SafeTug 19.3
User Guide

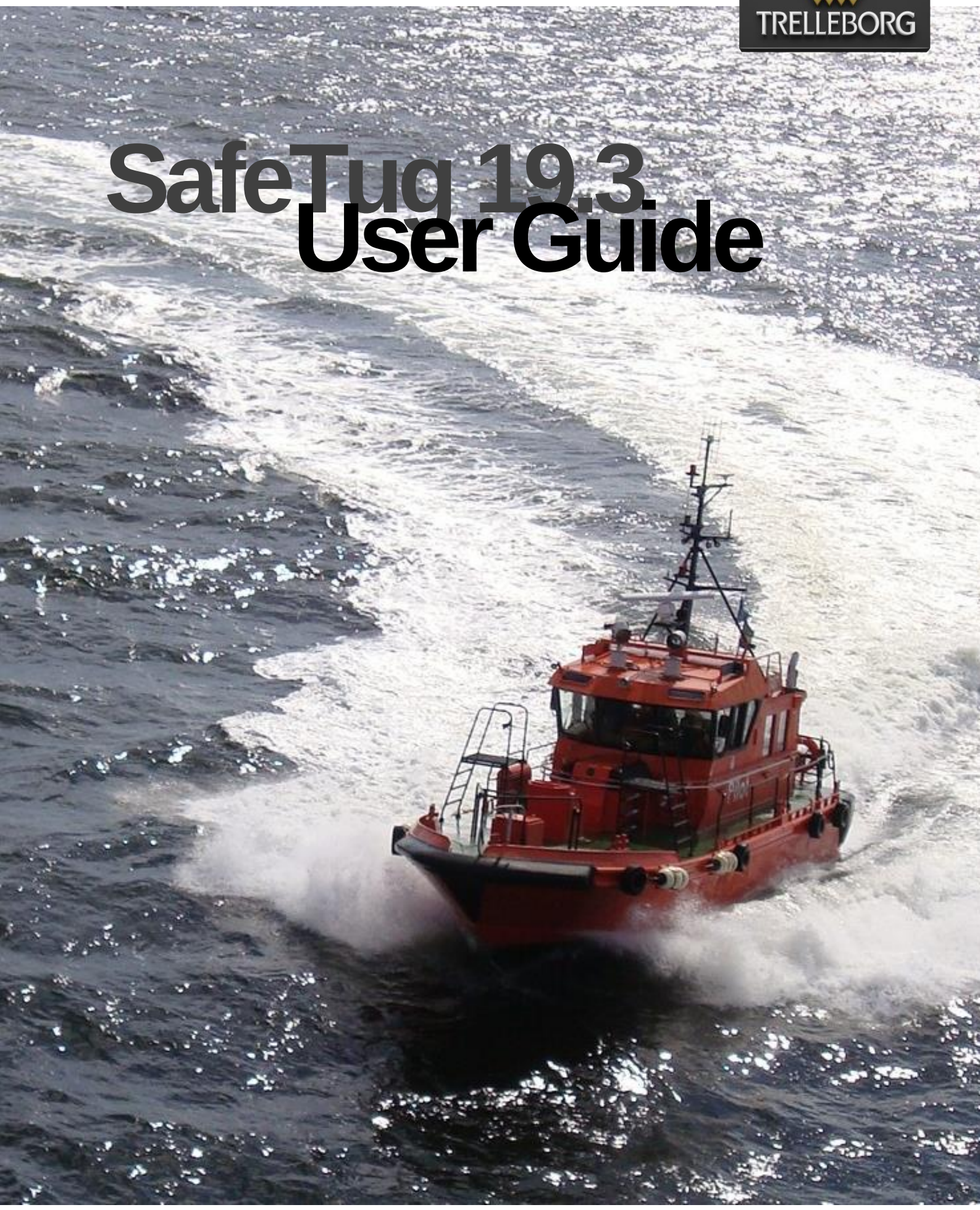


Table of Contents

What's new in SafeTug 19.3

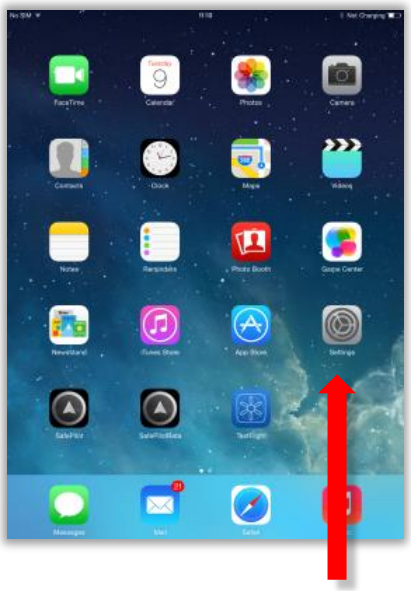
- Re-enabled multi-line vessel notes
- Option to set GNSS antenna beam offset from port or starboard

Introduction to SafeTug

The SafeTug software is a flexible tug support tool that can be extended by modules to fulfil a wide variety of demands.
This user guide consists of two parts. First are the standard settings used to customize the program to the individual captain's preference. Second is a detailed description of the SafeTug program itself.

App Settings

To get started with SafeTug begin by setting your personal preferences such as ship information, units of measurement, etc.
Go to the **Home Screen — Settings — SafeTug** and look at the options available.



