M300-SERIES

Installation & Operation Instructions

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Patents notice

This product is covered by one or more of US Patent Nos: 7470904; 7034301; 6812465; 7470902; 6929410 and other patents pending, or design patents pending.

Export control

M300-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.marine.flir.com

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CHAPTER 1: IMPORTANT INFORMATION

Safety warnings

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.

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: Switch off power supply

Ensure that 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 to do so in this document.

Warning: Entrapment hazard

This product features moving parts, which 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 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.

Product warnings

Warning: Product grounding

Before applying power to this product, it MUST be 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. For the correct voltage, refer to the information label affixed to the product.

Warning: PoE isolation coupler

Some networks require an inline Power over Ethernet (PoE) isolation coupler to be fitted before the camera can be connected to the network.

The inline PoE isolation coupler may be required regardless of whether a network device (e.g. an MFD / chartplotter, or network switch) outputs PoE or not.

Before connecting the camera to a network, refer to your network device manufacturer for more information.

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.

Caution: Power supply protection

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

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.

Regulatory notices

Cleaning the 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.

Routine camera inspections

It's important to routinely inspect cameras and associated mounting hardware.

Important:
Routinely inspect the camera and its mounting surface. 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 is rigid, while rotating freely.

• Conduct both visual and mechanical checks during your inspection, including the use of torque wrenches to ensure that all mounting fixings are secured to the recommended torque, as stated in the installation instructions.

• Ensure that the camera and weight-bearing mountings (including any risers) are installed securely, that the coated surfaces are intact, and that there are no signs of damage.

• Maintain a regular inspection schedule. Both visual and mechanical checks should be included in each inspection. Maintain a record of all inspections.

Water ingress

Water ingress disclaimer

Although the waterproof rating capacity of this product meets the stated standard (refer to the product's *Technical Specification*), water intrusion and subsequent equipment failure may occur if the product is not installed correctly or 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.

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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 (3.3 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 2 m (6.6 ft).

  - More than 2 m (6.6 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.

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.

For more information, refer to your third-party cable manufacturer.

Declaration of Conformity

Raymarine UK Ltd (FLIR) declares that the products listed below are in conformity with the relevant sections of the listed designated standards and / or other normative documents:

- M364C 30 Hz dual payload thermal camera, part number E70518
- M364C 9 Hz dual payload thermal camera, part number E70519
- M364C 30 Hz dual payload thermal camera, part number E70520
- M364C 9 Hz dual payload thermal camera, part number E70521
- M364 30 Hz single payload thermal camera, part number E70525
- M364 9 Hz single payload thermal camera, part number E70526
- M332 30 Hz single payload thermal camera, part number E70527
- M332 9 Hz single payload thermal camera, part number E70528
- M300C single payload camera, part number E70605

Region	Standard	Mark
UK	EMC Regulations 2016	UKCA
EU	EMC Directive 2014/30/EU	CE

The original Declaration of Conformity certificate may be viewed at:
www.bit.ly/m300-conformity

PSTI Compliance

For products sold into the United Kingdom (UK), use the following link to obtain the product's Statement of Compliance with the *Product Security and Telecommunications Infrastructure* (PSTI) Regulations:

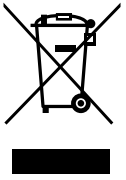
Visit the following web address and enter the product's model name or number (SKU) into the provided search field:

- www.bit.ly/rym-sec-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 which contains materials, components and substances that may be hazardous and present a risk to human health and the environment when WEEE is not handled correctly.



Equipment marked with the crossed-out wheeled bin symbol indicates that the equipment should not be disposed of in unsorted household waste.
Local authorities in many regions have established collection schemes under which residents can dispose of waste electrical and electronic equipment at a recycling center or other collection point.
For more information about suitable collection points for waste electrical and electronic equipment in your region, refer to the Raymarine website:
https://bit.ly/rym-recycling

Warranty policy and registration

Visit the Raymarine website to **read the latest warranty policy**, and **register** your product's warranty online: www.bit.ly/rym-warranty

It is important that you register your product to receive full warranty benefits. Your product package includes a barcode label indicating the serial number of the unit. This serial number is also provided on a label affixed to the product itself. You will need this serial number when registering your product online.

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.

Publication copyright

CHAPTER 2: DOCUMENT INFORMATION

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2.1 Document information

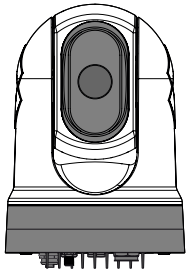
This document contains important information related to the installation and operation of your FLIR product.

The document includes information to help you:

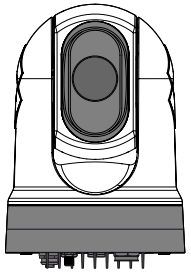
- Plan your installation and ensure you have all the necessary equipment;
- Install and connect your product as part of a wider system of connected marine electronics;
- Use your product along with an appropriate video monitor, Joystick Control Unit (JCU), Web browser, or multifunction display (MFD) / chartplotter.
- Troubleshoot problems and obtain technical support if required.

2.2 Applicable products

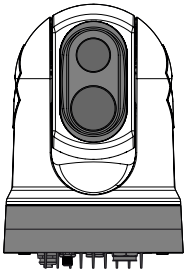
This document is applicable to the following products:



M332 (9 Hz)
M332 (30 Hz)
M364 (9 Hz)
M364 (30 Hz)



M300C



M364C (9 Hz)
M364C (30Hz)
M364C LR (9 Hz)
M364C LR (30Hz)

Camera (single payload)	Description
M332 (9 Hz) — (E70528)	• 24° Field of View (FOV) • 320px thermal sensor resolution
M332 (30 Hz) — (E70527)	• 24° Field of View (FOV) • 320px thermal sensor resolution
M364 (9 Hz) — (E70526)	• 24° Field of View (FOV) • 640px thermal sensor resolution
M364 (30 Hz) — (E70525)	• 24° Field of View (FOV) • 640px thermal sensor resolution
M300C — (E70605)	• DLTV visible-light optical sensor with 1080p resolution and 30x zoom

Camera (dual payload)	Description
M364C LR (9 Hz) — (E70521)	• 18° Field of View (FOV) • 640px thermal sensor resolution • DLTV visible-light optical sensor with 1080p resolution and 30x zoom
M364C LR (30 Hz) — (E70520)	• 18° Field of View (FOV) • 640px thermal sensor resolution • DLTV visible-light optical sensor with 1080p resolution and 30x zoom
M364C (9 Hz) — (E70519)	• 24° Field of View (FOV) • 640px thermal sensor resolution • DLTV visible-light optical sensor with 1080p resolution and 30x zoom
M364C (30 Hz) — (E70518)	• 24° Field of View (FOV) • 640px thermal sensor resolution • DLTV visible-light optical sensor with 1080p resolution and 30x zoom

2.3 Additional system components

Your thermal camera can be used in conjunction with the following optional items, available separately from FLIR:

- **Joystick Control Unit (JCU)**: With a compatible Joystick Control Unit (JCU) connected to the camera network, you can utilize the JCU's physical controls to remotely control the

camera. For more information, refer to the following section:
p.88 — Camera operation via JCU

2.4 Product documentation

The following documentation is applicable to your product:

Description	Part number
M300 Thermal Camera Installation and Operation Instructions (this document) Installation and operation of an M300 Series thermal camera and connection to a wider system of marine electronics.	71004
M300 Series surface mounting template Cut out template for mounting an M300 Series thermal camera.	77005
M300 Series riser mounting template Drill template for mounting the camera riser.	77006
M300 Thermal Camera Raymarine System Integration Guide Integration of an M300 Series thermal camera within a Raymarine system of marine electronics.	81400
JCU-4 Installation & Operation Instructions Installation of a JCU-4 Remote Keypad and connection to a wider system of marine electronics.	71007

2.5 MFD / chartplotter software version

When using the camera with a multifunction display (MFD) or chartplotter, ensure that the MFD / chartplotter is using the latest software version.

For instructions on how to obtain and update the MFD / chartplotter software, refer to the documentation that accompanies the display.

2.6 Applicable software version

This document has been updated to reflect the following M300-Series software version:

Applicable software version:
v2.00-79

Check the website for the latest software:

M300-Series software download link
https://bit.ly/m300-series-download

CHAPTER 3: PRODUCT AND SYSTEM OVERVIEW

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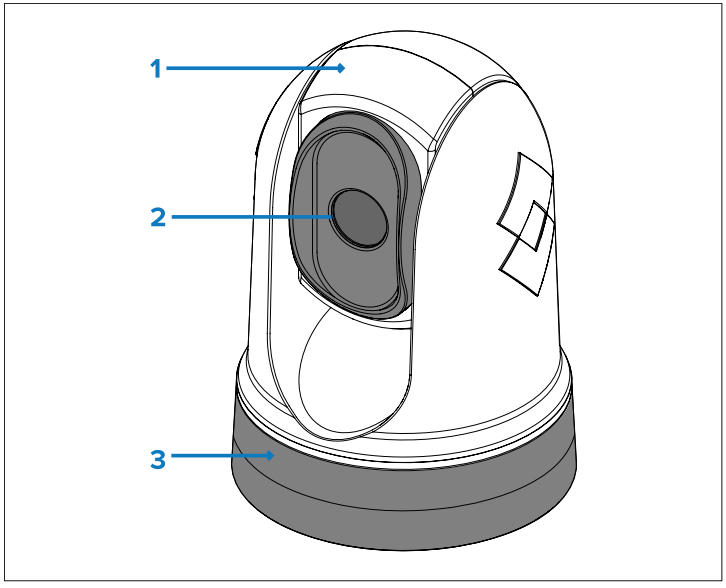
3.1 Product overview

M300-Series (single payload)

The M300-Series single payload variant is a maritime camera equipped with either a visible-light or thermal imaging system (depending on chosen model), for use on nearly any kind of vessel.

The camera will have one of the following types of imaging core, depending on the chosen model:

- **Visible-light** — provides a clear color image in daylight conditions. For example, a visible-light camera can help you maintain a watch of your surroundings, or zoom in on distant objects.
- **Thermal** — provides a clear image in faint 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.



1. Tilt assembly.
2. Camera lens window.
3. Pan assembly.

The M300-Series system has the following key functions and features:

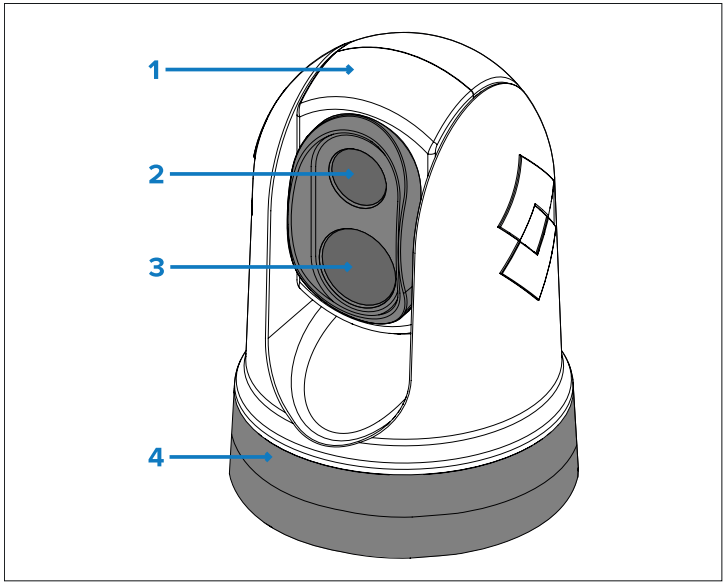
- IP connectivity to simplify installation and system integration.
- 4 simultaneous video outputs, including 2 visible-light or 2 thermal digital streams (depending on your chosen model). For further information, refer to the following section:
  p.46 — Video connections
- Pan and tilt operations via dedicated Joystick Control Unit (JCU), multifunction display (MFD) / chartplotter, or Web browser.
- 2-axis mechanical camera stabilization to suit changing conditions.
- Preset modes (Scenes) optimized for prevailing conditions.
- Marine Video Analytics (MVA) — intelligent thermal analytics technology; provides visual alerts when "non-water" objects are identified in the scene. This feature can be enabled using the camera's Web interface or the on-screen display via a connected JCU.
- Automatic window heaters to de-ice the lens window in cold weather.
- 12 V or 24 V dc power.

M300-Series (dual payload)

The M300-Series dual payload variant is a maritime camera equipped with a visible-light and thermal imaging system, for use on nearly any kind of vessel.

Dual payload cameras have 2 separate imaging cores:

- **Visible-light** — provides a clear color image in daylight conditions. For example, a visible-light camera can help you maintain a watch of your surroundings, or zoom in on distant objects.
- **Thermal** — provides a clear image in faint 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.



1. Tilt assembly.
2. Thermal camera lens window.
3. Visible-light camera lens window.
4. Pan assembly.

The M300-Series system has the following key functions and features:

- IP connectivity to simplify installation and system integration.
- 6 simultaneous video outputs, including 2 visible-light and 2 thermal digital streams. For further information, refer to the following section: **p.46 — Video connections**
- Pan and tilt operations via dedicated Joystick Control Unit (JCU), multifunction display (MFD) / chartplotter, or Web browser.
- 2-axis mechanical camera stabilization to suit changing conditions.
- Preset modes (Scenes) optimized for prevailing conditions.
- Color Thermal Vision (CTV) blending mode — blends thermal and visible-light color video feeds for enhanced identification of buoys, vessels and other targets at night.
- Multi Spectral Dynamic Imaging (MSX) blending mode — adds specific details from the visible-light video feed in real time to the thermal video feed, for detecting and sharpening the edges of objects in the thermal video feed.
- Marine Video Analytics (MVA) — intelligent thermal analytics technology; provides visual alerts when “non-water” objects are identified in the scene. This feature can be enabled using the camera’s Web interface or the on-screen display via a connected JCU.
- Automatic window heaters to de-ice the lens window in cold conditions.
- 12 V or 24 V dc power.

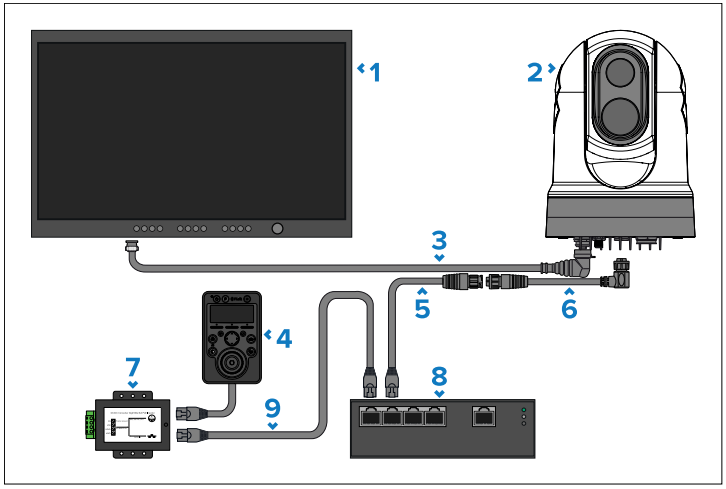
3.2 System overview

The camera has a flexible array of connection options for integration with your vessel’s electronics system.

With the right combination of devices and connections, you can view and control the camera’s image from the most convenient locations on your vessel.

The following illustration shows a very **typical** installation scenario. For more system configuration examples, ranging from small to large systems, refer to: **p.52 — Network connections**

For an overview of the camera’s video connection options, refer to: **p.45 — Video connections**



	Description
1	Digital video (HD-SDI) monitor, available separately from third-party retailers
2	M300-Series camera
3	HD-SDI video cable (BNC connectors) (3 m / 9.8 ft.), supplied with camera
4	Joystick control unit (JCU-4 currently illustrated), available separately
5	RayNet (Ethernet) to RJ45 adapter cable (100 mm (3.9 in)), supplied with camera
6	Right-angled RayNet (Ethernet) to RayNet (Ethernet) cable 3 m (9.8 ft.), supplied with camera
7	PSE (Power Sourcing Equipment — e.g. a PoE Injector or PoE network switch) providing PoE (Power over Ethernet) to the JCU-2, available separately
8	Ethernet network switch, available separately from third-party retailers
9	RJ45 to RJ45 cable, available separately

Important:
It is recommended that an HD video isolation transformer is fitted to camera HD-SDI connections. *Failure to install an inline HD video isolation transformer may invalidate the camera's warranty.* For more information, refer to:

• **p.48 — HD-SDI isolation transformer requirement**

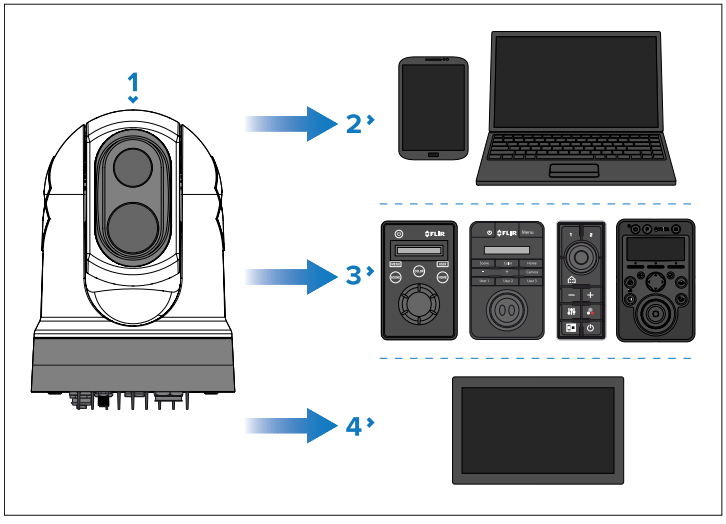
Important:
If you are powering a JCU via the separately-available PoE Injector (2nd Generation; 5 Gbit) (A80811), do NOT connect the power input labelled "*VIN1+*" on the PoE Injector.

Note:
Power connections are not shown in this illustration. For power connection information, refer to the instructions which accompany each device.

3.3 Control options

The following illustration shows the different options available for controlling the camera.

These options are not exclusive; the camera can be controlled from more than one device.



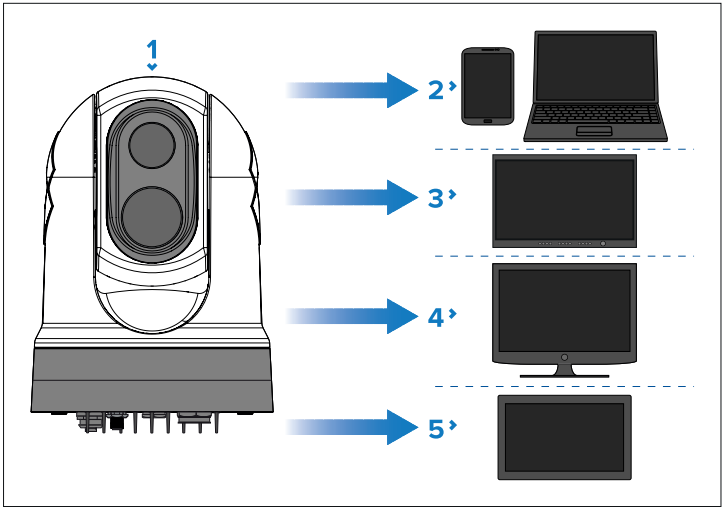
Note:
This illustration does NOT include any cables or accessories that may be required to connect the products shown; it is simply an overview of control options. For more information on specific connections, refer to the *Connections* section.

1. Camera.
2. Laptop or another Ethernet device running a Web browser, via an Ethernet connection.
3. Compatible Joystick Control Unit (JCU), via an Ethernet connection.
4. Compatible MFD / chartplotter, via an Ethernet connection.

3.4 Display options

The following illustration shows the different options available for displaying the camera's digital and analog video feeds.

All video feeds are available simultaneously.
For more information on the different video feeds available and their respective video formats, refer to: **p.45 — Video connections**



Note:
This illustration does NOT include any cables or accessories that may be required to connect the products shown. For more information on specific connections, refer to the *Connections* section.

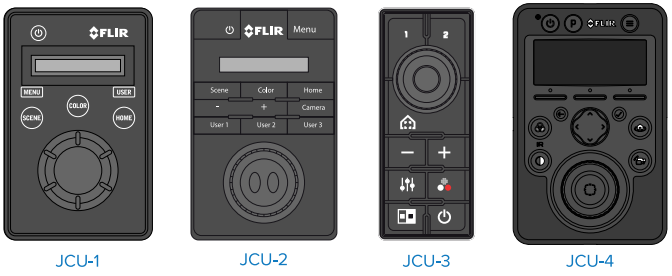
1. Camera.
2. Laptop or another Ethernet device running a Web browser: via an Ethernet connection.
3. Digital video monitor: via an HD-SDI connection directly to the camera (or an HDMI connection via a converter, available separately from third-party retailers).
4. Analog video monitor: via a composite analog video connection available on the camera's power cable.
5. Compatible MFD / chartplotter: via an Ethernet connection.

Note:
This product is ONVIF-compatible, and uses ONVIF (Profile S). ONVIF profiles help you to determine which IP digital video devices are compatible with one another. For more information on ONVIF profiles, refer to: www.onvif.org/profiles

3.5 Compatible Joystick Control Units (JCUs)

A Joystick Control Unit (JCU) is available to purchase as an optional accessory. With the JCU connected to the camera via a network switch, you can use the JCU's physical controls to control the camera remotely.

The camera's On-Screen Display (OSD) menu can also be accessed and further controlled using a connected JCU. For more information on the OSD menu options available, refer to the '*OSD Menu*' section of this document.



JCU-1 JCU-2 JCU-3 JCU-4

JCU variant	Documentation
JCU-1 (500-0385-00)	www.bit.ly/jcu1-docs
JCU-2 (500-0398-10)	www.bit.ly/jcu2-docs
JCU-3 (A80510)	www.bit.ly/jcu3-docs
JCU-4 (E70695 / E70697)	www.bit.ly/jcu4-docs

3.6 Compatible MFDs / chartplotters

Some multifunction displays (MFDs) / chartplotters may support camera control options via an ONVIF (Profile S)-compatible video / camera application. The range of control options available is dependent on the support that the MFD / chartplotter manufacturer has implemented for the dedicated video / camera application. Refer to the MFD / chartplotter manufacturer for information on whether your display is compatible with the camera.

The image streamed via the camera's RayNet (Ethernet) connector can also be viewed on any MFD / chartplotter featuring a Web browser. The on-screen controls displayed in the Web browser will enable you to perform basic camera control operations from your MFD / chartplotter, including pan / tilt functions and setting menu changes (dependent on camera variant).

