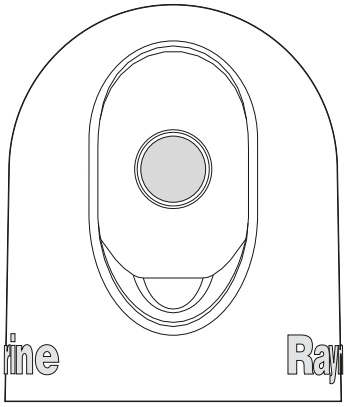
T200



Installation and operation instructions

English
Date: 06-2013
Document number: 81349-2-EN

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Raymarine®

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Software updates

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

Product handbooks

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

ENGLISH
Document number: 81349-2
Date: 06-2013

Contents

Chapter 1: Important information

Warning: Product installation and operation

This product must be installed and operated in accordance with the instructions provided. Failure to do so could result in personal injury, damage to your vessel and/or poor product performance.

Warning: Potential ignition source

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

Warning: Product grounding

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

Warning: Switch off power supply

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

Warning: Ensure safe navigation

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

Warning: Maintain a permanent watch

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

Caution: Power supply protection

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

Caution: Service and maintenance

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

Cleaning the thermal camera

The camera housing and lens will require occasional cleaning. Raymarine suggests that you clean the lens when image quality degradation is noticed or excessive contaminant buildup is seen. Clean the interface between the yoke and base often to prevent accumulation of debris or salt deposits.

When cleaning this product:

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

Particular care should be taken when cleaning the lens window, this has a protective anti-reflective coating which may be damaged by improper cleaning.

1. Switch off the power to the unit.
2. Clean the camera body with a clean, soft cotton cloth. You can moisten the cloth and use a mild detergent if required.
3. Clean the camera lens.
   - Rinse the lens with fresh water to remove all dirt particles and salt deposits, and allow to dry naturally.
   - If any spots or smears remain, very gently wipe the lens window with a clean microfibre cloth or soft cotton cloth.
   - If necessary, use isopropyl alcohol (IPA) or a mild detergent to remove any remaining spots or marks.

Water ingress

Water ingress disclaimer

Although the waterproof rating capacity of this product meets the IPX6 standard, water intrusion and subsequent equipment failure may occur if the product is subjected to commercial high-pressure washing. Raymarine will not warrant products subjected to high-pressure washing.

Disclaimer

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

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

EMC installation guidelines

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

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

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

- Raymarine equipment and cables connected to it are:
  - At least 1 m (3 ft) from any equipment transmitting or cables carrying radio signals e.g. VHF radios, cables and antennas. In the case of SSB radios, the distance should be increased to 7 ft (2 m).
  - More than 2 m (7 ft) from the path of a radar beam. A radar beam can normally be assumed to spread 20 degrees above and below the radiating element.
- The product is supplied from a separate battery from that used for engine start. This is important to prevent erratic behavior and data loss which can occur if the engine start does not have a separate battery.

- Raymarine specified cables are used.
- Cables are not cut or extended, unless doing so is detailed in the installation manual.

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

Connections to other equipment

Requirement for ferrites on non-Raymarine cables

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

Declaration of conformity

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

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

Product disposal

Dispose of this product in accordance with the WEEE Directive.

The Waste Electrical and Electronic Equipment (WEEE) Directive requires the recycling of waste electrical and electronic equipment. Whilst the WEEE Directive does not apply to some Raymarine products, we support its policy and ask you to be aware of how to dispose of this product.

Warranty registration

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

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

IMO and SOLAS

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

Technical accuracy

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

Chapter 2: Handbook and product information

Chapter contents

2.1 Handbook information

This handbook describes the installation of Raymarine T200 Series fixed mount thermal cameras as part of a marine electronics system.

This handbook includes information to help you:

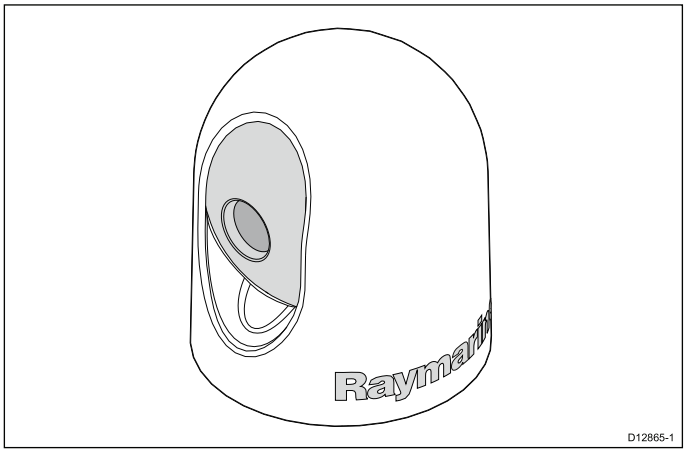
- plan your thermal imaging system and ensure you have all the necessary equipment,
- install and connect the thermal camera as a part of your system of Raymarine electronics,
- obtain support if required.

Handbooks

Description	Part number
T200 Series Installation and Operations Handbook	81349
T200 Series Mounting Template	87190

2.2 Product information

The T200 series fixed mount thermal cameras consist of a sealed camera ball assembly and a removable outer cover. The outer cover is not intended to provide sealing. The camera provides analog video output through a standard F-type connection and receives power from its Power over Ethernet (PoE) interface.



The following variants of the T200 series fixed mount thermal camera are available:

Part number	Description
E70111	T200 – Thermal camera 320 x 240 (9 Hz) NTSC
E70110	T203 – Thermal camera 320 x 240 (30 Hz) NTSC
E70113	T220 – Thermal camera 320 x 240 (9 Hz) PAL
E70112	T223 – Thermal camera 320 x 240 (25 Hz) PAL
E70121	T250 – Thermal camera 640 x 480 (9 Hz) NTSC
E70120	T253 – Thermal camera 640 x 480 (30 Hz) NTSC
E70123	T270 – Thermal camera 640 x 480 (9 Hz) PAL
E70122	T273 – Thermal camera 640 x 480 (25 Hz) PAL

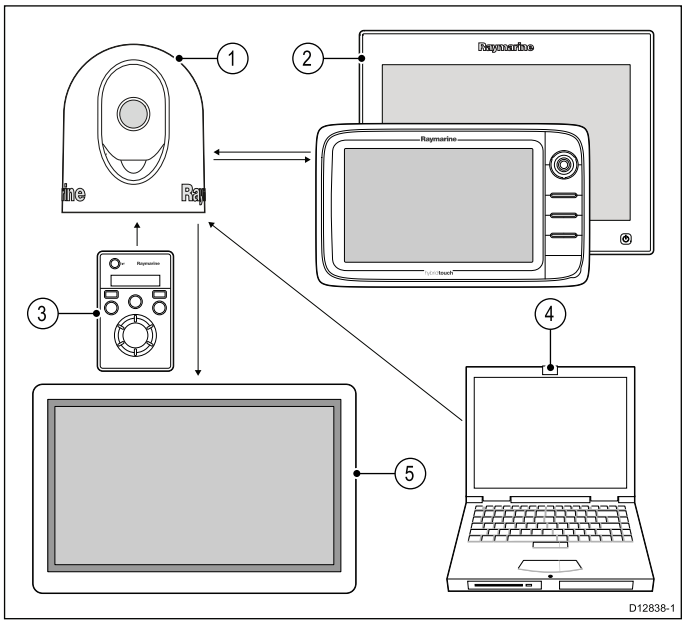
Note: The T200 Series are fixed mount cameras with the pan and tilt angles set during installation. Pan and tilt cannot be changed remotely.

Chapter 3: Planning the installation

Chapter contents

3.1 Thermal camera controllers and displays

A typical thermal camera system comprises of a thermal camera, a controller and a display. The display and the controller may be separate or integrated.



1. Thermal camera.
2. Raymarine Multifunction display — Integrated display and controller.
3. Joystick Control Unit (JCU) — Controller only.
4. Laptop or PC — Controller only.
5. Video monitor — Display only.

Additional equipment

You may have additional equipment as part of your thermal camera system:

- Multiple multifunction displays and controllers.
- SeaTalk^{hs} network switch – Used to create a network of compatible Raymarine equipment.

Compatible multifunction displays

The following Raymarine multifunction displays are compatible with your thermal camera.

- c Series (Power over Ethernet (PoE) injector required)
- e Series (Power over Ethernet (PoE) injector required)
- gS Series

Multifunction displays require software version 7.xx or later. Please visit the Raymarine website www.raymarine.com to download the latest software for your multifunction display.

3.2 Installation checklist

Installation includes the following activities:

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

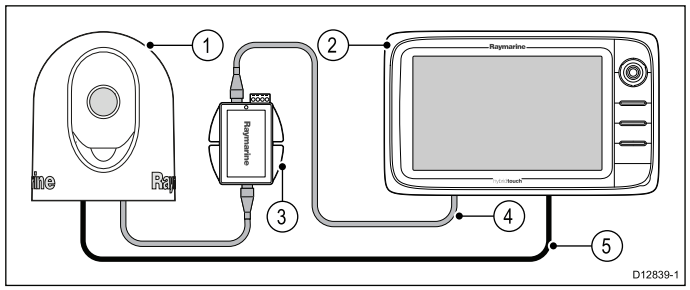
Schematic diagram

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

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

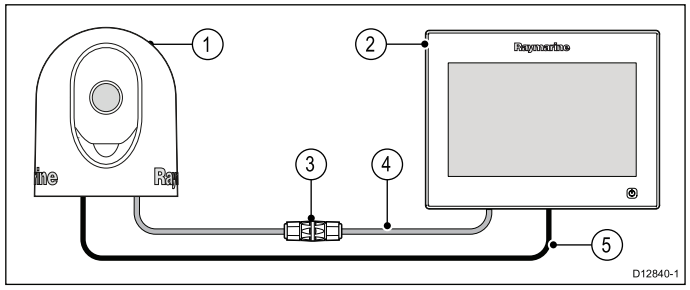
3.3 Typical systems

Example c / e Series system



1	Thermal camera.
2	c / e Series multifunction display (Integrated display and controller).
3	Power over Ethernet (PoE) injector.
4	RayNet to SeaTalkhs cable.
5	Video cable.

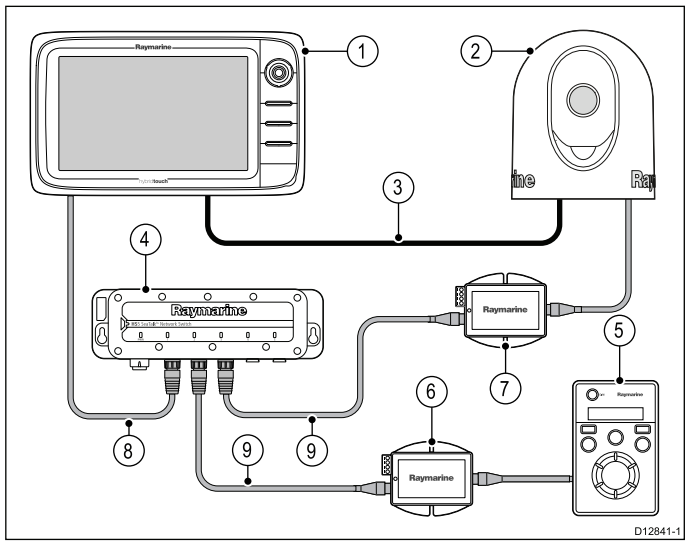
Example gS Series system



1	Thermal camera.
2	gS Series multifunction display (Integrated display and controller).
3	Ethernet coupler.
4	RayNet to SeaTalkhs cable.
5	Video cable.

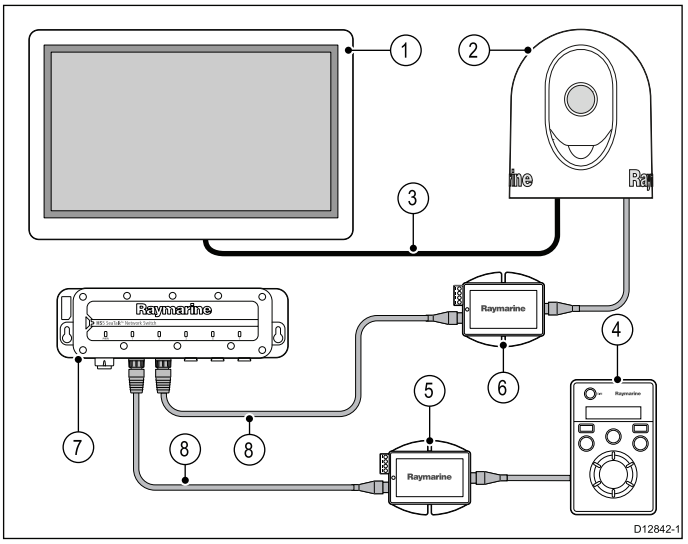
Note: When connected directly to a gS Series multifunction display the thermal camera is supplied with power over ethernet from the display.

