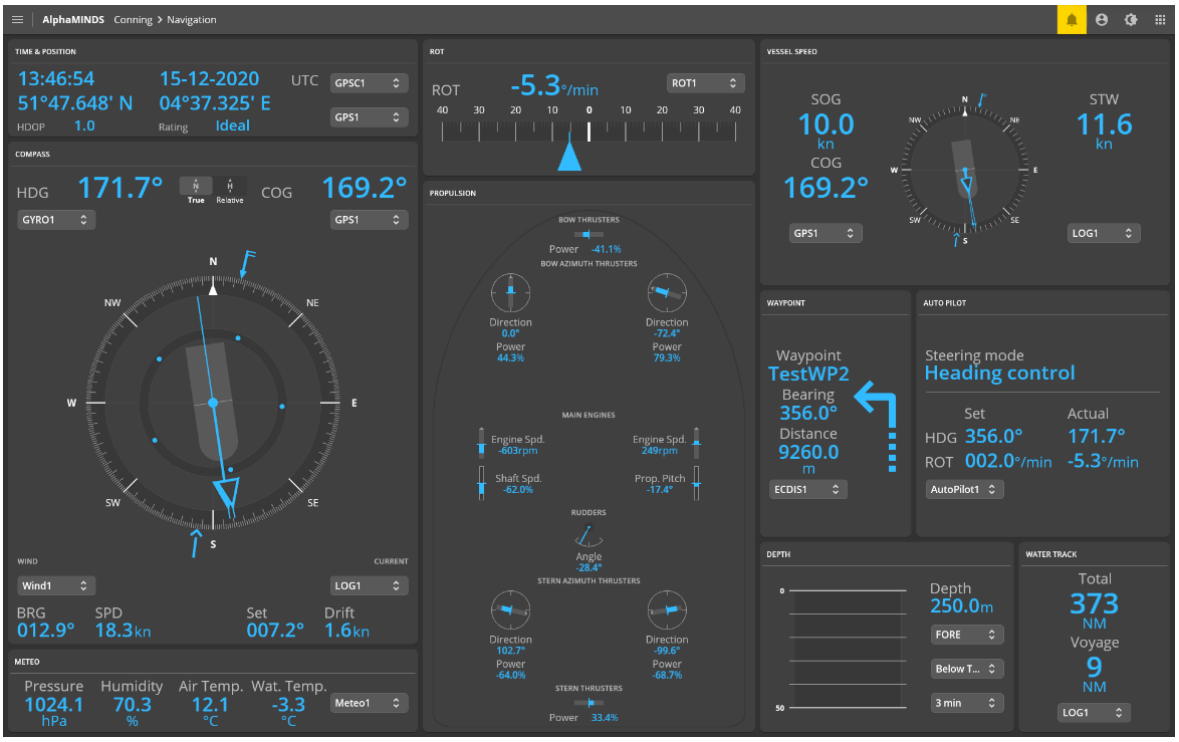
JRC Europe



AlphaMINDS Conning and Docking

Installation and Operation Manual

www.jrc-world.com

JRC Europe

Contents

I. Preface

AlphaMINDS Conning & Docking is a high-end vessel monitoring solution that enables safer and more efficient maritime operations.

This manual provides information required for operation.

- Thoroughly read this manual before installation and operation of the equipment.
- We recommend keeping this manual near the equipment to ensure ready access to it.

Contact the Alphatron Marine dealer for copies of this manual.

JRC Europe

Revision History

Revision No.	Date	Description	Author
1.0	07-04-2023	First version	J. Kreeft
1.1	01-06-2025	- Added chapter ‘Chart Handling’ - Minor (textual) improvements - Added computer datasheets	J. Kreeft

Glossary

The glossary contains a list of abbreviations and a list of definitions.

Abbreviations

Abbreviations used in this manual are explained in the table below.

Abbreviation	Description
AIS	Automatic Identification System
AMS	Alert Management System
ASM	Application Specific Message
AtoN	Aid to Navigation
AWFW	Above Water Forward
AWPSB	Above Water Port Side Bow
AWSBB	Above Water Starboard Bow
AWPSS	Above Water Port Side Stern
AWSBS	Above Water Starboard Stern
AWBW	Above Water Backward
BNWAS	Bridge Navigational Watch Alarm System
BOA	Beam, Overall
BRG	Bearing
BWFW	Below Water Forward
BWPSB	Below Water Port Side Bow
BWSBB	Below Water Starboard Bow
BWPSS	Below Water Port Side Stern
BWSBS	Below Water Starboard Stern
BWBW	Below Water Backward
CCRP	Consistent Common Reference Point
COG	Course Over Ground
CPA	Closest Point of Approach
DOP	Dilution of Precision
ECDIS	Electronic Chart Display and Information System
ENC	Electronic Nautical Charts
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GUI	Graphical User Interface
HDG	Heading
HDOP	Horizontal DOP
IEC	International Electrotechnical Commission
INS	Integrated Navigation System
LOA	Length, Overall
MINDS	Multifunctional Information Navigation Display System
MMSI	Maritime Mobile Service Identity
NMEA	National Marine Electronics Association
RTCM	Radio Technical Commission for Maritime Services
RTK	Real Time Kinematic
ROT	Rate of Turn

Abbreviation	Description
SAR	Search and Rescue
SART	Search and Rescue Transponder
SBAS	Satellite-based Augmentation Systems
SOG	Speed Over Ground
SPD	Speed
STW	Speed Through Water
TCPA	Time to the Closest Point of Approach
VRS	Virtual Reference Stations

Definitions

The meaning of standard definitions as used in this manual are explained in the table below.

Definition	Description
AlphaMINDS Conning and Docking	Product made by Alphatron Marine.
Automatic Identification System (AIS)	A maritime technical standard developed by the International Maritime Organisation (IMO). AIS is a sophisticated radio technology which combines GPS, VHF and data processing technologies to enable the exchange of relevant information in a strictly defined format between different marine entities.
AIS AtoN	An AIS AtoN is a AtoN promulgated by an authorized service provider using AIS Message 21 'Aids to navigation report' that is portrayed on devices or systems (e.g. ECDIS, radar or INS). An AIS AtoN can be implemented in two ways: AIS Real AtoN or AIS Virtual AtoN.
AIS base station	An onshore AIS unit that monitors traffic in the waterways.
AIS messages	AIS data is sent in messages to other devices via the AIS slot map.
AIS Message 21	AIS Message 21 21 'Aids to navigation report' is used by an AtoN AIS station. It is generally transmitted autonomously at a rate of once every three minutes and should not occupy more than two slots.
AIS Real AtoN	An AIS Message 21 transmitted from an AtoN that physically exists.
AIS slot map	Time slots of 26.6 milliseconds that AIS devices transmit data into.
AIS Virtual AtoN	An AIS message 21 transmitted for an AtoN that does not physically exist.
Aid to Navigation (AtoN)	Any sort of signal, markers or guidance equipment which aids the traveler in navigation, usually nautical or aviation travel. Common types of such aids include lighthouses, buoys, fog signals, and beacons.
Alert	An alert provides information about a defined state change in connection with information about how to announce this event in a defined way to the system and the operator. Alerts are divided into four priorities: emergency alarms, alarms, warnings and cautions.
Bow	The front of a vessel.
CCRP (Consistent Common Reference Point)	A location on a vessel, to which all horizontal measurements, such as target range, bearing, relative course/speed, closest point of approach, or time to closest point of approach are referenced.
Chart	Nautical term for maps used in nautical navigation that show all the available information such as depth of waters, land boundaries and other obstructions. Charts may be paper or electronic and electronic charts may be of a raster or vector type.
Closest Point of Approach (CPA)	Shortest calculated distance between own vessel and any target, that will occur in case of no change in course and speed.
Course	The direction a boat is being steered.
Course Over Ground (COG)	The direction of the track of the vessel over the ground, based on position changes.
Current	The flow of water is characterized by direction and speed. Current speed and direction may change with the tide.

Definition	Description
Depth	In the ECDIS, depth is water depth relative to the keel.
Dilution of Precision (DOP)	A term used in satellite navigation and geomatics engineering to specify the error propagation as a mathematical effect of navigation satellite geometry on positional measurement precision.
Draft	The vertical distance between the waterline and the bottom of the hull (keel).
Drift	The cumulative effect of wind and current on the vessel.
Electronic Chart Display and Information Systems (ECDIS)	A hardware/software/data marine navigation system that meets the specifications of the International Hydrographic Organization (IHO). An ECDIS is the only electronic system allowed to replace paper charts under the International Convention for the Safety of Life at Sea (SOLAS).
Electronic Navigation Chart (ENC)	An electronic data file containing information that could be used to display a chart. The ENC contains all the chart information necessary for safe navigation and may contain supplementary information in addition to that contained in the paper chart (for example sailing directions) which may be considered necessary for safe navigation.
Forward	Toward the front of a vessel or further ahead of a location
Global Positioning System (GPS)	An accurate worldwide navigational and surveying facility based on the reception of signals from an array of orbiting satellites. The term GPS is frequently used to refer to GPS receivers.
Horizontal DOP (HDOP)	HDOP (Horizontal Dilution of Precision) is a measure of the geometric quality of satellite positioning in the horizontal plane, specifically affecting latitude and longitude accuracy. It reflects how the arrangement of satellites in the sky influences the reliability of the position fix. A lower HDOP value indicates a better satellite geometry and higher positional accuracy, while a higher value suggests reduced accuracy due to poor satellite distribution.
Heading (HDG)	The direction the vessel is oriented.
Lynx	Automation and connecting platform developed by Alphatron Marine.
Maritime Mobile Service Identity (MMSI) number	A MMSI number is a 9 digit identification number of a marine radio station. It is used during radio communication by digital selective calling (DSC) or verbally between ship radio stations, coast radio stations, or group calls.
National Marine Electronics Association (NMEA)	An organization committed to enhance the technology and safety of electronics used in marine applications.
NMEA 0183	NMEA 0183 is a combined electrical and data specification used for communication between marine electronic systems. It is defined and maintained by the National Marine Electronics Association (NMEA). The protocol transmits data through predefined sentence structures, where each sentence conveys specific information—such as position, speed, or heading—between devices. Alphatron utilizes the international standard IEC 61162, which is partly based on NMEA 0183 but adapted to meet IMO requirements

Definition	Description
	for serial data communication. IEC 61162 supports structured message exchange through standardized sentences, ensuring reliable and consistent communication across compliant marine systems.
OpenBridge	A Design Guideline for the User Interface of maritime equipment.
Rate of Turn (ROT)	The number of degrees of heading change per unit of time.
Stern	The rear of a vessel.
Time to Closest Point of Approach (TCPA)	The time remaining until the closest point of approach of a target.

II. Safety Information

The signal words DANGER, WARNING and CAUTION used in this manual indicate the degree of hazard that may be encountered by the user. These words are defined as follows:

 **DANGER**	Indicates a hazardous situation which, if not avoided, will result in death or serious injury. This signal word is limited to the most extreme situations.
 **WARNING**	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
 **CAUTION**	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
 **NOTICE**	Indicates information considered important but not related to injury. It is typically used to prevent damage to equipment or property.

To safely operate this system, the following DANGERS, WARNINGS, and CAUTIONS must be adhered to. Failure to comply with the precautions or with specific dangers, warnings, and cautions elsewhere in this manual violates safety standards of design, manufacture, and intended use of the equipment. ALPHATRON MARINE assumes no liability for the customer's failure to comply with these requirements.

 **WARNING**	DO NOT DISASSEMBLE OR MODIFY THE EQUIPMENT. OTHERWISE, IT MAY CAUSE A FIRE, OR YOU MAY SUFFER FROM AN ELECTRICAL SHOCK.
 **WARNING**	IMMEDIATELY TURN OFF THE POWER AND DISCONNECT THE POWER SUPPLY CABLE IF THE EQUIPMENT IS GENERATING ANY SMOKE OR ODOUR OR IS OVERHEATED. IMMEDIATELY INFORM YOUR LOCAL SERVICE AGENT OF THE SYMPTOM TO HAVE IT REPAIRED. PROLONGED EQUIPMENT OPERATION UNDER SUCH A CONDITION CAN CAUSE A FIRE OR ELECTRIC SHOCK.

III. Warranty

To not to adversely affect the warranty, the following notices must be adhered to.

	**NOTICE**	The AlphaMINDS computer must be installed in accordance with the installation methods described in the manual of the computer. Acting otherwise will void the warranty.
	**NOTICE**	Installation of this product shall only be done by a certified installation company approved by either ALPHATRON MARINE or by an official ALPHATRON MARINE distributor. Acting otherwise will void the warranty.
	**NOTICE**	This product contains no operator serviceable parts. Service and repair shall only be carried out by personnel trained and certified by ALPHATRON MARINE.
	**NOTICE**	Any modification to this equipment without prior written permission from ALPHATRON MARINE will void the warranty.
	**NOTICE**	Operating personnel must not remove equipment covers. Only personnel trained and certified by ALPHATRON MARINE must make component replacement and internal adjustments.
	**NOTICE**	Operating personnel must not disassemble or modify the equipment. Failure to observe this instruction may cause equipment failure, and it will void the warranty.
	**NOTICE**	When cleaning the surface, do not use any organic solvent such as thinner or benzine. Otherwise, the paint and markings on the surface may get damaged. For cleaning the surface, remove the dust and debris and wipe with a clean dry cloth.
	**NOTICE**	Do not place a container containing liquid on the equipment. The equipment can be damaged if knocked over.

1 Introduction

AlphaMINDS Conning & Docking is a high-end vessel monitoring solution that enables safer and more efficient maritime operations. The product consists of hardware and two AlphaMINDS applications.

The AlphaMINDS Conning application contains standard presentations for displaying information for assisting in safe navigation of a vessel. The AlphaMINDS Docking application contains standard presentations for displaying information for assisting in safe docking of a vessel.

The system can be integrated on new build or retrofitted. It can be used as standalone system next to existing equipment on board. Standard interfaces and protocols are supported.

2 Intended use

WARNING

AlphaMINDS - which incorporates official data as well as other sources - is designed to facilitate the use of official both S-63 encrypted and S-57 unencrypted electronic navigational charts (ENCs) and not to replace them. Only official nautical charts and notices for navigators contain all the information necessary for safe navigation.

WARNING

AlphaMINDS - which incorporates validation of data from other sources - is designed to display AlphaMINDS-specific alerts. AlphaMINDS is no AMS (Alert Management System) and does not replace an AMS!

The system may be used for safer navigation of a vessel and safer docking of a vessel. It does not replace official nautical charts and notices for navigators.

3 General description

3.1 System overview

Figure 1 shows a schematic example of an AlphaMINDS Conning and Docking system. It shows the components and communication between the components.

The product AlphaMINDS Conning and Docking consists of an AlphaMINDS computer with AlphaMINDS Conning and Docking software and the AlphaMINDS secured USB dongle. The other components of the system can vary as the system can be integrated on new build or retrofit projects or used as standalone system next to existing equipment on board.

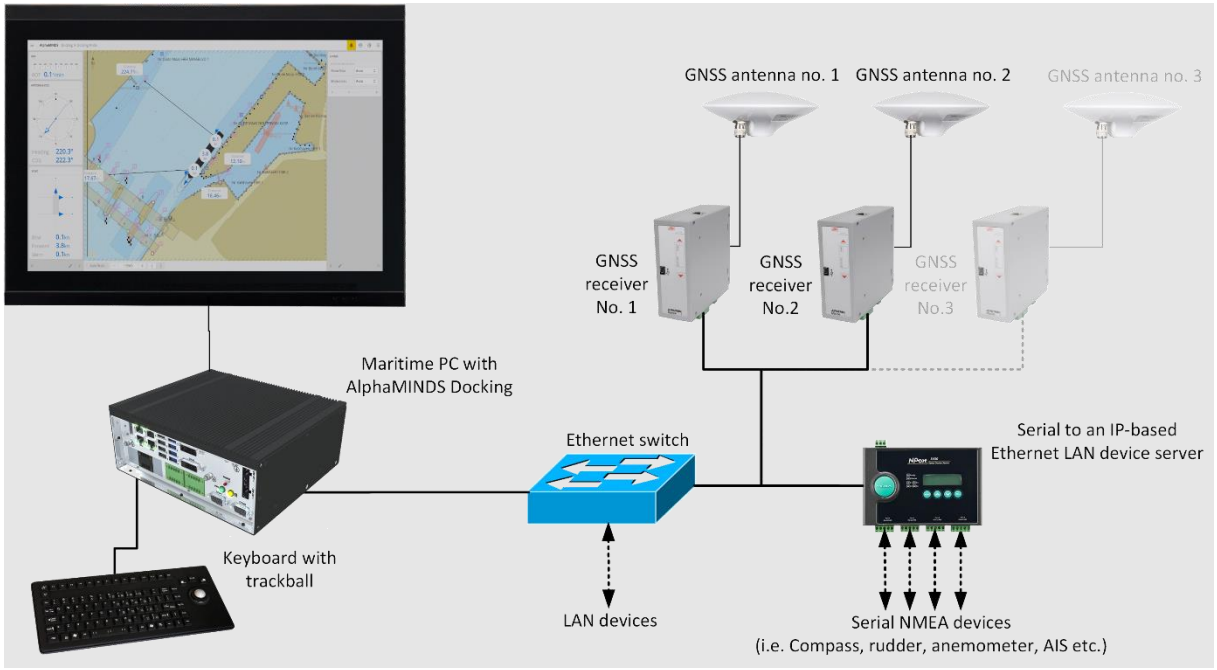


Figure 1: Schematic example of an AlphaMINDS Conning and Docking setup

NOTE: GNSS receivers and antennas are not required for the AlphaMINDS Conning application.

NOTE: A GNSS receiver and antenna is required for the AlphaMINDS Docking application. AlphaMINDS can work with any GNSS, however a GNSS with RTK is recommended. More GNSS receivers can be used to provide a more accurate heading, roll & pitch measurements, and redundancy, when required.

3.2 Software

The AlphaMINDS Conning & Docking software is an AlphaMINDS[1] product for vessel monitoring to enable safer and more efficient maritime operations.

The AlphaMINDS Conning & Docking software consists of two AlphaMINDS applications:

1. **AlphaMINDS Conning**
   An application that contains standard presentations for displaying information for assisting in safe navigation of a vessel.
2. **AlphaMINDS Docking**
   An application that contains standard presentations for displaying information for assisting in safe docking of a vessel.

[1] AlphaMINDS is an Alphatron product for monitoring and/or controlling all kinds of equipment onboard a vessel. AlphaMINDS is also known as a software suite, as it typically is a collection of two or more software applications bundled and sold together. The applications always have a similar GUI, and may have correlative features and functionality. AlphaMINDS is based on the automation and connecting platform Lynx, specifically designed by Alphatron Marine as maritime SCADA software for monitoring and controlling all kinds of equipment onboard a vessel. Integrated in Lynx is the OpenBridge design guideline that will give a better user experience with regards to design, styling and easy recognition of indicators, messages, alarms of the graphical user interface. Consistency across systems is an essential aspect for reducing human errors and this will contribute to an improvement of the quality of vessel bridges, the work environment for seafarers and overall vessel safety.

3.3 Included hardware

The AlphaMINDS computer and an AlphaMINDS secured USB dongle are provided as part of the product package.

3.3.1 AlphaMINDS computer

The AlphaMINDS computer is an IEC90645 certified marine computer.

3.3.2 AlphaMINDS secured USB dongle

The system requires a AlphaMINDS secured USB dongle for licensing. AlphaMINDS software will check for the presence of the dongle in the AlphaMINDS computer before running and while running.

3.3.3 Connected devices (not included)

Typical external devices connected to the AlphaMINDS computer include a monitor, keyboard, and hardware for GNSS, compass, ROT sensor, log sensor, serial to an IP-based Ethernet LAN device server. The sections below provide details on supported devices.

3.3.3.1 Monitor

AlphaMINDS supports monitors with a resolution of 1920x1200 and 1920x1080 (Full HD).

3.3.3.2 Serial to an IP-based Ethernet LAN device server

All data must be delivered to the AlphaMINDS computer via a LAN interface.

AlphaMINDS Conning and Docking software can communicate using a wide range of data protocols (e.g. NMEA 0183) and electrical protocols (e.g. RS232, RS422, RS485, and Ethernet).

Serial data (e.g. via RS232, RS422, or RS485) shall be converted to Ethernet data (using TCP/IP or UDP packets). This is possible via a JRC CMH-2370 (SLC) Serial LAN interface circuit, which may be available in a JRC MFD, or one can do this by using a simple and standard Serial to IP converter.

3.3.3.3 GNSS hardware

The AlphaMINDS Docking application requires GPS or GNSS position information. The system can work with a standard GNSS receiver (connected to the LAN network).

A standard GNSS receiver might not suffice when it comes to berthing a vessel (in this case, precise measurement of heading and ROT during low speed are of utmost importance).

For this reason, Alphatron developed the CT-104 GNSS Multi-band GNSS receiver that delivers decimeter level accuracy in seconds (depending on atmospheric and environmental conditions), to be used as part of a fixed installation of the navigation equipment.

Additional GNSS receivers and antennas are optional, but provide for more accurate heading, roll and pitch measurements, and redundancy. To get the best results, the antennas should be installed on the vessel with the greatest possible distance between them.

The CT-104 GNSS Multi-band GNSS receiver (not type-approved for navigational purpose) is a modular system in terms of the number of units, thus antennas and integrates multi-band GNSS and RTK technology. Depending on the number of these units connected to the Ethernet network, the GNSS receivers will provide data on precise positioning and accurate heading.

The GNSS receiver will by default calculate the position by combining and using the signals from four GNSS constellations available such as GPS, Glonass, BeiDou and Galileo. By using an augmentation system like SBAS correction signals, the positioning will already be a lot more accurate.

The CT-104 GNSS-receiver comes with built-in support for standard RTCM corrections, supporting decimeter-level navigation from local base stations or from VRS in a Network RTK setup. This means that when a more accurate positioning (below 20 cm or cm-level accuracy) is required, one should then activate the integrated RTK receiver with a 3rd party RTK-subscription, which will give an even higher accuracy.

A high-precision RTK GNSS Antenna can be connected to the CT-104 GNSS receiver. This seven-frequency survey antenna integrates GPS (L1 & L2) and GLONASS (G1 & G2), Galileo (E1/E5b) and BeiDou (B1 & B2 & B3), which can be widely used in geodetic surveys and thus are ideal for the AlphaMINDS Docking application.

4 Operation

WARNING

AlphaMINDS - which incorporates official data as well as other sources - is designed to facilitate the use of both S-63 encrypted and S-57 unencrypted electronic navigational charts (ENCs) and not to replace them. Only official nautical charts and notices for navigators contain all the information necessary for safe navigation.

WARNING

AlphaMINDS - which incorporates validation of data from other sources - is designed to display AlphaMINDS-specific alerts. AlphaMINDS is no AMS (Alert Management System) and does not replace an AMS!

4.1 Introduction

AlphaMINDS Conning & Docking provides information for maritime operations. Both AlphaMINDS applications, the menus, menu items, and widgets are explained in the next sections.

Some widgets shows selectable data sources. They can be selected if multiple sources are configured.

In the AlphaMINDS Docking application, certain settings can be changed quickly during operation via widgets on the operational page.

NOTE: Visualization is configured and depends on available data sources and user preferences. Note that all widgets are examples and provided for reference only. Default end-user settings are configured in the Settings (for more information, refer to chapter 6).

4.1.1 HMI overview

The AlphaMINDS Conning & Docking applications are shown in Figure 2 and Figure 3.