Note:
It is recommended that you use a dedicated video / camera application in order to:

- View a higher quality camera video feed (using the H.264 video codec).
- Avoid Web browser session expiration.

CHAPTER 4: PARTS SUPPLIED

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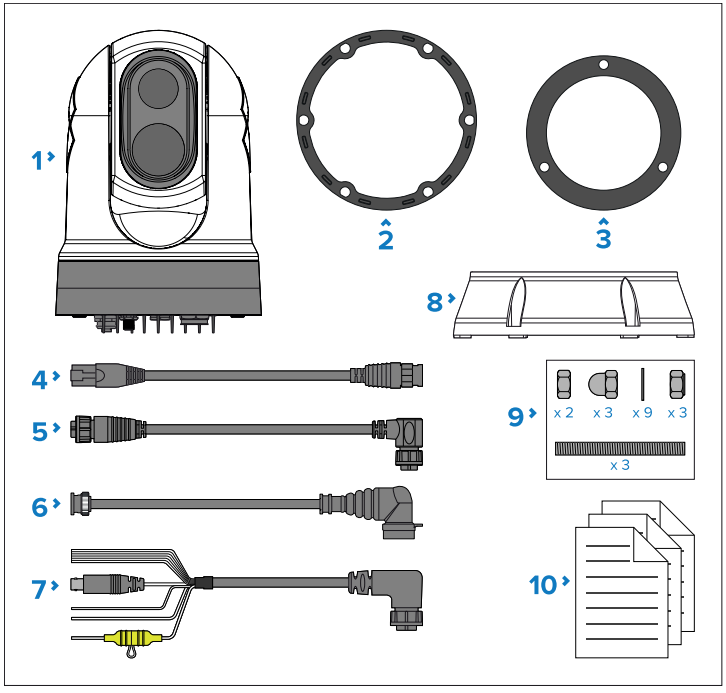
4.1 Parts supplied



	Description
1	M300-Series Camera
2	Riser base-seal
3	Camera seal
4	RayNet (Ethernet) to RJ45 adapter cable, 100 mm (3.9 in)
5	Right-angled RayNet (Ethernet) to RayNet (Ethernet) cable, 3 m (9.8 ft.)
6	Right-angled HD-SDI video cable (with BNC connectors), 3 m (9.8 ft.)
7	Right-angled power/NMEA 0183 / video cable, 3 m (9.8 ft.)
8	Mounting riser
9	(1) Fixings: 3x M6 threaded studs, 2x M6 flat nuts, 3x M6 dome nuts, 9x M6 flat washers, and 3x M6 nyloc nuts.
10	Documentation

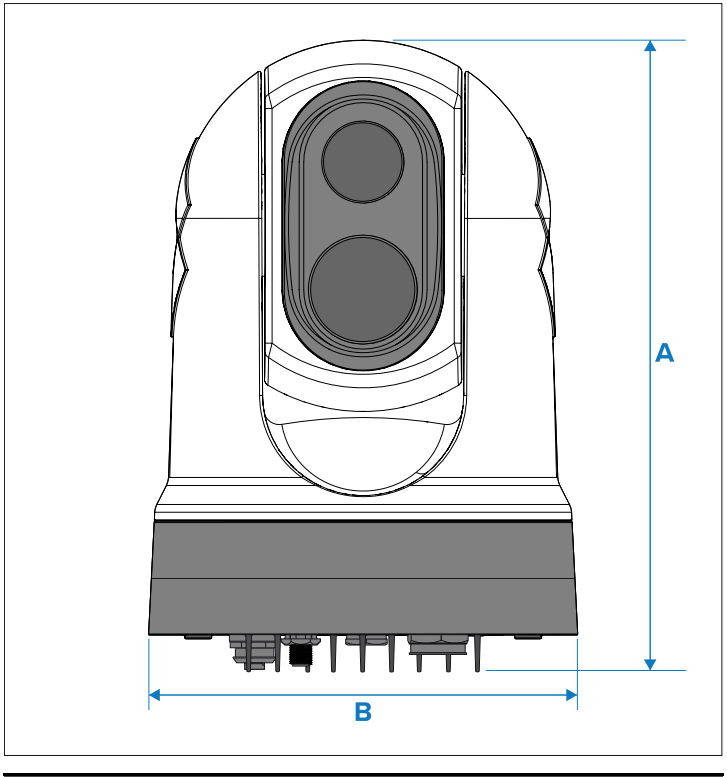
(1) The supplied flat nuts must only be used to assist in winding the studs into the camera's base. If required, you can fit the supplied dome nuts to the studs in order to cover exposed ends. **Do NOT** use dome nuts with a riser.

CHAPTER 5: PRODUCT DIMENSIONS

CHAPTER CONTENTS

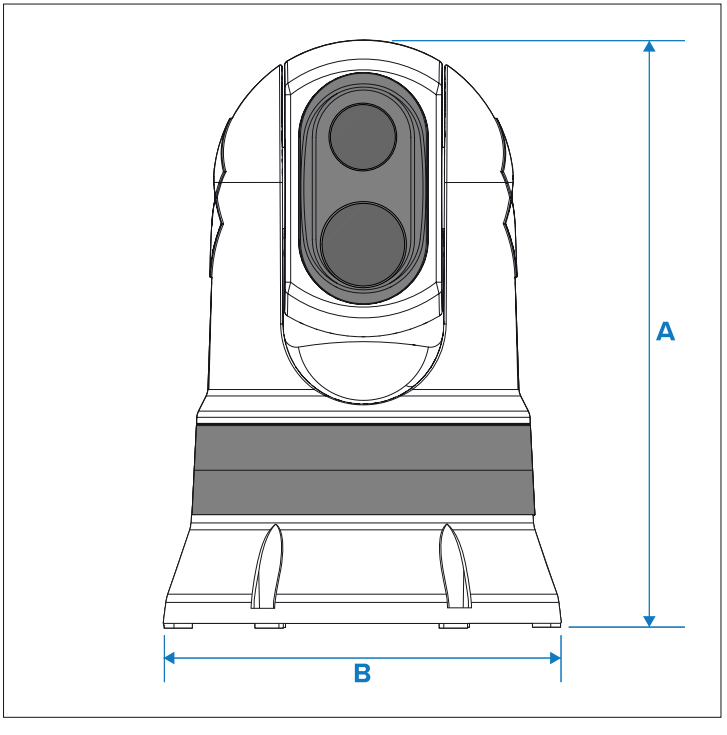
5.1 Product dimensions

M300 Series



	Description
A	328.30 mm (12.93 in)
B	222.20 mm (8.75 in)

M300 Series with optional mounting riser



	Description
A	365.50 mm (14.39 in)
B	256.00 mm (10.08 in)

CHAPTER 6: LOCATION REQUIREMENTS

CHAPTER CONTENTS

6.1 Warnings and cautions

Important:
Before proceeding, ensure that you have read and understood the warnings and cautions provided in the following section of this document:

• **p.9 — Important information**

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).

6.2 General camera location requirements

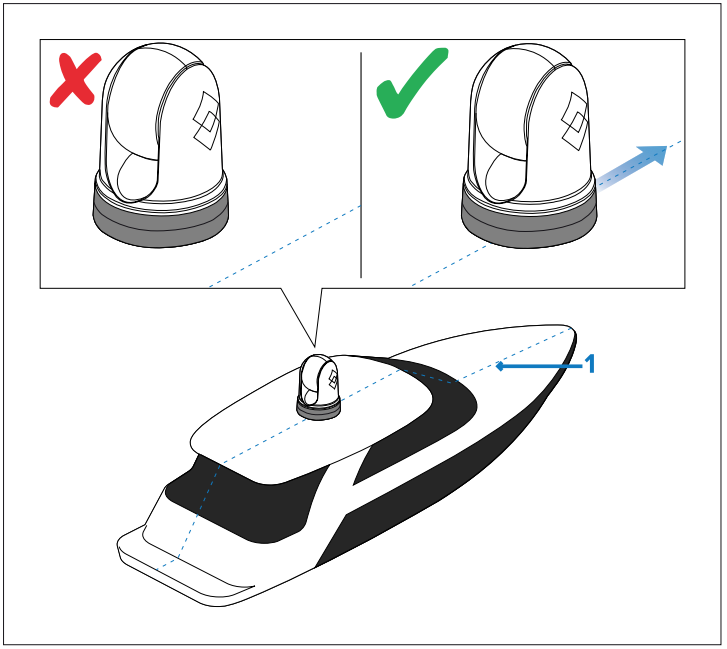
Important considerations when choosing a suitable location for your product.

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.
- **Center line** — the product should be mounted as close to your vessel's central line as possible to provide a symmetrical view of all angles.



1. Vessel's center line.

- **Clear view** — the product should have a clear view of the water with minimal obstruction to the 360° view.
- **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.
- **Height** — the product should be mounted as high as practical, giving a clear view of all directions.
- **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.

6.3 Camera location requirements

When planning the installation location, consider the following points:

- The camera is waterproof, and appropriate for above decks mounting.
- Install the camera more than 2 m (6.6 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.
- When mounting the camera in the ball-down (upside down) position, ensure that the camera is fitted to a weather-tight, flat and stiff mounting surface, with no open air exposure. For comprehensive installation instructions, refer to: **p.35 — Camera mounting**
- When mounting the camera in the ball-down (upside down) position, ensure that the camera is installed with adequate drainage so that standing water does not collect in the base. For comprehensive installation instructions, refer to: **p.35 — Camera mounting**
- Ensure the camera is installed in a location that will allow it to be accessed for regular periodic cleaning (fresh-water rinse) and for inspection of mounting point integrity and mechanical soundness.
- 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, fouling and sun damage to cables and connections. If a cutout is required in the mounting surface to accommodate the cables, and it is not possible to ensure a weather-tight and protected environment, consider mounting the camera using the supplied riser and routing the cables through the riser sidewall. An optional removable hatched area is provided for this purpose. For more information, refer to: **p.31 — Mounting preparation**
- 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 mounting riser supplied with the camera.
- 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 (3.3 ft) from any magnetic compass.
- Select a location that is at least 1 m (3.3 ft) from devices that may cause interference, such as motors, generators and radio transmitters / receivers.
- If installing an optional Joystick Control Unit (JCU), select a location for the JCU that is at least 1 m (3.3 ft) 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 3 threaded studs to the base; refer to: **p.35 — Camera mounting** Fitting the threaded studs 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.

6.4 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 (3.3 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 2 m (6.6 ft).
  - More than 2 m (6.6 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.

6.5 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 must aim to maintain a distance of at least 1 m (3.3 ft) in all directions from any compasses.

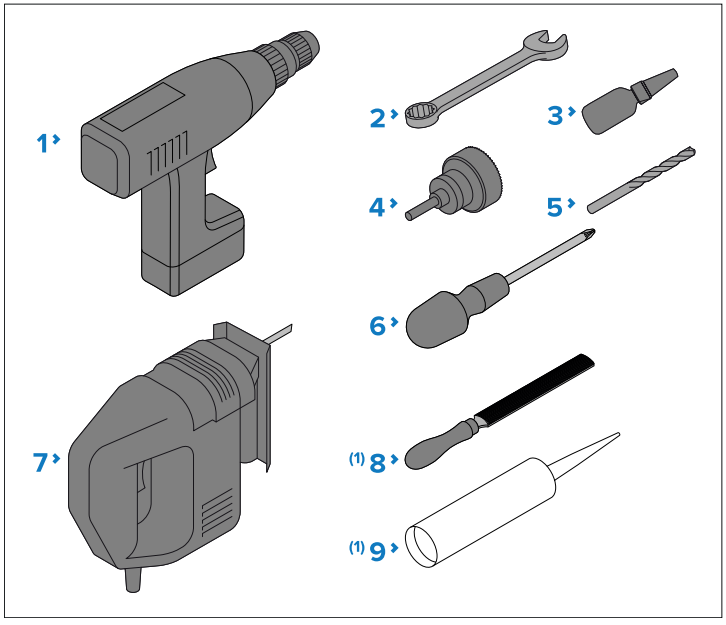
For some smaller vessels it may not be possible to locate the product this far away from a compass. In this situation, when choosing the installation location for your product, ensure that the compass is not affected by the product when it is in a powered on state.

CHAPTER 7: MOUNTING PREPARATION

CHAPTER CONTENTS

7.1 Tools required

The following tools are required for installation:



1. Drill.
2. 10 mm (0.39 in.) spanner.
3. Thread-lock.
4. 50 mm (2 in.) Hole saw.
5. Drill bit (appropriate size dependent on thickness and material of mounting surface).
6. Pozi-drive screwdriver.
7. Jigsaw.
8. **(1)** Half round file (or sandpaper) / Rotary tool.
9. **(1)** Marine grade sealant.

Note:
(1) Items are only required when removing the optional riser sidewall hatch. For more information, refer to the *Removing the riser sidewall hatch* section.

7.2 Camera orientation

The camera can be mounted in 2 orientations, informally known as "Ball-up" (upright) and "Ball-down" (upside down).

- When the camera is mounted ball-up (upright), the camera is mounted on top of the mounting surface.
- When the camera is mounted ball-down (upside down), the camera is mounted below the mounting surface.

The default video image orientation is for the ball-up (upright) configuration. If the camera is to be mounted in the ball-down (upside down) configuration, 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. For further information, refer to:
  p.75 — Camera operation via Web browser
- Use an ONVIF-supported MFD / chartplotter video application to set the appropriate option. For further information, refer to the documentation which accompanies your display.

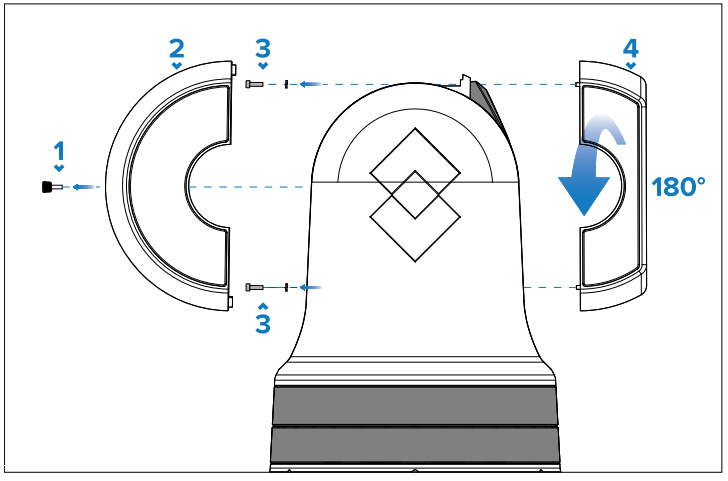
Ball-down (upside down) mounting: rotating the front cover

If you intend to mount your camera in the ball-down (upside down) mode, you must first rotate the camera's front cover so that the drain hole is facing down when it is mounted.

Important:
Use caution when attempting this procedure; there is a risk of water ingress and potential resulting damage to the camera if the cover is not reassembled correctly — the drain hole MUST be facing **down** when mounting the camera upside down.

1. Unscrew the rear cover screw.
2. Remove the rear cover.
3. Unscrew the 4 front cover screws and spring washers.
4. Remove the front cover and rotate it 180° **so that the drain hole is facing down when the camera is mounted upside down**.
5. Reassemble the front cover with the screws and spring washers. The screws must be tightened to a torque of 0.8 N·m (0.6 lbf·ft).

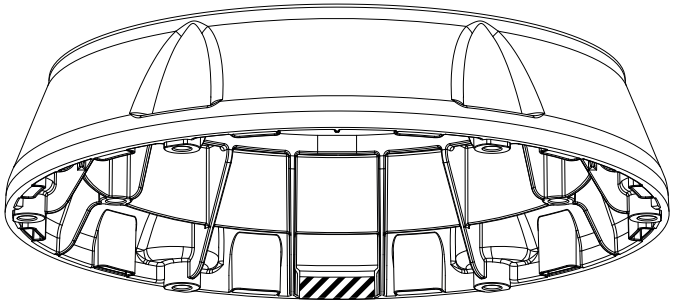
   Ensure that the front cover is reassembled using the correct orientation, and that the drain hole is facing down.
6. Screw the back cover on.



7.3 Routing cables through the riser's sidewall

Ideally, the camera's cables should be routed through a mounting surface cutout which is weather-tight and protected from water ingress, fouling, and sun damage. However, if this is not possible, the cables can alternatively be routed through the riser's sidewall. An optional 29 mm (1.14 in) wide, removable hatched area is provided on the riser for this purpose.

Use the following instructions to remove the riser's sidewall hatched area:



Note:
The riser shown above reflects the **latest** riser design (riser part number **1017892**, which can be found printed on the underside of the riser). For instructions reflecting the *legacy* riser design (riser part number *1009714*, which can be found printed on the underside of the riser), refer to:
p.119 — Routing cables through a (legacy) riser's sidewall

1. On the underside of the riser, mark the sidewall hatched area location, as identified on the supplied *Mounting Template* document (77006).
2. Use a half-round file or a rotary tool to remove the sidewall hatched area.
3. Use a half-round file and / or sandpaper to smooth any rough edges or burs on the removed area.

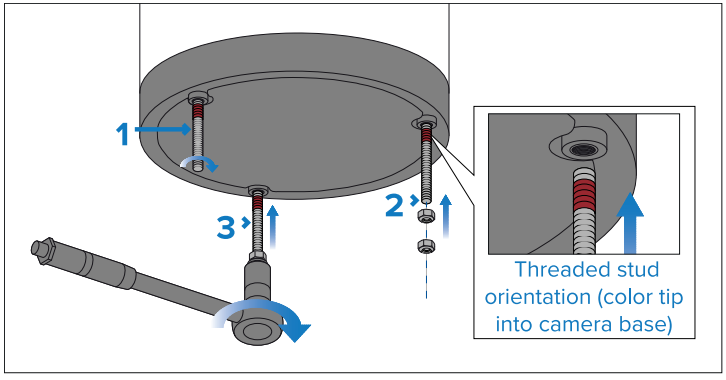
CHAPTER 8: MOUNTING

CHAPTER CONTENTS

8.1 Camera mounting

Inserting the studs into the camera base

The supplied threaded studs are provided pre-coated with threadlocker. You may need to use the supplied flat nuts to assist you in winding the studs into the camera base.



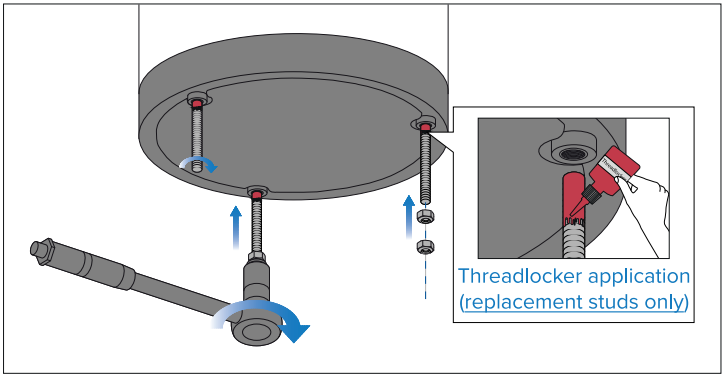
Important:
Before attempting to insert the supplied threaded studs into the camera base, ensure that the threaded studs are oriented so that the red-colored end of each stud is inserted into the camera base (as illustrated above).

1. Insert the red-colored end of the stud into the camera base by hand, with just enough turns to prevent it falling out.
2. Fit the 2 supplied flat nuts to the end of the stud, with just enough turns to secure the nuts.
3. Using an M6 socket wrench or spanner, securely grip the lower flat nut and then wind the stud fully into the camera base mounting holes.
4. Repeat steps 1 to 3 for each stud.
5. Once all 3 studs are fully inserted into the camera base, remove and discard the flat nuts.

Replacement threaded studs

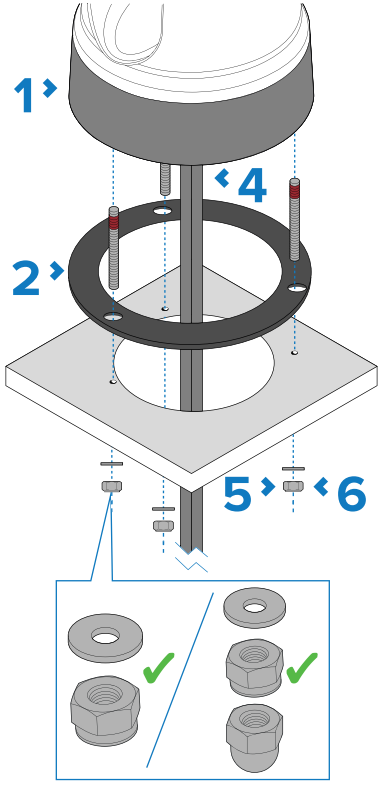
The supplied threaded studs are provided pre-coated with threadlocker. If the supplied threaded studs are not long enough to accommodate all the fixings and the thickness of the mounting surface, obtain longer replacement **marine-grade stainless steel** M6 threaded studs (e.g. 316/A4), and apply a suitable threadlocker (e.g. “Loctite 243”), to all replacement studs.

Once the replacement studs are inserted, clean any excess threadlocker from the studs and base, and then allow the threadlocker to cure for 24 hours before proceeding with the installation.

