OBSERVATOR
instruments

Operators' Manual

OMC-140 Multifunctional NMEA Display

Version: 1.10
Date: 12 October 2021
Author: Observator Instruments

Document history

The Observator range is in continuous development and so specifications may be subject to change without prior notice. When in doubt about the accuracy of this document, contact the Observator Group.

Reference documents

Type of document / tool	Product type and name (incl. url)
Software	OMC-140 FW2.7

Revision history

Version	Date	Amendments	Company, position
1.01	2014-7	Initial document creation	Observator Instruments
1.02	2014-10	Pre-liminary edition	Observator Instruments
1.03	2015-4	Test Manual	Observator Instruments
1.04	2015-12	First Release	Observator Instruments
1.05	2017-2	Update data log function	Observator Instruments
1.06	2017-6	Changed DNV Standard for Certification No. 2.4 to DNVGL-CG-0339	Observator Instruments
1.07	2018-8	Correction DDC message, extra functionality v2.4 and up	Observator Instruments
1.08	2019-1	Update functionality V2.6 and up, some setting info moved to the Installation manual.	Observator Instruments
1.09	2021-9	Update functionality V2.7 and up	Observator Instruments
1.10	2021-10	Update to new layout	Observator Instruments

Table of contents

1 Introduction

The OMC- 140 is a multi functional NMEA display primarily designed for wind information.
It is capable of calculation Theoretical and True wind if required data is available.

This manual is intended for the Operator of the display.
An Operators Guide with the basic essential information is also available.
For installation instructions we kindly refer to the Installation manual.
The Installation manual also contains information for the system administrator

2 Safety

Do not open display.
Potential lethal voltages inside.
No user exchangeable parts inside.

Only use indoors.

For outdoor use an IP66 or better housing is required.

For correct functioning of this display the display and connected sensors must be installed according installation instructions as described in the OMC-140 Installation manual.

Remember: instruments are tools.
They do NOT replace your own observations!

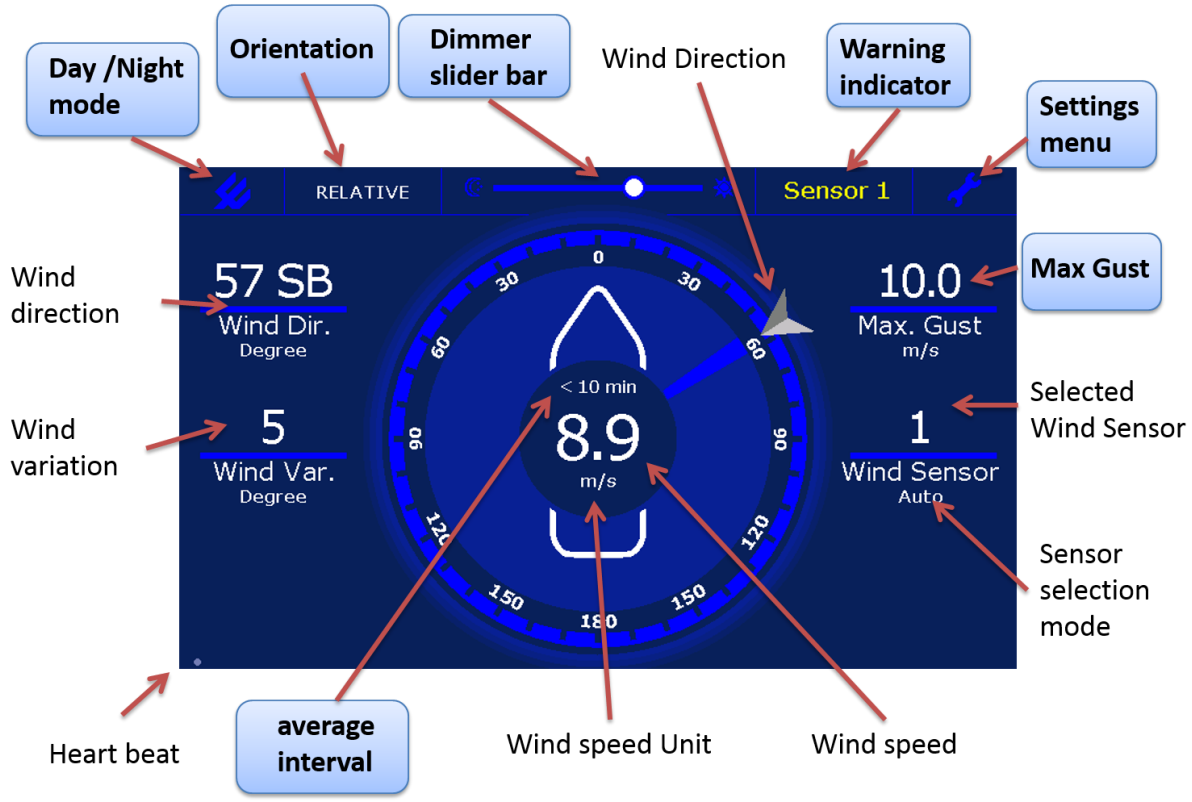
After end of life dispose this product according local regulations or return to manufacturer.

3 Display functions

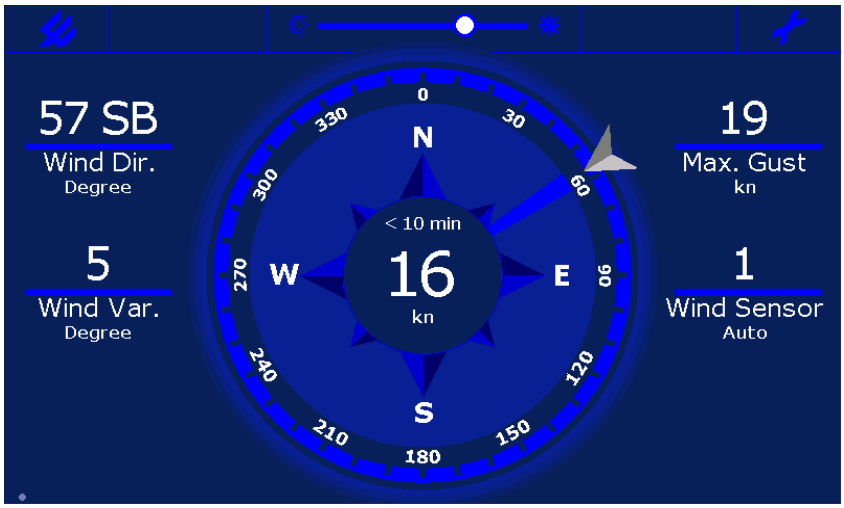
The examples used in this chapter display the default layout.
It is possible to customize the layout by adding, removing parameters or change their position.

3.1 Home screen Wind

Marine Display:



Land Display:

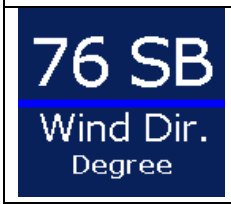


3.1.1 Home screen ‘buttons’:

	Select between Day or Night mode. In Night mode a darker color palette reduces the emitted light intensity.
	Brightness slider bar. In Automatic or NMEA control mode use this to set an offset.
	Opens the settings menu
	Only visible when an alert is active. Touch this button to acknowledge the alert. Details can be found via the settings ‘Info’ tab.
	Changes orientation of the display: Relative, Theoretical or True Availability of the orientations depends on received data. (Marine display only).
	Changes average interval: 10 min, 2 min, Instant or User*. ‘<’ indicates the selected interval has not yet been met. *User is a custom selectable interval which can be set via the settings menu.
	Resets the maximum Gust when the averaging is set to Instant.