Registration

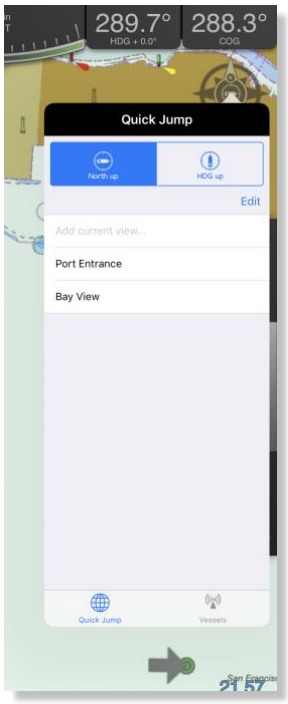
Please note that you need to register your SafeTug software with an e-mail address. This is done in the settings. To register your iPad must have an internet connection and the SafeTug program must be opened after the e-mail has been entered in settings.
If you are in charge of more devices each device must be registered with a unique e-mail. Trelleborg will return an e-mail, which you have to confirm, in order to complete the registration. The registered e-mail address serves as your license ID.

Chart control

SafeTug supports instant zooming and faster response than any other navigational software. To operate the chart view you simply:

- Drag to pan
- Pinch or double tap to zoom

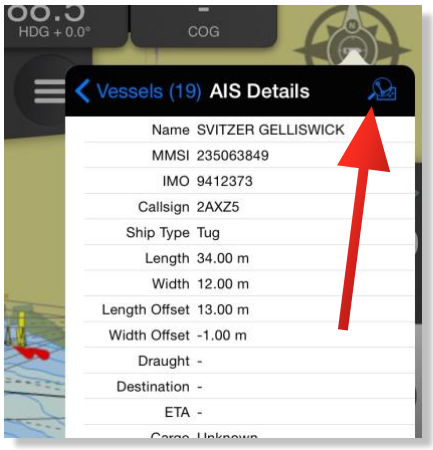
Chart orientation, scaling and navigation



The scale label below the compass in the top right corner of the screen indicates the charted distance from center of screen to top of screen.
Whenever the own vessel is shown on the screen, the screen will follow it, and locate it so that there will be the most visible chart area in front of the vessel. The vessel (and chart) may be relocated on the screen, so that the screen follows the vessel in this new location.
If the chart is moved, so own vessel is no longer visible on the screen, the screen will no longer follow the vessel. In this case an arrow pointing to an own vessel symbol will be shown to indicate in which direction the own vessel is. By tapping this symbol, the chart will be relocated so that own vessel again is visible on the screen.
Furthermore, if you are assisting a vessel, both the assisted vessel and your own vessel will be displayed and followed, until you move own vessel out of the view.
The following chart orientation modes are available:

- North up
- HDG up

By tapping the compass, the Quick Jump / Vessels popup will appear, and the chart orientation mode may be selected in the top. If you hold your finger on the compass symbol, the chart orientation mode is toggled between the two.



In the Quick Jump window, it is possible to define views and name them. This way you can have defined several specific locations that you visit often and jump to them without having to zoom and pan on the chart. When adding a new view, the current zoom level and location are saved under the name provided. Afterwards when you need to quickly go to one of these locations, just tap on the name. You can rearrange and delete items on the list by pressing edit.

In the bottom of this window you can select the Vessels tab. This will bring you to the list of vessels received by AIS. These vessels are sorted with the closest at top. Select a vessel to see the list of its particulars and to quickly jump to a certain vessel by tapping on the magnification symbol (red arrow).

Navigational data

The navigational data for the assisted vessel is always visible in two locations. The top bar shows the name of the assisted vessel (h-591) together with the rate of turn (ROT) of the assisted vessel. The left most graphic displays your own location source.

A right-hand side panel displays the speed vector movements of the assisted vessel and are only visible while assisting a vessel.

Replayer

All vessel movements are recorded automatically for every operation and saved in separate files for later replay. The list of recordings is located in a panel hidden behind the navigational data and can be revealed by dragging the tab in the center down.

You can slow down, speed up or jump in the replay as you wish. Note that if you are replaying in the middle of an active operation the recording of vessel movements will stop and no data saved. Also, when resuming the active operation again, a new recording will be created, and the operation will then consist of two recordings.

Assist a vessel

You can assist any other vessel visible on the map. To start assisting a vessel simply long press the vessel and select: Assist. The assisted vessel's navigational data will now be visible, and you and the assisted vessel will be followed on the map. To stop assisting a vessel you long press the vessel again and select: Stop assist. If you want to assist another vessel you may just start assisting the other vessel without stopping first.

Fullscreen displays

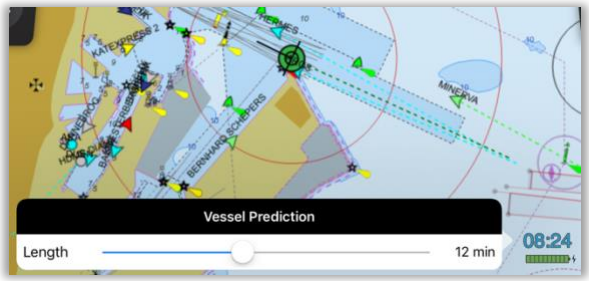
If fullscreen displays are available, they can be displayed by tapping on the assisted vessel panel on the right-hand side.

Assisted vessel prediction

The vessel prediction is a simple iterative projection of the position and heading based on the current position, COG, SOG, and ROT. The values for COG and SOG used for calculating prediction for assisted vessel are "smoothed" by using a three second average.

Vessel prediction

Tapping the clock in the lower right-hand corner brings up the vessel prediction dialog. The dialog has a slider that controls the amount of time into the future to predict the positions of vessels. Scrubbing the slider will thus visualize the projected movement of active vessels based on their current data.

