hefring marine | USER MANUAL

Contents

Introduction

Hefring Marine is a vessel mounted cloud-based solution that provides vessel operators with a variable, real time display of the maximum recommend speed for the vessel, where the system automatically varies the displayed maximum recommended speed (RedSpeed-over-Ground – ROG) to reflect prevailing sea and weather conditions. The system uses the latest sensor technologies with intelligent proprietary processing to present operators with actionable information that is used to operate the vessel within its safe and efficient operational envelope.

The onboard system is supported by a user-friendly, cloud-based admin portal, the HM Admin Console, that provides real-time monitoring and historic detailed trip insights and reports. The actual speed of the vessel and the safe operating speed is logged for each trip, thus monitoring vessel and operators to ensure that they are operating safely and efficiently.

This document is a user manual and installation guide for the on-board system. The system consists of two primary module types: the Control Unit and the Sensor Unit(s).

System Overview

Control Unit

The Control Unit is the central computing module of the system and handles data collection, data processing, presentation of data to a user interface and display, and uploading of data to the cloud, or the HM Admin Console.

Specifications:

Type:	-	Embedded system computer
Dimensions:	-	Enclosure: L217 x W188 x H87 mm
Connectors:	-	9-36VDC (max 1.5A @ 12V)
	-	CAN Bus M12 to Sensor Unit(s)
	-	NMEA2000 / Raymarine SeaTalk Primary data: GPS and speed Secondary: all other available data
	-	2x LAN / Ethernet To connect to selected multi-function displays and onboard modems where available
	-	HDMI
	-	2x USB
	-	SIM slot
Antennas:	-	2x LTE Cellular
	-	Wi-Fi
Construction:	-	IP67 enclosure rating
	-	Anti-vibration chassis

Setup alternatives:

- **Display:** The system offers several options for displaying the on-board user interface. The system can be connected to most latest, high-end Garmin, Simrad or Raymarine plotters, any HDMI display or a non-HDMI display using an HDMI-composite video converter. If the system is connected to the boat's own cellular modem, the user interface can be viewed on any browser-enabled device connected on the local network.
- **Cellular connectivity:** The system is provided with a cellular modem and antenna. It can also be connected to an on-board cellular modem via ethernet cable to make use of the boat's own internet connection.
- **GNSS/GPS:** The system receives location and speed data via NMEA2000. If NMEA 0183 is available instead of NMEA2000, the system can be connected to the NMEA 0183 network using a standard NMEA 0183 to NMEA2000 multiplexer or gateway.

Sensor Unit

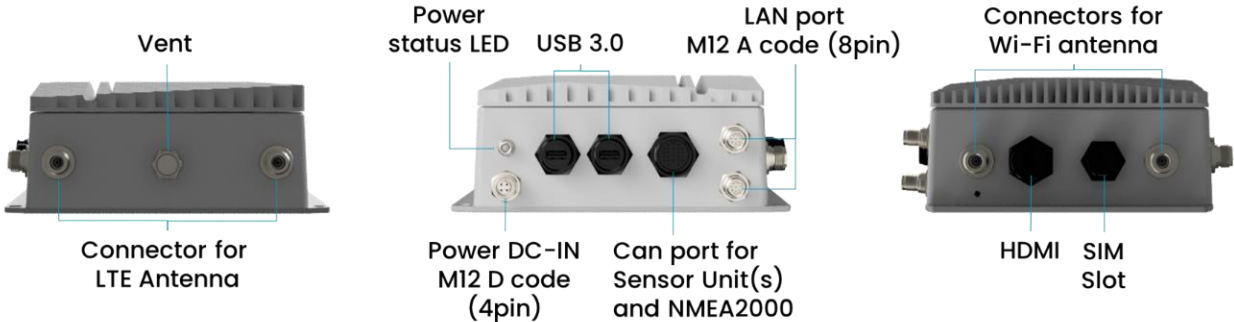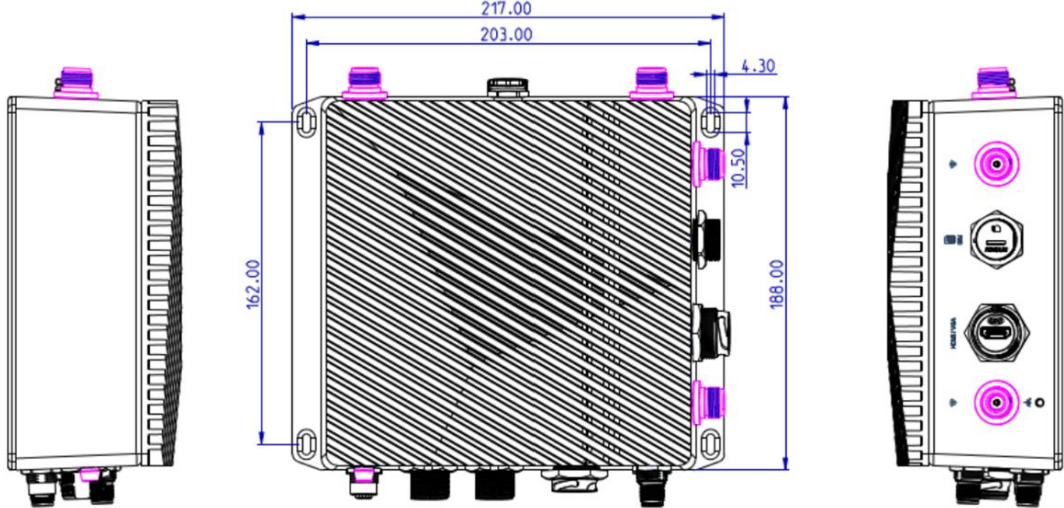The Hefring Marine system comes with one or two Sensor Units.

