FLIR®

The World's Sixth Sense

M100 / M200 SERIES

INSTALLATION & OPERATION INSTRUCTIONS
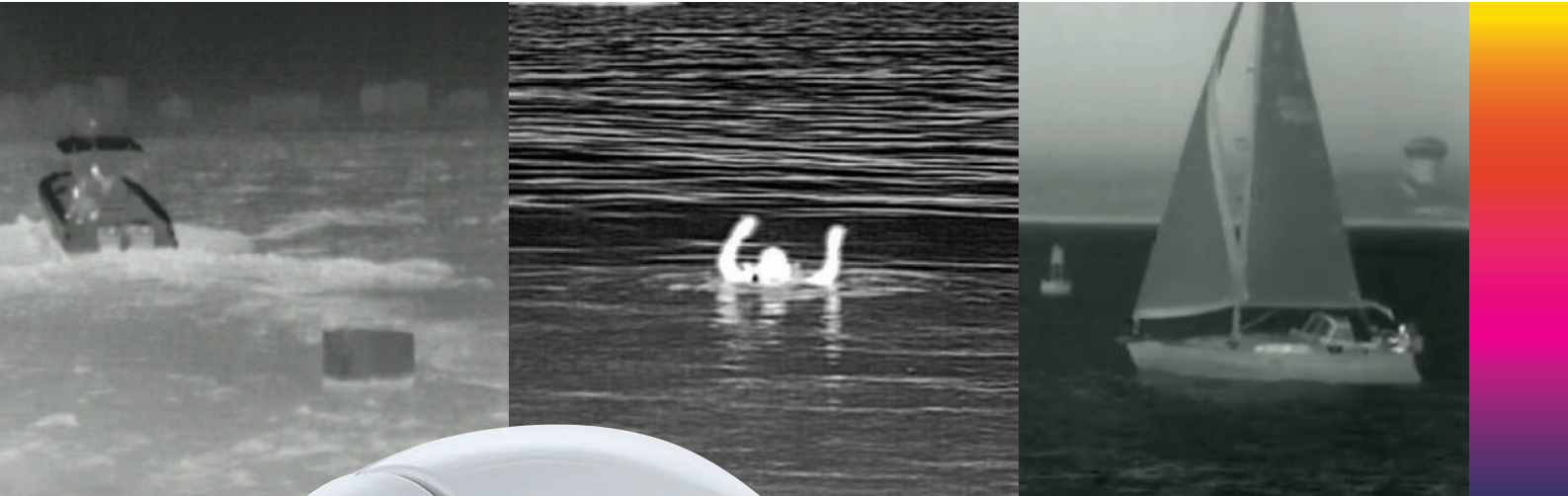
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Export control

M100–Series and M200–Series thermal cameras are controlled by US export laws.

There are special versions of the system that are approved for international distribution and travel. Please contact FLIR customer support if you have any questions.

Contact details can be found on the FLIR website, www.flir.com.

Export Administration Regulations (EAR)

This document is controlled to FLIR Technology Level 1. The information contained in this document pertains to a dual use product controlled for export by the Export Administration Regulations (EAR). FLIR trade secrets contained herein are subject to disclosure restrictions as a matter of law. Diversion contrary to US law is prohibited. US Department of Commerce authorization is not required prior to export or transfer to foreign persons or parties unless otherwise prohibited.

Software updates

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

www.flir.com/marine/support

Product handbooks

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

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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.
	• Certified installation by an approved installer is recommended. A certified installation qualifies for enhanced product warranty benefits. Contact your dealer for further details, and refer to the separate warranty document packed with your product.

	Warning: Corrosion
⚠	To avoid accelerated galvanic corrosion of the product, ensure that a non-metallic isolation mount is used when fitting the product directly to large stainless steel platforms/mounts, or directly to steel construction vessels.

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

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

	Warning: Positive ground systems
⚡	Do not connect this unit to a system which has positive grounding.

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

	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: Entrapment hazard
⚠	This product features moving parts that provide a potential entrapment hazard. Keep clear of moving parts at all times.

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 **FLIR** 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: Do not open the unit

The unit is factory sealed to protect against atmospheric humidity, suspended particulates and other contaminates. It is important that you do not open the unit or remove the casing for any reason. Opening the unit will:

* compromise the seal with possible damage to the unit, and

* void the manufacturer's warranty.

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.

Warning: Ensure all equipment has isolated power supply

This product features an isolated power supply. To prevent potential damage to equipment, it is recommended that any external equipment connected to this product also features an isolated power supply.

Caution: Service and maintenance

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

Caution: Sun covers

* If your product is supplied with a sun cover, to protect against the damaging effects of ultraviolet (UV) light, always fit the sun cover when the product is not in use.

* Sun covers must be removed when travelling at high speed, whether in water or when the vessel is being towed.

Cleaning the thermal camera

The camera housing and lens will require occasional cleaning. You should 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, or with abrasive materials such as paper or scrub brushes, as this could scratch the coating.

• Do NOT use 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.

Inspecting the thermal camera

Routinely inspect the camera and its mounting surface to ensure that it is installed securely, that the coated surfaces are intact, and that there are no signs of corrosion.

When the camera is powered off, grasp it firmly at the base and confirm it is rigid and secure. Then hold the camera above the base and confirm it will rotate freely and without noticeable wobble or looseness around the pan bearing.

Water ingress

Water ingress disclaimer

Although the waterproof rating capacity of this product meets the stated IPX standard (refer to the product's *Technical Specification*), water intrusion and subsequent equipment failure may occur if the product is subjected to commercial high-pressure washing. **FLIR** will not warrant products subjected to high-pressure washing.

Disclaimer

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

FLIR 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

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

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

> **Note:** In areas of extreme EMC interference, some slight interference may be noticed on the product. Where this occurs the product and the source of the interference should be separated by a greater distance.

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

- **FLIR** 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.
- **FLIR** 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

Suppression ferrites

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

Connections to other equipment

Requirement for ferrites on non-FLIR cables

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

Declaration of conformity

FLIR Systems Inc. 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.flir.com.

Product disposal

Dispose of this product in accordance with the WEEE Directive.

The Waste Electrical and Electronic Equipment (WEEE) Directive requires the recycling of waste electrical and electronic equipment.

Warranty registration

To register your FLIR product ownership, please visit www.flir.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, FLIR 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, FLIR cannot accept liability for any differences between the product and this document. Please check the FLIR website (www.flir.com/marine/support) to ensure you have the most up-to-date version(s) of the documentation for your product.

Chapter 2: Document and product information

Chapter contents

2.1 Document information

This document contains important information related to the installation and operation of your FLIR product.
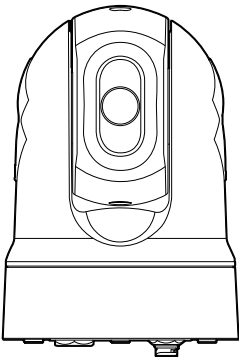
The document includes information to help you:

- plan your installation and ensure you have all the necessary equipment;

- install and connect your product as part of a wider system of connected marine electronics;

- use your product along with an appropriate video monitor, joystick control unit (JCU), web browser, or multifunction display (MFD).

- troubleshoot problems and obtain technical support if required.

This and other FLIR product documents are available to download in PDF format from www.flir.com/marine/support.

Applicable products

This document is applicable to the following products:

	Part number	Name	Description
	E70432	M132 (9 Hz)	Thermal tilt-only, night-vision IP video camera
	E70431	M132 (30 Hz)	
	E70354	M232 (9 Hz)	Thermal pan-and-tilt, night-vision IP video camera
	E70353	M232 (30 Hz)	

System kits

M100/M200–Series thermal cameras are supplied individually, or as part of a system kit.

In addition to the thermal camera, system kits include a joystick control unit (JCU) for controlling the camera, and an IP video decoder for displays that require an analog composite-video feed (NTSC or PAL).

The content of each system kit is listed below. For a list of the individual parts supplied with each camera, see **M100/M200–Series camera**.

System kit part number	Description	Contents (part numbers)
T70333	M132 Camera System Kit 30 Hz	• E70431: M132 thermal camera 30 Hz (tilt only) • A80510: JCU-3 control unit • A80508: IP video decoder
T70334	M132 Camera System Kit 9 Hz	• E70432: M132 thermal camera 9 Hz (tilt only) • A80510: JCU-3 control unit • A80508: IP video decoder
T70335	M232 Camera System Kit 30 Hz	• E70353: M232 thermal camera 30 Hz (pan & tilt) • A80510: JCU-3 control unit • A80508: IP video decoder
T70336	M232 Camera System Kit 9 Hz	• E70354: M232 thermal camera 9 Hz (pan & tilt) • A80510: JCU-3 control unit • A80508: IP video decoder

Document illustrations

Your product may differ slightly from that shown in the illustrations in this document, depending on product variant and date of manufacture.

All images are provided for illustration purposes only.

Product documentation

The following documentation is applicable to your product:

Description	Part number
M100/M200 Thermal Camera Installation and Operation Instructions Installation and operation of an M100–Series or M200–Series thermal camera and connection to a wider system of marine electronics.	71001
M100/M200–Series surface mounting template Mounting diagram for mounting an M100–Series or M200–Series thermal camera.	77001
M100/M200–Series top-down riser mounting template Mounting diagram for mounting the top-down riser for an M100–Series or M200–Series thermal camera.	77003
M100/M200 Thermal Camera Visual Quick Start Guide Single-page illustrated guide to help you get up-and-running with your thermal camera.	76001
LightHouse™ 2 MFD Operation Instructions Details the operation of the Camera application for LightHouse™ 2-compatible multifunction displays.	81360
LightHouse™ 3 MFD Basic Operation Instructions Details the operation of the Camera application for LightHouse™ 3-compatible multifunction displays.	81369
LightHouse™ 3 MFD Advanced Operation Instructions Details the operation of the Camera application for LightHouse™ 3-compatible multifunction displays.	81370
JCU-3 Remote Keypad Installation Instructions Installation of a JCU-3 Remote Keypad and connection to a wider system of marine electronics.	71002
IP Video Decoder for M100/M200 Thermal Camera — Quick Start Guide Describes how to connect and configure the IP video decoder to work with you M100/M200 thermal camera.	76002

2.2 Product overview

M100/M200

The M100/M200–Series is a maritime thermal imaging system for use on nearly any kind of vessel. It provides a clear image 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.

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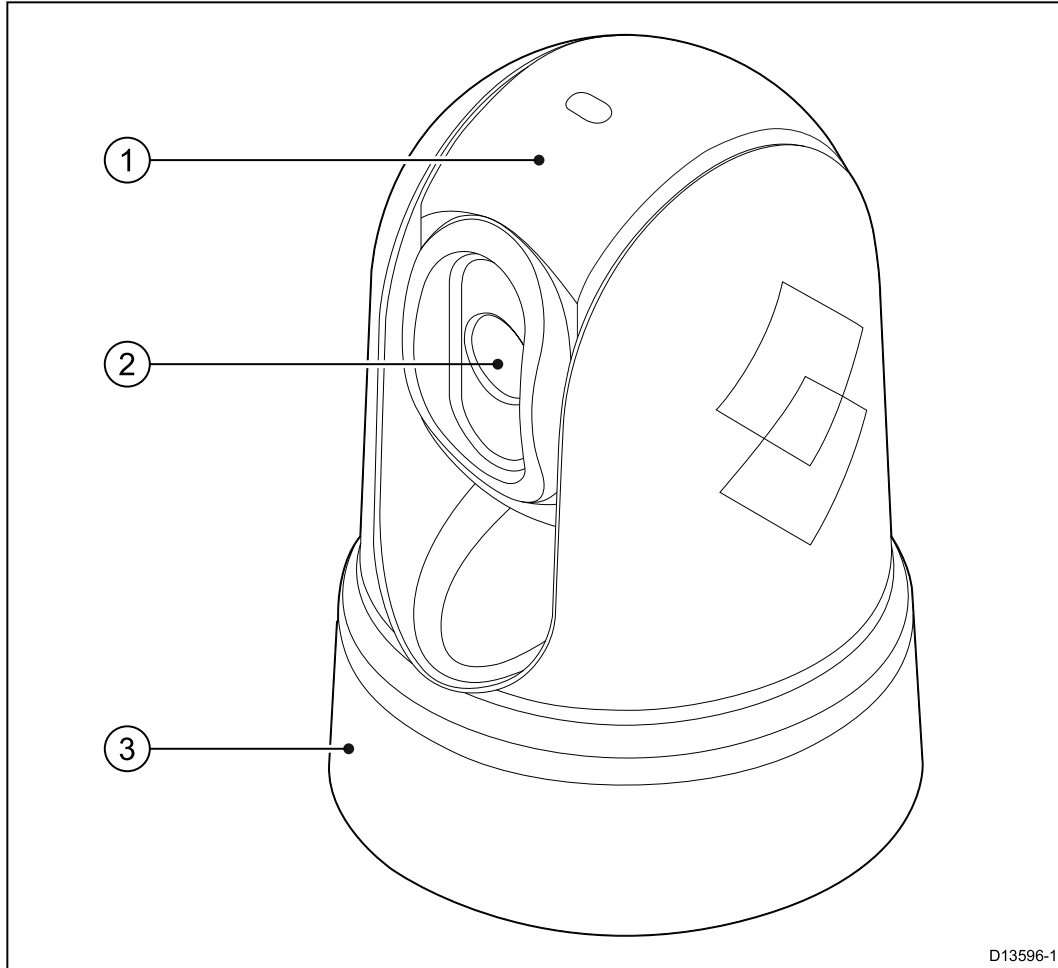
1. Tilt assembly.

2. Thermal camera lens window.

3. Pan assembly (fixed position for M100–Series).

The M100/M200–Series system has the following key functions and features:

- IP connectivity to simplify installation and system integration.

- H264–encoded IP video stream (convertible to analog NSTC/PAL composite-video using the IP video decoder supplied with M100/M200 system kits).

- Pan and tilt operations (tilt only for M100–Series) with dedicated joystick control unit, multifunction display (MFD), or web browser.

- Automatic camera adjustment to suit changing conditions.

- Preset modes (Scenes) optimized for prevailing conditions.

- ClearCruise™ intelligent thermal analytics technology; provides audible and visual alerts when "non-water" objects are identified in the scene. (Requires a Raymarine® MFD running LightHouse™ 3 software.)

- Automatic window heaters to de-ice the lens window in cold weather.

- 12 V or 24 V dc power.

Chapter 3: Planning the installation

Chapter contents

3.1 Installation checklist

Installation includes the following activities:

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

Schematic diagram

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

• Location of all components.

• Connectors, cable types, routes and lengths.

3.2 Compatible multifunction displays

Note: A Raymarine® LightHouse™-compatible multifunction display (MFD) is not required to use a M100/M200-Series camera. However certain camera features may not be accessible without one.

This product is compatible with the following Raymarine® LightHouse™ multifunction displays.

- a Series, c Series, e Series, eS Series.
- gS Series.
- Axiom and Axiom Pro.

Multifunction display software requirements

To use this product with a Raymarine® LightHouse™-compatible multifunction display (MFD), ensure that your MFD is running the latest version of the LightHouse™ 2 or LightHouse™ 3 software.

Note:

- This product is NOT compatible with LightHouse™ 2 software versions 17 or earlier.
- The latest LightHouse™ MFD software can be obtained by visiting www.raymarine.com/software.

3.3 Parts supplied

System kits

M100/M200–Series thermal cameras are supplied individually, or as part of a system kit.

In addition to the thermal camera, system kits include a joystick control unit (JCU) for controlling the camera, and an IP video decoder for displays that require an analog composite-video feed (NTSC or PAL).

The content of each system kit is listed below. For a list of the individual parts supplied with each camera, see **M100/M200–Series camera**.

System kit part number	Description	Contents (part numbers)
T70333	M132 Camera System Kit 30 Hz	• E70431: M132 thermal camera 30 Hz (tilt only) • A80510: JCU-3 control unit • A80508: IP video decoder
T70334	M132 Camera System Kit 9 Hz	• E70432: M132 thermal camera 9 Hz (tilt only) • A80510: JCU-3 control unit • A80508: IP video decoder
T70335	M232 Camera System Kit 30 Hz	• E70353: M232 thermal camera 30 Hz (pan & tilt) • A80510: JCU-3 control unit • A80508: IP video decoder
T70336	M232 Camera System Kit 9 Hz	• E70354: M232 thermal camera 9 Hz (pan & tilt) • A80510: JCU-3 control unit • A80508: IP video decoder

M100/M200–Series camera

The following items are supplied with your product.

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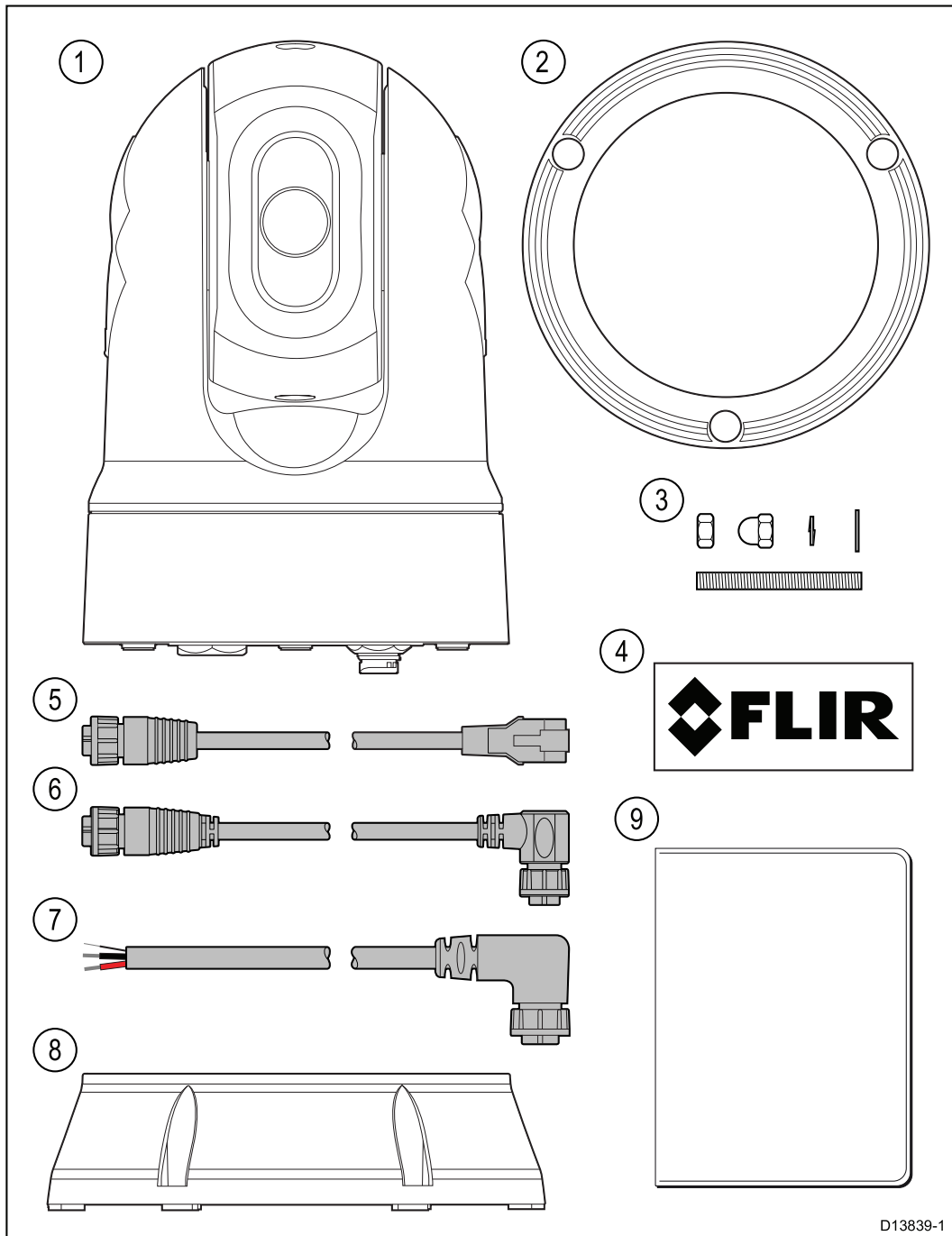
1. Thermal camera

2. Thermal camera base-seal

3. 3 x thermal camera fasteners: nuts, dome nuts, spring washers, flat washers, and threaded studs

4. 2 x Self-adhesive decals (for ball-down mounting only)

5. RayNet-to-RJ45 adapter cable (100 mm)

6. *Right-angled RayNet-to-RayNet cable (10 m)

7. *Right-angled 3-pin power cable (10 m)

8. Top-down riser kit (includes riser, riser base seal, and riser mounting template)

9. Documentation pack

*The supplied right-angled RayNet and Power cables are suitable for mounting on surfaces up to 25.4 mm (1.0 inch) thick. When mounting on thicker surfaces, you may need to use RayNet and Power cables with straight connectors (available separately).

> **Note:** For further details on network hardware and cables, see Chapter 10 **Spares and accessories**.

