuminated pixels	8

## Data connections

### Wired connections

NMEA 0183	2x NMEA 0183 ports: • NMEA port 1: Input and output, 4800 / 38400 baud • NMEA port 2: Input only, 4800 / 38400 baud <b>Note:</b> NMEA 0183 connection does not apply to New a Series multifunction displays.
Network (SeaTalk <sup>hs</sup> )	• a65 / a67 / e7 / e7D = 1 x SeaTalk <sup>hs</sup> port. 100 Mbits/s. RayNet type connection. • e95 / e97 / c95 / c97 / e125 / e127 / c125 / c127 / e165 = 2 x SeaTalk <sup>hs</sup> port. 100 Mbits/s. RayNet type connection.
SeaTalk <sup>ng</sup>	1 x SeaTalk <sup>ng</sup> connection

### Wireless connections

Wi-Fi	802.11 b / g <b>Note:</b> Wi-Fi connection does not apply to New a Series multifunction displays.
Bluetooth	AVRCP 2.1+ EDR power class 1.5

## Internal GPS specification

The Internal GPS specification applies to the following multifunction displays New a Series, New c Series and New e Series (excluding the e165).

<b>Channels</b>	50
<b>Cold start</b>	<2 minutes
<b>Receiver IC Sensitivity</b>	163 dBm Tracking
<b>Satellite Based Aiding System (SBAS)</b>	WAAS + EGNOS + MSAS
<b>Special features</b>	Active Jamming Reduction
<b>Operating frequency</b>	1575.42MHz
<b>Signal Acquisition</b>	Automatic
<b>Almanac Update</b>	Automatic
<b>Geodetic Datum</b>	WGS-84, alternatives available through Raymarine displays.
<b>Update Rate</b>	1 second
<b>Antenna</b>	Ceramic chip
<b>Accuracy</b>	<ul style="list-style-type: none"> <li>Without SBAS: &lt;= 15 metres 95% of the time</li> <li>With SBAS: &lt;= 5 metres 95% of the time</li> </ul>

## Internal sonar specification

The internal sonar specifications only apply to the following display variants: a67, c97, c127, e7D, e97 and e127.

<b>Operating frequencies</b>	50 / 83 / 200 KHz
<b>Transmit power</b>	Up to 600 W RMS, depending on transducer
<b>Depth range</b>	Up to 3000 ft, depending on transducer

## Video specification

<b>Signal type</b>	Composite
<b>Format</b>	PAL or NTSC
<b>Connector type</b>	BNC (female)
<b>Output resolution</b>	720p

## Electronic chart specification

<b>Embedded electronic charts</b>	Navionics worldwide base map.
<b>Compatible chart cards</b>	<ul style="list-style-type: none"> <li>Navionics Ready to Navigate</li> <li>Navionics Silver</li> <li>Navionics Gold</li> <li>Navionics Gold+</li> <li>Navionics Platinum</li> <li>Navionics Platinum+</li> <li>Navionics Fish'N Chip</li> <li>Navionics Hotmaps</li> </ul> <p>Refer to the Raymarine website (<a href="http://www.raymarine.com">www.raymarine.com</a>) for the latest list of supported chart cards.</p>

## Conformance specification

Conformance certification applies to all display variants

<b>Conformance</b>	<ul style="list-style-type: none"> <li>NMEA 2000 certification</li> <li>WiFi Alliance certification</li> <li>Bluetooth certification</li> <li>Europe: 1999/5/EC</li> <li>Australia and New Zealand: C-Tick, Compliance Level 2</li> <li>FCC 47CFR part 15</li> <li>Industry Canada RSS210</li> </ul>
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# Chapter 30: Spares and accessories

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### 30.1 Transducer accessories

Item	Part number	Notes
P48 sonar transducer	A102140	Transom mount.
P58 sonar transducer	A102138	Transom mount.
1 m (3.28 ft) Minn Kota transducer adaptor cable	A62363	Only for direct connection to sonar variant multifunction display.
0.5 m (1.64 ft) transducer adaptor cable	E66066	For connecting any 600 watt sonar module-compatible sonar transducer directly to a sonar variant multifunction display.