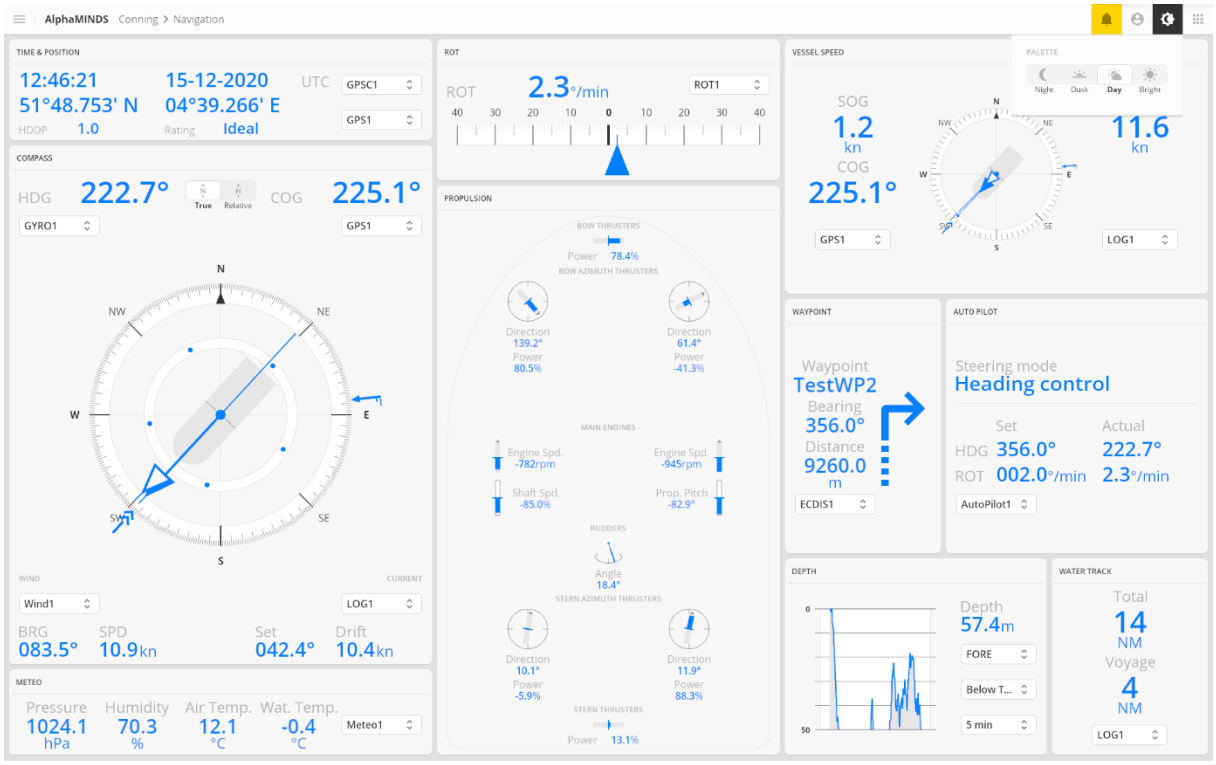


Figure 2: AlphaMINDS Conning application

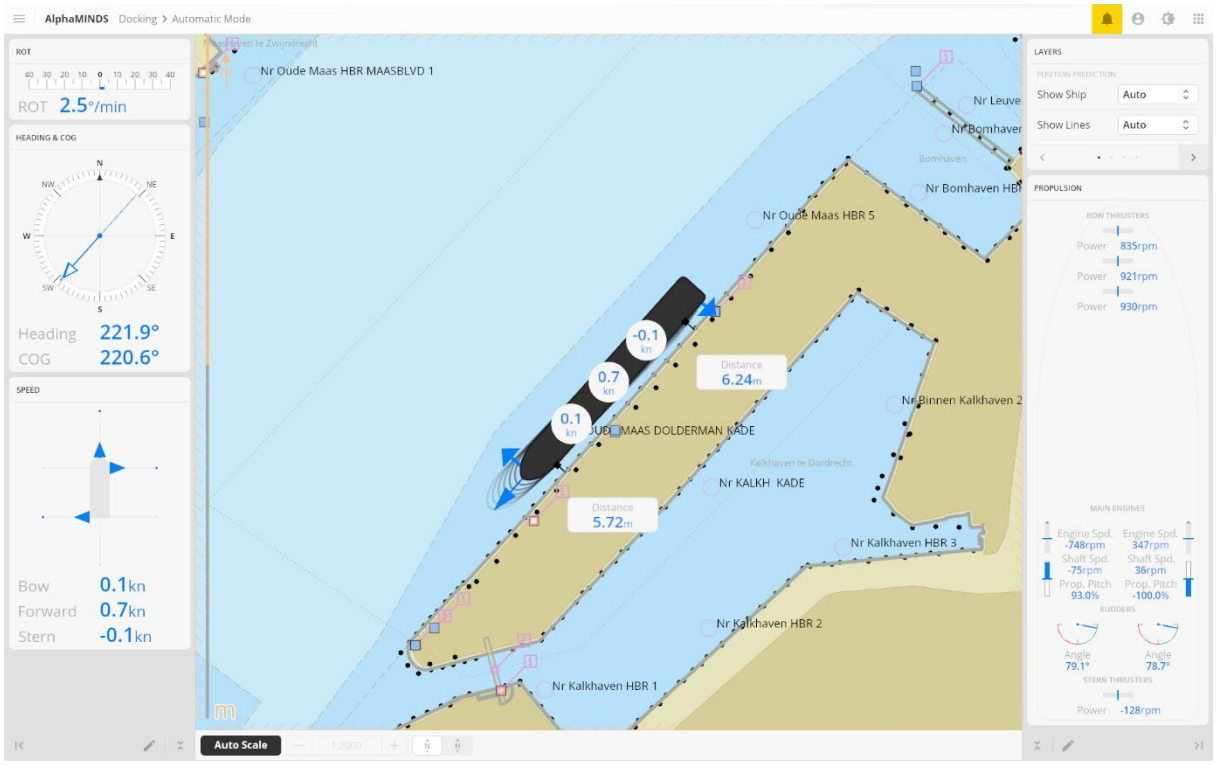
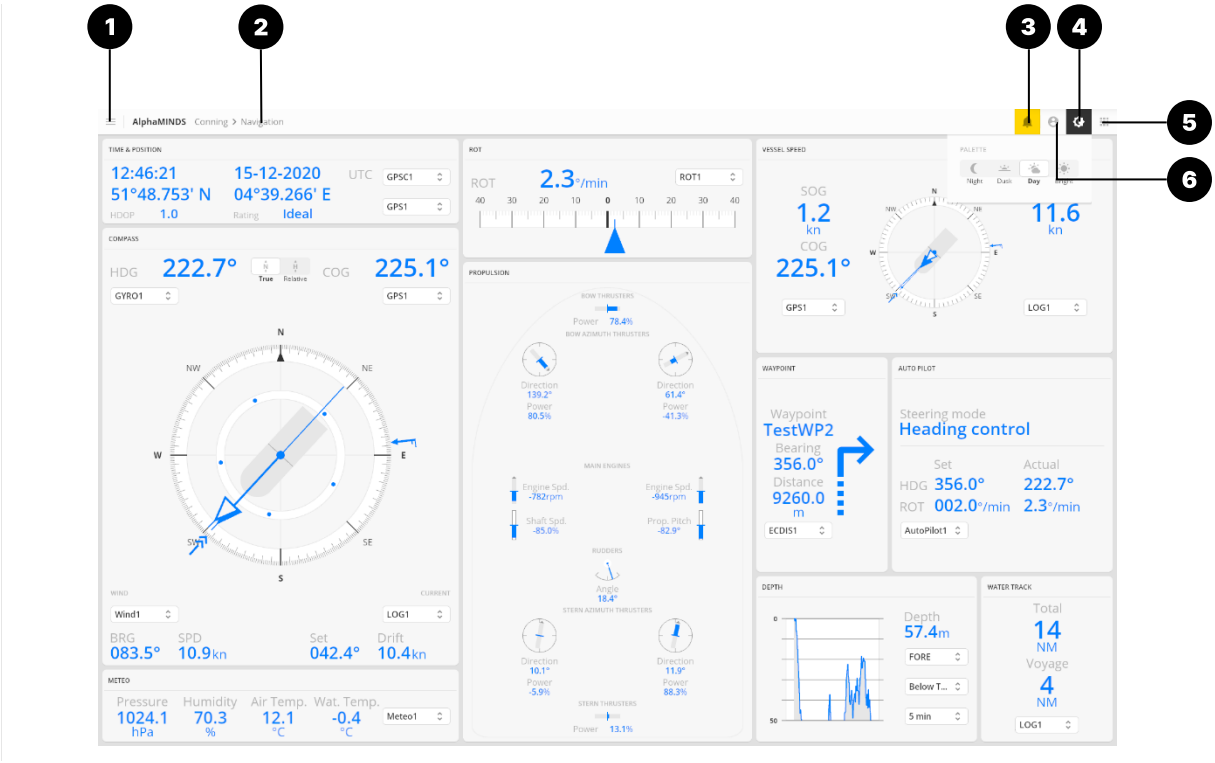


Figure 3: AlphaMINDS Docking application

4.1.2 Top bar items

The top bar across all AlphaMINDS applications includes six standard items, maintaining a consistent layout and functionality.



Item	Name	Description
1	Menu	This button provides access to various pages (e.g. Settings page and Help & Support page).
2	Breadcrumb	The name of the current (application and) page.
3	Alerts	This button opens the Alerts pop-up. It is highlighted when there is an alert.
4	Display options	This button opens a pop-up that allows a user to change the palette.
5	Application launcher	This button provides access to the Application launcher menu, where the user can select the AlphaMINDS Conning or the Docking application.
6	User options	This button opens a pop-up that allows a user to sign in.

All items are explained in more detail in the subsequent sections.

4.1.2.1 Menu

The information displayed in the menu depends on the AlphaMINDS application. For the AlphaMINDS Conning application, refer to section 4.2 on page 30. For the AlphaMINDS Docking application, refer to section 4.3 on page 36.

4.1.2.2 Alerts

WARNING AlphaMINDS, which incorporates validation of data from other sources, is designed to display AlphaMINDS-specific alerts. AlphaMINDS is no AMS (Alert Management System) and does not replace an AMS!

This section explains the Alert page and Alert list page. For troubleshooting, refer to chapter 7 on page 78. For help and support, refer to chapter 9 on page 88.

The Alert button is highlighted (i.e. yellow colored) when an alert is triggered. Press the Alerts button (on the top bar) to open the Alert page. The highlight is removed when all alerts are rectified.

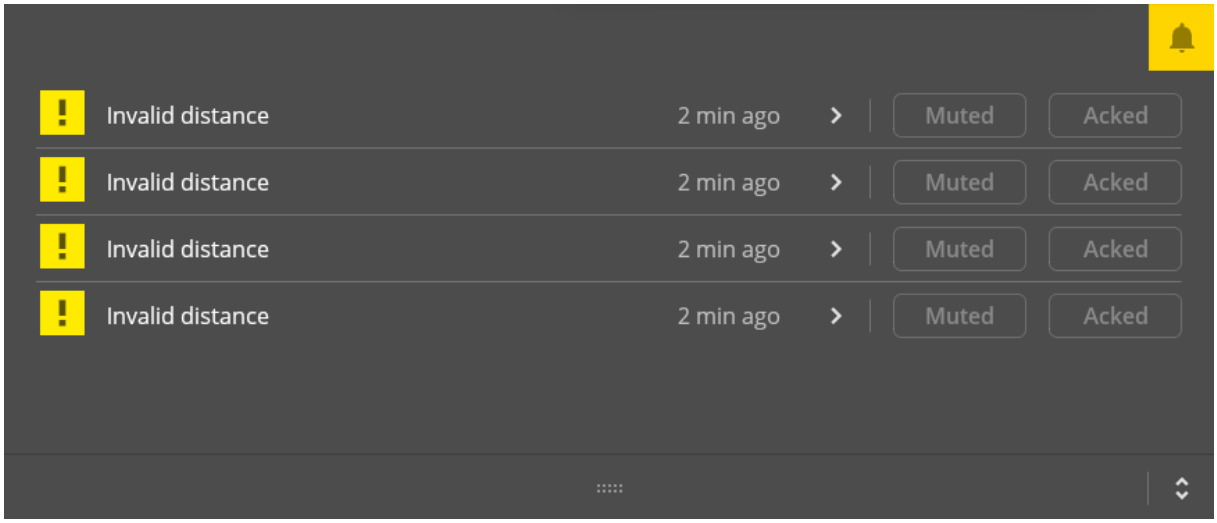


Figure 4: AlphaMINDS Conning application > Alert page

NOTE: The buttons ‘Muted’ and ‘Acked’ are disabled/inactive.

NOTE: Alerts are divided in four priorities: emergency alarms, alarms, warnings and cautions. The alerts triggered by and shown in AlphaMINDS are always cautions.

NOTE: The alerts triggered by and shown in AlphaMINDS are not audible.

For more details on an alert, press on the › (chevron right) button.

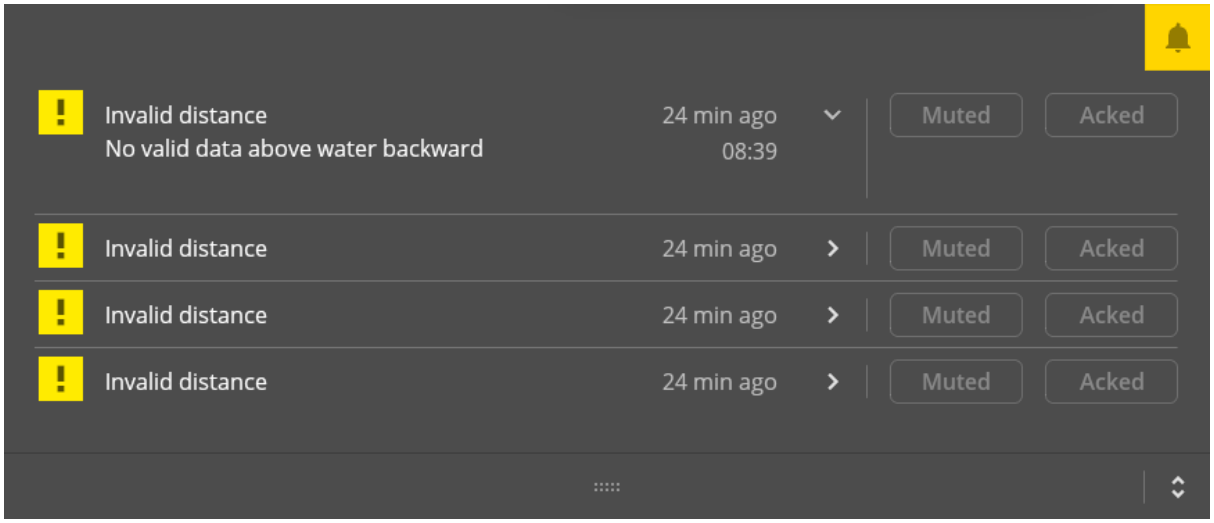


Figure 5: AlphaMINDS Conning application > Alert page with an unfolded item

For more details on alerts (e.g. priority and state), press on the ⌃⌄ (unfold) button. The Alert list page will be shown.

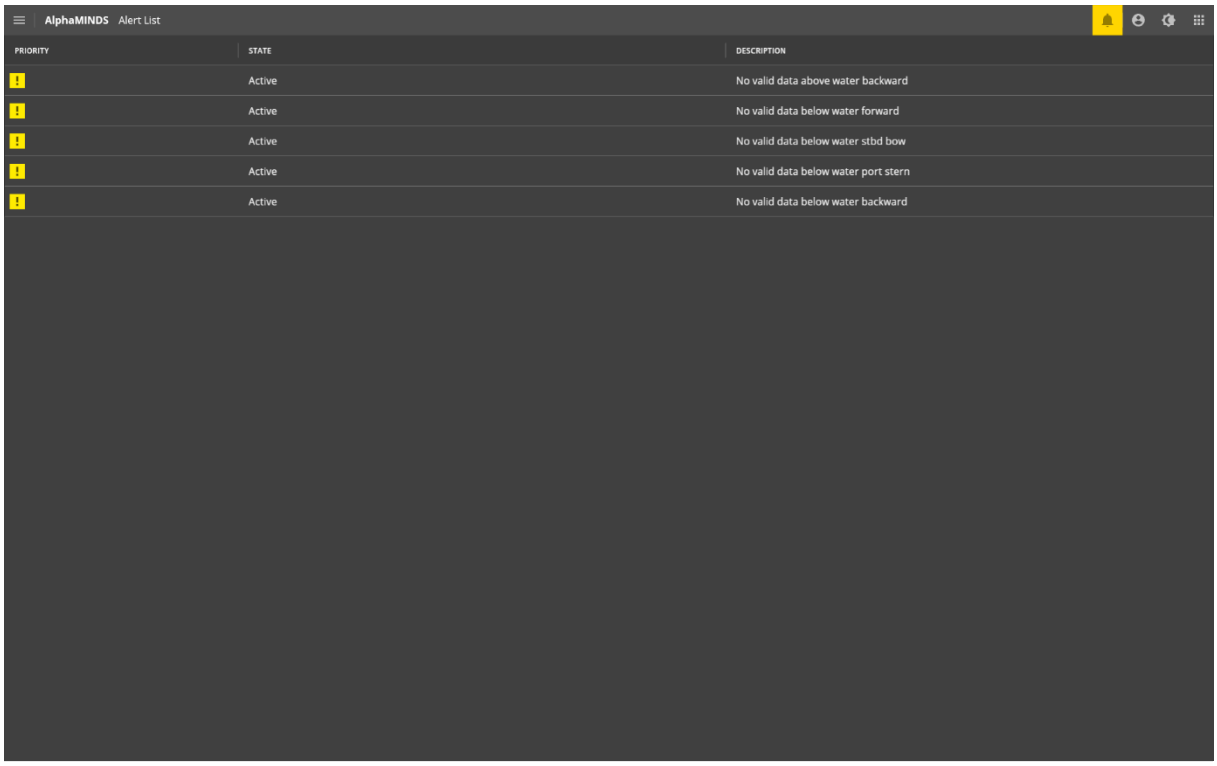
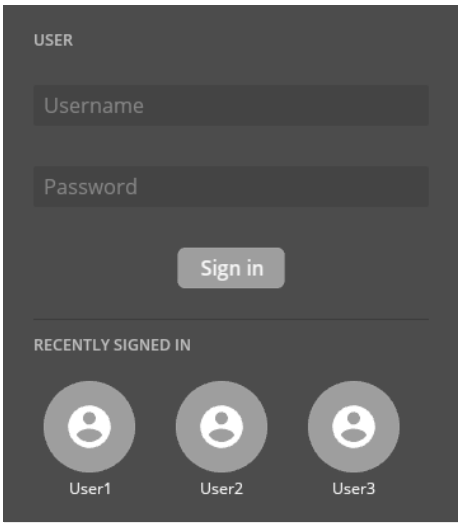
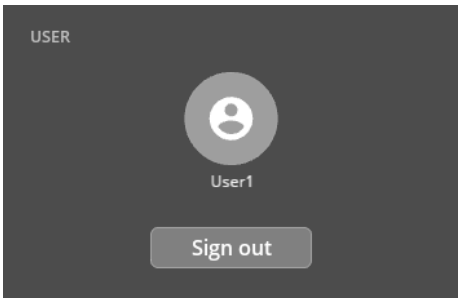
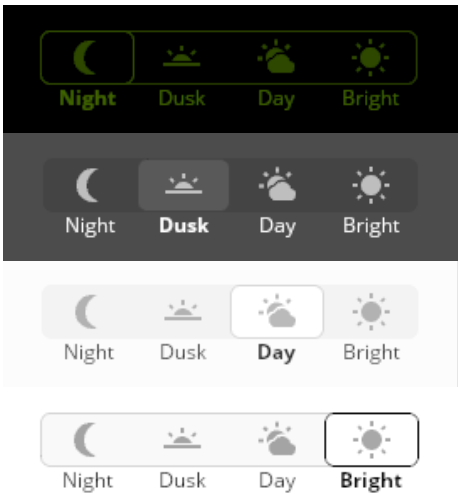


Figure 6: AlphaMINDS Conning application > Alert list page

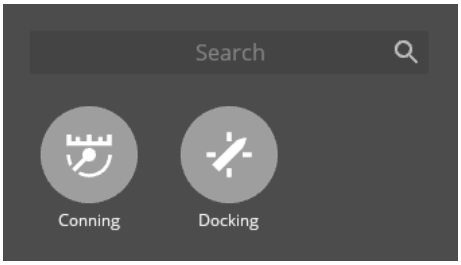
4.1.2.3 User options

Item	Description
 No user signed in.  User1 signed in.	There are three end-user profiles (User1, User2, and User3) that can sign in via this pop-up. No password is required. Each end-user profile has unique pre-defined settings. These settings are loaded when signed in. NOTE: Advanced settings and certain general settings are password protected (accessible with administrator credentials). These settings apply to all end-users.

4.1.2.4 Display options

Item	Description
	The palette can be set manually to: - Night - Dusk - Day - Bright

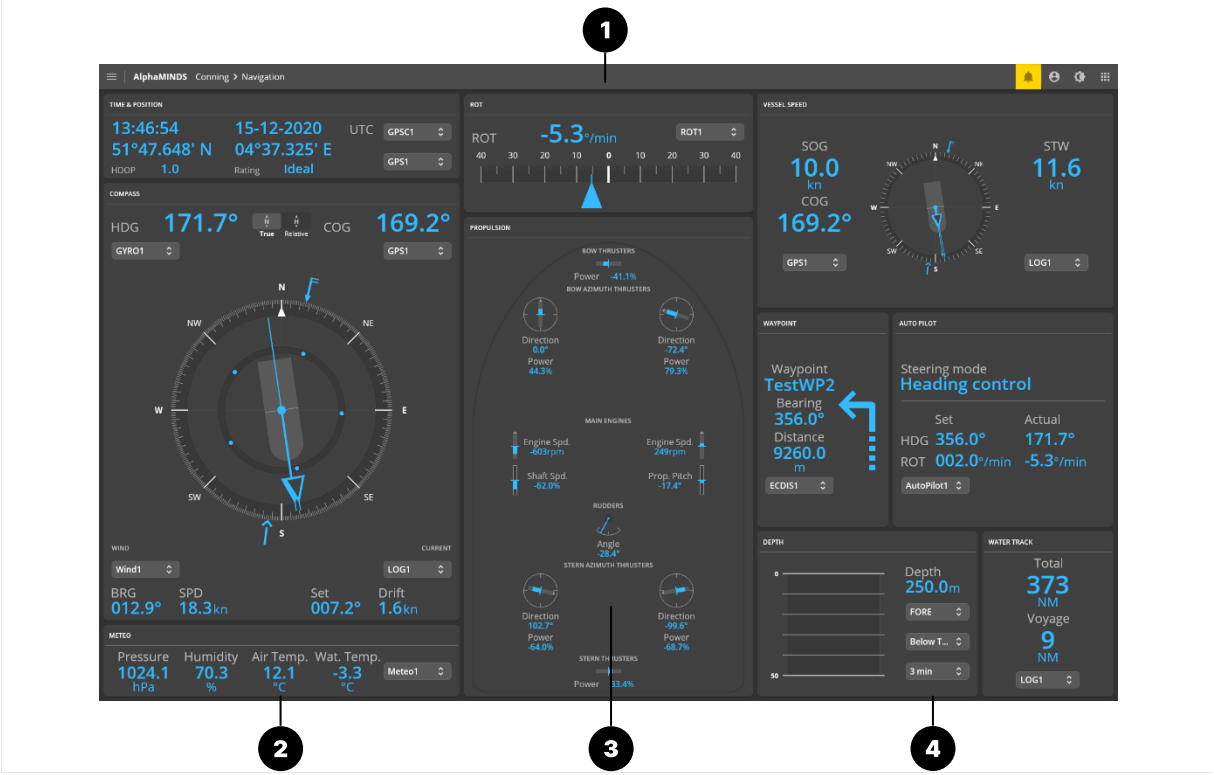
4.1.2.5 Application launcher

Item	Description
	The Application launcher shows the available AlphaMINDS applications. Press an icon to start the application.

4.2 AlphaMINDS Conning application

4.2.1 Overview

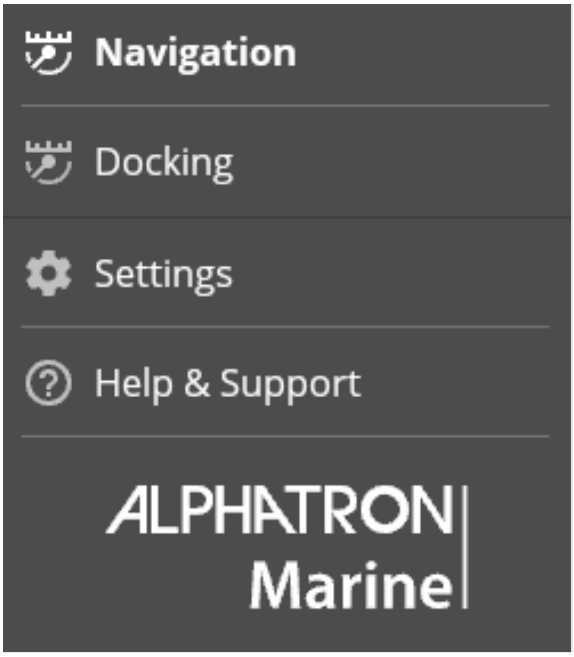
The HMI display layout of the AlphaMINDS Conning application is organized into four primary areas.