JCU–3

The JCU-3 joystick control unit is included in camera system packs, and is also available to purchase as a separate accessory. The unit is supplied with both a portrait-oriented keypad (fitted), and a landscape-oriented keypad.

For information on other accessories, see Chapter 10 **Spares and accessories**.

> **Note:** Your M100/M200-Series thermal camera is also compatible with the following joystick control units, provided with other FLIR and Raymarine camera systems:
>
> • JCU-1 (part no. 500-0385-00) — joystick control unit for FLIR M-Series and Raymarine T-Series cameras
>
> • JCU-2 (part no. 500-0398-00) — joystick control unit for FLIR M400-Series, MV-Series and MU-Series cameras

Parts supplied

The parts supplied with the keypad are shown below.

D13615-2
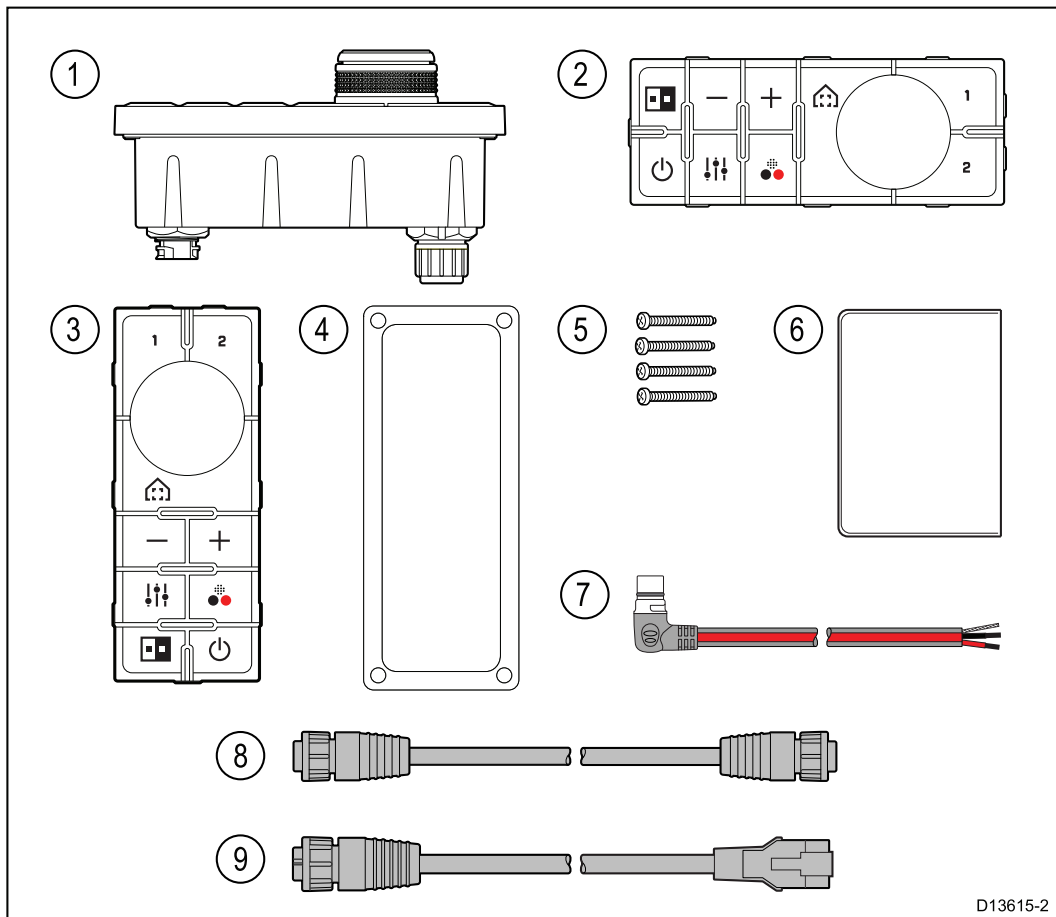
1. **JCU-3** keypad

2. Landscape keypad mat

3. Portrait keypad mat (supplied fitted to the unit)

4. Mounting gasket

5. 4 x mounting fixings

6. Documentation pack

7. Right angled power cable 2 m (6.6 ft.)

8. RayNet network cable 2 m (6.6 ft.)

9. RayNet-to-RJ45 adapter cable (100 mm)

IP video decoder

The IONODES ION-R100 IP video decoder is included in camera system packs, and is also available to purchase as a separate accessory.

For information on other accessories, see Chapter 10 **Spares and accessories**.

Parts supplied

The parts supplied with the IP video decoder are shown below.

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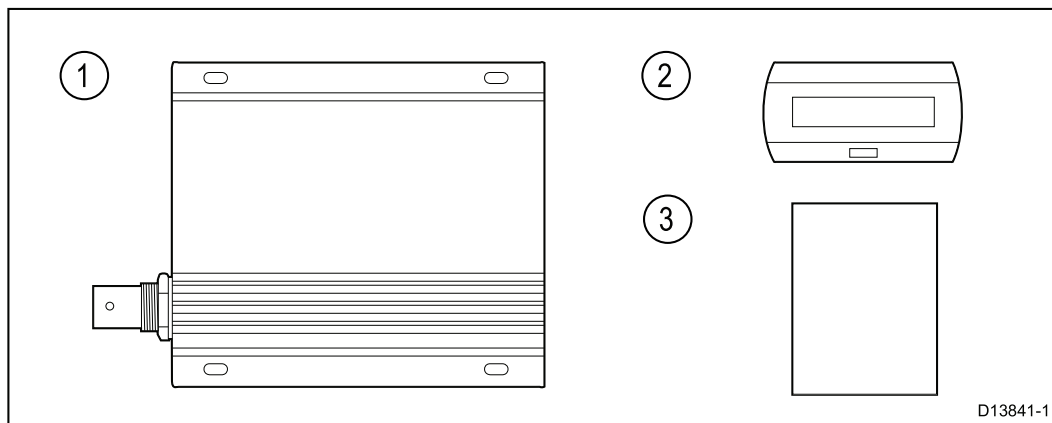
1. IONODES **ION-R100** IP video decoder
2. Suppression ferrite
3. Quick Start Guide

3.4 Tools required

The following tools are required for installation.
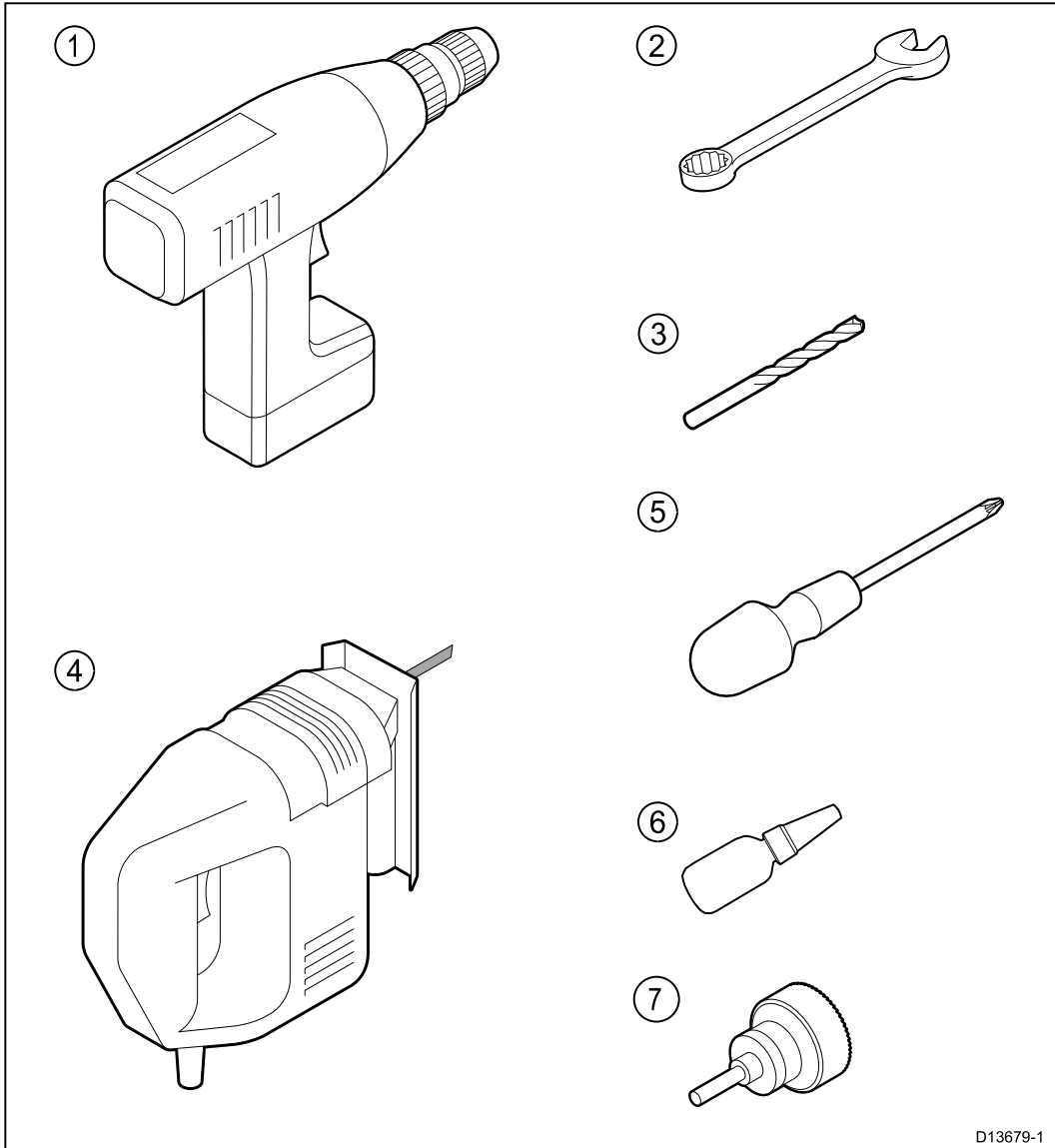
D13679-1

Item	Description
1.	Drill
2.	10 mm spanner
3.	Drill bit of appropriate size*
4.	Jigsaw (only required for JCU installation)
5.	Pozi-drive screwdriver (only required for JCU installation)
6.	Thread-lock
7.	50 mm (2 inch) Hole saw

Note: * The appropriate drill bit size is dependent on the thickness and material of the mounting surface.

3.5 Typical systems

> **Note:** For information on how to connect the product, refer to the Chapter 4 **Cables and connections** section. For information on available cables and accessories, refer to the Chapter 10 **Spares and accessories** section.

- **Basic Web browser system:** You can connect the product directly to an IP-capable device, such as a laptop or PC, using the supplied RayNet cable and RayNet-to-RJ45 adapter cable. You can control the camera through the user interface presented on the web browser.

- **Basic video display system with JCU:** You can connect the product directly to a primary analog video display via an Ethernet switch (using the supplied RayNet cable and RayNet-to-RJ45 adapter cable), IP video decoder (provided with system kits), and a coaxial video cable. You can control the camera with a JCU-3 unit (provided with system kits), also connected to the Ethernet switch.

- **Basic Web browser system with JCU:** You can connect the product to an IP-capable device, such as a laptop or PC, via an Ethernet switch (using the supplied RayNet cable and RayNet-to-RJ45 adapter cable), and an additional Ethernet cable. You can control the camera through the user interface presented on the web browser, or with a JCU-3 unit, also connected to the Ethernet switch.

- **Basic LightHouse™-powered Raymarine multifunction display (MFD) system:** You can connect the product directly to a Raymarine MFD using the supplied RayNet cable. You can control the camera directly using the MFD. For a more flexible system, you can install a RayNet switch between the camera and the MFD, and add a JCU-3 unit (also connected to the RayNet switch) to provide additional camera controls.

- **Complex system with multiple cameras, MFDs, and JCUs:** With sufficient RayNet or Ethernet ports available on installed switches, and appropriate RayNet and Ethernet cables, you can connect multiple cameras, MFDs, and JCUs together to form an integrated system. You can use any JCU or MFD to control and monitor any camera.

3.6 Warnings and cautions

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

3.7 General location requirements

Important considerations when choosing a suitable location for your product.

This product is suitable for mounting below decks.

The product should be mounted where it will be:

• protected from physical damage and excessive vibration.

• well ventilated and away from heat sources.

When choosing a location for the product, consider the following points to ensure reliable and trouble-free operation:

• **Access** — there must be sufficient space to enable cable connections to the product, avoiding tight bends in the cable.

• **Diagnostics** — the product must be mounted in a location where the diagnostics LED is easily visible.

Note: Not all products include a diagnostics LED. Refer to the Chapter 8 **System checks and troubleshooting** for more information.

• **Electrical interference** — the product should be mounted far enough away from any equipment that may cause interference such as motors, generators and radio transmitters / receivers.

• **Magnetic compass** — refer to the *Compass safe distance* section in this document for advice on maintaining a suitable distance between this product and any compasses on your vessel.

• **Power** — to keep cable runs to a minimum, the product must be located as close as possible to the vessel's dc power supply.

• **Mounting surface** — ensure the product is adequately supported on a secure surface. Refer to the weight information provided in the *Technical specification* for this product and ensure that the intended mounting surface is suitable for bearing the product weight. Do NOT mount units or cut holes in places which may damage the structure of the vessel.
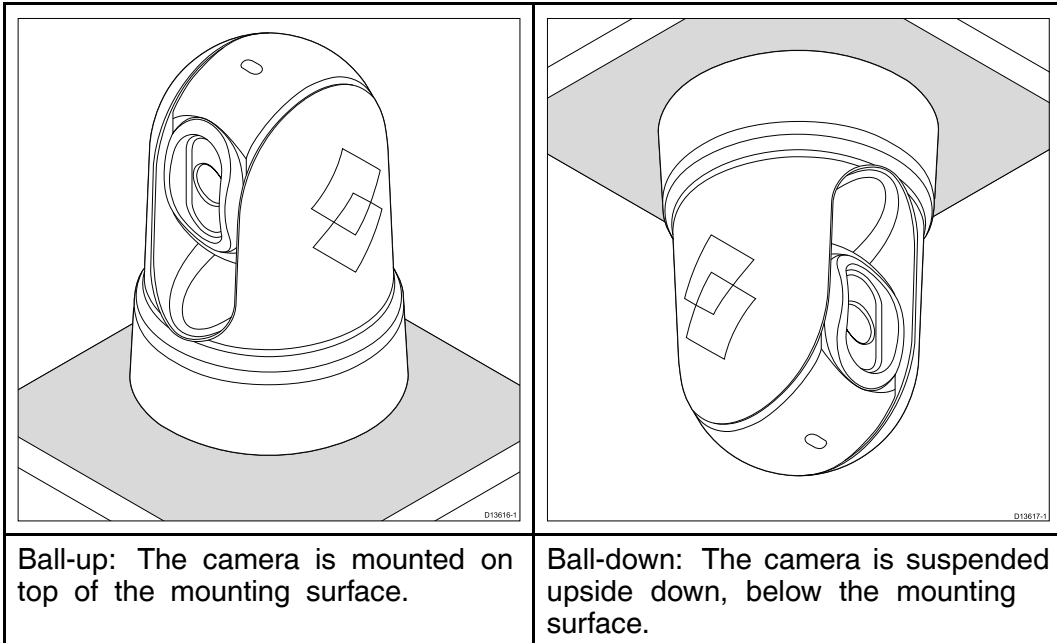
Compass safe distance

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

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

3.8 Camera orientation

The camera can be mounted in 2 orientations informally known 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.

The default video image orientation is for the ball-up configuration; if the camera is to be mounted in the ball-down configuration then the video image must be rotated. To rotate the video image, you must either:

• use the camera's web browser user interface to set the appropriate option (see 6.6 **Web browser interface**
), or

• if your system includes a Raymarine multifunction display (MFD), use the MFD's Camera app to set the appropriate option (refer to your MFD Operation Instructions).

3.9 Product dimensions

M100/M200 Series

229.3 mm (9.03 in)

161.1 mm (6.34 in)

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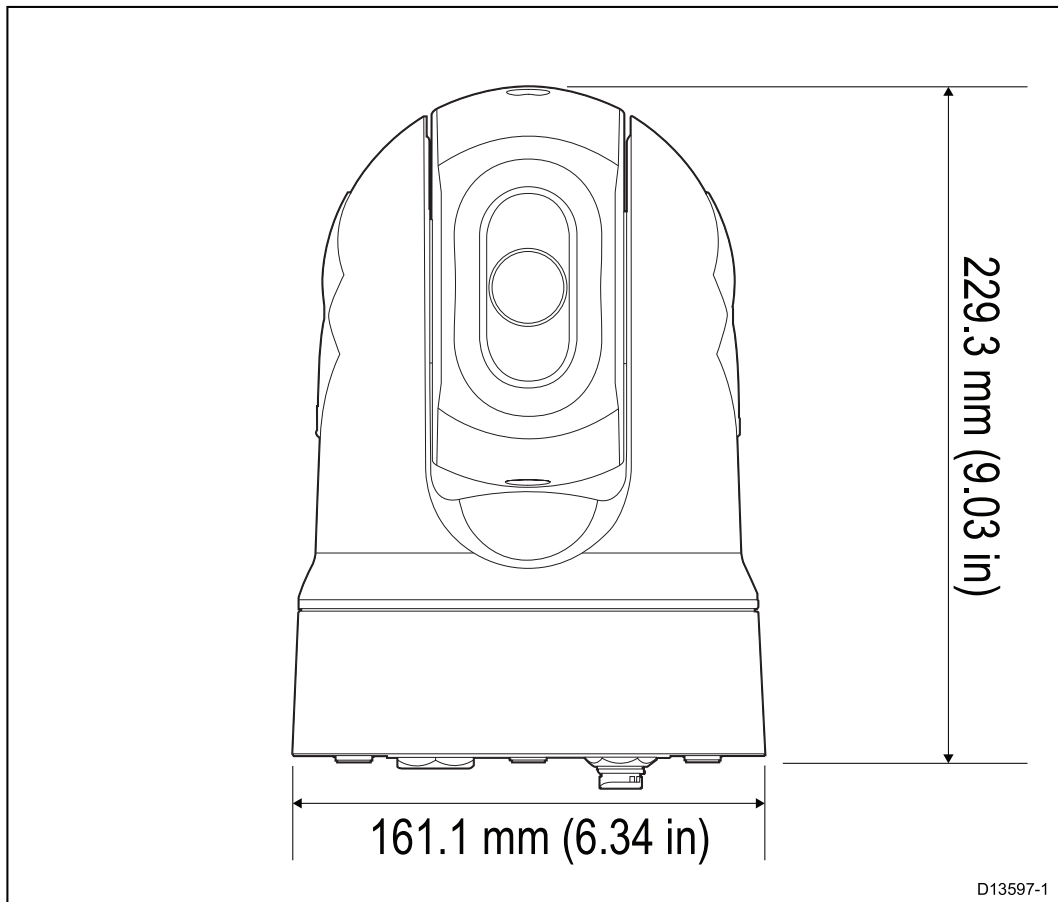
M100/M200 Series with optional top-down riser

279.0 mm (10.98 in)

188.0 mm (7.40 in)

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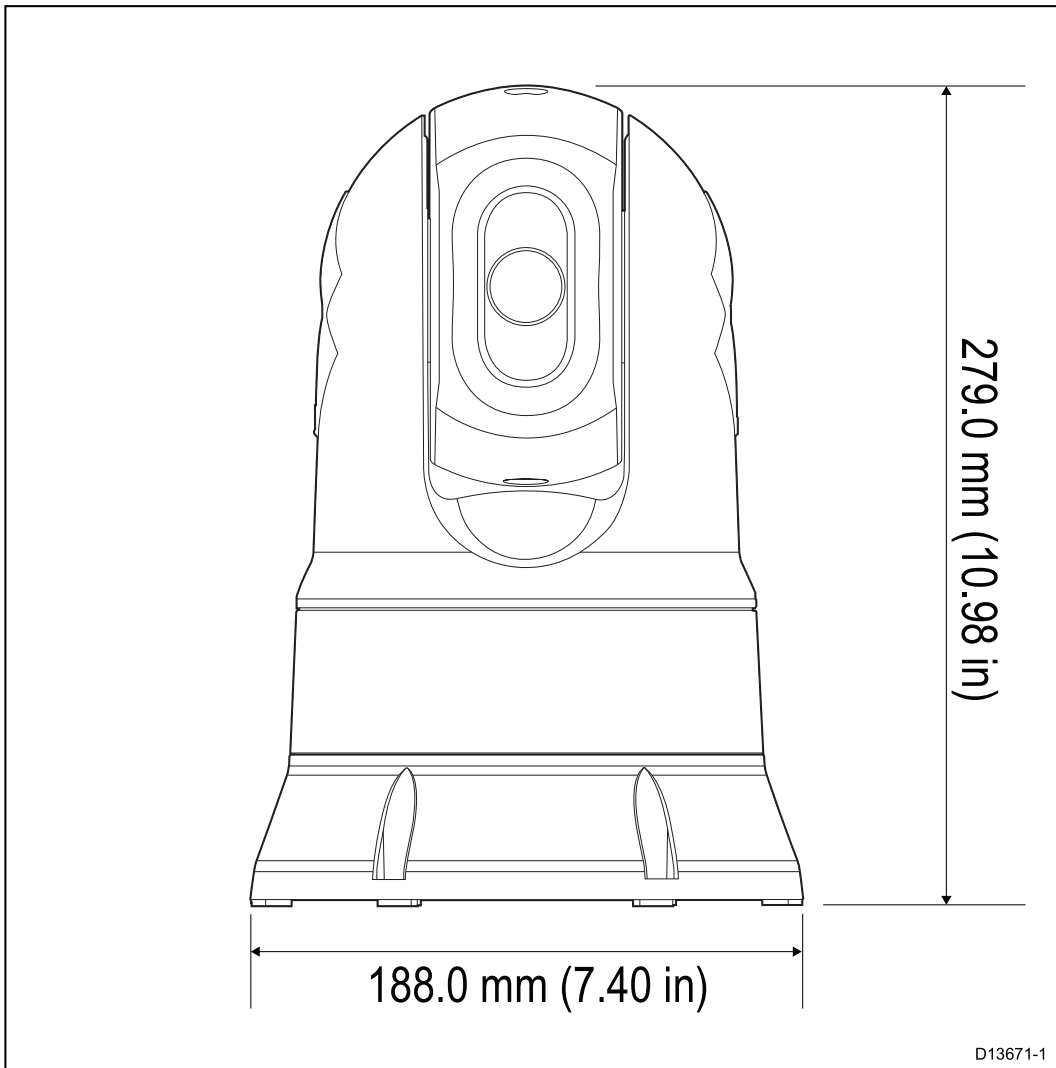
Note: Base diameter with riser base-seal fitted is 190 mm (7.48 in).