Specifications:

Type:	-	Inertial measurement unit
Dimensions:	-	L45 x W50 x H24 mm
Mounting:	-	Center-to-center between mounts: L45 x W39 mm Mounting hole: 4x⌀3 mm
Sensors:	-	Accelerometer (+/- 16g)
	-	Dual gyroscopes
	-	Magnetometer
Port:	-	CAN-bus M12 8 pin female port for cable connection to Control Unit
Signal processing:	-	Proprietary Hefring Marine rigid body filter
Construction:	-	IP67 enclosure rating

Dual Sensor Unit setup: The Hefring Marine system can be provided with a single or dual Sensor Unit configuration. While a single Sensor Unit setup is sufficient on most boat sizes, a dual configuration may be needed on larger vessels where monitored motions might vary significantly depending on placement in the vessel, or where different types of motion data and analysis are required. This may include using one sensor to monitor crew and another to monitor structural integrity.

Dimensions and System Details

Control Unit

217.00
203.00
4.30
162.00
10.50
188.00

| Vent | Power status LED | USB 3.0 | LAN port M12 A code (8pin) | Connectors for Wi-Fi antenna |

Connector for LTE Antenna

Power DC-IN M12 D code (4pin)

Can port for Sensor Unit(s) and NMEA2000

HDMI   SIM Slot

Sensor Unit

Can port connector
for M12 cable to Control Unit
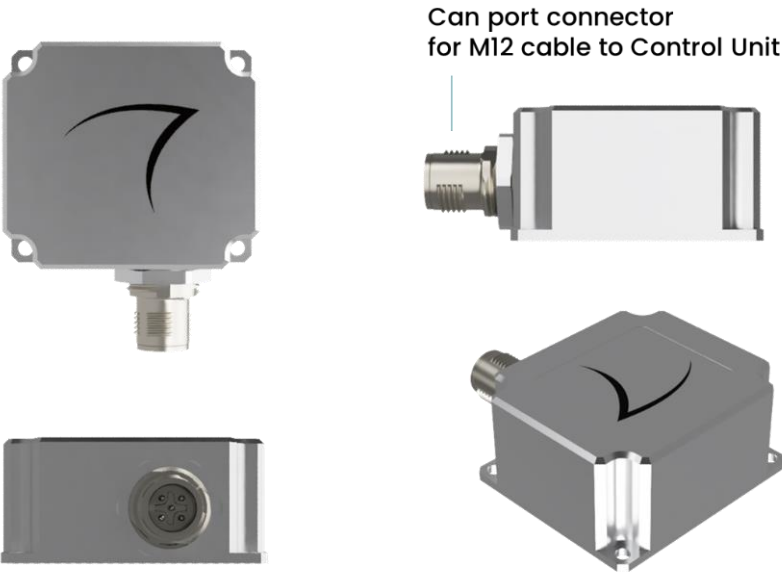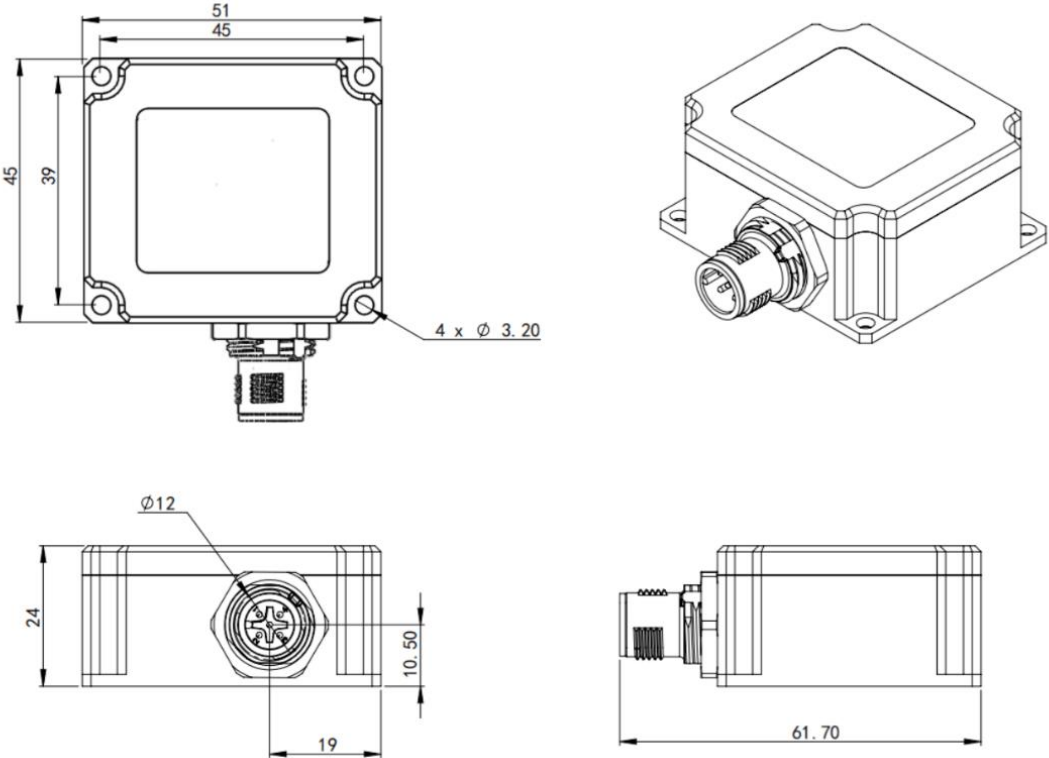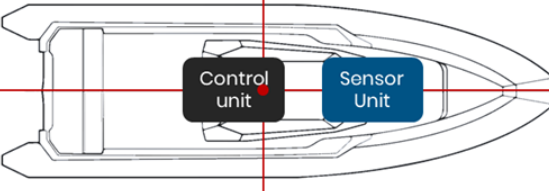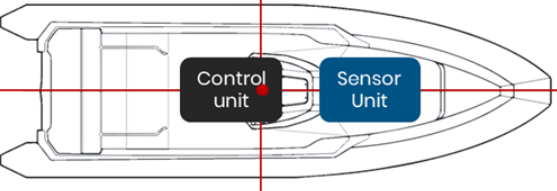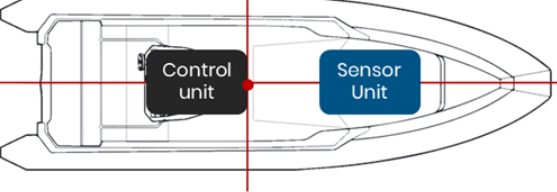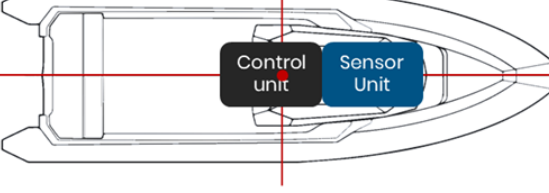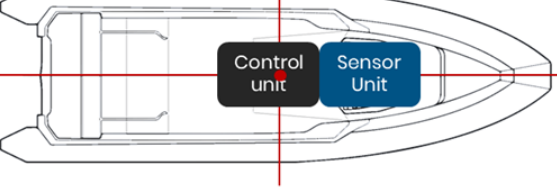
Installation Guidelines