Item	Name	Description
1	Top bar	The top bar provides access to the menu, alerts, and various other settings explained in section 6 on page 55.
2	Left area	The left area shows the widgets TIME & POSITION, COMPASS and METEO.
3	Middle area	The main area shows the widgets ROT and PROPULSION.
4	Right area	The right area shows the widgets VESSEL SPEED, WAYPOINT & AUTO PILOT (shown in Navigation mode) or GROUND SPEED (shown in Docking mode), DEPTH and WATER TRACK.

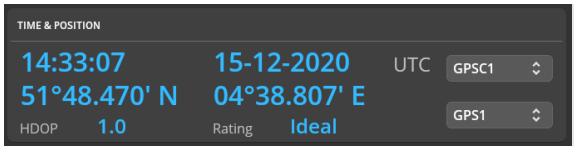
4.2.2 Menu

The menu is used to select to access the Settings, and to view Help & Support information.

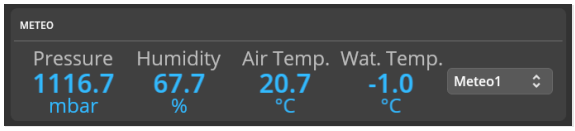
Item	Description
	**Navigation mode** Mode that will show the widgets WAYPOINT & AUTO PILOT, instead of the widget GROUND SPEED (shown in Docking mode) **Docking mode** Mode that will show the widget GROUND SPEED, instead of widgets WAYPOINT & AUTO PILOT (shown in Navigation mode) **Settings** Refer to chapter 6 on page 55. **Help & Support** Provides information on Help & Support. Refer to chapter 7 on page 78. **Alphatron Marine** Provides system information such as software versions.

4.2.3 Left area

The left area shows the widgets TIME & POSITION, COMPASS and METEO.

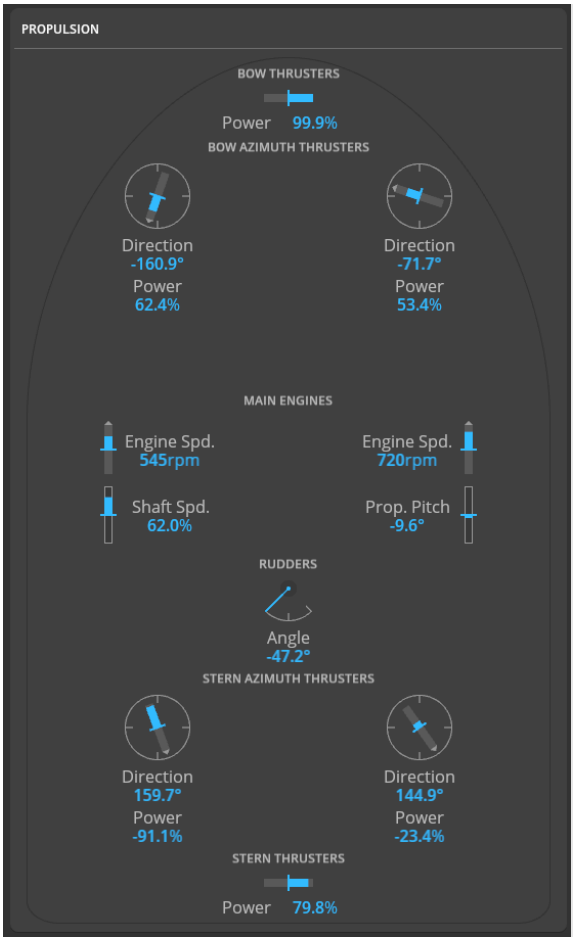
Item	Description
TIME & POSITION 	This widget shows the actual time and position data and source. The rating derives from the HDOP value. Possible values and ratings are explained in Appendix F.

COMPASS
 
	This widget shows the following compass data (graphical and numerical) and source:
	- Heading (HDG)
	- Course Over Ground (COG)
	- Wind
	  ○ Bearing (BRG)
	  ○ Speed (SPD)
	- Current
	  ○ Set
	  ○ Drift

METEO 	This widget shows the following Meteo data and source: - Pressure - Humidity - Air temperature - Water temperature

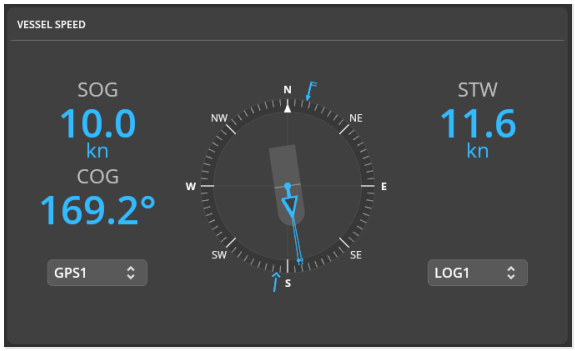
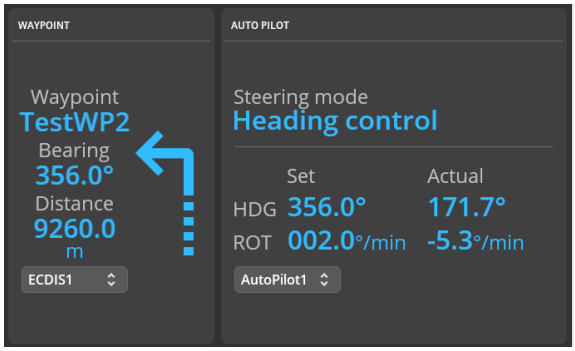
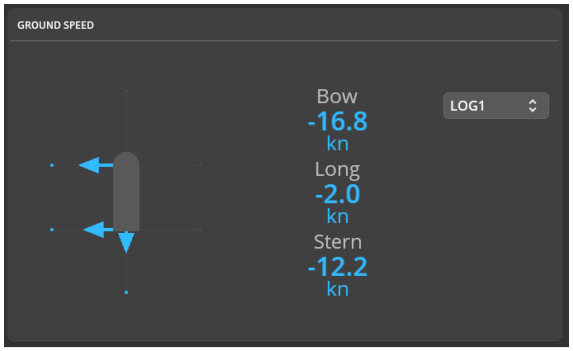
4.2.4 Middle area

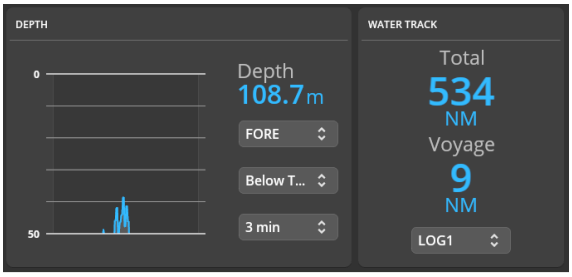
The middle area shows the widgets ROT and PROPULSION.

Item	Description
ROT 	This widget shows the ROT data (graphical and numerical) and source. NOTE: The displayed information may vary, depending on Range & Style settings.
PROPULSION 	This widget shows the propulsion data (graphical and/or numerical). NOTE: The displayed information and layout may vary, depending on the target vessel and its equipment.

4.2.5 Right area

The right area shows the widgets VESSEL SPEED, AUTO PILOT, DEPTH and TRACK.

Item	Description
VESSEL SPEED 	This widget shows the following vessel movement data (graphical and numerical) and source: - Heading - Speed Over Ground (SOG) - Course Over Ground (COG) - Speed Through Water (STW) Other sources can be selected if multiple sources are configured.
WAYPOINT & AUTO PILOT (shown in Navigation mode) 	The WAYPOINT widget shows the following data (graphical and numerical) and source: - Waypoint name - Bearing - Distance - Waypoint shape (shows the turn at the next waypoint) The AUTO PILOT widget shows the following data (graphical and numerical): - Steering mode - Set HDG - Set ROT - Actual HDG - Actual ROT
GROUND SPEED (shown in Docking mode) 	The GROUND SPEED widget shows the following data (graphical and numerical) and source: - Shape (shows the speeds) - Bow - Long - Stern

Item	Description
DEPTH & WATER TRACK  	The DEPTH widget shows the actual depth and logged depth (graphical and numerical). The logged depth can be set to 3, 5, or 10 minutes. The top dropdown offers a selection for which depth sensor to show the values: - FORE: The depth sensor at the front of the vessel. - MID: The depth sensor at the middle of the vessel. - AFT: The depth sensor at the back of the vessel. The center dropdown selects which distance to show: - Below Transducer: The depth that will be shown is the distance between the transducer (sensor) and the ground. - Below Keel: The depth that will be shown is the depth between the keel and the ground. - Below Surface: The depth that will be shown is the depth between the surface of the water and the ground. The bottom dropdown selects the time duration of the entire horizontal axis of the graph. The WATER TRACK widget shows the total and voyage and source. Both values are provided by the speed log device. Total is the total cumulative water distance. Voyage is the water distance since last reset (voyage distance could be reset each trip).

4.3 AlphaMINDS Docking application

The AlphaMINDS Docking application implements full support for AIS. The AIS functionality includes receiving and viewing AIS data, displaying AIS targets in the chart, alerting the end-user to potentially dangerous AIS targets as well as to the loss of communication with targets.

4.3.1 Overview

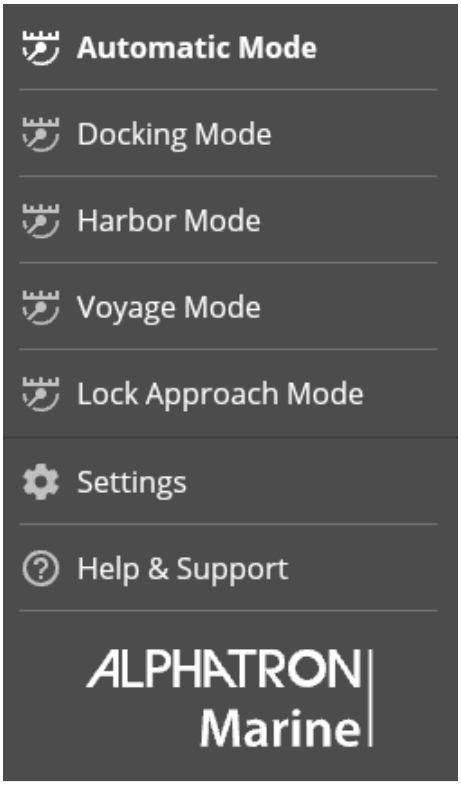
The HMI display layout of the AlphaMINDS Docking application is organized into five primary areas.

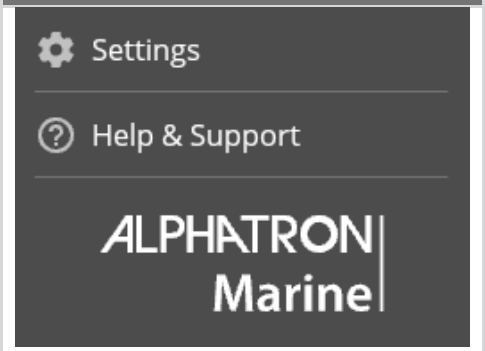
Item	Name	Description
1	Top bar	The top bar provides access to the menu, alerts, and various other settings explained in section 6 on page 55.
2	Left area	The left area shows vessel navigation data.
3	Main area	The main area shows the chart.
4	Right area	The right area shows chart options and vessel propulsion data.
5	Bottom bar	The bottom area shows scale and orientation options.

Area's can be adjusted using the buttons (expand left), (expand right), (minimize right), (minimize left), (unfold), and (fold).

4.3.2 Menu

The menu is used to select a Docking mode, to access the Settings, and to view Help & Support information.

Item	Description
	**Automatic Mode** In 'Automatic Mode', either 'Docking Mode', 'Harbor Mode', or 'Voyage Mode' is selected automatically based on vessel speed. 'Lock Approach Mode' is not selected automatically, and can be selected only manually. 'Docking Mode' will be selected automatically if the vessel speed is <2 m/s. 'Harbor Mode' will be selected automatically if the vessel speed is between 2 and 5 m/s. 'Voyage Mode' will be selected automatically if the vessel speed is > 5 m/s. When switching from one mode to another, the chart automatically zooms in/out and adds/removes information as predefined for each mode. **Docking Mode** Provides additional information such as position prediction vessel (used during docking to see if the vessel is properly steered and aligned), speed and distance information (used during docking to see the distance between the vessel and objects). Scale is by default 1:2000, and can be changed by end-user. **Harbor Mode** Provides additional information such as position prediction lines. Scale is by default 1:5000, and can be changed by end-user. **Voyage Mode** Provides information during normal navigation or sailing such as an zoomed-out chart for overview situations. Scale is by default 1:10000, and can be changed by end-user. **Lock Approach Mode** Provides additional information such as alignment lines (two lines straight ahead and parallel with the vessel) that can be used, for example, when approaching a lock or narrow channel to see if the vessel is straight ahead and properly aligned. Scale is by default 1:200, and can be changed by end-user. For examples and more information on the modes, refer to section 4.3.4 on page 40.

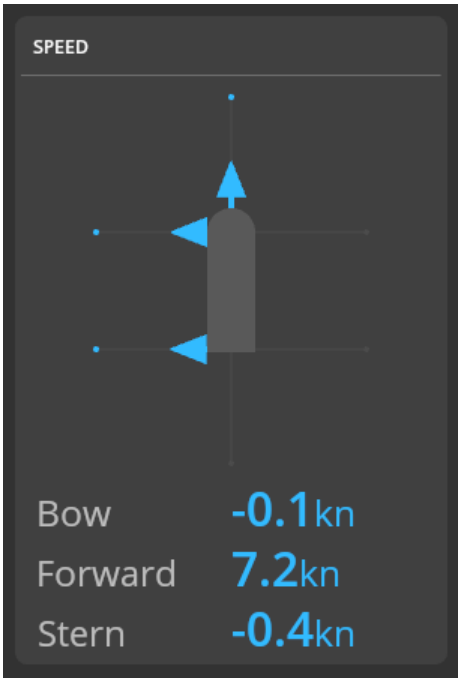
Item	Description
	4.3.2.1 Settings Refer to chapter 6 on page 55. 4.3.2.2 Help & Support Provides information on Help & Support. Refer to chapter 7 on page 78. **Alphatron Marine** Provides system information such as software version.

4.3.3 Left area

The left area shows ROT, HEADING & COG, and SPEED widgets.

NOTE: Visualization of the widgets can be altered (refer to chapter 'Settings)'.

Item	Description
ROT 	This widget shows the actual ROT (graphical and numerical).
HEADING & COG 	This widget shows the heading and COG (graphical and numerical).

Item	Description
SPEED 	This widget shows the multi-directional actual speed of the vessel (graphical and numerical). Bow and stern speed is negative when in the direction of port and positive when in the direction of starboard. The speeds are calculated using heading, ROT, SOG, COG, and GPS sensor position.

4.3.4 Main area

The main area shows the chart and additional chart layers.

The chart orientation and chart scale can be set via the buttons on the bottom bar (see section 4.3.6 on page 49). The visibility of chart layers can be changed via the Layers widget during operation (see section 4.3.5 on page 46).

The following chart layers are available and can be shown in the main area:

- **Alignment lines**; a layer that shows two lines straight ahead and in line with the vessel. It can be used, for example, when approaching a lock or narrow channel to see if the vessel is straight ahead and properly aligned. See Figure 8 for an example.
- **Position prediction vessels**; a layer that shows one or more scale models of the vessel at a predicted position. It can be used during Docking to see if the vessel is properly steered and aligned. It can also be used during turns for obstacle avoidance. See Figure 7 for an example.
- **Position prediction lines**; a layer that shows four lines (one from each 'corner' of the vessel) to indicate the predicted vessel position. It can be used in Harbor conditions to see if the vessel is properly steered and aligned. See Figure 9 for an example.
- **Speed information**; a layer that shows speed info on top of the vessel. It is typically used during Docking or Lock Approach to see if the vessel is properly controlled. See Figure 7 for an example.
- **Distance information**; a layer that shows the distance from vessels' hull to the quay (or other objects in the chart) as reference into the current chart will also be presented. See Figure 7 as an example.
- **Route information**; a layer that shows the route (received from ECDIS). See Figure 11 for an example. NOTE: Route information is not related to the modes as shown in Table 1.

Table 1 shows the available modes and their default layers.

Mode	Included in Automatic mode	Layer				
		Position Prediction Vessel	Position Prediction Lines	Alignment Lines	Speed Information	Distance Information
Automatic	-	-	-	-	-	-
Docking	✓	✓			✓	✓
Lock Approach				✓	✓	✓
Harbor	✓		✓			
Voyage	✓					

Table 1: Modes and their layers

The default chart orientation, default chart scale and default chart layers can be configured in the Chart Settings (refer to section 6.9 on page 76).

Use the 'reset to default' to get the recommended settings for the set vessel length.

Chart examples

The next pages show examples of chart layers.

NOTE: The automatically selected mode can be recognized by the scale of the chart and visibility of the layers.

NOTE: The chart shows additional information by default (e.g. the latitude scale, north arrow, and 'm' for - the unit of measure - for depth). This can be changed at 'Chart Settings > Display Settings > Viewing Groups'.

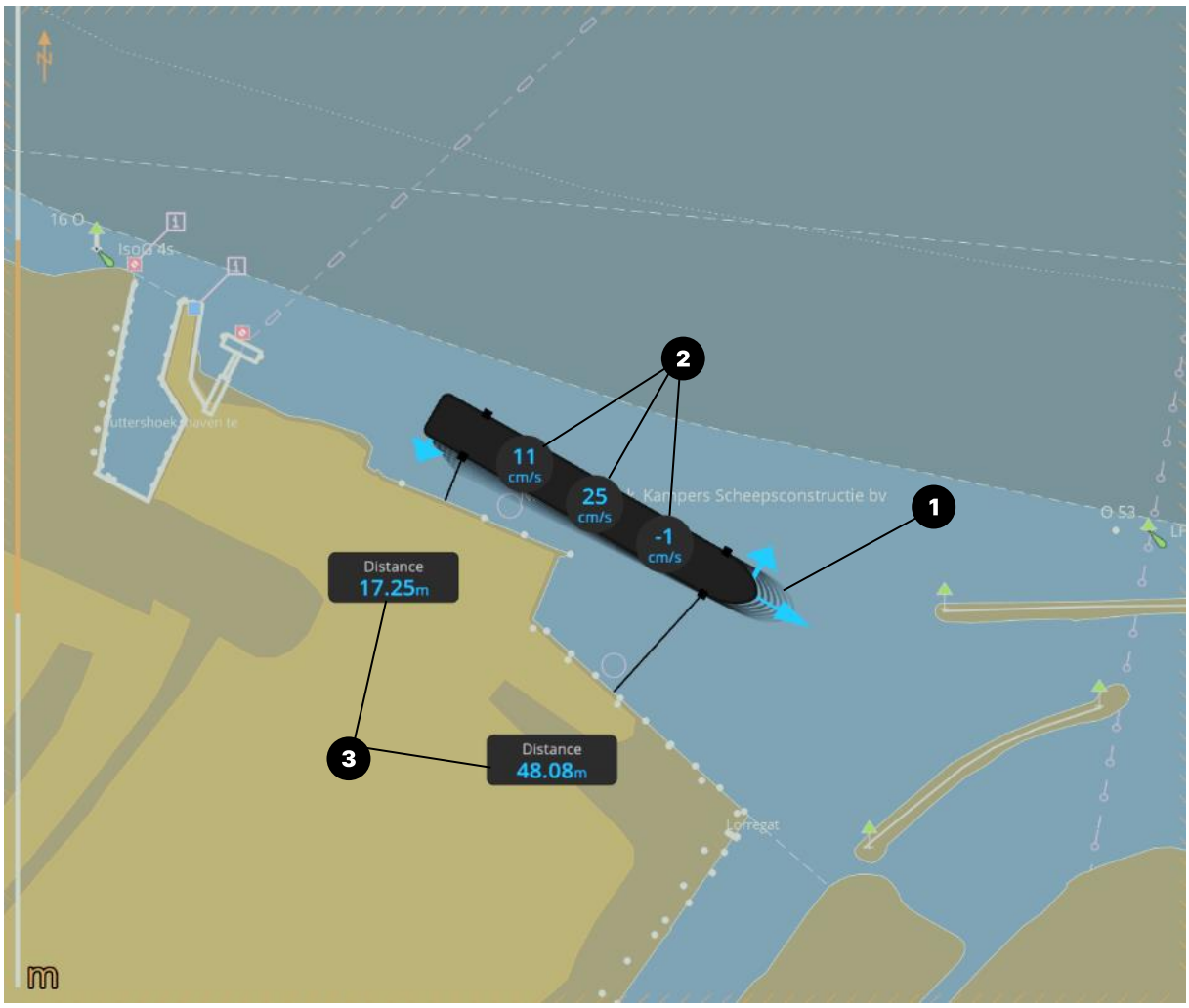


Figure 7: AlphaMINDS Docking application > Main area > Docking mode example

Figure 7 shows the following layers: (1) Position prediction vessel, (2) Speed information, and (3) Distance information.

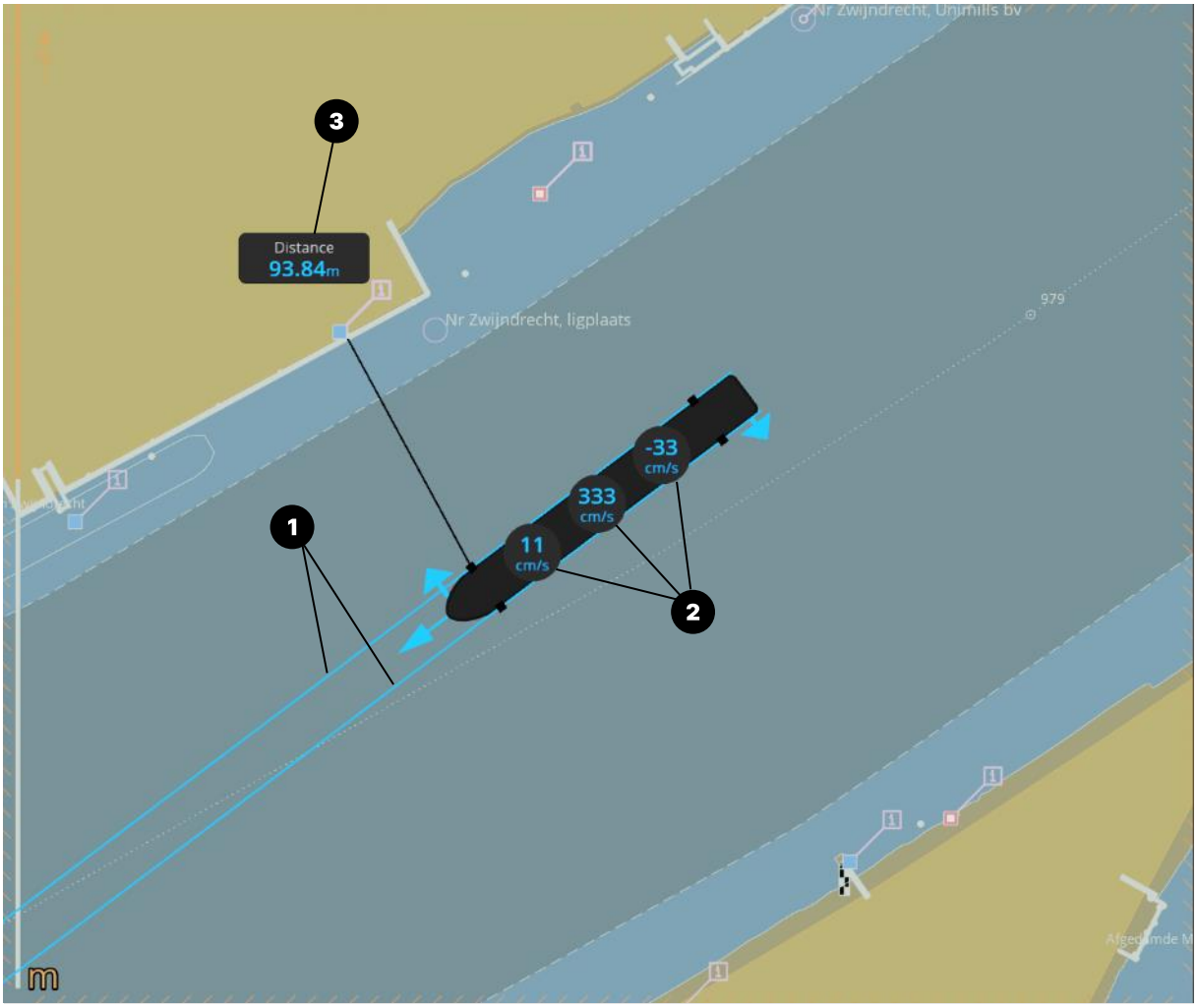


Figure 8: AlphaMINDS Docking application > Main area > Lock Approach mode example

Figure 8 shows the following layers: (1) Alignment lines, (2) Speed information and (3) Distance information.