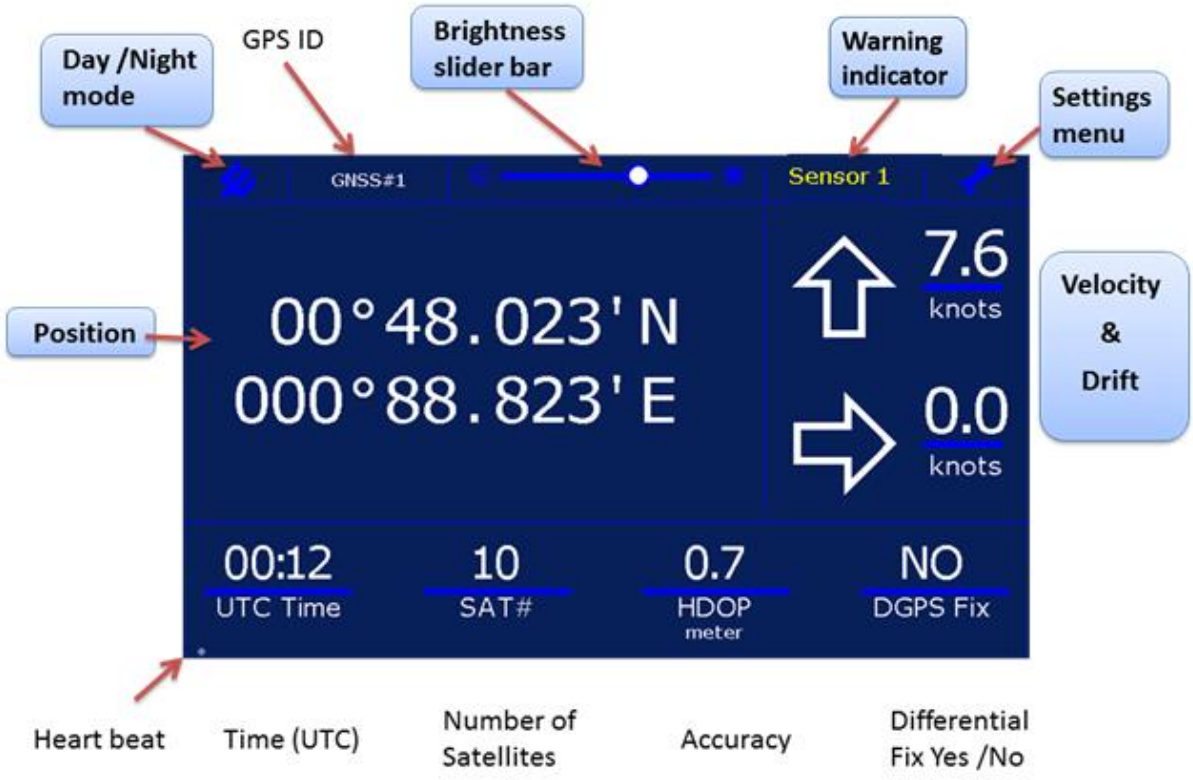
3.1.2 Home screen indicators:

	Selected Orientation. Relative, Theoretical or True (Marine display only)
	Wind Direction indicator. Shows the average wind direction over the selected interval time. Red or Gray arrow can be set via the USB menu.
	Wind direction variation over the selected average interval time. Also in the wind circle visualized in light blue: 

	Shows max Gust over the selected interval time. If 'Instant' is selected it shows the Max Gust since last reset. Touch to reset
	Selected wind sensor and selection mode.
	Average interval time. 10 min, 2 min, Instant or User Wind speed average over the selected interval time. Wind speed Unit. Bft, Mph, m/s, Kts or km/h
	Heart beat. The dot should be running from left to right to indicate the display is working and not frozen.
	Wind direction variation over the selected average interval time.
	Average wind direction over the selected average interval.

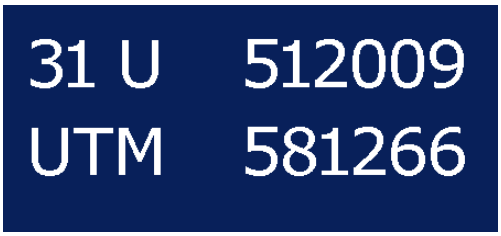
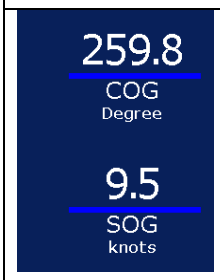
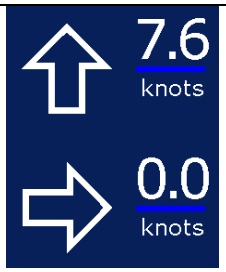
3.2 Home screen GPS repeater

3.2.1 Default Home screen functions:



3.2.2 Touch Buttons:

Note: The display is single touch, the display will not respond if multiple touch is detected. Don't place your hand on the edge while trying to touch a button, this could be detected as a touch**.**

	Select between Day or Night mode. In Night mode a darker color palette reduces the emitted light intensity.
	Brightness slider bar. In Automatic or NMEA control mode use this to set an offset.
	Opens the settings menu
	Only visible when an alarm is active. Touch this button to acknowledge the alarm.
 	Geographical Position (GGA)* Touching will toggle between UTM data** if available and the Geographical data **Requires UTM data input (GMP)*.
 	Speed and Course over ground (VTG)* Touching will switch to Arrow Speed display (Velocity & Drift) if available***. ***Requires Heading data input (HDT or THS)*.

** Reference to the required NMEA input message*

3.2.3 Default Indicators:

These are the factory default.

	GPS Identifier. Can be set in the Settings menu
	Heart beat. The dot should be running from left to right to indicate the display is working and not frozen.
	UTC time (GGA)*
	Number of Satellites (GGA)*
	Accuracy HDOP (GGA)*
	Differential Signal received YES / NO (GGA)*

** Reference to the required NMEA input message*

3.3 Home Screen Heading

3.3.1 Default Home screen functions:

3.3.2 Touch Buttons:

Note: The display is single touch, the display will not respond if multiple touch is detected. Don't place your hand on the edge while trying to touch a button, since this could be detected as a touch**.**

	Select between Day or Night mode. In Night mode a darker color palette reduces the emitted light intensity.
	Brightness slider bar. In Automatic or NMEA control mode use this to set an offset.
	Opens the settings menu
	Only visible when an alarm is active. Touch this button to acknowledge the alarm.
 	Heading from Gyro (THS or HDT)* Touch will toggle between Heading and Course Course Over Ground (VTG)*

** Reference to the required NMEA input message*

3.3.3 Default Indicators:

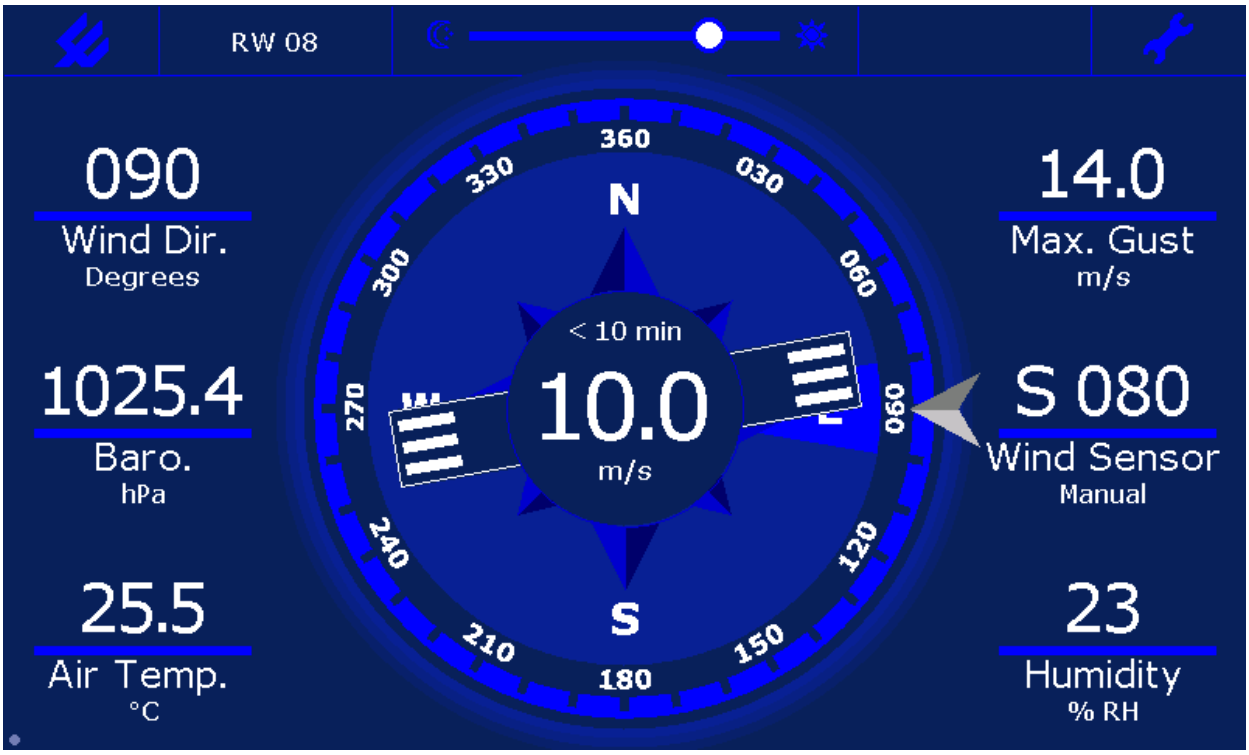
These are the factory default indicators:

	GPS Identifier. Can be set in the Settings menu
	Heart beat. The dot should be running from left to right to indicate the display is working and not frozen.
	Speed Over Ground (VTG)*
	Course Over Ground (VTG)*

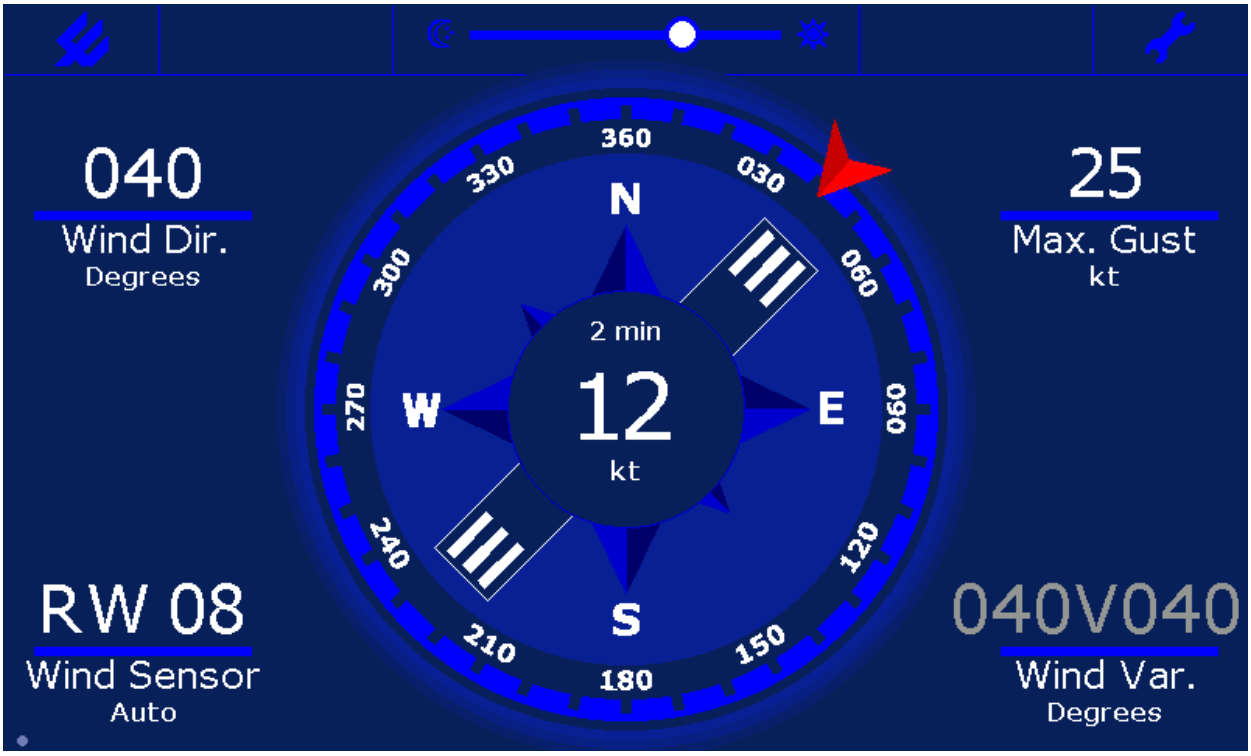
** Reference to the required NMEA input message*

3.4 Home screen Wind Airport

The “Wind Airport” display is another wind display, showing the wind relative to the runway.

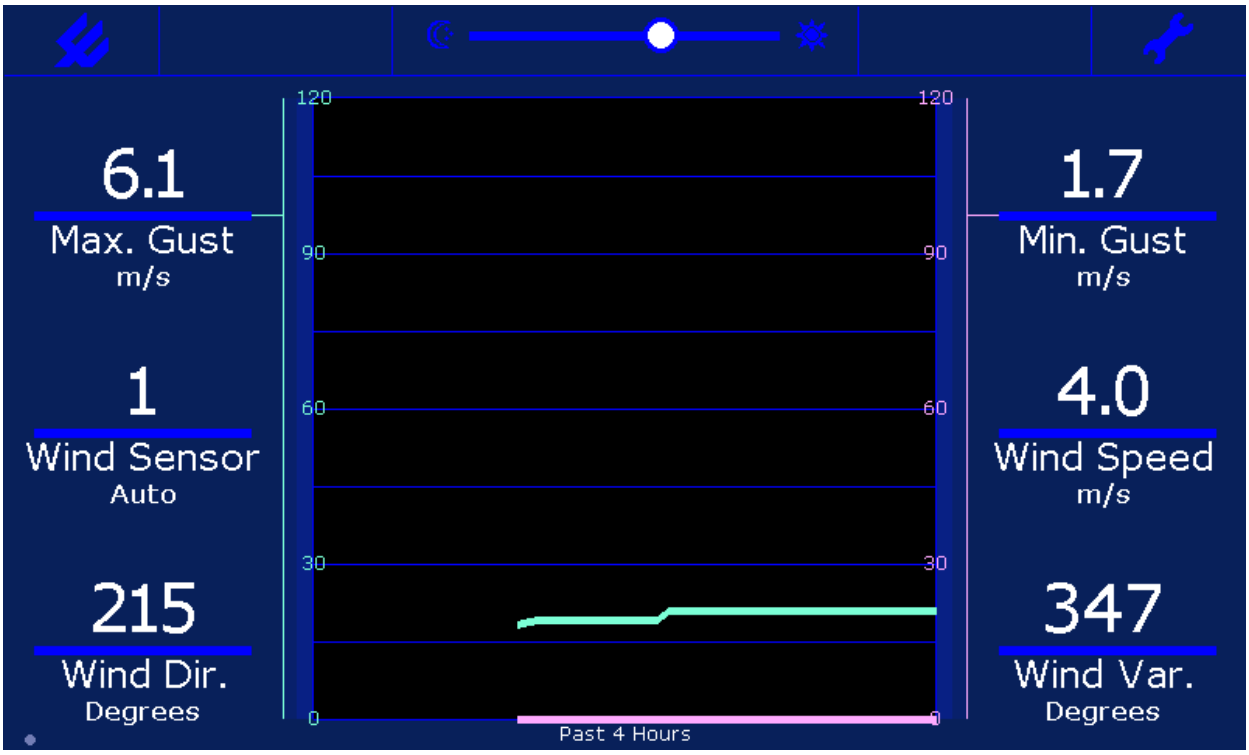


Variable wind in aviation should be shown as “0V0”, where the zeros will be filled in with the measured variable wind.