JCU-3

Product dimensions

D13603-2
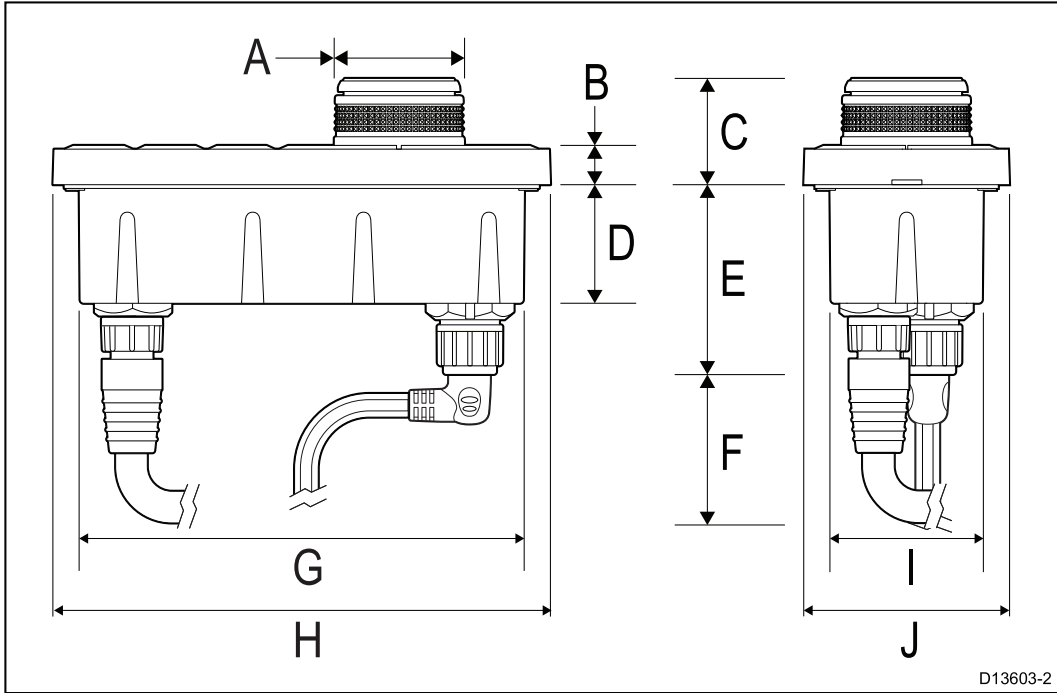
Dimension	Measurement
A	34.8 mm (1.37 in)
B	10.5 mm (0.41 in)
C	28.4 mm (1.12 in.)
D	31.7 mm (1.25 in.)
E	50.7 mm (2.00 in.)
F	80.0 mm (3.15 in.)
G	119.0 mm (4.69 in.)
H	133.0 mm (5.24 in.)
I	41.0 mm (1.61 in.)
J	55.0 mm (2.17 in.)

IP video decoder

Product dimensions
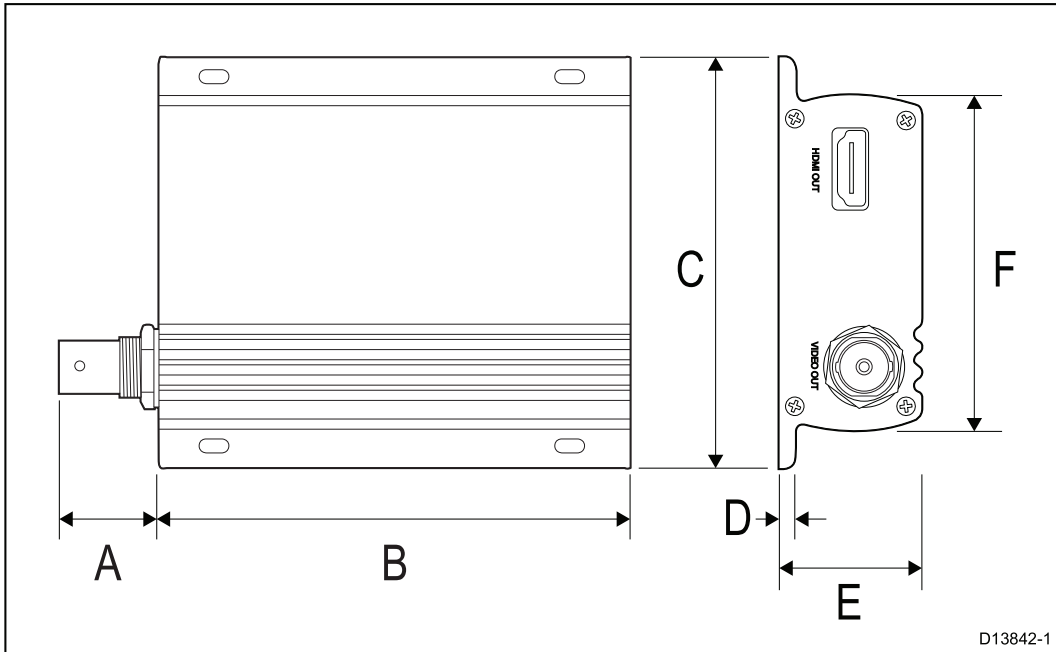
D13842-1

Dimension	Measurement
A	19.5 mm (0.77 in.)
B	90.5 mm (3.56 in.)
C	81.0 mm (3.19 in.)
D	3.0 mm (0.12 in.)
E	28.0 mm (1.10 in.)
F	66.0 mm (2.60 in.)

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 FLIR.

* Ensure that any non-FLIR 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).

200 mm (8 in)

100 mm (4 in)
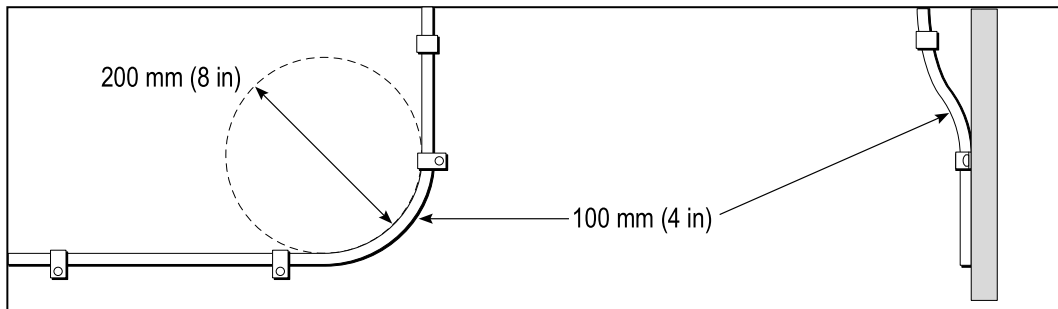
* Protect all cables from physical damage and exposure to heat. Use trunking or conduit where possible. Do NOT run cables through bilges or doorways, or close to moving or hot objects.

* Secure cables in place using tie-wraps or lacing twine. Coil any extra cable and tie it out of the way.

* Where a cable passes through an exposed bulkhead or deckhead, use a suitable watertight feed-through.

* Do NOT run cables near to engines or fluorescent lights.

Always route data cables as far away as possible from:

* other equipment and cables,

* high current carrying AC and DC power lines,

* antennae.

Strain relief

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

Circuit isolation

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

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

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

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

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

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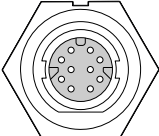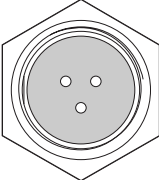
Cable shielding

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

4.2 Connections overview

Your product includes the following connectors.

Thermal camera connectors

Connector	Description	Connects to:	Suitable cables

	Network	• RJ45 connector on:
		  – 3rd-party network switch
		  – PC/laptop computer
		  – IP video decoder (provided with system kits)
		• RayNet connector on:
		  – Raymarine network switch
		  – Lighthouse™-powered Raymarine multifunction display (MFD)
			• RayNet-to-RJ45 adapter cable (supplied)
			• Right-angled RayNet-to-RayNet cable (supplied)
			
			Refer to Chapter 10 Spares and Accessories for available cables.

	Power and drain	12 / 24 V dc power supply	Right-angled power cable (supplied).

Note: The supplied right-angled RayNet and Power cables are suitable for mounting on surfaces up to 25.4 mm (1.0 inch) thick. When mounting on thicker surfaces, you may need to use RayNet and Power cables with straight connectors (available separately).

Note: The cables should be routed to a dry area of the vessel for connection. Alternatively you must ensure that all connections are water tight.

Note: If you want to make cable connections to the camera before mounting it to your vessel (for example, to test the camera), first attach the three threaded studs to the base (see **Mounting the camera**). This will help to protect the cable connectors on the base of the camera, and also provides a stable platform, helping to prevent damage caused by the unit rolling off the edge of the work surface.

Connecting cables

Follow the steps below to connect the cable(s) to your product.

1. Ensure that the vessel's power supply is switched off.
2. Ensure that the device being connected has been installed in accordance with the installation instructions supplied with that device.
3. Ensuring correct orientation, push cable connectors fully onto the corresponding connectors.
4. If applicable, engage any locking mechanism to ensure a secure connection.
5. Ensure any bare ended wire connections are suitably insulated to prevent corrosion due to water ingress.

Orientation of right-angled connectors

When making connections using the supplied right-angled power and network cables, ensure that you orient the connectors correctly with respect to the thermal camera base.

Viewed from the camera base, with the label uppermost, the right-angled power and network cables both leave the camera to the right, as illustrated.


D13612-2
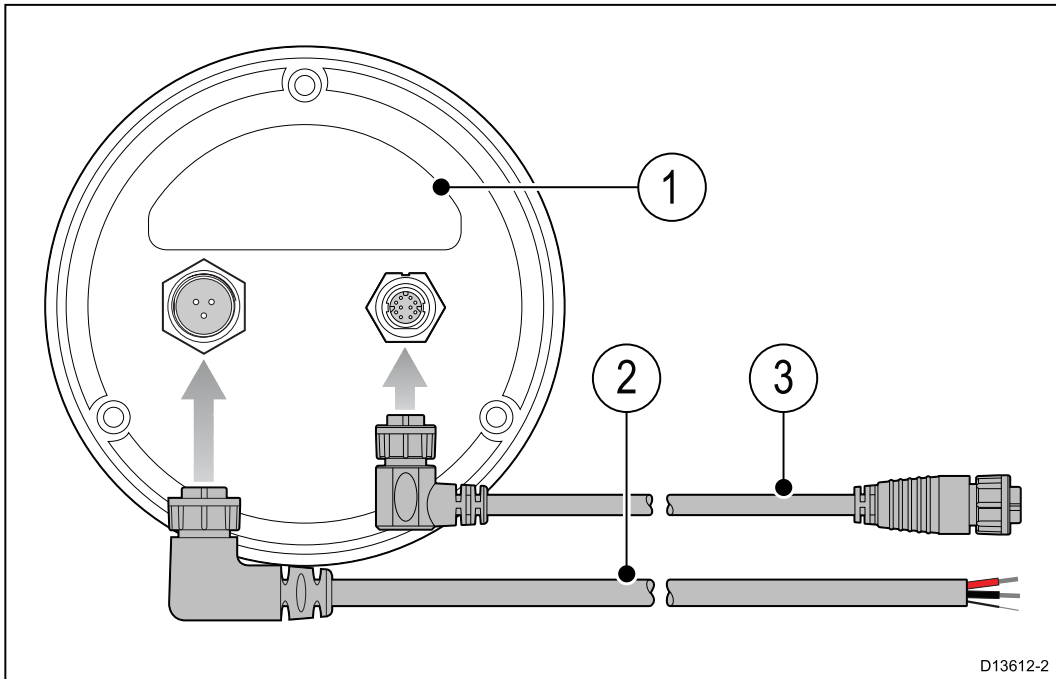
1. Label on camera base.
2. Power cable with right-angled connector.
3. Network cable with right-angled connector.

4.3 Power connection

Power must be supplied to the camera from an appropriate power source.

Power connection requirements

- 12 or 24 Vdc nominal supply voltage

- Isolated power supply

- Connected via an appropriately rated thermal breaker or fused switch.

D13792-1
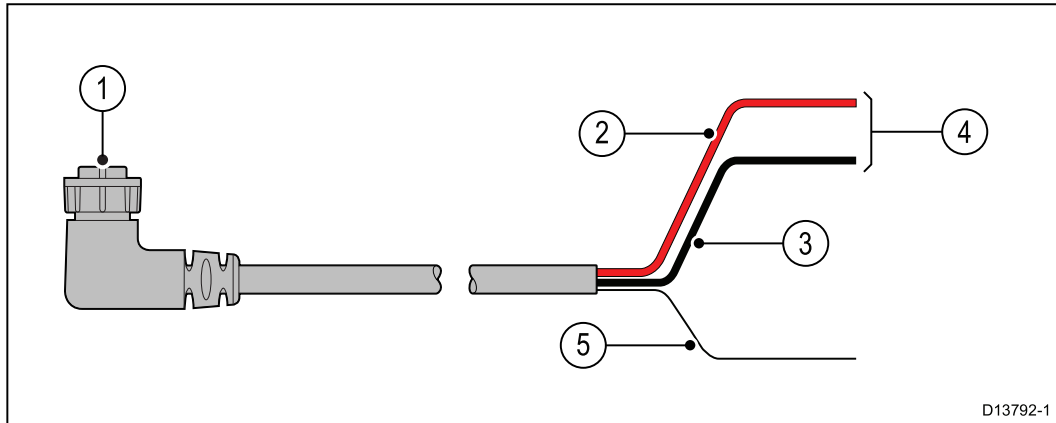
Item	Description	Connects to:
1	Power cable.	Product's power connector.
2	Red cable (positive)	Power supply's positive terminal.
3	Black cable (negative)	Power supply's negative terminal.
4	Connection to 12V / 24V power supply.	Power supply.
5	Drain / Ground	Vessel RF ground, or negative battery terminal

Power cable extension

The product is supplied with a power cable, which can be extended if required.

- The power cable for each unit in your system should be run as a separate, single length of 2-wire cable from the unit to the vessel's battery or distribution panel.

- For power cable extensions, it is recommended that a **minimum** wire gauge of 16 AWG (1.31 mm^2). For cable runs longer than 15 meters, you may need to consider a thicker wire gauge (e.g. 14 AWG (2.08 mm^2), or 12 AWG (3.31 mm^2)).

- An important requirement for all lengths of power cable (including any extension) is to ensure that there is a continuous **minimum** voltage of 10.8 V at the product's power connector, with a fully flat battery at 11 V.

> **Important:** Be aware that some products in your system (such as sonar modules) can create voltage peaks at certain times, which may impact the voltage available to other products during the peaks.

Power distribution

Recommendations and best practice.

- The product is supplied with a power cable. Only use the power cable supplied with the product. Do NOT use a power cable designed for, or supplied with, a different product.

- Refer to the *Power connection* section for more information on how to identify the wires in your product's power cable, and where to connect them.

- See below for more information on implementation for some common power distribution scenarios.

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

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

### Implementation — direct connection to battery

- The power cable supplied with your product may be connected directly to the vessel's battery, via a suitably rated fuse or breaker.

- The power cable supplied with your product may NOT include a separate drain wire. If this is the case, only the power cable's red and black wires need to be connected.

- If the supplied power cable is NOT fitted with an inline fuse, you MUST fit a suitably rated fuse or breaker between the red wire and the battery's positive terminal.

- Refer to the inline fuse ratings provided in the product's documentation.

- If you need to extend the length of the power cable supplied with your product, ensure you observe the dedicated *Power cable extensions* advice provided in the product's documentation.
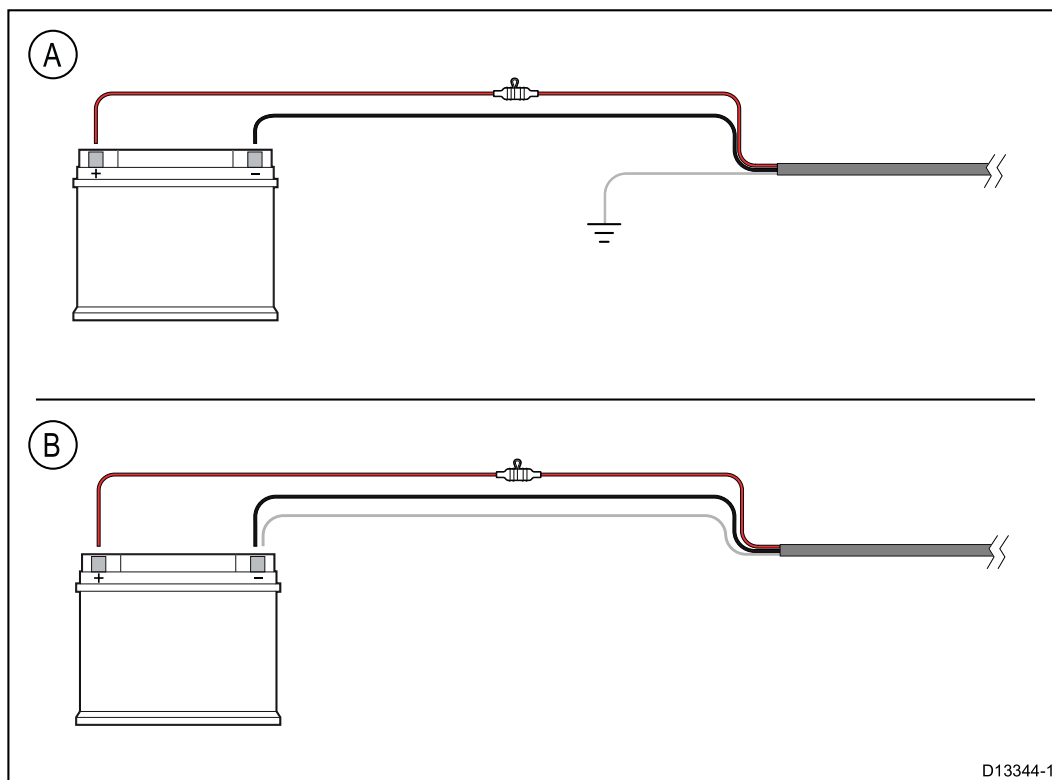

D13344-1

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

Implementation — connection to distribution panel
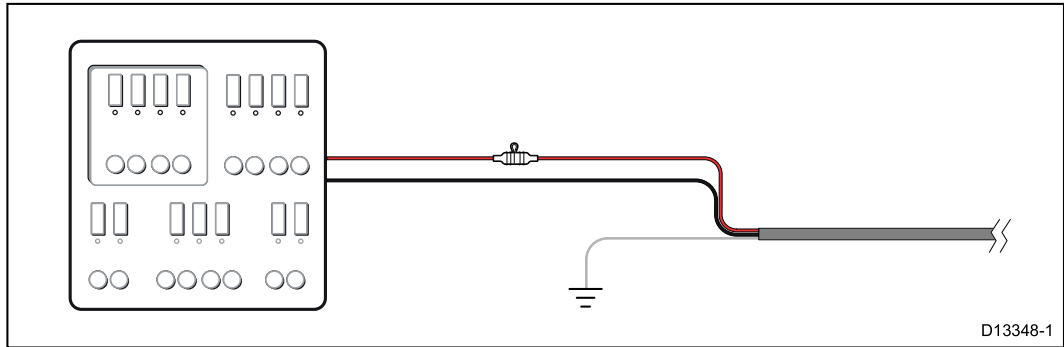
- Alternatively, the supplied power cable may be connected to a suitable breaker or switch on the vessel's distribution panel or factory-fitted power distribution point.