Example System with JCU



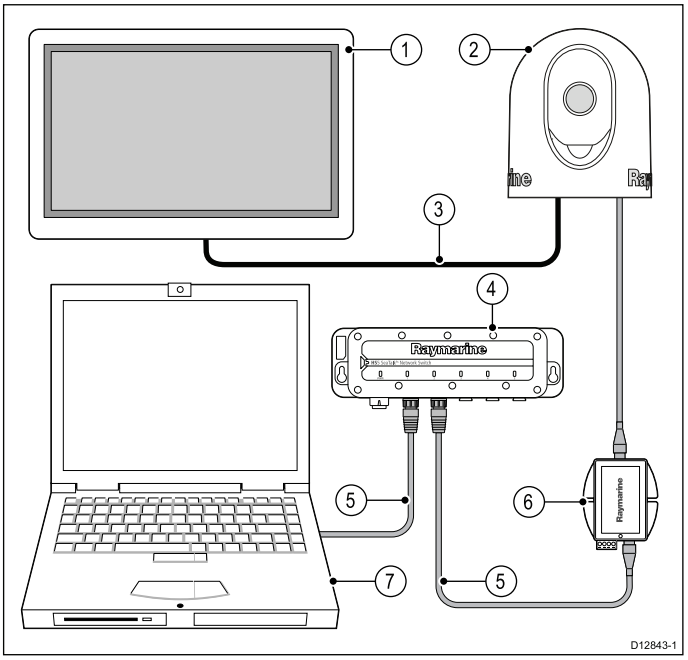
1	c / e Series multifunction display (Integrated display and controller).
2	Thermal camera.
3	Video input cable.
4	Network switch.
5	JCU (Optional controller).
6	Power over Ethernet (PoE) injector (Required to supply power to the JCU).
7	Power over Ethernet (PoE) injector (Required to supply power to the thermal camera).
8	RayNet cable.
9	RayNet to SeaTalkhs cable.

Example system with JCU and display



1	Video Display (Display only).
2	Thermal camera.
3	Video input cable.
4	JCU (Required Controller).
5	Power over Ethernet (PoE) injector (Required to supply power to the JCU).
6	Power over Ethernet (PoE) injector (Required to supply power to the thermal camera).
7	Network switch.
8	RayNet to SeaTalkhs cable.

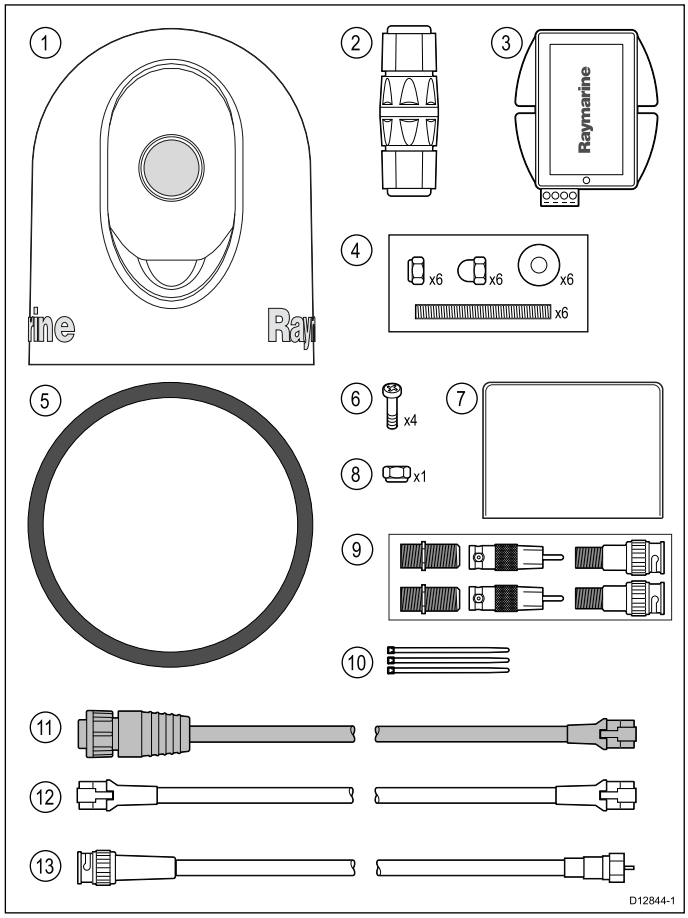
Example system with PC controller and display



1	Video Display (Display only).
2	Thermal camera.
3	Video input cable.

4	Network switch.
5	RayNet to SeaTalkhs cable.
6	Power over Ethernet (PoE) injector (Required to supply power to the thermal camera).
7	Laptop (Controller only).

3.4 Parts supplied



Item	Description	Quantity
1	Thermal camera.	1
2	Ethernet coupler.	1
3	Power over Ethernet (PoE) Injector.	1
4	Mounting kit, consisting of:	
	• M8 nylock nut	6
	• acorn nut	6
	• stud	6
	• washer	6
5	O-ring.	1
6	Top-down fixings.	4
7	Documentation pack.	1
8	Grounding strap securing nut.	1
9	Video connectors:	
	• Female to female F-type connector	2
	• Female F-type to Male RCA adaptor	2
	• Female F-type to BNC connector	2
10	Zip ties.	3
11	1 m (3.28 ft.) RayNet to SeaTalkhs cable.	1
12	7.7 m (25 ft.) Ethernet cable.	1
13	7.7 m (25 ft.) Coaxial video cable.	1

Unpack the camera unit carefully to prevent damage. Save the carton and packing in case the unit has to be returned for service.

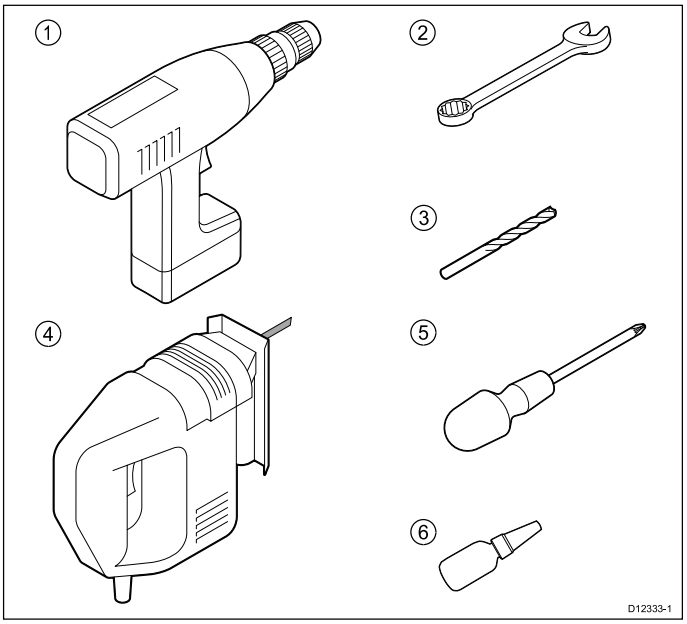
Additional items required

To complete the installation you will also need to obtain the following items:

- Chassis ground strap.
- Compatible display / controller hardware.
- Cables for video connections.
- Power cable for PoE injector (if using the PoE injector).
- Thread locking compound (e.g. Loctite 242 or equivalent), required for all metal-to-metal threaded connections.
- Marine grade sealing tape (e.g. 3M Scotch-Seal 2229 or equivalent).

3.5 Tools required

The following tools are required for installation.



Item	Description
1.	Drill.
2.	10 mm (7/16 inch) spanner.
3.	6.4 mm drill bit (for bottom down installation).
4.	Jigsaw (only required for JCU installation).
5.	Pozi-drive screwdriver (only required for JCU installation).
6.	Thread-lock.

Chapter 4: Cables and connections

Chapter contents

4.1 General cabling guidance

Cable types and length

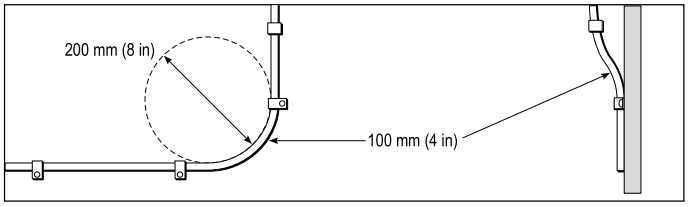
It is important to use cables of the appropriate type and length

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

Routing cables

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

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



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

Always route data cables as far away as possible from:

- other equipment and cables,
- high current carrying ac and dc power lines,
- antennae.

Strain relief

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

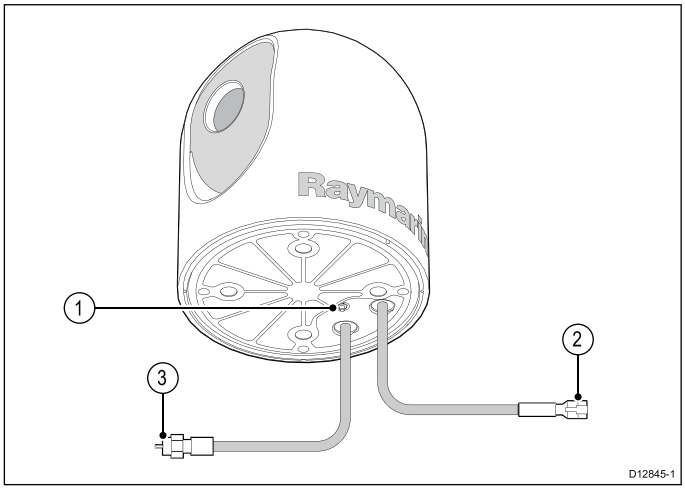
Cable shielding

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

Warning: Product grounding

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

4.2 Connections overview



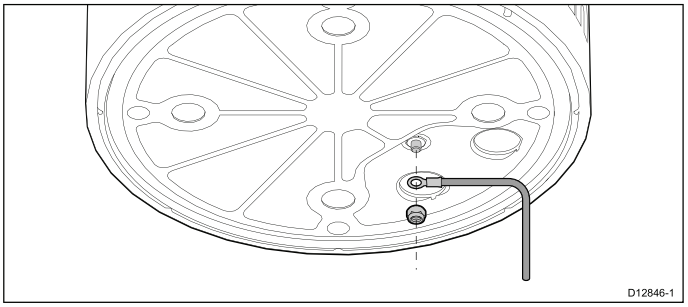
1. Chassis ground
2. Analog video connection — IR output.
3. Ethernet – To Raymarine network switch, multifunction display, or JCU.

Connection care points:

- The cable tails should be routed to a dry area of the vessel for connection. Alternatively you must ensure that all connections are made water tight.

4.3 Chassis ground connection

The chassis ground stud should be connected to the vessel ground point.



The nut (supplied) should be used to secure a ground strap (not supplied) to the base of the thermal camera. A ring terminal typically sized for #6 or M3 sized stud and gauge 14 to gauge 16 wire should be used for the strap.

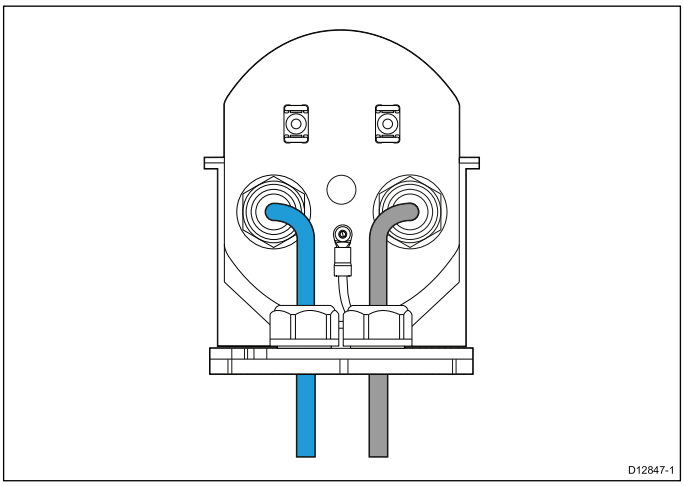
Note: Ensure that the ground strap does not interfere with mounting the camera.

4.4 External or internal connections

The cable connections can be made externally or internally.

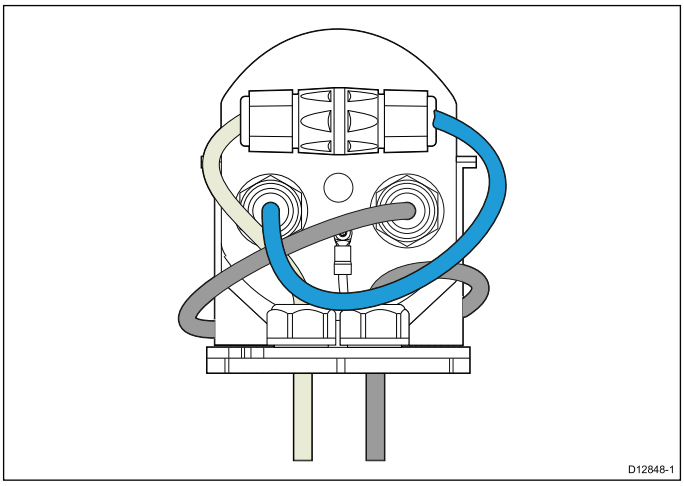
External

As supplied, the camera cable tails extend through the base and are connected externally:



Internal

Optionally you can make the cable connections internally.



To make internal connections, bring the cable tails up through the base and use the supplied ethernet coupler and video connector to make the connections internally. The ethernet coupler can be fixed to the camera ball assembly using the zip ties (supplied).

4.5 Network and power connection

The thermal camera is supplied power by and controlled using the ethernet network connection.

Camera to multifunction display with PoE

For multifunction displays that support PoE, the following supplied equipment is required:

- RayNet to RJ45 SeaTalk$_{hs}$ cable.
- Ethernet coupler.