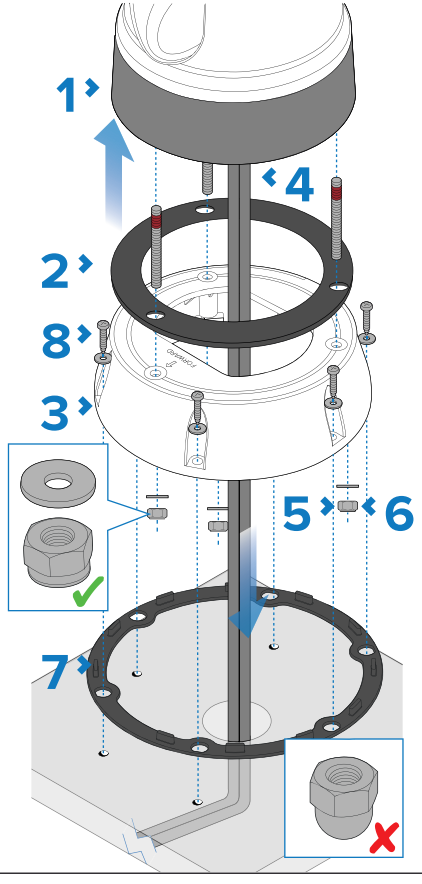


Mounting the camera ball-up

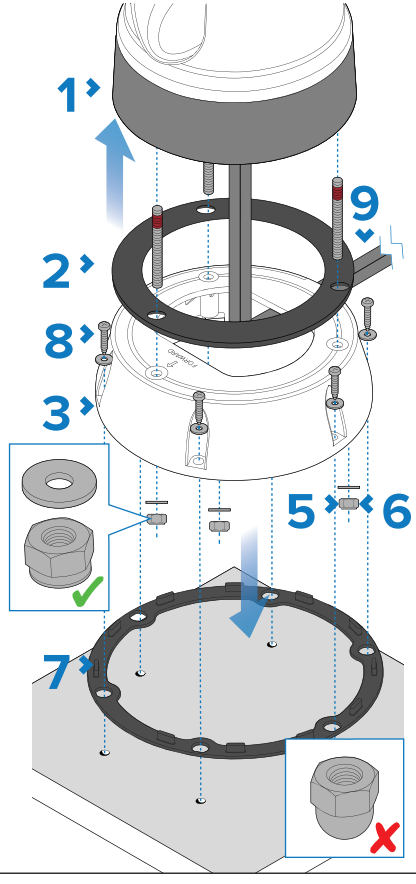
Ball-up mounting without riser



Ball-up mounting with riser (through surface cabling)



Ball-up mounting with riser (through sidewall cabling)



Use the following instructions to mount the camera unit in the "Ball-up" (upright) mounting position.

Note:
If a cutout is required in the mounting surface to accommodate the cables, ensure that the underside of the camera and any connections made are protected from potential water ingress and fouling. If this is not possible, consider mounting the camera using the supplied riser, and routing the cables through the riser sidewall. For more information, refer to:

- **p.33 — Removing the riser sidewall hatch**

Note:

- **The 2 supplied flat nuts must only be used to assist in winding the studs into the camera's base**. For more information, refer to:
  - **p.35 — Inserting the studs into the camera base**
- Ensure that the supplied threaded studs have been installed in the correct orientation, as shown in the following section:
  - **p.35 — Inserting the studs into the camera base**
- If required, you can fit the supplied dome nuts to the studs, to cover exposed ends. **Do NOT** use dome nuts with a riser.

1. Use the supplied mounting template to drill the holes for the camera base (or riser, if used), and the cables.
2. Place the camera seal on the bottom of the camera, carefully aligning the seal holes with the threaded studs.

Note:
If you are mounting the camera in the ball-down (upside down) position, do NOT fit the camera seal between camera and riser.

3. Optionally, (temporarily) secure the riser to the camera with a few hand turns of the nyloc nuts on the studs, to prevent the riser from falling while you connect the cables. Check that the camera seal remains firmly in place.

Note:
Observe the camera forward marking on the top surface of the riser. **You must ensure that the riser is mounted so that the camera is orientated properly, relative to the vessel's bow.**

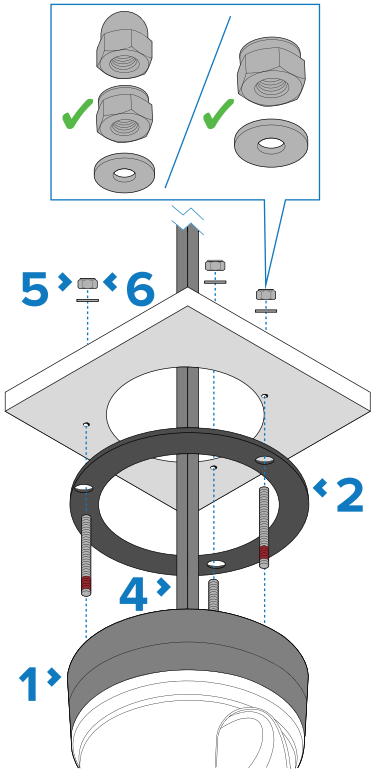
4. Connect the cables to the camera. If using the riser, either:
   - Loop the cables round within the riser base so that they can be threaded through the bottom of the riser and into the cable routing hole drilled in the mounting surface; or:
   - Loop the cables round within the riser base so that they can be threaded through the removed riser sidewall hatched area. For more information on how to remove the sidewall hatch, refer to: **p.33 — Removing the riser sidewall hatch**
5. Secure the camera assembly to the mounting surface (or riser, if used), using the supplied flat washers and nyloc nuts. Pay careful attention to the correct arrangement of the fixings, as shown in the image above.

Note:
If you are replacing an existing installed camera or have purchased an older riser, do NOT use the existing spring washers supplied with the camera or riser.

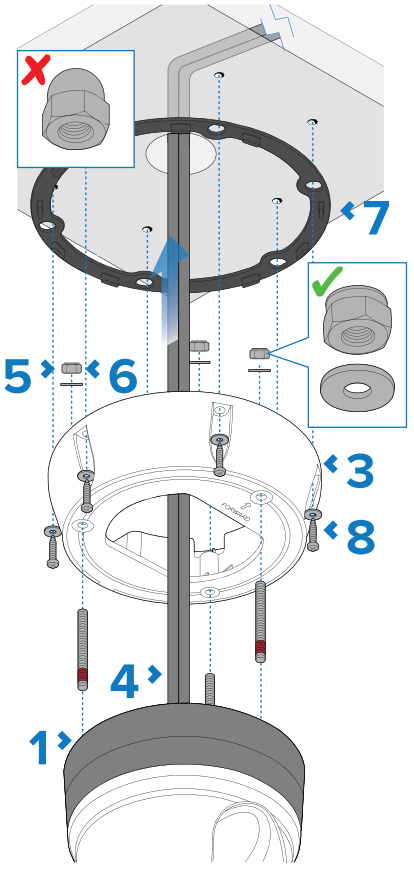
6. **Tighten the nyloc nuts to a torque of 5.0 to 6.0 N·m (3.7 to 4.4 lbf·ft).**
7. Fit the supplied riser base-seal to the riser.
8. Secure the riser to the mounting surface using the remaining supplied flat washers (rounded edges facing downward), and screws suitable for the mounting surface material and thickness. (Fixings not supplied).
9. **Tighten the screws to a torque of 3.0 to 4.0 N·m (2.2 to 3.0 lbf·ft).**
10. If the riser sidewall hatched area has been removed, apply an appropriate **marine-grade sealant** to the opening after cables have been routed, so that the area is weather-tight with no open air exposure.
11. **Add a regular check to your routine vessel maintenance schedule to ensure that weight bearing mountings, risers, and fixings remain secure and do not exhibit signs of wear or damage.**

Mounting the camera ball-down

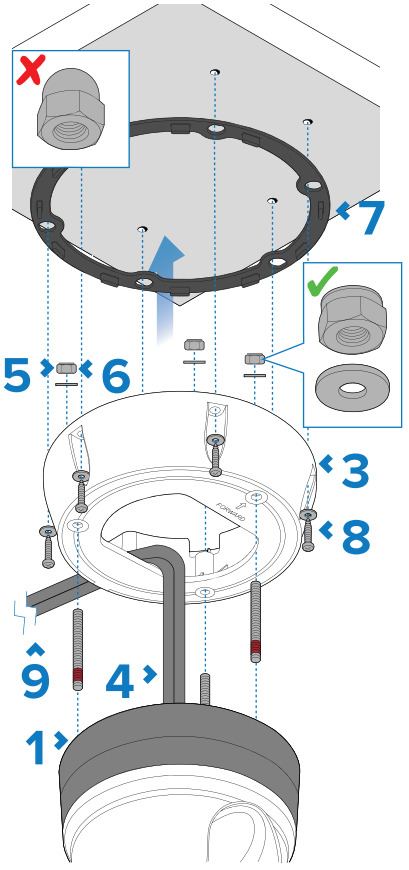
Ball-down mounting without riser



Ball-down mounting with riser (through surface cabling)



Ball-down mounting with riser (through sidewall cabling)



Use these instructions to mount the camera unit in the “Ball-down” (upside down) mounting position.

Note:
The camera should be fitted to a weather-tight, flat and stiff mounting surface, with no open air exposure. If a cutout is required in the mounting surface for the cables, ensure that the underside of the camera and any connections made are protected from potential water ingress, fouling and sun damage. If this is not possible, consider mounting the camera using the supplied riser, and routing the cables through the riser sidewall. Refer to:

- **p.33 — Removing the riser sidewall hatch**

Note:

- **The 2 supplied flat nuts must only be used to assist in winding the studs into the camera's base**. For more information, refer to:
  - **p.35 — Inserting the studs into the camera base**
- Ensure that the supplied threaded studs have been installed in the correct orientation, as shown in the following section:
  - **p.35 — Inserting the studs into the camera base**
- If required, you can fit the supplied dome nuts to the studs, to cover exposed ends. **Do NOT** use dome nuts with a riser.

1. Use the supplied mounting template to drill the holes for the camera base (or riser, if used), and the cables.
2. Place the camera seal on the bottom of the camera, carefully aligning the seal holes with the threaded studs.

Important:
If you are mounting the camera in the ball-down (upside down) position, do NOT fit the camera seal between camera and riser.

3. Optionally, (temporarily) secure the riser to the camera with a few hand turns of the nyloc nuts on the studs, to prevent the riser from falling while you connect the cables. Check that the camera seal remains firmly in place.

Note:
Observe the camera forward marking on the top surface of the riser. **You must ensure that the riser is mounted so that the camera is orientated properly, relative to the vessel's bow.**

4. Connect the cables to the camera. If using the riser, either:
   - 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; or:
   - Loop the cables round within the riser base so that they can be threaded through the removed riser sidewall hatched area. For more information on how to remove the sidewall hatch, refer to: **p.33 — Removing the riser sidewall hatch**
5. Secure the camera assembly to the mounting surface (or riser, if used), using the supplied flat washers and nyloc nuts. Pay careful attention to the correct arrangement of the fixings, as shown in the image above.

Important:
If you are replacing an existing camera installation or have purchased an older riser, do NOT use the existing spring washers supplied with the camera or riser.

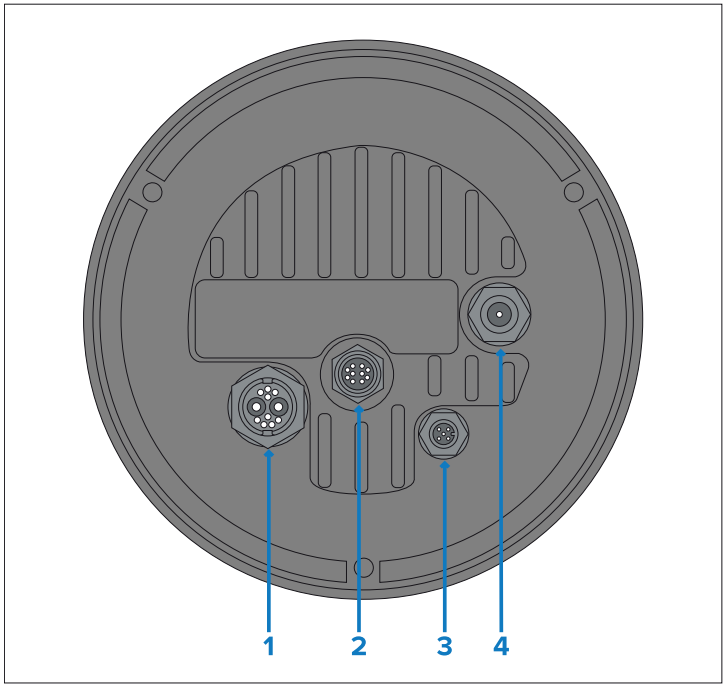
6. **Tighten the nyloc nuts to a torque of 5.0 to 6.0 N·m (3.7 to 4.4 lbf·ft).**
7. Fit the supplied riser base-seal to the riser.
8. Secure the riser to the mounting surface using the remaining supplied flat washers (rounded edges facing downward), and screws suitable for the mounting surface material and thickness. (Fixings not supplied).
9. **Tighten the screws to a torque of 3.0 to 4.0 N·m (2.2 to 3.0 lbf·ft).**
10. If the riser sidewall hatched area has been removed, apply an appropriate **marine-grade sealant** to the opening after cables have been routed, so that the area is weather-tight with no open air exposure.
11. **Add a regular check to your routine vessel maintenance schedule to ensure that weight bearing mountings, risers, and fixings remain secure and do not exhibit signs of wear or damage.**

CHAPTER 9: CONNECTIONS OVERVIEW

CHAPTER CONTENTS

9.1 Connections overview

Physical connectors available on the camera, and suitable connections and cables.



Connector	Suitable cables
1) Power / NMEA 0183 / Composite video Connects to: • 12 / 24 V dc power supply • NMEA 0183 in / out • Composite video (on female BNC connector)	• Right-angled power supply cable (supplied)
2) RayNet (Ethernet) Connects to: • RayNet (Ethernet) network device	• RayNet (Ethernet) to RJ45 adapter cable (supplied) • Right-angled RayNet (Ethernet) to RayNet (Ethernet) cable (supplied)
3) DeviceNet **This connection is not currently supported.**	Not applicable — this connection is not currently supported.
4) HD-SDI Connects to: • HD-SDI digital video device. Alternatively, the camera can be connected to an HDMI device via suitable converter and adapter cables, available separately from third-party retailers.	• HD-SDI video cable (supplied), terminated in BNC connectors.

For more information on available cables refer to
p.108 — Spares and Accessories

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:
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 3 threaded studs to the base. 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.

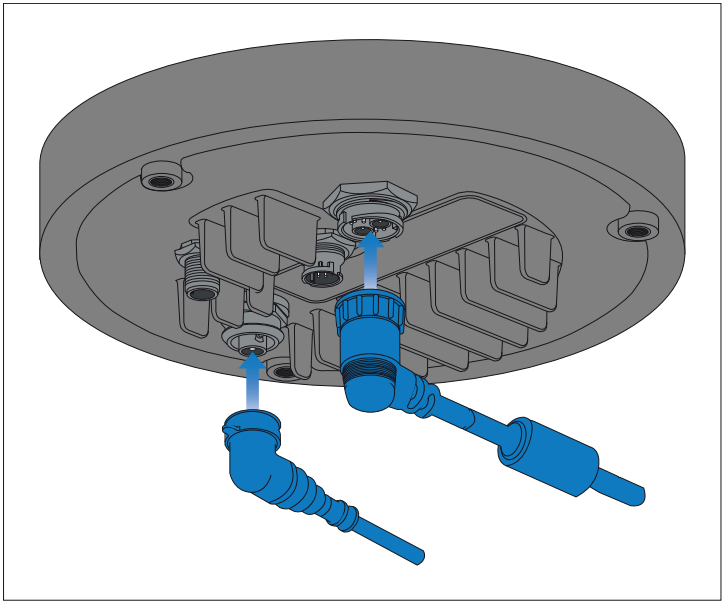
Connecting cables

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. Engage any locking mechanism to ensure a secure connection (e.g.: turn locking collars clockwise until tight, or in the locked position).
5. Ensure any bare ended wire connections are suitably insulated to prevent shorting and corrosion due to water ingress.

Orientation of right-angled cable connectors

When making cable connections, ensure that you orient the connectors correctly with respect to the thermal camera base.



9.2 General cabling guidance

Cable types and length

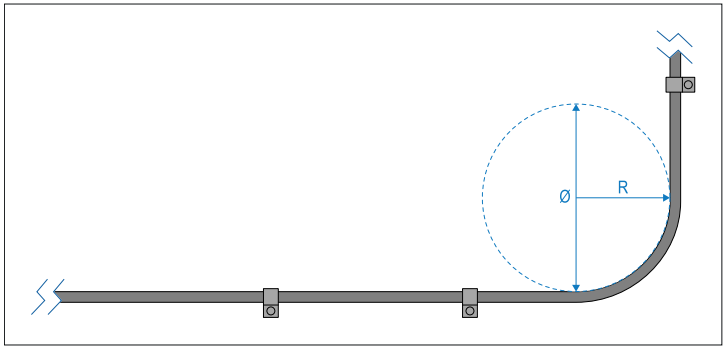
It is important to use cables of the appropriate type and length.

- 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.

Cable routing and bend radius

To maximize cable performance and lifespan, it's important to ensure that all cables are routed correctly and adequate space is provided to allow for each cable's minimum bend radius.

Minimum cable bend radius



Do NOT bend cables excessively. Wherever possible, ensure that your chosen product installation location allows enough clearance for the minimum cable bend diameter specified in the following table:

	Description	Value
Ø	Cable minimum bend **diameter**.	200 mm (7.87 in.)
R	Cable minimum bend **radius**.	100 mm (3.94 in.)

Note:
For products where multiple different cable types are connected, each with a different minimum cable bend radius, the higher figure is provided in the table above (i.e. the cable with the greatest minimum bend radius is specified).

Cable routing — best practices

- 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 cable clips or cable ties. Coil any excess cable and tie it out of the way.
- Where a cable passes through an exposed bulkhead or deckhead, use a suitable watertight feed-through (conduit).
- 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.
  - Antennas.

Strain relief

Use adequate strain relief for cabling to ensure that connectors are protected from strain and 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 PCs, processors, displays and other sensitive electronic instruments or devices.
- If using Weather FAX audio cables, always use an isolating transformer.
- If using a third-party audio amplifier, always use an isolated power supply.
- If using an RS232/NMEA converter, always ensure optical isolation on the signal lines.
- Always ensure that PCs or other sensitive electronic devices have a dedicated power circuit.

Cable shielding

Ensure that cable shielding is not damaged during installation and that all cables are properly shielded.

Important:
Be aware that some **third-party** cables and adaptors (for example, certain Ethernet cables using RJ45 connectors) are not always shielded. To prevent breaks in cable shielding continuity and potential grounding issues, special attention is required to ensure that any cables, extension cables, adaptors, or other signal-coupling devices (such as multi-way connectors, junction boxes, terminal blocks etc.) used in cable runs **maintain all shield connections throughout the cable run**.

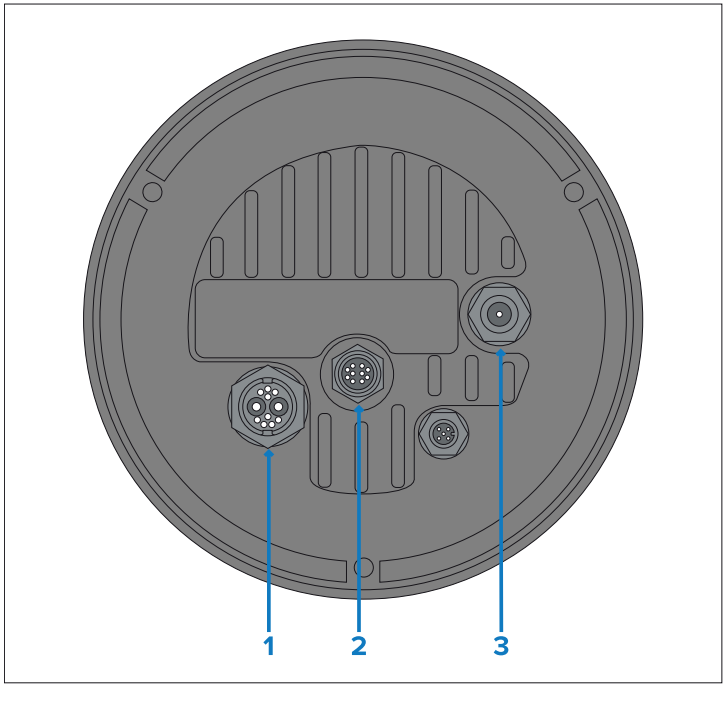
CHAPTER 10: VIDEO CONNECTIONS

CHAPTER CONTENTS

10.1 Video connections

The camera supports multiple video formats, and is capable of providing different video feeds to multiple devices, simultaneously.

Furthermore, with the dual payload camera variants you can use a **combination** of different video connection methods to display both thermal and visible-light video feeds **simultaneously**.
For example, you can view the thermal video feed via a display connected to the camera's HD-SDI connector, and the visible-light video feed at the same time, via a display connected to the camera's RayNet (Ethernet) connector.
The different camera video output methods are described below:



Connector	Video format
1) Composite video BNC connector on camera's power cable	Analog PAL / NTSC composite video — on dual-payload cameras, this video feed is user-selectable between visible-light and thermal.
2) RayNet (Ethernet) **Primary** digital IP video streams: • For single payload cameras, one primary thermal or visible-light video feed is available at full HD resolution (1920 x 1080). • For dual payload cameras, 2 primary thermal and / or visible-light video feeds are available at full HD resolution (1920 x 1080).	**Supported codecs:** • **H.264-encoded digital video stream** — offers an improved camera video feed quality compared to MJPEG, and is streamed to an ONVIF (Profile S)-compatible IP video-capable device. • **MJPEG-encoded digital video stream** — offers a lower-latency feed compared to H.264, and is streamed to a Web browser on a PC / laptop / tablet. **Supported resolutions:** • 1920 x 1080 • 1280 x 720 • 960 x 540 • 854 x 480 • 640 x 360 **Supported protocols:** ONVIF (Profile S) or RTSP

Connector	Video format
2) RayNet (Ethernet) **Secondary** digital IP video streams: Secondary streams are available in addition to, and at the same time as, primary streams. Depending on your chosen camera model, secondary streams can be any combination of thermal and / or visible-light video feeds. • For single payload cameras, one secondary thermal or visible-light video feed is available at a 1280 x 720 resolution. • For dual payload cameras, 2 secondary thermal and / or visible-light video feeds are available at a 1280 x 720 resolution in addition to, and at the same time as the 2 primary video feeds.	**Supported codecs:** • **H.264-encoded digital video stream** — this is streamed to an ONVIF (Profile S)-compatible IP video-capable device. • **MJPEG-encoded digital video stream** — this is streamed to a Web browser on a PC / laptop / tablet. **Supported resolutions:** • 1280 x 720 • 960 x 540 • 854 x 480 • 640 x 360 **Supported protocols:** • ONVIF (Profile S) • RTSP
3) HD-SDI	Digital video, SDI format, HD-SDI (SMPTE-292M).

Important:
When streaming digital IP video to multiple devices via the RayNet (Ethernet) connector and a network switch, it may be necessary to set the *[Enable Multicast]* option to "Yes", in the *Camera Settings* menu. Multicasting is very effective at optimizing bandwidth in systems where multiple users on the same network require access to the same live IP video stream. The default setting for the camera is "No" (i.e. only Unicast video streams), which means that the stream can only be received by a limited number of IP devices (typically less than 3). For more information, refer to:

• **p.53 — Multicasting**

Note:
It is also possible to connect to an HDMI-capable display or device, via a suitable third-party HD-SDI to HDMI converter.