- The distribution point should be fed from the vessel's primary power source by 8AWG (8.36mm^2) cable.

- Ideally, all equipment should be wired to individual suitably-rated thermal breakers or fuses, with appropriate circuit protection. Where this is not possible and more than 1 item of equipment shares a breaker, use individual in-line fuses for each power circuit to provide the necessary protection.
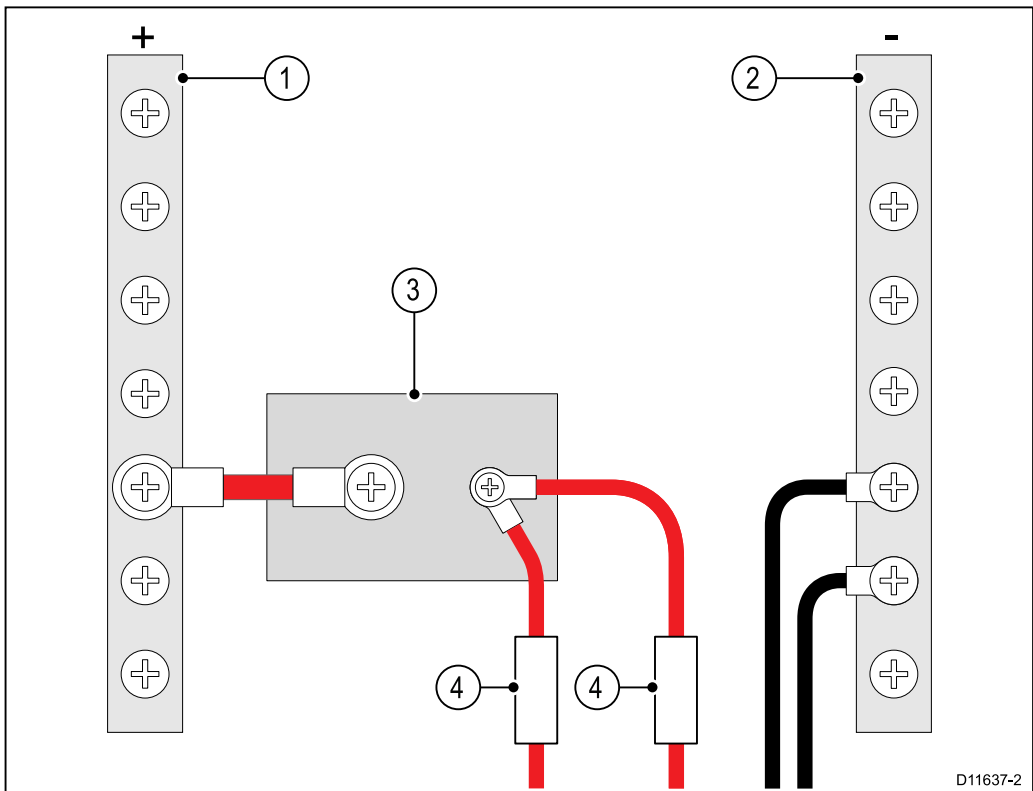
1	Positive (+) bar
2	Negative (-) bar

3	Circuit breaker
4	Fuse

- In all cases, observe the recommended breaker / fuse ratings provided in the product's documentation.

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

Grounding

Ensure that you observe the separate grounding advice provided in the product's documentation.

More information

Raymarine recommends that best practice is observed in all vessel electrical installations, as detailed in the following standards:

- BMEA Code of Practice for Electrical and Electronic Installations in Boats
- NMEA 0400 Installation Standard
- ABYC E-11 AC & DC Electrical Systems on Boats
- ABYC A-31 Battery chargers and Inverters
- ABYC TE-4 Lightning Protection

In-line fuse and thermal breaker ratings

The following in-line fuse and thermal breaker ratings apply to your product:

In-line fuse rating	Thermal breaker rating
5 A slow blow	5 A (if only connecting one device)

Note:

- The suitable fuse rating for the thermal breaker is dependent on the number of devices you are connecting. If in doubt consult an authorized FLIR dealer.
- Your product's power cable may have a fitted in-line fuse, if not then you can add an in-line fuse to the positive wire of your product's power connection.

Grounding — Dedicated drain wire

The power cable supplied with this product includes a dedicated shield (drain) wire for connection to a vessel's RF ground point.

It is important that an effective RF ground is connected to the system. A single ground point should be used for all equipment. The unit can be grounded by connecting the shield (drain) wire of the power cable to the vessel's RF ground point. On vessels without an RF ground system the shield (drain) wire 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.
- Floating, with neither battery terminal connected to the vessel's ground

⚠ **Warning: Positive ground systems**

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

4.4 Network connections

Your thermal camera has a single RayNet network connector. This connects the camera to your vessel's wider IP network. This could be an existing third-party Ethernet network, or a dedicated Raymarine RayNet network.

The details of the network connections between the camera, video display (web browser, analog video monitor, or LightHouse™-powered Raymarine multifunction display), control unit (for example, a JCU-3 controller) and the rest of your installation depend on:

• how you want to control the camera (for example, with a web browser, a LightHouse™-powered Raymarine multifunction display, a JCU controller, or a combination)

• how you want to view the camera's IP video feed (for example, with an analog video monitor connected through an IP video decoder, a LightHouse™-powered Raymarine multifunction display, a web browser, or a combination)

• the equipment already installed on your vessel (for example, network switches with free ports, analog video monitors, or other cameras)

The following sections show some possible network connections, starting with a basic system with a single camera directly connected to web browser, and finishing with a more complex multi-camera, multi-display, multi-JCU system.

Non-RayNet systems

You can install your camera on a vessel that doesn't already have a RayNet network or LightHouse™-powered Raymarine multifunction display (MFD) installed.

The following examples show possible network connections for:

• a single-camera system with the camera connected directly to a laptop or other device running a web browser (for camera control, and viewing the camera's IP video feed)

• a single-camera system comprising a laptop or other device running a web browser (for camera control, and viewing the camera's IP video feed), an Ethernet network switch, and an optional JCU (provided with system kits) for additional camera control

• a single-camera system comprising an analog video monitor connected via an IP video decoder (provided with system kits), an Ethernet network switch, and a JCU (provided with system kits) for camera control.

Single-camera system with direct connection to web browser
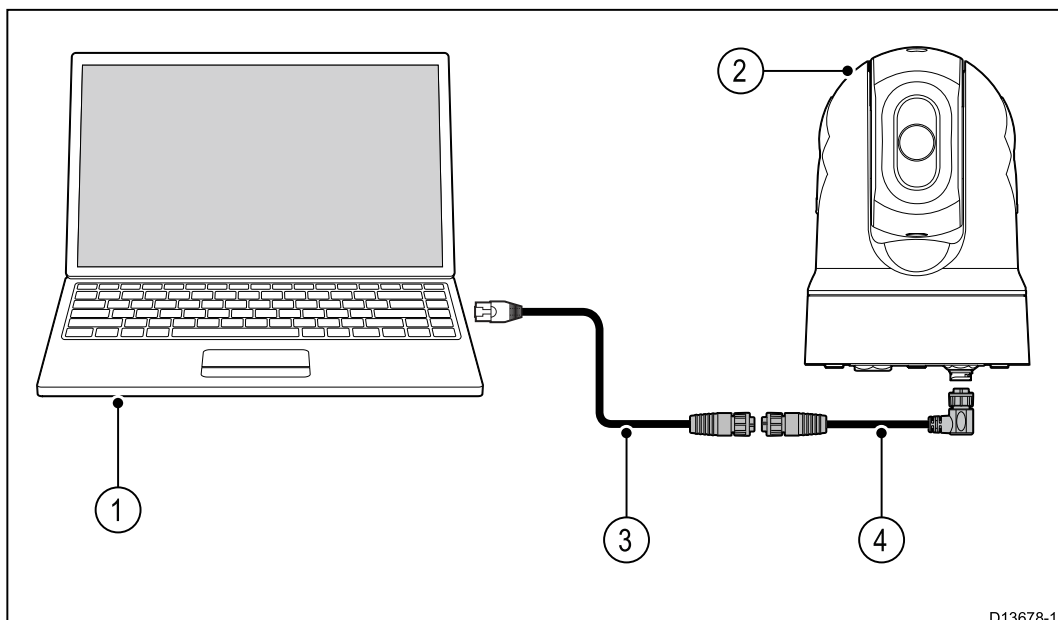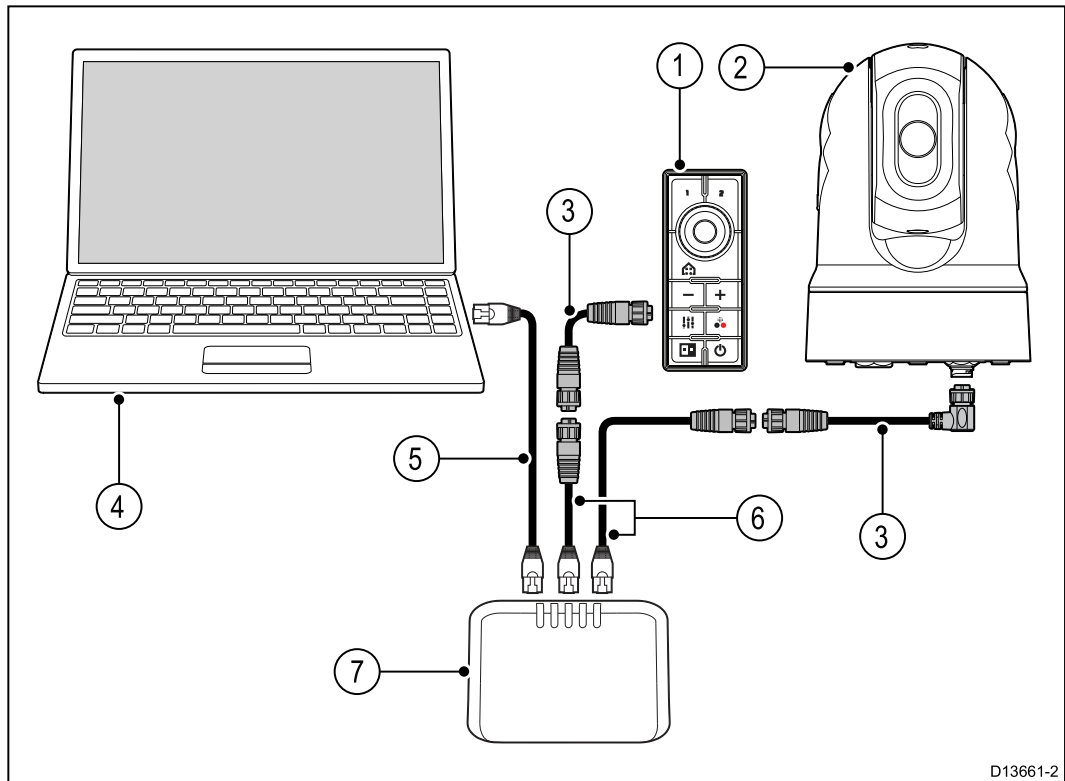

D13678-1

Note: Power connections are not shown in this illustration. The camera and the other devices shown require their own dedicated power connection.

Item	Description
1	Laptop (or other Ethernet-connected device running a web browser)
2	M100/M200–Series camera
3	RayNet-to-RJ45 adapter cable
4	RayNet-to-RayNet cable

Single-camera system with web browser and an optional JCU
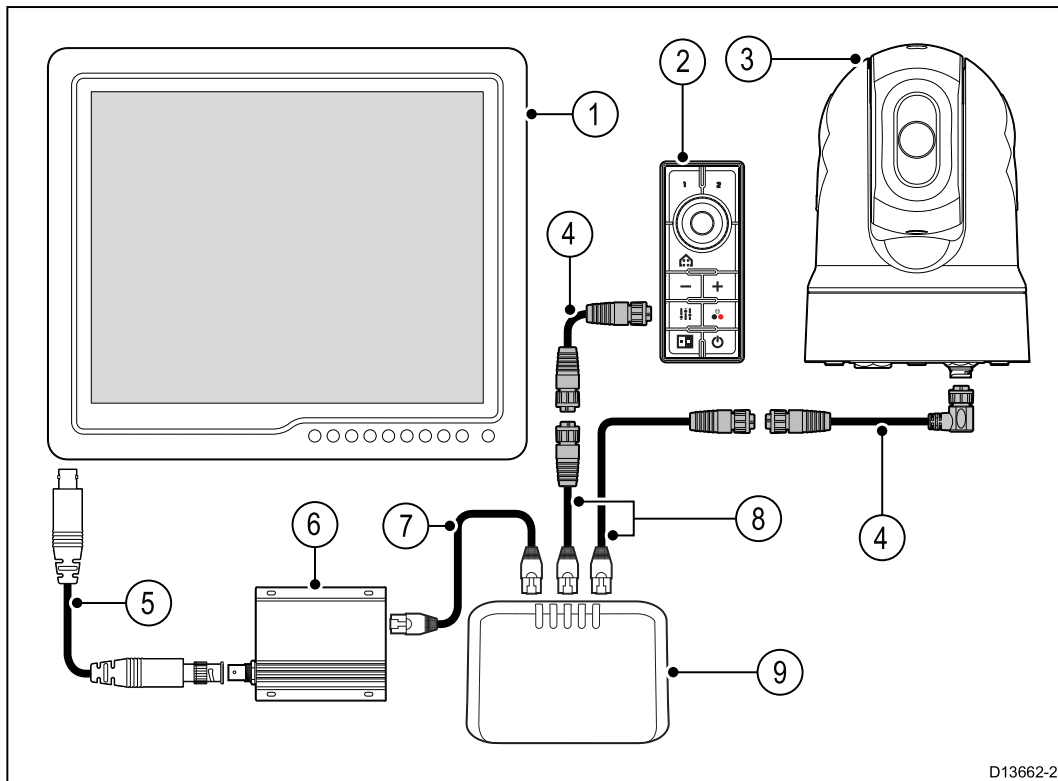

D13661-2

Note: Power connections are not shown in this illustration. The camera and the other devices shown require their own dedicated power connection.

Item	Description
1	Joystick control unit (JCU-3), provided with system kits
2	M100/M200–Series camera
3	RayNet-to-RayNet cable
4	Laptop (or other Ethernet-connected device running a web browser)
5	RJ45-to-RJ45 Ethernet cable
6	RayNet-to-RJ45 adapter cable
7	Ethernet network switch

Single-camera system with analog video monitor and JCU

For this system, a device running a web browser is not required. The camera's IP video feed is routed through an Ethernet network switch to an IP video decoder (provided with system kits), and on to an analog video monitor. Camera control is provided by a JCU (provided with system kits).

D13662-2

Note: Power connections are not shown in this illustration. The camera and the other devices shown require their own dedicated power connection.

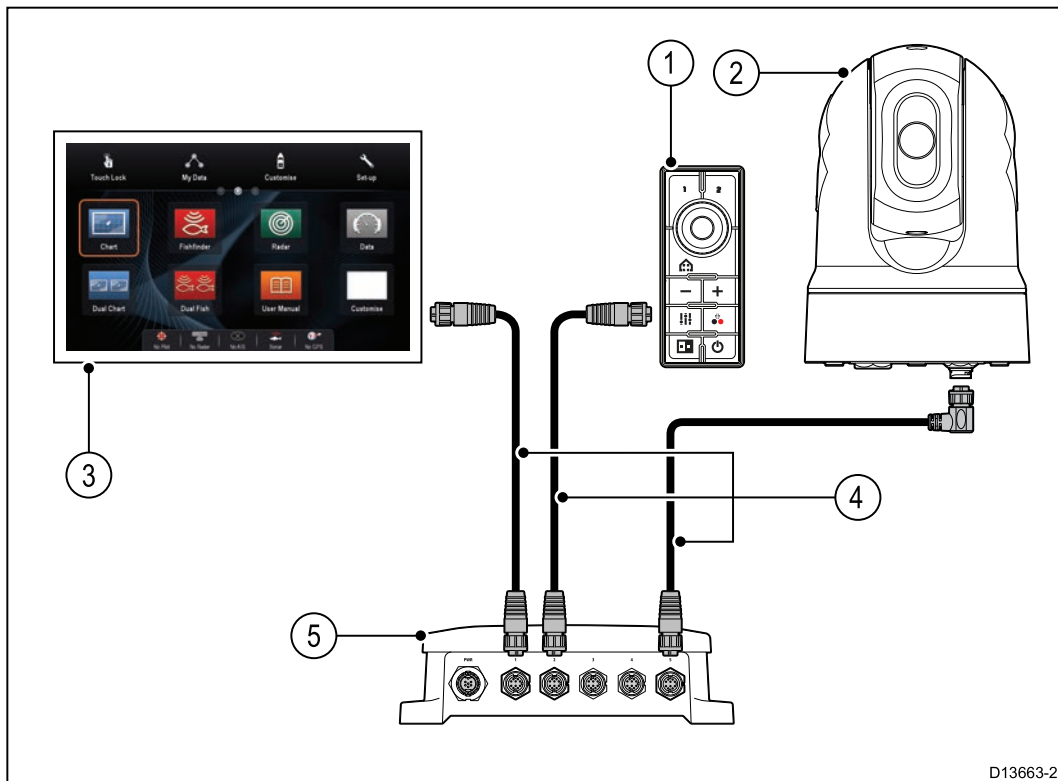| Item	Description
1	Analog video monitor
2	Joystick control unit (JCU-3), provided with system kits
3	M100/M200–Series camera
4	RayNet-to-RayNet cable
5	Analog video cable
6	IP video decoder, provided with system kits
7	RJ45-to-RJ45 Ethernet cable
8	RayNet-to-RJ45 adapter cable
9	Ethernet network switch

RayNet systems with LightHouse™-powered Raymarine multifunction displays (MFDs)

M100/M200–Series cameras are compatible with LightHouse™-powered Raymarine multifunction displays (MFDs) and existing RayNet networks.

The following examples show possible network connections for:

• a single-camera system comprising a Raymarine MFD (for camera control, and viewing the camera's IP video feed), a RayNet network switch, and a JCU (provided with system kits) for additional camera control

• a multi-camera system comprising an analog video monitor connected via an IP video decoder (provided with system kits), two Raymarine MFDs, a RayNet network switch, two JCUs (one JCU is provided with system kits), and a web browser (laptop) for additional camera control.

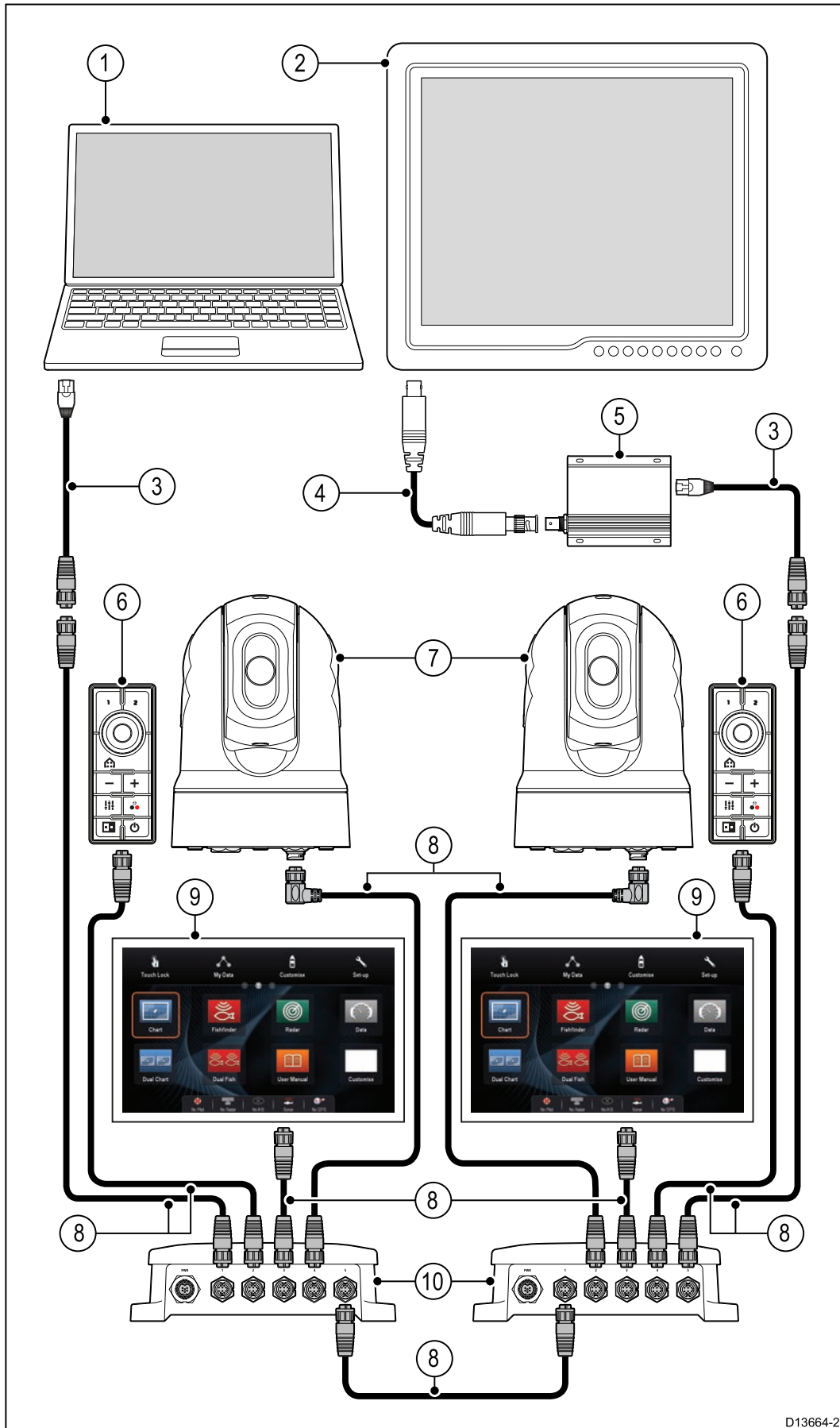**Single-camera system with Raymarine MFD and JCU**

D13663-2

Note: Power connections are not shown in this illustration. The camera and the other devices shown require their own dedicated power connection.