Camera to multifunction display without PoE

For multifunction displays that do not support PoE, the following supplied equipment is required:

- PoE injector.
- RayNet to RJ45 SeaTalk$_{hs}$ cable.
- Ethernet coupler

Camera to a network switch

To connect the thermal camera to a Raymarine network switch, the following supplied equipment is required:

- 7.6 m (25 ft) Ethernet cable.
- Ethernet coupler
- PoE injector.
- RayNet to RJ45 SeaTalk$_{hs}$ cable.

Power over Ethernet (PoE) injector

A PoE injector is required when connecting the thermal camera to a Raymarine network switch or to a multifunction display that does not support PoE. An additional PoE injector is required when connecting a JCU.

Joystick Control Unit (JCU)

To connect a JCU the ethernet cable (supplied with the JCU), PoE injector and a RayNet to SeaTalk^{hs} network cable are required. The JCU is supplied with a 7.6 m (25 ft) ethernet cable for this connection. If you require a different length contact your dealer for suitable cables.

Note: The PoE injector must be mounted in a dry area.

Network cables

RayNet to RayNet cables

Cable	Part number
400 mm (1.3 ft) RayNet to RayNet cable (female)	A80161
2 m (6.56 ft) RayNet to RayNet cable (female)	A62361
5 m (16.4 ft) RayNet to RayNet cable (female)	A80005
10 m (32.8 ft) RayNet to RayNet cable (female)	A62362
20 m (65.6 ft) RayNet to RayNet cable (female)	A80006
50 mm (1.97 in) RayNet to RayNet cable (male)	A80162
RayNet right-angled coupler	A80262
RayNet cable puller 5-pack	R70014

RayNet to RJ45 SeaTalk^{hs} adapter cables

Cable	Part number
1 m (3.28 ft) RayNet to RJ45 SeaTalk^{hs} cable	A62360
3 m (9.84 ft) RayNet to RJ45 SeaTalk^{hs} cable	A80151
10 m (32.8 ft) RayNet to RJ45 SeaTalk^{hs} cable	A80159
400 mm (1.3 ft) RayNet to RJ45 SeaTalk^{hs} (female) cable	A80160

4.6 Video connection

Video cables and connectors are required to connect the analog video connection to a suitable display.

Note: The video signal is analog only and is not available over ethernet.

Video cables

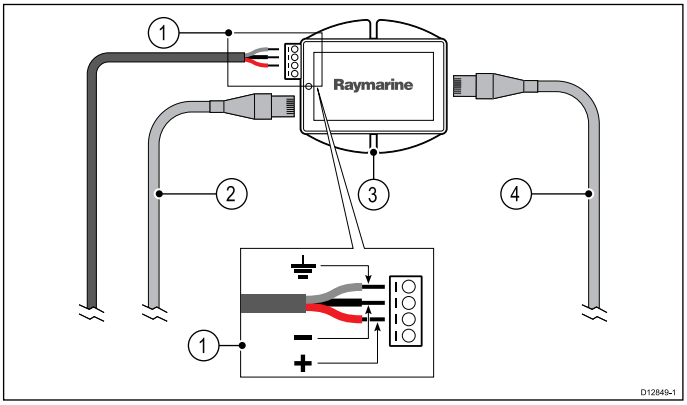
If you require video cables or connectors other than those supplied with the product please contact your local authorized Raymarine dealer.

Raymarine recommends the use of a BNC terminated RG59 75ohm (or better) coaxial cable.

4.7 PoE connection

A PoE injector is required when connecting the thermal camera to a network switch or a multifunction display that does not support PoE. An additional PoE injector is required when connecting a JCU.

The PoE injector requires a 12 V / 24 V dc power supply.



1	12 V / 24 V dc power supply connection to PoE injector. (Power cable NOT supplied; refer to PoE power connection for suitable cables.)
2	SeaTalkhs connection (to network switch or multifunction display).
3	PoE Injector.
4	Ethernet connection (to thermal camera or JCU).

PoE power connection

The PoE injector requires a dedicated power cable for direct connection to a 12 V / 24 V power supply.

The unit is intended for use on dc “negative” or “floating” ground power systems.

Raymarine recommends that all power connections are made via a distribution panel. All equipment must be either:

- powered from a circuit breaker or switch, with 5A circuit protection, or
- powered from a 5A slow blow in-line fuse connected to the RED positive wire of the power cable.

The unit does not have a power switch. The unit is powered when the power cable is connected to the vessel's power supply.

Note: The unit should be mounted so that the power cable can be easily removed if necessary. If the unit is placed in a difficult to reach location, Raymarine recommends installing an on / off switch on the power connection at a point that is easily accessible.

Recommended power cable sizes

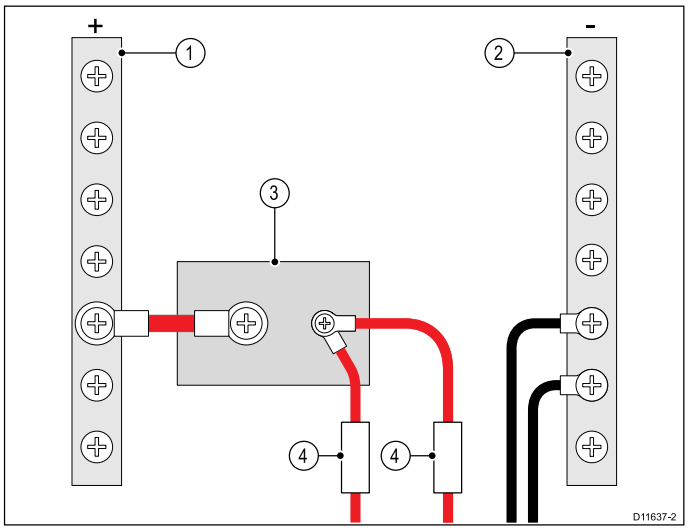
Cable length		Wire size	
Feet	Metres	AWG	mm^2
10	3	14	2.1
15	4.6	14	2.1
20	6	12	3.3
25	7.6	12	3.3
30	9	10	5.3

Note:

- Cable length is the distance between the power source and the unit.
- These wire sizes give a total drop of about 0.5 V between the power source and the unit, achieving a minimum voltage at the unit of 10.5 V with a fully flat battery at 11 V.

Sharing a breaker

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



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

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

Warning: Product grounding

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

Grounding information (PoE injector only)

The information provided in the following section applies only to the PoE injector.

Grounding — Dedicated drain wire required

This product includes a dedicated drain conductor (screen) for connection to a vessel's RF ground point.

It is important that an effective RF ground is connected to the unit. The unit can be grounded by connecting the drain conductor (screen) to the vessel's RF ground point. On vessels without an RF ground system the drain conductor (screen) should be connected directly to the negative battery terminal.

The dc power system should be either:

- Negative grounded, with the negative battery terminal connected to the vessel's ground; or
- Floating, with neither battery terminal connected to the vessel's ground.

If several items require grounding, they may first be connected to a single local point (e.g. within a switch panel), with this point connected via a single, appropriately-rated conductor, to the vessel’s common RF ground point.

Implementation

The preferred minimum requirement for the path to ground is via a flat tinned copper braid, with a 30 A rating (1/4 inch) or greater. If this is not possible, an equivalent stranded wire conductor maybe used, rated as follows:

- for runs of <1 m (3 ft), use 6 mm^2 (#10 AWG) or greater.
- for runs of >1 m (3 ft), use 8 mm^2 (#8 AWG) or greater.

In any grounding system, always keep the length of connecting braid or wires as short as possible.

References

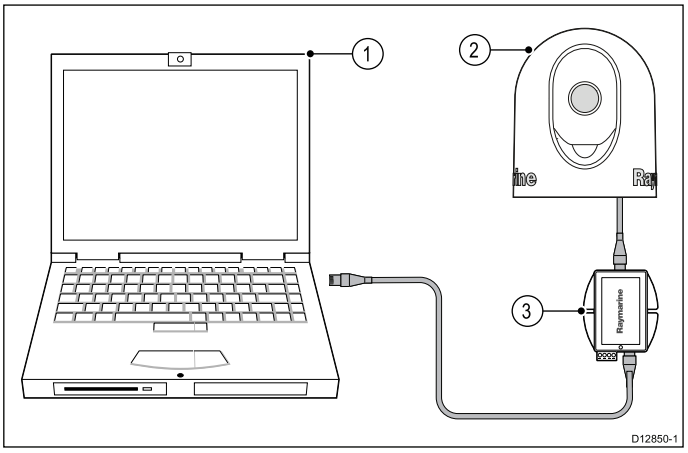
- ISO10133/13297
- BMEA code of practice
- NMEA 0400

Warning: Positive ground systems

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

4.8 PC connection

To enable control of the thermal camera using the web interface, the thermal camera must be connected to a laptop either directly or using network switch.



1	Laptop.
2	Thermal camera.
3	Power over Ethernet (PoE) injector.

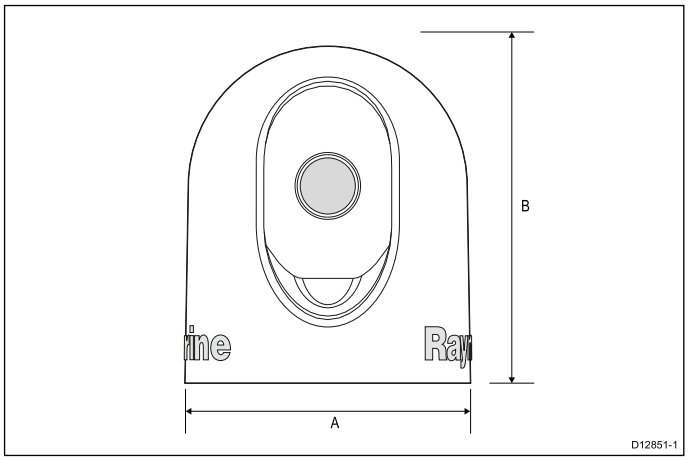
The thermal camera must be connected to the PoE injector. The laptop can be either connected directly to the PoE injector or to a network switch that the camera's PoE injector is also connected to.

Chapter 5: Installation

Chapter contents

5.1 Camera mounting

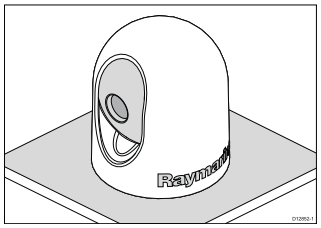
Product dimensions



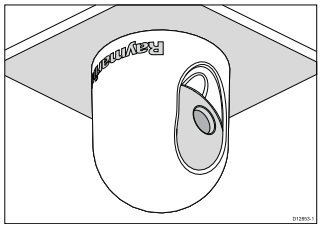
A	151.56 mm (6 in.)
B	176.7 mm (7 in.)

Camera orientation

The camera can be mounted in 2 orientations referred to as “Ball up” and “Ball down”.



Ball up: The camera is mounted on top of the mounting surface.



Ball down: The camera is suspended upside down, below the mounting surface.

Note: For ball down mounting you must invert the image orientation using the Web interface or the camera’s On-Screen Display menu.

Inverting the video orientation

When mounting in the Ball down configuration the image orientation must be changed to invert the image. If required, the image orientation should be changed prior to installation.

The web interface can be used to invert the video orientation.

1. Select **Setup** from the web interface.
2. Scroll down to **Image Orientation**.
3. Click the drop down box and select Invert.
   The video image is now inverted.
4. Select **Save Settings**.

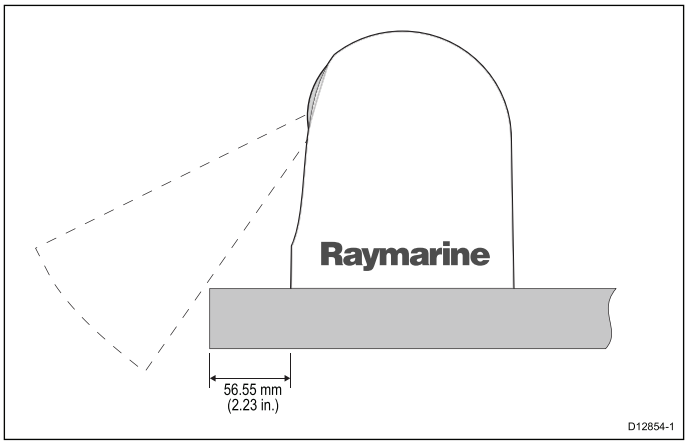
Note: The video image orientation can also be inverted using the On-Screen Display menu: **Menu > System Setup > Enable / Disable Ball-Down Installation**

Location requirement

When planning the installation location, consider the following points:

- The camera is waterproof, and appropriate for above decks mounting.
- The underside (inside) of the compartment or deck on to which the camera is mounted must be weather-tight. You must ensure protection from water ingress to cables and connections.
- The mounting surface must be horizontal.
- If you cannot access both sides of the mounting surface, then you will need to mount the camera “top down”.
- Fixings are supplied for a mounting surface of up to 41 mm (1.6 in) thick. A thicker surface will require the installer to provide alternative fixings.
- The camera mounting surface must be at least as large as the footprint of the camera itself to ensure an adequate seal with the O-ring.
- The camera should be mounted as high as practical, but without interfering with any radar, navigational or communications electronics.
- Choose a location that will provide the most unobstructed view in all directions.
- Choose a location as close to the vessel’s center line as possible. This provides a symmetrical view when looking forward or aft.
- Select a location for the camera that is at least 7 cm (2.75 in.) from any magnetic compass.
- Select a location that is at least 1 m (3 ft) from devices that may cause interference, such as motors, generators and radio transmitters / receivers.
- If installing an optional JCU, select a location for the JCU that is at least 11 cm (4.33 in.) from any magnetic compass.