• The MD-HX HDMI / (3G/HD/SD)-SDI Cross Converter is not suitable for use, due to unreliable performance.

Contact your dealer or retailer for suitable devices and cables.

Note:
ONVIF profiles help you to determine which IP digital video devices are compatible with one another. For more information on ONVIF profiles, refer to:

• www.onvif.org/profiles

10.2 Video and network cables

A range of cables is suppled with the camera to cover typical connection scenarios. You may need to purchase additional cables to complete your installation.

Connector	Suitable cables
Composite video BNC connector on camera's power cable	Use the supplied BNC-to-BNC video cable (3 m (9.8 ft.)), if not using otherwise for the HD-SDI connection. Alternatively, obtain a 75-ohm coax video cable terminated in BNC connectors at both ends. (The BNC connector on the camera's power cable is a female connector.)
RayNet (Ethernet)	**To connect to a device with an RJ45 socket**: Use the supplied RayNet (Ethernet) to RJ45 adapter cable (100 mm (3.9 in)). Longer adapter cables are available separately.
HD-SDI	Use the supplied BNC-to-BNC video cable (3 m (9.8 ft.)). If a longer cable is required, obtain a 75-ohm coax video cable terminated in BNC connectors at both ends. (The BNC connector on the camera is a female connector.)

Note:
It is also possible to connect to an HDMI-capable display or other video device, via a suitable third-party HD-SDI to HDMI converter. Contact your dealer or retailer for suitable devices and cables.

10.3 HD-SDI cable connection

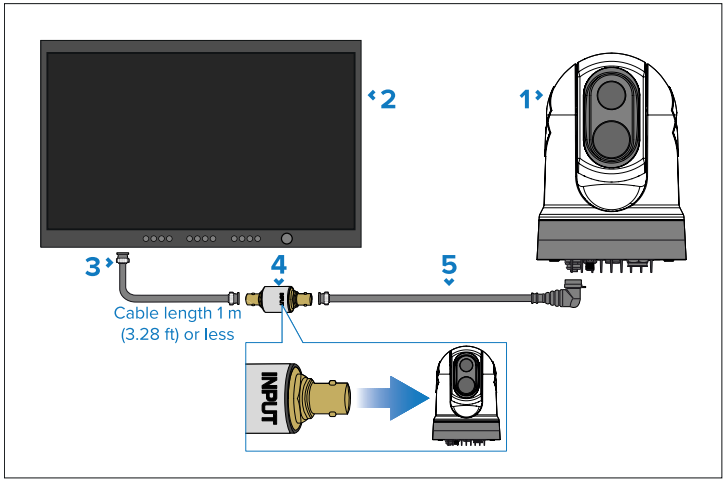
When making the HD-SDI connection to the camera using the supplied cable, ensure that the rubber shroud surrounding the cable connector is secured with cable ties (not supplied), once fitted to the connector. Fit one tie to the shroud at the point where the cable enters the bottom of the shroud, and another tie around the shroud where it covers the connector itself.

10.4 HD-SDI isolation transformer

When connecting the camera via HD-SDI, to prevent potential grounding issues, an HD video isolation transformer should be fitted to the HD-SDI cable within 1 m (3.28 ft) of the display or video converter, ensuring that the **camera** is connected to the end of the isolation transformer labelled **input**.

A suitable isolation transformer is available as an optional accessory, part number: 4142057.

Important:
Failure to install an inline HD video isolation transformer following this guideline may invalidate the camera's warranty.



Note:
The HD-SDI video cable connected between the HD video isolation transformer and your digital video (HD-SDI) monitor or video converter must be maximum 1 m (3.28 ft) in length.

	Description
1	M300 Series camera.
2	Digital video (HD-SDI) monitor, available separately from third-party retailers.
3	HD-SDI video cable (BNC connectors) (1 m / 3.28 ft or less), available separately from third-party retailers — **connected to the digital video (HD-SDI) monitor**.
4	HD video isolation transformer, available separately (part number: 4142057).
5	HD-SDI video cable (BNC connectors) (3 m / 9.8 ft.), supplied with camera — **connected to the M300 Series camera**.

Note:
If you wish to extend the length of a video cable connected to your product, refer to:

• **p.108 — Spares and accessories**

CHAPTER 11: NMEA 0183 CONNECTION

CHAPTER CONTENTS

11.1 NMEA 0183 overview

The NMEA interface allows the camera to communicate with radar, GPS, or other third-party devices using the National Marine Electronics Association (NMEA) 0183 protocol. NMEA 0183 (or NMEA for short) is a combined electrical and data specification for communication between marine electronic devices.

For information on how to connect NMEA 0183 devices to the camera, refer to: **p.51 —** NMEA 0183 connection

For additional information regarding the NMEA 0183 protocol, refer to: https://www.nmea.org

When it receives valid NMEA 0183 sentences from connected NMEA 0183 devices, the camera can automatically point itself towards vessels and other objects in its field of view, and track their movement. The camera can receive 3 types of NMEA messages:

- **Radar Cursor Tracking**, which is implemented using the NMEA *Radar System Data* (**RSD**) sentence.
- **Slew to Waypoint**, which uses the NMEA *Bearing and Distance to Waypoint, Great Circle* (**BWC**) sentence.
- **Radar Tracking**, which uses the NMEA *Tracked Target Message* (**TTM**) sentence.

Note:
All 3 (or any combination) of these NMEA messages can be enabled via the camera's NMEA interface. When more than one type is enabled, the system processes **RSD** first, then **BWC**, and finally **TTM**. For example, if the unit is listening to **BWC** or **TTM** messages and looking at a particular target and it receives an **RSD** message, it waits until the end of the dwell time and then moves on to the **RSD** message, ignoring all other input.

Note:
Even though you can only enable up to 3 types of messages via the camera's NMEA interface, the camera uses additional messages to perform the calculations needed to respond to these 3 message types. If your camera is not responding as expected, verify that the NMEA device sending messages is sending the following additional message types to your system:

- **HDT** (*Heading — True*)
- **GGA** (*Global Positioning System Fix Data*)
- **VHW** (*Water Speed and Heading*)
- **OSD** (*Own Ship Data*)
- **TLL** (*Target Latitude and Longitude*)

Important:
In order for the NMEA features to work correctly, the camera's altitude above the waterline must be specified using the camera's Web interface. Enter the altitude by accessing the Web interface and selecting the *[Georeference]* tab.

11.2 NMEA 0183 connection

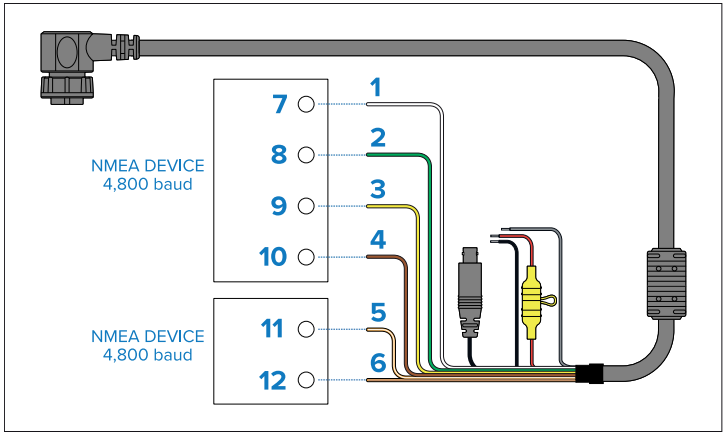
NMEA 0183 devices can be connected to your camera using the supplied Power / Video / NMEA 0183 cable. The camera has the following NMEA 0183 ports:

- **Port 1**: Input and output: 4,800 baud rate only.
- **Port 2**: Input only: 4,800 baud rate only.

Note:

• For Port 1, both the input and output communicate at the same baud rate. For example, if you have one NMEA 0183 device connected to the camera's Port 1 INPUT, and another device connected to the camera's Port 1 OUTPUT, both devices must use the same baud rate.

Up to 4 devices can be connected to the camera's NMEA **output**; up to 2 devices to the camera's NMEA **inputs**:



	Device	Cable color	Port	Input / output	(+) / (-)
1	Camera	White	1	Input	Positive (+)
2		Green	1	Input	Negative (-)
3		Yellow	1	Output	Positive (+)
4		Brown	1	Output	Negative (-)
5		Orange / White	2	Input	Positive (+)
6		Orange / Green	2	Input	Negative (-)
7	NMEA device	*	*	Output	Positive (+)
8		*	*	Output	Negative (-)
9		*	*	Input	Positive (+)
10		*	*	Input	Negative (-)
11	NMEA device	*	*	Output	Positive (+)
12		*	*	Output	Negative (-)

Note:
* For connection details, refer to the instructions provided with your NMEA 0183 device.

11.3 Enabling NMEA features

For more information on how to enable the various NMEA features (such as radar integration, for example), refer to:
p.95 — NMEA radar tracking

CHAPTER 12: NETWORK CONNECTIONS

CHAPTER CONTENTS

12.1 Network connections

Your camera has a single RayNet (Ethernet) network connector. This connects the camera to your vessel's wider IP network, such as to an existing Ethernet network.

The specific details of the network connections between the camera, video display (Web browser, video monitor, or compatible multifunction display (MFD) / chartplotter), Joystick Control Unit (for example, a JCU-4) and the rest of your installation will depend on:

- How you want to control the camera (for example, using a Web browser, an MFD / chartplotter with an ONVIF-compatible video application, a JCU controller, or a combination of these).
- How you want to view the camera's IP video feed (for example, via a laptop / PC, a compatible MFD / chartplotter, or a combination of these).
- The equipment already installed on your vessel (for example, network switches with free ports, 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.

Important:
If you are powering a JCU via the separately-available PoE Injector (2nd Generation; 5 Gbit) (A80811), do NOT connect the power input labelled "*VIN1+*" on the PoE Injector.

Note:
Power connections are not shown throughout each of the following illustrations. For power connection information, refer to the instructions which accompany each device.

Note:
An Ethernet network switch is only required in the provided example scenarios when the camera needs to be connected to more than one Ethernet device. For a high speed connection, ensure that equipment is connected to your network switch via an available Gigabit (GBit)-speed port.

Multicasting

Multicasting is a method of transmitting a stream of data (e.g. an IP video feed) from a single source (e.g. thermal camera) to multiple destinations (e.g. video displays) on a network, eliminating the need for the stream to be transmitted individually from the source to each destination device.

Multicasting is effective at optimizing bandwidth in systems where multiple users on the same network require access to the same live IP video stream. With multicasting, the network bandwidth remains the same between the camera and the core of the network, even as the number of destination devices increases. This reduces the traffic strain on network infrastructure, and makes it easier to plan and manage predictable bandwidth requirements.

However, multicasting is not suitable for all systems, and there are a number of important considerations to make before implementing multicasting in your network:

- Multicasting is often only required in large systems featuring multiple receivers of the IP video stream(s). For smaller networks consisting of up to 2 or 3 displays receiving the IP video stream, unicast may be the preferred option, due to the added complexity of configuring and managing multicast networks.
- Multicasting is only possible when ALL network devices receiving the multicast stream (switches, routers, displays, etc) are also multicast compatible and enabled. Refer to the documentation which accompanies your network devices for multicast compatibility information and additional configuration instructions.
- When using multicasting, your network must be capable of managing multiple transmission methods within the same network (i.e. multicast and unicast). This is because IP video sources may not always transmit identically, and certain devices in a network may not necessarily support multicasting.

Enabling multicasting

In order to enable the *[multicast]* setting, you must first setup and log in to the Web browser user interface, by following the instructions found in the following section:

- **p.75 — Camera operation via Web browser**

With the Web browser user interface displayed:

1. Navigate to: *[Video > Enable Multicast]*.
2. Select *[Yes]*.

Power over Ethernet (PoE)

Power over Ethernet (PoE) is a system which allows both power and data to be passed along a single CAT 6 Ethernet cable.

There are 2 main types of PoE device:

- **Power Sourcing Equipment (PSE)** — this **PoE** system component provides electrical power over a CAT 6 **Ethernet** cable.
- **Powered Device (PD)** — this **PoE** system component is powered by the electrical power provided by the Power Sourcing Equipment (PSE).

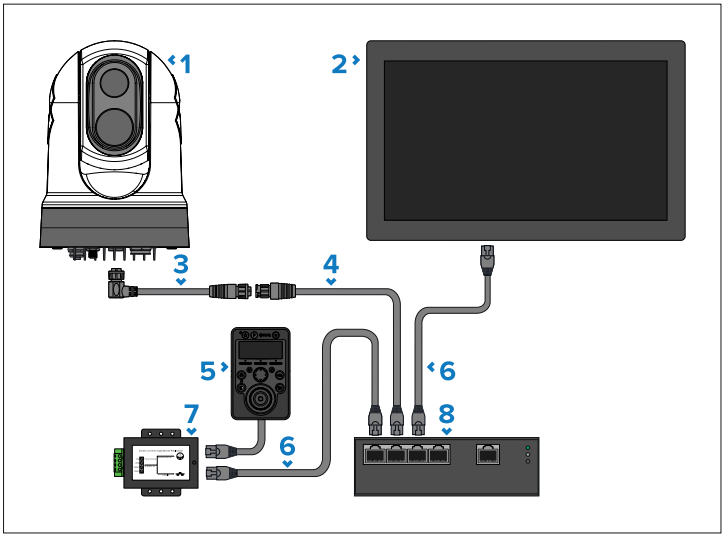
Warning: PoE isolation coupler

Some networks require an inline Power over Ethernet (PoE) isolation coupler to be fitted before the camera can be connected to the network.

The inline PoE isolation coupler may be required regardless of whether a network device (e.g. an MFD / chartplotter, or network switch) outputs PoE or not.

Before connecting the camera to a network, refer to your network device manufacturer for more information.

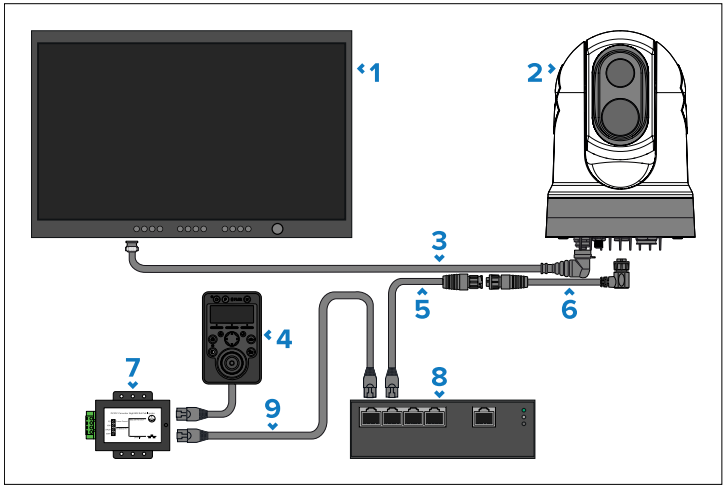
Single-camera system with a compatible MFD / chartplotter and JCU



	Description
1	Camera
2	Compatible MFD / chartplotter, available separately
3	Right-angled RayNet (Ethernet) to RayNet (Ethernet) cable (3 m (9.8 ft.)), 1x supplied with camera
4	RayNet (Ethernet) to RJ45 adapter cable (100 mm (3.9 in)), 1x supplied with camera
5	Joystick Control Unit (JCU-4 currently illustrated), available separately
6	RJ45 to RJ45 Ethernet cable, available separately
7	PSE (Power Sourcing Equipment) — e.g. a PoE Injector or PoE network switch) providing PoE (Power over Ethernet) to the JCU-4, available separately
8	Ethernet network switch, available separately

Single-camera system with a digital video (HD-SDI) monitor and JCU

For this system, a device running a Web browser is not required. The camera's video feed is routed through the camera's HD-SDI video connection to a digital video monitor. Camera control is provided by a JCU (available separately).



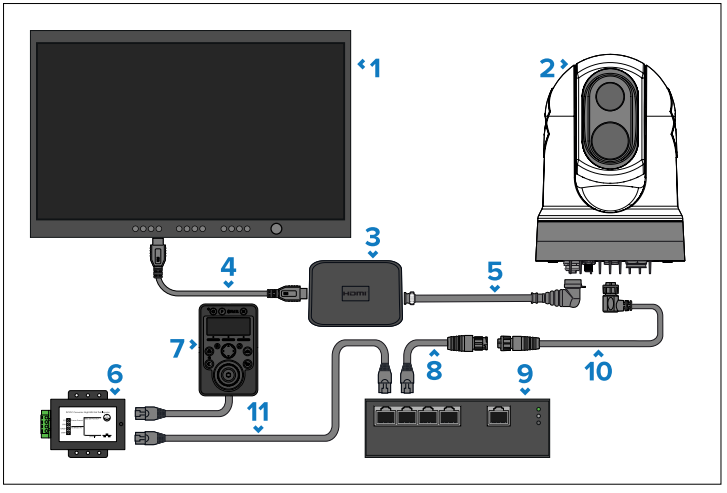
Important:
It is recommended that an HD video isolation transformer is fitted to camera HD-SDI connections. *Failure to install an inline HD video isolation transformer may invalidate the camera's warranty.* For more information, refer to:

• **p.48 — HD-SDI isolation transformer requirement**

	Description
1	Digital video (HD-SDI) monitor, available separately from third-party retailers
2	M300-Series camera
3	HD-SDI video cable (BNC connectors) (3 m / 9.8 ft.), supplied with camera
4	Joystick Control Unit (JCU-4 currently illustrated), available separately
5	RayNet (Ethernet) to RJ45 adapter cable (100 mm (3.9 in)), supplied with camera
6	Right-angled RayNet (Ethernet) to RayNet (Ethernet) cable 3 m (9.8 ft.), supplied with camera
7	PSE (Power Sourcing Equipment — e.g. a PoE Injector or PoE network switch) providing PoE (Power over Ethernet) to the JCU-4, available separately
8	Ethernet network switch, available separately from third-party retailers
9	RJ45 to RJ45 cable, available separately

Single-camera system with a digital video (HDMI) monitor and JCU

For this system, a device running a Web browser is not required. The camera's video feed is routed through the camera's HD-SDI video connector via a third-party HD-SDI to HDMI video converter (not supplied) to a digital video monitor. Camera control is provided by a JCU (available separately).



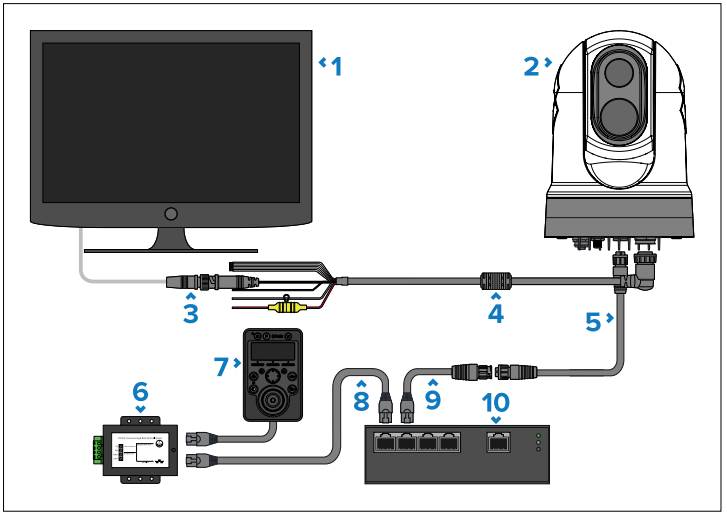
Important:
It is recommended that an HD video isolation transformer is fitted to camera HD-SDI connections. *Failure to install an inline HD video isolation transformer may invalidate the camera's warranty.* For more information, refer to:

• **p.48 — HD-SDI isolation transformer requirement**

	Description
1	Digital video (HDMI) monitor, available separately from third-party retailers
2	M300-Series camera
3	HD-SDI to HDMI video converter, available separately from third-party retailers
4	HDMI video cable, available separately from third-party retailers
5	HD-SDI video cable (BNC connectors) (3 m / 9.8 ft.), 1x supplied with camera
6	PSE (Power Sourcing Equipment — e.g. a PoE Injector or PoE network switch) providing PoE (Power over Ethernet) to the JCU-4, available separately
7	Joystick Control Unit (JCU-4 currently illustrated), available separately
8	RayNet (Ethernet) to RJ45 adapter cable (100 mm (3.9 in)), 1x supplied with camera
9	Ethernet network switch, available separately
10	Right angled RayNet (Ethernet) to RayNet (Ethernet) cable (3 m (9.8 ft.)), 1x supplied with camera
11	RJ45 to RJ45 Ethernet cable, available separately

Single-camera system with an analog video monitor and JCU

For this system, a device running a Web browser is not required. The camera's video feed is routed through the power cable's composite analog video connection to an analog video monitor. Camera control is provided by a Joystick Control Unit (JCU), available separately.

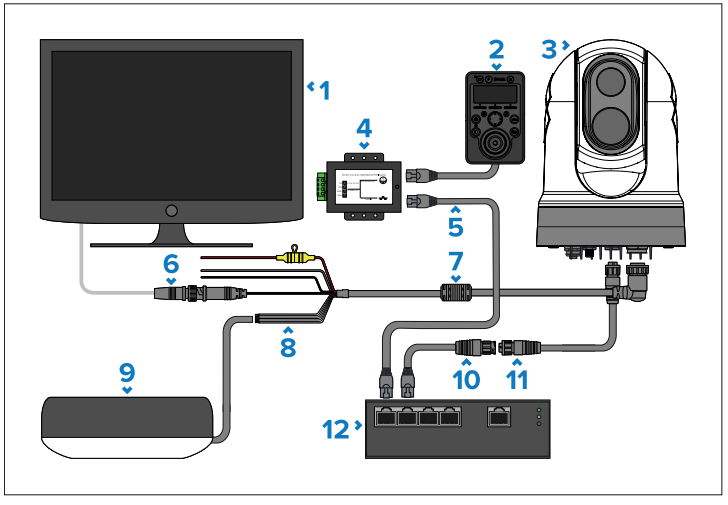


	Description
1	Analog video monitor, available separately from third-party retailers
2	M300-Series camera
3	BNC to BNC video cable, available separately. If you are not using the supplied BNC cable (3 m / 9.8 ft.) for the HD-SDI connection, you can use it for this composite analog connection. Otherwise, obtain a suitable cable, separately from third-party retailers.
4	Camera's power cable (3 m / 9.8 ft.), 1x supplied with camera
5	RayNet (Ethernet) to RayNet (Ethernet) cable, available separately

	Description
6	PSE (Power Sourcing Equipment — e.g. a PoE Injector or PoE network switch) providing PoE (Power over Ethernet) to the JCU-4, available separately
7	Joystick Control Unit (JCU-4 currently illustrated), available separately
8	RJ45 to RJ45 Ethernet cable, available separately
9	RayNet (Ethernet) to RJ45 adapter cable (100 mm (3.9 in)), 1x supplied with camera
10	Ethernet network switch, available separately

Single-camera system connected to a third-party radar with an analog video monitor and JCU

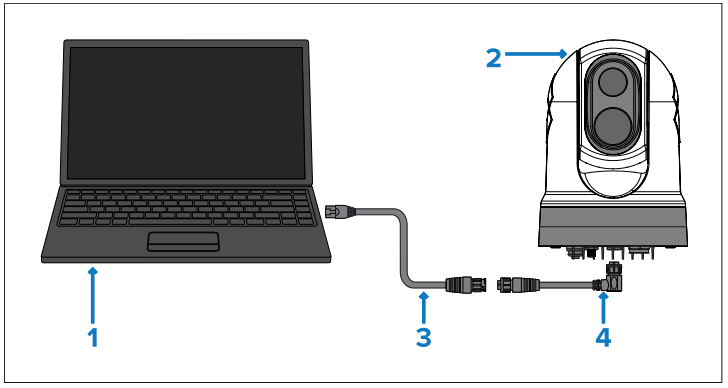
For this system, a device running a Web browser is not required. The camera's video feed is routed through the power cable's composite analog video connection to an analog video monitor. Camera control is provided by a Joystick Control Unit (JCU), available separately.