Item	Description
1	Joystick control unit (JCU-3), provided with system kits
2	M100/M200–Series camera
3	Raymarine MFD
4	RayNet-to-RayNet cable
5	RayNet network switch

Multi-camera system with video monitor, two Raymarine MFDs, two JCUs, and a web browser

D13664-2

Note: Power connections are not shown in this illustration. The camera and the other devices shown require their own dedicated power connection.

Item	Description
1	Laptop (or other Ethernet-connected device running a web browser)
2	Analog video monitor
3	RayNet-to-RJ45 adapter cable
4	Analog video cable
5	IP video decoder, provided with system kits
6	Joystick control unit (JCU-3), provided with system kits
7	M100/M200–Series camera
8	RayNet-to-RayNet cable
9	Raymarine MFD
10	RayNet network switch

Chapter 5: Mounting

Chapter contents

5.1 Camera mounting

Location requirements

When planning the installation location, consider the following points:

- The camera is waterproof, and appropriate for above decks mounting.

- When mounting the camera in a ball-down position, ensure that the camera is installed with adequate drainage so that standing water does not collect in the base.

- Ensure the camera is installed in a location that will allow it to be accessed for regular periodic cleaning (fresh-water rinse), inspection of mounting point integrity and mechanical soundness, and preventative maintenance.

- 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" using the top-down riser supplied with the camera (also available as a separate accessory: part number A80509).

- The right-angled RayNet and power cables supplied are suitable for use with a mounting surface up to 25.4 mm (1 in) thick. A thicker surface may require the use of straight-connector cables (available separately).

- Fixings are supplied for a mounting surface up to 41 mm (1.6 in) thick. A thicker surface will require the installer to provide alternative fixings.

- 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 1 m (39.4 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 1 m (39.4 in.) from any magnetic compass.

> **Note:** If you want to make cable connections to the camera before mounting it to your vessel (for example, to test the camera), first attach the three threaded studs to the base (see **Mounting the camera**). This will help to protect the cable connectors on the base of the camera, and also provides a stable platform, helping to prevent damage caused by the unit rolling off the edge of the work surface.

Mounting the camera

Use these instructions to mount the camera unit in position.

D13613-1
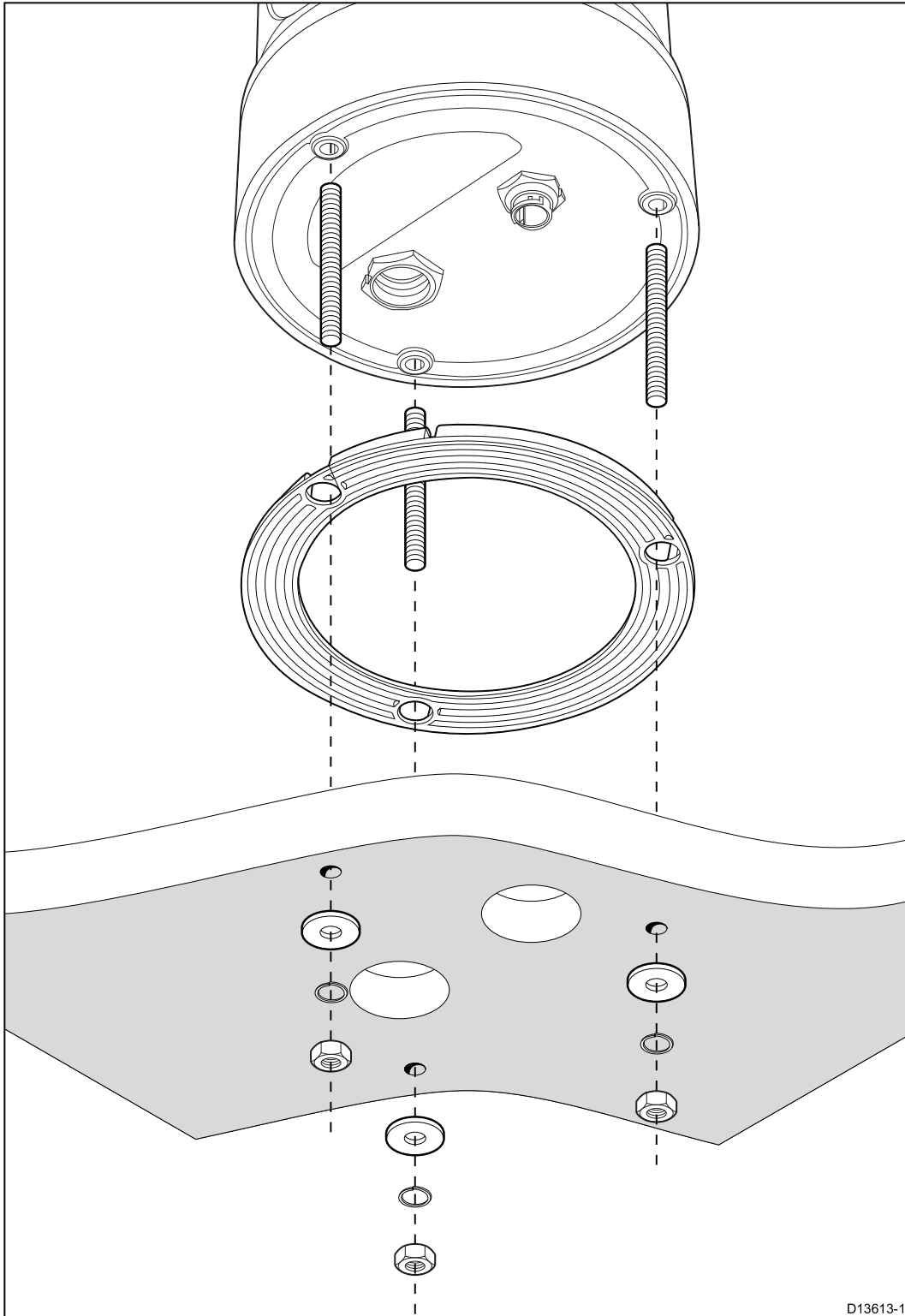
1. Using the template supplied, mark and drill the holes for mounting the camera.

   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.*

   - *Note the camera forward markings on the camera base, and 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.*

2. Install the 3x threaded 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.

3. Slide the seal over the threaded studs, and push it firmly into place on the camera's base.

4. Connect the power supply cable and network cable to the camera, and thread the cables through the central holes.

> **Note:** The right-angled RayNet and power cables supplied are suitable for use with a mounting surface up to 25.4 mm (1 in) thick. A thicker surface will require the use of straight-connector cables (available separately).

5. Place the camera on the mounting surface so the threaded studs extend through the drilled holes.

6. Make the required connections with the free ends of the cables.

7. Slide a flat washer, and then a spring washer, onto each stud.

8. Secure the camera body to the mounting surface with the supplied nuts, ensuring that the seal remains correctly positioned on the camera's base.

   Tighten the nuts to a torque of 3.7 Nm (2.7 lb-ft).

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

Mounting the camera with the optional top-down riser (part number A80509)

The optional top-down riser (A80509) is used when access to the underside of the mounting surface is restricted. Use the instructions below to mount the camera unit using the optional top-down riser (A80509).

D13665-1
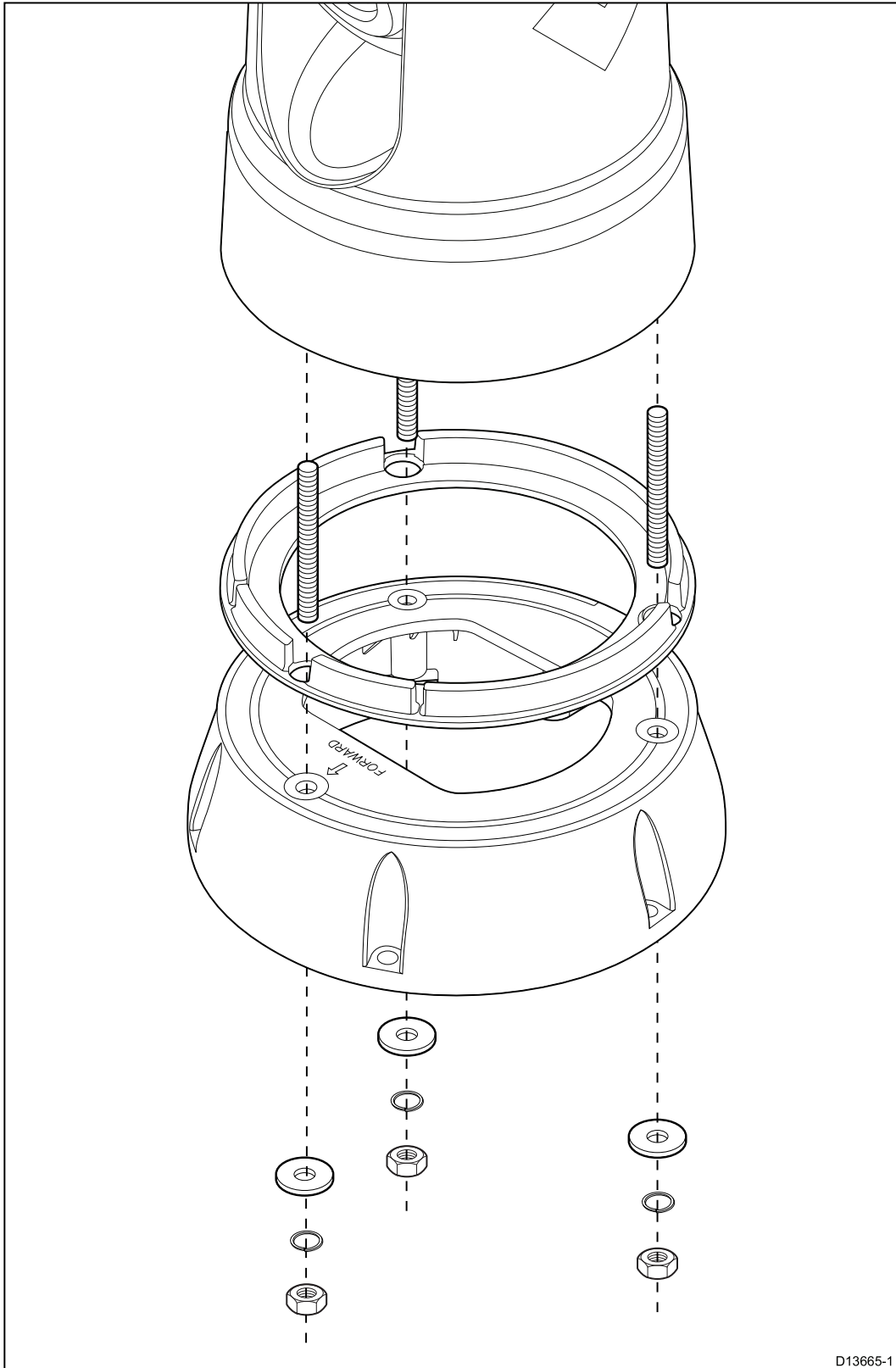
1. Using the template provided, mark and drill the holes for mounting the riser.

   • Note the camera forward marking on the top surface of the riser. You must ensure that the riser is mounted so that the camera is oriented properly relative to the bow of the vessel.

- Only drill the optional cable routing hole in the mounting surface if you intend to route the cables through the base of the riser, rather than through the side of the riser.

2. Install the 3x threaded studs into the base of the camera. Do not use thread locking compound, as this may damage the plastic riser.

3. Slide the camera-base seal over the threaded studs, and push it firmly into place on the camera's base.

4. Place the camera on top of the riser, so the threaded studs extend through the three holes in the riser's top surface. Check that the camera-base seal remains firmly in place.

   - Note the camera forward marking on the top surface of the riser. You must ensure that the riser is mounted so that the camera is oriented properly relative to the bow of the vessel.

5. Slide a flat washer, and then a spring washer, onto each stud.

6. Secure the camera body to the riser with the supplied nuts, ensuring that the seal remains correctly positioned on the camera's base.

   Tighten the nuts to a torque of 3.7 Nm (2.7 lb-ft).

7. Connect the power supply cable and network cable to the camera, then loop the cables round within the riser base so that they can be threaded through the bottom of the riser, and into the cable routing hole drilled in the mounting surface.

8. Position the riser-base seal, and then fasten the camera-riser assembly to the mounting surface using fasteners appropriate for the surface's thickness and material. Do not use thread locking compound, as this may damage the plastic riser.

   You must ensure a watertight seal between the riser base and the mounting surface. You may use a marine-grade sealant as an alternative to the supplied mounting gasket.

Note:

- If it is not possible to route the camera cables through the mounting surface, cut a hole in the side of the riser, and route the cables through the riser sidewall. You may need to loop the cables around within the riser base, so that they can be passed through the hole you have cut in the side of the riser.

- If routing the camera cables through the riser sidewall, and the camera is mounted ball-up, do NOT seal the riser base with either the supplied gasket, or sealant. Sealing may result in water pooling inside the riser.

- If routing the camera cables through the riser sidewall, and the camera is mounted ball-down, do NOT seal the connection between the camera base and the top surface of the riser with the supplied gasket. Sealing may result in water pooling inside the riser.
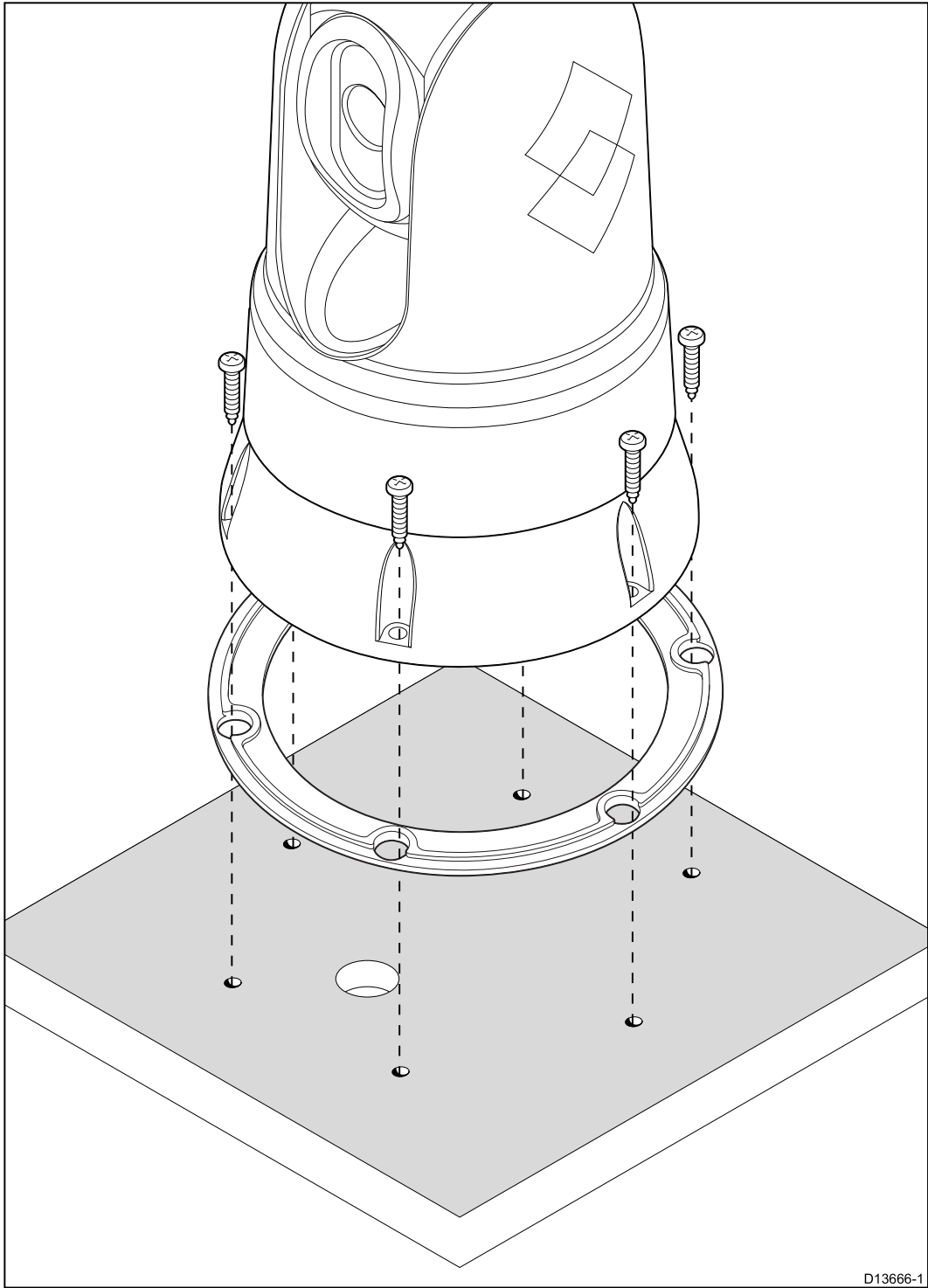
D13666-1

5.2 JCU–3 Mounting

Note: The JCU-3 joystick control unit is supplied with M100/M200 Series camera system kits, and separately as an optional accessory. JCU-3 units are **not** supplied with cameras purchased individually. See **System kits** for more information about system kits and parts supplied.

Location requirements

When planning the installation location, consider the following points:

• Select a position on your vessel that is close to a display showing the camera video output.

• Ensure the JCU-3 is mounted at least 1 m (39.4") away from any equipment fitted with a magnetic compass.

• The JCU-3 can be mounted to a dash or other surface in any orientation.

• Consider cable lengths and cable routing.

Removing the keypad mat

To gain access to the mounting hole locations, the keypad mat must be removed.

D13608-2
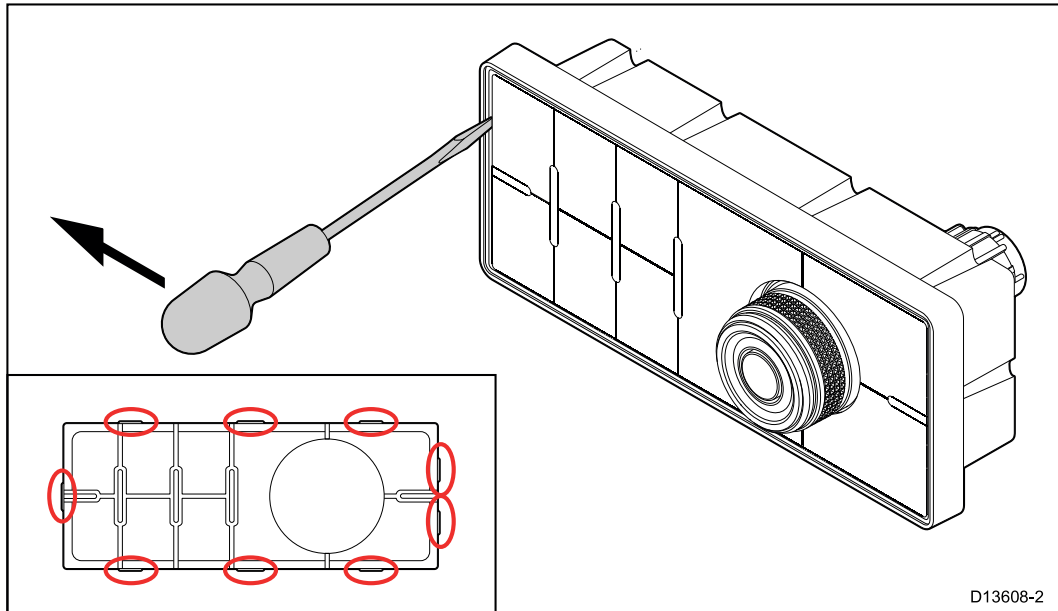
Tip To help prevent scratching the product, cover the tip of your screwdriver blade with a small piece of insulation tape.

1. Using a thin, flat bladed screwdriver insert the tip of the screwdriver into the gap between the edge of the keypad mat and the keypad housing, at a location between locking tabs.

2. Gently lever the keypad mat away from the keypad to release the keypad mat.

   Take care not to bend the keypad mat during removal.