Distance to surface front edge



The unit should be mounted a maximum distance of 56.55 mm (2.23 in.) from the front edge of the mounting surface to allow for the full range of tilt.

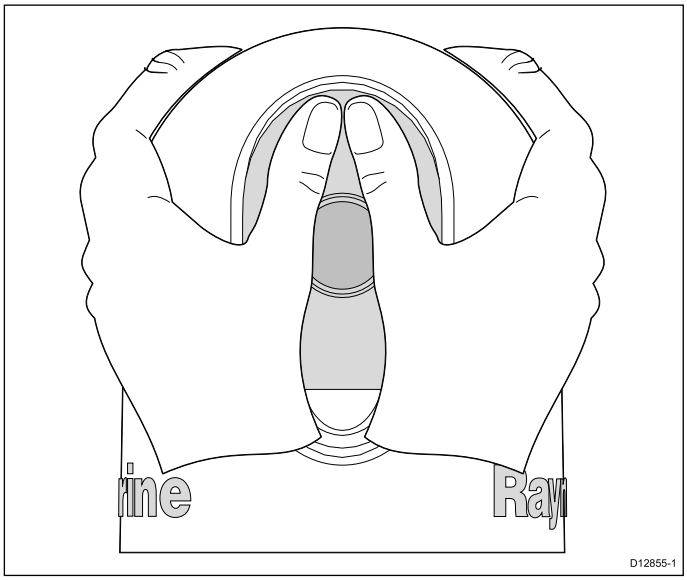
Clearance above the camera

Ensure sufficient clearance is available above the unit to enable removal of the outer cover.

The unit should only be installed in a location that has a clearance of at least double the height of the unit.

Removing the outer cover

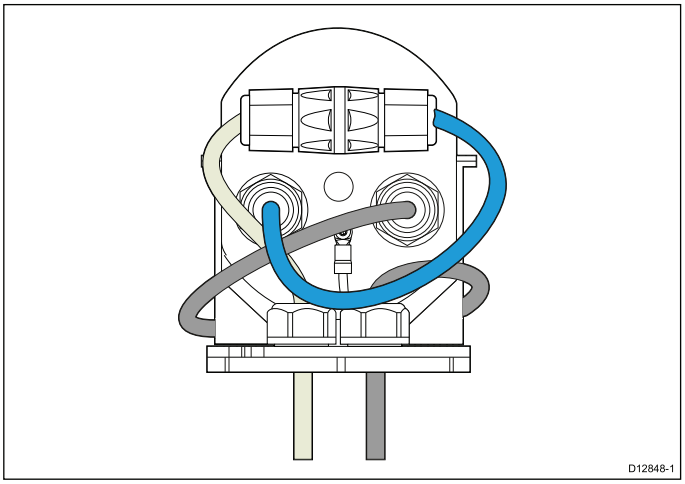
Follow the steps below to remove the camera’s outer cover.



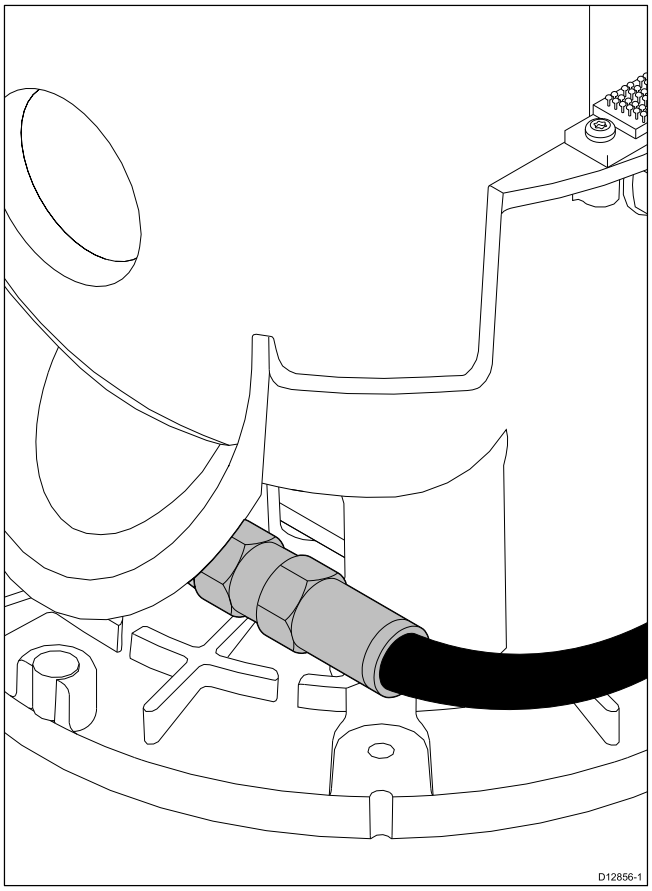
1. Place both thumbs on the camera ball assembly, above the camera lens.
2. Push your thumbs downwards, whilst pulling the cover away from the base of the camera with the rest of your grip.
3. Once the cover is detached, slide it up and off the camera.

Making internal connections

If there is limited space or you want the cable connection to be made internally follow the steps below.



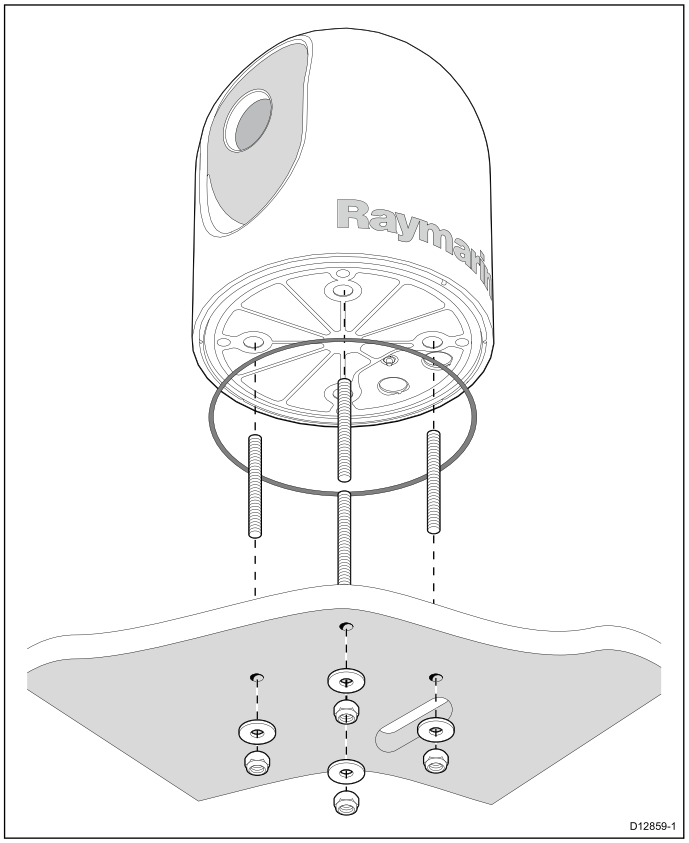
1. Remove the camera's outer cover.
2. Unscrew the light grey cable capture nuts on both of the cable glands on the base of the camera.
3. Pull the rubber glands and clamping claws out of the bore holes.
4. Pull both cables up through the base.
5. Remove the rubber gland, clamping claw and capture nut from both cables.
6. Connect the camera's ethernet cable to one end of the ethernet coupler (supplied).
7. Thread the external ethernet and video cables through the bore holes.
8. Thread the external ethernet cable through the rubber gland, clamping claw and capture nut.
9. Connect the external ethernet cable to the other end of the ethernet coupler.
10. Using the zip ties (supplied) secure the ethernet coupler to the rear of the camera ball assembly.
11. Pull any excess cable back through the bore hole.
12. Secure the ethernet cable by reassembling the rubber gland and clamping claw into the bore hole and tightening the capture nut.
13. Feed the camera's video cable around the front of the camera ball assembly.
14. Apply Locktite to both ends of a female to female connector.
15. Connect a female to female connector to the camera's video cable.



16. Feed the external video cable through the bore hole.
17. Connect the external video cable to the other end of the female to female connector.
18. Wrap the video connection with marine grade sealing tape (e.g. 3M Scotch-Seal 2229 or equivalent).
19. Secure the video cable to the front of the ball assembly using the zip tie (supplied).
20. Pull any excess cable back through the bore hole.
21. Secure the video cable by reassembling the rubber gland and clamping claw into the bore hole and tightening the capture nut.

Mounting the camera

When access is available to the underside of the mounting surface then use these instructions to mount the camera.



1. Remove the camera's outer cover.
2. Using the template supplied, mark and drill the holes marked 'bottom down'.

   Mounting holes care points:

   - Check the dimensions of any printed template (to ensure that the template is printed to the correct scale) prior to drilling any holes.
   - Make sure the template is oriented properly relative to the bow of the vessel. This is affected by whether the camera is to be mounted ball-up or ball-down.
3. Cut out the hole for the cables to feed through
4. Install the threaded mounting studs into the base of the camera with thread-locking compound. If required, you can use studs of a different length to suit your installation.

   Tighten the studs to a torque of 9.5 Nm (7 lbs-ft).
5. Install the rubber O-ring in the base of the camera.
6. Attach the grounding strap to the grounding point on the camera.
7. Place the camera on the mounting surface so the threaded studs extend through the drilled holes.
8. Make the required cable connections to the camera tails.
9. Secure the camera body to the mounting surface with the supplied nuts and washers.

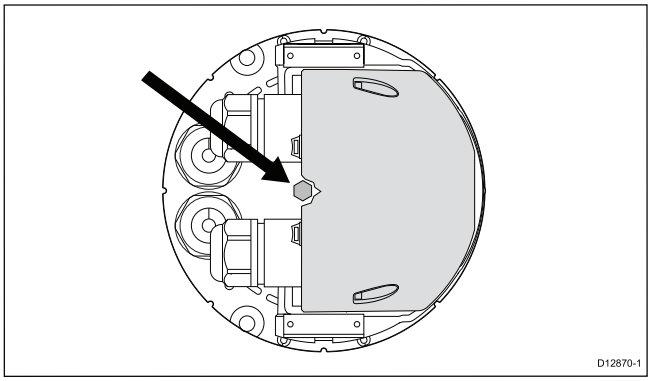
   Dome capped nuts are provided for a neater solution where the mounting is exposed to view.

   You must ensure a watertight seal. You may use a marine-grade sealant as an alternative to the mounting O-ring.

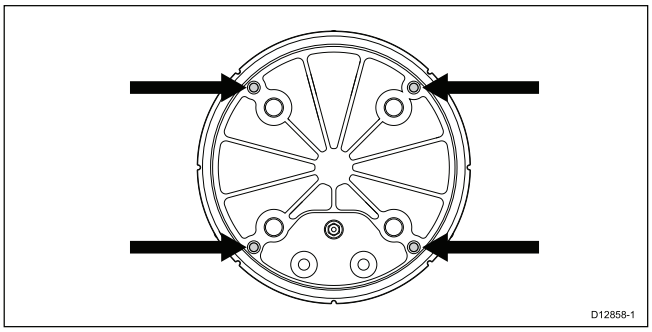
Mounting the camera top down

The top down mounting method is used when access to the underside of the mounting surface is restricted. Use the instructions below to mount the camera unit using the top down method.

1. Remove the camera's outer cover.
2. Undo the ball assembly securing bolt shown below.



3. Unscrew the ethernet and video cable securing glands and remove the base plate from the ball assembly.
4. Drill out the 4 top down mounting holes located in the base plate.

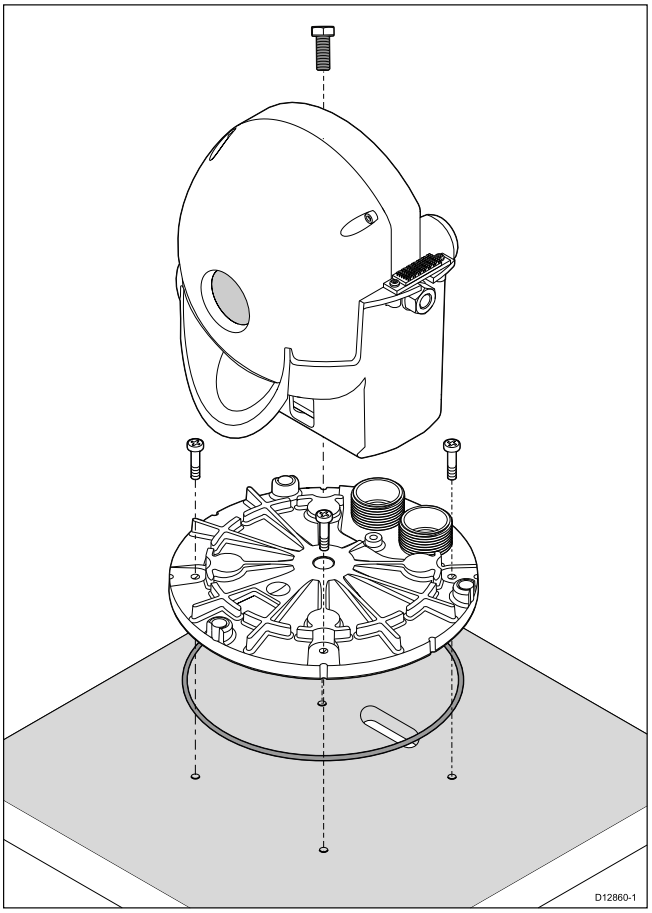


5. Using the mounting template supplied, mark and drill the holes marked 'top down' on the mounting surface.

   Mounting holes care points:

   - Check the dimensions of any printed template (to ensure that the template is printed to the correct scale) prior to drilling any holes.
   - Make sure the template is oriented properly relative to the bow of the vessel. This is affected by whether the camera is to be mounted ball-up or ball-down.
6. Cut out the hole in the mounting surface for the cables to feed through
7. Install the rubber O-ring in the base plate.
8. Attach the grounding strap to the grounding point on the base plate.
9. Route the relevant cable through the cable hole.
10. Secure the base plate to the mounting surface using the fixings provided.