3.5 Home screen Graph

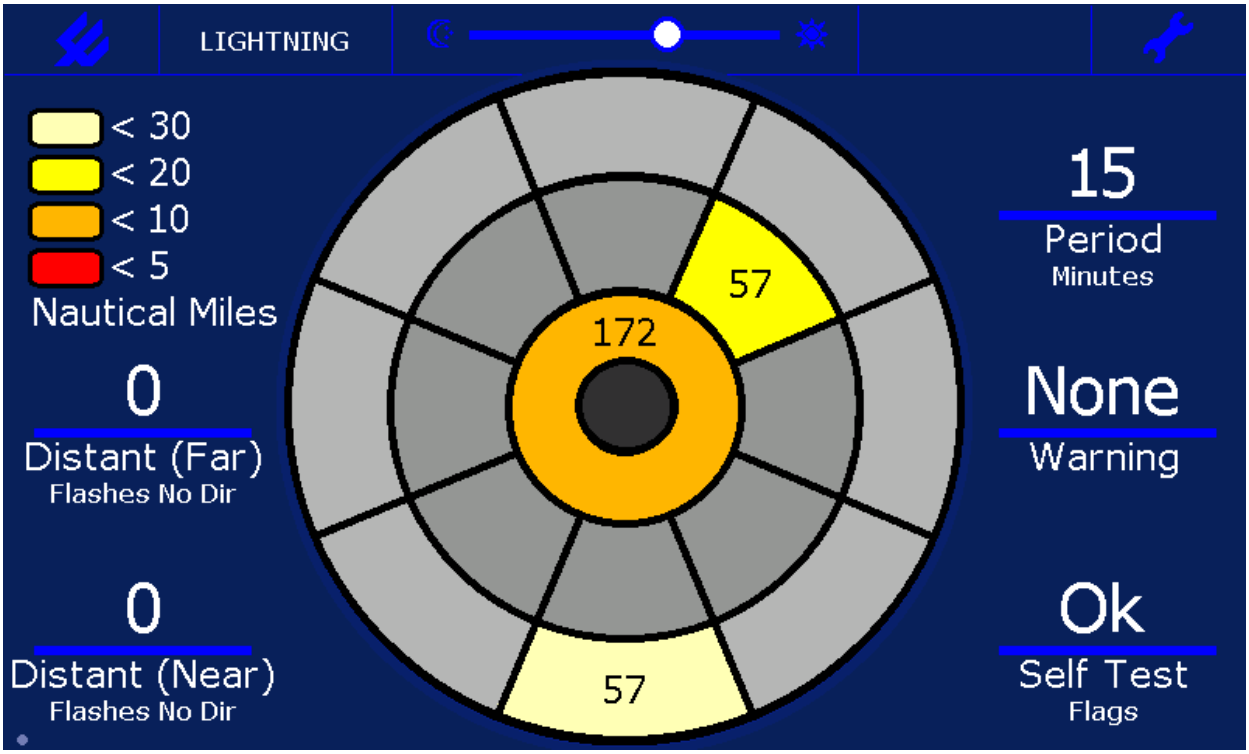
The “Graph display” monitors the two top parameters and shows the results in the chart.



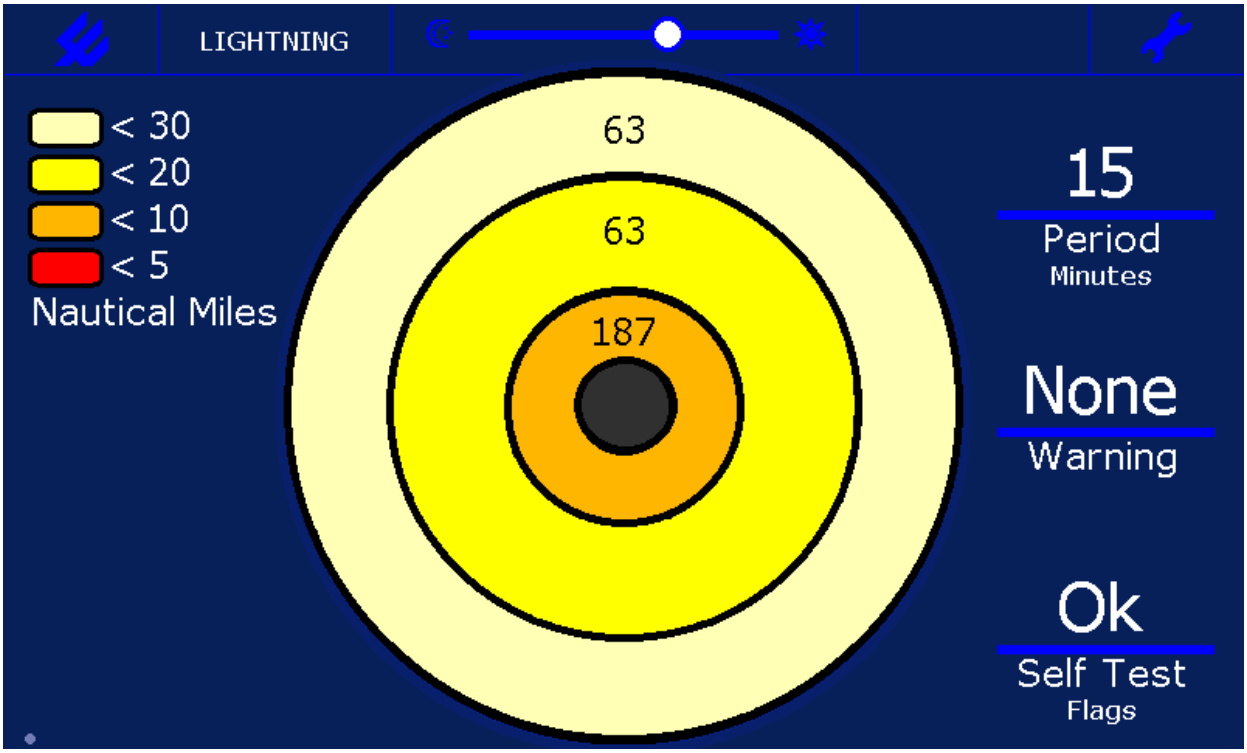
3.6 Home screen Lightning

This is a dedicated screen for the BTD300 and BTD350 Thunderstorm detectors.

Directional:



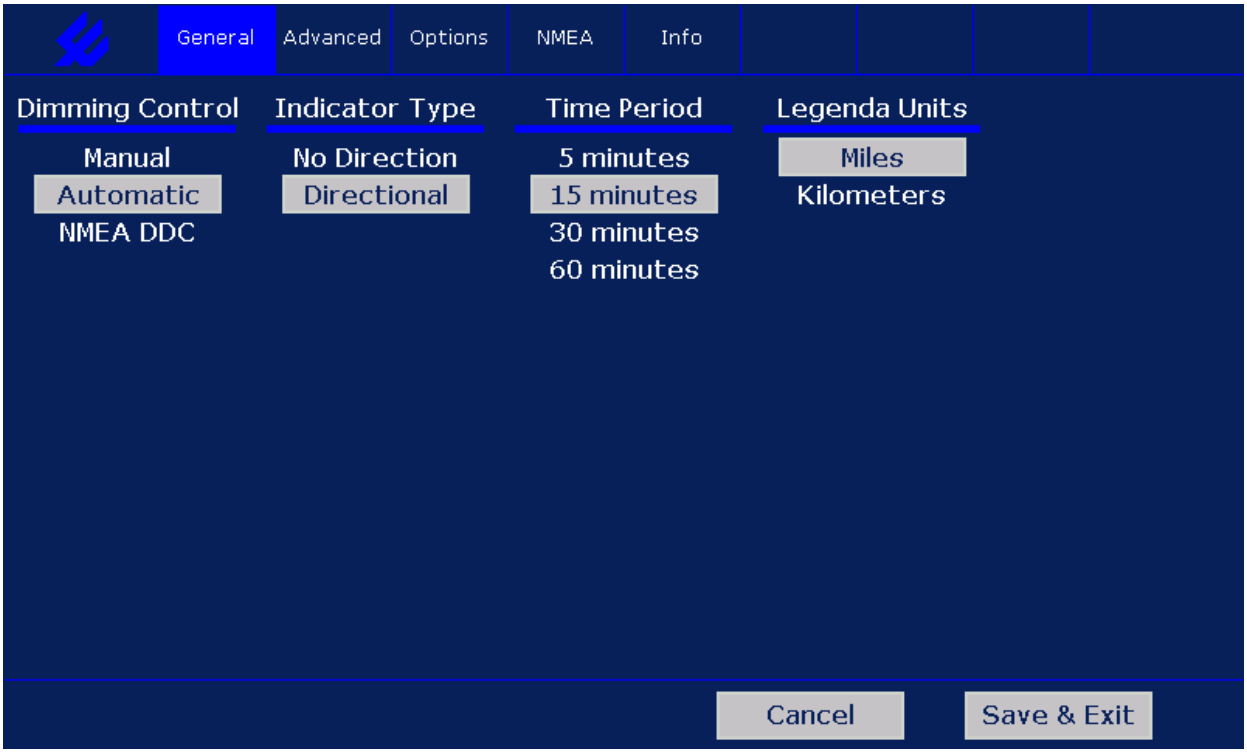
Non-Directional:



The number of detected flashes in the selected period are displayed in the relevant sectors.
Distant (Far) and Distant (Near) will display the number of flashes of which no direction was detected.