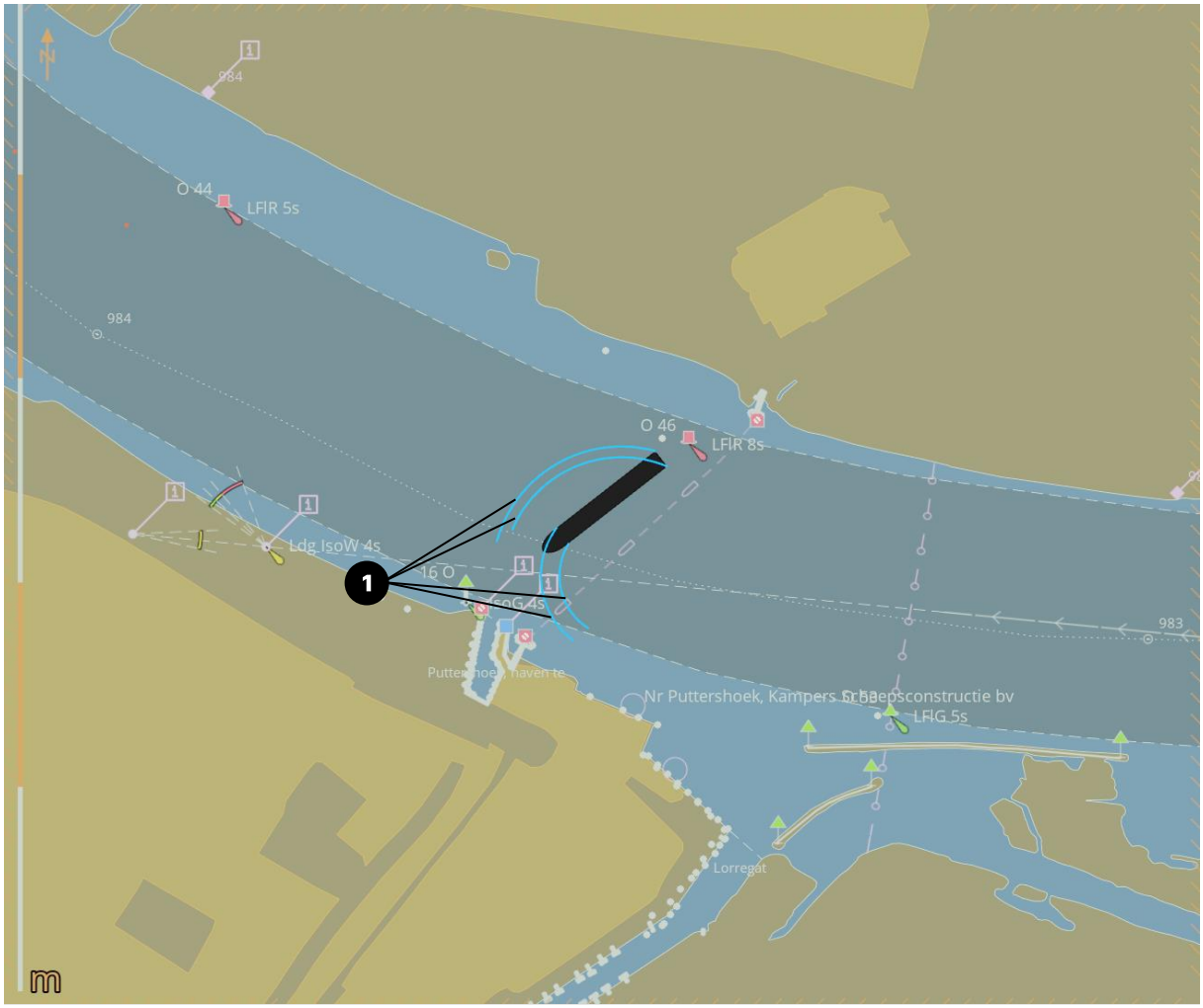


Figure 9: AlphaMINDS Docking application > Main area > Harbor mode example

Figure 9 shows the following layer: (1) Position prediction lines.

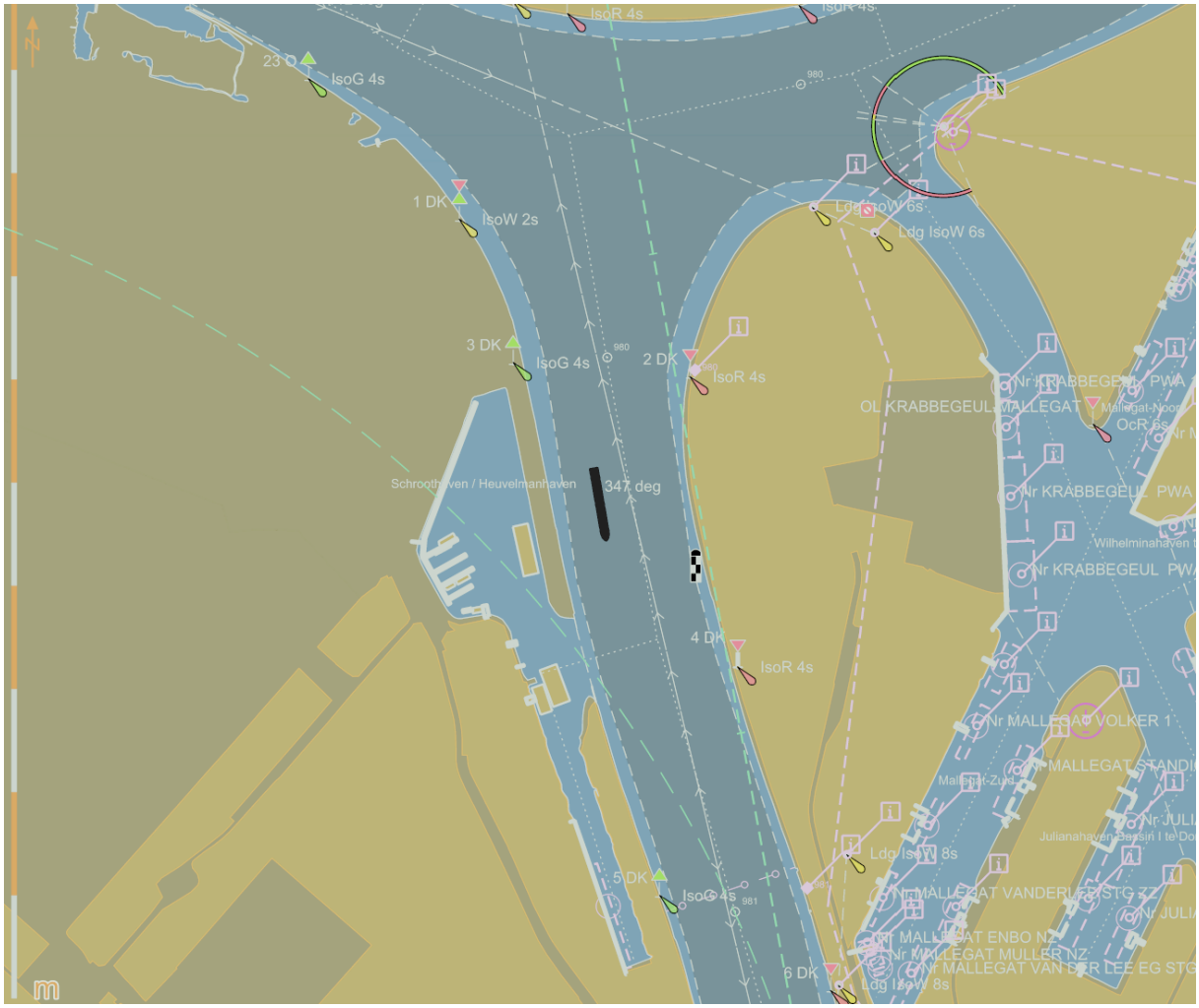


Figure 10: AlphaMINDS Docking application > Main area > Voyage mode example with no layers

Figure 10 shows no layers.

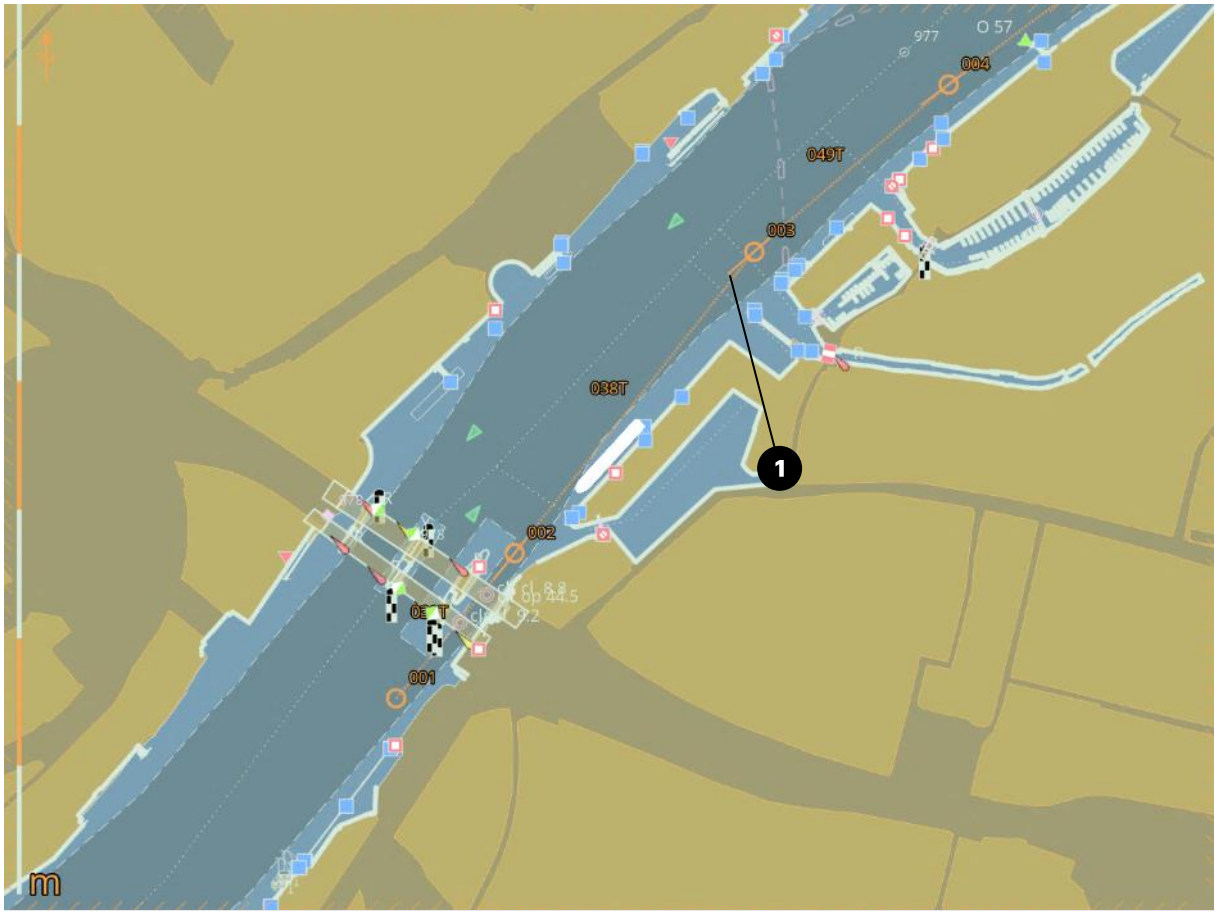
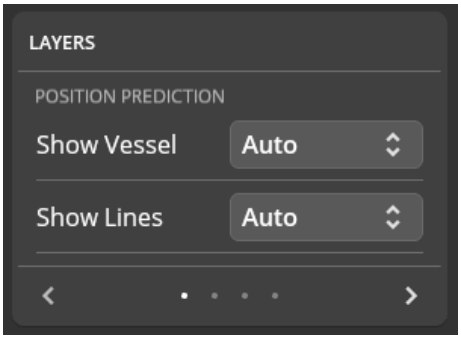
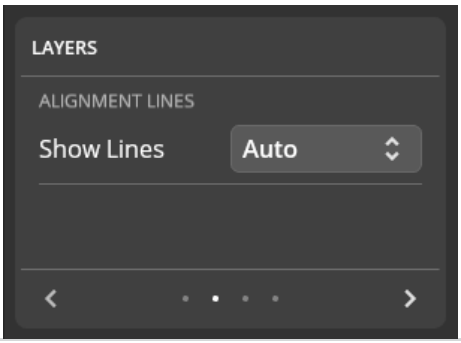


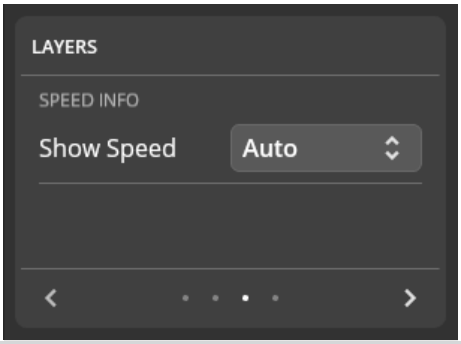
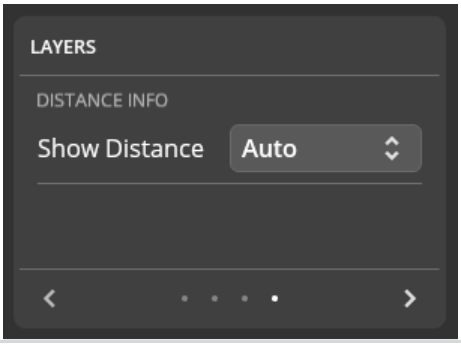
Figure 11: AlphaMINDS Docking application > Main area > Automatic mode example with route information

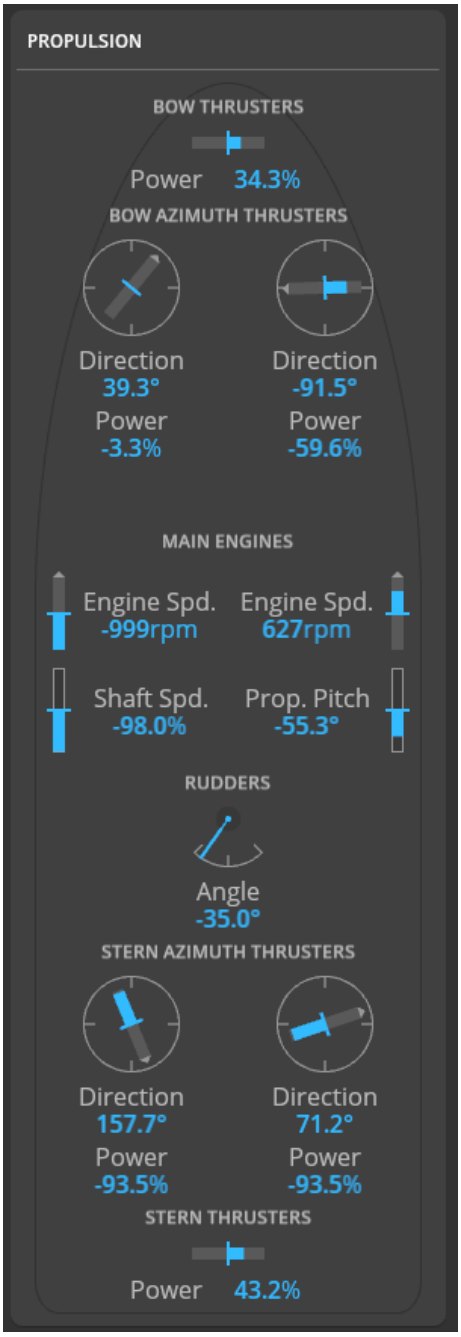
Figure 11 shows the following layer: (1) Route information.

4.3.5 Right area

The right area shows a LAYERS and PROPULSION widgets. The LAYERS widget is used to hide or display information on the chart.

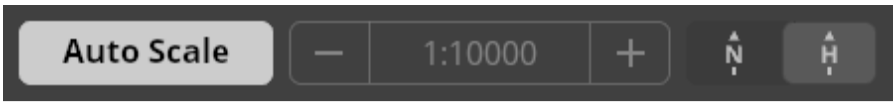
Item	Description
LAYERS - POSITION PREDICTION 	Show Vessel (i.e. one or more scale models of the vessel at a predicted position): - Auto (position prediction vessel will be shown when in Docking mode (see Figure 7 on page 41)) - On - Off Show Lines (i.e. two lines that show the predicted vessel position): - Auto (position prediction lines will be shown when in Harbor mode (see Figure 9 on page 43)) - On - Off NOTE: Visualization can be altered (refer to chapter 'Settings)'.
LAYERS – ALIGNMENT LINES 	Show Lines: - Auto (alignment lines parallel to the vessel will be shown when in Lock Approach mode (see Figure 8 on page 42)) - On - Off

Item	Description
LAYERS – SPEED INFO 	Show Speed: - Auto (speed info will be shown (on the vessel) when in Docking mode (see Figure 7 on page 41) or Lock Approach mode) - On - Off
LAYERS – DISTANCE INFO 	Show Distance: - Auto (distance info will be shown (on the chart) when in Docking mode (see Figure 7 on page 41) or Lock Approach mode) - On - Off

Item	Description
PROPULSION 	This widget shows the propulsion data (graphical and/or numerical). NOTE: The displayed information may vary, depending on the target vessel and its equipment.

4.3.6 Bottom bar

The bottom bar shows chart scale and orientation options.



No	Item	Description
1	Auto Scale	Button to enable or disable ‘Auto Scale’. Enable 'Auto Scale' to scale automatically to the appropriate zoom level for the active mode.
2	Scale	Buttons and input field to change the scale.
3	North up	Button to set chart orientation to north up.
4	Head up	Button to set chart orientation to head up.

NOTE: ‘Course up’ is not supported.

5 Installation

The system is easy to install and maintain on the vessel. This chapter describes the installation of the AlphaMINDS Conning and Docking system.

5.1 Initial inspection

The AlphaMINDS computer shall be inspected before installation as described in this section.

Inspect the shipping cartons - of each component - immediately upon receipt for evidence of damage during the transport. If the shipping carton is severely damaged or water stained, request the carrier's agent to be present when opening the carton. Save the carton and packing material for future use.

CAUTION To avoid hazardous electric shock, do not perform electrical tests if there is any sign of shipping damage to the AlphaMINDS computer.

Check that the contents of the shipment are as listed in the enclosed packing list. If the contents are incomplete, if there is mechanical damage or defect, or if the system does not work properly, notify your dealer.

After you unpack the system do as follows:

- Inspect each component thoroughly for hidden damaged or loose components or fittings.
- Check for loose or missing hardware.
- Fasten any loose hardware.

5.2 Installing the system

NOTICE The AlphaMINDS computer must be installed in accordance with the installation methods described in the manual of the computer. Acting otherwise will void the warranty.

The AlphaMINDS systems can be integrated with the vessels existing installation or can be installed as a standalone system. Normally it is installed in the wheelhouse or in the bridge. Refer to the project specifications and installation drawings for the details.

For information on cables and wiring of the system, refer to section 5.2.4 on page 52. For information, on how-to configure the system, refer to section 5.3 on page 53.

5.2.1 General installation requirements

All components in the system must be placed indoors! For information on environmental requirements, refer to the technical specifications.

5.2.2 Power requirements

The AlphaMINDS computer operates on 100 – 240 Vac and 24 Vdc (nominal value).

NOTE: The computer has a dual input power supply which will accept both AC and DC input. If both inputs are connected, the unit will be powered by AC. If AC is disconnected it will automatically switch over to DC without affecting the operation of the unit. This makes it possible to use AC power as primary power and a 24V battery as secondary power, eliminating the need for expensive UPS systems.

5.2.3 Grounding availability

NOTICE Propagation and reception of electromagnetic energy may cause unwanted effects such as electromagnetic interference (EMI) or even physical damage in operational equipment.

Use a suitable location for connecting the computer to vessel ground (hull). The computer has a grounding screw. Connect the grounding bolt to the vessel's ground with a low impedance connection.

Grounding aims to reduce emissions or divert EMI.

5.2.4 Connecting the system

Electrical installation of the components shall be performed according to the project specifications and installation drawings (cable diagrams and connection diagrams).

Note that cables are typically installed, finished, and connected by an electrical subcontractor.

5.3 Commissioning and testing

NOTE: A soft-reset is not available, use the hard-reset switch on the AlphaMINDS computer.

This section provides the information required for commissioning and testing of the system. Commissioning and testing include setting various parameters, and performing functional checks of the equipment.

Preparation

1. Before starting with commissioning and testing:
    a) Get the information needed to configure the system.
    b) Get the correct documentation (including but not limited to; cable diagrams and connection diagrams)
    c) Get a good understanding of the system.
    d) Verify that the cables are prepared/installed as required per project specifications
    e) Verify that the computer is connected according to the User Manual of the computer.
    f) Verify availability of power supply.
2. Before power on, verify that the following conditions are met:
    a) All components of the system available and installed correctly.
    b) All components of the system are secured.
    c) Power and data connections checked.
    d) Cables are secured and undamaged.
    e) CAN bus network topology and terminations checked, if applicable.
    f) Shielding is connected in accordance with wiring instructions and sleeved where required.

Initial setup and dock trial

3. Power on the system.
4. Set all the necessary parameters of the vessel and sensor interface data, see chapter 6 Settings on page 55.
5. Check availability of data coming from equipment and sensors (e.g. Gyro, Compasses, GPS, ECDIS).
6. Verify correct functioning of the following:
    a) Rudder position feedback
    b) Navigation data (present)
    c) Alerts (no alerts at this stage)
7. Backup the settings. The settings are stored as CFG files at 'C:\Alphatron\AlphaMINDS' (folder 'SystemConfiguration' and 'UserSettings').
    NOTE: In order to restore the settings, the AlphaMINDS must be closed first!

Sea trial

8. Verify correct functioning of the following:
    a) Rudder position feedback
    b) Navigation data (present)
    c) Alerts (there should be no alerts)

9. Verify correct functioning of the AlphaMINDS Conning application.
10. Verify correct functioning of the AlphaMINDS Docking application, if applicable.
11. Backup the settings.

6 Settings

This chapter provides an overview and description of all settings (for end-user and administrator).

Note that settings are grouped and availability depends on user credentials and available applications.