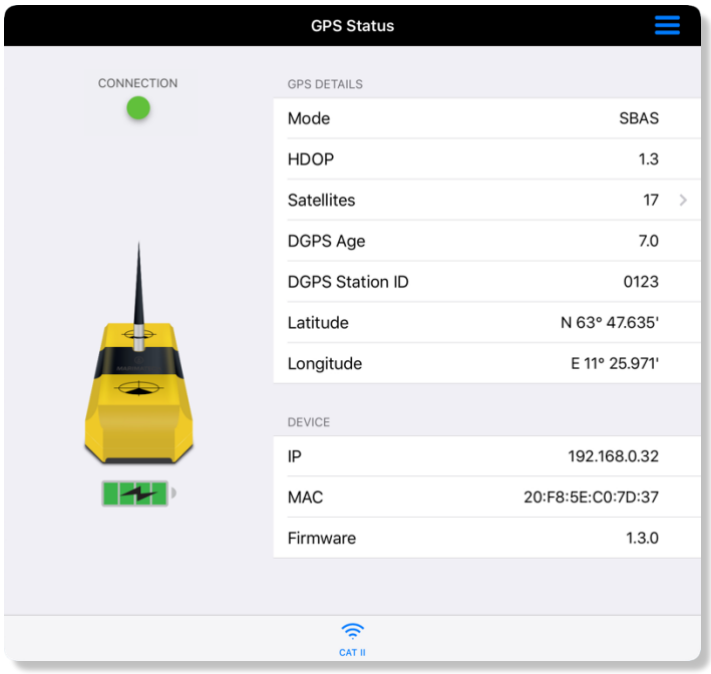


GPS status

In the left side of the top bar the current status of the data source is displayed. Tap on it to see satellite data as HDOP, number of satellites, differential correction station ID etc. In this window, you can also see the battery status of the CAT.
With the status code shown in the Mode field, you can expect the following position accuracy.

RTK:	1-2 cm (CAT III)
FRTK:	20 cm (CAT III)
DGPS:	40 cm (CAT III), 40cm (CAT II), 50 cm (CAT I / CAT XT)
SBAS:	60 cm (CAT III), 60cm (CAT II), 70 cm (CAT I / CAT XT)
GPS:	1.2 m (CAT III), 1.5 m (CAT II), 1.5 m (CAT I / CAT XT)
AIS:	Based on vessel instrumentation
EST:	Estimated
INV:	Invalid data: No position available
N/A:	Data not available
iPad:	iPad's internal GPS

The difference between SBAS and DGPS, is that in DGPS the corrections are coming from a shore station, and in SBAS the corrections are coming from a satellite.
To see the raw data received from the connected CAT tap on the list symbol (3 blue lines) at the top right corner in the status window.



Tapping on the number of satellites line in the list brings up a more detailed view of the current satellite constellation. showing PRN number, elevation, azimuth, signal/noise ratio and what system they belong to (GPS, Galileo, Glonass etc.).

If a connected device is low on battery, a battery warning symbol is shown alongside the GPS status icon. If the battery level becomes critical, the battery warning symbol will flash.

Vessel setup

Vessels received from AIS are automatically saved into the vessel database for easy retrieval/setup at next visit.

To select a vessel from the vessel database, tap at the arrow behind the vessel name and the vessel list will appear. This list is generated based on the AIS data received, for quick setup of new vessel. The list is searchable in the top.

The GPS antenna offsets indicate the location of the position antenna(s), i.e. CAT XT GPS, CAT I, CAT II, CAT III, and/or the vessel's own GPS antenna.

Length offset is the distance from bow to Pos antenna.

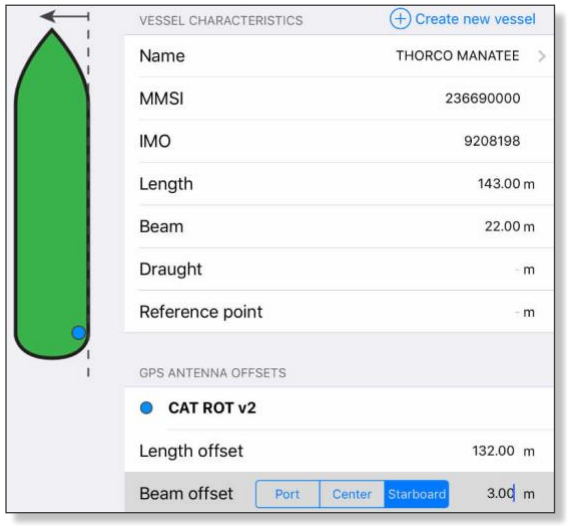
Beam offset is the distance from center line (negative number for port side, positive number for starboard side) to Pos antenna.

Heading offset (only for CAT II / III) is the orientation of the heading antenna compared to the position antenna.

Hdg antenna in front of Pos antenna = 0 deg offset
Hdg antenna to starboard of Pos antenna = 90 deg offset
Hdg antenna astern of Pos antenna = 180 deg offset
Hdg antenna to port of Pos antenna = 270 deg offset

Draught is the draught of the vessel. Used for displaying the safety contour.

Reference point is used for specifying the conning position offset from the bow. If this is not set, antenna length offset is used for conning position.