11. Secure the ball assembly to the base plate using the bolt removed earlier.

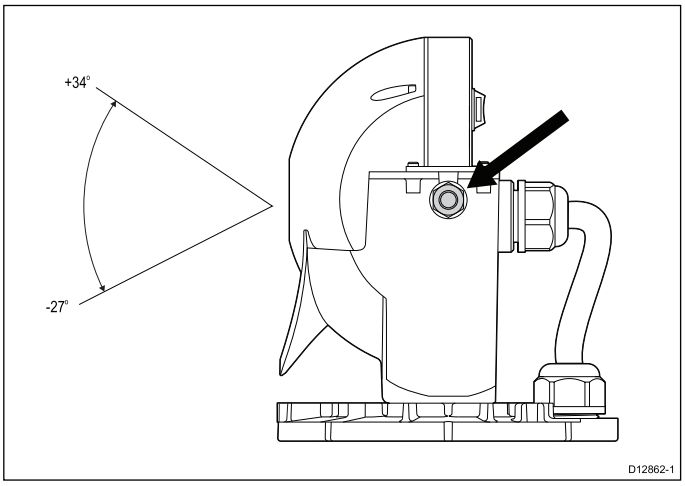


- You must ensure that the camera is facing the correct way depending upon whether the camera is to be mounted ball up or ball down.
- Ensure the rubber O-ring is positioned correctly in the base of the camera.

12. Make the required cable connections to the camera tails.
13. Secure the cables using the glands removed earlier.
14. Use a marine grade sealant to seal around the fixings to prevent water ingress.

Adjusting the thermal camera's tilt angle

Once mounted the thermal camera's tilt angle can be adjusted to the required position.

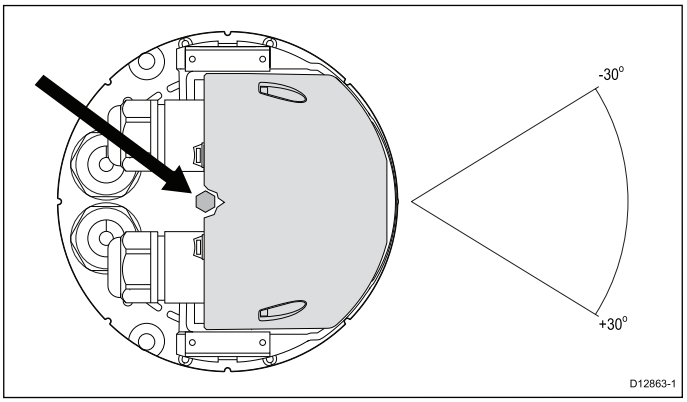


Once the thermal camera is installed:

1. Remove the camera's outer cover.
2. Loosen the securing nuts half a turn so that the camera ball assembly can be tilted up and down.
3. You may also need to loosen the cable glands to allow the ball assembly to rotate freely.
4. Adjust the tilt to the required position.
5. Retighten the securing nuts to a torque of 13.6 Nm (10 ft-lbs) — Do not overtighten.
6. Replace the cover.
7. Ensure that the cover is seated correctly all the way around the base of the camera ball assembly.

Adjusting the thermal camera's pan angle

Once mounted the thermal camera's pan angle can be adjusted to the required position.



With the outer cover removed

1. Loosen the securing bolt half a turn.
2. You may also need to loosen the cable glands to allow the ball assembly to rotate freely.
3. Swivel the camera ball assembly's position to the required location.
4. Retighten the securing bolt, ensuring the camera ball assembly does not move.
5. Replace the cover.
6. Ensure that the cover is seated correctly all the way around the base of the camera ball assembly.

5.2 Optional JCU mounting

Location requirements

When planning the installation location, consider the following points:

- Select a position on your vessel that is close to the monitor that displays the T-Series camera video output.
- Ensure the JCU is mounted at least 55 cm (21.7") away from any equipment fitted with a magnetic compass.
- The JCU can be mounted to a dash or other surface in any orientation.
- Consider cable lengths and cable routing.

Flush mounting

The standard method for mounting the JCU is a flush or panel mounting arrangement.

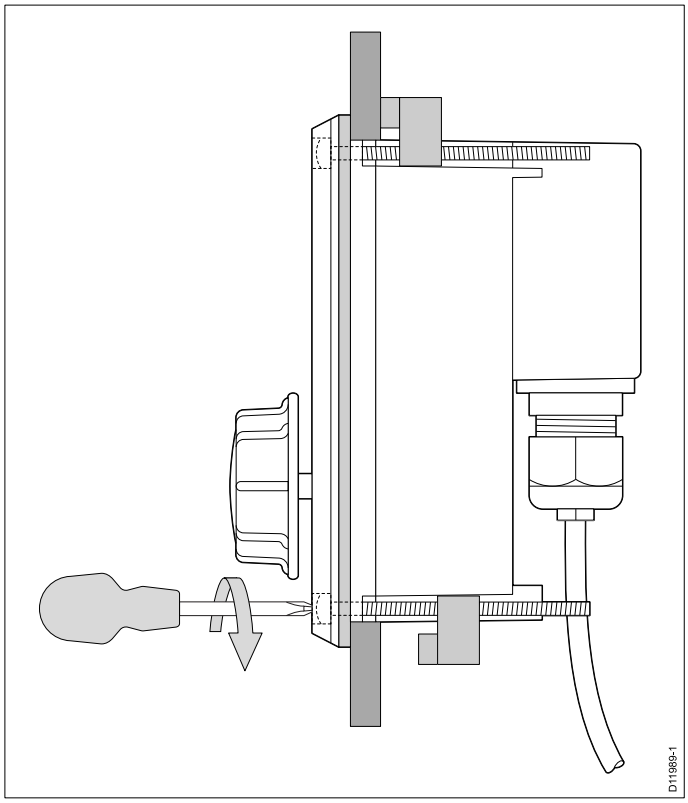
Before mounting the unit, ensure that you have:

- Selected a suitable location. A clear, flat area with suitable clearance behind the panel is required.
- Identified the cable connection required and the route that the cable will take.
- Detached the front bezel to reveal the mounting screws.

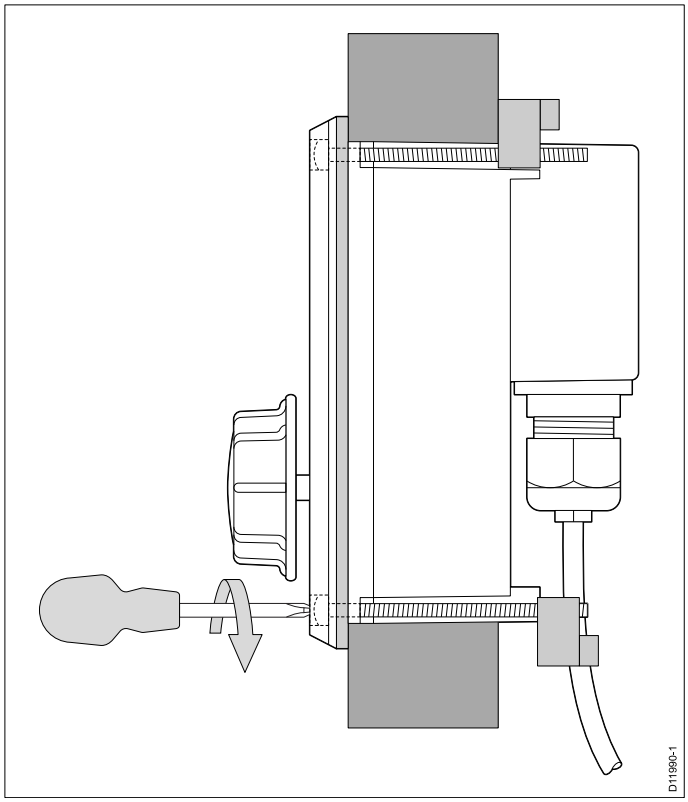
Mounting the JCU

1. Cut the mounting hole according to the dimensions specified in the mounting template included in this document.
2. Ensure that the unit fits into the removed area and then file around the cut edge until smooth.
3. Drill four 6.4 mm (0.25 in) holes as indicated on the template to accept the mounting screws.
4. Before mounting the JCU, insert the supplied ethernet cable through the mounting hole and into the JCU ethernet port. Ensure the cable gland sealing nut is tightened correctly.
5. Remove the 4 panel mounting clamps and insert the JCU in place. Affix the mounting clamps to the screws on the other side of the mounting surface, ensuring that the mounting clamps are rotated outward from the JCU housing. Tighten the screws to draw the mounting clamps up against the mounting surface and then tighten another 1/4 to 1/2 turn. Do not overtighten the screws.
   i. As shipped from the factory, the JCU can be mounted to a panel thickness ranging from 0.79 to 4.45 cm (0.31 to 1.750 in). The clamps are set with the small “foot” on the clamp facing towards the mounting surface, away from the front of the JCU, as shown in the "Thick panel mounting" diagram in this document.
   ii. To mount the JCU to a panel thickness of 0.79 cm (0.31 in) or less, remove the clamps from the mounting screws, turn them around and thread them back onto each of the four screws. In this configuration, the clamp “foot” faces away from the mounting surface and allows the clamp to contact thinner panel surfaces while still allowing for proper compression of the JCU mounting gasket to form a watertight seal. This mounting configuration is shown in the "Thin panel mounting" diagram in this document.
6. Once you have secured the JCU in place, replace the bezel.

Thin panel mounting



Thick panel mounting



Chapter 6: System operation and setup

Chapter contents

6.1 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.

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 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.
	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.

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.

6.2 Operation and features overview

The camera features can be accessed using the thermal camera application of a compatible Raymarine multifunction display, from a JCU (Joystick control unit) or using a web enabled device (e.g. Laptop PC or smartphone).

This handbook covers methods using the JCU and web enabled device, for details on how to operate this product using a compatible Raymarine multifunction display please refer to the thermal camera application section of the manual supplied with your multifunction display.

The main Thermal camera operations are outlined below:

Control the camera:

- Zoom.
- Pause the camera image.

Adjust the camera image:

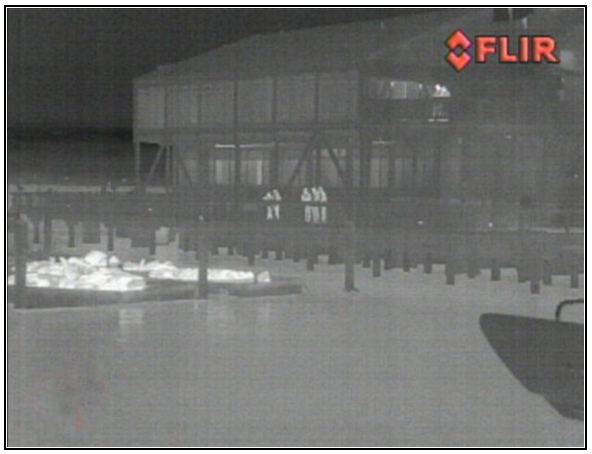
- Color palette.
- Scene presets.
- Reverse Video (white hot / black hot) — Inverts the video polarity .
- Rear view mode.

In addition to the above, the camera also provides setup menus to configure the system to your requirements.

Image adjustments

Camera zoom

The default zoom level is 1x. In addition to this the thermal camera can be set to either 2x (320 x 240 cameras) or 2x and 4x (640 x 480 cameras) zoom level.

1x	
2x	
4x	

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:

	**Night Running** — scene preset mode for night conditions.
	**Day Running** — scene preset mode for daytime conditions.
	**Night Docking** — scene preset mode for night docking.
	**Search** — 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.

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 white, 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.

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:

	White-hot thermal image.
	Black-hot thermal image.

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

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.

Chapter 7: Web browser interface

Chapter contents

7.1 Web interface overview

The thermal camera includes a web interface that can be used to control and change settings of the thermal camera. The web interface requires a username and password.