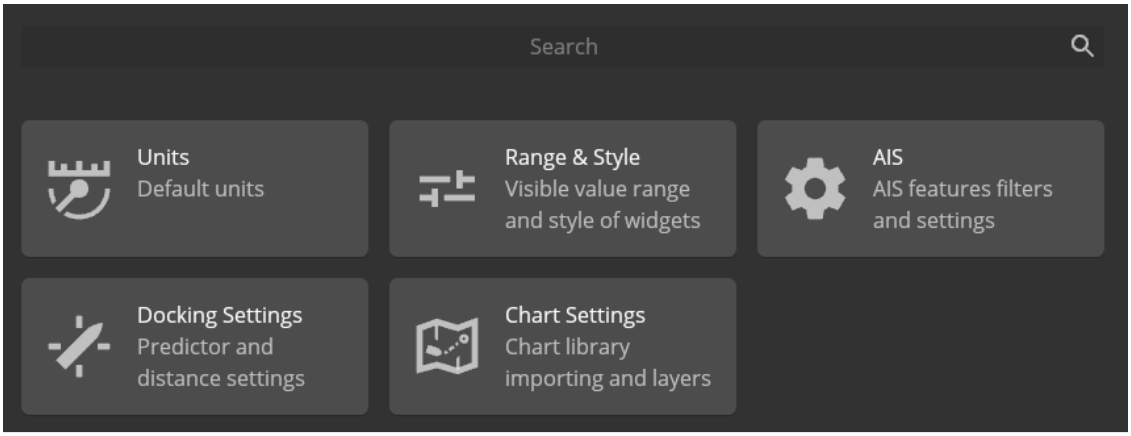


Figure 12: Setting pages, signed in as end-user, and both AlphaMINDS Conning and Docking available

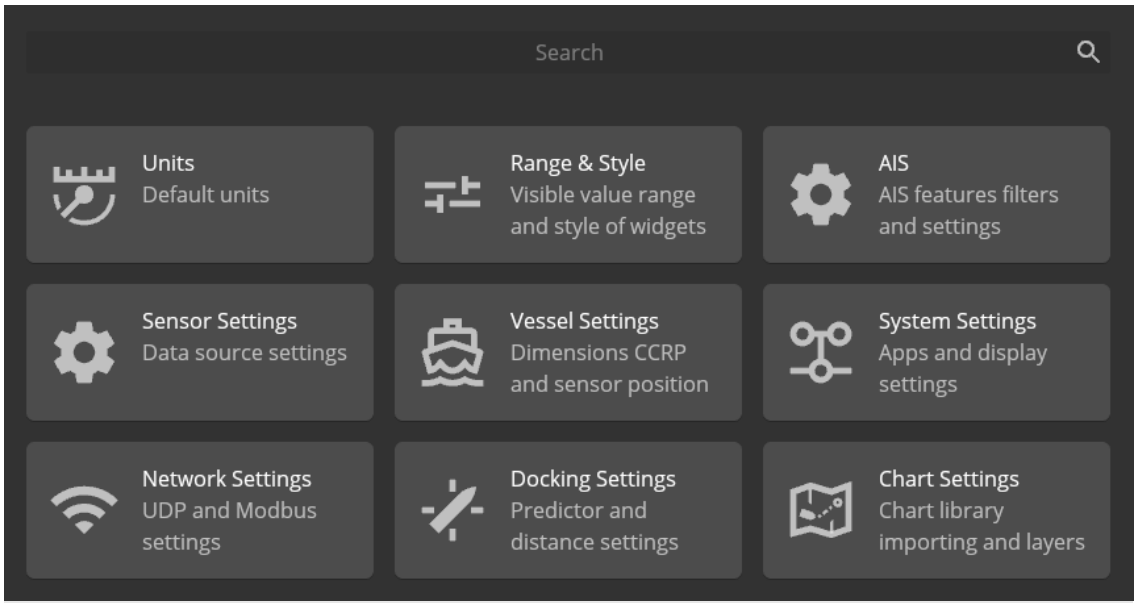


Figure 13: Setting pages, signed in as administrator, and both AlphaMINDS Conning and Docking available

No	Item	Remarks
1	Units	This page is used to configure settings of units (e.g. for distance, speed, temperature, pressure)
2	Range & Style	This page is used to configure settings of range and style (e.g. for depth, rudder, ROT)
3	AIS	This page is used to configure settings of AIS features, AIS filters, and AIS settings.

No	Item	Remarks
		NOTE: AIS settings are shown only when signed in as administrator!
4	Sensor Settings	This page is used to configure settings of connected sensors. NOTE: Shown only when signed in as administrator.
5	Vessel Settings	This page is used to configure settings of the vessel. NOTE: Shown only when signed in as administrator.
6	System Settings	This page is used to configure App and display settings. NOTE: Shown only when signed in as administrator.
7	Network Settings	This page is used to configure settings such as UDP and Modbus setting.
8	Docking Settings	This page is used to configure settings such as prediction time, prediction vessel, and distance detection. NOTE: Docking Settings is available when the AlphaMINDS Docking application is installed.
9	Chart Settings	This page is used to install, update, and remove charts, and to configure chart settings. NOTE: Chart Settings is available when the AlphaMINDS Docking application is installed.

When displayed on a settings page, the settings can be reset to default values via a slider button. Slide the button to the right, until a checkmark appears, and release it to reset to default values.

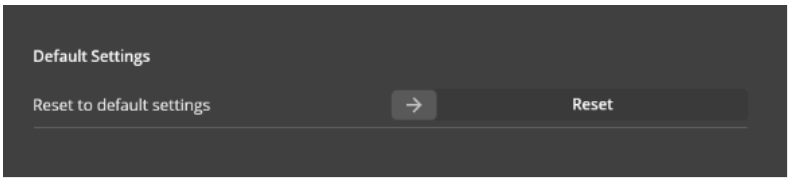


Figure 14: Reset to default settings (slider button)

The next subsections will explain the settings in more detail. Self-explanatory settings show a '-' at the description.

6.1 Units

This page is used to configure settings of units (e.g. for distance, speed, temperature, pressure).

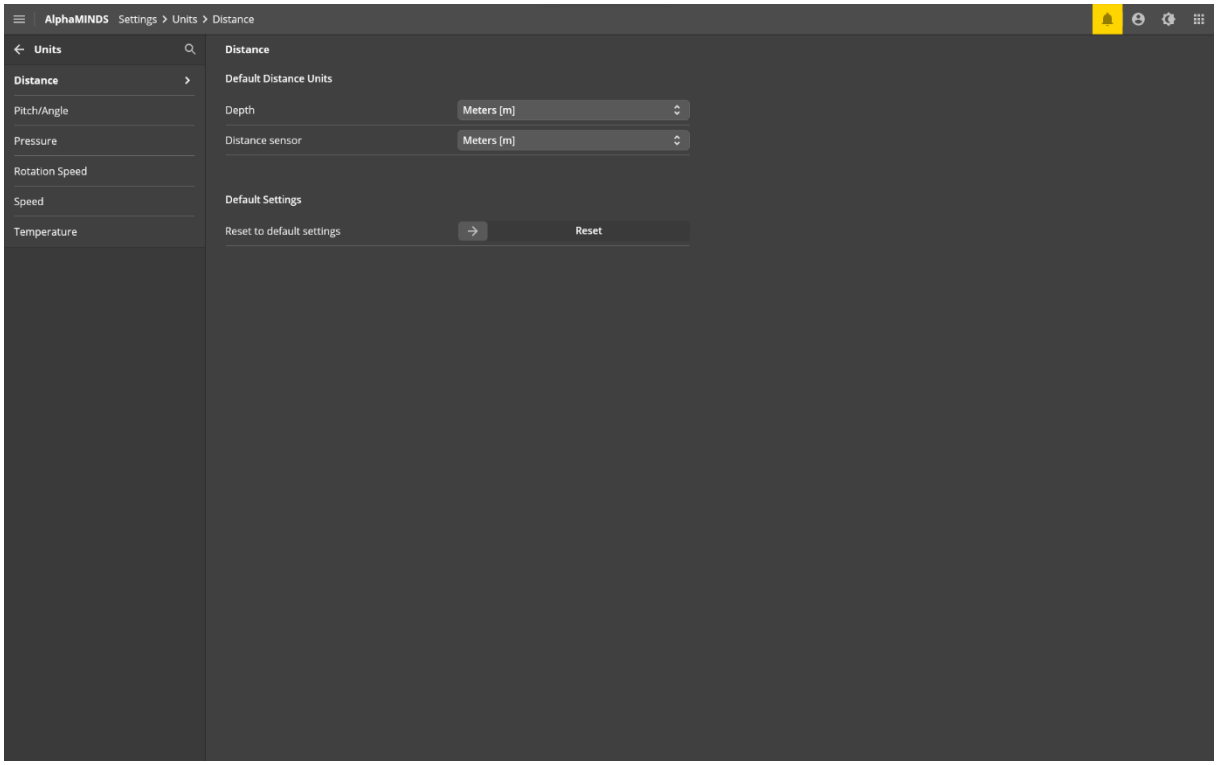


Figure 15: AlphaMINDS > Settings > Units > Distance

Setting	Value	Description
Distance		
Depth	m or ft	-
Distance Sensor	cm, m or ft	-
Pitch/Angle		
Propeller pitch angle	° or %	-
Thruster pitch angle	° or %	-
Rudder angle	° or %	-
Pressure		
Air Pressure	hPa or mbar	-
Rotation Speed		
Shaft rotation speed	rpm, 1/min, 1/s, or %	-
Thruster rotation speed	rpm, min-1, s-1, or %	-
Speed		
Vessel speed	cm/s, m/s, km/h, or kn	-
Current drift	m/s, km/h, or kn	-
Wind speed	m/s, km/h, or kn	-
Temperature		
Air temperature	°C or °F	-
Water temperature	°C or °F	-

6.2 Range & Style

This page is used to configure settings of range and style (e.g. for depth, rudder, ROT).

Setting	Value	Description
Depth		
Depth visible range	50, 100, 200, or 500	The scale in the current selected unit. It is not scaled when switching units.
Depth timeline [min]	3, 5, or 10	Depth visible time. NOTE: Depth logging time is 10 minutes.
ROT		
ROT [°/min]	40, 80, 120, 160 or 200	-
ROT style	Regular, PortStarboard, or Bar	Option 'PortStarboard' shows a red and green line.
Rudder		
Rudder angle [°]	45, 60, or 90	-
Rudder style	Regular or PortStarboard	-

6.3 AIS

This page is used to configure settings of AIS features, AIS filters, and AIS settings.

6.3.1 Features

Setting	Value	Description
AIS Visibility		
Show targets	On or Off	Show targets (as symbols) indicating the presence and orientation of vessels equipped with AIS in a certain location.
Range Marks		
Visibility range mark	On or Off	When a target is inside this range, it is displayed in the chart. Targets outside the range are not displayed.
Activation range mark	On or Off	When a target is inside this range, the target symbol changes and additional information about the target appears in the chart view (name, COG, SOG).
Danger range mark	On or Off	When a target is inside this range, the target symbol turns red.
Target Features		
Show target outline	On or Off	AIS targets can be displayed as true scale symbols based on dimensions from the AIS messages.
Show heading line	On or Off	To show the heading of an AIS target, heading line is used.
Show turn indicator	On or Off	To show that an AIS target is turning, the turn indicator is used (pointing in the direction of the turn).
Show velocity vector	On or Off	Velocity vector of an AIS target is a vector predicting position of the target in a specified period of time based on the current speed and course. The target's speed and course over ground (SOG and COG) are used.
Velocity vector length [s]	10 – 360	Length of the velocity vector.
Show velocity vector time increments	On or Off	Display time marks on the velocity vector.

Setting	Value	Description
Velocity vector time increments step size [s]	10 – 360	Time mark step for the velocity vector.
Show relative velocity vector	On or Off	-
Show path predictor	On or Off	Display a path prediction vector (or path predictor) (along with the velocity vector). It is based on SOG, COG and ROT.
Show past track	On or Off	To monitor track of AIS targets over time.
Past track interval [s]	10 – 360	Interval (step of time marks) of the past track.
Past track length [s]	10 – 360	Length of the past track.
Show target label	On or Off	Show the name (or MMSI when the name is not available) of activated targets
Show target data	On or Off	-
Highlight targets	On or Off	Show the highlighted variant of targets (filled in vessel or triangle)

6.3.2 Filters

Setting	Value	Description
Target Filtering		
Enable filtering	On or Off	Main setting that enables or disables all filters mentioned below
Type Filtering		
Show base stations	On or Off	-
Show SAR aircrafts	On or Off	-
Show SARTs	On or Off	-
Show real AToNs	On or Off	-
Show virtual AToNs	On or Off	-
Show ASM objects	On or Off	-
Show sleeping targets	On or Off	-
Show activated targets	On or Off	-
Show class A targets	On or Off	-
Show class B targets	On or Off	-
Value Filtering		
CPA filter enabled	On or Off	-
CPA filter distance [m]	50 – 1000	-
TCPA filter enabled	On or Off	-
TCPA filter time [s]	10 – 360	-
Distance filter enabled	On or Off	-

Setting	Value	Description
Distance filter [m]	1000 – 20000	-
Speed filter enabled	On or Off	-
Speed filter [m/s]	0.1 – 10.0	-

6.3.3 Settings

Setting	Value	Description
Past Track		
Past track to store [s]	10 – 360	-
CPA Settings		
Calculate CPA	On or Off	-
Danger CPA [m]	10 – 1000	-
Danger TCPA [s]	0 – 600	-
Visibility Settings		
Visibility range enabled	On or Off	-
Visibility distance [m]	1000 – 100000	-
Activation Settings		
Auto activation enabled	On or Off	-
Activation distance [m]	1000 – 100000	-
Danger Distance Settings		
Danger distance alert enabled	On or Off	-
Danger distance [m]	1000 – 100000	Distance of the Danger Range Mark. See also Danger Range Mark at ‘AIS - Filters’
Target Lost Settings		
Remove vessel timeout [s]	10 – 360 s	-
AToN Settings		
Show real AToN purpose	On or Off	-
AToN from edition one	On or Off	-

6.4 Sensor Settings

NOTE: These settings are password protected (accessible with administrator credentials).

This page is used to configure settings of connected sensors (e.g. GPS, compass). These setting can be used by all AlphaMINDS applications.

6.4.1 AIS

Setting	Value	Description
AIS 1..2		
Enabled	On or Off	Setup of channel for data input. - On: Sensor connected - Off: Sensor not connected
Source	61162-1/2 or 61162-450	Setup IEC 61162-1/2 for single talker and multiple listeners, or setup IEC 61162-450 for multiple talkers and multiple listeners (Ethernet interconnection).
NMEA UDP device	[value]	Setup NMEA UDP device. Editable when 61162-1/2 is selected.
NMEA 450 channel	[value]	Setup NMEA 450 device. Editable when 61162-450 is selected.
SFI	[value]	Setup SFI (System Function Identifier). Editable when 61162-450 is selected.

6.4.2 Anemometer

Settings similar as for AIS.

6.4.3 Climate meter

Settings similar as for AIS.

6.4.4 Auto Pilot

Similar settings as for AIS.

6.4.5 Bow Thruster

Setting	Value	Description
Bow Thruster 1..2		
Enabled	On or Off	Setup of channel for data input. - On: Sensor connected - Off: Sensor not connected
Source	61162-1/2 or 61162-450 or Modbus	Setup IEC 61162-1/2 for single talker and multiple listeners, setup IEC 61162-450 for multiple talkers and multiple listeners (Ethernet interconnection) or setup Modbus communication.
NMEA UDP device	[value]	Setup NMEA UDP device. Editable when 61162-1/2 is selected.
NMEA 450 channel	[value]	Setup NMEA 450 device. Editable when 61162-450 is selected.
SFI	[value]	Setup SFI (System Function Identifier). Editable when 61162-450 is selected.
NMEA source	TRD or XDR	Select NMEA identifier. Editable when 61162-1/2 is selected.
TRD thruster index	[value]	Setup NMEA TRD thruster index number. Editable when 61162-1/2 is selected, in combination with TRD as NMEA source.
XDR RPM identifier	[value]	Setup NMEA RPM identifier number. Editable when 61162-1/2 is selected, in combination with XDR as NMEA source.
MODBUS device	Device 1, Device 2, Device 3 or Device 4	Setup MODBUS device. Editable when Modbus is selected.
MODBUS register type	Coils, inputs, input registers or holding registers	Setup the register type. Editable when Modbus is selected.
RPM register	[value]	Setup the register index number. Editable when Modbus is selected.
RPM table	[value]	Setup the conversion table to go from Modbus register range

Setting	Value	Description
		to displayed range. Editable when Modbus is selected.
Load register	[value]	Setup the register index number. Editable when Modbus is selected.
Load table	[value]	Setup the conversion table to go from Modbus register range to displayed range. Editable when Modbus is selected.
RPM to load table	<RPM start value>,0;<RPM end value>,100;*	Setup the conversion table to go from RPM value to load percentage. This is only used when the selected display UoM is not available.
Load to RPM table	0,<RPM start value>;100,<RPM end value>;*	Setup the conversion table to go from Load percentage to RPM value. This is only used when the selected display UoM is not available.

* The values must be formatted correctly (i.e. '<X1>,<Y1>;<X2>,<Y2>;... <Xn>,<Yn>'), and must contain at least two sets of points. For example, '0,-90;65535,90' will map a Modbus register range to '[-90, 90]'.

6.4.6 Distance Above Water

Setting	Value	Description
Distance Sensor Forward / Starboard Bow / Starboard Stern / Portside Stern / Portside Bow		
Enabled	On or Off	-
Maximum Range [m]		-
Source	61162-1/2 or 61162-450 or Modbus	-
UDP Port		-
SFI		Setup SFI (System Function Identifier). Editable when 61162-450 is selected.
Modbus Register		-
Sensor Minimum Input Range [m]		-
Sensor Maximum Input Range [m]		-

6.4.7 Distance Below Water

Settings similar as for Distance Above Water.

6.4.8 ECDIS

Settings similar as for AIS.

6.4.9 Echo Sounder

Settings similar as for AIS.

6.4.10 Engine & Shaft

Setting	Value	Description
Engine 1..2		
Enabled	On or Off	-
Source	61162-1/2 or 61162-450 or Modbus	-
NMEA UDP Device		-
NMEA 450 Channel		-
SFI		Setup SFI (System Function Identifier). Editable when 61162-450 is selected.
NMEA Source		-
RPM Engine Index		-
XDR RPM Engine Identifier		-
XDR RPM Shaft Identifier		-
XDR Angle Propeller Identifier		-
MODBUS Device		-
MODBUS Register Type		-
Engine RPM Register		-
Engine RPM Table		-
Engine Load Register		-
Engine Load Table		-
Shaft RPM Register		-
Shaft RPM Table		-
Shaft Load Register		-
Shaft Load Table		-
Propeller Pitch Angle Register		-
Propeller Pitch Angle Table		-
Propeller Pitch Percent Register		-
Propeller Pitch Percent Table		-

6.4.11 GPS

Settings similar as for AIS.

6.4.12 GPS Compass

Settings similar as for AIS.

6.4.13 Gyro Compass

Settings similar as for AIS.

6.4.14 Magnetic Compass

Settings similar as for AIS.

6.4.15 Rudder

Setting	Value	Description
Rudder 1..2		
Enabled	On or Off	Setup of channel for data input. - On: Sensor connected. - Off: Sensor not connected.
Source	61162-1/2 or 61162-450 or Modbus	Setup IEC 61162-1/2 for single talker and multiple listeners, or setup IEC 61162-450 for multiple talkers and multiple listeners (Ethernet interconnection).
NMEA UDP Device		-
NMEA 450 Channel		-
SFI		Setup SFI (System Function Identifier). Editable when 61162-450 is selected.
NMEA Source		-
RSA Rudder Index		-
RSA Angle Scale Factor		-
XDR Angle Identifier		-
MODBUS Device		-
MODBUS Register Type		-
Angle Register		-
Angle Table		-
Direction Percent Register		-
Direction Percent Table		-

6.4.16 Speed Log

Settings similar as for AIS.

6.4.17 Stern Thruster

Settings similar as for Bow Thruster.

6.4.18 Turn Indicator

Settings similar as for AIS.

6.4.19 Vessel Clock

Settings similar as for AIS.

6.5 Vessel Settings

NOTE: These settings are password protected (accessible with administrator credentials).

This page is used to configure settings of the vessel. These setting can be used by all AlphaMINDS applications.

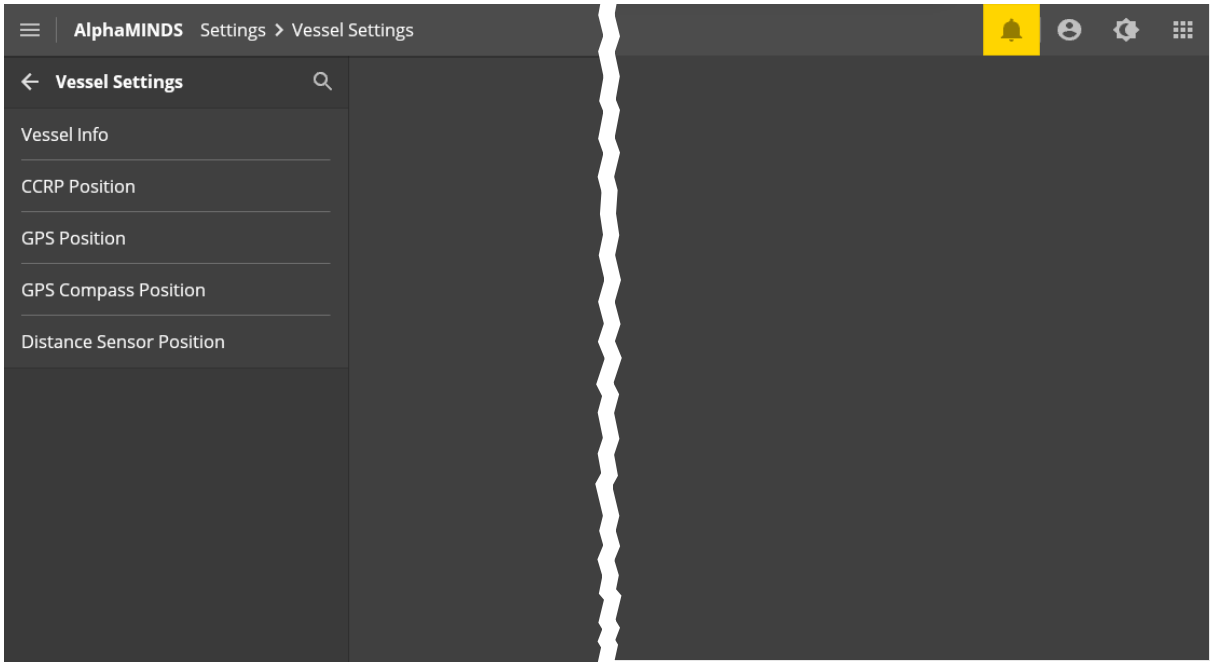


Figure 16: AlphaMINDS > Settings > Vessel Settings

6.5.1 Vessel Info

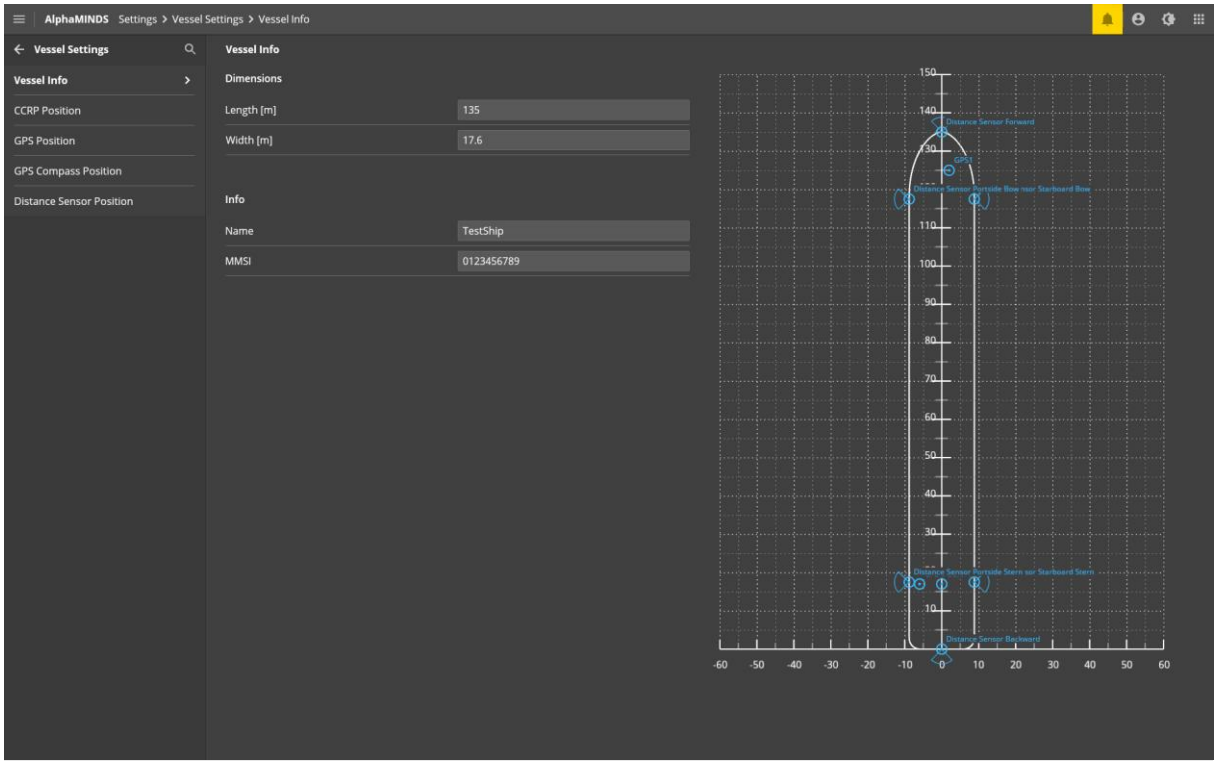


Figure 17: AlphaMINDS > Settings > Vessel Settings > Vessel Info

NOTE: The required values should derive from the Vessel General Arrangement plan.

Setting	Value	Description
Dimensions		
Length [m]	[value]	Length, Overall (LOA)
Width [m]	[value]	Beam, Overall (BOA)
Info		
Name	[value]	Name of the vessel
MMSI	[value]	MMSI of the vessel

6.5.2 CCRP Position

Setting	Value	Description
CCRP 1		
X [m]	[value]	Position from vessel centerline to Forward or Aft.
Y [m]	[value]	Position from vessel centerline to Port or Starboard direction.