	Description
1	Analog video monitor, available separately from third-party retailers
2	Joystick Control Unit (JCU-4 currently illustrated), available separately
3	M300-Series camera
4	PSE (Power Sourcing Equipment — e.g. a PoE Injector or PoE network switch) providing PoE (Power over Ethernet) to the JCU-4, available separately
5	RJ45 to RJ45 Ethernet cable, available separately
6	BNC to BNC video cable, available separately. If you are not using the supplied BNC cable (3 m / 9.8 ft.) for the HD-SDI connection, you can use it for this composite analog connection. Otherwise, obtain a suitable cable, separately from third-party retailers.
7	Camera's power cable (3 m / 9.8 ft.), 1x supplied with camera
8	NMEA 0183 connection. For information on how to connect NMEA 0183 devices to the camera, refer to: **p.51 — NMEA 0183 connection**
9	Third-party Radar scanner, available separately from third-party retailers
10	RayNet (Ethernet) to RJ45 adapter cable (100 mm (3.9 in)), 1x supplied with camera
11	RayNet (Ethernet) to RayNet (Ethernet) cable, available separately
12	Ethernet network switch, available separately

Single-camera system with direct connection to a Web browser

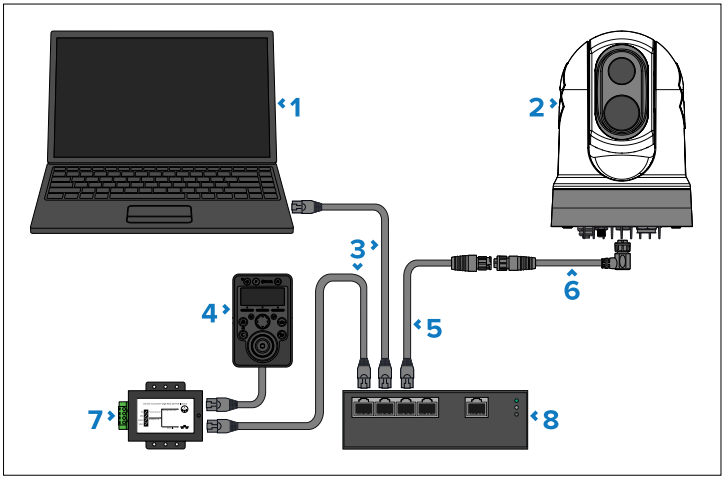
The network connection scenario illustrated below is primarily intended for configuration and diagnostic purposes.



	Description
1	Laptop (or another Ethernet-connected device running a Web browser), available separately from third-party retailers
2	Camera
3	RayNet (Ethernet) to RJ45 adapter cable (100 mm (3.9 in)), 1x supplied with camera
4	Right angled RayNet (Ethernet) to RayNet (Ethernet) cable (3 m (9.8 ft.)), 1x supplied with camera

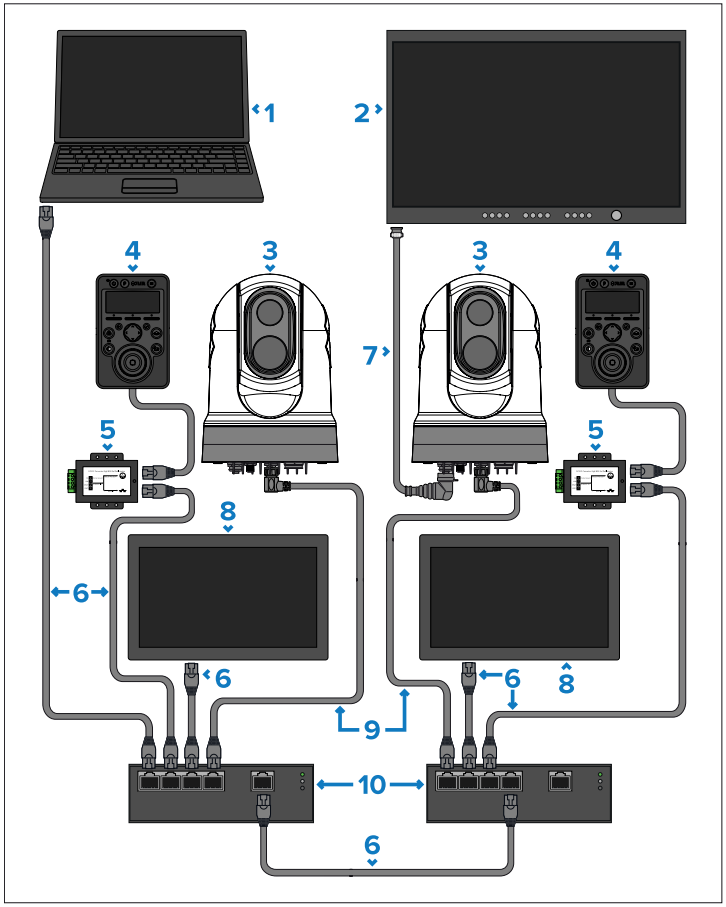
Single-camera system with a Web browser and an optional JCU

The network connection scenario illustrated below is primarily intended for configuration and diagnostic purposes.



	Description
1	Laptop (or another Ethernet-connected device running a Web browser), available separately from third-party retailers
2	Camera
3	RJ45 to RJ45 Ethernet cable, available separately
4	Joystick Control Unit (JCU-4 currently illustrated), available separately
5	RayNet (Ethernet) to RJ45 adapter cable (100 mm (3.9 in)), 1x supplied with camera
6	Right angled RayNet (Ethernet) to RayNet (Ethernet) cable (3 m (9.8 ft.)), 1x supplied with camera
7	PSE (Power Sourcing Equipment — e.g. a PoE Injector or PoE network switch) providing PoE (Power over Ethernet) to the JCU-4, available separately
8	Ethernet network switch, available separately

Multi-camera system with a digital video monitor, 2 compatible MFDs, 2 JCUs, and a Web browser



Important:
It is recommended that an HD video isolation transformer is fitted to camera HD-SDI connections. *Failure to install an inline HD video isolation transformer may invalidate the camera's warranty.* For more information, refer to:

- **p.48 — HD-SDI isolation transformer requirement**

	Description
1	Laptop (or another Ethernet-connected device running a Web browser), available separately from third-party retailers
2	Digital video monitor, available separately from third-party retailers
3	Camera
4	Joystick Control Unit (JCU-4 currently illustrated), available separately
5	PSE (Power Sourcing Equipment — e.g. a PoE Injector or PoE network switch) providing PoE (Power over Ethernet) to the JCU-4, available separately
6	RJ45 to RJ45 Ethernet cable, available separately
7	HD-SDI video cable (BNC connectors) (3 m / 9.8 ft.), supplied with camera
8	Compatible MFD / chartplotter, available separately
9	Right-angled RayNet (Ethernet) to RJ45 cable, available separately
10	Ethernet network switch, available separately

CHAPTER 13: POWER CONNECTIONS

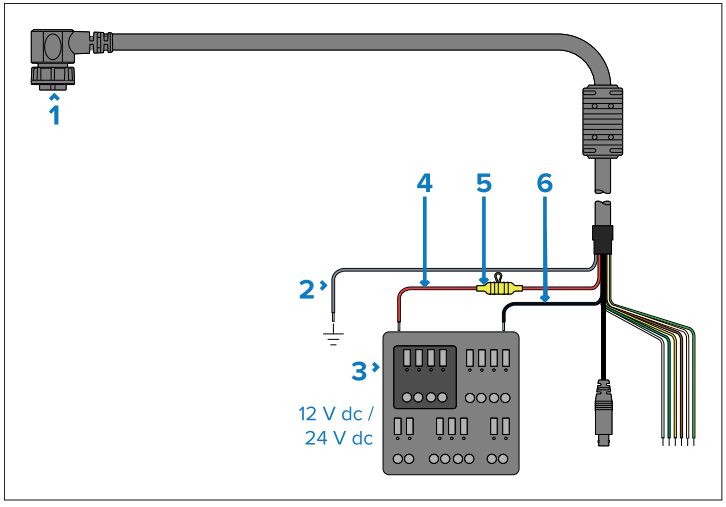
CHAPTER CONTENTS

13.1 Power connection

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

Power connection requirements

- 12 or 24 V dc nominal supply voltage.
- Isolated power supply.
- Connected via an appropriately-rated thermal breaker or fused switch (refer to *Inline fuse and thermal breaker ratings*).



	Description	Connects to:
1	Power cable	Product's power connector.
2	Drain wire (thin black wire)	Vessel's RF ground, or negative battery terminal.
3	Connection to 12 V / 24 V power supply.	Vessel's power supply.
4	Red cable (positive)	Power supply's positive terminal
5	Inline fuse	Waterproof fuse holder containing a suitably-rated inline fuse (refer to *Inline fuse and thermal breaker ratings*).
6	Black cable (thick black wire) (negative)	Power supply's negative terminal

Inline fuse and thermal breaker ratings

The following inline fuse and thermal breaker ratings apply to your product:

Inline fuse rating	Thermal breaker rating
15A slow blow	15A (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 dealer.
- Your product's power cable may be supplied with a fitted inline fuse (depending on product variant). If not, you must add an inline fuse (rated as stated above) to the positive wire of your product's power connection.

Power distribution

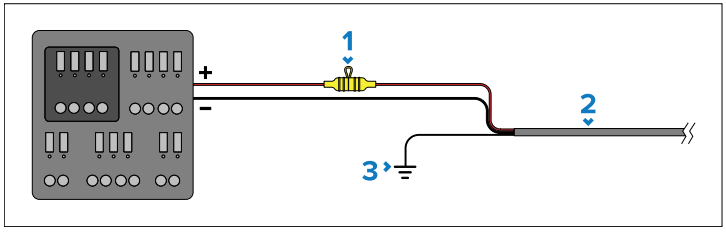
Recommendations and best practice for the power connection of products supplied with a drain wire as part of the supplied power cable.

- The product is supplied with a power cable, either as a separate item or a captive cable permanently attached to the product. 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:

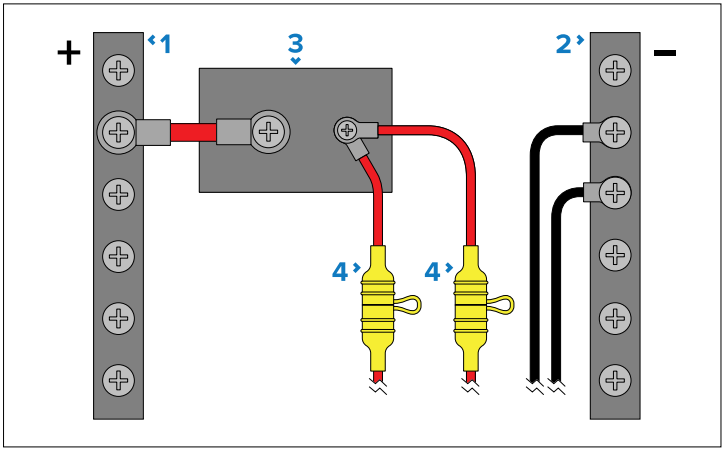
- When planning and wiring, take into consideration other products in your system, some of which (e.g. sonar modules) may place large power demand peaks on the vessel's electrical system, which may impact the voltage available to other products during the peaks.
- The information provided below is for 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 dealer or a suitably qualified professional marine electrician.

Implementation — connection to distribution panel (Recommended)



	Description
1	Waterproof fuse holder containing a suitably-rated inline fuse must be fitted. For suitable fuse rating, refer to: *Inline fuse and thermal breaker ratings*.
2	Product power cable.
3	Drain wire connection point.

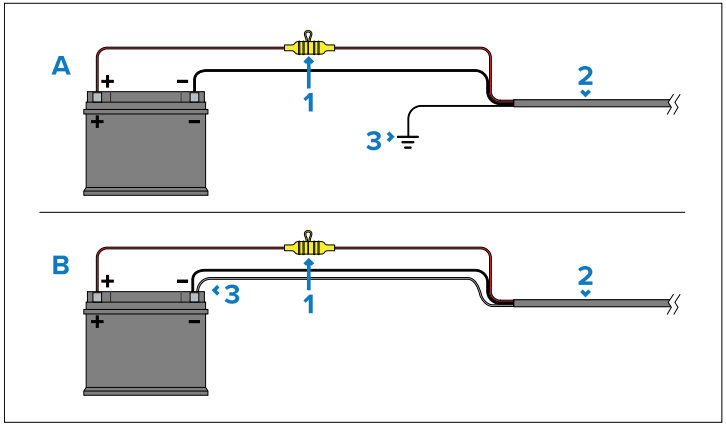
- It is recommended that the supplied power cable is connected to a suitable breaker or switch on the vessel's distribution panel or factory-fitted power distribution point.
- The distribution point should be fed from the vessel's primary power source by 8 AWG (8.36 mm^2) cable.
- Ideally, all equipment should be wired to individual suitably-rated thermal breakers or fuses, with appropriate circuit protection. Where this is not possible and more than 1 item of equipment shares a breaker, use individual inline fuses for each power circuit to provide the necessary protection.
- The power cable supplied with your product includes a drain wire, which must be connected to the vessel's common RF ground.



	Description
1	Positive (+) bar
2	Negative (-) bar
3	Circuit breaker
4	Waterproof fuse holder containing a suitably-rated inline fuse must be fitted. For suitable fuse rating, refer to: *Inline fuse and thermal breaker ratings*.

Important:
Observe the recommended fuse / breaker ratings provided in the product's documentation, however be aware that the suitable fuse / breaker rating is dependent on the number of devices being connected.

Implementation — direct connection to battery



- Where connection to a power distribution panel is not possible, the power cable supplied with your product may be connected directly to the vessel's battery, via a suitably rated fuse or breaker.
- If the power cable is NOT supplied with a fitted 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.

	Description
1	Waterproof fuse holder containing a suitably-rated inline fuse must be fitted. For suitable fuse rating, refer to: *Inline fuse and thermal breaker ratings*.
2	Product power cable.
3	Drain wire connection point.

Battery connection scenario A:
Suitable for a vessel with a common RF ground point. In this scenario, the power cable's drain wire should be connected to the vessel's common ground point.
Battery connection scenario B:
Suitable for a vessel without a common grounding point. In this case, the power cable's drain wire should be connected directly to the battery's negative terminal.

Grounding

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

More information

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

- BMEA Code of Practice for Electrical and Electronic Installations in Boats
- NMEA 0400 Installation Standard
- ISO 13297: Small craft — Electrical systems — Alternating and direct current installations
- ISO 10133: Small craft — Electrical systems — Extra-low-voltage d.c. installations
- ABYC E-11 AC & DC Electrical Systems on Boats
- ABYC A-31 Battery chargers and Inverters
- ABYC TE-4 Lightning Protection

Power cable extension (12 / 24 V systems)

If you need to extend the length of the power cable supplied with your product, ensure you observe the following advice:

- 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.
- Ensure that the extension cable is of a sufficient gauge for the supply voltage, the total current load of the device, and the length of the cable run — as the cable run length increases, the greater the voltage drop will be from one end of the power cable to the other.
- Refer to the following table for typical **minimum** power cable wire gauges:

Cable length in meters (feet)	Wire gauge in AWG (mm²) for 12 V supply	Wire gauge in AWG (mm²) for 24 V supply
<8 (<25)	16 (1.31 mm²)	18 (0.82 mm²)
16 (50)	14 (2.08 mm²)	16 (1.31 mm²)

Cable length in meters (feet)	Wire gauge in AWG (mm²) for 12 V supply	Wire gauge in AWG (mm²) for 24 V supply
24 (75)	12 (3.31 mm²)	14 (2.08 mm²)
>32 (>100)	10 (5.26 mm²)	12 (3.31 mm²)

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.

Important:
To ensure power cables (including any extension) are of a sufficient gauge, ensure that there is a continuous **minimum** voltage of **10.8 V dc** at the end of the cable where it enters the product's power connector, even with a fully flat battery at 11 V dc. (Do not assume that a flat battery is at 0 V dc. Due to the discharge profile and internal chemistry of batteries, the current drops much faster than the voltage. A "fully flat" battery still shows a positive voltage, even if it doesn't have enough current to power your device.)

Power cable drain wire connection

The power cable supplied with this product includes a dedicated drain wire for connection to a vessel's Radio Frequency (RF) ground point (if available), or the negative battery terminal.

The purpose of the drain wire is to drain excess voltage from the cable shield, giving it a path to safety. The drain wire protects the cable's inner signal conductors from electrical noise emitted by other cables and devices.

Although the drain wire is not intended to ground the product's internal circuits, it's important that the drain wire is connected to the vessel's common RF ground point, which should be used for all equipment in your system. If several items require grounding, the drain wires and dedicated ground connections (if available) of all equipment should first be connected to a single local point (e.g. within a distribution panel), and then this point connected via an appropriately-rated conductor to the vessel's RF common ground point. An RF ground point is typically a circuit with a very low-impedance signal at Radio Frequency, connected to the sea via an electrode immersed in the sea, or bonded to the inner side of the hull in an area that is underwater.

On vessels without an RF ground system, the drain wires and dedicated ground connections (if available) of all equipment should be connected directly to the vessel's negative battery terminal.

The dc power system should be either:

- Negative grounded ("bonded"), with the negative battery terminal connected to the vessel's RF ground.
- Floating, with neither battery terminal connected to the vessel's ground.

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

- for runs of <1 m (3.3 ft), use 6 mm2 (10 AWG) or greater.
- for runs of >1 m (3.3 ft), use 8 mm2 (8 AWG) or greater.

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

Warning: Positive ground systems

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

CHAPTER 14: IP ADDRESS DISCOVERY

CHAPTER CONTENTS

14.1 Camera IP address discovery

Before you can access the camera's web interface page(s), you first need to know the camera's IP address. The way in which you obtain this IP address depends on: 1) **which device** in the network is allocating the IP addresses; and 2) **how** the IP network addresses are allocated. The majority of IP networks are configured to allocate IP addresses to connected devices automatically. However, on some networks, it will be necessary to configure the camera's IP address manually.

IP address allocation methods

Method	Description
Automatic: via DHCP or link local address	The majority of networks will allocate an IP address for the camera automatically, via DHCP (*Dynamic Host Configuration Protocol*). Windows PCs also have *link local* support, which means that if a DHCP server is not found on the IP network, the camera will fallback to using a link local address, in the 169.254.x.x range. In this scenario, no further IP configuration is required, and you will be able to access the camera's web interface page by entering its IP address into the web browser's address bar. **How to find the camera's IP address:** Refer to the *How to find an IP address* section below.
Manual: via a static IP address	Networks that do NOT use DHCP or link local IP addressing require a **static IP** address to be permanently assigned to each connected device. An IP address can be assigned manually using the camera's Configuration page. However, before you can access this page and change the camera's default IP address to a static address of your choosing, you must first find out the camera's existing factory-configured IP address. **How to find the camera's IP address:** Refer to the *How to find an IP address* section below.

Note:
When setting a static IP address, be aware that some IP network policies impose IP address *octet filtering* rules, which may require the numbers in a specific octet of the address to be within a specific range. In this scenario, it may not be possible to assign a static IP address to the device if the address is not in the correct range, and it will be necessary to refer to the vessel's IP network administrator.

Note:
IP addresses are self-allocated by certain Raymarine equipment in the following range: 198.18.0.32 to 198.18.3.255 (inclusive). On networks featuring Raymarine-branded IP devices, you must avoid placing any devices in this range using manual (static) IP addresses.

How to find an IP address

There are a variety of ways for discovering a device's IP address, and the method differs depending on the platform:

On a Windows PC or laptop:

Method 1:

1. Start a command prompt by entering "*cmd*" in the Windows search bar.
2. Type: "*ipconfig /all*" in the command prompt, followed by the Enter key.
3. All connected IP devices will be listed, along with an IP address for each. Find the camera in the list.

Method 2:

1. Open Windows **File** Explorer, and click on the "*Network*" category in the sidebar on the left.
2. Find the camera via its serial number in the list of devices, and then right-click on its icon and select "*Properties*" in the .
3. The IP address will be listed in the displayed web page.

Method 3:
Use third-party IP scanning software (such as *Wireshark*) to scan the devices on your IP network. The IP address of all devices will be listed in the scan results.

On a network router:

1. Access the router's web interface page via a web browser (the router's IP address is typically *192.168.1.1* or *192.168.0.1*). It is also usually printed on the Router's product label.
2. Navigate to the "*Device List*", "*Connected Devices*", or "*DHCP Clients*" section.
3. The camera and its IP address will be listed.

On an MFD / chartplotter:

The IP address for connected devices is usually displayed on a *Diagnostics* page. Refer to the display's *Operation Instructions* document for instructions on how to access the Diagnostics page.

14.2 Setting a static IP address

In some circumstances, you may need to set a static IP address for the camera's IP-network, rather than relying on the automatic IP addresses provided by the DHCP server (the camera's default setting).