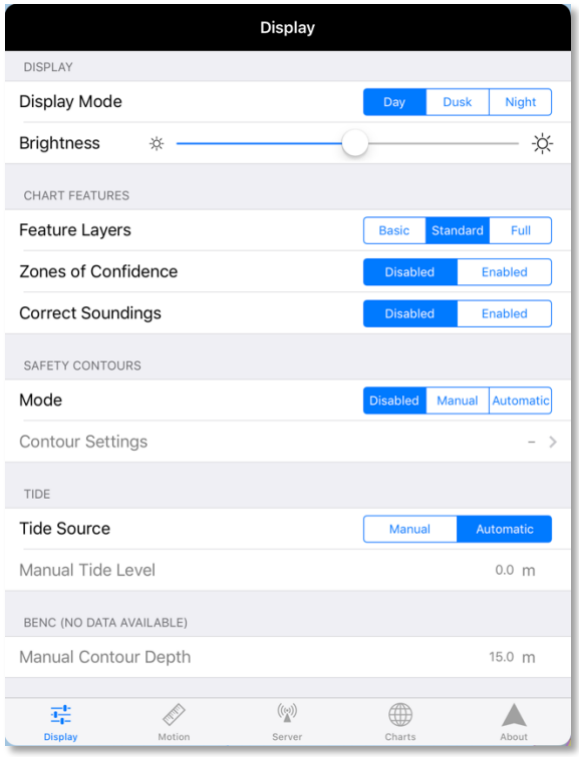
When getting the data from pilot plug of the ship, the dimension and antenna offsets are sometimes wrong. These can be adjusted here to correct for these errors.

Tap “Create new vessel” to create a blank sheet for entering vessels particulars.

Control center

The control center (gear icon) is located below the context selection wheel in side panel on the left-hand side.
Tap on the icon and you have the following options:

- Display
- Motion
- Server (only available with the Port Server module)
- Charts
- About



Display — Day, dusk and night mode

The pilot can toggle between day, dusk and night mode.

Display — Brightness of the screen

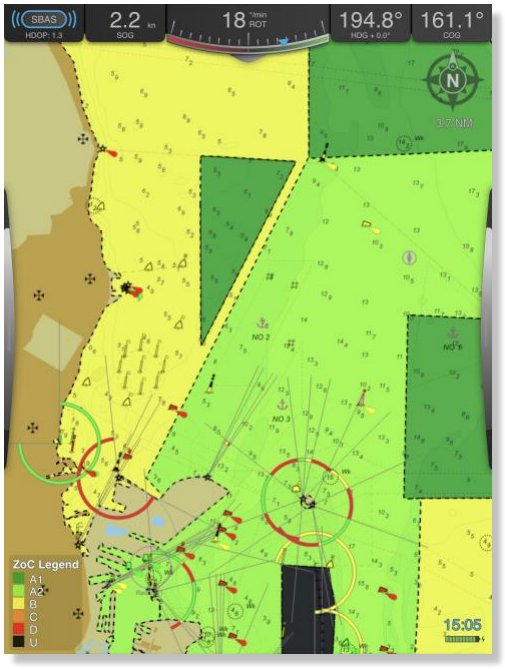
Adjust the brightness of the screen.

Display — Feature Layers

Select which feature layers to be visible in the charts. Three predefined modes are available: Basic, Standard, and Full. See Appendix 1 for a detailed list of which features are visible in each of the three modes.

Display — Zones of Confidence

Enable zones of confidence to get a picture of the quality of surveyed data in the charts.



The legend in the lower left corner of the screen maps each color to a category of zone.

ZOC	Position Accuracy	Depth Accuracy	Seafloor Coverage	Typical Survey Characteristics
A1	± 5 m + 5% depth	± 0.5 m + 1% depth	Full area search undertaken. Significant seafloor features detected and depths measured.	Controlled, systematic survey high position and depth accuracy achieved using DGPS or a minimum three high quality lines of position (LOP) and a multibeam, channel or mechanical sweep system.
A2	± 20 m	± 1.0 m + 2% depth	Full area search undertaken. Significant seafloor features detected and depths measured.	Controlled, systematic survey achieving position and depth accuracy less than ZOC A1 and using a modern survey echosounder and a sonar or mechanical sweep system.
B	± 50 m	± 1.0 m + 2% depth	Full seafloor coverage not achieved; uncharted features, hazardous to surface navigation are not expected but may exist.	Controlled, systematic survey achieving similar depth but lesser position accuracies than ZOCA2, using a modern survey echosounder, but no sonar or mechanical sweep system.
C	± 500 m	± 2.0 m + 5% depth	Full area search not achieved, depth anomalies may be expected.	Low accuracy survey or data collected on an opportunity basis such as soundings on passage.
D	Worse than ZOC C	Worse than ZOC C	Full area search not achieved, large depth anomalies may be expected.	Poor quality data or data that cannot be quality assessed due to lack of information.
U	Unassessed – The quality of the bathymetric data has yet to be assessed.			

SOURCE: WWW.S-57.COM

Display — Safety Contours

Safety contours can be adjusted under the Display tab. Three modes can be chosen:

- Disabled
- Manual, selection of shallow contour and safety contour
- Automatic, based on either a fixed under keel clearance or on a percentage of the draught.

Here it is also possible to enable auto corrections of soundings based on tide.

Display — Tidal data integration

Tidal data can be integrated by a manual value, in form of a tide table or as live feed from tidal sensors. The tide integration options are handled under the Display tab in the control center.