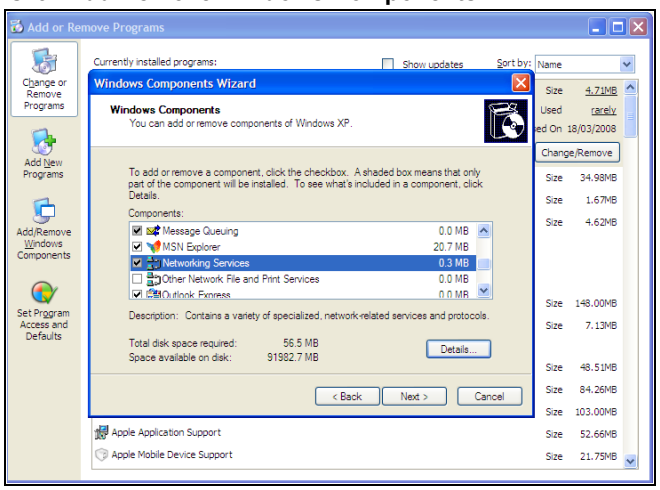
To access the web interface the camera must be networked to a web enabled device (e.g. laptop PC). The settings on the web enabled device must be configured correctly to allow access.

Changing network settings — Windows XP

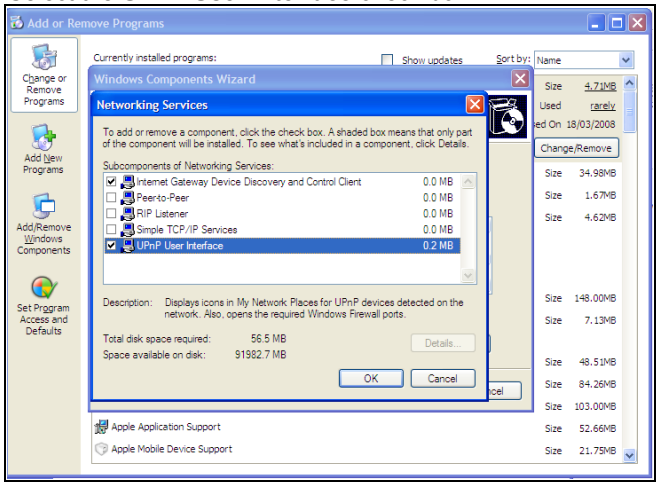
In order to control and view camera settings on a PC using Windows XP you need to enable UPnP devices and set a static IP address.

With the camera networked to the PC (as described in section 4.8 PC Connection):

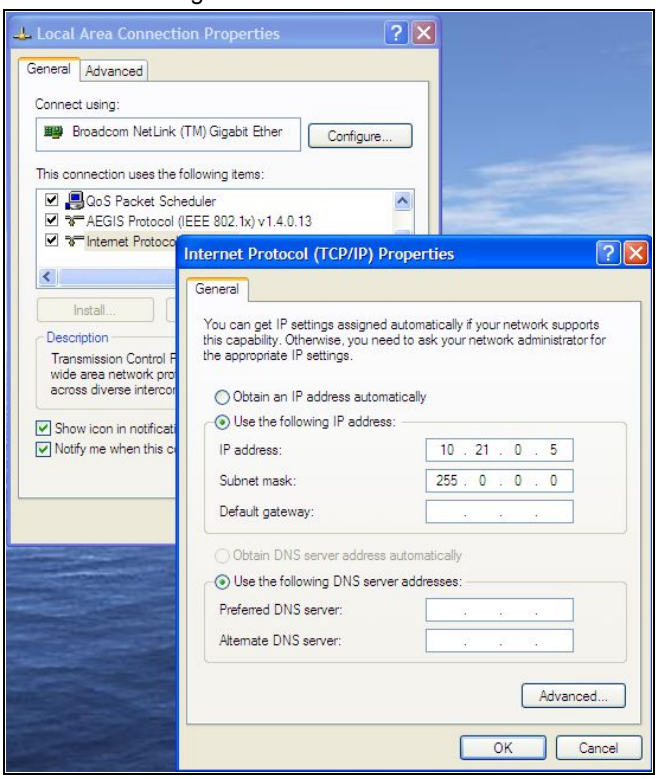
1. Click **Start**.
2. Click **Control Panel**.
3. Click **Add or Remove Programs**.
4. Click **Add/Remove Windows Components**.



5. Click **Networking Services**.
6. Click the **Details** button.
7. Select the **UPnP User Interface** check box.



8. Click **OK**.
9. Click **Next** in the Windows Components Wizard.
10. You may be asked for the Windows XP installation CD.
11. When the installation has completed click **Start**.
12. Select **Connect To**.
13. Click **Show all connections**.
14. Right click on the network connection that the camera is connected to.
15. Click **Properties**.
16. Select **Internet Protocol (TCP/IP)**.
17. Click the **Properties** button.
18. Click on **Use the following IP address**.
19. Enter an IP address that is in the same range as the thermal cameras IP address (e.g. 10.21.0.5).
20. Enter the following Subnet Mask: **255.0.0.0**.



21. Click on the **OK** button.

You should now be able to access the web interface using a compatible web browser.

Changing network settings - Windows 7

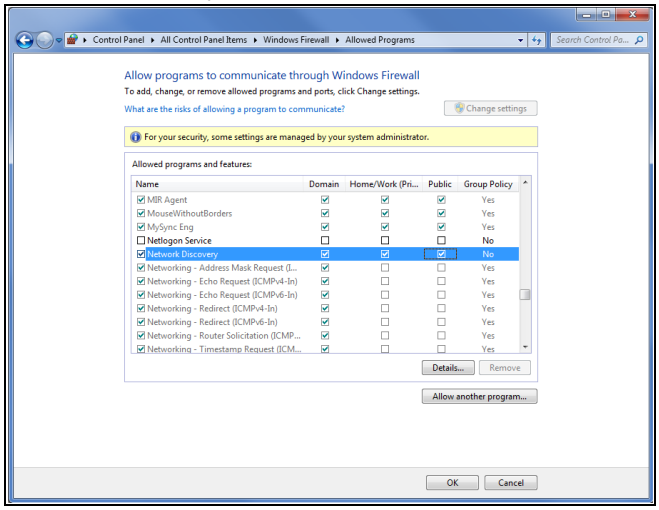
To configure the necessary network settings on a Windows 7 PC follow the steps below

With the camera networked to the PC (as described in section 4.8 PC Connection):

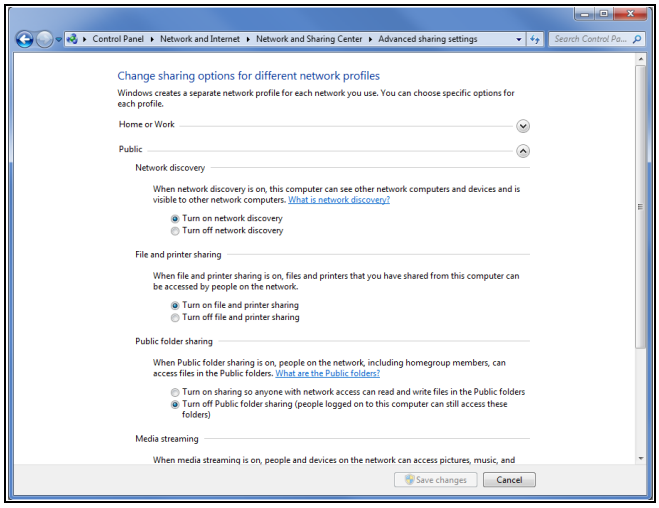
1. Click **Start**.
2. Click **Control Panel**.
3. Click **System and Security**.
4. Click **Windows Firewall**.

5. Click **Allow a program or feature through Windows Firewall**.
6. Scroll down the list to **Network Discovery**.

7. Place a tick in the box for the type of network that the camera is on (this is usually Public).



8. Click **OK**.
9. From the Control Panel click **Network and Internet**.
10. Click **Network and Sharing Center**.
11. Click **Change advanced sharing settings**.
12. Click on the relevant network type (e.g. Public).
13. Ensure **Turn on network discovery** is selected.



14. Click **Save changes** if you switched on network discovery, or
15. Click **Cancel** if network discovery was already turned on.

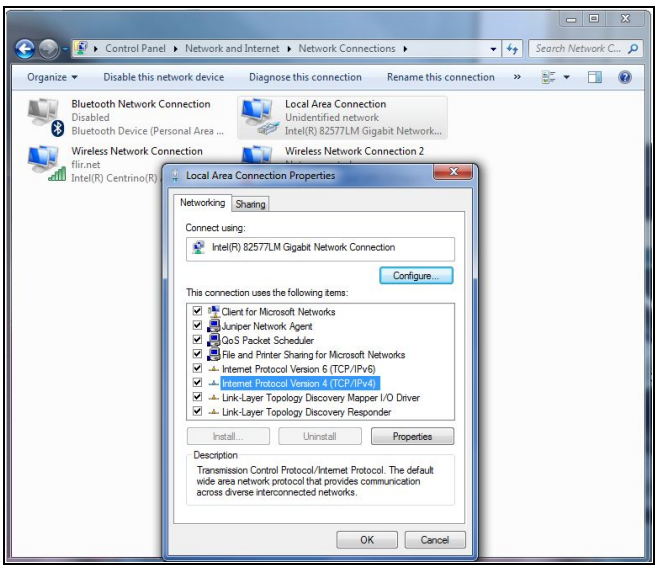
You should now be able to access the web interface using a compatible web browser.

Setting a manual IP address in windows 7

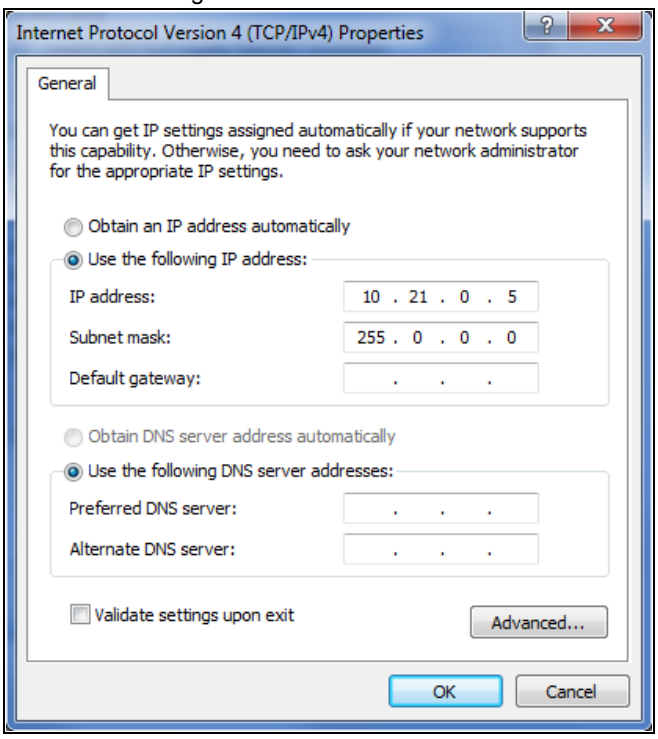
If you experience issues accessing the camera's web interface you may need to assign the PC a static IP address.

To assign a static IP address follow the steps below:

1. From the Control panel Click **Network and Internet**.
2. Click **Network and Sharing Center**.
3. Click **Change adaptor settings**.
4. Select the Network Connection that your thermal camera is connected to
5. Right click and choose **Properties**.
   The Network Connection Properties dialog is displayed.



6. Select **Internet Protocol Version 4 (TCP/IPv4)**.
7. Click on the **Properties** button.
8. Click on **Use the following IP address**.
9. Enter an IP address that is in the same range as the thermal cameras IP address (e.g. 10.21.0.5).
10. Enter the following Subnet Mask: **255.0.0.0**.



11. Click on the **OK** button.
12. You may need to restart the PC for the changes to take effect.

You should now be able to access the web interface using a compatible web browser.

7.2 Web interface access

The Web interface provides a browser based user interface for the thermal camera that can be accessed from any PC or web enabled device that is on the same network.

The thermal camera is assigned the following default IP address: **10.21.0.03**

Default login details are as follows:

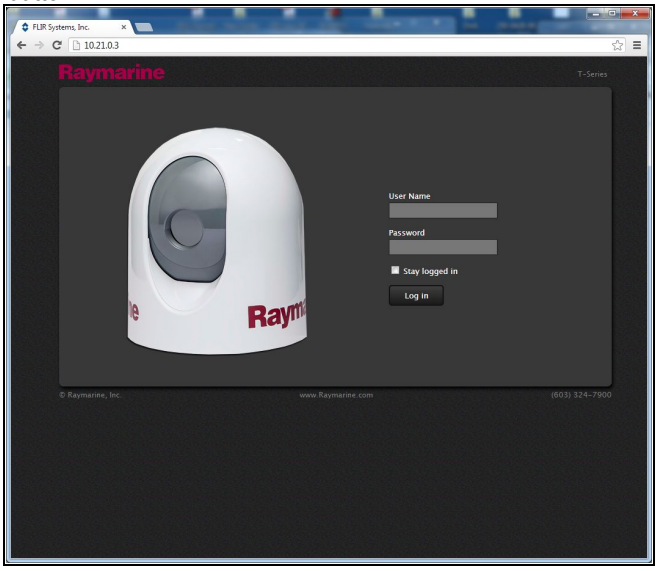
Type	User-name	Password	Description
User	user	fliradmin	The User login should be used for normal camera operation and controls.
Expert	expert	fliradmin	An expert user has access to additional settings.
Administrator	admin	fliradmin	An administrator has access to additional settings and the maintenance menu.

Note: The default login passwords should be changed to prevent unauthorized access. Ensure you do not forget the new password.

Accessing the Web interface

You can access the Web interface from any web enabled device networked to the thermal camera.