System Ports and Connections
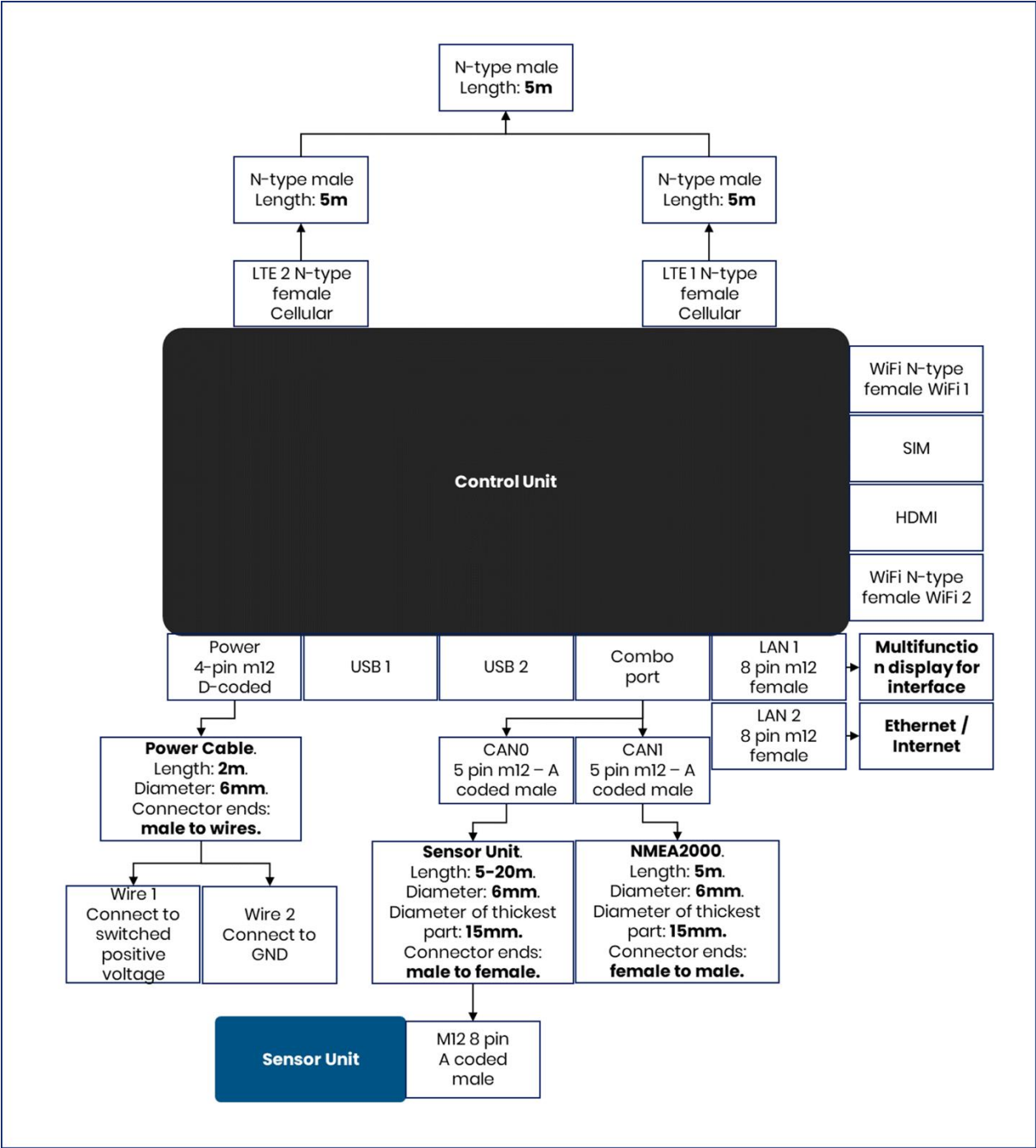
Standard Sensor Unit placement

Centre console

Control unit | Sensor Unit

Centre cabin

Control unit | Sensor Unit

Aft console

Control unit | Sensor Unit

Aft cabin

Control unit | Sensor Unit

Bow console

Control unit | Sensor Unit

Bow cabin

Control unit | Sensor Unit

Unit Positioning

Control unit

Where the console or cabin is situated centrally or near the aft, install behind Sensor Unit, in or around the console or cabin, near to the vessel's centre of gravity (●).

Where the console or cabin is situated toward the bow, install in the console or helm.