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. To configure the camera's IP network parameters manually:

1. Log into the camera's Web interface.
   For more information on logging in, refer to:
   - **p.76 — Logging in to the Web browser user interface**
2. From the Web Interface *[Homescreen]*, select *[System Settings]* from the bottom left of the screen.
3. Select *[Network]*.
4. Select the *[DNS Mode]* drop down menu and select *[Static]*.
5. Select the *[Host Name]* drop down menu and select *[Static]*.
6. Adjust the values for *[IP Address]* and *[Netmask]* as required.

Note:
Keep a record of the changes made. You will need this address to access the camera's Web interface in future.

7. At the bottom of the page, select *[Save]*.

14.3 Accessing the camera's web interface page

Once you know the camera's IP address, you can enter it into a web browser to access the camera's web interface page.

Enter the IP address directly into the web browser's address bar, and then press *Enter* on a physical keyboard, or tap *Go* (or equivalent) on an on-screen keyboard.

Depending on the camera model, you may be prompted to enter a username and password to access the interface page. For more information on how to do this, refer to:

- **p.76 —** Logging in to the Web browser user interface

CHAPTER 15: CAMERA CONTROL OPTIONS AND STATUS ICONS

CHAPTER CONTENTS

15.1 Camera control options

There are a number of different ways of controlling the camera remotely.

- **Via a compatible multifunction display (MFD) / chartplotter** — With the camera connected to the MFD / chartplotter or the MFD / chartplotter network via Ethernet, you can either use a Web browser or an ONVIF (Profile S)-compatible video / camera application (if supported by your display) to view and control the camera remotely.
- **Via a Joystick Control Unit (JCU)** — With the JCU connected to the camera via a network switch, you can use the JCU's physical controls to control the camera remotely.
- **Via a Web browser** — With the camera connected to a laptop or another Ethernet device with a Web browser, you can use the Web browser to view and control the camera remotely.

15.2 Camera image

The M300 camera outputs an IP digital video feed which can be displayed on a video monitor, a Web browser, or a compatible multifunction display (MFD) / chartplotter.

Depending on your chosen camera model, the IP digital video feed comprises of:

- A visible-light image.
- A thermal image.
- Status icons overlaid on the video image.

Thermal Camera

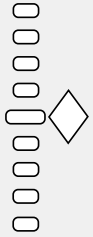
You should take time to familiarize yourself with the thermal image. This will help you to get the most out of your system:

- 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.

Camera status icons

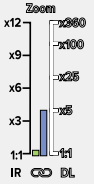
The camera image includes icons to show the current status of the camera.

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

Icon	Description
[Thermal Camera] 	Indicates that the Thermal Camera feed is being controlled by a connected JCU.
[Visible Camera] 	Indicates that the Visible-light Camera feed is being controlled by a connected JCU.
[Azimuth (Position)] 	Shows the azimuth (or direction) of the camera *relative to the vessel*. The triangle shows the approximate camera Field Of View (FOV).
[Elevation (Tilt)] 	Shows the vertical tilt of the camera. The triangle shows the approximate camera position.
[Home] 	Indicates that the camera is in the home position. The icon flashes when a new home position is set.

Icon	Description
[Lock Zoom] 	Locks the zoom factor of the camera to the active payload, whenever possible. **Dual payload camera variants only:** As the two payloads are separate imaging cores, they can each be set to a different zoom factor at the same time. E.g. thermal set to 2x zoom, visible-light set to 10x zoom. When you "lock the zoom to active", the camera attempts to synchronize the two zoom levels.
[Mirrored View] 	Indicates the camera feed is reversed with respect to the vertical axis; i.e. it will be the “mirror image” of the original default orientation. This feature is useful in situations where you have a camera pointing in the opposite direction to the direction of your vessel’s travel; i.e. it is a rear-facing camera.
[Polarity] 	Indicates a change in image polarity. For example, if you invert the polarity of a typical monochrome thermal image where white represents hot temperatures, and black represents cold temperatures, the colors will be inverted so that black represents hot temperatures, and white represents cold temperatures.
[Color Palette] 	Indicates a change in image color palette.
[NMEA] 	Indicates that the NMEA feature is enabled. For more information, refer to: **p.95 — NMEA radar tracking**

Icon	Description
[Power Down] 	This symbol is displayed to indicate that the camera is shutting down.
[Scene: Night] 	One of four scene presets (Automatic Gain Control (AGC) settings), optimized for use on the open water at night.
[Scene: Docking] 	One of four scene presets (Automatic Gain Control (AGC) settings), optimized for use when the boat is docking at night.
[Scene: Day] 	One of four scene presets (Automatic Gain Control (AGC) settings), optimized for use on the open water during the day.
[Scene: Contrast] 	One of four scene presets (Automatic Gain Control (AGC) settings), optimized for providing visibility to small moving objects.

Icon	Description
[Zoom Scale] 	Indicates the zoom factor of the active camera.

Icon	Description
[Vertical Stabilization] 	Indicates that gyro stabilization is configured to use the *[Vertical Stabilization]* setting only. Vertical stabilization is intended to minimize the effects of vessel pitch (while used in a forward or reverse facing position) and vessel roll (while used in a port or starboard facing position).
[Vertical and Horizontal Stabilization] 	Indicates that gyro stabilization is configured to use the *[Vertical and Horizontal Stabilization]* setting. Vertical stabilization is intended to minimize the effects of vessel pitch (while used in a forward or reverse facing position) and vessel roll (while used in a port or starboard facing position). * Horizontal stabilization is intended to keep the camera pointed in a fixed bearing, even as the vessel turns. For further information, refer to the '*Flir Maritime M300 Series Camera Horizontal Stabilization*' article found on the FLIR Technical Support Center website: • https://maritime-support.flir.com/s/article/FLIR-Maritime-M300-Series-Camera-Horizontal-Stabilization **Note:** • * Horizontal stabilization is not a form of target tracking. It is best used to reduce the effects of subtle bearing changes when running in a fixed direction. Whenever the vessel makes a notable course change, the camera will need to be manually adjusted to align with the new bearing. • FLIR Maritime Cameras utilize commercially available components, and as a result, both vertical and horizontal stabilization will exhibit minor levels of drift over long durations of time. Under their intended use (image stabilization for an underway vessel), the effects of this stabilization drift are insignificant.

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 polarity

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.

Set camera to Ball-Down mode

Set your camera to Ball-Down mode for Ball-Down (upside down) installations.

Note:
The following steps will affect all camera payloads (thermal and visible-light).

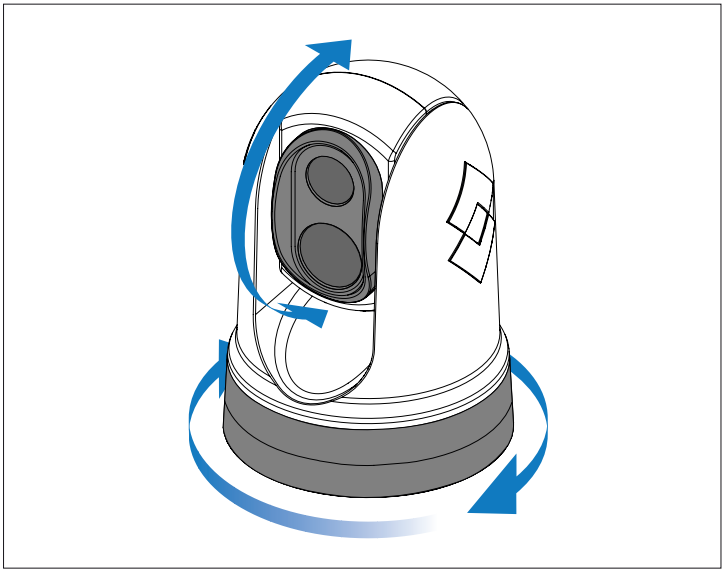
1. Login to your camera's Web browser.
2. Select the *[PTZ]* (Pan Tilt Zoom) tab.
3. Scroll down and select *[Advanced Settings]*.
4. Scroll down to the *[Ball-Down]* setting and select *[On]*. The camera is now set to *[Ball-Down]* mode.
5. To save these settings: select *[System Settings]*.
6. Select *[Firmware & Info]*.
7. Under *[System Default Settings]* select *[Save]*. A notification will pop up to confirm this action.
8. Under *[Reset factory default and reboot]* select *[Reboot]* and select *[Yes]* from the pop up to confirm.
9. After the camera has successfully rebooted it will be set to *[Ball-Down]* mode.

Note:
Ball-Down mode can be reverted by repeating the steps above and selecting *[Off]* for the *[Ball-Down]* setting.

15.3 Camera control

Pan, tilt and zoom (PTZ)

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



- Pan continuously through 360°.
- Tilt to +110° / -90°, relative to the camera base.
- Zoom the thermal camera image.

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

- A compatible multifunction display / chartplotter: see **p.22 — Compatible MFDs / chartplotters**
- The joystick on a JCU remote keypad: see **p.88 — Camera operation via JCU**
- The camera's Web browser interface: see **p.75 — Camera operation via Web browser**

Forward position

The forward position is a preset position for the camera.

The forward position usually defines a position facing forward relative to your vessel — for example, straight ahead and level with the horizon.

Icon	Information
	You can set the forward position as required, and return the camera to the forward position, using: • A compatible multifunction display / chartplotter; see: **p.22 — Compatible MFDs / chartplotters** • A JCU remote keypad; see: **p.88 — Camera operation via JCU** • The camera's Web browser interface; see: **p.75 — Camera operation via Web browser**

Note:
For further information, refer to the '*Flir Maritime M300 Series Home & Forward Position Setting*' article found on the FLIR Technical Support Center website:

• https://maritime-support.flir.com/s/article/Flir-Maritime-M300-Series-Home-Forward-Position-Setting

Home position

The home position is a preset position for the camera.

The home position usually defines a useful reference point — for example, a view outward from the vessel's beam or aft position.

Icon	Information
	You can set the home position as required, and return the camera to the home position, using: • A compatible multifunction display / chartplotter; see: **p.22 — Compatible MFDs / chartplotters** • A JCU remote keypad; see: **p.88 — Camera operation via JCU** • The camera's Web browser interface; see: **p.75 — Camera operation via Web browser**

Note:
For further information, refer to the '*Flir Maritime M300 Series Home & Forward Position Setting*' article found on the FLIR Technical Support Center website:

• https://maritime-support.flir.com/s/article/Flir-Maritime-M300-Series-Home-Forward-Position-Setting

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.

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

- A compatible MFD / chartplotter: see **p.22 — Compatible MFDs / chartplotters**
- The user-programmable buttons on a JCU remote keypad: see **p.88 — Camera operation via JCU**
- The camera's Web browser interface: see **p.75 — Camera operation via Web browser**

CHAPTER 16: CAMERA OPERATION VIA WEB BROWSER

CHAPTER CONTENTS

16.1 Logging in to the Web browser user interface

If your product was:

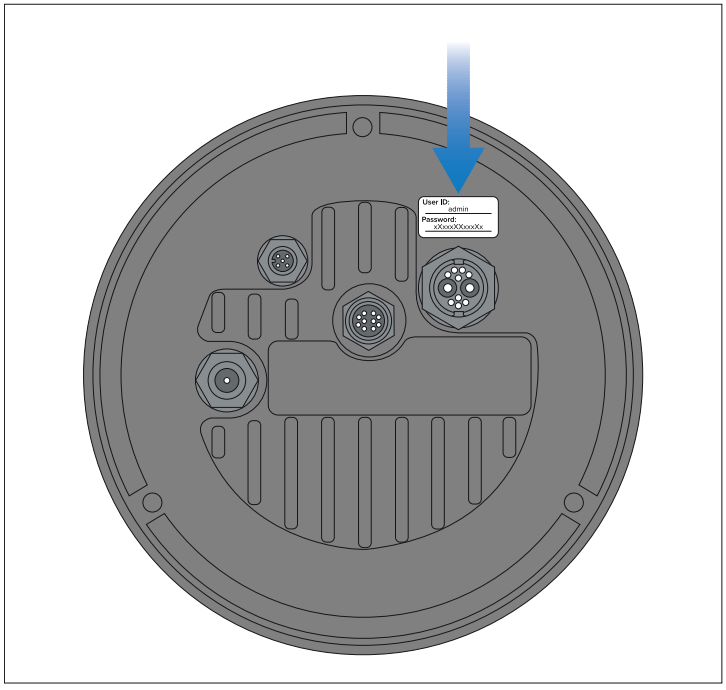
- Originally obtained running a software version **earlier than** v2.00-67:

You can log in to the Web interface using the User Name *[admin]* and Password *[admin]*.

If your product was:

- Originally obtained running software version v2.00-67 **or later**:

You can log in to the Web interface using the User Name *[admin]* and the unique Password located on the serial number label supplied in the box and / or on the underside of your product:



Important:
You should change the default login password to prevent unauthorized access.

The *[admin]* login can access the *[Maintenance menu]* and all the other menus. The *[admin]* login can also create user accounts and change login passwords.

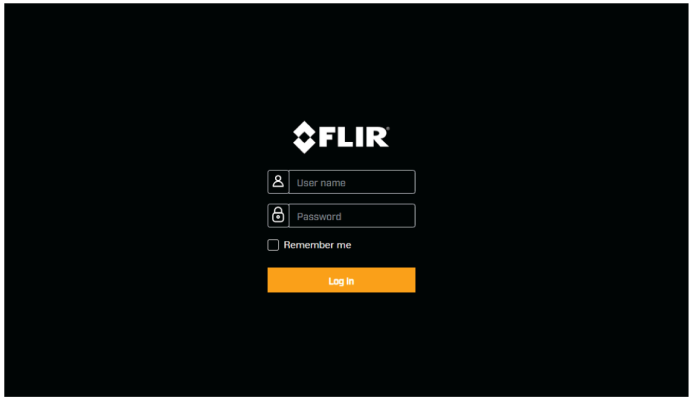
Note:
Only 2 Web sessions can be active at once.

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).

   For more information, refer to the following section:
   p.66 — Camera IP address discovery

   The login screen is displayed:



2. Enter the applicable login information referenced above, then click *[Log in]*.

First time login

After successfully logging into the Web interface for the first time, it is important that you change the default password to a new secure password for future use.

If your product was:

- Originally obtained running a software version earlier than v2.00-67 **or later**:

You will be automatically prompted to enter a new password.

If your product was:

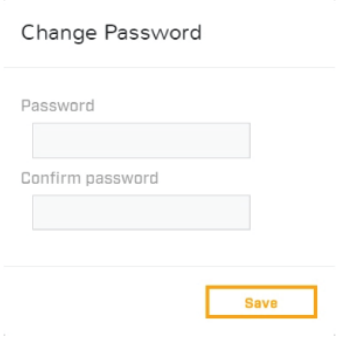
- Originally obtained running software version v2.00-67 **or later**:

You must navigate to *[System Settings > Users]* via the Web interface in order to change your password.

Password requirements

Your password must:

- Contain at least 12 characters.
- Contain at least 1 lowercase character.
- Contain at least 1 uppercase character.
- Contain at least 1 number.



Note:

- In low security / leisure camera installations, it is recommended you create an easy to remember password and save a copy of the password in a safe, secure and memorable location.
- If you forget your password contact FLIR support for help with resetting your camera: https://www.flir.co.uk/support/

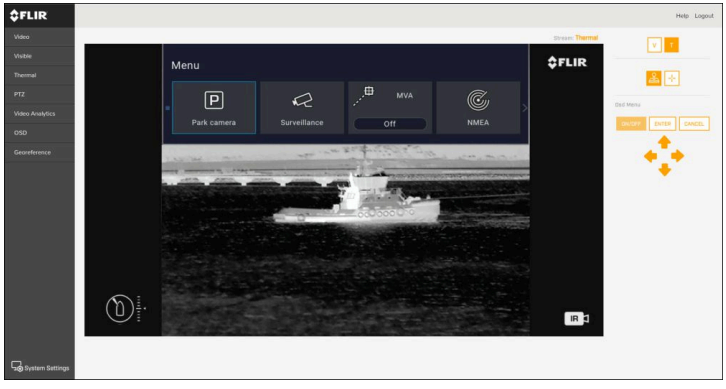
Important:
Resetting a lost password can only be accomplished with the aid of a FLIR support agent. This action will cause the internal user setting to be reset to factory.

16.2 Video feed

After logging in to the camera's Web interface, you can view the live image from the camera's current video stream.

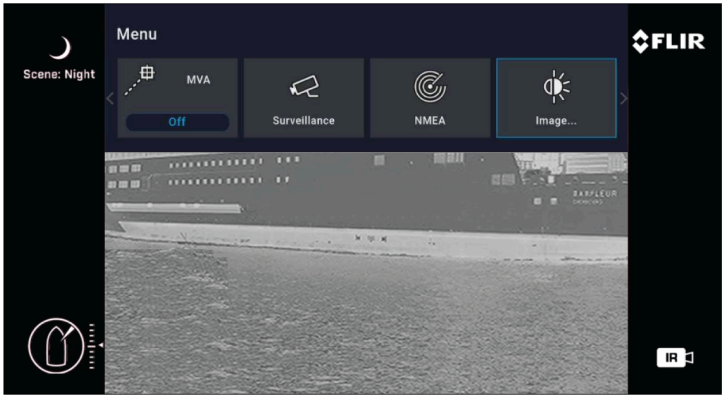
From the top-right menu you can:

- Change between the visible-light and thermal streams using the *[V]* and *[T]* icons.
- Change the camera movement control settings between 2 main modes of operation:
  - *[Joystick]* — select the on-screen "Joystick" icon, and then use the on-screen "directional arrow" controls to pan or tilt the camera in that direction continuously; this will continue until the on-screen cursor is disengaged.
  - *[Cross]* — select the on-screen "cross hairs" icon, and then use the on-screen "directional arrow" controls to center the image at the selected position.
- The icons displayed above the on-screen "directional arrow" controls enable you to change the camera's OSD (On-Screen Display) *[Main Menu]* settings:
  - Select the *[ON / OFF]* button to turn the OSD *[Main Menu]* on or off.
  - Select the *[Directional arrows]* to navigate between each menu selection.
  - Select the *[ENTER]* button to confirm your selection.
  - Select *[CANCEL]* to exit the current menu.



16.3 OSD Menu

You can access and change the camera's OSD (On-Screen Display) settings via the Web browser user interface or a connected JCU. The menu will be overlaid on the video feed.



OSD Menu Icons:

- *[Park Camera]* — The camera will pan and tilt to its predefined Park position. The park position can be defined using the Web browser user interface. For further information, refer to the following section: **p.75 — Camera operation via Web browser**
- *[Surveillance]* — In Surveillance mode, the camera pans continuously left and right until it is taken out of surveillance mode, or the video feed is switched.
- *[MVA]* — Access MVA (Marine Video Analytics) settings.
- *[NMEA]* — Enable or disable the processing of external control messages using the NMEA interface.
- *[Image]* — Access advanced image settings.
- *[Settings]* — Access advanced camera settings.
- *[Help]* — Opens the Help menu, which provides access to explanations of on-screen controls and camera features.

16.4 OSD Settings

Park camera:

Settings	Options
Park Camera	• On • Off

Surveillance:

Settings	Options
Surveillance	• On • Off

MVA:

Settings	Options
MVA	• Off • VIS • IR • IR & VIS

NMEA:

Settings	Options
NMEA	• On • Off

Image:

Settings	Options
Active camera	• VIS • IR
Stabilization	• Off • Vertical • Horizontal & Vertical
CTV	• On • Off **Note:** Applies to dual payload cameras only.
MSX	• On • Off **Note:** Applies to dual payload cameras only.
Polarity	• RedHot • BlackHot
Color	• Greyscale • Redscale • Fusion • Firelce
Scene	• Night • Day • High contrast • Dock
VIS low light mode	• On • Off • Auto
IR / VIS zoom link	• On • Off
Mirrored view	• On • Off

Settings:

Settings	Options
Save current settings as defaults	• Activate
Restore settings from defaults	• Activate
Restore factory settings	• Activate

Settings (Advanced image):

Settings	Options
IR eZoom	• On • Off
VIS eZoom	• On • Off
VIS wide dynamic range	• On • Off
VIS electronic stabilization	• On • Off
VIS camera defog	• On • Off
VIS MVA Threshold	• 1–16
IR MVA Threshold	• 1–16
VIS MVA Environment	• Coastal • Open Sea
IR MVA Environment	• Coastal • Open Sea
MSX Blend Percentage	• 0–100
CTV Blend Percentage	• 0–100

Settings (User interface):

Settings	Options
Interface language	• English • Español • Türkçe
Pilot mode	• On • Off
Display icons	• Minimal • Custom • Full
Help text	• On • Off
Icon & text color	• White • Red
User 1, User 2, User 3	• Vert stab • V & H stab • Surveillance • Mirrored view • Icon levels • Polarity • MSX • CTV
Set Az & El zero reference	• Set Origin • No

Settings (Surveillance):

Settings	Options
Scan width	• Small • Medium • Large
Scan speed	• Slow • Medium • Fast

Settings (NMEA):

Settings	Options
Radar cursor (RSD)	• On • Off
Next waypoint (BWC)	• On • Off
Radar target (TTM)	• On • Off

Help:

Settings	Options
About	• Camera • Versions • Contact
User guide	• Quick start guide

16.5 Camera settings menus

You can access different camera settings menus on the left side of the video stream. The settings contained in these menu pages can be used to configure your camera.

- *[Video]* — Edit general video settings.
- *[Visible]* — Edit the visible-light camera settings.
- *[Thermal]* — Edit the thermal camera settings.
- *[PTZ (Pan Tilt Zoom)]* — Edit the Pan Tilt and Zoom settings and control the camera.
- *[Video Analytics]* — Edit MVA (Marine Video Analytics) and object detection settings.
- *[OSD (On Screen Display)]* — Edit the on-screen status symbols and icons displayed on the video feed.
- *[Georeference]* — Edit the camera's altitude above the waterline.