Flush mounting the keypad

Flush mounting provides a sleek installation where the product and dash are flush, with only the buttons and Rotary controller protruding from the dash. Flush mounting requires the mounting surface to be rebated.
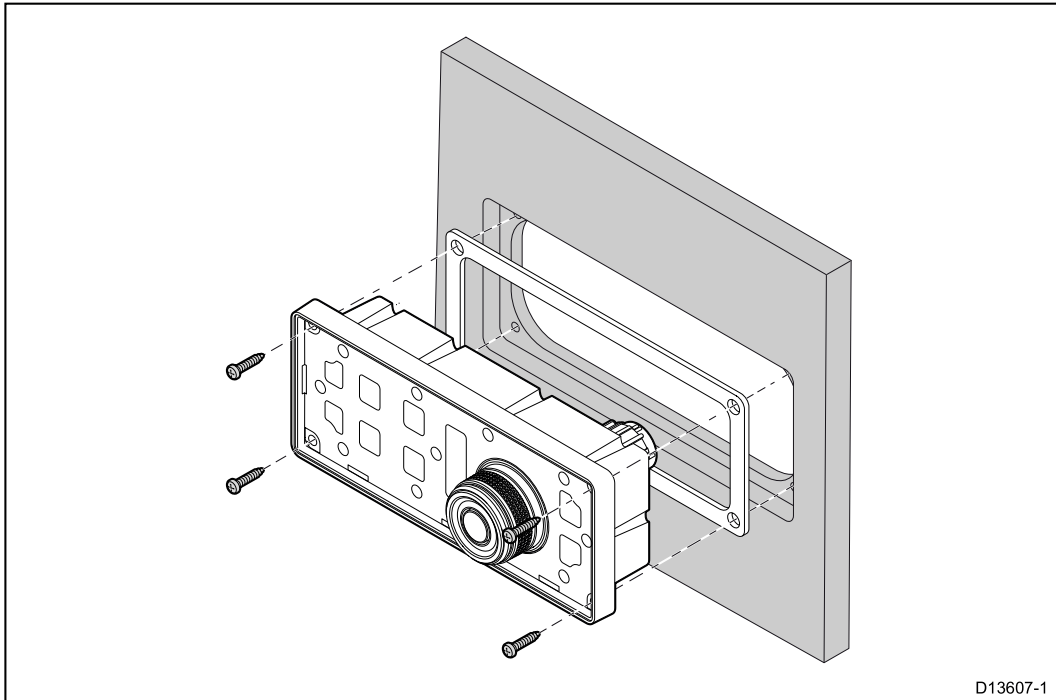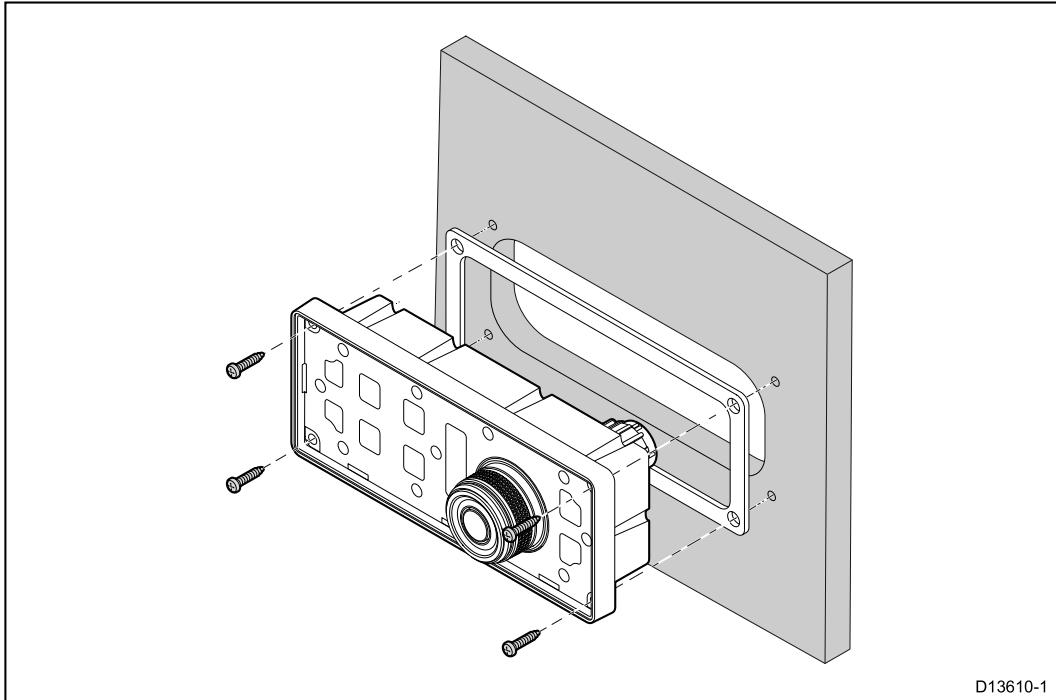

D13607-1

1. Check the selected location for the unit. A clear, flat area with suitable clearance behind the panel is required.
2. Before modifying the mounting surface, refer to the dimensions supplied in this document to ensure there is enough space for the unit and all cables.
3. Fix the supplied mounting template to the selected location, using masking or self adhesive tape.
4. Drill 4 holes as indicated on the mounting template to accept the fixings.
5. Using a suitable hole saw (the size and position is indicated on the template), make a hole in each corner of the cut-out area.
6. Using a suitable saw, cut along the inside edge of the cut-out line.
7. Using a Router, follow the Flush mount rebate line, to cut out a rebate to the specified rebate depth, as indicated on the template.
8. Ensure that the unit fits into the removed area and then remove rough edges.
9. Place the supplied gasket onto the rear of the keypad, ensuring the mounting holes are aligned.
10. Connect the relevant cables to the unit.
11. Place the keypad into the rebate and secure using the fixings provided.

Note: The appropriate tightening torque and drill bit size to use depends on the thickness of the mounting surface and the type of material it is made from.

Note: The supplied gasket provides a seal between the unit and a suitably flat and stiff mounting surface or binnacle. The gasket should be used in all installations. It may also be necessary to use a marine-grade sealant if the mounting surface or binnacle is not entirely flat and stiff or has a rough surface finish.

Surface mounting the keypad

Surface mounting provides a uniform installation where the products protrude, usually by the thickness of the bezel, from the mounting surface.

D13610-1

1. Check the selected location for the unit. A clear, flat area with suitable clearance behind the panel is required.
2. Before modifying the mounting surface, refer to the dimensions supplied in this document to ensure there is enough space for the unit and all cables.
3. Fix the supplied mounting template to the selected location, using masking or self adhesive tape.
4. Drill 4 holes as indicated on the mounting template to accept the fixings.
5. Using a suitable hole saw, make a hole in each corner of the cut-out area.
6. Using a suitable saw, cut along the inside edge of the cut-out line.
7. Ensure that the unit fits into the removed area and then remove rough edges.
8. Place the supplied gasket onto the rear of the keypad, ensuring the mounting holes are aligned.
9. Connect the relevant cables to the unit.
10. Secure using the fixings provided.

> **Note:** The appropriate tightening torque and drill bit size to use depends on the thickness of the mounting surface and the type of material it is made from.

> **Note:** The supplied gasket provides a seal between the unit and a suitably flat and stiff mounting surface or binnacle. The gasket should be used in all installations. It may also be necessary to use a marine-grade sealant if the mounting surface or binnacle is not entirely flat and stiff or has a rough surface finish.

Fitting the keypad mat

Your keypad can be installed in portrait or landscape orientation. Keypad mats are available for each orientation.

• You should fit the keypad mat that matches your chosen mounting orientation.
• You should only fit the keypad mat after the unit has been secured to the mounting surface.

1. Ensure the keypad mat is orientated correctly.

2. Slide the keypad mat's shorter edge, with the 2 locking tabs, into the end of the keypad that has 2 notches to accept the tabs.

D13605-1
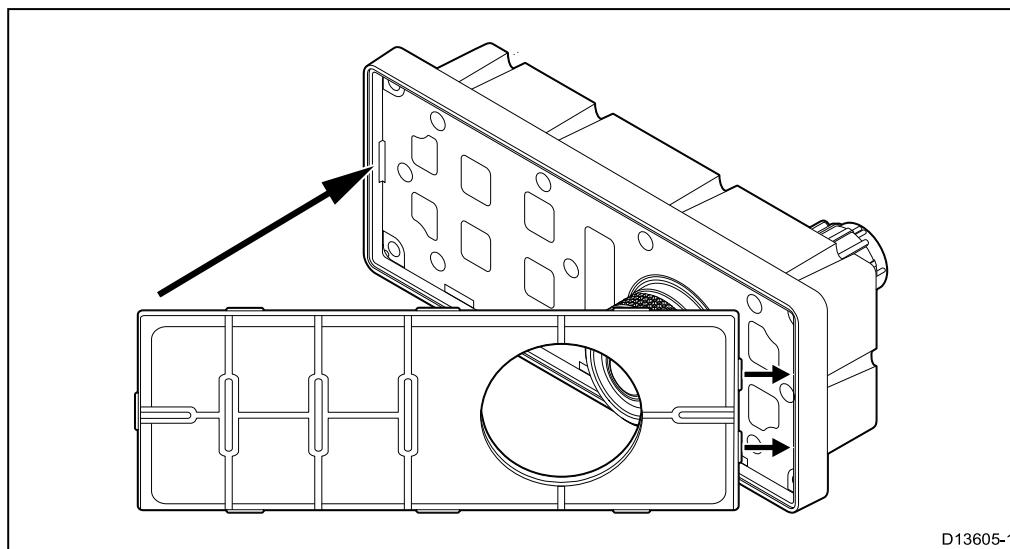
3. Close the opposite end of the keypad mat into the keypad, ensuring that the tab slides into the notch provided. Push all of the tabs on the longer sides into their notches (you should hear a click as each tab engages).

D13606-1
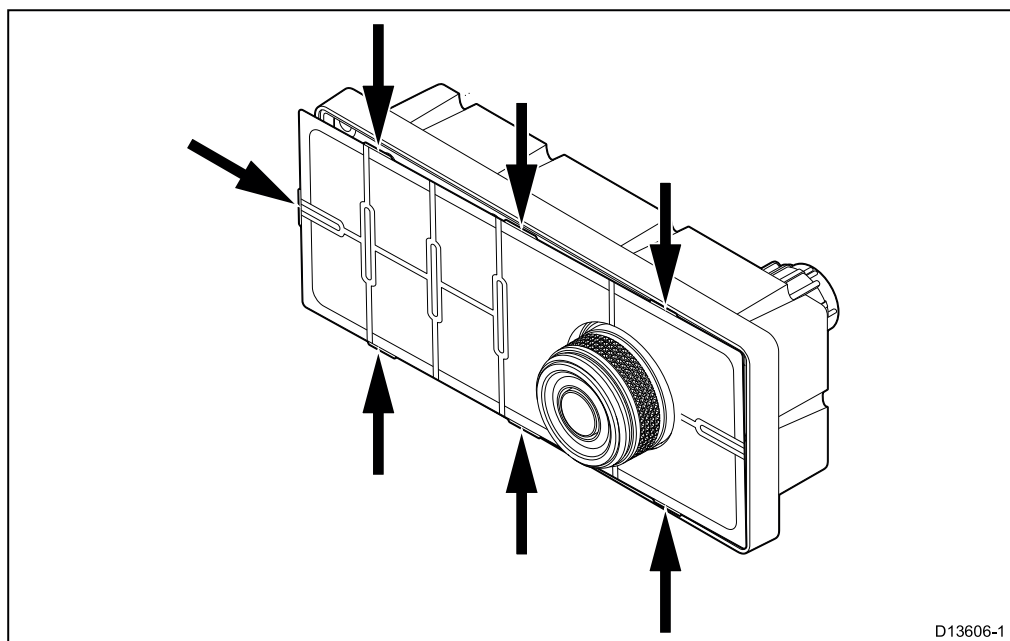
Chapter 6: System operation and setup

Chapter contents

6.1 Thermal camera image

The thermal camera outputs an IP-video feed which can be displayed on a video monitor, a web browser, or a LightHouse™-powered Raymarine multifunction display (MFD).
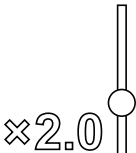

The IP-video feed comprises:
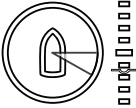
• the thermal image

• status icons

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 different palettes and scene presets.

• 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.

> **Note:** Icons are colored red if the **WhiteHot** or **BlackHot** palette is in use, and colored white for all other palettes.

Icon	Description
	Camera direction indicator • *The segment inside the circle indicates which direction the camera is pointing with respect to the vessel (azimuth). • The scale and marker on the right indicates the camera's tilt angle (elevation). *M200–Series only.
	Home position • Displayed momentarily when you command the camera to move to its home position. • Flashes three times when you set the camera's home position.
	Park indicator Displayed when the camera is parked.
	Motor stalled Displayed instead of the **Camera direction indicator** when the camera motor is stalled. > **Note:** If this icon is displayed, check that the camera's movement is not being physically obstructed.
	Zoom indicator Displayed whenever the thermal image is zoomed-in (magnified). The figure indicates the amount of magnification (up to 4.0).

6.2 Operation and features overview

The camera features can be accessed using:

- a web browser running on an IP-capable device (for example, a laptop or PC) that is directly attached to the camera, or connected to the same network as the camera

- a joystick control unit (JCU)

- the "Thermal camera" or "Camera" application of a compatible LightHouse™-powered Raymarine multifunction display

Note: A Joystick control unit (JCU) or LightHouse™-powered Raymarine multifunction display (MFD) is not required to operate the camera; a web browser with access to the camera's web server is sufficient.

This handbook covers camera control and image adjustments using either a web browser, or a JCU-3 remote keypad. For details on how to operate the camera using a compatible LightHouse™-powered Raymarine multifunction display, please refer to the "Thermal camera" or "Camera" application section of the manual supplied with your multifunction display.

The main thermal camera operations are outlined below.

Control the camera:

- Pan (M200–Series only), tilt, and zoom

- Move to Home position / set home position

- Surveillance mode

- Auto-tracking (man overboard; dangerous AIS and MARPA targets)

- ClearCruise™ thermal analytics

- Capture and save camera video, or a still image

- Heater

- Park and stow

- Set "forward" position, and camera height above water
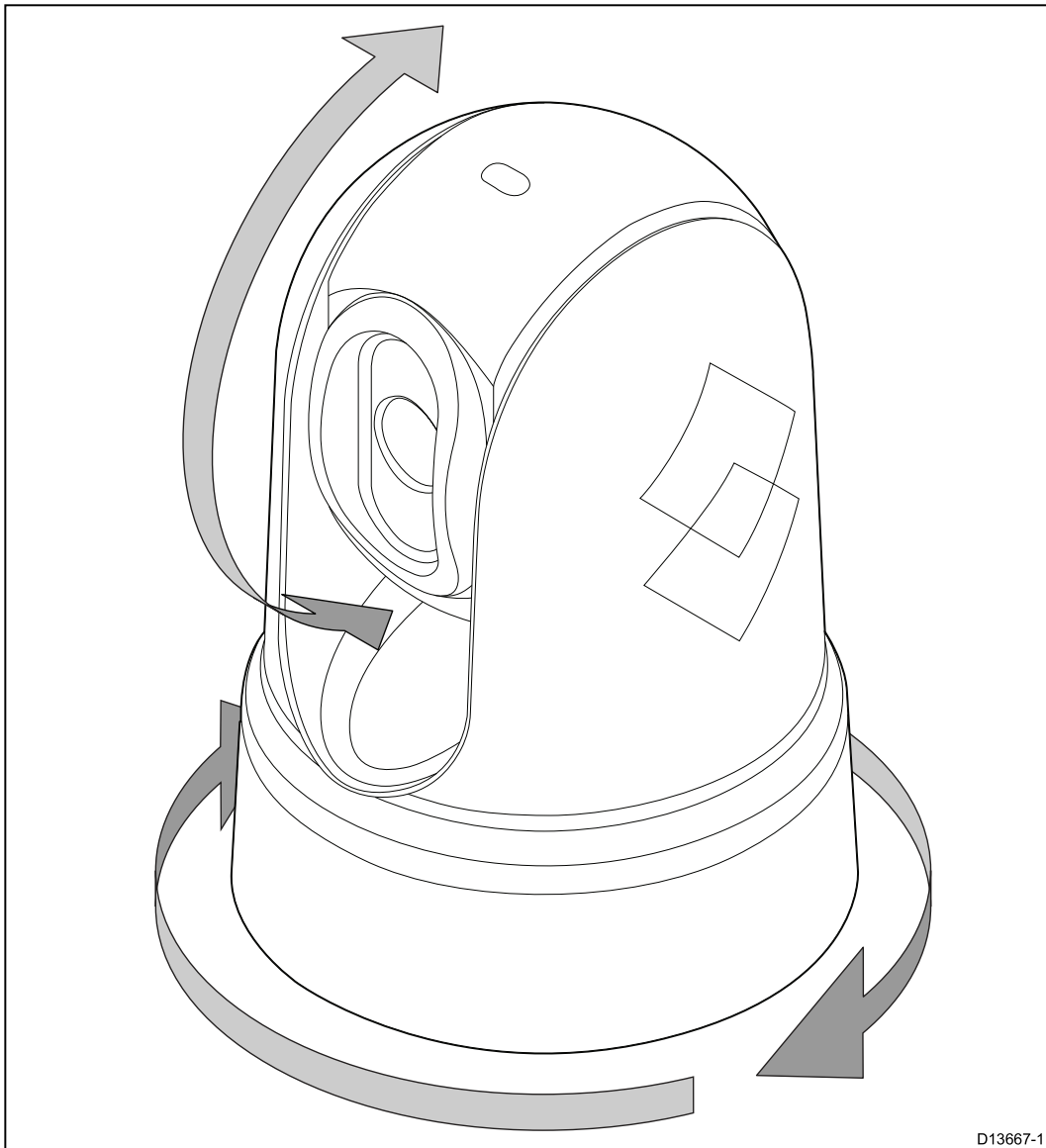
Adjust the camera image:

- Color palette and polarity

- Scene presets

- "Ball-down" and rear-view-mirror modes

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

6.3 Camera control

Pan, tilt and zoom

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

D13667-1

• Pan continuously through 360° (M200 Series only).

• Tilt to +110°/-90° relative to the camera base.

• Zoom the thermal camera image.

You can control pan, tilt, and zoom, using:

• the camera's web browser interface: see **Live Video page**

• the "UniController" on a JCU-3 remote keypad: see 6.5 **JCU–3 controls overview**

• a compatible Raymarine MFD: see the "Thermal camera" or "Camera" application section in the documentation supplied with your MFD.

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.

	The home icon is displayed momentarily when you command the camera to move to its home position.
	The home icon flashes three times when you set the camera's home position.

You can set the home position as required, and return the camera to the home position, using:

• the camera's web browser interface: see **Live Video page**

• the "UniController" on a JCU-3 remote keypad: see **Home position**

• a compatible Raymarine MFD: see the "Thermal camera" or "Camera" application section in the documentation supplied with your MFD.

Surveillance mode

In surveillance mode the camera continuously pans left and right, automatically scanning the scene.

The camera continues scanning until you:

• disable surveillance mode

• manually pan or tilt the camera

• command the camera to move to its home position

Any of these actions stops surveillance mode; surveillance mode does not resume until you re-enable it.

Note: Surveillance mode is available with M200–Series cameras only.

You can control surveillance mode, including the scan speed and scan width, using:

• the camera's web browser interface: see **Live Video page**

• the user programmable buttons on a JCU-3 remote keypad: see 6.5 **JCU–3 controls overview**

• a compatible Raymarine MFD: see the "Thermal camera" or "Camera" application section in the documentation supplied with your MFD.

Auto-tracking

You can set the camera to automatically track the following targets:

- man overboard

- dangerous AIS target

- dangerous MARPA target

You can activate auto-tracking, and control which types of target are tracked, using a compatible Raymarine MFD: see the "Thermal camera" or "Camera" application section in the documentation supplied with your MFD.

> **Note:** Auto-tracking is available with M200–Series cameras only.

> **Note:** To use auto-tracking, your system must include a compatible Raymarine MFD.

ClearCruise thermal analytics

ClearCruise™ intelligent thermal analytics technology provides audible and visual alerts when "non-water" objects are identified in the scene.

Boats, obstacles, and navigation markers can all be automatically identified in a scene by ClearCruise™.

You can activate ClearCruise™and control "beep on detection", using a compatible Raymarine MFD: see the "Camera" application section in the documentation supplied with your MFD.

> **Note:** To use ClearCruise™, your system must include a compatible Raymarine® MFD running LightHouse™ 3 software.

> **Note:** ClearCruise™ detection performance is dependent on conditions, and is not a replacement for maintaining a visual watch.

6.4 Image adjustments

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:

- **Day** — scene preset mode for daytime conditions.
- **Night** — scene preset mode for night conditions.
- **Docking** — scene preset mode for docking.
- **High Contrast** — scene preset mode for extra-high contrast.

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 four available color palettes:

- WhiteHot
- RedHot
- Fusion
- FireIce

The factory default color mode is WhiteHot, which may improve your night vision.