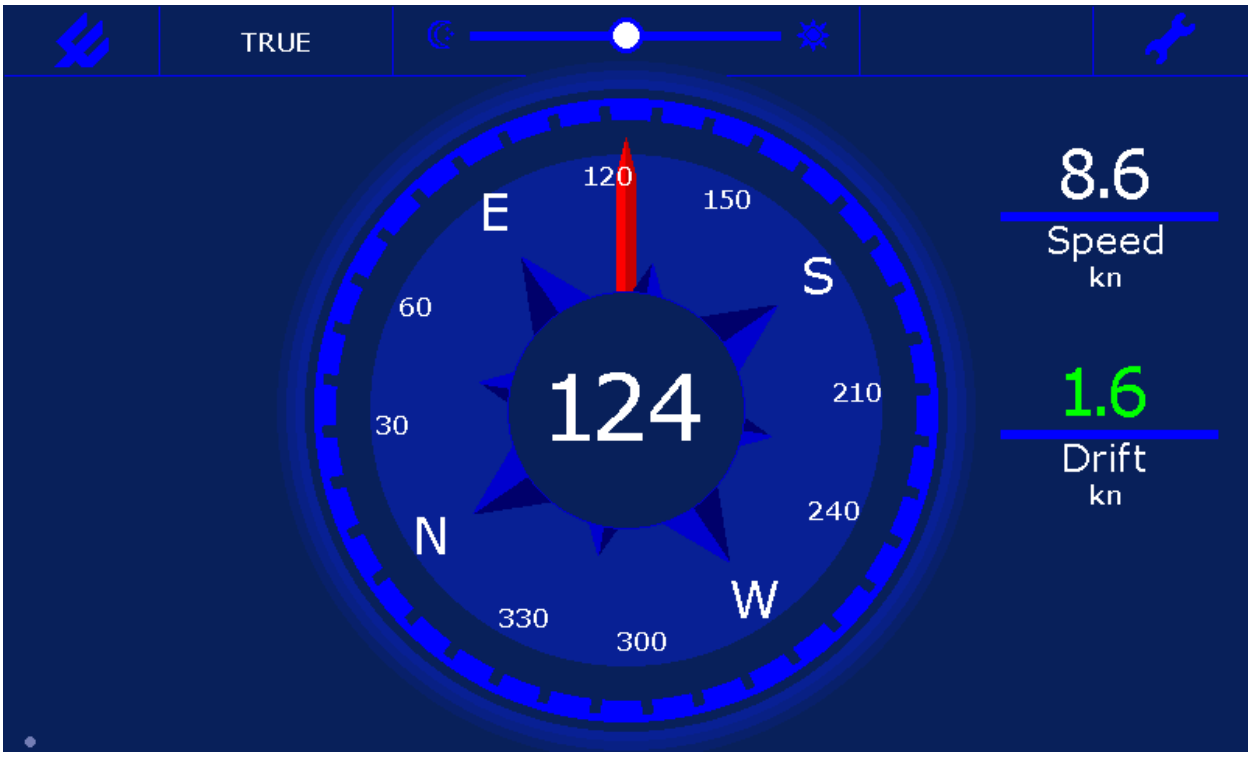
Warning & Self Test display the status of the BTD Thunderstorm detector. Refer to the relevant BTD Thunderstorm detector manual for more info if a Warning is present or the Self Test does not display OK.

On the General settings the Time Period and Units (Kilometers or Nautical Miles) can be set.
The Indicator type can be set to No Direction in case your BTD Thunderstorm sensor doesn't have a direction detector.



3.7 Home screen Heading 2

This screen type is a Gyro repeater.
The Gyro data is presented as dial gauge and numeric in the center. The 6 (or 4 in Portrait mode) other parameters are free to configure (See installation manual).

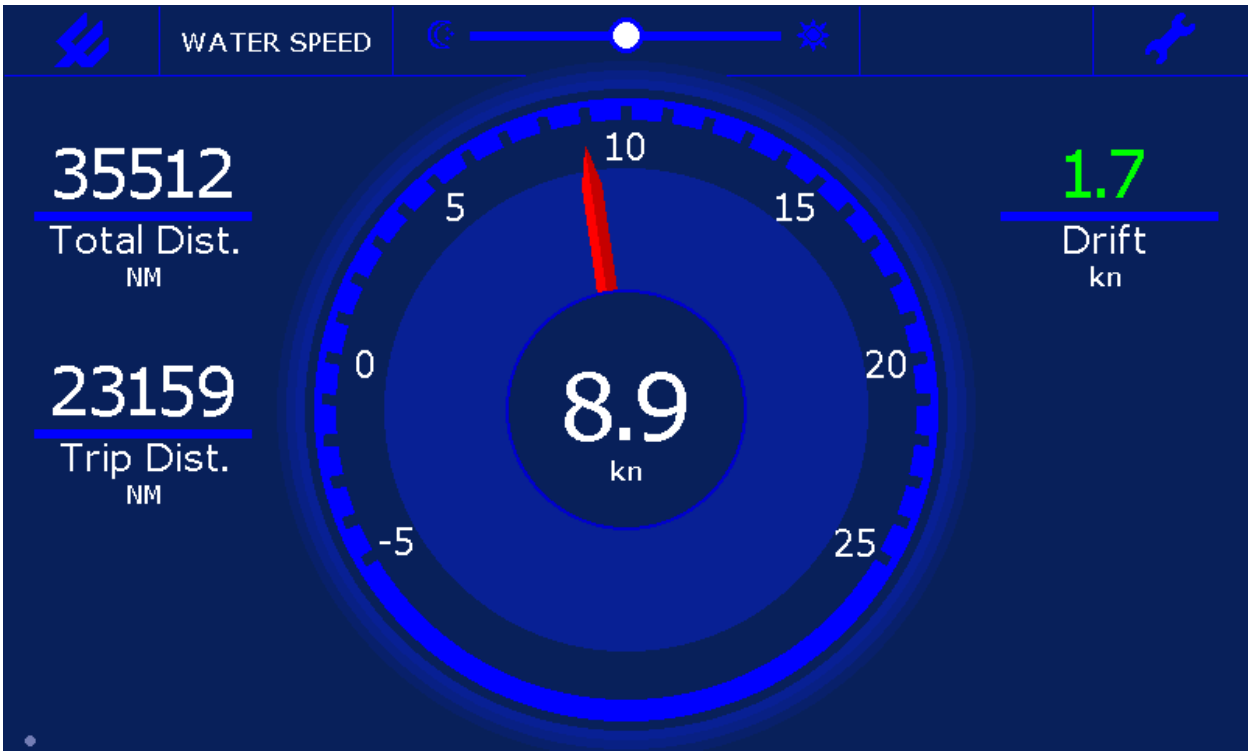


3.8 Home screen Speed log

This screen is a Water Speed Log repeater.
The water speed is displayed as dial gauge displayed numeric in the middle.