16.6 Camera settings

Video:

Settings	Options
Video profile	• T1 (Thermal profile 1) • T2 (Thermal profile 2) • V1 (Visible 1) • V1 (Visible 2) **Note:** Visible and Thermal video profiles are dependent on camera model
Codec	• H.264 • MJPEG • Baseline Profile • Main Profile • High Profile
Resolution	• 640x360 • 854x480 • 960x540 • 1280x720 • 1920x1080

Settings	Options
Frame Rate	• 1–30
Rate control	• CBR • VBR
Bit Rate [KBPS]	• 32–102400
I-frame Interval	• 1–300
Enable Multicast	• No • Yes **Note:** When enabled, the Multicast setting reduces the total amount of network traffic on your system by simultaneously distributing the camera's video feed data to multiple configured devices. For more information, refer to: **p.53 —** Multicasting
Destination Address	• Enter Value
Destination Port	• Enter Value
TTL	• Enter Value

Visible:

Settings	Options
E-Flip	• On • Off
Reverse	• On • Off
Freeze	• On • Off
Picture Effect	• Off • Negative Art • Black & White
Contrast Adjustment	• 0%–100%
Color Gain	• 0%–100%
Auto Exposure Mode	• Full Auto • Manual • Shutter Priority • Iris Priority
Exposure Comp	• On • Off
Spot Auto Exposure	• On • Off
Slow Shutter	• On • Off
Backlight Compensation	• On • Off
Exposure	0–14
Shutter	0–21
Gain	0–17
Iris	1–100
ICR Mode (Low Light)	• On • Off • Auto
Stabilization	• On • Off

Settings	Options
Wide Dynamic Range Mode	• Off • On • Visibility Enhancer On
Display Brightness	• 0–6
Brightness Compensation	• Very Dark • Dark • Standard • Bright
Compensation Level	• Low • Mid • High
White Balance Mode	• Auto • Outdoor • Indoor • One Push • ATW • Manual
Defog	• Off • Low • Mid • High
Lens	• Manual • Auto
Focus	• 0%–100%
Autofocus Mode	• Normal • Interval • Zoom Trigger

Settings	Options
Autofocus Sensitivity	• Normal • Low
Focus Rate	• 0–100
Zoom Rate	• Select
Initialize Lens	• Select
Focus to Infinity	• Select
Autofocus Push	• Select
Aperture — High Sensitivity	• On • Off
Aperture	• 0–15
Noise Reduction	• Off • 1 • 2 • 3 • 4 • 5 • 2D NR/3D NR
2D NR Level	• 0–5
3D NR Level	• 0–5
Gamma Mode	• Standard • Straight
Offset	• 0–100
Ezoom	• On • Off

Thermal:

Settings	Options
AGC RDI	• Custom • Full Screen • Horizon • Sky • Ground • Centre 75 • Centre 50 • Centre 25
Ace	• 0.5–4
Max Gain	• 0.25–8
DDE	• 0–8
Damping Factor	• 0–100
Tail Rejection	• 0–49
Plateau Value	• 1–100
Linear Percent	• 1–100
Detail Headroom	• 0–127
Smoothing Factor	• 0–8191
Information-Based Mode	• On • Off
Colorization	• WhiteHot • BlackHot • RedHot • RedHot Inverse • Fusion • Fusion Inverse • FireIce • FireIce Inverse
Blend Mode	• Off • CTV • MSX • 0–100
Blending Registration Offset: • X • Y • Width • Height	• –32–32
Mirroring/Inversion	• Ball-down Off / Rearview Off • Ball-down On / Rearview Off • Ball-down Off / Rearview On • Ball-down On / Rearview On
Scene Presents	• Night • Day • High Contrast • Docking

Settings	Options
FFC	• Manual • Auto • Ext.
FFC Period (Seconds)	• Enter Value • Apply
Temp Change (0.1 °C)	• Enter Value • Apply
FFC Integration Period (Frames)	• 2 • 4 • 8 • 16 • Perform FFC
Ezoom	• On • Off
High-To-Low Intensity Threshold	• 0–49
High-To-Low Population Threshold	• 0–49
Low-To-High Population Threshold	• 0–49

PTZ:

Settings	Options
Pan / Tilt	• Tilt left • Tilt right • Pan left • Pan right
Speed	• 1–10
Pilot Mode	• Yes • No
Zoom	• Zoom out • Zoom in
Sync Visible Zoom	• Enabled • Disabled
Home Position	• Go to • Set
Park Position	• Go to • Set
Present Position	• Select Position.
Set Preset (Index)	• 1–128
Preset Name	• Enter Description
Stabilization	• On • Off
Horizontal Stabilization	• On • Off
Ball-Down	• On • Off
Forward Position	• Set
Relative Auto Scan — Width	• Narrow • Medium • Wide

Settings	Options
Relative Auto Scan — Speed	• Low • Medium • High
Relative Auto Scan	• Save • Start • Stop

Video Analytics:

Settings	Options
Enable	• None • Visible • Thermal • Both
Profile	• Thermal • Visible
Threshold	• 1–16
Environment	• Open Sea • Coastal

OSD:

Settings	Options
Display Icons	• Full • Minimal • Custom
Help Text	• On • Off
OSD Language	• English • Español • Türkçe

Settings	Options

Georeference:

Settings	Options
Altitude (Meters)	• Set Altitude

16.7 System settings

You can access the following advanced camera settings and diagnostic information by selecting the *[System Settings]* menu located at the bottom of the screen.

- Network
- Date & Time
- Users
- JCU
- OSD
- Temperature
- Cyber
- ONVIF
- Video Outputs
- Radar
- Firmware & info

CHAPTER 17: CAMERA OPERATION VIA JCU

CHAPTER CONTENTS

17.1 Compatible Joystick Control Units (JCUs)

A Joystick Control Unit (JCU) is available to purchase as an optional accessory. With the JCU connected to the camera via a network switch, you can use the JCU's physical controls to control the camera remotely.

The camera's On-Screen Display (OSD) menu can also be accessed and further controlled using a connected JCU. For more information on the OSD menu options available, refer to the '*OSD Menu*' section of this document.

JCU-1 JCU-2 JCU-3 JCU-4

JCU variant	Documentation
JCU-1 (500-0385-00)	www.bit.ly/jcu1-docs
JCU-2 (500-0398-10)	www.bit.ly/jcu2-docs
JCU-3 (A80510)	www.bit.ly/jcu3-docs
JCU-4 (E70695 / E70697)	www.bit.ly/jcu4-docs

CHAPTER 18: CAMERA OPERATION VIA MFD / CHARTPLOTTER

CHAPTER CONTENTS

18.1 Using the camera with an MFD / chartplotter

You can view the camera's video feed and also control the camera by using an MFD / chartplotter equipped with a Web browser which supports the MJPEG codec.

Some MFDs / chartplotters may also support further control options via a dedicated video / camera application, which must be compatible with **ONVIF (Profile S)**. The range of camera control options available is dependent on the support that the MFD / chartplotter manufacturer has implemented for their video / camera application.

Note:
It is recommended that you use a dedicated video / camera application in order to:

- View an improved camera video feed quality (using the H.264 video codec).
- Avoid Web browser session expiration.

- For information on how to operate the camera via a Web browser, refer to the following section:
  - **p.75 — Camera operation via Web browser**
- For information on whether you can operate the camera via your display's dedicated video / camera application, and how, refer to the documentation which accompanies your display.

CHAPTER 19: MARINE VIDEO ANALYTICS (MVA)

CHAPTER CONTENTS

19.1 Overview

The Marine Video Analytics (MVA) feature alerts you when "non-water" objects are identified in the scene. Boats, obstacles, and navigation markers can all be automatically identified in a scene when this feature is enabled.

Important:
MVA performance is dependent on conditions, and is not a replacement for maintaining a visual watch.

Important:
Weather conditions can cause the target's temperature, luminance, contrast or chrominance to be below a detectable range in relation to the background image. Therefore, the effectiveness of the MVA feature for distinguishing targets and non-targets is dependent on optimal scene conditions. It is recommended that:

- The visible image is adjusted to contain good color, brightness and contrast;
- The *[Threshold]* setting in the *[Video Analytics]* menu is adjusted to ensure that irrelevant regions such as sun glare are excluded from the object detection.

MVA can be activated using:

- The camera's Web interface.
- The camera's on-screen display, via a connected JCU.

19.2 Enabling MVA via the camera's Web interface

You can enable MVA using the camera's Web interface.

1. Log-in to the camera's Web interface.

Note:
For more information on how to log-in, refer to:

- **p.76 — Logging in to the Web browser user interface**

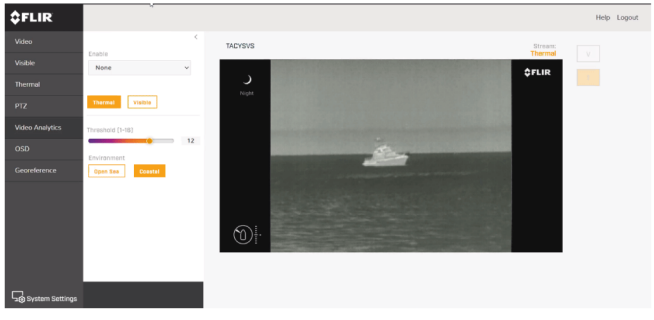
2. From the menu on the left, select *[Video Analytics]*.
3. From the drop-down menu displayed below *[Enable]*, select the payload you want *[Object Detection]* enabled for: *[Visible]*, *[Thermal]* or *[Both]*.

Note:
Payload choice is dependent on camera model.

From the *[Video Analytics]* menu you can adjust the Object Detection feature settings:

- *[Payload]* — select which payload to adjust settings for:

  - *[Visible]*
  - *[Thermal]*
- *[Threshold]* — adjusting the threshold value will increase or decrease the camera payload's sensitivity for detecting objects:
  - *[1]* is the lowest threshold and will show all small and distant detected objects.
  - *[16]* is the maximum threshold and will only show prominent objects detected by the camera.
- *[Environment]* — select the environment you are using object detection in:
  - *[Coastal]* has more filtering to reduce false detections of land.
  - *[Open sea]* has less filtering, so may identify land as an object.



19.3 Enabling MVA via the camera's on-screen display and JCU

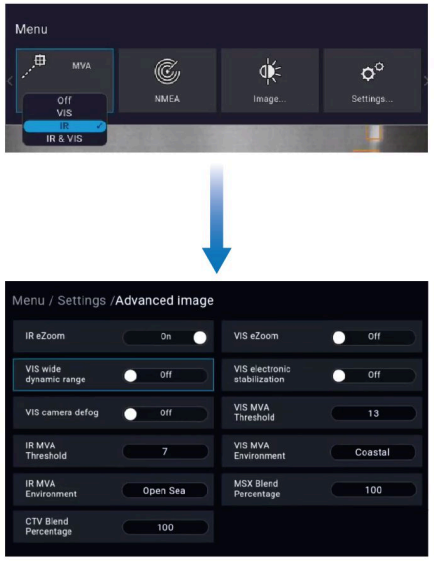
You can enable MVA using the camera's on-screen display and a connected JCU.

1. Press the *[Menu]* button on the connected JCU to open the on-screen display menu.
2. Scroll through the menu and select *[MVA]*.
3. From the drop-down menu, select the payload you want *[Object Detection]* enabled for: *[Visible (VIS)]*, *[Thermal (IR)]* or *[Both]*.

Note:
Payload choice is dependent on camera model.

Object Detection settings can be found in the Settings menu: *[Menu > Settings > Advanced image]*

- *[VIS / IR Threshold]* — adjusting the threshold value will lower or increase the camera payload's sensitivity for detecting objects:
  - *[1]* is the lowest threshold and will show all small and distant detected objects.
  - *[16]* is the maximum threshold, and will only show prominent objects detected by the camera.
- *[VIS / IR Environment]* — for each of the camera's payloads, select the type of external environment you are using object detection in:
  - *[Coastal]* has more filtering to reduce false detections of land.
  - *[Open sea]* has less filtering, and may identify land as an object.



CHAPTER 20: NMEA RADAR TRACKING

CHAPTER CONTENTS

20.1 NMEA 0183 overview

The NMEA interface allows the camera to communicate with radar, GPS, or other third-party devices using the National Marine Electronics Association (NMEA) 0183 protocol. NMEA 0183 (or NMEA for short) is a combined electrical and data specification for communication between marine electronic devices.

For information on how to connect NMEA 0183 devices to the camera, refer to: **p.51 —** NMEA 0183 connection

For additional information regarding the NMEA 0183 protocol, refer to: https://www.nmea.org

When it receives valid NMEA 0183 sentences from connected NMEA 0183 devices, the camera can automatically point itself towards vessels and other objects in its field of view, and track their movement. The camera can receive 3 types of NMEA messages:

- **Radar Cursor Tracking**, which is implemented using the NMEA *Radar System Data* (**RSD**) sentence.
- **Slew to Waypoint**, which uses the NMEA *Bearing and Distance to Waypoint, Great Circle* (**BWC**) sentence.
- **Radar Tracking**, which uses the NMEA *Tracked Target Message* (**TTM**) sentence.

Note:
All 3 (or any combination) of these NMEA messages can be enabled via the camera's NMEA interface. When more than one type is enabled, the system processes **RSD** first, then **BWC**, and finally **TTM**. For example, if the unit is listening to **BWC** or **TTM** messages and looking at a particular target and it receives an **RSD** message, it waits until the end of the dwell time and then moves on to the **RSD** message, ignoring all other input.

Note:
Even though you can only enable up to 3 types of messages via the camera's NMEA interface, the camera uses additional messages to perform the calculations needed to respond to these 3 message types. If your camera is not responding as expected, verify that the NMEA device sending messages is sending the following additional message types to your system:

- **HDT** (*Heading — True*)
- **GGA** (*Global Positioning System Fix Data*)
- **VHW** (*Water Speed and Heading*)
- **OSD** (*Own Ship Data*)
- **TLL** (*Target Latitude and Longitude*)

Important:
In order for the NMEA features to work correctly, the camera's altitude above the waterline must be specified using the camera's Web interface. Enter the altitude by accessing the Web interface and selecting the *[Georeference]* tab.

20.2 Enabling NMEA 0183 via the camera's web interface

You can enable NMEA 0183 using the camera's Web interface.

1. Log into the camera's Web interface.

Note:
For more information on how to log in, refer to:

- **p.76 — Logging in to the Web browser user interface**

2. At the bottom left of the screen, select *[System Settings]*.
3. From the top menu, select *[Radar]*.
4. Use the drop-down menu to select your connected radar.
5. Set the *[Dwell Time]* using the slider.

   [Dwell Time] is the length of time the camera will focus on each radar target before switching focus to the next target.

6. At the bottom right of the screen, select *[Save]* to save these settings.

20.3 Enabling NMEA 0183 via the camera's on-screen display

You can enable NMEA 0183 using the camera's on-screen display and a connected JCU.

1. Press the *[Menu]* button on the connected JCU to open the on-screen display menu.
2. Scroll through the menu and select *[NMEA]* to toggle NMEA On / Off. **When NMEA is enabled it will display a radar symbol on the camera feed.**

NMEA settings can be found in the settings menu *[Menu > Settings > NMEA]*

- *[Radar Cursor (RSD)]* — you can control the camera by using the cursor on the radar display to highlight a target. The camera will pan to whichever target is selected by the cursor. If you move the cursor on the radar display to a different target, the camera will move accordingly. This function is also known as "radar cursor tracking".
- *[Next Waypoint (BWC)]* — the camera will pan in the direction of a specific waypoint, when your vessel comes within 3 NM (5 Km) of the waypoint location. This function is also known as "slew to waypoint".
- *[Radar Target (TTM)]* — the camera will automatically and continuously pan to whichever target is selected on the Radar display. This function is also known as "slew to cue". It is possible to track multiple radar targets. Once targets are selected, the camera will automatically pan to "track" each target sequentially. In this scenario, the camera will remain "locked-on" to each target for approximately 10 seconds, before moving to the next target. Due to the way that Radar operates, it is possible to lose a target momentarily. To ensure that the tracking process continues after the momentary loss of a target, the TTM function maintains the last known position of the target in its queue for 60 seconds after receiving the last valid message. After 60 seconds, that target is removed from the queue.

CHAPTER 21: MAINTENANCE

CHAPTER CONTENTS

21.1 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.

21.2 Routine camera inspections

It's important to routinely inspect cameras and associated mounting hardware.

Important:
Routinely inspect the camera and its mounting surface. 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 is rigid, while rotating freely.

- Conduct both visual and mechanical checks during your inspection, including the use of torque wrenches to ensure that all mounting fixings are secured to the recommended torque, as stated in the installation instructions.
- Ensure that the camera and weight-bearing mountings (including any risers) are installed securely, that the coated surfaces are intact, and that there are no signs of damage.
- Maintain a regular inspection schedule. Both visual and mechanical checks should be included in each inspection. Maintain a record of all inspections.

21.3 Cleaning the 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 22: SYSTEM CHECKS AND TROUBLESHOOTING

CHAPTER CONTENTS

22.1 Troubleshooting

The troubleshooting section provides possible causes and the corrective action required for common problems that are associated with the installation and operation of your product.

Before packing and shipping, all products are subjected to comprehensive testing and quality assurance programs. If you do experience problems with your product, this section will help you to diagnose and correct problems to restore normal operation.

If after referring to this section you are still having problems with your product, please refer to the *Technical support and servicing* section of this manual for useful links and contact details.

22.2 Camera not shown in your PC / laptop / tablet's device list

In some circumstances, the camera may not appear in the device list.

Possible causes	Possible solutions
Incorrect IP address configuration:	Depending on your network configuration, it may take up to 5 minutes for the camera to appear in the list of devices. If the camera is not listed after 5 minutes, double-check that your IP address is configured correctly. Afterward, attempt to renew your IP device's IP address. For Windows 7, 8, 10, and 11: 1. Go to *[Start > Run]*, then type "cmd" (without quotes), and click *[OK]*. 2. In the Command Prompt window that opens, type "ipconfig /release" (without quotes), then press Enter. 3. Type "ipconfig /renew" (without quotes), then press Enter. 4. Type "exit" (without quotes), then press Enter to close the window.

22.3 Video not displayed

In the event that the camera is not displaying video:

Possible causes	Possible solutions
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 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.

22.4 Cannot control camera from MFD / chartplotter

In the event that the camera cannot be controlled from a connected multifunction display (MFD) or chartplotter:

Possible causes	Possible solutions
Incorrect MFD / chartplotter application in use:	Ensure that you are attempting to use the correct MFD / chartplotter application in order to control the camera. For further information on which application(s) can be used to control the camera, refer to the documentation which accompanies your MFD / chartplotter.

22.5 Erratic or unresponsive controls

In the event that the camera's controls are responding erratically, or not responding at all:

Possible causes	Possible solutions
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 network switch.) • Check the status of the network switch. • Check that the network 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.

22.6 Camera image too dark or too light

Image adjustments may be required in order to optimize the displayed image.

Possible causes	Possible solutions
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. If a connected JCU is available, use the *[SCENE]* button to change the *Scene Mode*.

22.7 Camera image is inverted

In some circumstances, the camera image may appear inverted.

Possible causes	Possible solutions
Camera "Ball down" (upside down) setting is incorrect:	Ensure that the Ball down (upside down) setting is set correctly.

22.8 FLIR Maritime technical support and servicing

FLIR provides a comprehensive product support service, as well as warranty, service, and repairs. You can access these services using the contact details provided below.

Product information

For the latest support information, go to: https://maritime-support.flir.com
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 available when using your product.

Warranty policy and registration

Visit the Raymarine website to **read the latest warranty policy**, and **register** your product's warranty online: www.bit.ly/rym-warranty

Servicing and contact information

FLIR and Raymarine offer dedicated service departments for servicing and repairs. Contact details:

Region	Contact details
United Kingdom (UK), EMEA, and Asia Pacific:	**Telephone:** +44 (0)1329 246 932 **Address:** Marine House, Cartwright Drive, Fareham, PO15 5RJ, UK. www.bit.ly/rym-service
United States (US):	**Telephone:** Tel: +1 (603) 324 7900 (Toll-free: +800 539 5539) **Address:** 110 Lowell Road, Hudson, NH 03051, USA. www.bit.ly/rym-service

CHAPTER 23: TECHNICAL SPECIFICATION

CHAPTER CONTENTS

23.1 Physical specification

Specification	
Dimensions:	For camera and riser dimensions, refer to: • **p.26 — Product dimensions**
Weight (M300 C / M332 / M364):	5.9 kg (12.9 lb) without mounting riser; 6.3 kg (13.9 lb) with mounting riser
Weight (M364C / M364LR):	6.3 kg (13.9 lb) without mounting riser; 6.75 kg (14.9 lb) with mounting riser
Pan / tilt:	• 360° continuous pan • +/- 90° tilt

23.2 Power specification

Specification	
Nominal supply voltage:	12 to 24 V dc
Operating voltage range:	10.8 V to 31.2 V dc
Current:	Peak 10.0 A
Power consumption:	• 41 W typical • 56 W max (with heaters on) **Note:** It is recommended that you use a 75 W power supply

23.3 Environmental specification

Specification	
Operating temperature:	-25 °C to +55 °C (-13 °F to 131 °F)
Storage temperature:	-30 °C to +70 °C (-22 °F to 158 °F)
Automatic window defrost:	Standard at power-up (3 minute duration)
Relative humidity:	max 95%
Water ingress protection:	IPx6
Wind:	100 mph (161 kph)
Vibration:	• IEC/EN 60945:2002 (exposed) • ABS IACS UR E10
Shock:	15 g vertical, 9 g horizontal
Salt Mist:	IEC60945
Lightning Protection:	Near Strike at 2 kV

23.4 Video specification

Specification	
Video output:	• Video Resolution: 1920 x 1080 pixels @30 fps (progressive scan) • IP digital video format: H.264-encoded IP video stream, compatible with ONVIF (Profile S) • IP digital video format: MJPEG-encoded IP video stream (accessible via Web interface only) • SDI video format, HD-SDI (SMPTE-292M).
Visible-light optical sensor:	• Sensor resolution; refer to comparison table: **p.107 — Sensor specification** • Field of View; refer to comparison table: **p.107 — Sensor specification** • Optical Zoom: 30x • Digital Zoom: 12x
Thermal sensor:	• Sensor resolution; refer to comparison table: **p.107 — Sensor specification** • Field of View (FOV); refer to comparison table: **p.107 — Sensor specification** • Digital Zoom: 4x

Note:
ONVIF profiles help you to determine which IP digital video devices are compatible with one another. For more information on ONVIF profiles, refer to:

- www.onvif.org/profiles

23.5 Conformance specification

Specification	
Electromagnetic compliance:	EMI: IEC 60945

23.6 Sensor specification

Model	Visible-light sensor		Thermal sensor	
	Resolution and frame rate	*FOV*	*Resolution*	*FOV*
M332 (9 Hz) (E70528)	-	-	320 x 256 pixels	24° (H) x 18° (V)
M332 (30 Hz) (E70527)	-	-	320 x 256 pixels	24° (H) x 18° (V)
M364 (9 Hz) (E70526)	-	-	640 x 512 pixels	24° (H) x 18° (V)
M364 (30 Hz) (E70525)	-	-	640 x 512 pixels	24° (H) x 18° (V)
M300C (E70605)	1920 x 1080 pixels @ 30 fps	64° (H) x 60° (V)	-	-
M364C LR (9 Hz) (E70521)	1920 x 1080 pixels @ 30 fps	64° (H) x 60° (V)	640 x 512 pixels	18° (H) x 13.5° (V)
M364C LR (30 Hz) (E70520)	1920 x 1080 pixels @ 30 fps	64° (H) x 60° (V)	640 x 512 pixels	18° (H) x 13.5° (V)
M364C (9 Hz) (E70519)	1920 x 1080 pixels @ 30 fps	64° (H) x 60° (V)	640 x 512 pixels	24° (H) x 18° (V)
M364C (30 Hz) (E70518)	1920 x 1080 pixels @ 30 fps	64° (H) x 60° (V)	640 x 512 pixels	24° (H) x 18° (V)

CHAPTER 24: SPARES AND ACCESSORIES

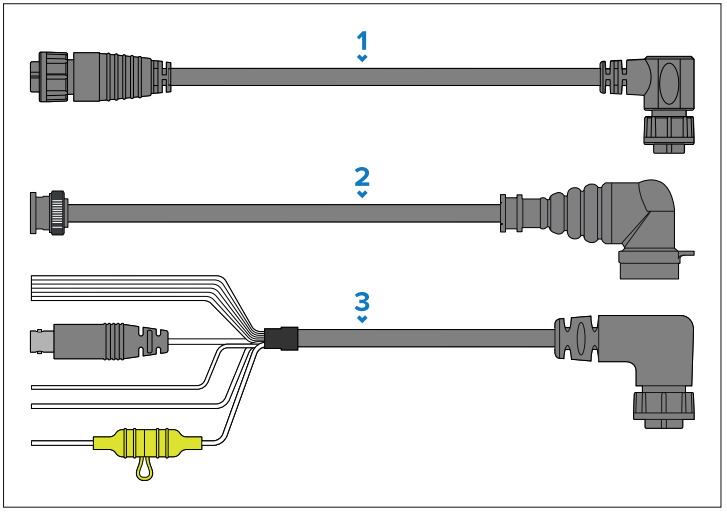
CHAPTER CONTENTS

24.1 Camera spares and accessories

The following spares and accessories are available for your product:

	Description
1	(500–0385–00) — JCU-1 remote control unit.
2	(500–0398–10) — JCU-2 remote control unit.
3	(A80510) — JCU-3 remote control unit (with portrait and landscape keypad mats).
4	• (E70695) — JCU-4 remote control unit. • (E70697) — JCU-4 remote control unit (without cabling).
5	(4142057) — HD video isolation transformer.