6.5.3 GPS Position

Setting	Value	Description
GPS 1..2		
X [m]	[value]	Position from vessel centerline to Forward or Aft.
Y [m]	[value]	Position from vessel centerline to Port or Starboard direction.

6.5.4 GPS Compass Position

Setting	Value	Description
GPS Compass 1..2		
X [m]	[value]	Distance in the transversal (Port/Starboard) direction.
Y [m]	[value]	Distance in the longitudinal (Fore) direction, measure from the rear (Aft) of the vessel.

6.5.5 Distance Sensor Position

Setting	Value	Description
Distance Sensor Forward / Starboard Bow / Starboard Stern / Backward / Portside Stern / Portside Bow		
X [m]	[value]	Distance in the transversal (Port/Starboard) direction.
Y [m]	[value]	Distance in the longitudinal (Fore) direction, measure from the rear (Aft) of the vessel.
Direction [°]	[value]	Direction of the sensor.

6.6 System Settings

NOTE: These settings are password protected (accessible with administrator credentials).

This page is used to configure settings of AlphaMINDS system. These setting can be used by all AlphaMINDS applications.

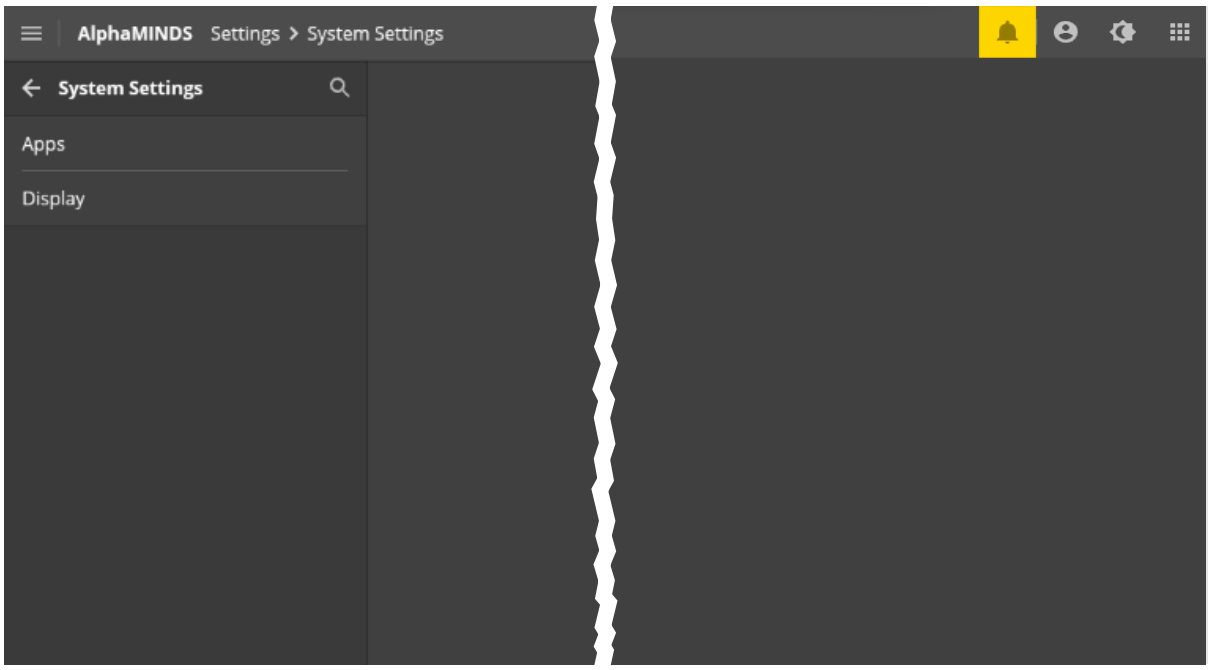


Figure 18: AlphaMINDS > Settings > System Settings

6.6.1 Apps

Setting	Value	Description
Available Apps		
Conning	On or Off	-
Docking	On or Off	-
Default Apps		
Start-up screen	SplashScreen, Conning, Docking	-

6.6.2 Display

Setting	Value	Description
Scale and layout		
Configuration resolution	'1920 x 1080' or '1920 x 1200'	-

6.7 Network Settings

UDP

Setting	Value	Description
UDP Device 1..16		
Enabled	On or Off	-
Port	[value]	-

UDP Multicast

Setting	Value	Description
Transmission Groups		
MISC enabled	On or Off	-
TGTD enabled	On or Off	-
SATD enabled	On or Off	-
NAVD enabled	On or Off	-
VDRD enabled	On or Off	-
RCOM enabled	On or Off	-
TIME enabled	On or Off	-
PROP enabled	On or Off	-

Modbus

Setting	Value	Description
Modbus TCP Device 1..4		
IP address		-
Port		-
Poll group 1 enabled		Enable/disable the polling of an address range. Polling is the action of requesting the data on those addresses. The Modbus device only sends data upon request.
Start address		The address of the first item to poll
Number of coils/registers		Number of coils/registers to poll
Type	coils, inputs, input registers, or holding registers	Coils and inputs are single bits, input registers and holding registers are 16-bit units (hence the 65535 max. value), and one of each is read only. The selected datatype is another address range in the Modbus device.
Poll group 2	Ditto Poll group 1	-

Setting	Value	Description
Poll group 3	Ditto Poll group 1	-
Poll group 4	Ditto Poll group 1	-

6.8 Docking Settings

Predictor

Setting	Value	Description
Predictor Settings		
Prediction time [s]	10 – 360	-
Ghost Vessel Settings		
Visualisation	Outline or Filled	-
Number of vessels	1 - 10	-

Distance Detection

Setting	Value	Description
Distance Detection Settings		
Detection angle [°]	10 – 170	-
Detection range [m]	10 – 1000	-
Detectable Features		
Beacon, cardinal	Enabled or Disabled	-
Beacon, isolated danger	Enabled or Disabled	-
Beacon, lateral	Enabled or Disabled	-
Beacon, safe water	Enabled or Disabled	-
Beacon, special purpose/general	Enabled or Disabled	-
Bridge	Enabled or Disabled	-
Buoy, cardinal	Enabled or Disabled	-
Buoy, installation	Enabled or Disabled	-
Buoy, isolated danger	Enabled or Disabled	-
Buoy, lateral	Enabled or Disabled	-
Buoy, safe water	Enabled or Disabled	-
Buoy, special purpose/general	Enabled or Disabled	-
Coastline	Enabled or Disabled	-
Dam	Enabled or Disabled	-
Daymark	Enabled or Disabled	-
Fence/wall	Enabled or Disabled	-
Gate	Enabled or Disabled	-
Hulk	Enabled or Disabled	-
Land area	Enabled or Disabled	-
Landmark	Enabled or Disabled	-
Light	Enabled or Disabled	-
Light float	Enabled or Disabled	-
Light vessel	Enabled or Disabled	-
Mooring/Warping facility	Enabled or Disabled	-
Obstruction	Enabled or Disabled	-
Offshore platform	Enabled or Disabled	-
Pile	Enabled or Disabled	-

Setting	Value	Description
Pontoon	Enabled or Disabled	-
Pylon/bridge support	Enabled or Disabled	-
Shoreline construction	Enabled or Disabled	-

6.9 Chart Settings

Display Settings

Setting	Value	Description
Chart Settings		
Auto scale	On or Off	Default value is 'Enabled'. If 'Disabled', the pre-set chart scale (see below) will be used.
Chart scale	1:x	Default value is '1:3000'.
Auto scale docking	1:x	Default value is '1:2000'.
Auto scale harbor	1:x	Default value is '1:5000'.
Auto scale voyage	1:x	Default value is '1:10000'.
Auto scale lock	1:x	Default value is '1:2000'.
Orientation	North Up or Heading Up	-
Chart Layers		
Prediction vessels	Auto, On, or Off	Default value is 'Auto' (i.e. automatic chart layer selection based on active mode), also called mode dependent. 'On' and 'Off' are both mode independent.
Prediction lines	Auto, On, or Off	Ditto Prediction vessels
Alignment lines	Auto, On, or Off	Ditto Prediction vessels
Speed info	Auto, On, or Off	Ditto Prediction vessels
Distance sensors	Auto, On, or Off	Show the values measured by the distance sensor, if enabled in the settings menu, otherwise the distance measured/calculated from chart data is shown. Default value is 'Auto'.
Display mode	Base, Standard, Full, Custom	Selecting one of these modes will apply a preset selection to the viewing groups. Default value is 'Standard'.
Viewing groups		The layers that make up the default chart.

Chart Library

Setting	Value	Description
Available charts		
CHART1	Enabled or Disabled	A chart for testing purpose. Default value is 'Disabled'.
OVERVIEW	Enabled or Disabled	A very basic world chart with not much details. Default value is 'Enabled '.

Setting	Value	Description
TDS	Enabled or Disabled	Default value is 'Disabled'.

Chart Importer

Setting	Value	Description
Importer		
Chart name	Text	The visible name in the chart library. User must enter a name. The name will be visible in other parts of the application. NOTE: If a name is used that already exists, then the chart will be updated.
Source drive	Path	The drive that contains the source data. This can be network drives as well. When a drive is selected the drive is scanned for available source data.
Source location	Path	Select the correct source data and use the slider button to import it. NOTE: S-57 charts can be imported if they have a catalog.031 file.

NOTE: Navtor does not supply any nautical charts for inland waterways. For Dutch waterways, freely available charts can be downloaded at vaarweginformatie.nl.

Chart Remover

Setting	Value	Description
Remove Chart		
Chart to remove	Available charts	Select a chart and use the Slider button to remove the chart.

7 Chart Handling

This chapter provides instructions for installing and updating both S-63 encrypted and S-57 unencrypted electronic navigational charts (ENCs) within AlphaMINDS. These charts form a critical foundation for navigation, route planning, and situational awareness, and must be kept current to ensure safe and compliant vessel operations.

7.1 Installing Charts

To install or update a new encrypted (S-63) chart, section 7.1.1 - 7.1.4 should be followed. To install or update an unencrypted (S-57) chart, only section 7.1.4 needs to be followed.

To update a chart, apply the same chart name as the chart that you want to update. This will apply the update to the installed chart.

7.1.1 Find the userpermit

To order a new chart/permit a userpermit is required. You can find the userpermit of your AlphaMINDS system with the following steps:

1. Go to the userpermit page in the settings menu (Settings > Chart Settings > Userpermit)
1. Use the 28 character code to order your new chart/permits.

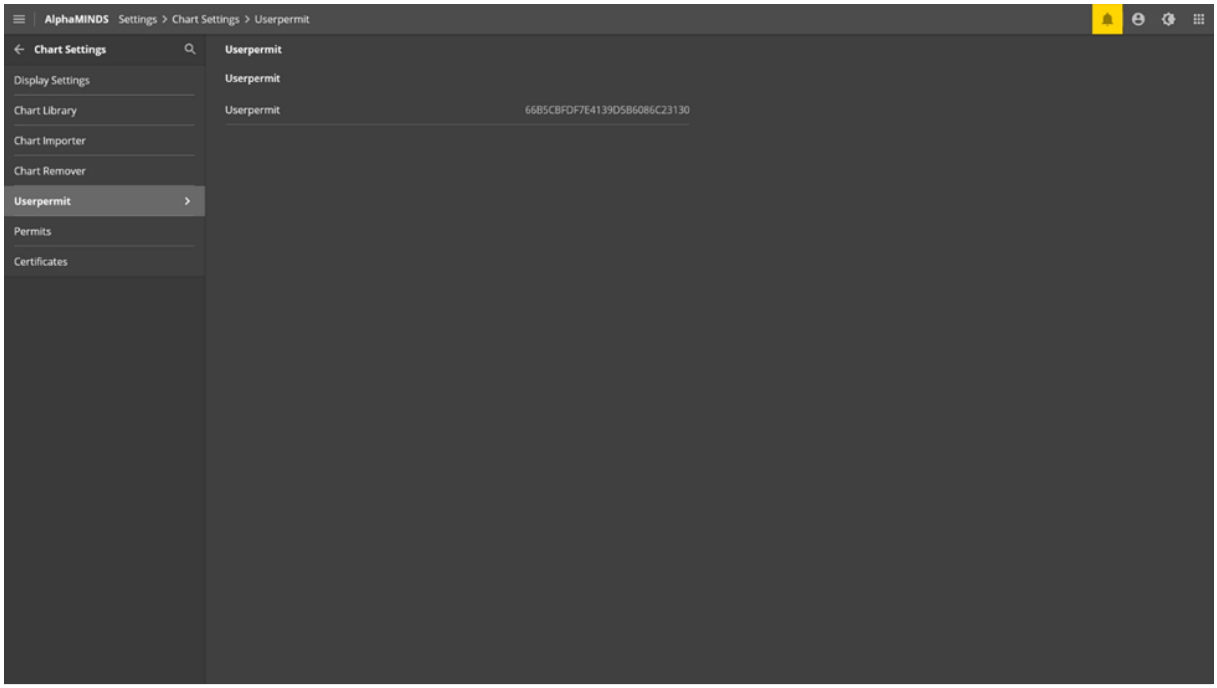


Figure 19: AlphaMINDS > Settings > Chart Settings > Userpermit

NOTE: If the Userpermit field shows the text "Not available", then the license of AlphaMINDS is incorrect.

7.1.2 Install a new certificate'

NOTICE Installing a new certificate with the same name as an installed certificate will replace the installed certificate. This action cannot be undone.

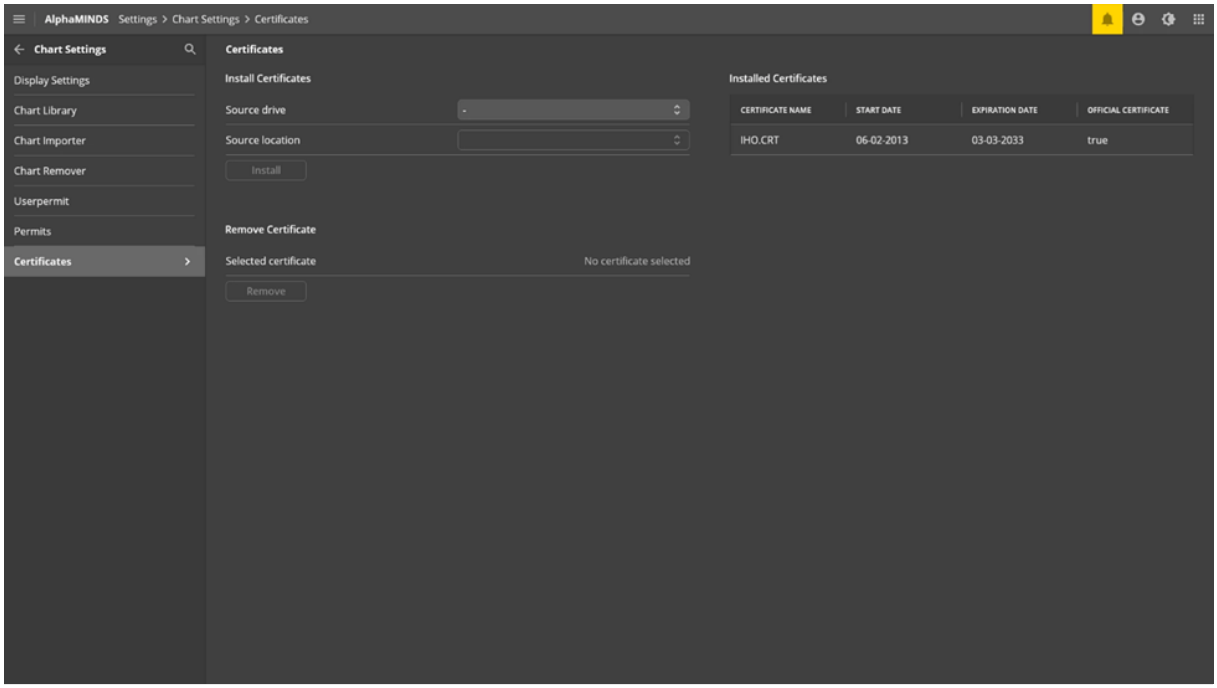


Figure 20: AlphaMINDS > Settings > Chart Settings > Certificates

To install a chart you need to have the same certificate installed as used by your chart supplier and it can't be expired. For official charts you can get this certificate from the IHO website. With the following steps a new certificate can be installed:

2. Put the new certificate file (for the official IHO certificate this is the IHO.CRT file) on a removable drive.
3. Connect the removable drive to the AlphaMINDS computer.
4. Go to the certificates page in the settings menu (Settings > Chart Settings > Certificates)
5. Select the removable drive in the 'Source drive' dropdown. If the USB device isn't shown in the source drive dropdown list, try closing and opening the dropdown. This will refresh the list of connected devices.
6. If applicable, wait for the search popup to disappear (on removable drives with only a few files this might be instantly).
7. Select the new certificate file in the 'Source location' dropdown.
8. Click on the 'Install' button.
9. Verify that you are sure to install the new certificate.
10. Wait for the result popup message and click on 'OK'.
11. Your new certificate is now installed and should be visible in the table on the right area of the screen.

7.1.3 Install a new permit

NOTICE

Installing a new permit with the same cell name and dataserver id will replace the installed permit if the expiration date is further in the future or the same. This action cannot be undone.

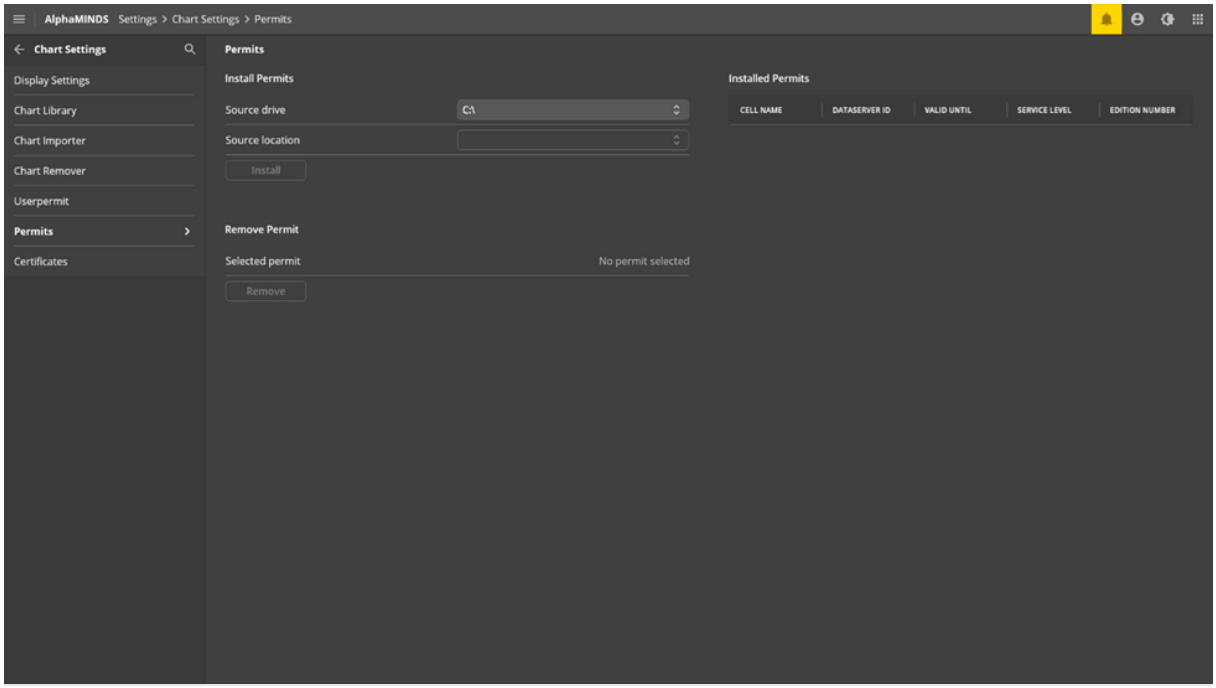


Figure 21: AlphaMINDS > Settings > Chart Settings > Permits

When the chart is ordered you will receive some files one of which is the PERMIT.TXT file. This file contains the new permits. To install these permits follow the following steps:

1. Put the permit file on a removable drive.
2. Connect the removable drive to the AlphaMINDS computer.
3. Go to the permits page in the settings menu (Settings > Chart Settings > Permits).
4. Select the removable drive in the 'Source drive' dropdown. If the USB device isn't shown in the source drive dropdown list, try closing and opening the dropdown. This will refresh the list of connected devices.
5. If applicable, wait for the search popup to disappear (on removable drives with only a few files this might be instantly).
6. Select the new permit file in the 'Source location' dropdown
7. Click on the 'Install' button.
8. Verify that you are sure to install the new permit.
9. Wait for the result popup message and click on 'OK'.
10. Your new permit is now installed and should be visible in the table on the right area of the screen.

7.1.4 Importing a chart

NOTICE If the new chart name matches an installed chart, then the installed chart will be overwritten. This action cannot be undone.

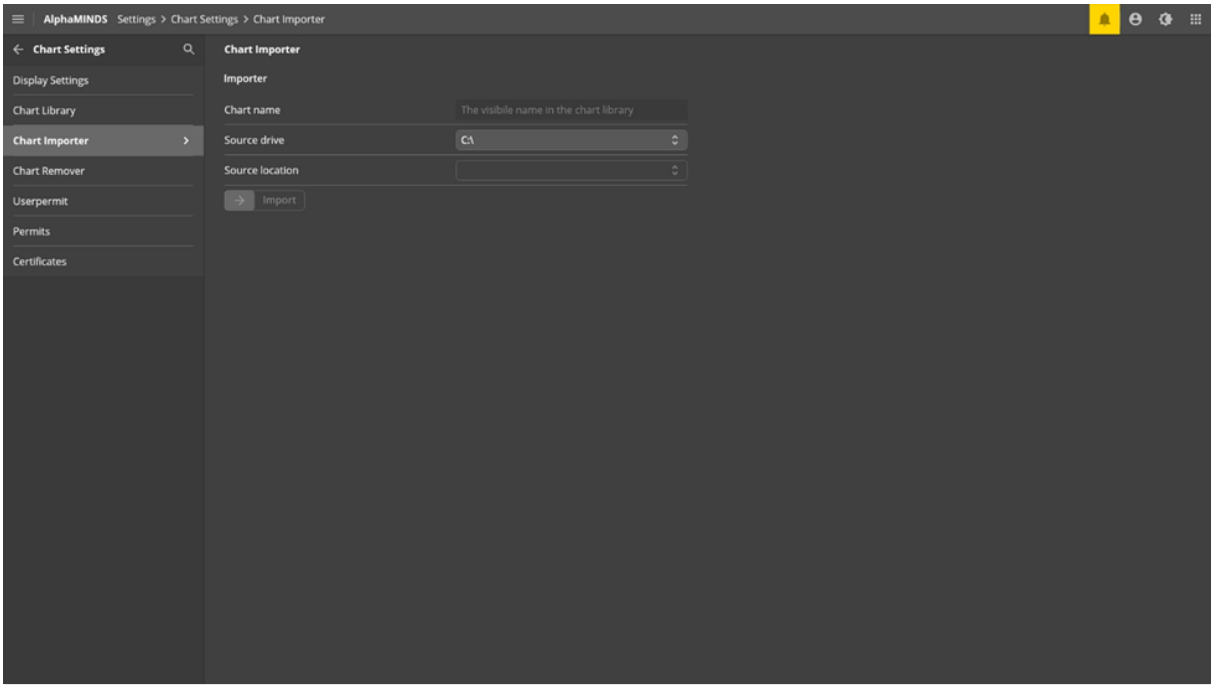


Figure 22: AlphaMINDS > Settings > Chart Settings > Chart Importer

To install a new chart follow the following steps:

1. Put the chart on a removable drive.
2. Connect the removable drive to the AlphaMINDS computer.
3. Go to the chart remover page in the settings menu (Settings > Chart Settings > Chart Importer).
4. Enter a suitable chart name (without special characters).
5. Select the removable drive in the ‘Source drive’ dropdown. If the USB device isn't shown in the source drive dropdown list, try closing and opening the dropdown. This will refresh the list of connected devices.
6. If applicable, wait for the search popup to disappear (on removable drives with only a few files this might be instantly).
7. Select the new chart in the ‘Source location’ dropdown. If the new ENC doesn't appear in the dropdown, then verify if the new chart contains the CATALOG.031 file. If this file is not available, then the chart can't be installed.
8. Slide the ‘Import’ button to the right and release it when a checkmark icon becomes visible
11. Verify that you are sure to install the new chart.
9. Wait for the progress bar to be completely filled.
10. If a green circle containing a checkmark appears, then the installation of the chart is successful. The chart will become visible in the ‘Chart library’.