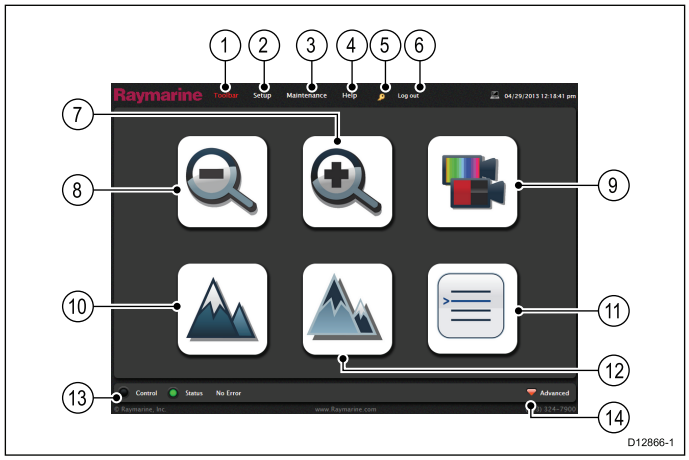
1. Open up the web browser on your device.
2. In the address box enter the IP address of your thermal camera (Default = **10.21.0.03**) and press the **RETURN** button.



3. Enter the username and password.
4. Click **Login**.

Web interface controls

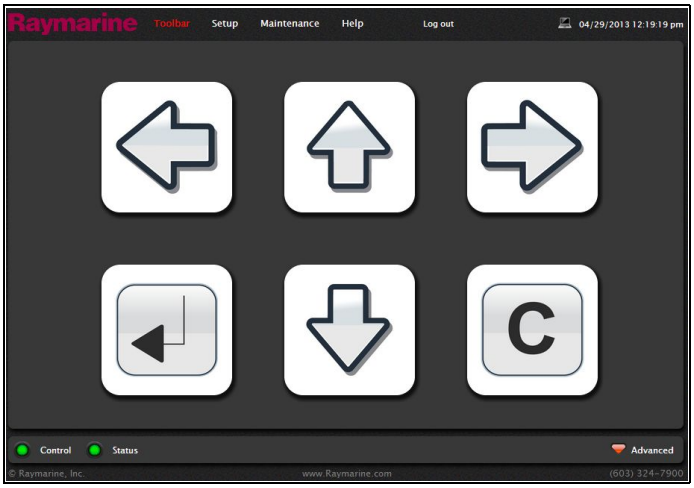
The Web interface can be used to control the thermal camera.



1	**Toolbar** — accesses the control Toolbar page.
2	**Setup** — accesses the Setup menu page.
3	**Maintenance** — accesses the Maintenance page.
4	**Help** — accesses the support and product information page.
5	**Change Password** — changes the password for the current account. This icon is only available when account type has been set to allow change of password.
6	**Log Off** — logs the current user out of the web utility.
7	**Zoom in** — zooms in the thermal image.
8	**Zoom out** — zooms out the thermal image.
9	**Change Color** — cycles through color palettes.
10	**Change Scene** — cycles through scene presets.
11	**On-Screen Menu** — Opens the On-Screen Display (OSD) menu. The OSD menu is shown on the connected video display.
12	**Invert Video Polarity** — inverts the video polarity (white hot / black hot)
13	**Camera Control** — Indicates whether current user has control of the thermal camera.
14	**Advanced IP Communications** — Displays actual command strings sent to and received from the thermal camera.

Web interface OSD controls

When the On-Screen Menu icon is selected, the Toolbar changes to provide controls to navigate the OSD menu. The OSD menu is displayed on the connected video display device.



1	**Left Arrow**
2	**Up Arrow**
3	**Right Arrow**
4	**Enter**

5	**Down Arrow**
6	**Cancel**

Please refer to Chapter 8 OSD menu for OSD menu options.

Camera control

The Control status indicator located at the bottom left of the toolbar page indicates the current control status of the thermal camera.

The camera will not respond to any commands until the user takes control of the camera. The control light will turn green when the user has control of the camera.

Taking control of the thermal camera

To take control of the thermal camera using the Web interface follow the steps below.

With the control status light not lit:

1. Select the Control status indicator or other on-screen icon.

   A control request is sent to the camera.

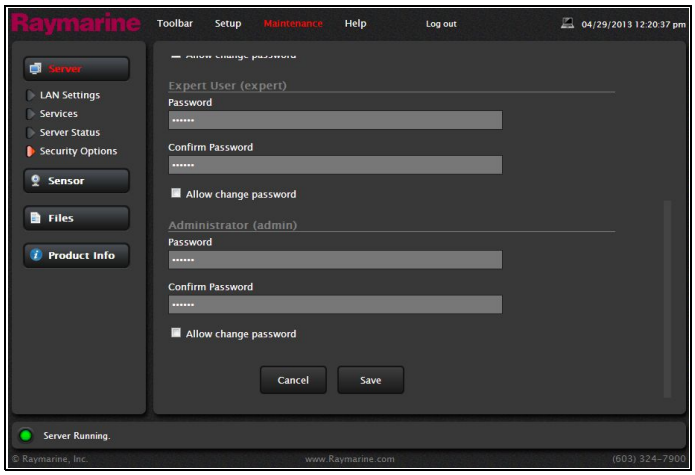
Changing account passwords

The password for all accounts can be changed when logged in as administrator.

From the Web interface:

1. Select **Maintenance** from the top banner.
2. Select **Server** form the options on the left hand side.
3. Select **Security Options**.
4. Enter the new password in the relevant Password and Confirm Password fields.
5. You can also select whether the account type can change their own passwords by placing or removing a tick in the **Allow change password** check box.

   When this option is ticked the change password icon will appear at the top of the page for account types which have been allowed to change their own passwords.
6. Select **SAVE** to save the new password(s).



Note: If multiple users have access to the administrator account it is not recommended that you allow change of password on that account.

Changing the password

To change the current users password follow the steps below.

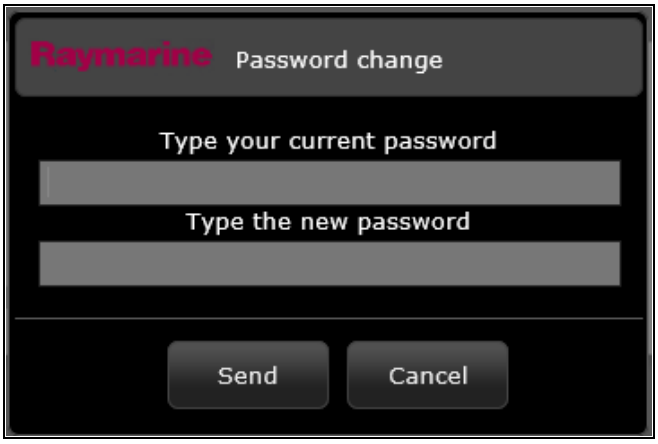
Passwords can only be changed if an administrator has allowed the account type to change their own password.

From the Web interface:

1. Select the Change password icon

   The change password icon is the yellow key icon located along the top of the page.

   The change password dialog is displayed.



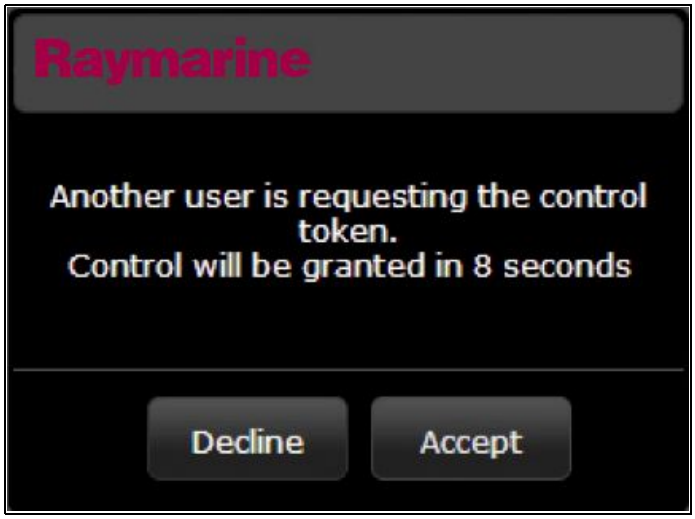
2. Enter the current password and then enter your new password in the boxes provided.
3. Select **Send**.

The password is now changed.

Multiple controllers

The camera can be controlled by more than 1 control device.

In a system which includes more than 1 control device if a second control device sends a control request to the camera then the first control device will receive a warning message.



Control will automatically be granted to the second device after the allotted time unless the **Decline** button is selected.

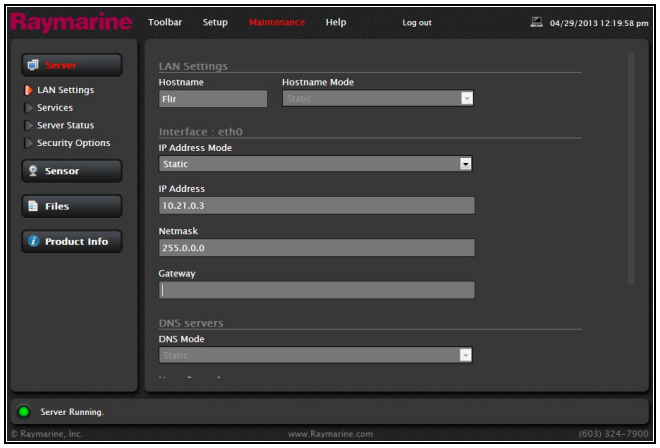
When control is granted to the second device the control status indicator will turn yellow which indicates that the device is still connected but not controlling the camera.

Changing the camera's IP address

By default all T200 series cameras are assigned the following IP address: **10.21.0.03**. If multiple cameras are on the same network then each camera must be assigned a unique IP address from the following IP address range: **10.21.0.02** to **10.21.0.15**.

1. Log into the web utility as the administrator.
2. Select the **Maintenance menu**.
3. From the left hand menu select **Server**.
4. From the expanded server options select **LAN Settings**.

   The camera's network settings are displayed.



5. Select Static from the **IP Address Mode** drop down box.
   The page will refresh and the previously grayed out fields will now be available.
6. Enter a unique IP address in the **IP Address** field.
7. Select **Save** to save the new settings.
   A warning message is displayed as the network is restarted. The open web page, opened under the old IP address, is no longer valid.
8. You can now log into the Web interface using the new IP Address.

Note: If your web enabled device has been configured with a static IP address in order to access the Web interface then it may be necessary to change its IP address as well.

Zooming the camera using the toolbar

The toolbar can be used to control the zoom level of the thermal camera, when the zoom level is changed an icon is displayed on-screen momentarily to indicate the zoom level.

With no zoom level selected:

1. From the web interface toolbar, select the **Zoom in** icon to set the zoom level to 2x.
2. On a 640 x 480 camera you can select the **Zoom in** icon again to set the zoom level to 4x.
3. Selecting the **Zoom out** icon will return to the previous zoom level.

Selecting a scene preset using the toolbar

From the web interface toolbar:

1. Select the **Change Scene** icon to change the scene.

Selecting the Change Scene icon will cycle through the available scenes.

Selecting a color palette using the web utility toolbar

To select a color palette follow the steps below.

From the web interface toolbar:

1. Select the **Change Color** icon to change the color palette.

Selecting the Change Color icon will cycle through the available color palettes.

Reversing the video polarity using the toolbar

To reverse the polarity of the video image follow the steps below.

From the web interface toolbar:

1. Select the **Invert Video Polarity** icon to reverse the video polarity.

Selecting the Invert Video Polarity icon will switch the video image between white hot and black hot.

Switching the camera to rear view mode using the web interface

To switch the camera to rear view mode follow the steps below

From the web utility:

1. Select **Setup**.
2. Scroll down to **Image Orientation**.
3. For Ball Up configuration select **Revert** from the drop down box.
4. For Ball Down configuration select **Both** from the drop down box.

Restoring factory defaults using the web interface

Use this procedure to reset the camera to its factory default settings.

From the web interface:

1. Select **Setup**.
2. Scroll to the bottom of the page.
3. Select **Factory Defaults**.

7.3 Advanced IP Communications

The advanced IP communications drop down is located in the lower right corner of the Web interface page.

Use of the Advanced drop down is not required for day to day operation of the camera.

The information that is displayed in the text area is intended for system integrators and programmers. It displays the actual command strings sent to and received from the thermal camera

Programmers and integrators can manually input command strings and send them to the camera using the **TX** button.

Chapter 8: On-Screen Display Menu

Chapter contents

8.1 On-Screen Display (OSD) menu options

The OSD menus provide a range of tools and settings to configure the thermal camera. The OSD menus are only available using a JCU or the web interface.

The menus can be accessed from any JCU on the system. The menus are overlaid onto the video image.

Menus available

Video Setup	This menu is used to set the video configuration options.
Set Symbology	Settings associated with the status icons.
User Programmable Button	Configure the **USER** button on the JCU.
System Setup	Settings to optimize operation for this particular system / installation.
About / Help	Helpful information and restore to factory defaults setting.
Exit	Cancels the OSD menu.