Sensor Unit

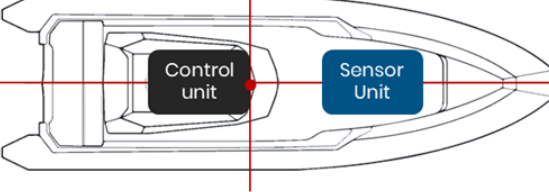Where the console or cabin is situated centrally or near the aft, install in the front-most seating position or toward the bow.

Where the console or cabin is situated toward the bow, install in the console or helm.

Sensor Unit alignment

Sensor Unit

✓

Down

Position the Sensor Unit(s) so that they sit horizontally on an even surface directly on or as near to the deck of the vessel as possible. Avoid placing the units in a way where they are slanted, rotated or in a vertical position. Also avoid placing on top of any material that may dampen or increase monitored impacts and vibrations.

Straight line toward bow

Left Port

90°

Right Starboard

Straight line toward stern

The accelerometer in the Sensor Unit is sensitive to high-frequency vibrations, which if monitored may influence and distort data from the actual movements of the vessel. While the Sensor Unit tries to eliminate these signals, make sure that the Sensor Unit is not placed on any surface that can vibrate independently of the vessel itself. Also avoid placing the Sensor Unit on any material that may dampen the vibrations and impacts experienced. For best results, place the Sensor Unit directly onto the deck structure, or as close to it as possible.

For best results, ensure that the sensor is correctly aligned. See the figure on the left. The cable port on the Sensor Unit should face backward toward the stern of the vessel and the opposite side toward the bow.

Alignment of dual Sensor Units

Try to position the units so that they follow a straight line along the middle of the vessel from one another.

Avoid placing the units diagonally across the vessel.
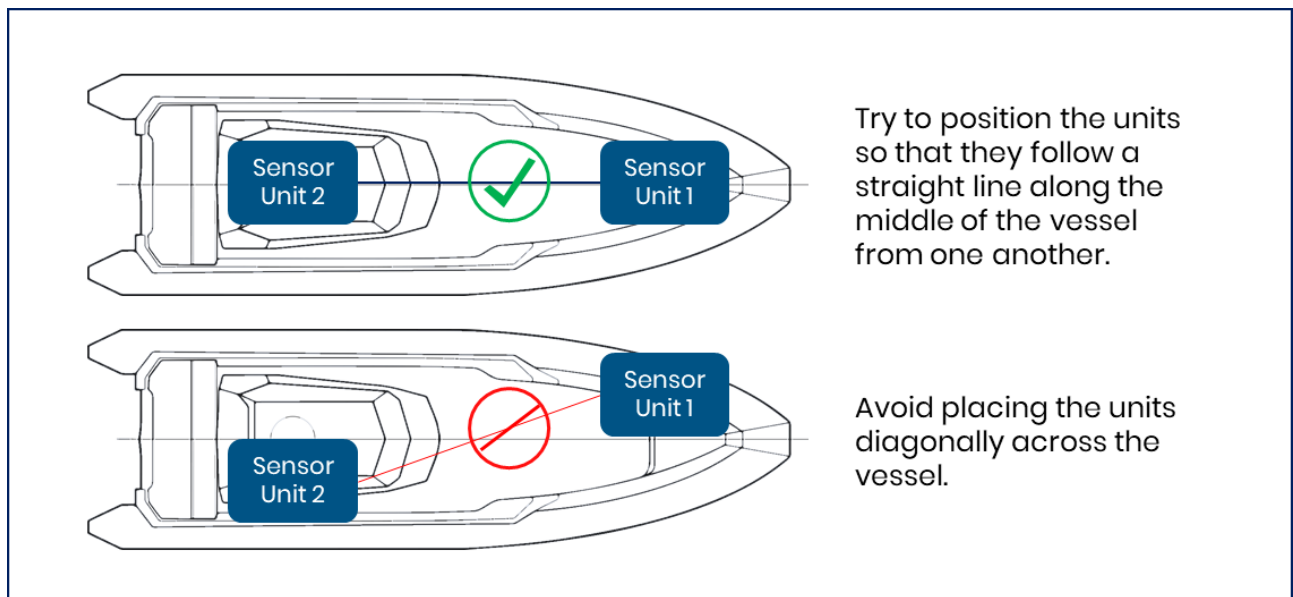
Installation Process

Installation requirements

- Access to 9-36VDC, maximum 1.5A @ 12V within 2 meters of Control Unit placement
- Access to NMEA2000 backbone within 5 meters of Control Unit placement
- Flat surfaces for each unit to be mounted on.
  - Sensor Unit needs to be placed horizontally (see "Sensor Unit alignment" section).
  - Control Unit can be mounted vertically if required.
- Cable conduit/suitable cable pathway between the Control and Sensor Units