7.2 Removing Charts

NOTICE Removing certificates, permits and charts is a permanent action that cannot be undone.

7.2.1 Removing certificates

1. Go to the certificates page in the settings menu (Settings > Chart Settings > Certificates)
2. Select the certificate you want to remove in the table on the right side of the page.
3. Verify if the selected certificate is the certificate you want to remove.
4. Click on the 'Remove' button and confirm to remove the certificate.

7.2.2 Removing permits

1. Go to the permits page in the settings menu (Settings > Chart Settings > Permits)
2. Select the permit you want to remove in the table on the right side of the page.
3. Verify if the selected permit is the permit you want to remove.
4. Click on the 'Remove' button and confirm to remove the permit.

7.2.3 Removing charts

1. Go to the chart remover page in the settings menu (Settings > Chart Settings > Chart Remover)
2. Select the chart you want to remove in the 'Chart to remove' dropdown.
3. Slide the remove button to the right and confirm to remove the chart.

8 Troubleshooting

When an abnormal condition has arisen, an alert message is displayed. For information on how to view the alerts (on the Alert page and Alert list page), see section 4.1.2.2 on page 26.

All alerts are listed in Appendix E.

8.1 Mitigation

Most issues can be mitigated as follows:

1. Check the alert message.
2. Check if the related equipment is switched on.
3. Check the wiring.
4. Check if the related equipment is sending correct data. Use the Line Monitor, refer to section 8.2.10 on page 87.

8.2 Support page

The support page contains an overview of one or more Support pages (for end-user and administrator).

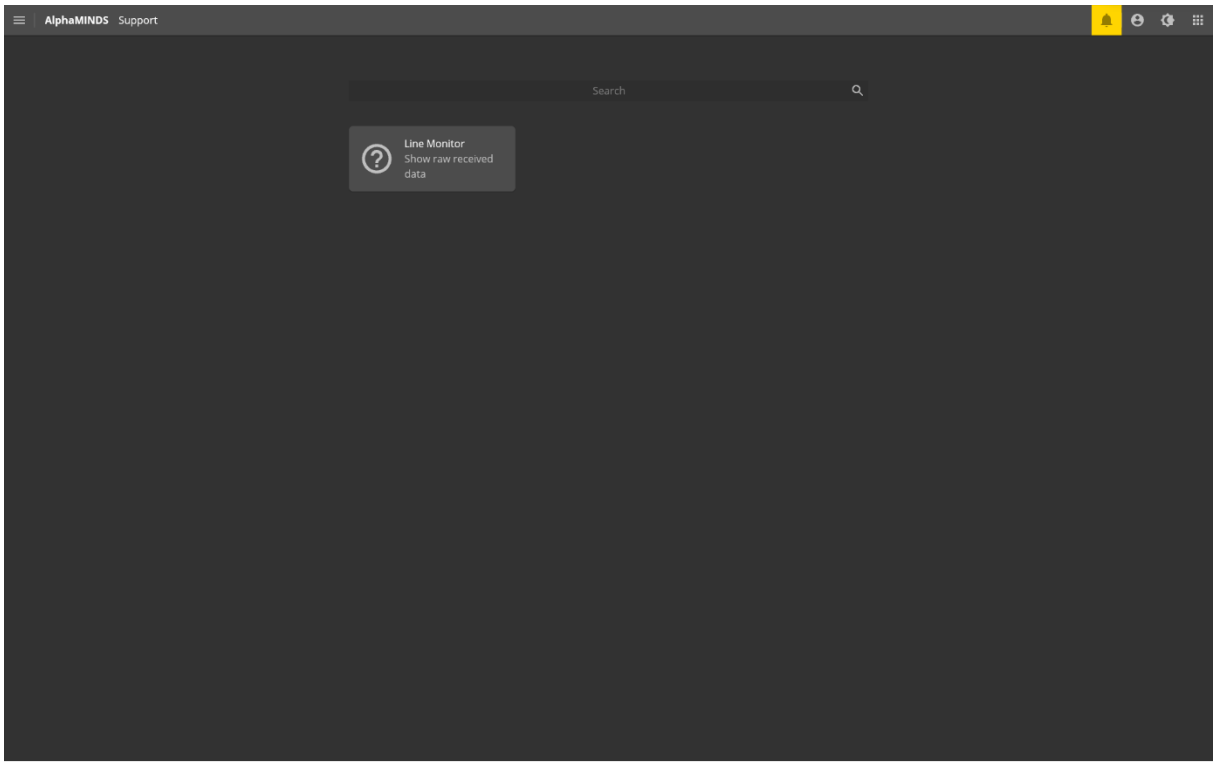


Figure 23: AlphaMINDS > Help & Support

8.2.1 Line Monitor

The Line Monitor page allows the user to view received NMEA sentences and Modbus data for each source for analysis.

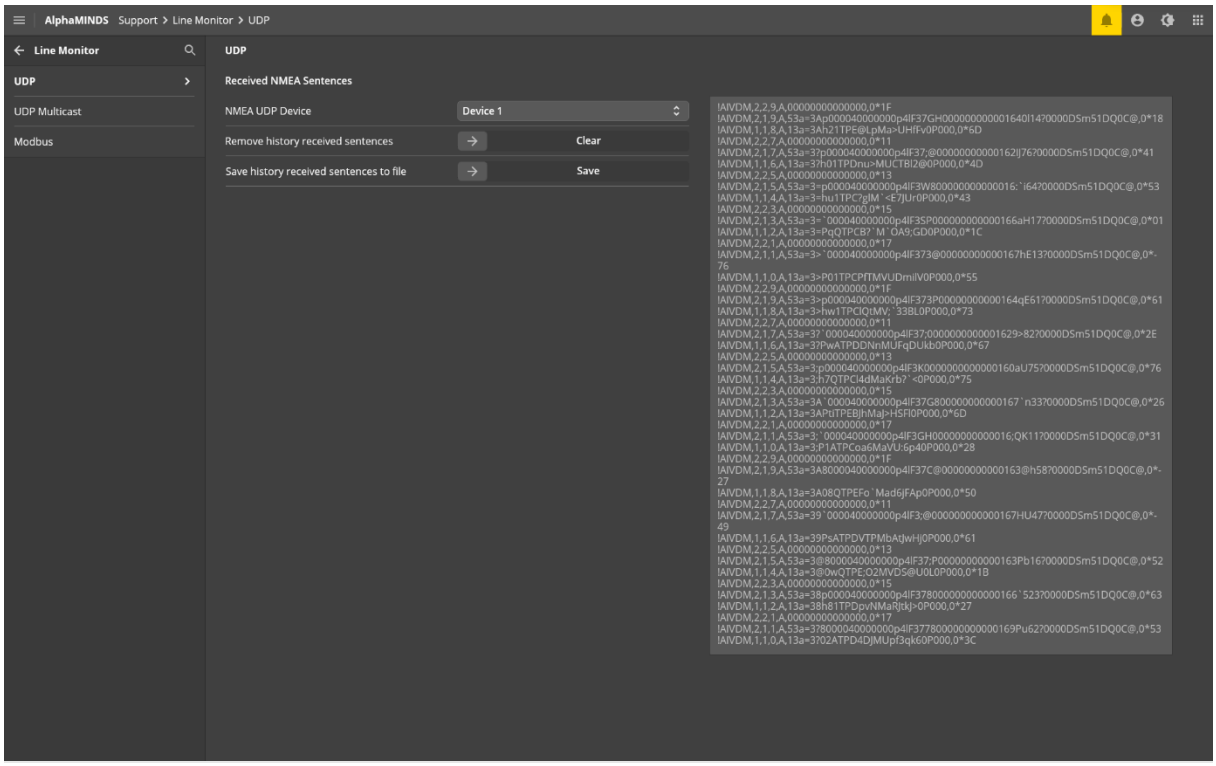


Figure 24: AlphaMINDS > Help & Support

The user can select an NMEA UDP or Modbus device. The received sentences are then shown on the right side.

9 Help & Support

If the equipment for some reason does not work as described in this manual, contact the distributor or dealer, from where the equipment was originally bought. The distributor or dealer will have experience and know-how to assist with further technical support and troubleshooting.

All information that will get back to Alphatron Marine, either directly or indirectly, will be handled with confidentiality. End-user sensitive data will not be shared with any third party without prior written acceptance from the involved parties.

Appendices

Appendix A: Specifications

Box Contents upon Delivery
- Computer for AlphaMINDS Conning, or AlphaMINDS Conning & Docking - AlphaMINDS secured USB dongle (G-009374)

Physical Dimensions Computer for AlphaMINDS Conning	
Dimensions (WxHxD)	222x89x300 mm (8.66x3.50x11.81")
Weight	3.7 kg (8.1 lbs)

Physical Dimensions Computer for AlphaMINDS Conning & Docking	
Dimensions (WxHxD)	380x89x351 mm (14.97x3.50x13.82")
Weight	7.5 kg (16.5 lbs)

Power Specifications	
Power supply	Multi Power: 100-240VAC 50/60Hz and 24VDC

Operating Conditions	
Operating temperature	-15°C to +55°C[2]
Operating humidity	Up to 95%
Storage temperature	-20°C to +60°C
Storage humidity	Up to 95%
Compass safe distance Computer for AlphaMINDS Conning	Std: 30 cm / Steering: 25 cm
Compass safe distance Computer for AlphaMINDS Conning & Docking	Std: 160 cm / Steering: 130 cm

Display Requirements	
Resolution	1920x1200 or 1920x1080[3]
Orientation	Horizontal

Input/Output Signals Computer for AlphaMINDS Conning	
DVI-I	1x
DVI-D	1x
Display Port (DP++ 1.2)	1x
Ethernet Ports	4x
USB2.0	4x
USB3.0	4x
Interface modules such as CAN/NMEA COM/COM and DIO	Optional

Input/Output Signals Computer for AlphaMINDS Conning & Docking	
DisplayPort	2x
Ethernet Ports	4x
USB3.1	4x
USB-C	1x
Interface modules such as CAN/NMEA COM/COM and DIO	Optional

Norms/Standards	
IEC 60945 (2002), IACS E10, EN55024, EN55022 Class A,EU-RO-MR - Mutual Recognition	AlphaMINDS Computer
IEC 61162 series	NMEA Definitions
IEC 62288 (2014)	

Available Accessories	
CT-104 GNSS-receiver	G-009636
GNSS High-Precision Multi-band Surveying RTK antenna	G-021655

[2] Although the test conditions provide for a maximum operation temperature of 55°C, continuous operation of all electronic components should, if possible, take place at ambient temperature of 25°C. This is necessary for a long life and low service costs.

[3] Other aspect ratio's possible on request.

JRC Europe

Appendix B: Computer for AlphaMINDS Conning

DATASHEET

HATTELAND TECHNOLOGY
an EMBRON Company

Manufacturer:	**Hatteland Technology AS**
Product:	**Compact Fanless Computer**
Type:	**HT B30Gx STC-yzz-Mzzzzz (Long Depth model)** (where x=CPU type, y=OS, z=Configuration)

Last Revised:	**09 May 2023**
Revision#:	**37**

Compact Fanless Computer

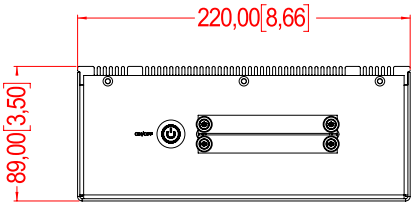
Overview:

The HT B30 range is based on the latest Intel® chipset and Skylake processor platform, delivering even more power for maritime technology developers to design and build high-end vessel control and monitoring solutions that enable safer and more effecient maritime operations.

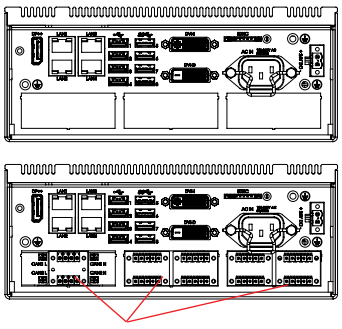
HT B30 computers are available in two new form factors, short depth and long depth, allowing for flexible installation options including 3U rack mounting in pairs. Using the same system architecture as our new, second generation Series X Panel Computers, the HT B30 range offers significant processing speed and graphical performance improvements, which when combined with multiple-drive solid state storage and silent, fanless operation, positioning it among the most advanced computing platforms for maritime applications.

HT B30 computers can be delivered with a choice of Intel® Core™ / Celeron® processors, up to i7. Graphical output is handled by 1 x DVI-I[3], 1 x DVI-D and 1 x Display Port (DP++ 1.2) while standard interfaces include 4 x Ethernet Ports, 4 x USB2.0 and 4 x USB3.0. The HT B30 platform also supports a wide range of interface modules such as CAN/NMEA COM/COM and DIO, ensuring it is ready off-the-shelf for all maritime applications. In addition, HT B30G range of computers features a lightweight, fully enclosed aluminium chassis and comes with Hatteland Technology's Multi-power system (both AC and DC power built in).

FRONT VIEW

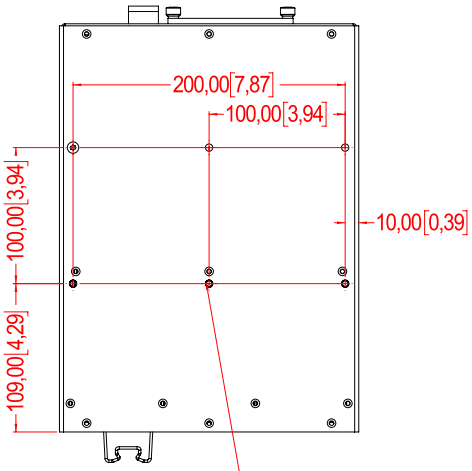


BACK VIEW

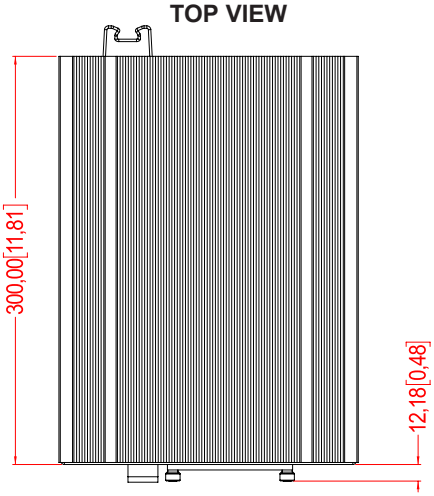


Shown with 3 x Factory Mounted Module Options

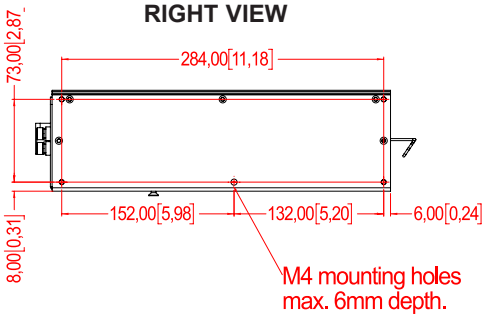
BOTTOM VIEW



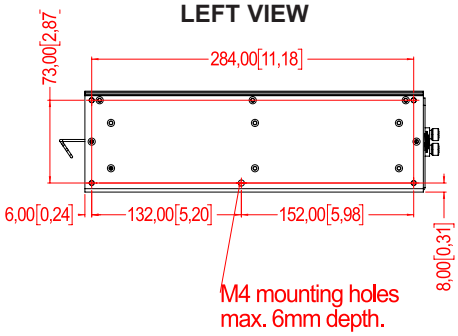
TOP VIEW



RIGHT VIEW



LEFT VIEW



Dimensions might be shown with or without decimals and indicated as mm [inches]. Tolerance on drawings is +/- 1mm. For accurate measurements, check relevant DWG file.

SPECIFICATIONS

Note: All specifications are subject to change without prior notice!
Please visit www.hattelandtechnology.com for the latest electronic version.

HATTELAND TECHNOLOGY
an EMBRON Company

TECHNICAL DESCRIPTION

Computer Specifications: (Standard model)

		External Connector Type:
• Operating System	: None or Customized image - See table below	
• Processor	: 1 x Intel® Core™ - See table below	
• Memory/RAM	: 2 x SO-DIMM SLOT DDR4-2133, Max 2x16GB - See table below	
• Storage #1	: 2 x 2.5" removable front trays - See table below for sizes	
• Storage #2 internal	: 1 x SSD m.2 - See table below for sizes	
• Media Storage	: 1 x SDXC (SDcard) slot	1 x SDcard Slot
• Graphics	: Intel® HD Graphics 510 (OpenGL 4.4)/520 (OpenGL 4.5), DirectX 12.0, OpenCL 2.0 3 independent displays (valid combinations: ref Intel datasheet)	1 x DVI-I[3] + 1 DVI-D + 1 x DP++ 1.2
• Graphics Resolutions	: DP = 4096x2304@60Hz. DVI-I/D = 1920x1200@60Hz	
• System Chipset	: Integrated in 6th Generation Intel® Core™ U-series processor	
• BIOS	: ACPI support	
• Ethernet #1	: 1 x 10/100/1000Mbps, Intel® Ethernet Controller I210-AT Gigabit LAN	1 x RJ-45, Teaming
• Ethernet #2	: 1 x 10/100/1000Mbps, Intel® Ethernet Controller I210-AT Gigabit LAN	1 x RJ-45, Teaming
• Ethernet #3	: 1 x 10/100/1000Mbps, Realtek RTL8119 Gigabit LAN	1 x RJ-45, Teaming
• Ethernet #4	: 1 x 10/100/1000Mbps, Realtek RTL8119 Gigabit LAN	1 x RJ-45, Teaming
• USB Ports #1	: 4 x USB2.0 (<5m)	4 x USB Type A
• USB Ports #2	: 4 x USB3.0 (<3m)	4 x USB Type A
• Power Manager	: ACPI S3/S4	
• Watchdog Timer	: 256 Segments, 0, 1, 2...255 sec/min	
• RTC	: 0.5s/day[2]	
• H/W Status Mont.	: TPM2.0, Firmware Raid, Temperatures, voltages, Battery load status Alarm, cooling fan status[1]. Auto throttling control if CPU overheats	
• Battery	: Normal operational conditions: life time >5 year, worst case conditions(@70C, 24/7): life time >2 year	

[1] Cooling FAN status, not applicable for system without CPU/system FAN.
[2] Required accuracy may be dependent of the actual implementation/environment and may require calibration to be within specified boundaries.
[3] Depending on manufactured date of unit, the DVI-I connnector are present on unit, but it will not support VGA
ref: https://www.hattelandtechnology.com/product-notifications/ht-b30-configuration-update-due-to-component-shortage

Power Specifications:

Power Supply options:
• Multi Power: 100-240VAC 50/60Hz + 24VDC — 1 x STD IEC + 1 x 2-pin Terminal Block 5.08
• Power Consumption[4] - AC/DC: 39W (typ)[5] - 75W (max) - [5]at 25% load. Max Allowed External USB load = 10W.
Note: You may connect either AC power or DC power or both. In case both sources are connected, power will be sourced from the AC input. If AC input is lost, there will be a uninterrupted switch-over to DC input.

Available Computer Configurations:

Type	Description	Size/Specification
CPU	1 x Intel® Core™ i5-6300U (2 physical core / 4 thread) 1 x Intel® Core™ i7-6600U (2 physical core / 4 thread) 1 x Intel® Celeron® 3955U (2 physical core / 2 thread)	- 2.4GHz / 3GHz 2/4 @15W, 403 GFLOPS, Chipset: Intel® HD 520 - 2.6GHz / 3.4GHz 2/4 @15W, 403 GFLOPS, Chipset: Intel® HD 520 - 2.0GHz 2/2 @15W, 173 GFLOPS, Chipset: Intel® HD 510
Memory	Dual Channel, DDR4-2133 SO-DIMM, 2 slots available	- 2x4GB (Standard), 2x8GB, 2x16GB (Max)
Storage #1	2 x 2.5" SSD SATA	- 240GB (599TBW), 480GB (945TBW), 960GB (1750TBW) Review "SSD Selection Guide" in User Manual
Storage #2	1 x SSD m.2 SATA	- 240GB (599TBW), 480GB (945TBW), 960GB (1750TBW) Review "SSD Selection Guide" in User Manual
OS Option 32/64bit where applicable	Windows® 7 Pro/Ult. Embedded Systems[6], Windows® Emb. Standard 7 (Toolkit & Runtime) All Versions [7], Windows® 10 IoT Enterprise 2019 LTSC[8] Linux (Skylake: kernel 4.4 or later). [6]Product Distribution End Date September 2024. [7]Product Distribution End Date July 2025. [8]Product Distribution End Date January 2029.	

Factory Mounted Options:

• 1,2 or 3 x PCA200828-1 (4xCOM RS-422/485 isolated NMEA 4 channel) module
• 1 x HTA2020002-AD1033 (1 x CAN isolated, 2 channel) module
• 1 x HTA2020002-SLCAN (1 x CAN isolated, 2 channel, socketCAN) module
• 1 x PCA100297-1 (4 x Digital Input/Output isolated) module
• 1 x PCA100298-1 (LAN 10/100Mbps, 2 ports (RJ45) module
• 1 x VSD203134-1 (2W Amplified Audio out via DB9F)
• 1, 2 or 3 x PCA100309-1: Dual Isolated RS-232, 2xDB9M module
• Power Button Cover Option
• Variations of Storage Devices, RAM Memory and Operating System
* Contact us for possible combinations. Review separate datasheet for more info.

[4] Power Consumption: Numbers are specified as the unit is delivered from factory. All additional installed equipment like USB, PCIe and similar loads have to be added to power consumption. Note that total extra load have to be multiplied by 1.5 to compensate for efficiency in internal power converters. Typical power consumption varies a lot with computer load. We measure with 25% of max computer load.

Available Accessories:

• HT 00262 OPT-A1: 4 x RS-422/RS-485 isolated, USB ext. module
• HT 00263 OPT-A1: 4 x RS-232 COM non-isolated, USB ext. module
• HT 00264 OPT-A1: 1 x CAN isolated, 2 channel, USB ext. module
• HT 00264 OPT-A2: 1 x CAN isolated, 2 channel, socketCAN USB ext. module
• HT 00273 OPT-A1: 4 x Digital IN/OUT isolated, USB ext. module
• HT 00274 OPT-A1: 2 x LAN 10/100Mbps, RJ45, USB ext. module
• HT 00228 OPT-A1: 1 x Mounting Plate with cable relief, RAL9011
• HT MBK STD-A1: 1 x Mounting Bracket Kit[9]
• HT RET STD-A1: 1 x Cable Retainer/Relief Kit[9]
• HT RMK STD-A1: 1 x 2U Rack Mount Kit RAL9011
• HT RMK STD-H1: 1 x 2U Rack Mount Kit w/Handles, RAL9011
• HT SRK STD-A2: 1 x 3U 19" Slide Rack Mount Kit (For 1 or 2 x HTB30)
• SF-41-20: 2 x 20" ball bearing sliding rail kit for 19" Rack[10]
• SF-41-26: 2 x 26" ball bearing sliding rail kit for 19" Rack[10]
• JH C01MF A-A: 1 x USB Cable 1m, Type A to Chassis mount receptacle
• HD 000TR SX2-A2: 1 x Removable Front Tray 2.5" Empty
• HD xxxyy SX2-z2: 1 x Removable Front Tray 2.5" w/Storage Device[11]
• HT 00300 MSOS: OS options:
https://www.hattelandtechnology.com/os
[9] Included with delivery
[10] Must be combined with HT SRK STD-A2
[11] Where xxx=Size of device. yy=GB,TB. z=S (SSD) Choose Storage Device from table above.

MECHANICAL DESCRIPTION

Physical Specifications:

Product Dimensions and Weight:
• W:220.00 [8.66"] x H:89.00 [3.50"] x D:300.00 [11.81"] mm [inch]
• Weight: 3.7 kg / 8.1lbs
• Aluminium Cooling Chassis, Painted RAL9011
• Includes: Mounting Bracket Kit, USB + DP/HDMI Retainers, Cable Relief Retainer
• Power/Reset/Power LED Combined Function
Product Carton Size and Weight:
• L:405.00 [15.94"] x W:184.00 [7.24"] x H:373.00 [14.69"] mm [inch]
• Approx: 5.0 kg / 11.0lbs

Environmental Considerations:

• Operating	: Temperature -15°C to +55°C
• Storage	: Temperature -20°C to +60°C
• Humidity	: Up to 95% (Operating / Storage)
• Shock - Vibration	: 5g/11ms - 0.7g (IEC 60945 / IACS E10)
• Air Pressure Maximum Altitude	: Operating: 4000m - Storage: 12912m
• Air Pressure Maximum Altitude (Bonded)	: Operating: 3000m - Storage: 3000m
• Compass Safe Distance	: Standard: 30cm - Steering: 25cm

Lifetime Considerations:
Even though the test conditions for bridge units provide for a maximum operating temperature of 55°C, continuous operation of all electronic components should, if possible, take place at ambient temperatures of only 25°C. This is a necessary prerequisite for long life and low service costs.