### 30.2 RayNet connector network cables

Cable	Part number
1 m (3.28 ft) RayNet to SeaTalk <sup>hs</sup> (RJ45) cable	A62360
3 m (9.84 ft) RayNet to SeaTalk <sup>hs</sup> (RJ45) cable	A80151
10 m (32.8 ft) RayNet to SeaTalk <sup>hs</sup> (RJ45) cable	A80159
400 mm (1.3 ft) RayNet to RayNet cable	A80160
2 m (6.56 ft) RayNet to RayNet cable	A62361
5 m (16.4 ft) RayNet to RayNet cable	A80005
10 m (32.8 ft) RayNet to RayNet cable	A62362
20 m (65.6 ft) RayNet to RayNet cable	A80006
50 mm (1.97 in) RayNet (male) to RayNet (male) cable	A80162
400 mm (1.3 ft) RayNet to SeaTalk <sup>hs</sup> (female) adaptor	A80160
RayNet cable puller 5 pack	R70014

### 30.3 SeaTalk<sup>hs</sup> network cables

Cable	Part number
1.5 m (4.9 ft) SeaTalk <sup>hs</sup> network cable	E55049
5 m (16.4 ft) SeaTalk <sup>hs</sup> network cable	E55050
10 m (32.8 ft) SeaTalk <sup>hs</sup> network cable	E55051
20 m (65.6 ft) SeaTalk <sup>hs</sup> network cable	E55052

### 30.4 SeaTalk<sup>hs</sup> patch cables

Cable	Part number
1.5 m (4.9 ft) SeaTalk <sup>hs</sup> patch cable	E06054
5 m (16.4 ft) SeaTalk <sup>hs</sup> patch cable	E06055
10 m (32.8 ft) SeaTalk <sup>hs</sup> patch cable	E06056
15 m (49.2 ft) SeaTalk <sup>hs</sup> patch cable	A62136
20 m (65.6 ft) SeaTalk <sup>hs</sup> patch cable	E06057

### 30.5 Video cables

The following video cable is required for the video in / out connector on the e95 / e97 / e125 / e127 variant multifunction displays.

Part number	Description	Notes
R70003	e-series accessory video cable	

### 30.6 Power cables

Cable	Part number
1.5 m (4.9 ft) Straight power and data cable	R62379
1.5 m (4.9 ft) Right angled power and data cable	R70029



### 30.7 e7 e7D spares

Item	Part number	Notes
Trunnion (bracket) mount kit	A62358	
Documentation pack	R62378	
Flush mount panel set	R62376	
Front bezel	R62377	
Suncover	R62365	

### 30.8 e95 / e97 / c95 / c97 spares

Item	Part number	Notes
c/e series trunnion kit	R70001	
c/e series front bezel	R7004	
c/e series suncover	R70005	
c/e/ series rear bezel	R70027	
c.e series gasket	R70079	
Mounting adaptor kit — C90W/E90W	R70008	
Mounting adaptor kit — C80/E80	R70010	
Mounting screw kit	R62369	
Document pack	R70061	

### 30.9 e125 / e127 / c125 / c127 spares

Item	Part number	Notes
c/e series trunnion kit	R70002	
c/e series front bezel	R7006	
c/e series suncover	R70007	
c/e/ series rear bezel	R70028	
c.e series gasket	R70080	
Mounting adaptor kit — C120W/E120W	R70009	
Mounting adaptor kit — C120/E120	R70011	
Mounting screw kit	R62369	
Document pack	R70061	

### 30.10 e165 Spares

Item	Part number	Notes
e165 trunnion kit	A80176	
e165 front bezel	R70126	
e165 suncover	R70127	
e165 flush mount kit	R70125	

## Appendix A NMEA 0183 sentences

The display supports the following NMEA 0183 sentences. These are applicable to NMEA 0183 and SeaTalk protocols.