What's included

- Standard
  - Control Unit.
  - Sensor Unit.
  - Sensor Unit cable (5-20 meters).
  - NMEA2000 cable (5 meters).
  - Power cable 9-36VDC (max 1.5A @ 12V) (2 meters).
- If requested
  - Sensor Unit 2.
  - Cable (5-20 meters) and t-piece for Sensor Unit 2.
  - Ethernet cable (2-10 meters).
  - HDMI cable (2 meters).
  - USB cable (2 meters).
  - Cellular antenna with coax cable (5 meters) for cellular modem.

Installation instructions

1. Identify suitable positions on the vessel for the Control Unit and Sensor Unit(s) based on the information detailed in the Installation Guidelines above.
   a. The **Control Unit** has a mounting bracket with four mounting holes that are 4.3x10.5mm in size. To mount, use M5 screws, or equivalent, to fix the Control Unit in place in a suitable position on the vessel.
   b. The **Sensor Units** come in an IP67 aluminium enclosure that has its own mounting holes that are 3mm in diameter. Use M3 screws, or equivalent, to fix the Sensor Unit in a suitable position on the vessel.
2. Ensure that the Control Unit is appropriately positioned with access to 9-36VDC and a NMEA2000 backbone within 2 meters.
3. Connect the Control Unit to the NMEA2000 backbone using the NMEA2000 cable and t-piece.
   a. If adding to the end/beginning of the NMEA2000 backbone, remove the terminator resistor off of the backbone, insert the new t-piece and place the resistor to the end of the new t-piece. Connect the NMEA2000 cable to the centre of the new t-piece.
   b. If adding the t-piece in between other t-pieces, simply disconnect them, add the new t-piece in between and connect both to the new t-piece. Then connect the NMEA2000 cable to the new t-piece on one end and to the Control Unit on the other end.
4. Lead the Sensor Unit cable from the Control Unit to the Sensor Unit via a suitable cable pathway. If the cable provided is too long, remove the connector piece off the end, cut the cable to the appropriate length and reinstall the connector piece. Connect the Sensor Unit cable to the Control Unit on one end and the Sensor Unit on the other end.
   a. For a dual Sensor Unit setup, connect the t-piece to the Sensor Unit port on the Control Unit. Then connect the two Sensor Unit cables on both ends of the t-piece. Connect the Sensor Units on the other ends of the cables, as in point 4.
5. Connecting to internet.
   a. The antenna may have either one or two cables. If the antenna has two cables or ports, they will be labelled 1 and 2. Cable end 1 should be connected to LTE 1 while 2 should be connected to LTE 2. If the antenna only has one cable, then connect the cable to port LTE 1. Fasten the antenna securely in a position where it has a clear view of the sky. If needed, the antenna cables can be extended.
   b. If using a modem on board, connect an ethernet cable to the LAN 2 port on the Control Unit on one end and to the on-board network switch/router on the other end.
6. Connecting a display.
   a. To connect to an HTML5-enabled multifunction display (check your model and type), connect an ethernet cable to the LAN 1 port on the Control Unit. Connect the other end of the ethernet cable to the LAN port on the multifunction display. The Hefring Marine icon should appear in the display. For Garmin plotters, this will be under the OneHelm option. In Simrad and Raymarine, the icon will appear on the main icon screen.
   b. To connect to an HDMI display, connect an HDMI cable to the Control Unit on one end and to the HDMI display on the other end. The interface should appear automatically, although some HDMI displays require the correct port to be selected.
   c. If connected to an on-board modem for internet, the interface will be accessible on any browser-enabled devices connected on the same local network. Using your handheld device or laptop, simply go to http://hefring.local in your browser and the interface will appear.

7. Using the USB ports.
   a. If your system has been provided with any auxiliary devices or a flash drive, connect it to a USB port. Any additional functionality will be subject to the nature of the auxiliary device. If applicable, see Appendix for descriptions of auxiliary devices.
8. Once the Control Unit has been connected to the Sensor Unit(s) and other applicable systems, then connect the Control Unit to power.
   a. The Control Unit requires a 9-36VDC (max 1.5A @ 12V) power supply. The power cable has two cores, which should be connected as follows:

Cable core #	Function
1	Switched 9-36V
2	GND

   b. **Do not power the system on before properly connecting the Units.**
   c. Once the power cable has been connected, provide power to the system by switching on the vessel's electrical system and/or engines. As long as a power source is available, the system will continuously remain active.