APPROVALS & CERTIFICATES

These products have been tested / type approved by the following classification societies:

IEC 60945 4th (EN 60945:2002) **IACS E10** **EN55024** **EN55022, Class A** **EU RO MR** - Mutual Recognition
ClassNK - Nippon Kaiji Kyokai **CCS** - China Classification Society **ABS** - American Bureau of Shipping **BV** - Bureau Veritas
KR - Korean Register of Shipping

JRC Europe

Appendix C: Computer for AlphaMINDS Conning & Docking

DATASHEET

HATTELAND TECHNOLOGY
an EMBRON Company

Manufacturer:	**Hatteland Technology AS**
Product:	**Industrial Marine Computer (Standard Models)**
Type:	**HT20470-ww-xx yzzzzzz**
	where ww=CPU type (i3,i5,i7,i9), xx=Power Input (AC, DC), y=manufacturing site, zz=configuration

Last Revised:	**17 Feb 2025**
Revision#:	**17**

Marine Computer (Standard Models)

Features:

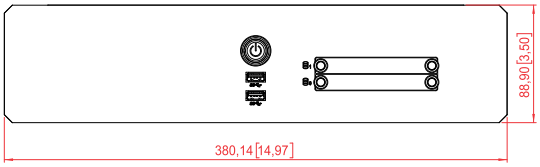
The HT20470 model is the successor to the best in class and highly successful HT20370 computer. The new model incorporates latest processor technologies and enhanced feature sets, thus providing greater versatility for high-end maritime system applications.

The HT20470 models are high-end platforms with an enhanced chassis that includes external disc bays at the front. The i3, i5, i7 or i9 processor options ensure state of the art computing performance is delivered; while the extensive feature options allows for the HT20470 to be built up to a quasi-Server capability.

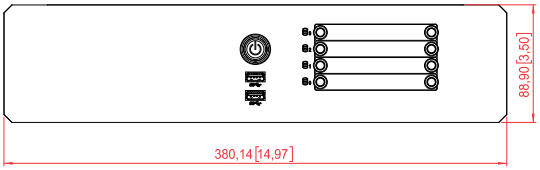
By default equipped with 2 x removable 2.5" SSD bays in front and internal space for 2 x 2.5" SSD's, 4 x removable 2.5" SSD bays available as option, onboard raid, M.2, up till 4 x PCI-e slots, memory up to 64GB RAM, 6 x USB, 4 x LAN ports, 3 x Signal outputs (2 x DP+ and 1 x USB-C) and more, making the HT20470 the most versatile rugged PC solution for the professional maritime segment.

Note: AC model contains only 3 x PCIe- slots

FRONT VIEW (2-Bay model)

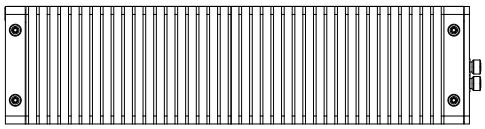


FRONT VIEW (4-Bay model)



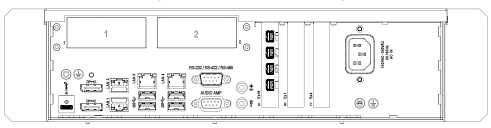
For 4-bay model: Contact your sales representative at Hatteland Technology for details.

SIDE VIEW



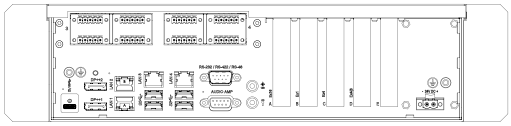
BACK VIEW (AC)

Shown with optional Nvidia Quadro P620 Graphics Card

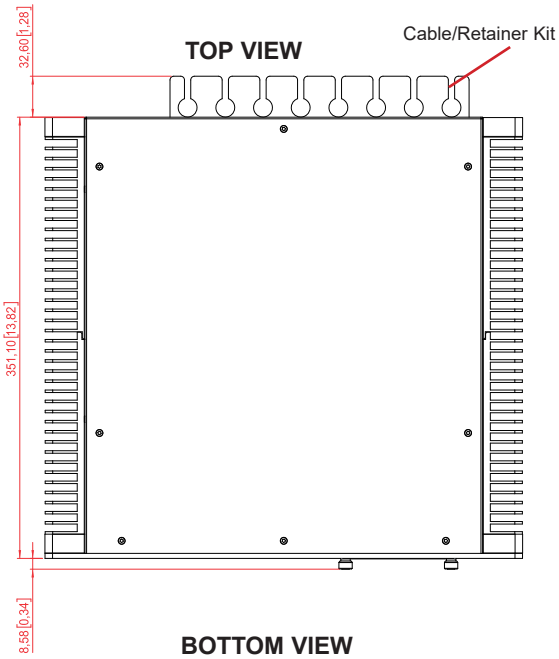


BACK VIEW (DC)

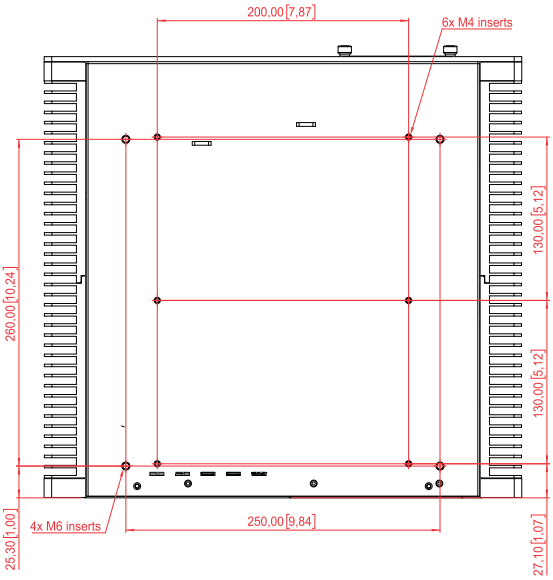
Shown with optional 2x NMEA module



TOP VIEW



BOTTOM VIEW



Dimensions might be shown with or without decimals and indicated as mm [inches]. Tolerance on drawings is +/- 1mm. For accurate measurements, check relevant DWG file.

SPECIFICATIONS

Note: All specifications are subject to change without prior notice!
Please visit www.hattelandtechnology.com for the latest electronic version.

HATTELAND TECHNOLOGY
an EMBRON Company

TECHNICAL DESCRIPTION

Computer Specifications:

		External Connector Type:
• Installed Operating System	: Windows® 10 IoT Enterprise 2019 LTSC (64bit). See table below for options	
• Supported Storage	: 2 or 4 x SATA 3.0 (6GB/s) in Removable SSD tray in front (2.5" size). See table below for options	
• Processor	: 1 x Intel® Core™ i5-10500TE, 6-Core 2.20Ghz - 3.60GHz, 9MB Cache - See table below for options	
• Memory/RAM	: 1 x 8GB (single channel) installed - Max 64GB possible - Dual Channel available - See table below for options	
• Graphics	: Intel® UHD 630	1 x USB-C + 2 x DisplayPort 1.2
• Graphics Capabilities	: DirectX Support 12.0, Shader Model 6.4, OpenCL 2.1, OpenGL Support 4.5/linux, Vulkan 1.1.97	
• Max Graphics Resolution	: Max 3840 x 2160 (4K UHD) @ 60Hz for DP (DisplayPort)	
• System Chipset	: Intel® Q470	
• BIOS	: UEFI, ACPI support	
• PCIe Slots	: 1 x PCIe 3.0 x16 (reserved for additional Graphics Card, See Factory Mounted options below) 1 x PCIe 3.0 x4 (x8 socket)[1] + 1 x PCIe 3.0 x4 + 1 x PCIe 3.0 x1	
• M.2 Storage (PCIe options)	: 1 x M.2 2280 M-key (one SATA + NVMEx4) 1 x M.2 2230 E-Key (PCIe + USB for WiFi)	
• Ethernet #1-2	: 2 x LAN 10/100/1000Mbps, Intel®, Intel i211AT Support for Intel® Teaming	2 x RJ-45 Teaming
• Ethernet #3-4	: 2 x LAN 10/100/1000Mbps Realtek RTL8111H	2 x RJ-45
• USB Ports #1-2	: 2 x USB 3.1 (<3m) ports in front	2 x USB Type A
• USB Ports #3-6	: 4 x USB 3.1 (<3m) ports in rear	4 x USB Type A
• USB Ports #7	: 1 x USB-C (DisplayPort - Power Distribution enabled)	1 x USB-C
• Serial Port #1	: 1 x RS-232/RS-422/RS-485 un-isolated Baud Rate: Max 115.2Kbps	1 x DB9M
• Audio Onboard	: Realtek HD Audio supports 2.0 channel, Mic. in, Line out	2 x 3.5mm Audio Jack
• Audio Amplified	: 2W, Stereo/Mono supported	1 x DB9F
• Power Manager	: ACPI	
• Watchdog Timer	: Reset: 1 sec.~255 min. and 1 sec. or 1 min./step	
• H/W Status Monitor	: Temperatures, voltages & cooling fan status. Auto throttling control if CPU overheats	
• Other Features	: LAN Wakeup, USB Boot, Trusted Platform Module 2.0 (TPM2.0), Firmware Raid, Intel® Management Engine. True power on after power fail.	

Note: [1]Not available for AC model.

Power Supply:

• Single DC: 24VDC
Power Consumption - Operating: 85W Typical - 135W High Load (excluding external additional loads) - 240W Max (at label, theoretically MAX defined by PSU)

• Single AC: 100-240V AC - 50/60Hz
Power Consumption - Operating: 85W Typical - 135W High Load (excluding external additional loads) - 412W Max (at label, theoretically MAX defined by PSU)

External Connector Type:

1 x 2-pin Terminal Block 5.08 +
1 x 2-pin Cable Hosuing KGG_MSTB 2.5/2 1803934

STD IEC

Available Computer Configurations:

Type	Description	Size/Specification
CPU	1 x Intel® Core™ i3-10100TE 1 x Intel® Core™ i5-10500TE 1 x Intel® Core™ i7-10700TE 1 x Intel® Core™ i9-10900TE	4-Core 2.3GHz - 3.6GHz, 6MB Cache 6-Core 2.3GHz - 3.7GHz, 9MB Cache 8-Core 2.0GHz - 4.4GHz, 16MB Cache 10-Core 1.8 GHz - 4.5 GHz 20 MB Cache
Memory	DDR4 - SO-DIMM 260-pin	- Uses 2 slots, Single or Dual Channel (where applicable), available sizes are: Single Channel: 1x8GB (2400MHz) Dual Channel: 2x8GB (2400MHz), 2x16GB (2400MHz), 2x32GB (2666MHz)
Storage	2.5" SSD SATA	- 240GB (0.9PBW), 480GB (1.2PBW), 960GB (3.4PBW), 1.9TB (7.1PWB)
OS Option	Microsoft® Windows® Server 2016/2019 64bit, Windows Server IoT 2022 (onboard Intel i211AT not supported), Windows® 10 IoT Enterprise 2019 LTSC (64bit), Windows® 10 IoT Enterprise 2021 LTSC (64bit), Win11 2024. Linux: Kernel 4.1x or later version	

Factory Mounted Options:

- PNY NVIDIA T400: PCIe 3.0 x16, 3x mDP 1.4, 4GB GDDR6
- CP-114EL-I ELEK KIT: 4xCOM,PCIe x1,1xDB44F to 4xDB9M isolated, RS-232/422/485)
- HTA2020002-AD1033: CAN isolated, 2 channel module*
- PCA100309-1: Dual Isolated RS-232, 2xDB9 module*
- HTA2020002-SLCAN: Socket CAN isolated, 2 channel module*
- i350T4V2BL: Intel® Ethernet Server Adapter i350-T4V2
- PCA100298-1: LAN 10/100Mbps, 2 ports (RJ45) module**
- PCA100297-1: Digital IO Isolated, 4 IN + 4 OUT module**
- PCA200828-1: COM RS-422/485 isolated NMEA 4 ch., 5-pin T. Block 3.81**
- x710DA2: Intel Fiber Network Adapter (10GbE), 2 x SFP+**

*For all Factory Mounted Options, review User Manual for possible HW combinations.
**Note: in combination with GPU, only USB 2.0 in front

Available Accessories:

- HT RMK STD-E1: 2U Rack Mount Kit 19" - HT20xxx
- HT MBK STD-E1: Desktop Mounting Kit HT20xxx – Plate Shaped
- HT MBK STD-F1: Mounting Bracket Kit HT20xxx – L-Shaped
- HT RET STD-A3: 1 x Cable Retainer/Relief Kit (included w/delivery)
- HT 00225 OPT-A1: 2 x 26" ball bearing sliding rail & mount kit for 19" Rack
- HT 00224 OPT-A1: 2 x 20" ball bearing sliding rail & mount kit for 19" Rack
- HT 00262 OPT-A1: 4 x RS-422/RS-485 isolated, USB ext. module
- HT 00263 OPT-A1: 4 x RS-232 COM non-isolated, USB ext. module
- HT 00264 OPT-A1: 1 x CAN isolated, 2 channel, USB ext. module
- HT 00274 OPT-A1: 2 x LAN 10/100Mbps, RJ45, USB ext. module
- HT 00264 OPT-A2: 1 x CAN isolated, 2 channel, socketCAN USB ext. module
- HT 00300 MSOS: OS options -> http://www.hattelandtechnology.com/os
- HT 00273 OPT-A1: 4 x Digital IN/OUT isolated, USB ext. module
- HD 000TR SX1-A1: 1 x Removable Tray 2.5" Empty
- HD xxxyy SX1-Z1: 1 x Removable Tray 2.5" w/Storage Device[3]
- HD 000TR SX2-A3: 1 x Removable Tray 2.5" w/4xM3x4mm Phillips Countersunk Screws
- JH C01MF A-A: 1 x USB Cable 1m, Type A-Chassis mount receptacle
- RC3473 / HT DPM2DVI-DF-A1: 1 x DP to DVI adapter
- ZA-A390: Mini DP to DVI(female) adapter
- ZA-A391: Mini DP to HDMI(female) adapter
- QSP-MINIDP/DPV3: miniDP to DP adapter
- VSD203400-1: External Power Button Cable 2m
- VSD203400-2: External Power Button Cable 5m
- VSD203733-1: External Power Button Cable 4.6m (no power button included)

[3]Where xxx=Size of device. yy=GB,TB. z=S (SSD), z=H (HDD) - Choose Storage Device from table above.

MECHANICAL DESCRIPTION

Physical Specifications:

- W:380.14 [14.97"] x H:88.90 [3.50"] x D:351.10 [13.82"] mm [inch]
- Weight: Approx 7.5kg / 16.5lbs
- 2U chassis, Aluminum Alloy
- 2 x Removable SSD tray in front (2.5" size)
- Power/Reset/Power LED Combined Function

Environmental Considerations:

• Operating	: Temperature -15°C to +55°C
• Storage	: Temperature -20°C to +70°C
• Humidity	: Up to 95% (Operating / Storage)
• Shock - Vibration	: 5g/11ms - 0.7g (IEC 60945 / IACS E10)
• Air Pressure Maximum Altitude	: Operating: 4000m - Storage: 12912m
• Compass Safe Distance	: Standard: 160cm - Steering: 130cm

Lifetime Considerations:

Even though the test conditions for bridge units provide for a maximum operating temperature of 55°C, continuous operation of all electronic components should, if possible, take place at ambient temperatures of only 25°C. This is a necessary prerequisite for long life and low service costs.

APPROVALS & CERTIFICATES

These products have been tested / type approved by the following classification societies:

IEC 60945 4th (EN 60945:2002)
ABS - American Bureau of Shipping
KR - Korean Register of Shipping
IACS E10
CCS - China Classification Society
LRS - Lloyd's Register of Shipping
EN61162
BV - Bureau Veritas
EU RO MR - Mutual Recognition by DNV
ClassNK - Nippon Kaiji Kyokai

Appendix D: AlphaMINDS inputs

Sensor	Source	Sentence	Required
AIS	IEC 61162-1/2	--VDM	Optional for app Docking
	IEC 61162-450		
Anemometer	IEC 61162-1/2	--MWV	Required for app Conning
	IEC 61162-450		
Auto Pilot	IEC 61162-1/2	--HTD	Required for app Conning
	IEC 61162-450		
Bow Thruster	IEC 61162-1/2	--TRD OR --XDR	TRD or XDR or Modbus TCP. Load and/or RPM. If load or RPM is not available a conversion table can be configured. (Required if available)
	IEC 61162-450		
	Modbus TCP	16-bit register Load	
		16-bit register RPM	
Climate Meter	IEC 61162-1/2	--MTW	Required for app Conning
	IEC 61162-450		
	IEC 61162-1/2	--XDR	
	IEC 61162-450		
Distance Above Water	IEC 61162-1/2	--DPT	Optional for app Docking
	IEC 61162-450		
	Modbus TCP	16-bit register distance	
Distance Below Water	IEC 61162-1/2	--DPT	Optional for app Docking
	IEC 61162-450		
	Modbus TCP	16-bit register distance	
ECDIS	IEC 61162-1/2	--BWC	Required for app Conning
	IEC 61162-450		
	IEC 61162-1/2	--RTE AND --WPL	Optional for app Docking
	IEC 61162-450		
Echo Sounder	IEC 61162-1/2	--DPT	Required for app Conning
	IEC 61162-450		
Engine/Shaft	IEC 61162-1/2	--RPM OR --XDR	RPM or XDR or Modbus TCP. Load and/or RPM. Angle and/or percent. If load or RPM is not available a conversion table can be configured. If angle or percent is not available a conversion table can be configured. (Required if available)
	IEC 61162-450		
	Modbus TCP	16-bit register Engine Load	
		16-bit register Engine RPM	
		16-bit register Shaft Load	
		16-bit register Shaft RPM	
		16-bit register Prop. Pitch Angle	
		16-bit register Prop. Pitch Percent	
GPS	IEC 61162-1/2	--GGA	Required (At least 1 GGA and VTG source required from GPS and GPS Compass)
	IEC 61162-450		
	IEC 61162-1/2	--VTG	
	IEC 61162-450		

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Sensor	Source	Sentence	Required
GPS Compass	IEC 61162-1/2	--GGA	Required (At least 1 GGA and VTG source required from GPS and GPS Compass)
	IEC 61162-450		
	IEC 61162-1/2	--VTG	
	IEC 61162-450		
	IEC 61162-1/2	--THS OR --HDT	Optional (At least 1 THS or HDT source required from GPS Compass or Gyro Compass)
	IEC 61162-450		
	IEC 61162-1/2	--ROT	Optional (At least 1 ROT source required from GPS Compass, Gyro Compass or Turn Indicator)
	IEC 61162-450		
Gyro Compass	IEC 61162-1/2	--THS OR --HDT	Required
	IEC 61162-450		
	IEC 61162-1/2	--ROT	Optional
	IEC 61162-450		
Magnetic Compass	IEC 61162-1/2	--HDG	Optional
	IEC 61162-450		
Rudder	IEC 61162-1/2	--RSA OR --XDR	RSA or XDR or Modbus TCP. Angle and/or percent. If angle or percent is not available a conversion table can be configured. (Required if available)
	IEC 61162-450		
	Modbus TCP	16-bit register Angle	
		16-bit register Percent	
Speed Log	IEC 61162-1/2	--VHW	Required for app Conning
	IEC 61162-450		
	IEC 61162-1/2	--VBW	
	IEC 61162-450		
	IEC 61162-1/2	--VLW	
	IEC 61162-450		
Stern Thruster	IEC 61162-1/2	--TRD OR --XDR	TRD or XDR or Modbus TCP. Load and/or RPM. If load or RPM is not available a conversion table can be configured. (Required if available)
	IEC 61162-450		
	Modbus TCP	16-bit register Load	
		16-bit register RPM	
Turn Indicator	IEC 61162-1/2	--ROT	Required (At least 1 ROT source required from GPS Compass, Gyro Compass or Turn Indicator)
	IEC 61162-450		
Vessel Clock	IEC 61162-1/2	--ZDA	Optional
	IEC 61162-450		

Appendices

Appendix E: AlphaMINDS alerts

Title	Description	Type
Invalid AIS	No valid NMEA data for AIS 1	Caution
Invalid AIS	No valid NMEA data for AIS 2	Caution
Invalid data	No valid data for Anemometer 1	Caution
Invalid data	No valid data for Anemometer 2	Caution
Invalid data	No valid data for Auto Pilot 1	Caution
Invalid data	No valid data for Auto Pilot 2	Caution
Invalid data	No valid data for Bow Thruster 1	Caution
Invalid data	No valid data for Bow Thruster 2	Caution
Invalid data	No valid data for Bow Thruster 3	Caution
Invalid data	No valid data for Bow Azi Thruster 1	Caution
Invalid data	No valid data for Bow Azi Thruster 2	Caution
Invalid data	No valid data for Climate Meter 1	Caution
Invalid data	No valid data for Climate Meter 2	Caution
Invalid distance	No valid data AWFW	Caution
Invalid distance	No valid data AWPSB	Caution
Invalid distance	No valid data AWSBB	Caution
Invalid distance	No valid data AWPSS	Caution
Invalid distance	No valid data AWSBS	Caution
Invalid distance	No valid data AWBW	Caution
Invalid distance	No valid data BWFW	Caution
Invalid distance	No valid data BWPSB	Caution
Invalid distance	No valid data BWSBB	Caution
Invalid distance	No valid data BWPSS	Caution
Invalid distance	No valid data BWSBS	Caution
Invalid distance	No valid data BWBW	Caution
Invalid data	No valid data for ECDIS 1	Caution
Invalid data	No valid data for ECDIS 2	Caution
Invalid data	No valid data for Echo Sounder FORE	Caution
Invalid data	No valid data for Echo Sounder MID	Caution
Invalid data	No valid data for Echo Sounder AFT	Caution
Invalid data	No valid data for Engine 1	Caution
Invalid data	No valid data for Engine 2	Caution
Invalid data	No valid data for GPS 1	Caution
Invalid data	No valid data for GPS 2	Caution
Invalid data	No valid data for GPS Compass 1	Caution
Invalid data	No valid data for GPS Compass 2	Caution
Invalid data	No valid data for Gyro Compass 1	Caution
Invalid data	No valid data for Gyro Compass 2	Caution
Invalid data	No valid data for Magn. Compass 1	Caution
Invalid data	No valid data for Magn. Compass 2	Caution
Invalid data	No valid data for Rudder 1	Caution
Invalid data	No valid data for Rudder 2	Caution
Invalid data	No valid data for Speed Log 1	Caution
Invalid data	No valid data for Speed Log 2	Caution
Invalid data	No valid data for Stern Thruster 1	Caution

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Invalid data	No valid data for Stern Thruster 2	Caution
Invalid data	No valid data for Stern Thruster 3	Caution
Invalid data	No valid data for SternAziThruster 1	Caution
Invalid data	No valid data for SternAziThruster 2	Caution
Invalid data	No valid data for ROTIndicator 1	Caution
Invalid data	No valid data for ROTIndicator 2	Caution
Invalid data	No valid data for Vessel Clock 1	Caution
Invalid data	No valid data for Vessel Clock 2	Caution
Invalid position	No valid position available	Caution
Invalid heading	No valid heading available	Caution
Invalid ROT	No valid ROT available	Caution

Appendices

Appendix F: DOP values and their rating

DOP value	Rating	Description
<1	Ideal	Highest possible confidence level to be used for applications demanding the highest possible precision at all times.
1–2	Excellent	At this confidence level, positional measurements are considered accurate enough to meet all but the most sensitive applications.
2–5	Good	Represents a level that marks the minimum appropriate for making accurate decisions. Positional measurements could be used to make reliable in-route navigation suggestions to the user.
5–10	Moderate	Positional measurements could be used for calculations, but the fix quality could still be improved. A more open view of the sky is recommended.
10–20	Fair	Represents a low confidence level. Positional measurements should be discarded or used only to indicate a very rough estimate of the current location.
>20	Poor	At this level, measurements should be discarded.

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JRC Europe / Alphatron Marine B.V.

Schaardijk 23 (harbor 115)
3063 NH Rotterdam
The Netherlands

T +31 10 453 4000
F +31 10 453 4010
service@jrc-europe.com
www.jrc-world.com

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