If tide is set to **Manual** a value can be entered.
If set to **Automatic** SafeTug will read from nearest available tide sensor or tide table.
The tide value is used in combination with the Safety Contour functionality.
(See section Safety contours)

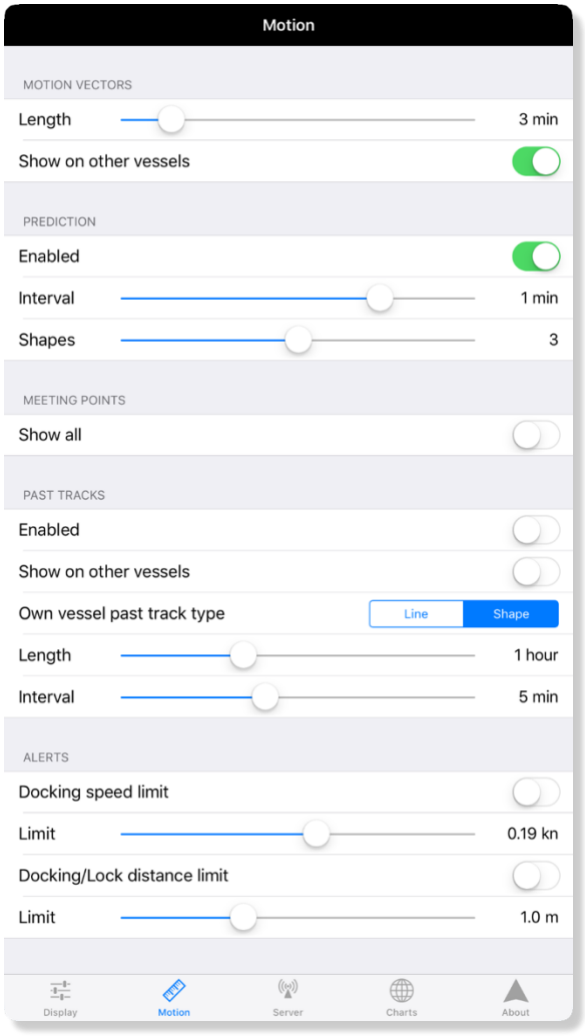
Motion

The Motion tab has settings for configuring properties related to motion, both past and predicted. There are sections for configuring motion vectors, prediction shapes and past tracks.

When own ship is moving slower than 5 knots or is turning more than 10 °/min, two motion vectors will be shown, one from the bow and one from the stern of the ship shape. Otherwise, only one motion vector will be shown from the conning position. The values for COG and SOG used for calculating motion vectors for own vessel are "smoothed" by taking a three second average. Motion vector on other vessels are always originating from their GPS antenna location.

You may activate “Show all” meeting points to automatically see meeting points for all other ships around your current route. The only exception is ships with a SOG below 1 knot which will not have a meeting point.

You may enable an audible and visible warning on transverse docking speeds. If either bow or stern speed exceeds the set limit, the relevant number will become colored amber, and an audio alert will sound.
Likewise, a distance warning can be enabled. This will trigger a warning if the docking or lock distance is less than the chosen value.



Server

This tab shows if you are connected to a SafePilot Port Server. You can see the server address and enable or disable the internet AIS stream.

About

The **About** tab display system information such as the ENC user permit required for chart purchase, the license email used for registration (“assigned to”), version number and a list of activated modules.

Charts

The **Charts** tab display information about the installed charts and updates for charts.

AIS targets and data

AIS targets are displayed with true shape when width, length and heading data is available. If any of the info is missing, the AIS target will be displayed as a symbol indicating the position. If the heading is missing the approximation is made that HDG is the same as COG and the vessel shape will appear as a transparent ghost shape. If both HDG and COG are missing the transparent ghost shape of the vessel will have a HDG of zero degrees. The dimensions of the vessel are displayed.
To see target info, tap on an AIS target. To remove the info box, tap on the info box or the AIS target. The information shown in the info box and the size of the info box can be changed in the App Settings.
In App Settings you can choose to show certain ship types with reduced detail to reduce clutter. These will then be shown with a smaller symbol, no name and no motion vector.

Charts from PRIMAR

If you have purchased your ENC charts from PRIMAR using your User Permit from SafeTug, SafeTug will automatically connect to the PRIMAR servers and download your charts and any future updates to the charts.

File handling

Charts and other files can be exchanged between SafeTug and a computer via iTunes.

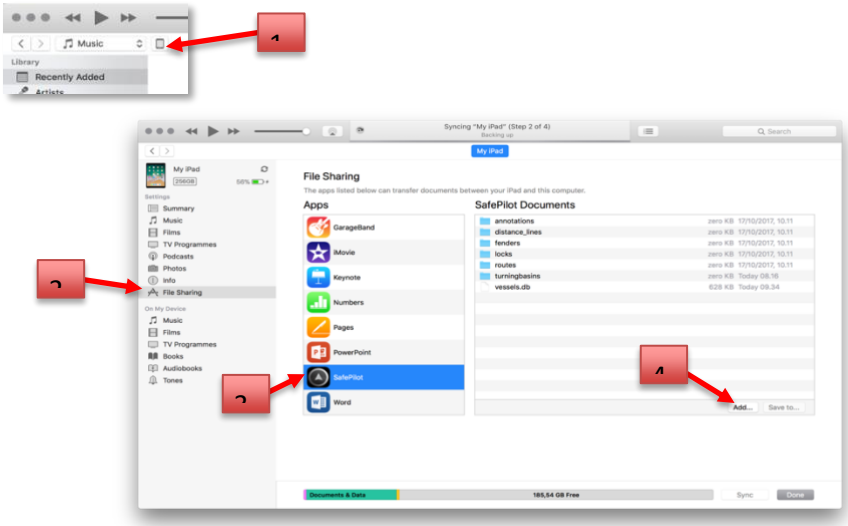
- Connect your iPad to the computer via USB-cable and open iTunes on the computer.
- Select **iPad** (step 1) **—** **App** (step 2) **—** scroll down (step 3) **—** **SafeTug** (step 4).