Sentence	Description	Transmit	Receive
AAM	Waypoint arrival alarm sentence		•
APB	Autopilot sentence 'B'	•	•
BWC	Bearing and distance to waypoint	•	•
BWR	Bearing and distance to waypoint — Rhumb	•	•
DBT	Depth below transducer	•	•
DPT	Depth	•	•
DSC	Digital selective calling information sentence		•
DSE	Distress sentence expansion		•
DTM	Datum reference sentence		•
GBS	GPS satellite fault detection data sentence		•
GGA	GPS System fix data	•	•
GLC	Geographic position loran C sentence		•
GLL	Geographic position latitude longitude	•	•
GSA	GPS DOP and active satellites	•	•
GSV	GPS satellites in view	•	•
HDG	Heading deviation and variation sentence		•
HDT	Heading true sentence		•
HDM	Heading magnetic sentence		•
MDA	Meteorological composite sentence		•
MSK	MSK receiver interface sentence		•
MSS	MSK receiver signal status sentence		•
MTW	Water temperature	•	•
MWV	Wind speed and angle	•	•
RMA	Recommended minimum loran C data	•	•
RMB	Recommended minimum navigation information	•	•
RMC	Recommended minimum specific GNSS data	•	•
RSD	Radar system data	•	•
RTE	Routes	•	•
TTM	Tracked target message	•	•
VHW	Water speed and heading	•	•
VLW	Distance travelled through the water	•	•
VTG	Course over ground and ground speed	•	•
WPL	Waypoint location sentence	•	•
XTE	Cross track error measured sentence		•
ZDA	Time and date	•	•

## Appendix B NMEA 2000 sentences

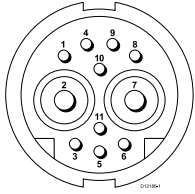
The display supports the following NMEA 2000 sentences. These are applicable to NMEA 2000, SeaTalk<sup>ng</sup> and SeaTalk 2 protocols.

Message number	Message description	Transmit	Receive	Bridge
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	•	•	•
126992	System time	•	•	•
126996	Product information	•	•	•
127237	Heading/Track Control		•	
127245	Rudder	•	•	•
127250	Vessel heading	•	•	•
127488	Engine parameters rapid update		•	
127489	Dynamic engine parameters		•	
127493	Dynamic transmission parameters		•	
127498	Static engine parameters		•	
127505	Fluid level		•	
128259	Speed	•	•	•
128267	Water depth	•	•	•
128275	Distance log	•	•	•
129025	Position rapid update	•	•	•
129026	COG & SOG rapid update	•	•	•
129029	GNSS position data	•	•	•
129033	Time and date	•	•	•
129038	AIS Class A Position Report		•	
129039	AIS Class B Position Report		•	
129040	AIS Class B Extended Position Report		•	
129041	AtoN position report		•	
129044	Datum	•	•	•
129283	Cross track error	•	•	•
129284	Navigation data	•	•	•
129291	Set and drift rapid update	•	•	•
129301	Time to or from mark		•	
129539	GNSS DOPs		•	
129540	GNSS Sats in view	•	•	•
129545	GNSS RAIM output message		•	
129550	GNSS differential correction receiver interface		•	
129551	GNSS differential correction receiver signal		•	
129793	AIS UTC and Date Report		•	
129794	AIS Class A Static and Voyage Related Data		•	
129801	AIS Addressed Safety Related Message		•	
129802	AIS Safety Related Broadcast Message		•	
129809	AIS class B "CS" static data report part A		•	
129810	AIS class B "CS" static data report part A		•	