Video setup menu

Menu item / Description	Settings / Operation
Set Thermal Color Default	This saves the current color setting as the default value.
Set Reverse Video or **Set Video Polarity**	This toggles the infrared image between white-hot (or red-hot if viewing a color image) and black-hot.
Enable / Disable Color Thermal Video	Enable or disable the thermal color palettes: • Enabled – Greyscale, Red, Sepia, Rainbow and Fusion palettes are available. • Disabled – Only Greyscale and Red palettes are available.
Display Test Pattern	Use the display test pattern when setting up the color / contrast settings for your particular display or monitor. You can switch through the 4 test patterns available.
Exit	

Set symbology menu

Menu item / Description	Settings / Operation
Enable / Disable PC Icon	• Enabled – The PC icon is displayed whenever a PC is detected on the network. • Disabled – The PC icon is not displayed.
Enable / Disable JCU Icon	• Enabled – The JCU icon is displayed whenever a JCU is detected on the network. • Disabled – The JCU icon is not displayed.
Display All Icons	Selecting this menu item enables all available icons.
Display Minimal Icons	Selecting this menu item reduces the icon activity: • Position, Zoom, Rearview, Pause, Stabilization disabled and Point Mode enabled icons are unaffected. • Home and Scene icons are displayed only momentarily. • Other icons are not shown.
Hide All Icons	Selecting this option hides all icons except for: • Position indicator • Rearview mode enabled • Stabilization disabled • Point mode enabled
Exit	Returns to the main menu.

User Programmable Button menu

Use this menu to set up the **USER** button on the JCU.

Menu item / Description	USER button operation
Man-Over-Board settings	The **USER** button will set the camera scene to Man-Overboard mode.
Hide / Show All Icons	The **USER** button will toggle between Show and Hide icon settings.
Reverse Video or **Inert Video Polarity**	The **USER** button will toggle between the White-hot and Black-hot (reverse) thermal image.
Rearview Mode	The **USER** button will toggle Rearview mode on and off.
Exit	Returns to the main menu.

System Setup menu

Menu item / Description	Settings / Operation
Save Camera Settings	Save any changes to the camera settings
Enable / Disable Ball-Down Installation	This option should be enabled when the camera is mounted upside down (Ball-Down).
Enable / Disable Rearview Mode	When this option is enabled the camera image is reversed and you will see a mirror image on the display.
Name Camera	Use this option to name the camera.
Exit	

About / Help menu

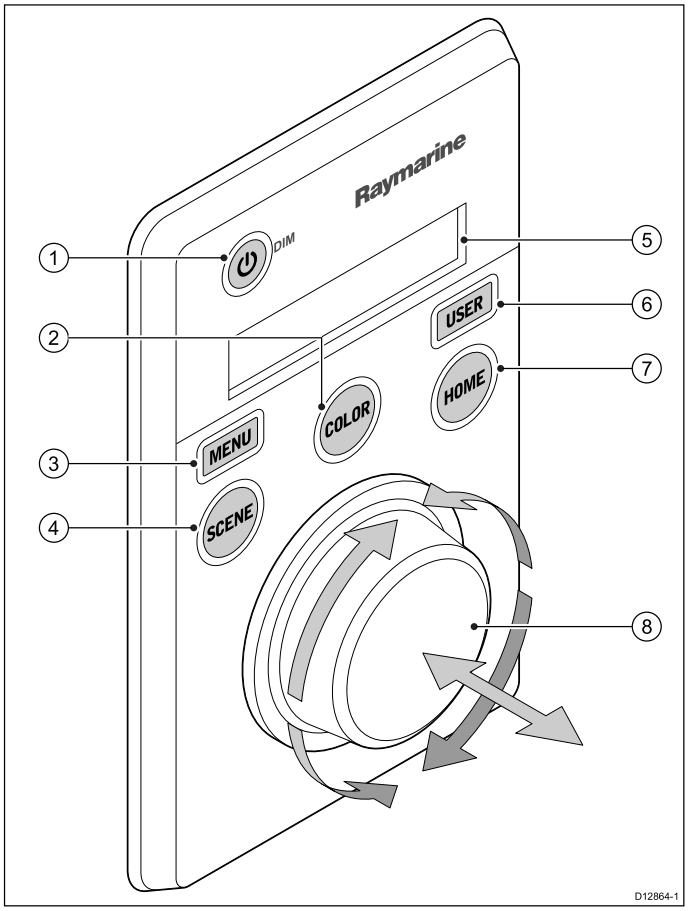
Menu item / Description	Settings / Operation
Video Icon Help Screens	This option displays an explanation of the purpose of each of the screen icons. Use the direction controls to cycle through the pages.
Product Information	This option displays information about the camera: • Name, • Serial number, • MAC address, and • Software information.
Contact Raymarine	This option displays Raymarine contact details.
Restore Factory Defaults	Use this option to restore the camera settings to their factory default value.
Exit	

Chapter 9: Optional JCU (Joystick Control Unit)

Chapter contents

9.1 JCU controls overview

The controls when using the optional JCU are shown below.



1	**STANDBY / DIM** • Press and hold – "Wake" the camera from standby mode or access the power menu. • Momentary press – Change JCU display brightness (3 different levels).
2	**COLOR** The factory default is for a red color image to suite night navigation. You may change this using the color menu. • Momentary press – Cycle through the available color settings. (Greyscale, Glowbow, Rainbow, Fusion and Red.) • Press and hold – Perform FFC (Flat Field Correction) operation. This performs a correction for the current ambient temperature.
3	**MENU** – Access the camera setup menus. • Press once – display on–screen setup menu. • Press again – exit setup menu.
4	**SCENE** • Short press – Select between the available scene presets.
5	**Display** – Provides information regarding the JCU and camera status.
6	**USER** – A programmable button for accessing a favorite setting or function not provided on the other keys. The default operation is the Reverse Video function (white-hot / black-hot). • Short press – Perform the programmed action. • Press and hold – Program the **USER** button with another function. The **USER** button can be programmed for the following functions: • **Man-Over-Board** — changes scene to the Man Overboard scene. • **Hide / Show All Icons** • **Invert Video Polarity** — changes between white hot and black hot video modes. • **Rearview Mode**
7	**HOME** — The Home button is not used when controlling a fixed mount thermal camera.
8	**PUCK** – Use the puck to control the camera and navigate the setup menus. Control camera: • Press down (and hold) – Zoom thermal image in. • Lift up (and hold) – Zoom thermal image out. • Double-click (2 quick presses) – Pause thermal image. (Move puck in any direction to unfreeze.) • Turn clockwise — Zoom thermal image in. • Turn Anti-clockwise — Zoom thermal image out. • Move up, down left right – is not used when controlling a fixed mount thermal camera. Navigate setup menus: • Move up, down – Scroll through menu options. • Press down – Select highlighted menu option. • Turn clockwise — next menu item. • Turn Anti-clockwise — previous menu item.

9.2 Image adjustments

Zooming the camera using the JCU

The JCU puck is used to control the zoom function of the thermal camera, an icon will be displayed on-screen to indicate the current zoom level.

With no zoom level selected:

1. Push the **Puck** in and hold for 1 second to turn on 2X zoom.
2. Push the **Puck** in and hold for 2 seconds to turn on 4X zoom.
3. Pull the **Puck** out to return to the previous zoom level.

Selecting a scene preset using the JCU

1. Press the **SCENE** button to change the scene.

Pressing the Scene preset button will cycle through the available scenes.

Selecting a color palette using the JCU

To select a color palette follow the steps below.

1. Press the **COLOR** button to change the color palette.

Pressing the Color button will cycle through the available color palettes.

Reversing the video polarity

To reverse the polarity of the video image follow the steps below.

Using the JCU:

1. Press **MENU**.
2. Select **Video Setup**.
3. Select **Set Reverse Video** or **Invert Video Polarity**.
4. Select **MENU** to cancel the on-screen menu.

Switching the camera to rearview mode

To switch the camera to rear view mode follow the steps below.

Using the JCU

1. Press **MENU**.
2. Select **System Setup**.
3. Select **Enable Rearview Mode**.

   When enabled the option is changed to **Disable Rearview Mode**, selecting this will revert back to normal view.
4. Press **MENU** to cancel the on-screen menu.

9.3 JCU Power menu

Menu item / Description	Settings / Operation
JCU Stndby	This option places the JCU in standby. Other controllers on the system are unaffected.
System Stndby	This option places the JCU into Standby mode.
Global Stndby	This option places all connected JCU's into standby.
Calibrate JCU	Use the "Calibrate JCU" function to calibrate the JCU puck. Follow the on screen instructions to calibrate the puck: • **Rotate CCW / CW** – requires you to rotate the puck fully clockwise, then anti-clockwise. then press the puck to continue.
Cancel	Exit the Power Menu.

Accessing the power menu

The power menu can be accessed by following the steps below.

Using the JCU

1. Press and hold the **Power** button on the JCU.

   The JCU LCD will countdown from 3 to 0, after which the power menu is displayed.
2. Use the JCU **Puck** to select the relevant power option.
3. Select **Cancel** to cancel the power menu.

Note: The power menu is only displayed on the JCU's LCD display.

9.4 Restoring factory defaults

Use this procedure to reset the camera to its factory default settings.

With the camera setup menu displayed:

1. Select the **About/Help** menu.
2. Select **Restore Factory Defaults** from the available options.

9.5 Resetting the JCU

Occasionally it may be necessary to reset the JCU, to do this you can either power cycle the JCU or follow the steps below:

1. Press and hold the **SCENE**, **COLOR** and **HOME** buttons for 1 second.

Chapter 10: Troubleshooting and support

Chapter contents

10.1 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.	• Check thermal camera video cables are sound and properly connected. • Ensure that the video is connected into video input 1 at the multifunction display or GVM. • Ensure that the correct video input is selected at the display.
	Problem with power supply to the camera or JCU (if used as the primary controller)	• Check the power connections to the camera and JCU / PoE injector (if used). • Ensure that the power switch / breaker is on. • Check the fuse / breaker state.
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^{hs} / 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.	• Ensure you are using a high quality shielded cable. • Ensure proper cable separation, for example do not run data and power cables in close proximity with each other.
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 **SCENE** 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.

10.2 Raymarine customer support

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

Web support

Please visit the customer support area of our website at:

www.raymarine.com

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

Telephone and e-mail support

In the USA:

- **Tel:** +1 603 324 7900
- **Toll Free:** +1 800 539 5539
- **E-mail:** support@raymarine.com

In the UK, Europe, and the Middle East:

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

In Southeast Asia and Australia:

- **Tel:** +61 (0)29479 4800
- **E-mail:** aus.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.
- System diagrams.

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

Chapter 11: Technical specification

Chapter contents

11.1 Camera technical specification

Power requirements	PoE Class 3 device
Power consumption	• 4.8 W typical — without demister • 12.5 W Max — with demister
Environmental	**Installation environment** • Operating temperature: -25ºC to +55ºC (-13ºF to 131ºF) • Storage temperature: -30ºC to +70ºC (-22ºF to 158ºF) • Relative humidity: max 95% • Waterproof to IPX6 • Wind: 100 knot (115.2 mph) • Vibration: IEC 60945; MIL-STD-810E • Sand/dust: MIL-STD-810E • Salt Mist: IEC60945; MIL-STD-810F
Electromagnetic compliance	EMI: IEC 60945
Dimensions	• Base diameter: 178 mm (7 in.) • Height: 152 mm (6 in.)
Weight	<1.4 kg (3 lb) depending on camera variant.
Video out	• NTSC = <9Hz and 30Hz • PAL = <9Hz and 25Hz Depending on camera model.
Pan and Tilt adjustments	• Pan = ±30º • Tilt = +34º to –27º **Note:** Pan and Tilt angles are fixed during installation.
Video resolution	• 320 x 240 • 640 x 480 Depending on camera model.
Field of View	• 24º x 18º • 25º x 20º Depending on camera model.

11.2 PoE Injector technical specification

Nominal input voltage	12 or 24 V dc
Operating input voltage range	9 V dc to 36 V dc
Power consumption	22 W Max
Output voltage	48 V dc @ 0.35 A
Output power	17 W Max
Environmental	**Installation environment** • Operating temperature: -25ºC to +75ºC (-13ºF to 167ºF) • Storage temperature: -40ºC to +85ºC (-40ºF to 185ºF) • Operation humidity: 5% to 90% • Vibration: IEC 60945; MIL-STD-810E • Sand/dust: MIL-STD-810E • Salt Mist: IEC60945
Electromagnetic compliance	FCC Class B, EN55022 Class B, EN60950, EN60945
Dimensions	• Length: 85 mm (3.35 in) • Width: 57 mm (2.24 in) • Height: 36 mm (1.42 in)
Weight	.45 kg (1 lb)
Connector type	RJ45 ethernet 10 / 100 / 1000 M/bits

Chapter 12: Spares and accessories

Chapter contents

12.1 T200 Spares and accessories

The table below lists the spares and accessories available for the T200 series thermal cameras.

Description	Part number
PoE Injector	R32141
Ethernet coupler	R32142
Coaxial video cable 7.6 m (25 ft)	A80266
Ethernet cable 7.6 m (25 ft)	A80267
Mounting kit	R32144
JCU (Joystick Control Unit)	E32130

12.2 RayNet to RJ45 SeaTalk^{hs} adaptor cables

Cable	Part number
1 m (3.28 ft) RayNet to RJ45 SeaTalk^{hs} cable	A62360
3 m (9.84 ft) RayNet to RJ45 SeaTalk^{hs} cable	A80151
10 m (32.8 ft) RayNet to RJ45 SeaTalk^{hs} cable	A80159
400 mm (1.3 ft) RayNet to RJ45 SeaTalk^{hs} (female) cable	A80160

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