Now you see the document list of SafeTug. It contains a number of folders each containing one type of files. The files in the folders have different extensions to distinguish them from each other:

- Annotations have .san extension

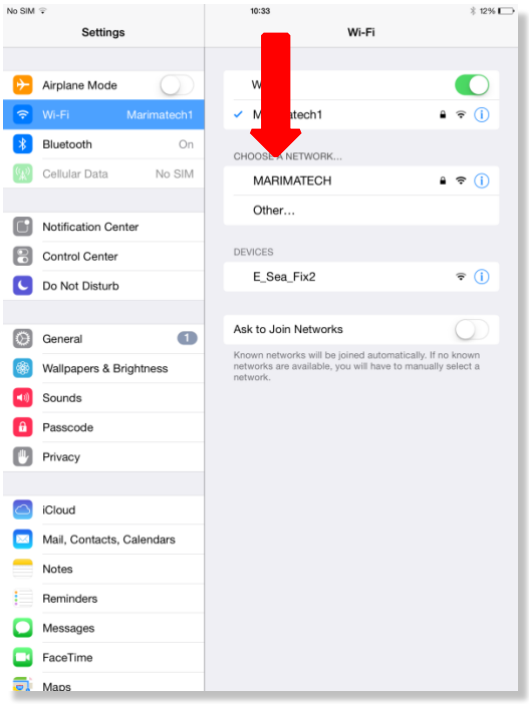
The vessel database is named vessels.db.

If you want to install charts or files (such as tide tables, bENC data, routes) select add (step 5) and browse to the location on the computer with the files. If you want to export files from the iPad mark the file you what to extract and select “Save to…” instead. The files that are placed in folders need to be added or saved as the complete folder. I.e. if you wish to add a route, you will have to first save the "routes" folder from the iPad, add the route to the folder on the computer, and then add the folder back to the iPad.



How to connect to CAT ROT / CAT I

The CAT ROT unit creates an access point and automatically provides an IP address to the iPad/PC. The CAT I will automatically connect to the CAT ROT.



The first time you connect to a CAT ROT you should follow this procedure:

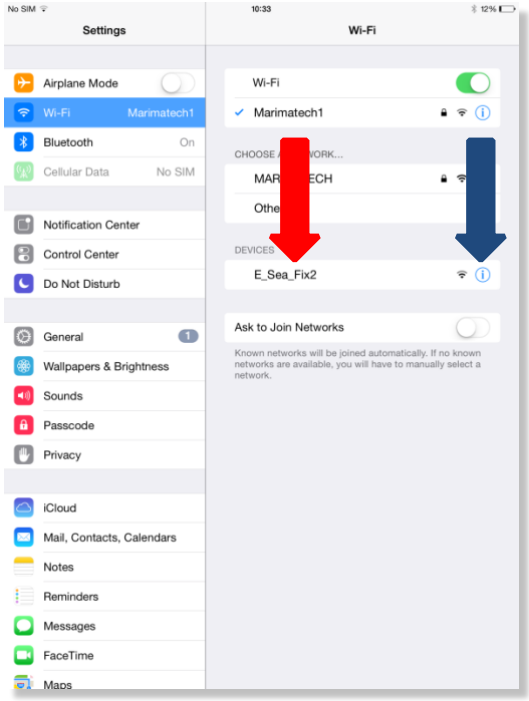
- Place the CAT ROT v2 unit on a horizontal surface and connect it to the pilot plug.
- Turn on the unit.
- Go to **Settings — Wi-Fi** on the iPad and select the network created by the CAT ROT. See note below for differences between the different CAT ROT versions.
- Start SafeTug.

You are now connected. Next time the iPad sees the same network name it will automatically connect.
You can have multiple iPads connected to the CAT ROT to receive the same data.

Note on network name and password:
The default network name is always *MARIMATECH* with no password.
Using the CatConfigTool the network name may be changed to a unique name for the CAT ROT.
Please be aware that the iPad will not complain, if you happen to enter a wrong password – it just won't connect to the CAT ROT's network!

How to connect to CAT II and CAT III

The older CAT II and CAT III uses a fixed IP address, newer models use Auto IP address. It is indicated on the unit itself what type it is.
The first time you connect to a new CAT II or CAT III unit follow the procedure below:



- Set-up the CAT II or III on the railing of the bridge wing or monkey Island with clear view of the sky.
  Spread out the antennas with as long base line as possible. It is, however, essential that both antennas are completely clear of any obstructions as spotlights, sun cover, close bulkheads, antennas etc.

- The unit is turned on automatically when the GPS antennas are spread.

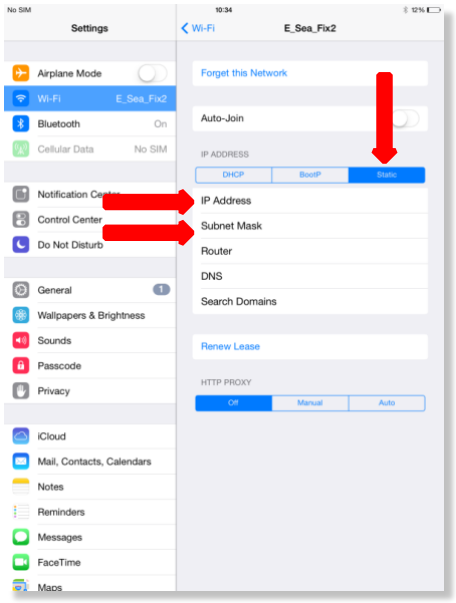
- Go to **Settings - Wi-Fi** on the iPad and select the network called “E_Sea_Fix**x**” (**x** = each unit will end with a unique number for the unit).

- Tap on the information icon (blue “i") and select **Static or DHCP**.

- Enter in the **IP Address** of the iPad. On CAT II and CAT III this address is written on a label designated “PC” on the device.