Message number	Message description	Transmit	Receive	Bridge
130306	Wind data	•	•	•
130310	Environmental parameters	•	•	•
130311	Environmental parameters		•	
130576	Small craft status		•	
130577	Direction data	•	•	•
130578	Vessel speed components		•	

# Appendix C Connectors and pinouts

## Power, data, and video connector

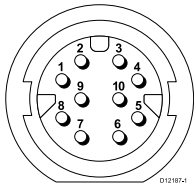


Item	Remarks
Identification	PWR / NMEA / Video
Connector type	11 pin twist-lock
Current source to network	No current sourced for external devices
Current sink from network	<ul style="list-style-type: none"> <li>PSU: Main Power input.</li> <li>NMEA: No power required for interface.</li> <li>Video: No power required for interface.</li> </ul>

## Power, data and video cable cores and colors

Signal	Pin	AWG	Color
BATT+	2	16	Red
BATT-	7	16	Black
SCREEN	10	26	Black
NMEA1 TX+	8	26	Yellow
NMEA1 TX-	9	26	Brown
NMEA1 RX+	1	26	White
NMEA1 RX-	4	26	Green
NMEA2 RX+	3	26	Orange / White
NMEA2 RX-	11	26	Orange / Green
VIDEO IN	6	RG179 coaxial	
VIDEO RTN	5	Screen	

## Network connector



Item	Remarks
Identification	Network
Connector type	RJ45 (with suitable waterproofing)
Current source to network	No current sourced for external devices
Current sink from network	No power required for interface

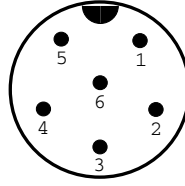
  

Pin	Signal
1	Rx+
2	Rx-
3	Not connected
4	Not connected
5	Tx+
6	Tx-
7	Not connected
8	Not connected

Pin	Signal
9	Screen
10	Not connected

**Note:** Use only Raymarine RayNet cables when connecting SeaTalk<sup>hs</sup> devices.

## SeaTalk<sup>ng</sup> connector

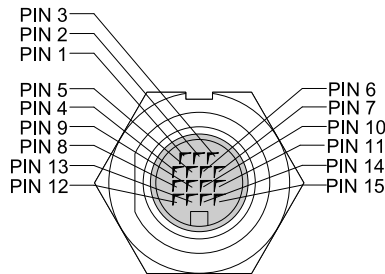


Item	Remarks
Identification	ST2/NMEA2000
Connector type	STNG
Current source to network	No current sourced for external devices
Current sink from network	<160mA (Interface drive only)

Pin	Signal
1	+12V
2	0V
3	Screen
4	CanH
5	CanL
6	SeaTalk (not connected)

**Note:** Use only Raymarine cables when connecting to SeaTalk<sup>ng</sup>

## Video in/out connector



PIN	Signal
1	H-SYNC
2	V-SYNC
3	V-SYNC 0V
4	DDC CLK
5	DDC DATA
6	BLUE RTN
7	BLUE
8	Not used
9	H-SYNC 0V
10	GREEN RTN
11	GREEN
12	VIDEO IN2
13	VIDEO IN2 RTN
14	RED RTN
15	RED

## Appendix D Software releases

Raymarine regularly updates its multifunction display software to introduce improvements, additional hardware support and user interface features. The table below details some of the important enhancements and which software revision they were introduced with.