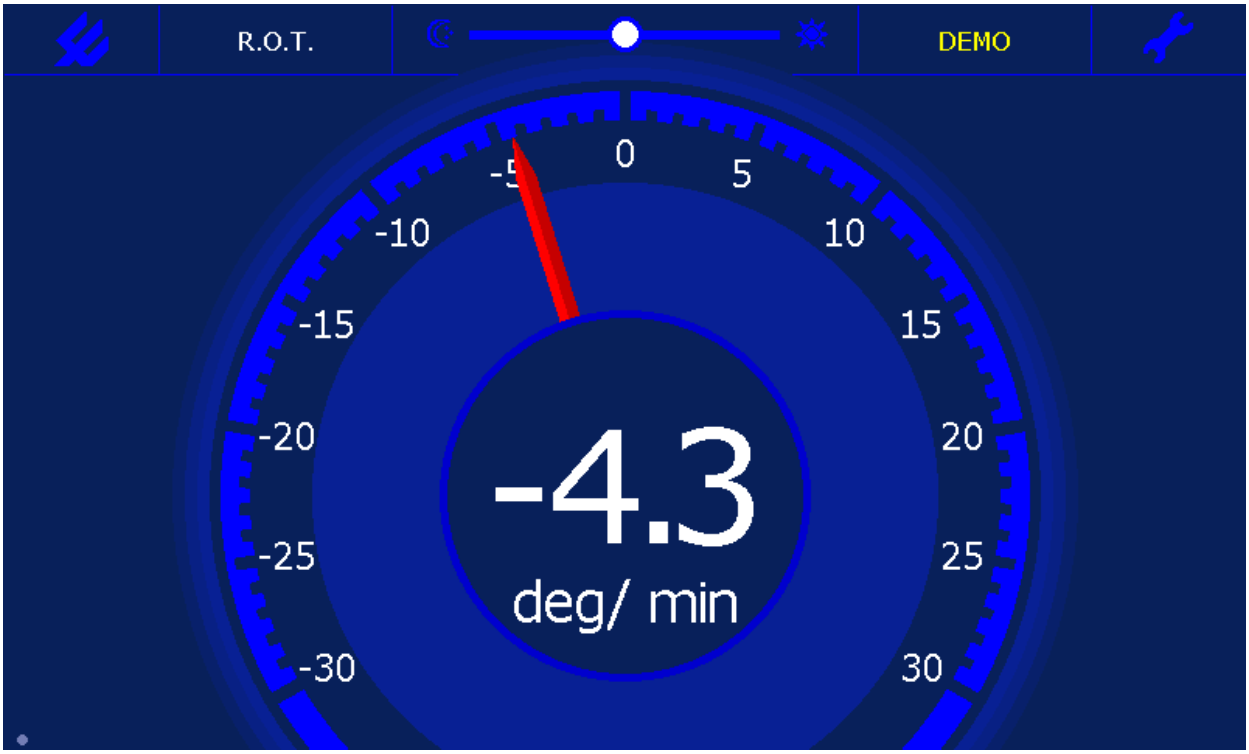
The scale can de set to -5 .. 25 or -5 to 55 Knots.

The 6 (or 4 in Portrait mode) other parameters are free to configure (See installation manual).



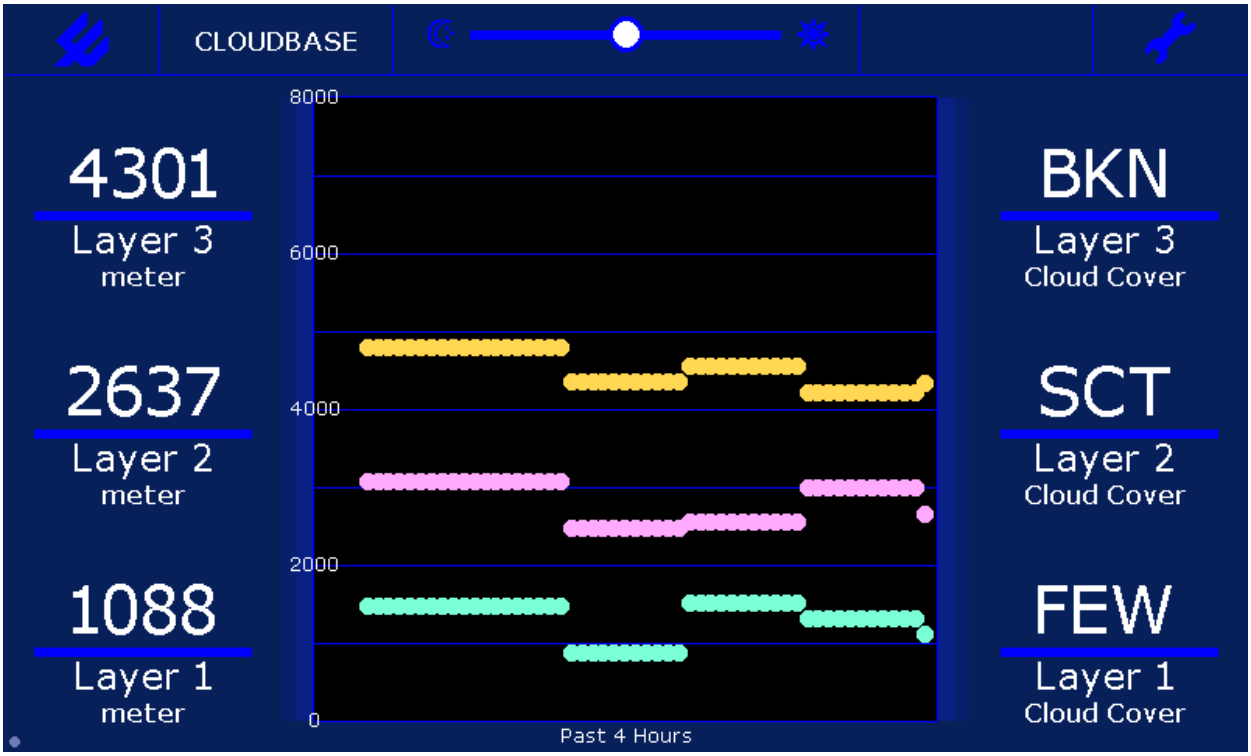
3.9 Home screen Rate of Turn

This screen displays the 10s average Rate Of Turn (derived from the gyro) as a dial gauge and numeric in the middle.



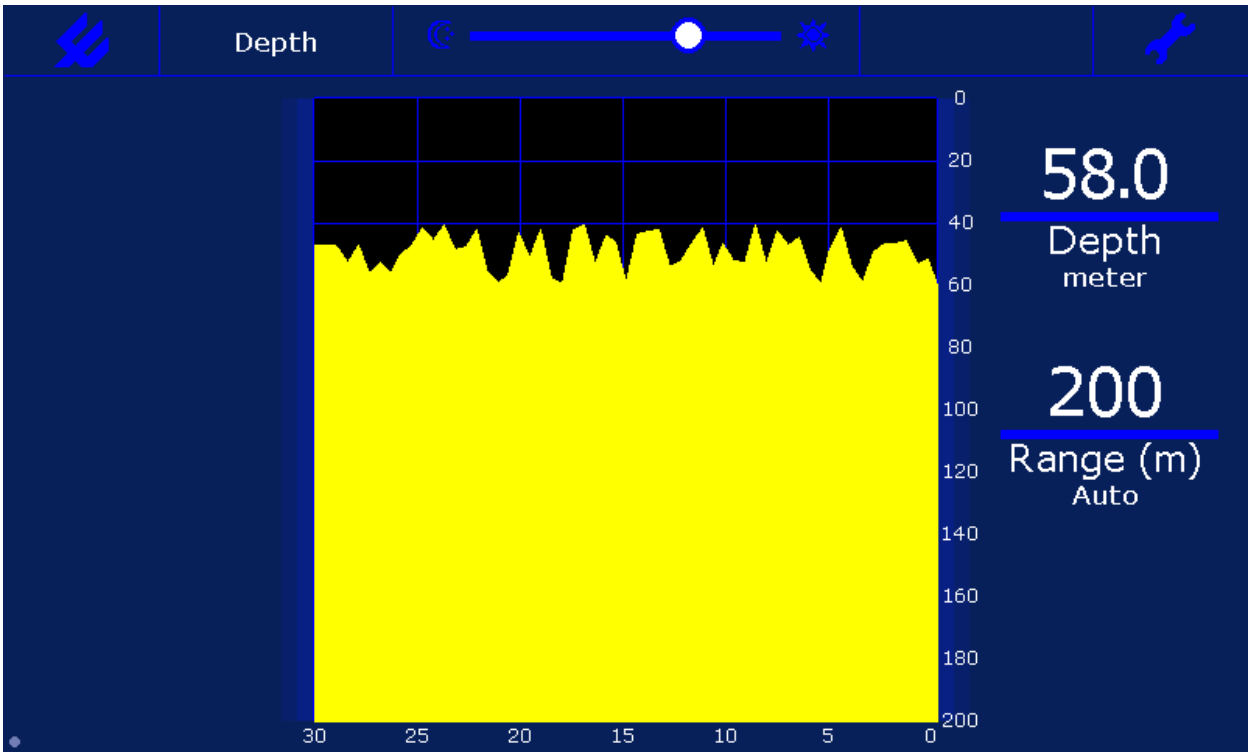
3.10 Home screen Cloud

This screen shows the cloud information, it is dedicated screen for the Observator defined “POBSCME” NMEA-sentence (from Meteolink).