Thermal camera reverse video

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

Changing the polarity setting will toggle between the two available polarities for the color mode that is already selected.

The available polarity options are:

- WhiteHot / BlackHot
- RedHot / RedHot Inverse
- Fusion / Fusion Inverse
- FireIce / FireIce Inverse

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

6.5 JCU–3 controls overview
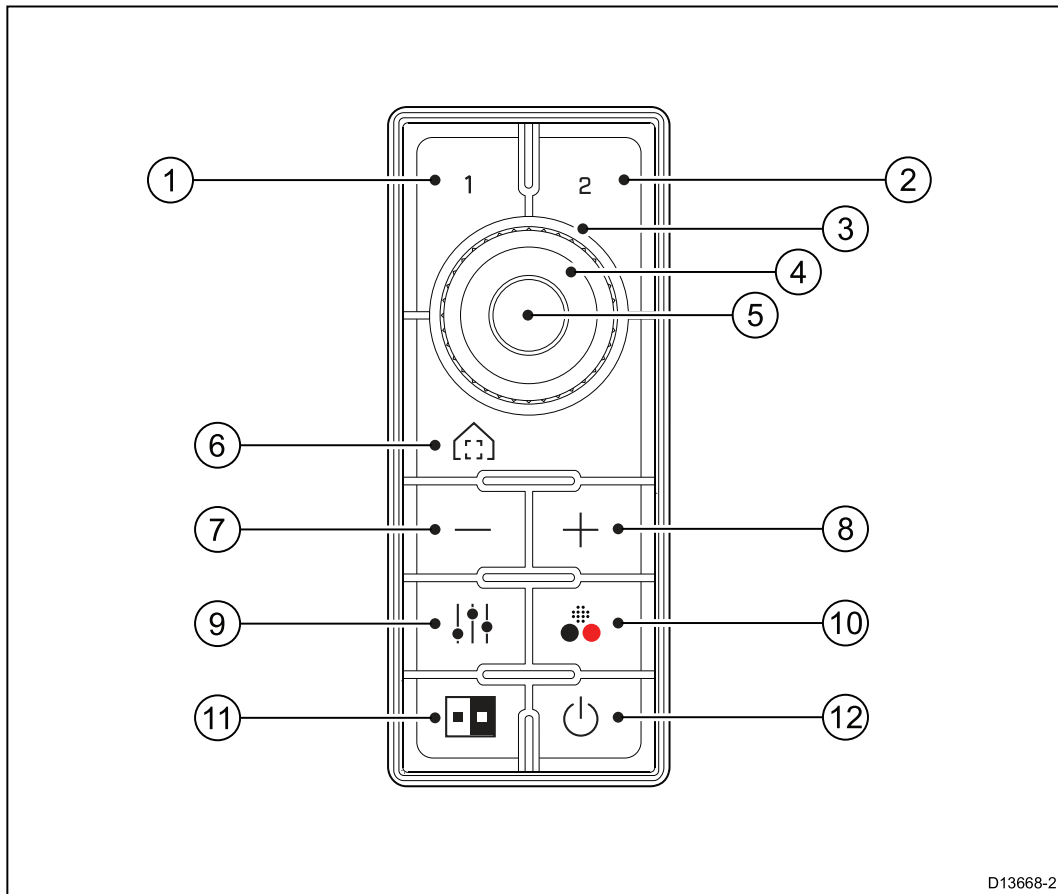
D13668-2

Note: The JCU-3 keypad is supplied with the portrait-oriented keypad mat fitted. If you choose to replace this with the landscape-oriented keypad mat, you must also change the "Orientation" setting on the JCU-3 keypad web interface. See the documentation provided with your JCU-3 keypad for further information.

1	**USER 1** • User programmable button (configured via camera web page: see **Configuring JCU-3 user-programmable buttons (UPBs)**). Default action is "toggle surveillance mode".
2	**USER 2** • User programmable button (configured via camera web page: see **Configuring JCU-3 user-programmable buttons (UPBs)**). Default action is "toggle rear-view mirror mode".
3, 4, 5	**UNI-CONTROLLER** • Rotate outer ring (3) clockwise or counter-clockwise to continuously pan the camera (M200-Series cameras only): rotate more to increase pan rate. • Press inner ring (4) up, down, left, or right to pan and tilt camera (tilt-only for M100-Series cameras). • Central button (5): **USER 3** — user programmable button (configured via camera web page: see **Configuring JCU-3 user-programmable buttons (UPBs)**). Default action is "return camera to home position".
6	**HOME** • Press momentarily – return camera to home position. • Press and hold – Set current position as camera home.

7	**ZOOM-OUT**
	• Press to zoom thermal camera out
8	**ZOOM-IN**
	• Press to zoom thermal camera in
9	**SCENE**
	• Press to cycle through image scene presets (Day > Night > Docking > High Contrast)
10	**COLOR**
	• Press momentarily to cycle through four different color palettes (WhiteHot > RedHot > Fusion > FireIce)
	• Press and hold to toggle the polarity of the current color palette (WhiteHot > BlackHot; RedHot > RedHot Inverse; Fusion > Fusion Inverse ; FireIce > FireIce Inverse)
11	**<NOT USED>**
12	**POWER**
	• Press momentarily to cycle through keypad backlight brightness settings (Dim > Normal > Bright)
	• Press and hold to park and stow the camera; pan, tilt, or press the home key to wake the camera
	• Press twice to cycle through cameras (multi-camera systems only)

6.6 Web browser interface

Web browser user interface overview

This chapter describes how to use a Web browser to communicate with and configure your M100/M200-Series camera.

M100/M200-Series cameras are network devices that communicate over an Ethernet network using Internet Protocol (IP). Using a Web browser, you can view video, control the camera, and change camera configuration settings.

> **Note:** Changes to configuration settings should only be made by someone who has expertise with M100/M200 cameras and a thorough understanding of how the settings affect the image. Haphazard changes can lead to image problems including a complete loss of video.

You can use various types of IP-networked device to interact with the camera's Web interface (such as a laptop, PC, tablet, or smart phone). The device must be connected to the same network as the camera (or connected directly), and running a supported Web browser (Microsoft Internet Explorer version 9, or the latest version of the Google Chrome or Mozilla Firefox browsers).

> **Note:** To communicate with and configure your M100/M200 camera using a JCU-3 control unit or LightHouse™-powered Raymarine multifunction display (MFD), refer to the documentation supplied with the JCU-3 or MFD.

> **Note:** Initial setup of a JCU-3 unit is achieved via a Web interface. For information on using a Web browser to communicate with and configure a JCU-3, see the documentation supplied with the unit.

Setting up a network connection to the camera

The M100/M200 Series cameras support DHCP and UPnP to simplify the process of finding the camera on a network, and connecting to it using a web browser.

> **Note:** The web browser must be running on a device that is on the same network as the camera.

DHCP (**D**ynamic **H**ost **C**ontrol **P**rotocol) is used to automatically assign IP addresses and other important IP-network parameters to devices on a network. The camera is set to use DHCP by default.

UPnP (**U**niversal **P**lug a**n**d **P**lay) is a protocol that helps the camera identify itself to other network devices.

In most circumstances, you won't need to get involved with detailed IP network configuration for the camera. However, if necessary, the camera's configuration pages enable you to set IP-network parameters manually (see **Configuring the camera's IP-network parameters manually**).

> **Note:** You should not attempt to set the camera's IP-network parameters manually unless you have previous experience with configuring IP networks.

To set up a network connection between your IP device (such as a laptop or PC), and the camera:

1.

- If your system already includes a network switch (either a 3rd-party switch, or a Raymarine HS5 switch, for example), connect both the camera and the IP device that will run your web browser, to the switch (see 4.4 **Network connections** for example network connections). Then power-on the camera, network switch, and IP device.

- If you don't have any existing networking hardware (such as a network switch), connect the camera and IP device together directly (see 4.4 **Network connections** for example network connections). Then power-on the camera, and IP device.

2. Make sure that your IP device is:

   a. *configured to obtain an IP address automatically*. For Windows 7, 8, and 10:

      i. Go to **Control Panel**, then **Network and Sharing Center** > **Change adapter settings**.

      ii. Right-click the network connection corresponding to the wired Ethernet connection on your IP device (often labelled "Local Area Connection") and select **Properties**

      iii. Select the **Networking** tab.

      iv. Under **This connection uses the following items**, select **Internet Protocol Version 4 (TCP/IPv4)**.

      v. Select **Properties**.

      vi. Check that the option to **Obtain an IP address automatically** is selected.

   b. *configured to detect UPnP devices*. For Windows 7, 8, and 10:

      i. Go to **Control Panel** > **Network and Sharing Center** > **Advanced sharing settings**

      ii. Check that the option to **Turn on network discovery** is selected.

3. The camera is automatically added to the list of devices located by your IP device, and is named according to the camera part number, and serial number (for example: *E70353 1234*). For Windows 7, 8, and 10, the camera is listed in Windows Explorer under **Network**.

Note: Depending on your network configuration, it may take up to five minutes for the camera to appear in the list of devices. If the camera is not listed after five minutes, double-check that your IP address is configured as described in step 2, then try renewing your IP device's IP address. For Windows 7, 8, and 10:

a. Go to **Start** > **Run**, then type "cmd" (without quotes), and click **OK**.

b. In the Command Prompt window that opens, type "ipconfig /release" (without quotes), then press Enter.

c. Type "ipconfig /renew" (without quotes), then press Enter.

d. Type "exit" (without quotes), then press Enter to close the window.

---

4. Under **Network**, double-click the camera item to open the camera's web page. To show more information about the camera, including its IP address, right-click the camera item and select **Properties**.

Logging in to the Web browser user interface

You can log in to the camera's Web interface using one of three User Names: **user**, **expert,** or **admin**. By default, the passwords are: **user**, **expert**, and **fliradmin**, respectively.

- The **user** login can access the Live Video page and control the camera.
- The **expert** login can access the Setup menus and make configuration changes to the payloads and other components.
- The **admin** login can access the Maintenance menu and all the other menus as well as change the login passwords.

You should change the default login passwords to prevent unauthorized log in.

> **Note:** Only two web sessions can be active at once.

To log in:

1. Go to the camera's web page by:

    - entering the camera's IP address directly into the address bar of your web browser, OR
    - double-clicking the camera in "My Network Places" (Windows XP) or "Network" (later versions of Windows).

    (See Setting up a network connection to the camera for more information.)

    The login screen with a picture of the camera is displayed.
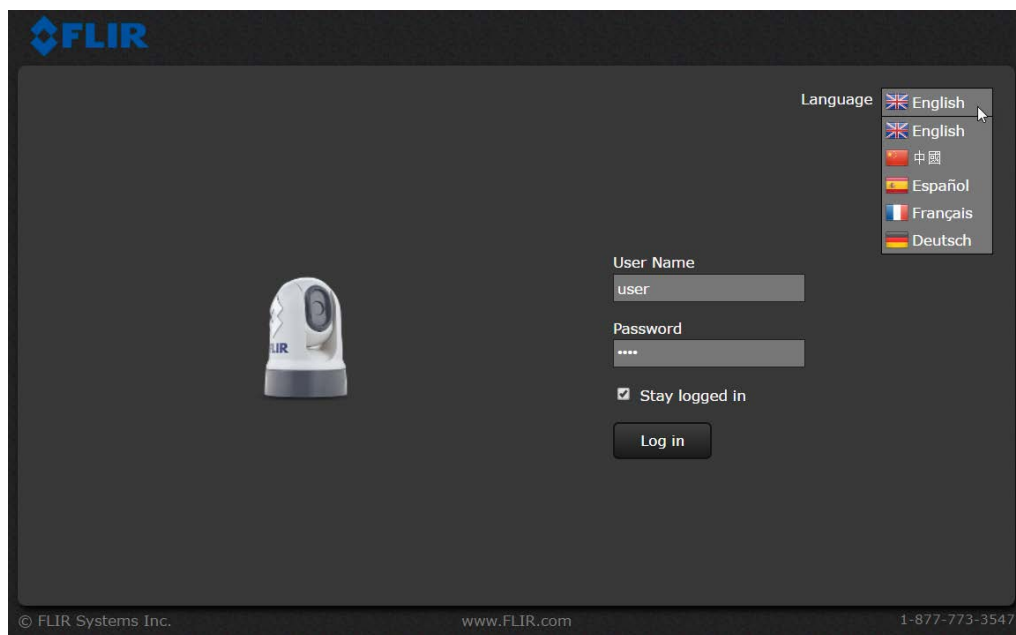
2. Select a different language if desired.
3. Enter **user** for User Name and **user** for Password, then click Log in.
    The **Live Video** page is displayed.

Live Video page

The Live Video page comprises a live image from the camera on the left side of the page, and a virtual joystick and function buttons on the right. Menu choices are available at the top of the screen, next to the FLIR logo.
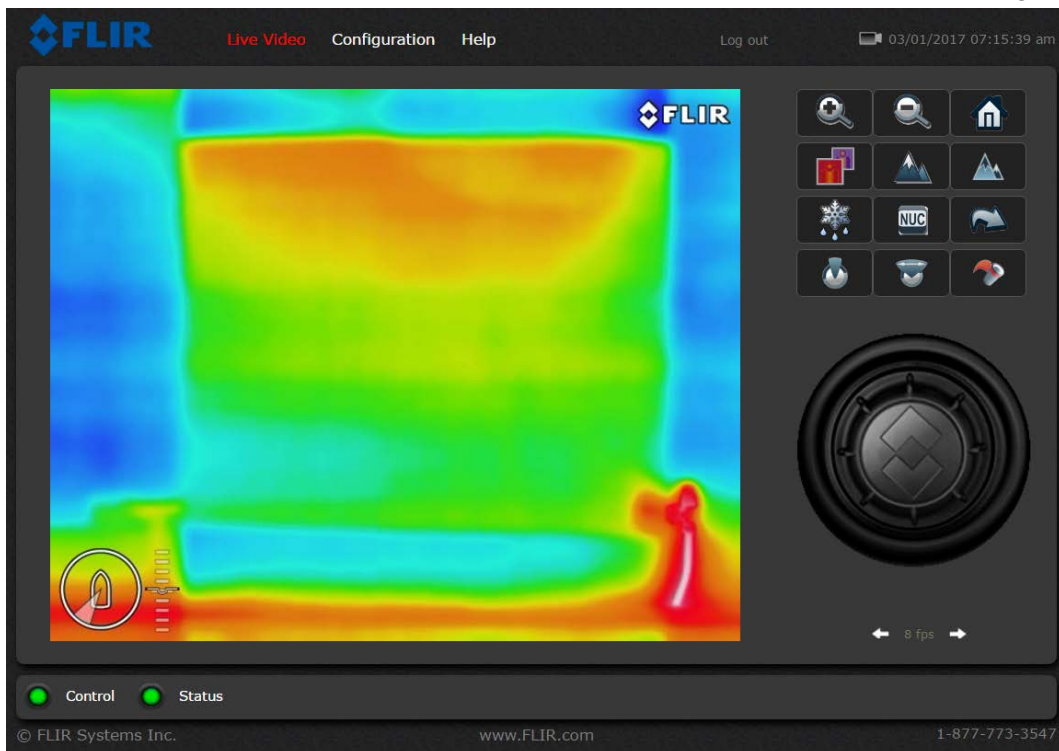
The **user** login, can only access the Live Video page and controls, and a limited selection of Configuration settings.

To change the password for the **user** login, click **Configuration** in the top menu, then in the **Basic User (user)** section of the Configuration page, select **Allow change password**.

Click **Live Video** to return to the Live Video page, and click **user** (next to the **Log out** link). The **Password change** dialog is displayed.
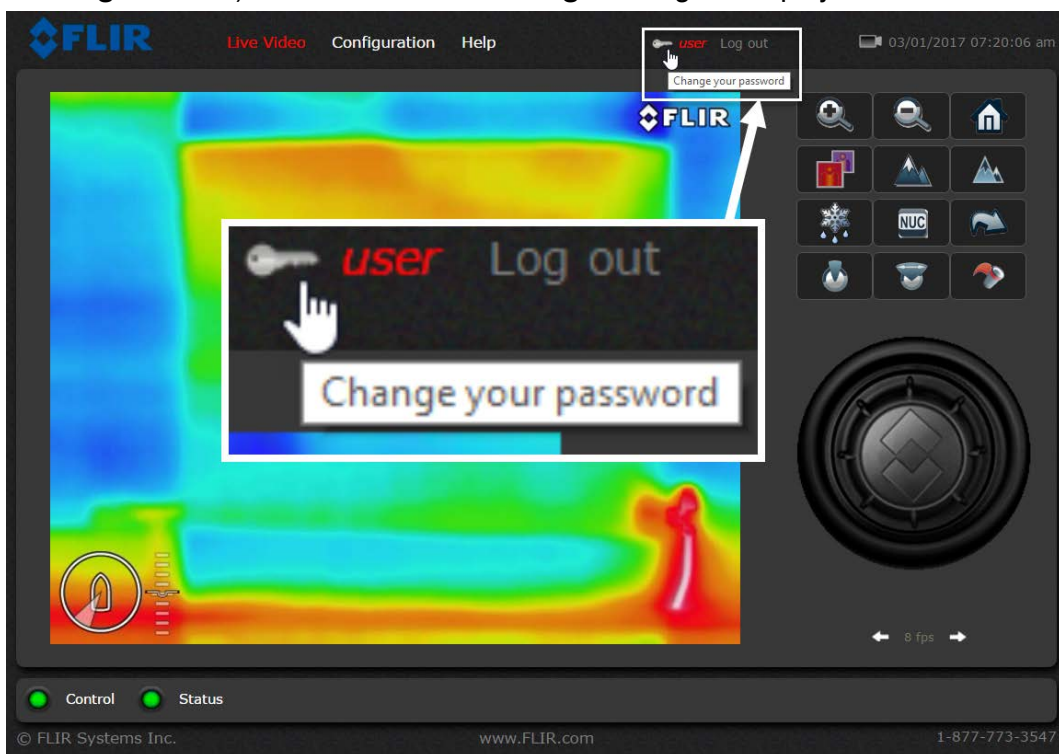
A frame-rate selector at the lower-right of the page enables you to change the rate at which video frames are displayed. This rate applies only to this instance of the web browser. Video streams for other users are not affected.

At the top of the page, the **Help** menu shows software version information. This page includes information about the camera, including hardware and software revision numbers, part numbers, and serial numbers. Before contacting FLIR Technical Support for assistance, make a note of the information from this page.

Use the **Log out** link at the top of the page to disconnect from the camera and stop the display of the video stream. If your web session is inactive for more than 20 minutes, you will be logged out automatically.

In the lower left of the screen are two indicator lights: **Control** and **Status**. Initially the Control light is off (black), indicating that you are not able to control the camera.

When multiple users are connected to a camera, only one user at a time can issue commands to the camera. If another user has control of the camera, the Control light is yellow. To request control of the camera, click on the yellow or black light, or by sending a command to the camera. The Status light may turn off (black) temporarily, while waiting for a response from the camera. There may be a slight delay responding to your inputs while the browser waits for a response from the camera.

In addition, when you move the mouse cursor over the video display, pan & tilt arrows, zoom buttons, and a snapshot button are shown.

The pan & tilt arrows and zoom buttons are shown at the lower-left of the screen; the snapshot button is shown at the upper-right.
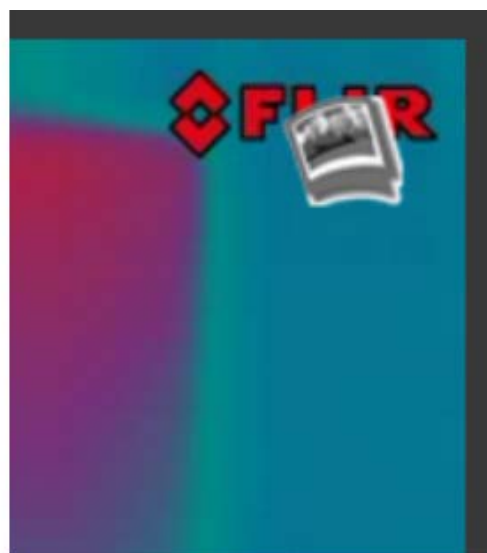
To save a still image from the video feed, click the snapshot button. The video image at the moment the snapshot button is clicked, is created as a JPEG (.jpg) file. Follow the browser prompts to save the image file; the exact prompts depend on the browser you are using.

> **Note:** M100-Series cameras support tilt movements only.

Control buttons

The control buttons on the right side of the page provide a way to control the camera in a limited number of ways.

When you position your mouse cursor over a button, a tool tip is displayed.

The following table describes the function of each button for M100/M200-Series cameras.

Button	Description
	Zoom In Click and hold to zoom-in the thermal image. The current zoom level (between x1.0 and x4.0) is shown at the bottom-right of the thermal image.
	Zoom Out Click and hold to zoom-out the thermal image. The current zoom level (between x1.0 and x4.0) is shown at the bottom-right of the thermal image.
	Home Click and release to move the camera to its home position. Click and hold to set the current pan and tilt position as the home position.
	Toggle Palette Cycle through four different look up table (LUT) color palettes: WhiteHot, RedHot, Fusion, and FireIce Depending on the subjects viewed, one color palette may be preferable to the others.