Testing and troubleshooting

1. If the LED status light on the Control Unit glows green when power has been fed to the system, then it has been activated and is running.
   a. If the LED status light does not appear, check the power connections and revisit the steps in point 8 above.
2. If the interface appears on your multifunction display or HDMI screen, then the Control System has been properly connected to power and the display.
   b. If the interface does not appear in your display, check the power and display connections again. If you are using a multifunction display, ensure that it is an HTML5 compatible model. If you are using an HDMI screen, check the cable.
3. Follow the instructions in "System Activation and Use" to register the system and link it to a vessel. Once registration is completed, the main gauge screen will appear. If the icon in the top right corner of the main gauge screen turns green and shows the status "Connected", then the system has been properly connected to the sensor and is up and running.
   c. If the icon remains red and "Disconnected", check the cable connection to the Sensor Unit. If you have a dual Sensor Unit set up, make sure to check that the t-piece is properly connected.
4. To determine whether data is being streamed to the cloud, log into the HM Admin Console (see instructions in "System Activation and Use" below) and go to the "Console" page. If the trip is active in the Console, then the system is streaming data and is connected to the internet. It may take a few minutes for a trip to appear in the Console.
   d. If the trip does not show up in the Console but the system is active in the vessel, check the cables to the antenna. Also make sure that the antenna is properly placed where it has a clear view of the sky, ideally outside. If you are connected to an on-board modem, make sure that the Control Unit is appropriately connected to the network switch or router.
5. For any other issues or if problems persist, see the "Support" section below.

System Activation and Use

Starting up the on-board system

After installation, switch on the vessel's electrical system and/or engines to provide power to the system. For the registration step, please ensure that the system is connected to a display. When the system is activated for the first time, the display will show a registration code, which will be used in the next step of the activation process.

Registering the system and linking to a vessel

1. Navigate to console.hefringmarine.com and start by creating an account. If you already have an account, skip this step by signing in.
2. To create an account, click on "Sign up". Enter the applicable information requested until you have completed the sign-up process.
3. Once you have created an account and signed in, go to the page "Vessels" in the left-hand pane. Press "Add vessel" in the top right corner of the screen and enter the requested information about the vessel where the system is installed.
4. Under the "System settings" section of the vessel creation page, you are asked about "Impact Limit (g-force)" and "ROG Speed Limit (knots)", where ROG is the RedSpeed-over-Ground, or the guidance speed calculated by the system.
   a. The "Impact Limit (g-force)" is by default set to 3g. This implies that the system will aim to avoid g-force impacts at and above this threshold. Hefring ehf. recommends not exceeding this maximum impact value for general purpose use. However, the value can be increased or decreased to better suit your operating profile.
   b. The "ROG Speed Limit (knots)" is the speed limit for the vessel, over which all actual speed is considered to be in excess the specified ROG speed limit. The system will automatically vary its speed guidance as below the ROG Speed Limit value. By default, this value is set to 30 knots, but it can be changed to a higher or lower value as needed.
5. Once you have entered all applicable values, press "Create". Your new vessel should now appear in the vessel list. In the vessel list, under "Actions", press the link/chain 🔗 icon.
6. When powering on your on-board system for the first time, you are presented with a registration code. Type this code into the "Registration Code" field under "Link Vessel". Then press "Link". Your vessel should now be linked to the onboard system and configured with the specifications and settings inserted during the vessel creation process.

After completing registration

After completing the registration process, the on-board system will not show the registration code again. When the system is powered on after registration is completed, it will start by showing a logo splash screen, followed by a disclaimer. If you have an interactive display, you can click Agree on the disclaimer. Otherwise, the disclaimer will disappear once the counter reaches zero. Your use of the system following the disclaimer screen indicates your acceptance of the disclaimer terms. After the disclaimer screen, the system will