Software version	Applicable product manual	Multifunction displays compatibility	Changes
V5.xx	81337-5	a65 / a67 / c95 / c97 / c125 / c127 / e7 / e7D / e95 / e97 / e125 / e127 / e165	<ul style="list-style-type: none"> <li>• Addition of Fuel Manager including: Estimated fuel remaining, distance to empty and time to empty calculations, fuel used and fuel economy data, fuel range rings in the Chart application and low fuel alarm).</li> <li>• Addition of Document (pdf) Viewer application.</li> <li>• Addition of Slew to Cue (Auto slew thermal camera to AIS, MARPA or MOB targets).</li> <li>• Support for multiple thermal camera JCUs.</li> <li>• Thermal cameras OSD menu options now available directly from Thermal Camera application's menu.</li> <li>• Video application now called Camera application.</li> <li>• Support for networked IP cameras in the Camera application.</li> <li>• Ability to automatically cycle through available video / camera feeds in the Camera application.</li> <li>• Support for up to 5 engines in the Data application.</li> <li>• Improved engine data selection in the Data application.</li> <li>• Support for detailed engine warning alarms.</li> <li>• Addition of on-screen range controls to the Weather application</li> <li>• Ability to view images saved to SD card from the homescreen My Data menu.</li> <li>• Addition of Demo Video mode for retail.</li> <li>• Ability to record live bus messages (NMEA 0183 and SeaTalk<sup>ng</sup> to SD card.</li> </ul>
V4.xx	81337-4	c95 / c97 / c125 / c127 / e7 / e7D / e95 / e97 / e125 / e127	<ul style="list-style-type: none"> <li>• Addition of on-screen range controls to the Chart &amp; Radar applications.</li> <li>• Addition of on-screen Gain, Rain &amp; Sea controls to Radar application.</li> <li>• Addition of on-screen Gain &amp; TVG controls to Sonar application.</li> <li>• Addition of slider bar control adjustment.</li> <li>• Addition of new numeric adjustment controls.</li> <li>• Improved Power Key shortcuts to Brightness and Capture Screen image options</li> </ul>
V3.xx	81337-3	c95 / c97 / c125 / c127 / e7 / e7D / e95 / e97 / e125 / e127	<ul style="list-style-type: none"> <li>• Added support for Raymarine CP450C CHIRP Sonar Module.</li> <li>• Added support for AIS feature support for STEDS EAIS integration &amp; display of SAR aircraft &amp; SART devices.</li> <li>• Added limited support for Sirius Marine Weather Module.</li> <li>• Added Standby / PowerSave Mode.</li> <li>• Added support for RayRemote and RayControl Applications.</li> <li>• Enhanced home screen customize option permitting 9 and 12 inch MFDs to view up to 4 applications on a single page.</li> <li>• Default Fuel data page added.</li> <li>• Added Arabic language support.</li> <li>• Inclusion of Remote Upgrade Utility to permit the upload of software to peripheral Raymarine products using SeaTalk<sup>ng</sup> / SeaTalk<sup>hs</sup>.</li> <li>• Display of Aids To Navigation (AtoNs) AIS targets when data received on either SeaTalk<sup>ng</sup> or NMEA 0183.</li> <li>• Added 1kW transducer support added to MFDs featuring internal ClearPulse Digital Sounder circuitry (i.e. c97/c127/e7D/e97/e127 MFDs) ... transducer output limited to 600W.</li> </ul>

Software version	Applicable product manual	Multifunction displays compatibility	Changes
			<ul style="list-style-type: none"> <li>• Corrected the ability to select Tide and/or Current Station using the Find Nearest feature.</li> <li>• Added NMEA 0183 &amp; SeaTalkng data monitors to the diagnostics features.</li> <li>• Increased touch area for Alarm pop-ups and Back buttons.</li> </ul>
V2.xx	81337-1	c95 / c97 / c125 / c127 / e7 / e7D / e95 / e97 / e125 / e127	<ul style="list-style-type: none"> <li>• Cartography redraw performance has been improved when sharing cartography via the SeaTalks/RayNet network.</li> <li>• Added support to display fuel flow rate.</li> <li>• Addition of NMEA 0183 and SeaTalk<sup>ng</sup> data buffer diagnostics.</li> <li>• Improvements to databar customization.</li> <li>• Ability to manually change the aspect ratio of the Video application.</li> </ul>
V1.xx	81332-1	e7 / e7D	<ul style="list-style-type: none"> <li>• Initial software release.</li> </ul>





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