M300-Series camera cables

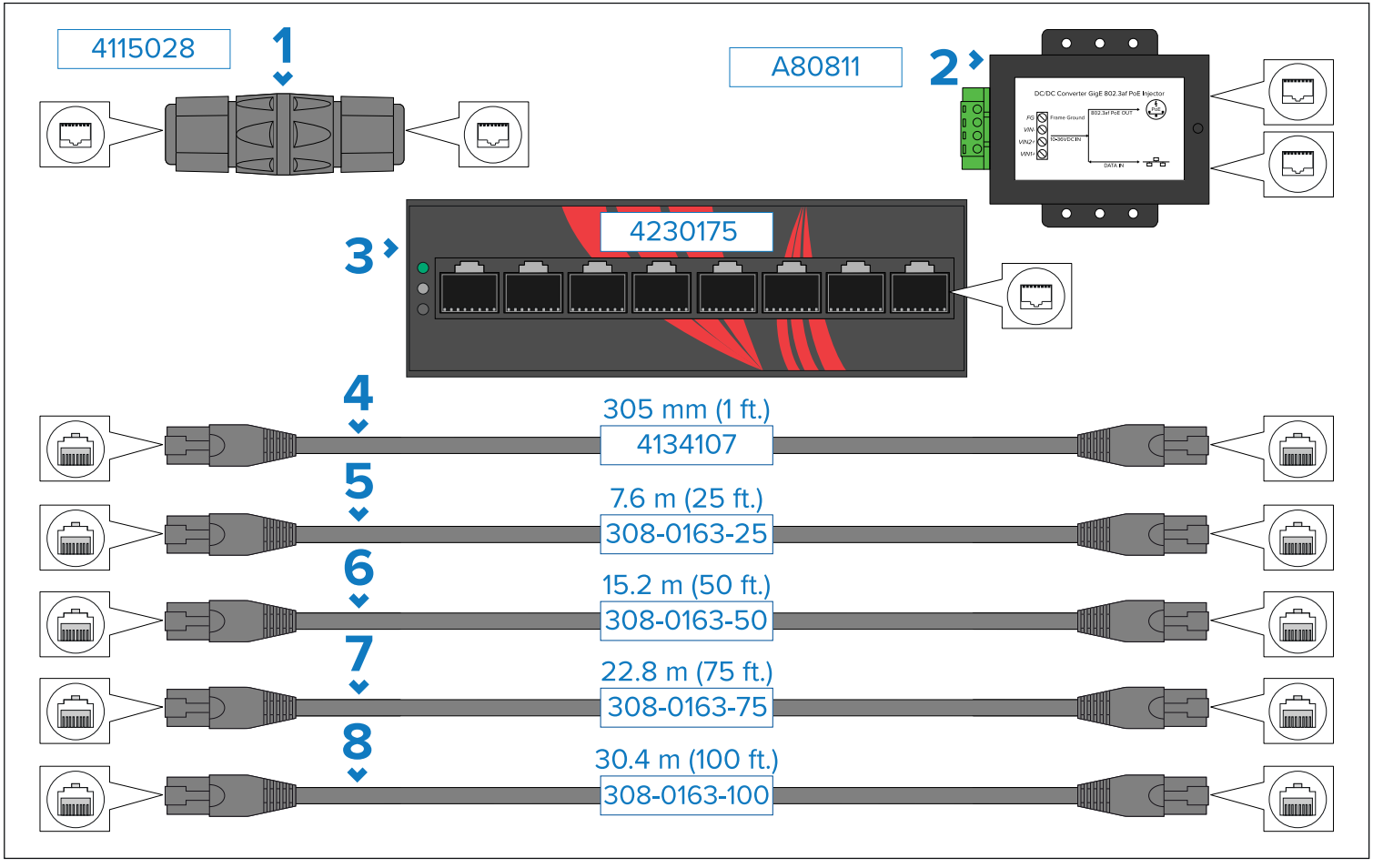


	Description
1	Right-angled RayNet (Ethernet) to RayNet (Ethernet) cable • **0.5 m (1.64 ft)** — A80670 • **3 m (9.84 ft)** — A80695 • **10 m (32.81 ft)** — A80673
2	Right-angled HD-SDI video cable (with BNC connectors) • **0.5 m (1.64 ft)** — A80670 • **3 m (9.84 ft)** — A80693 • **10 m (32.81 ft)** — A80665
3	Right-angled power cable / NMEA 0183 / video cable • **0.5 m (1.64 ft)** — A80670 • **3 m (9.84 ft)** — A80694 • **10 m (32.81 ft)** — A80666

A80667 — 0.5 m (1.64 ft) cable kit, includes:

	Description
1	(A80670) — Right-angled RayNet (Ethernet) to RayNet (Ethernet) cable, 0.5 m (1.64 ft).
2	(A80668) — Right-angled HD-SDI video cable (with BNC connectors), 0.5 m (1.64 ft).
3	(A80669) — Right-angled power cable / NMEA 0183 / video cable, 0.5 m (1.64 ft).

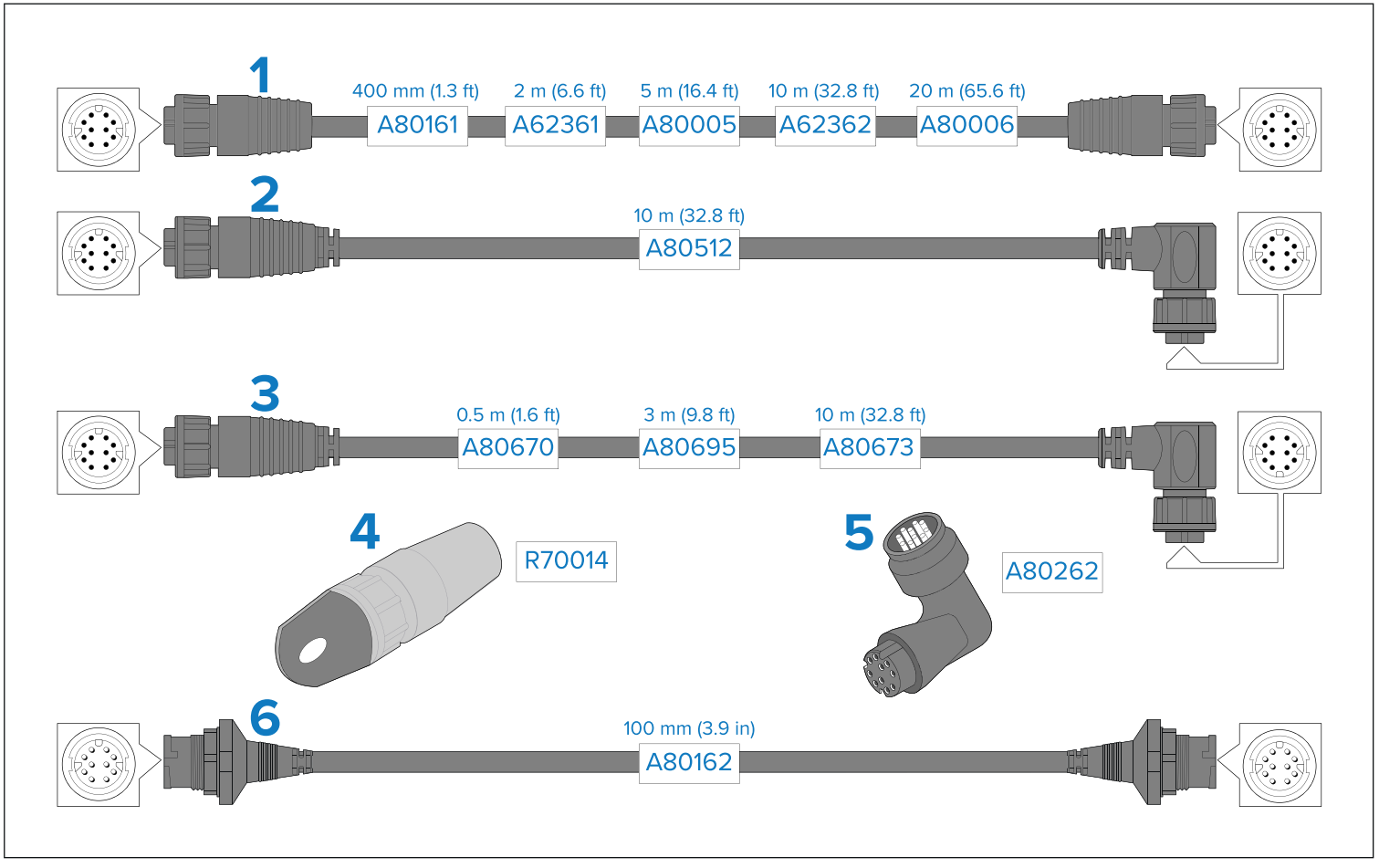
24.2 FLIR networking accessories



1. RJ45 coupler, for joining 2 separate RJ45 network cables together to achieve longer cable runs.
2. PoE Injector (2nd Generation; 5 Gbit). Supplies power to a non-PoE network connection. Typical use is for powering a JCU-Series controller connected to a non-PoE network switch.
3. PoE 8-port Gigabit Network Switch.
4. 305 mm (1 ft.) RJ45-to-RJ45 Ethernet cable, double shielded with LSZH low interference jacket.
5. 7.6 m (25 ft.) RJ45-to-RJ45 Ethernet cable, double shielded with LSZH low interference jacket.
6. 15.2 m (50 ft.) RJ45-to-RJ45 Ethernet cable, double shielded with LSZH low interference jacket.

7. 22.8 m (75 ft.) RJ45-to-RJ45 Ethernet cable, double shielded with LSZH low interference jacket.
8. 30.4 m (100 ft.) RJ45-to-RJ45 Ethernet cable, double shielded with LSZH low interference jacket.

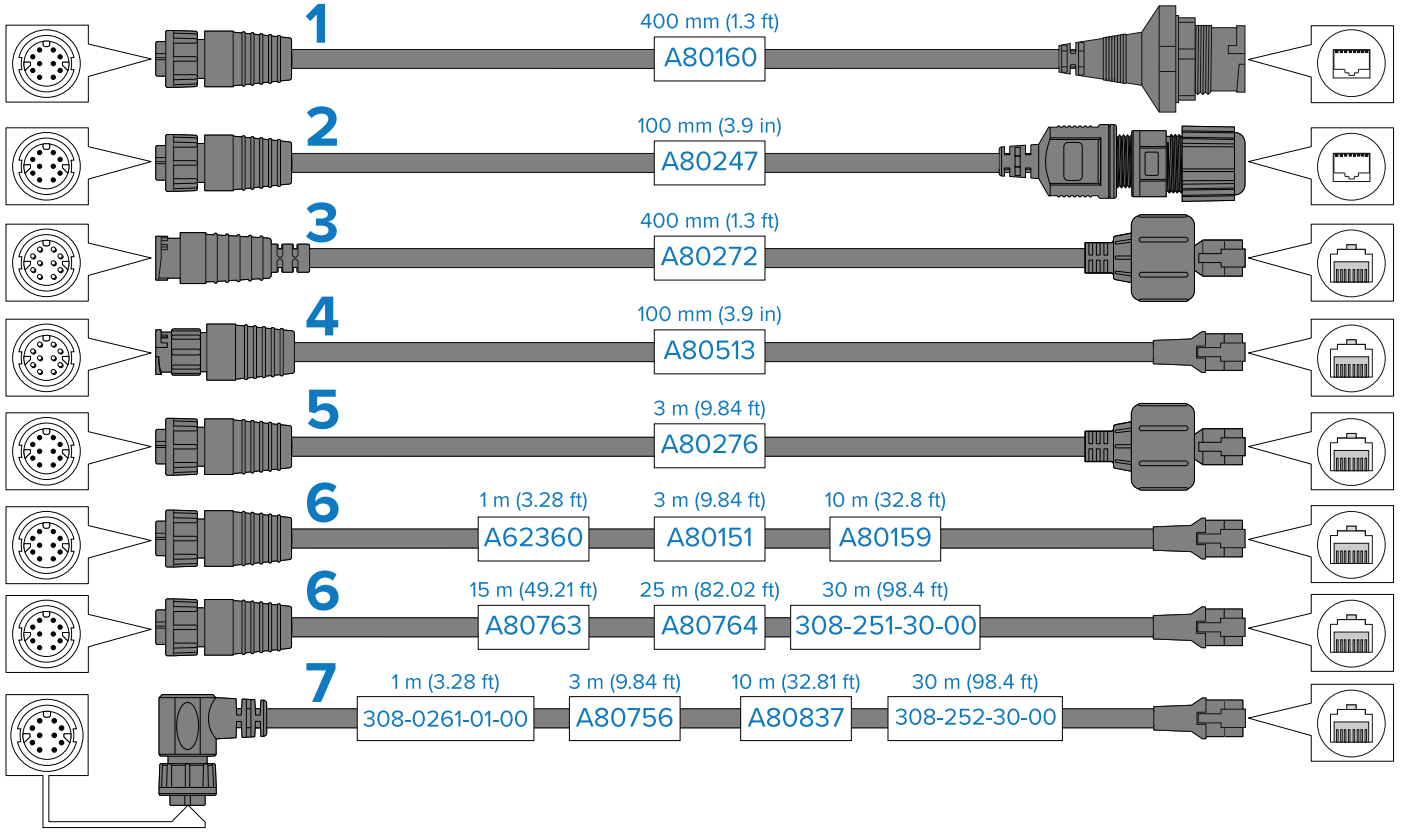
24.3 RayNet to RayNet cables and connectors



1. Standard RayNet connection cable with a RayNet (female) socket on both ends.
2. Right-angle RayNet connection cable with a straight RayNet (female) socket on one end, and a right-angle RayNet (female) socket on the other end. Suitable for connecting at 90° (right angle) to a device, for installations where space is limited.
3. Right-angle RayNet connection cable with a straight RayNet (female) socket on one end, and a right-angle RayNet (female) socket on the other end. Available as an alternative to the (A80512) accessory cable, for installations which require an alternate cable routing direction.
4. RayNet cable puller (5 pack).

5. RayNet to RayNet right-angle coupler / adapter. Suitable for connecting RayNet cables at 90° (right angle) to devices, for installations where space is limited.
6. Adapter cable with a RayNet (male) plug on both ends. Suitable for joining (female) RayNet cables together for longer cable runs.

24.4 RayNet to RJ45, and RJ45 (SeaTalk HS) adapter cables



1. Adapter cable with a RayNet (female) socket on one end, and a waterproof (female) RJ45 (SeaTalk HS) 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).
2. Adapter cable with a RayNet (female) socket on one end, and a waterproof (female) RJ45 (SeaTalk HS) socket on the other end, along with a locking gland for a watertight fit.
3. Adapter cable with a RayNet (male) plug on one end, and an RJ45 (SeaTalk HS) waterproof (male) plug on the other end.

4. Adapter cable with a RayNet (male) plug on one end, and an RJ45 (male) plug on the other end.
5. Adapter cable with a RayNet (female) socket on one end, and an RJ45 (SeaTalk HS) waterproof (male) plug on the other end.
6. Adapter cable with a RayNet (female) socket on one end, and an RJ45 (male) plug on the other end.
7. Adapter cable with a right-angled RayNet (female) socket on one end, and an RJ45 (male) plug on the other end.

Appendix A Software release history

The list below is a cumulative list of the new features introduced in subsequent releases of the M300-Series software, since the initial release (v1.00-1).

This list includes *new features* only. It does NOT include software maintenance items, such as bug fixes or performance improvements.
To download the software, and view the complete list of all software updates, including new features, bug fixes, and performance improvements, visit:

M300-Series software download link
https://bit.ly/m300-series-download

M300-Series, v2.00-79 new features:
(Software release date: *October 2024*)

- Maintenance release.

M300-Series, v2.00-78 new features:
(Software release date: *September 2024*)

- Maintenance release.

M300-Series, v2.00-67 new features:
(Software release date: *June 2024*)

- Updated serial number specific SSH keys and Web UI admin passwords to comply with the PSTI (*Product Security and Telecommunications Infrastructure*) regulation. For more information, refer to: **p.76 — Logging in to the Web browser user interface**

M300-Series, v2.00-38 new features:
(Software release date: *December 2023*)

- Maintenance release.

M300-Series, v2.00-30 new features:
(Software release date: *November 2023*)

- Maintenance release.

M300-Series, v2.00-19 new features:
(Software release date: *September 2021*)

- Added support which enables the park position to be edited through the Web browser user interface. For more information, refer to: **p.78 — OSD Menu**
- Added *[Dwell Time]* settings for NMEA 0183 radar tracking. For more information, refer to: **p.96 — Enabling NMEA 0183 via the camera's web interface**

M300-Series, v1.01-229 new features:
(Software release date: *March 2020*)

- Maintenance release.

M300-Series, v1.01-193 new features:
(Software release date: *January 2020*)

- Maintenance release.

M300-Series, v1.01-130 new features:
(Software release date: *November 2019*)

- Maintenance release.

M300-Series, v1.00-1 new features:
(Software release date: *November 2019*)

- Initial public release.

Appendix B Supported NMEA 0183 sentences

Receive

- BWC (Bearing & Distance to Waypoint — Great Circle)
- GGA (Global Positioning System Fix Data)
- HDT (Heading — True)
- OSD (Own Ship Data)
- RDS (Radar System Data)
- RSD (Radar Cursor Data)
- TTM (Tracked Target Message)
- TLL (Target Latitude and Longitude)
- VHW (Water Speed and Heading)

Appendix C Supported NMEA 2000 PGNs

Transmit and Receive

- 59392 — ISO Acknowledgement
- 59904 — ISO Request
- 60416 — ISO Transport Protocol, Connection Management - BAM group function
- 60928 — ISO Address Claim
- 126720 — MDS
- 126996 — Product Information

Transmit

- 126208 — NMEA - Acknowledge group function
- 126464 — Receive / Transmit PGNs Group Function
- 126993 — Heartbeat
- 126998 — Configuration Information

Receive

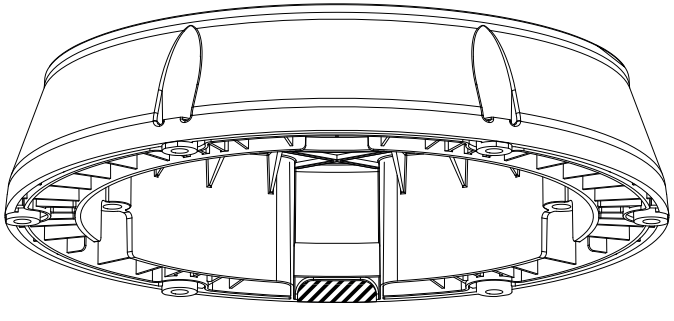
- 60160 — ISO Transport Protocol, Data Transfer
- 65240 — ISO Commanded Address
- 126208 — NMEA — Command group function
- 127250 — Vessel Heading
- 127258 — Magnetic Variation
- 128520 — Tracked Target Data
- 128259 — Speed, Water Referenced
- 129029 — GNSS Position Data
- 129283 — Cross Track Error
- 129284 — Navigation Data

Appendix D Routing cables through a (legacy) riser's sidewall

Ideally, the camera's cables should be routed through a mounting surface cutout which is weather-tight and protected from water ingress, fouling, and sun damage. However, if this is not possible, the cables can alternatively be routed through the riser's sidewall. An optional 30 mm (1.18 in) wide, removable hatched area is provided on the riser for this purpose.

Use the following instructions to remove the riser's sidewall hatched area:

Note:
This information relates **only** to the **legacy** riser design (riser part number **1009714**, which can be found printed on the underside of the riser). For instructions reflecting the *latest* riser design (riser part number *1017892*, which can be found printed on the underside of the riser), refer to: **p.33 — Routing cables through riser's sidewall**



1. On the underside of the riser, mark the sidewall hatched area location, as identified on the supplied *Mounting Template* document (77006).
2. Use a half-round file or a rotary tool to remove the sidewall hatched area.
3. Use a half-round file and / or sandpaper to smooth any rough edges or burs on the removed area.

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