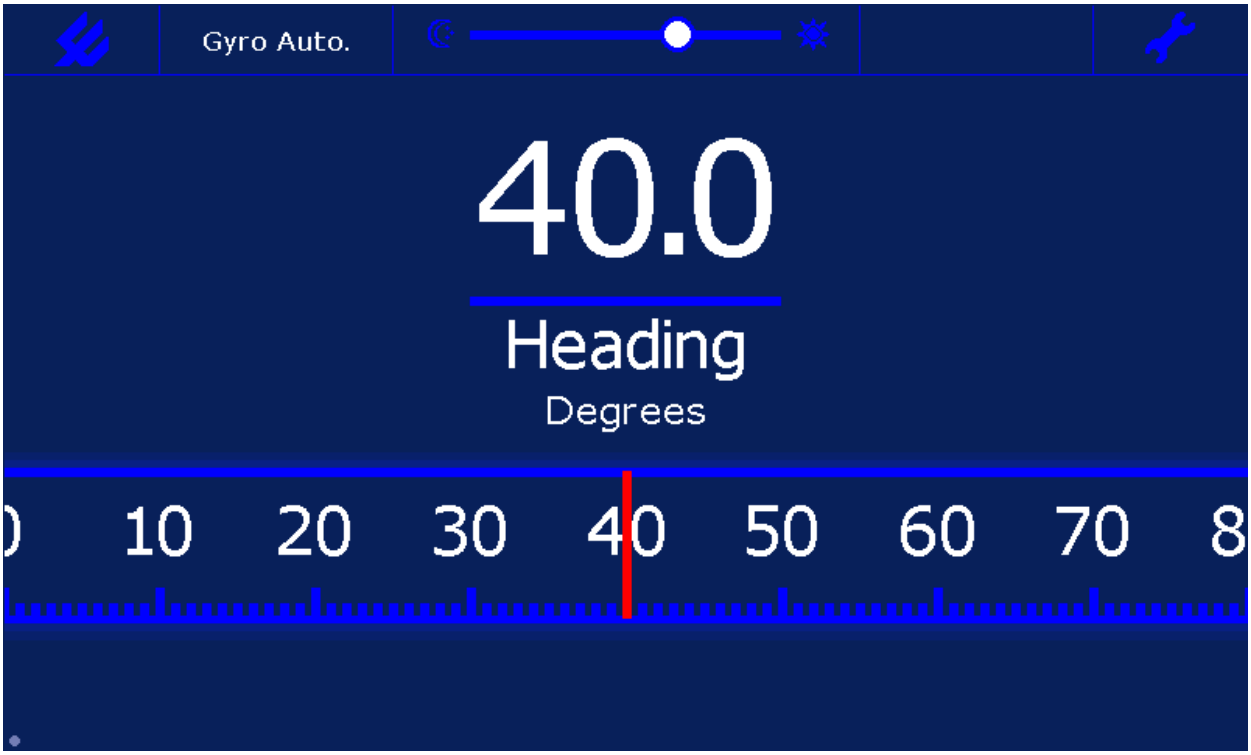
3.11 Home screen Echo sounder

The “Echo sounder display” shows the depth.



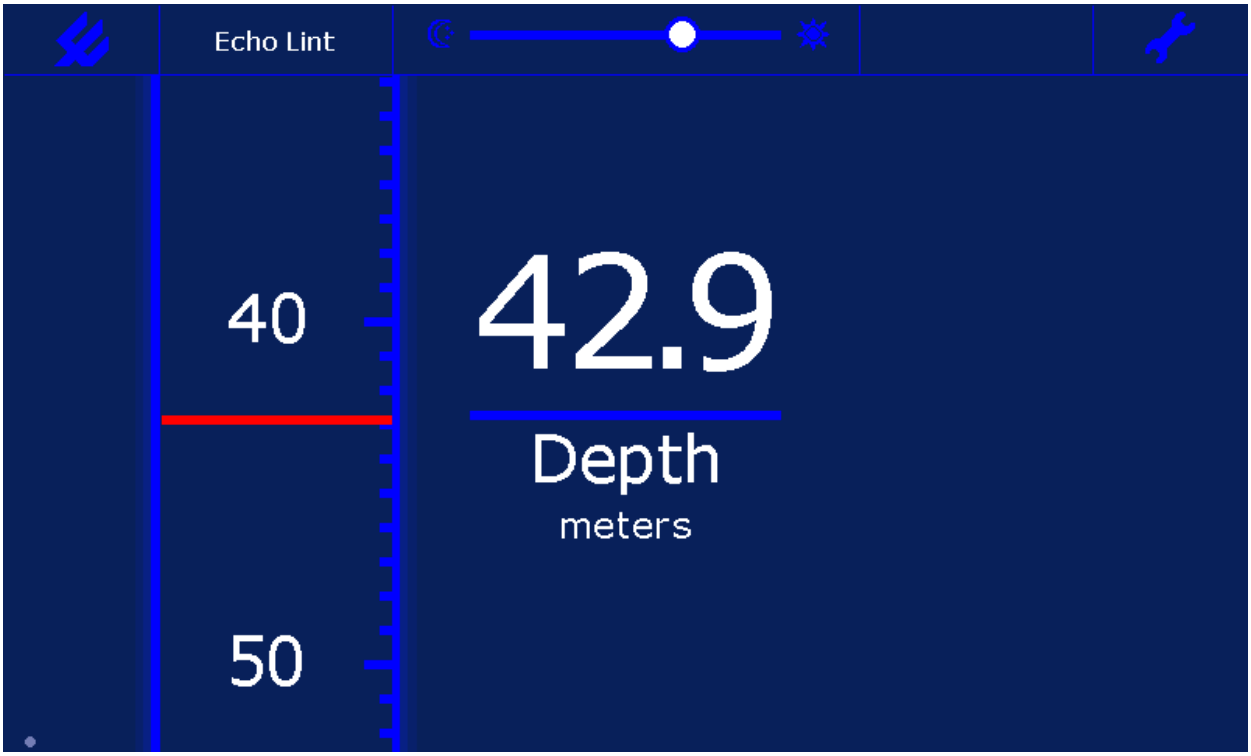
3.12 Home screen Heading lint

The “Heading lint display” shows the heading of the vessel in numeric style in the top half of the screen and in lint style on the bottom half.