- Set the **Subnet Mask** to 255.255.255.0

- Start SafeTug



You are now connected. Next time the iPad sees the “E_Sea_Fix**x**” network it will automatically connect.

Antenna location

To obtain the full performance and accuracy of a satellite based system the pilot must be extremely critical with the antenna location. The aerials must be **minimum** 1 m clear of any obstruction (marked by red arrows below). The distance between the aerials (baseline) should be 4 m, but it can be reduced, if required, to get clear of obstructions. The reduced base line must be minimum 3 m. A shorter baseline will result in a reduction in heading accuracy.

SafeTug Port Server options

When SafeTug is connected to a Port Server several extra features are available.

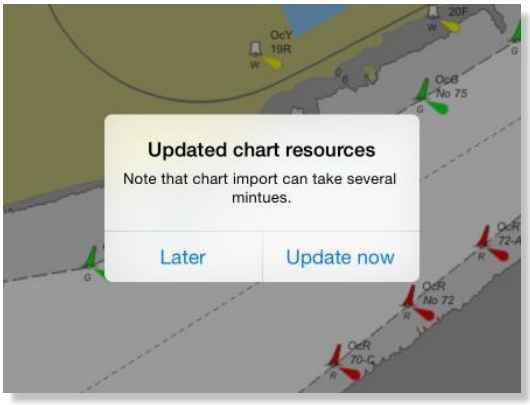


Chart updates

SafeTug gets chart updates from the Port Server when available. SafeTug checks every minute if there are new updates. You can choose to install later and SafeTug will prompt you to update the charts later.

Shared annotations

Annotations done on the SafePilot Shore Viewer will be automatically synched to SafeTug, providing the user with updated information in real time. Annotations synched from shore cannot be modified.

Other synchronizations

All files put on the SafePilot Port Server will be synchronized.

Appendix 1 – Feature layers

BASIC	STANDARD	FULL
BRIDGE: Bridge	ACHARE: Anchorage area	ACHARE: Anchorage area
BUAARE: Built-up area	ACHBRT: Anchor berth	ACHBRT: Anchor berth
CANALS: Canal	BCNCAR: Beacon, cardinal	ADMARE: Administration Area (Named)
CAUSWY: Causeway	BCNISD: Beacon, isolated danger	AIRARE: Airport/airfield
COALNE: Coastline	BCNLAT: Beacon, lateral	ARCSLN: Archipelagic Sea Lane
DEPARE: Depth area	BCNSAW: Beacon, safe water	ASLXIS: Archipelagic Sea Lane axis
DEPCNT: Depth contour	BCNSPP: Beacon, special purpose/general	BCNCAR: Beacon, cardinal
DRGARE: Dredged area	BERTHS: Berth	BCNISD: Beacon, isolated danger
FLODOC: Floating dock	BOYCAR: Buoy, cardinal	BCNLAT: Beacon, lateral
GATCON: Gate	BOYINB: Buoy, installation	BCNSAW: Beacon, safe water
HULKES: Hulk	BOYISD: Buoy, isolated danger	BCNSPP: Beacon, special purpose/general
LAKARE: Lake	BOYLAT: Buoy, lateral	BERTHS: Berth
LNDARE: Land area	BOYSAW: Buoy, safe water	BOYCAR: Buoy, cardinal
PONTON: Pontoon	BOYSPP: Buoy, special purpose/general	BOYINB: Buoy, installation
RIVERS: River	BRIDGE: Bridge	BOYISD: Buoy, isolated danger
SLCONS: Shoreline construction	BUAARE: Built-up area	BOYLAT: Buoy, lateral
UNSARE: Unsurveyed area	BUISGL: Building, single	BOYSAW: Buoy, safe water
	CANALS: Canal	BOYSPP: Buoy, special purpose/general
	CAUSWY: Causeway	BRIDGE: Bridge
	CBLARE: Cable area	BUAARE: Built-up area
	CBLOHD: Cable, overhead	BUISGL: Building, single
	CBLSUB: Cable, submarine	CANALS: Canal
	COALNE: Coastline	CAUSWY: Causeway
	CONVYR: Conveyor	CBLARE: Cable area
	CTNARE: Caution area	CBLOHD: Cable, overhead
	CTSARE: Cargo transhipment area	CBLSUB: Cable, submarine
	DAMCON: Dam	CGUSTA: Coastguard station
	DAYMAR: Daymark	CHKPNT: Checkpoint
	DEPARE: Depth area	COALNE: Coastline
	DEPCNT: Depth contour	CONVYR: Conveyor
	DISMAR: Distance mark	CONZNE: Contiguous zone
	DMPGRD: Dumping ground	COSARE: Continental shelf area
	DOCARE: Dock area	CRANES: Crane
	DRGARE: Dredged area	CTNARE: Caution area
	DRYDOC: Dry dock	CTRPNT: Control point
	DWRTCL: Deep water route centerline	CTSARE: Cargo transhipment area
	DWRTPT: Deep water route part	CURENT: Current - non-gravitational
	FAIRWY: Fairway	CUSZNE: Custom zone
	FLODOC: Floating dock	DAMCON: Dam
	FNCLNE: Fence/wall	DAYMAR: Daymark
	FOGSIG: Fog signal	DEPARE: Depth area
	FSHFAC: Fishing facility	DEPCNT: Depth contour
	GATCON: Gate	
	HRBFAC: Harbour facility	