Button	Description
	Toggle Scene Preset Cycle through four different image presets: Day, Night, Docking, and High Contrast. Each preset adjusts the image brightness and contrast. Depending on the time of day, weather, and other conditions, you may find that one preset produces a clearer thermal image than the others.
	Toggle Polarity Switch the polarity of the image to change the appearance of objects on-screen. The available polarity options depend on the currently selected color palette: WhiteHot / BlackHot; RedHot / RedHot Inverse; Fusion / Fusion Inverse; FireIce / FireIce Inverse
	Toggle De-ice Switch the camera's de-ice heater on or off. The button displays a red **ON** overlay when the heater is operating.
	IR NUC Calibration Perform a Non-Uniformity Correction operation. This can improve the quality of the thermal video image.
	Scan Position Presets Display a numeric keypad. Click a number to select an AutoScan (Surveillance) preset position. Click left-arrow or right-arrow to show the previous or next sequence of preset buttons. Click **C** to return to the main control buttons.
	Toggle AutoScan (Surveillance) mode Switch the camera into and out of AutoScan (Surveillance) mode. While in AutoScan (Surveillance) mode, the camera pans left and right continuously.
	Toggle AutoScan (Surveillance) width Cycle through AutoScan (Surveillance) width settings. This controls the range through which the camera pans when in AutoScan (Surveillance) mode.
	Toggle AutoScan (Surveillance) speed Cycle through AutoScan (Surveillance) speed settings. This controls the speed at which the camera pans when in AutoScan (Surveillance) mode.

Ball-down mode

You can configure the camera to account for a unit that is installed "ball down" (that is, with the base fixings positioned *above* the camera lens). For ball-down installations, the thermal image presented on displays is rotated 180 degrees, and pan and tilt controls are modified to account for the inverted camera.

To configure ball-down mode:

1. From the camera's Web interface, click **Configuration** on the top menu.

   The Configuration page is displayed.

2. From the left-hand panel, click **Devices**.

   The **PT** submenu is selected, and the **PLAT** panel is displayed.

3. From the **Upside Down** list, select **Yes**.

4. Click **Save** to confirm the change.

   An information dialog confirms that the changes have been saved correctly.

5. Click **Accept** in the information dialog.

   A message in the page footer indicates that you need to restart the camera server before the changes will be effective.

6. To stop the server, click the green icon on the left side of the page footer.

   An information dialog confirms that the server has stopped.

7. Click **Accept** in the information dialog.

8. To restart the server, click the black icon on the left side of the page footer.

   An information dialog confirms that the server is now running.

9. Click **Accept** in the information dialog.

   The black icon reverts to green, and the camera is now configured for ball-down operation.

Configuring JCU-3 user-programmable buttons (UPBs)

The JCU-3 keypad's user-programmable buttons (UPBs) can be configured using the camera's Web interface.

You can assign a different action to each UPB (for example, "Park", or "Delce") on a per-camera basis.

> **Note:** UPB mappings apply to individual cameras rather than to specific JCU-3 keypads. This means that, if you are using a single JCU-3 keypad to control two M100 / M200 Series cameras, UPB number 1 could be configured to initiate a different action on each camera.

To configure JCU-3 user programmable buttons (UPBs) using the camera's Web interface:

1. From the camera's Web interface, click **Setup** on the top menu.
   The Setup page is displayed.
2. From the left-hand panel, click **JCU**.
   The **UPB Configuration** panel is displayed.
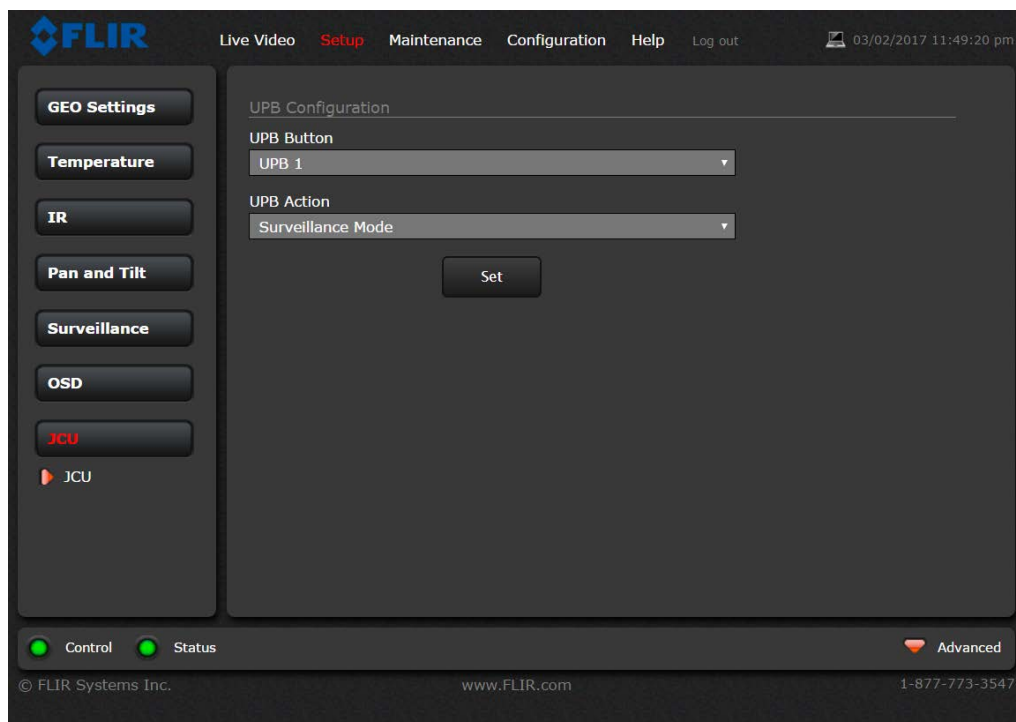
3. From the **UPB Button** list, select the button you wish to configure.
4. From the **UPB Action** list, choose the camera action you wish to associate with that UPB button.
5. Repeat steps 3 and 4 for each UPB you wish to configure.
6. Click **Set** to save the UPB Configuration.
   The **Live Video** page is displayed.

Configuring the camera's IP-network parameters manually

In some circumstances, you may need to configure the camera's IP-network parameters manually, rather than relying on automated configuration with DHCP (the camera's default setting).

For example, your network configuration may require the camera to use a fixed IP address. This is the case if you are using the IP video decoder supplied with system kits; refer to the documentation provided with the IP video decoder.

Note: Unless you are specifically instructed in FLIR documentation, or have previous experience of configuring IP networks, you should NOT attempt to set the camera's IP-network parameters manually. If you mis-configure the IP-network parameters, your camera may stop working correctly or become inaccessible on the network.

This procedure assumes that you have already established a network connection, and can access the camera's Web interface (see **Setting up a network connection to the camera**). To configure the camera's IP network parameters manually:

1. In the Internet Explorer Browser, type the camera IP address into the address bar.

   The camera's web interface is displayed

2. In the **User Name** box, type "expert"; in the **Password** box, type "expert", then click **Log in**.

   The **Live Video** page is displayed.

3. In the top menu, click **Configuration**, then in the left-hand menu, click **Server** > **LAN Settings**.

   The camera's network options are displayed.

4. Make any required changes to the IP-network parameters ("LAN Settings"). The following example shows how to set a static IP address:

   i. In the **Interface: eth0** section of the page, from the **IP Address Mode** list, select **Static**.

   ii. Adjust the values for **IP Address** and **Netmask** as required for the network your camera will be connected to. The remaining parameters are not likely to require changes.

Note: Keep a record of the address shown in the **IP Address** box below the **IP Address Mode** list. You will need this address to access the camera's configuration web interface in future.

5. At the bottom of the LAN Settings page, click **Save**.

   An information dialog confirms that settings have been changed, and that a network restart is required.

6. click **Restart Network**.

   An information dialog confirms that the network has restarted, and that you may need to enter a new IP address to regain access to the camera's Web interface.

Chapter 7: Maintenance

Chapter contents

7.1 Service and maintenance

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

7.2 Cleaning the thermal camera

The camera housing and lens will require occasional cleaning. You should 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, or with abrasive materials such as paper or scrub brushes, as this could scratch the coating.

- Do NOT use 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.

Chapter 8: System checks and troubleshooting

Chapter contents

8.1 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 network connections.	• Check thermal camera network cables (RayNet or Ethernet) are sound and properly connected.
	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 opposed 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.

Problem	Possible causes	Possible solutions
Image too dark or too light.	Display brightness is set too low.	Use the brightness controls at the display to adjust accordingly.
	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 is inverted (upside down).	Camera "Ball down" setting is incorrect.	Ensure that the Ball down setting is set correctly.

8.2 FLIR Maritime product support and servicing

FLIR provides a comprehensive product support service, as well as warranty, service, and repairs. You can access these services through the FLIR website, telephone, and e-mail.

Product information

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

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

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

Servicing and warranty

FLIR offers dedicated service departments for warranty, service, and repairs.

Don't forget to visit the FLIR website to register your product for extended warranty benefits: http://customer.flir.com/Warranty/EndUserRegistration.

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

Web support

On the FLIR website, please visit the "Marine" portal support area: http://www.flir.com/marine/support

Telephone and e-mail support

Region	Telephone	E-mail
United Kingdom (UK), EMEA, and Asia Pacific	+44 (0)1329 246 777	maritimecamerasupport@flir.com
United States (US)	+1 (603) 324 7900 (Toll-free: +800 539 5539)	support@flir.com
Australia and New Zealand	+61 2 8977 0300	aus.support@flir.com (FLIR Maritime subsidiary)
France	+33 (0)1 46 49 72 30	support.fr@flir.com (FLIR Maritime subsidiary)
Germany	+49 (0)40 237 808 0	support.de@flir.com (FLIR Maritime subsidiary)
Italy	+39 02 9945 1001	support.it@flir.com (FLIR Maritime subsidiary)
Netherlands	+31 (0)26 3614 905	support.nl@flir.com (FLIR Maritime subsidiary)
Sweden	+46 (0)317 633 670	support.se@flir.com (FLIR Maritime subsidiary)

Region	Telephone	E-mail
Finland	+358 (0)207 619 937	support.fi@flir.com (FLIR Maritime subsidiary)
Norway	+47 692 64 600	support.no@flir.com (FLIR Maritime subsidiary)
Denmark	+45 437 164 64	support.dk@flir.com (FLIR Maritime subsidiary)

Chapter 9: Technical specification

Chapter contents

9.1 M100/M200 Series cameras

Technical specification

Nominal supply voltage	12 or 24 V dc
Operating voltage range	-10% to +30% of nominal supply range
Current	Peak 5.0 A
Power consumption	• 15 W typical • 18 W maximum
Environmental	**Installation environment** • 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: max 95% • Waterproof to IPX6 • Wind: 100 mph (161 kph) • Vibration: IEC 60945; MIL-STD-810E • Salt Mist: IEC60945
Electromagnetic compliance	EMI: IEC 60945
Dimensions	Camera: • Base diameter: 161.1 mm (6.34 in.) • Height: 229.3 mm (9.03 in.) Camera attached to top-down riser: • Base diameter (without seal): 188.0 mm (7.40 in.) • Base diameter (with seal): 190.0 mm (7.48 in.) • Height: 279.0 mm (10.98 in.)
Weight	2.7 kg (6.0 lb) without top-down riser; 3.0 kg (6.6 lb) with top-down riser
Pan / tilt	• 360° continuous pan (M200–Series only) • +110°/-90° tilt
Video	• Output: H264–encoded IP video stream • Video resolution: 640(H) x 512(V) pixels • Sensor resolution: 320(H) x 240(V) pixels • Field of view: 24 degrees (horizontal); 18 degrees (vertical)

9.2 JCU-3

Technical specification

Power specification

PoE class	Class 1
Nominal supply voltage	• PoE: 48 V dc • Alternate power: 12 V / 24 V dc
Operating voltage range	• PoE: 44 V to 57 V dc • Alternate power: 9 V to 32 V dc
Power consumption	4 W Max with full keypad illumination

Environmental specification

Operating temperature	-25 ºC to +55 ºC (-13 ºF to 131 ºF)
Storage temperature	-30 ºC to +70 ºC (-22 ºF to 158 ºF)
Relative humidity	Maximum 93%
Waterproof rating	IPx6 & IPx7

Wired connections

Network / PoE	1 x RayNet 10/100 Mb/s connector
Alternate power	1 x Power connector (SeaTalkng® style connector)

Chapter 10: Spares and accessories

Chapter contents

10.1 M100/M200 Series camera accessories

Accessories

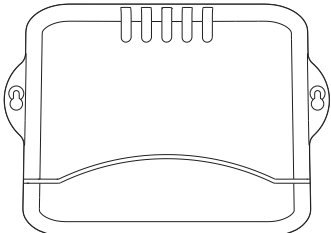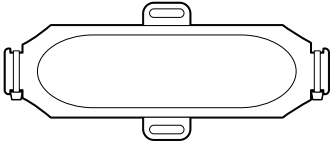| Item	Part number
Right-angled single keyway power cable, 10 m (32.8 ft)	A80511
Right-angled RayNet cable, 10 m (32.8 ft)	A80512
RayNet adapter cable, 100 mm (3.9 in)	A80513
Top-down riser for M100/M200 Series cameras	A80509
JCU-3 remote control unit (with portrait and landscape keypad mats)	A80510

10.2 Keypad spares and accessories
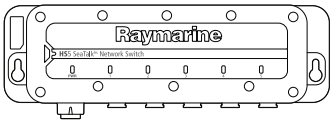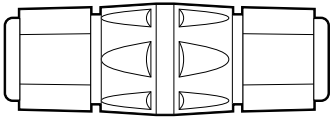
Spares

Item	Part number
Portrait keypad mat spare	R70557
Landscape keypad mat spare	R70558

Accessories

Item	Part number
Right angled 2 m (6.6 ft) power cable	A06070
Straight 2 m (6.6 ft) power cable	A06049

10.3 Network hardware

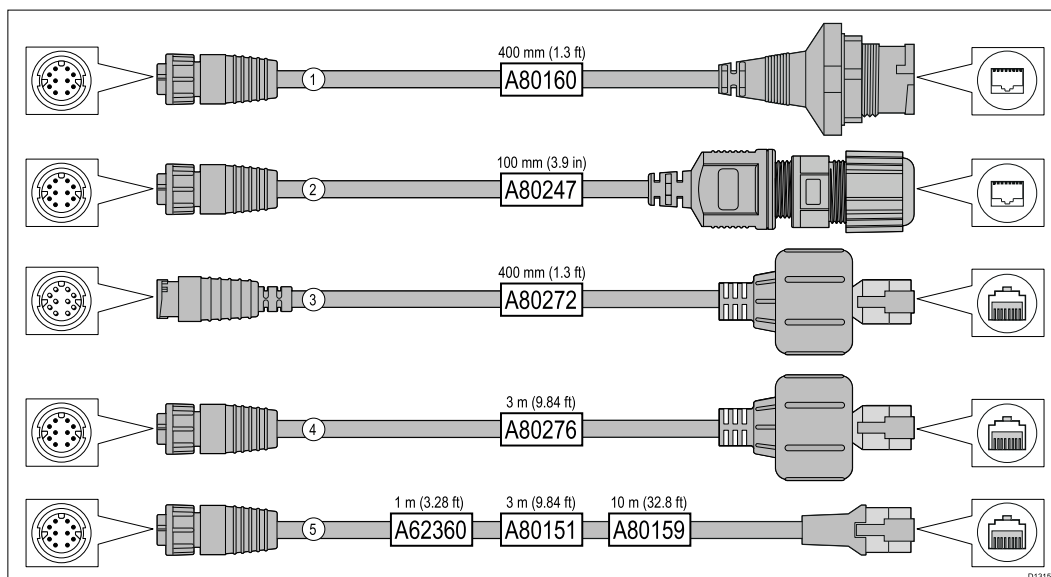| Item	Part number	Notes
HS5 RayNet network switch	A80007	5–port switch for network connection of multiple devices featuring RayNet connectors. Equipment with RJ45 SeaTalk^{hs} connectors can also be connected using suitable adapter cables.
RJ45 SeaTalk^{hs} network switch	E55058	8–port switch for network connection of multiple SeaTalk^{hs} devices featuring RJ45 connectors.
RJ45 SeaTalk^{hs} crossover coupler	E55060	• Enables direct connection of RJ45 SeaTalk^{hs} devices to smaller systems where a switch is not required. • Enables the connection of RJ45 SeaTalk^{hs} devices to a HS5 RayNet network switch (in conjunction with suitable adapter cables). • Enables 2 RJ45 SeaTalk^{hs} cables to be connected together to extend the length of the cabling. Recommended for internal installations. **Important:** Do NOT use crossover devices for POE (Power Over Ethernet) connections.
Ethernet RJ45 coupler	R32142	• Enables direct connection of RJ45 SeaTalk^{hs} devices to smaller systems where a switch is not required. • Enables the connection of RJ45 SeaTalk^{hs} devices to a HS5 RayNet network switch (in conjunction with suitable adapter cables). • Enables 2 RJ45 SeaTalk^{hs} cables to be connected together to extend the length of the cabling. Recommended for external installations.

Network cable connector types

There are 2 types of network cable connector — RayNet, and RJ45 SeaTalk[hs].

	RJ45 SeaTalk[hs] connector.
	RayNet connector.

10.4 RayNet to RJ45 adapter cables

	Description	Typical use	Quan- tity
1	Adapter cable with a **RayNet** (female) socket on one end, and a waterproof (female) socket on the other end accepting the following cables with an **RJ45 SeaTalk**hs waterproof **locking** (male) plug: • **A62245** (1.5 m). • **A62246** (15 m).	A typical use for this adapter cable is to connect a **DSM300** sonar module to a **LightHouse** MFD, using all-waterproof cable connections. This adapter cable will also accept the following **RJ45 SeaTalk**hs cables, although the **RJ45** plug that connects at the equipment end (e.g. **DSM300**) will NOT be waterproof: • **E55049** (1.5 m). • **E55050** (5 m). • **E55051** (10 m). • **A62135** (15 m). • **E55052** (20 m).	1
2	Adapter cable with a **RayNet** (female) socket on one end, and a waterproof (female) **RJ45** socket on the other end, along with a locking gland for a watertight fit.	Directly connect a Raymarine radar scanner with an **RJ45 SeaTalk**hs (male) cable to a **RayNet** network switch (e.g. **HS5**) or **LightHouse** MFD.	1
3	Adapter cable with a **RayNet** (male) plug on one end, and an **RJ45 SeaTalk**hs waterproof (male) plug on the other end.	Connect a legacy **G-Series GPM-400**, **C-Series** Widescreen or **E-Series** Widescreen MFD to a Raymarine radar scanner supplied with a **RayNet** power / data cable.	1

	Description	Typical use	Quan-tity
4	Adapter cable with a **RayNet** (female) socket on one end, and an **RJ45 SeaTalk^{hs}** waterproof (male) plug on the other end.	Connect a legacy **G-Series GPM-400**, **C-Series** Widescreen or **E-Series** Widescreen MFD to a **RayNet** network switch (e.g. the **HS5**).	1
5	Adapter cable with a **RayNet** (female) socket on one end, and an **RJ45 SeaTalk^{hs}** (female) socket on the other end.	Connect a **LightHouse** MFD to a legacy **SR6** switch / weather receiver or a legacy 8–port **SeaTalk^{hs}** network switch. Another common use for the cable is in conjunction with a crossover coupler (**E55060** or **R32142**) to connect Raymarine products with an **RJ45** connection (e.g. radar scanner, thermal camera or **DSM300**) to a **LightHouse** MFD or **RayNet** network switch (e.g. the **HS5**).	1

10.5 RayNet to RayNet cables and connectors

	400 mm (1.3 ft)	2 m (6.56 ft)	5 m (16.4 ft)	10 m (32.8 ft)	20 m (65.6 ft)
①	A80161	A62361	A80005	A62362	A80006

② R70014

③ A80262

④ 100 mm (3.9 in) A80162

D13160-1

	Description	Typical use	Quantity
1	Standard **RayNet** connection cable with a **RayNet** (female) socket on both ends.	Suitable for connecting all **RayNet** equipment directly to **LightHouse** multifunction displays featuring a **RayNet** connector. Can also be used to connect **RayNet** equipment via a **RayNet** network switch (e.g. **HS5**).	1
2	**RayNet** cable puller (5 pack).	These "handles" securely attach to the twist-lock on **RayNet** cables, enabling you to pull the cables through conduits and other obstacles.	5
3	**RayNet** to **RayNet** right-angle coupler / adapter.	Suitable for connecting **RayNet** cables at 90° (right angle) to devices, for installations where space is limited. For example, use this adapter to connect a **RayNet** cable to a multifunction display when there is not enough space behind the display for the usual cable bend radius required by a standard RayNet cable. This adapter features a **RayNet** (female) socket at one end, and a **RayNet** (male) plug at the other end.	1
4	Adapter cable with a **RayNet** (male) plug on both ends.	Suitable for joining (female) **RayNet** cables together for longer cable runs.	1

Index

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