display the digital gauge screen. This is the main screen for the system's functionality and remains active during all trips. This intuitive screen provides real time information and guidance to aid safe and comfortable operation of the vessel.
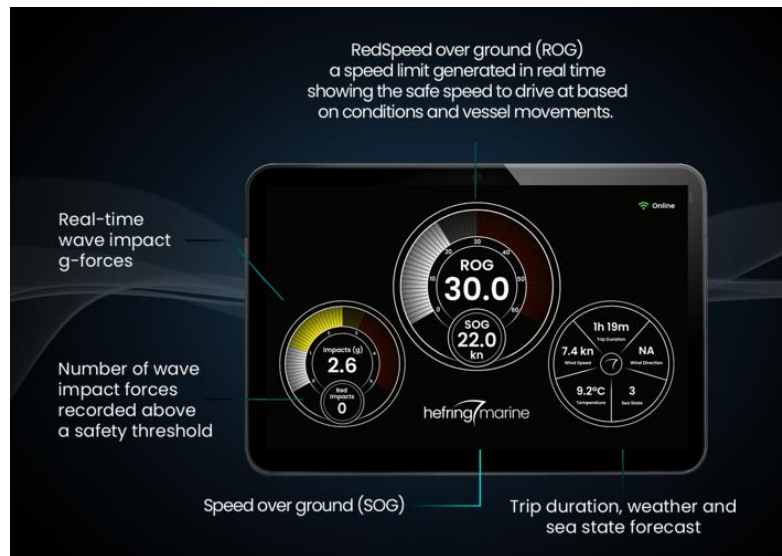
The left gauge shows the instantaneous impact g-forces experienced, both with gauge motions and as a value at the centre of the dial. At the bottom of the gauge is a dial that counts the number of impacts recorded above the Impact Limit, which is by default set to 3g.

In the centre of the screen is an intuitive speedometer, which displays actual vessel Speed-over-Ground (SOG) at the bottom of the gauge compared to the dynamic and varying RedSpeed-over-Ground (ROG) at the centre of the gauge, where the ROG is the calculated safest and most comfortable speed at any given time, based prevailing impacts, weather and sea conditions. While the ROG is continuously adapted to account for conditions, the ROG Speed Limit is configured in the HM Admin Console platform, as described above.

On the right side of the screen is a trip information gauge, showing trip duration, the Beaufort Sea-state, temperature, wind speed, and wind direction.

Using the HM Admin Console

The HM Admin Console can be accessed at console.hefringmarine.com.

The **Console** page displays a live feed from all active vessel trips. The **Trips** page shows a log of all past trips. By selecting a trip from the list, you are taken to a trip report with insights and analysis. The trip data can be downloaded from this report page. The **Vessels** page contains all registered vessels and whether they are paired to a system. Each vessel has a statistics page that can be accessed by clicking on the
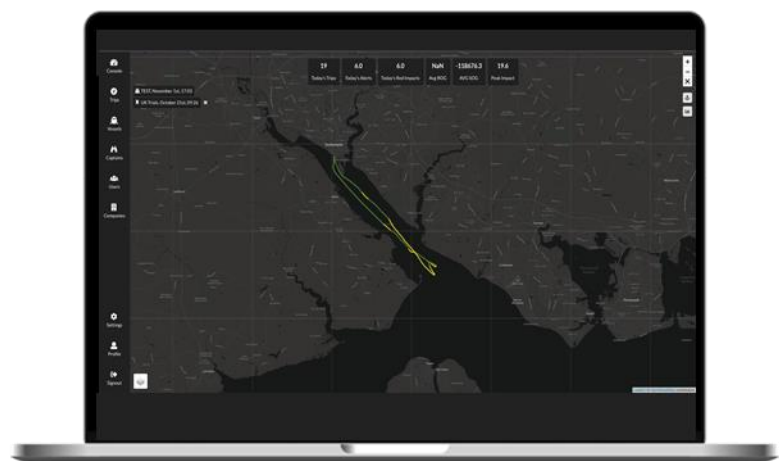
vessel's row in the table. Under **Users** you can add new users of the console and system. Each user can be given a specific role, where fleet managers have access to all information. A user with a Captain role can be assigned to a trip under the **Trips** page. **Profile**, **Settings** and **Sign out** are found on the bottom of the left-hand pane**.** You can change the account owner's information under **Profile** and **Settings** allows you to access site configurations and billing.

Software updates

The onboard system may be updated as improvements are made to the embedded software. Software updates are pushed out automatically and the system will install them when powered on and connected to internet. Software updates to the onboard system require no actions on part of the user. However, if you believe a software update has resulted in reduced performance, please share your feedback with us by contacting the email address provided in the Support section below.

Support

If you require assistance or run into problems and require additional support, please send us an email at support@hefringmarine.com. Please include the name of your organization or company and a brief summary of your issue in your email's subject line.

Appendix

hefring marine