BASIC	STANDARD	FULL
	HULKES: Hulk ICEARE: Ice area LAKARE: Lake LIGHTS: Light LITFLT: Light float LITVES: Light vessel LNDARE: Land area LNDMRK: Landmark LNDRGN: Land region LOGPON: Log pond LOKBSN: Lock basin MARCUL: Marine farm/culture MIPARE: Military practice area MORFAC: Mooring/Warping facility NAVLNE: Navigation line OBSTRN: Obstruction OFSPLF: Offshore platform PILBOP: Pilot boarding place PILPNT: Pile PIPARE: Pipeline area PIPOHD: Pipeline, overhead PIPSOL: Pipeline, submarine/on land PONTON: Pontoon PRCARE: Precautionary area PYLONS: Pylon/bridge support RAILWY: Railway RCRTCL: Recommended route centerline RCTLPT: Recommended traffic lane part RDOCAL: Radio calling-in point RECTRC: Recommended track RESARE: Restricted area RIVERS: River ROADWY: Road RTPBCN: Radar transponder beacon SBDARE: Seabed area SEAARE: Sea area/named water area SLCONS: Shoreline construction SOUNDG: Sounding SUBTLN: Submarine transit lane TOPMAR: Topmark TSELNE: Traffic separation line TSEZNE: Traffic separation zone TSSBND: Traffic separation scheme boundary	DISMAR: Distance mark DMPGRD: Dumping ground DOCARE: Dock area DRGARE: Dredged area DRYDOC: Dry dock DWRTCL: Deep water route centerline DWRTPT: Deep water route part DYKCON: Dyke EXEZNE: Exclusive economic zone FAIRWY: Fairway FERYRT: Ferry route FLODOC: Floating dock FNCLNE: Fence/wall FOGSIG: Fog signal FORSTC: Fortified structure FRPARE: Free port area FSHFAC: Fishing facility FSHGRD: Fishing ground FSHZNE: Fishery zone GATCON: Gate GRIDRN: Gridiron HRBARE: Harbour area (administrative) HRBFAC: Harbour facility HULKES: Hulk ICEARE: Ice area ICNARE: Incineration area ISTZNE: Inshore traffic zone LAKARE: Lake LIGHTS: Light LITFLT: Light float LITVES: Light vessel LNDARE: Land area LNDELV: Land elevation LNDMRK: Landmark LNDRGN: Land region LOCMAG: Local magnetic anomaly LOGPON: Log pond LOKBSN: Lock basin M_ACCY: Accuracy of data M_COVR: Coverage M_CSCL: Compilation scale of data M_HOPA: Horizontal datum shift parameters M_NPUB: Nautical publication information

BASIC	STANDARD	FULL
	TSSCRS: Traffic separation scheme crossing TSSLPT: Traffic separation scheme lane part TSSRON: Traffic separation scheme roundabout TWRTPT: Two-way route part UNSARE: Unsurveyed area UWTROC: Underwater/awash rock WATTUR: Water turbulence WRECKS: Wreck	M_NSYS: Navigational system of marks M_SDAT: Sounding datum M_SREL: Survey reliability M_VDAT: Vertical datum of data MAGVAR: Magnetic variation MARCUL: Marine farm/culture MIPARE: Military practice area MORFAC: Mooring/Warping facility NAVLNE: Navigation line OBSTRN: Obstruction OFSPLF: Offshore platform OILBAR: Oil barrier OSPARE: Offshore production area PILBOP: Pilot boarding place PILPNT: Pile PIPARE: Pipeline area PIPOHD: Pipeline, overhead PIPSOL: Pipeline, submarine/on land PONTON: Pontoon PRCARE: Precautionary area PRDARE: Production/storage area PYLONS: Pylon/bridge support RADLNE: Radar line RADRFL: Radar reflector RADRNG: Radar range RADSTA: Radar station RAILWY: Railway RAPIDS: Rapids RCRTCL: Recommended route centerline RCTLPT: Recommended traffic lane part RDOCAL: Radio calling-in point RDOSTA: Radio station RECTRC: Recommended track RESARE: Restricted area RIVERS: River ROADWY: Road RSCSTA: Rescue station RTPBCN: Radar transponder beacon RUNWAY: Runway SBDARE: Seabed area SEAARE: Sea area/named water area SILTNK: Silo/tank

BASIC	STANDARD	FULL
		SISTAT: Signal station, traffic SISTAW: Signal station, warning SLCONS: Shoreline construction SLOGRD: Sloping ground SLOTOP: Slope topline SMCFAC: Small craft facility SNDWAV: Sand waves SOUNDG: Sounding SPLARE: Sea-plane landing area SPRING: Spring STSLNE: Straight territorial sea baseline SUBTLN: Submarine transit lane SWPARE: Swept Area T_HMON: Tide - harmonic prediction T_NHMN: Tide - non-harmonic prediction T_TIMS: Tide - time series TESARE: Territorial sea area TIDEWY: Tideway TOPMAR: Topmark TS_FEB: Tidal stream - flood/ebb TS_PAD: Tidal stream panel data TS_PNH: Tidal stream - non-harmonic prediction TS_PRH: Tidal stream - harmonic prediction TS_TIS: Tidal stream - time series TSELNE: Traffic separation line TSEZNE: Traffic separation zone TSSBND: Traffic separation scheme boundary TSSCRS: Traffic separation scheme crossing TSSLPT: Traffic separation scheme lane part TSSRON: Traffic separation scheme roundabout TUNNEL: Tunnel TWRTPT: Two-way route part UNSARE: Unsurveyed area UWTROC: Underwater/awash rock VEGATN: Vegetation WATFAL: Waterfall WATTUR: Water turbulence WEDKLP: Weed/Kelp WRECKS: Wreck

Trelleborg is a world leader in engineered polymer solutions that seal, damp and protect critical applications in demanding environments. Its innovative solutions accelerate performance for customers in a sustainable way.

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