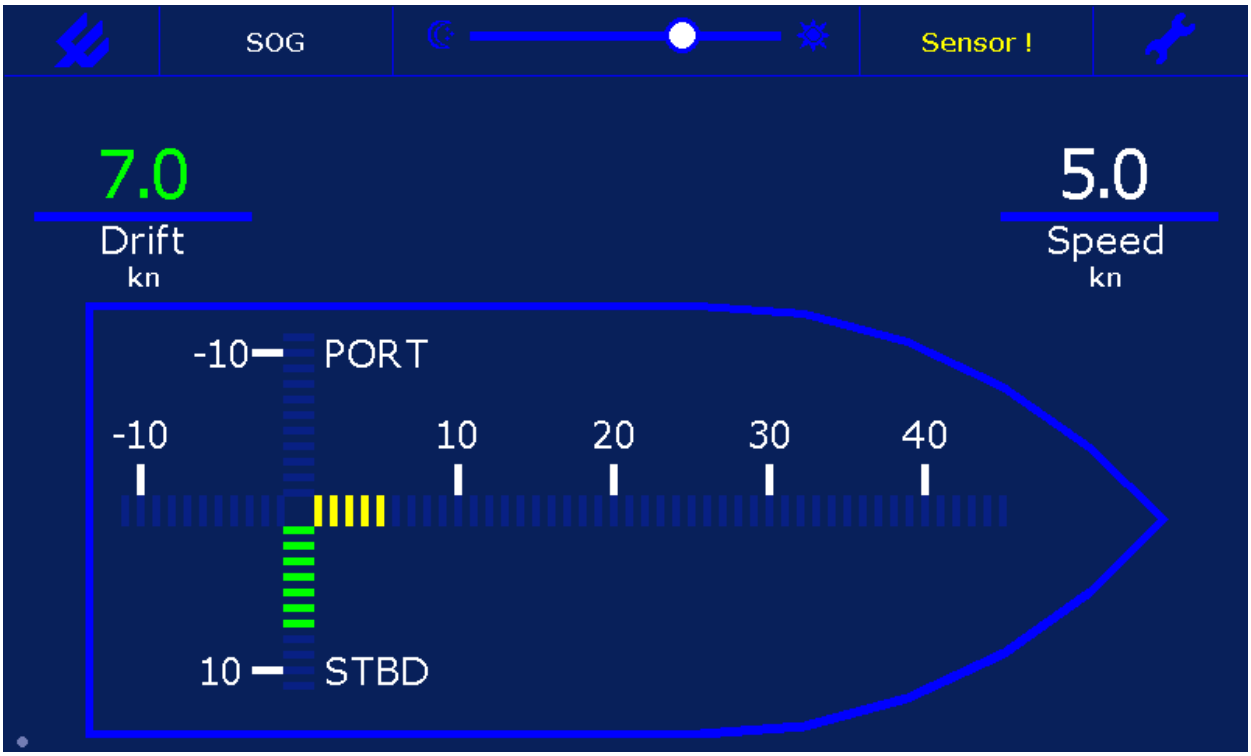
3.13 Home screen Echo lint

The “Echo lint shows the shows the actual depth.

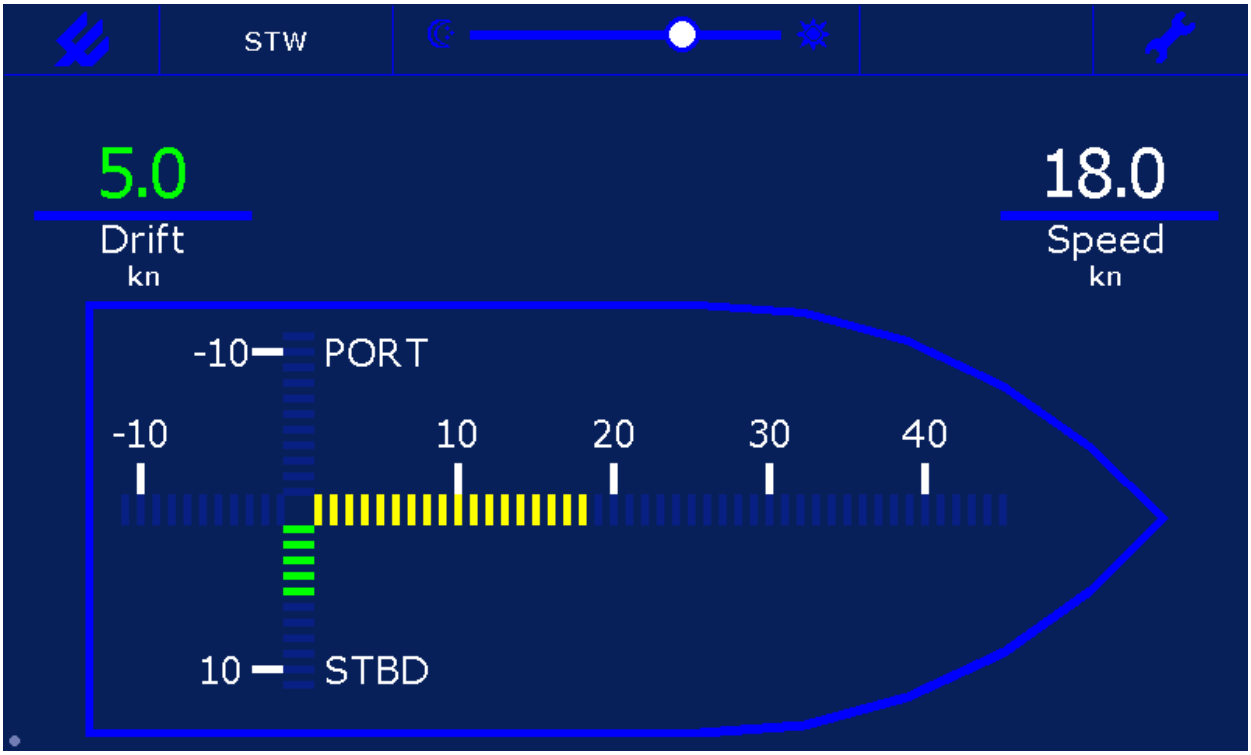


3.14 Home screen SOG/STW

The SOG screen shows the speed over ground and drift of the vessel.



The STW screen shows the speed through water and drift of the vessel.



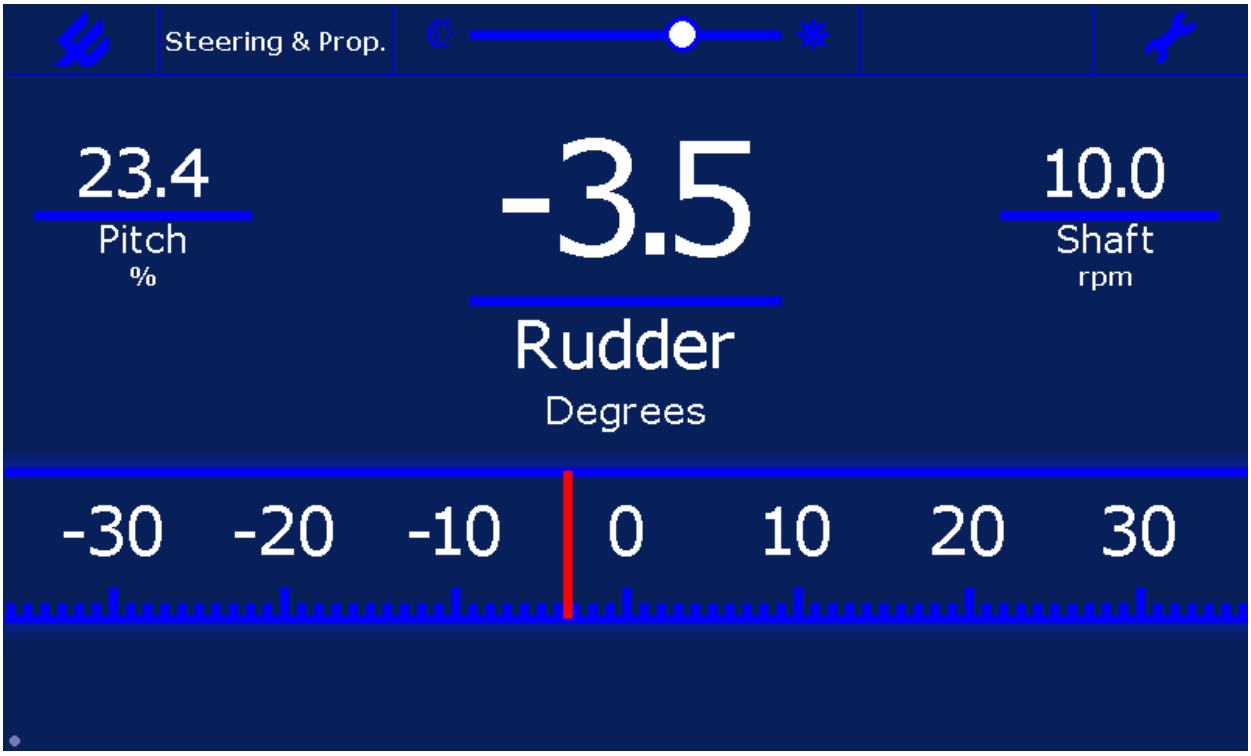
Horizontal in the graphics (Yellow) shows the speed of the vessel, while vertical (Green) the Drift is presented.

The SOG and STW indication is also a touch button.
Touching it will toggle between the 2 views.

3.15 Home screen Steering & Propulsion

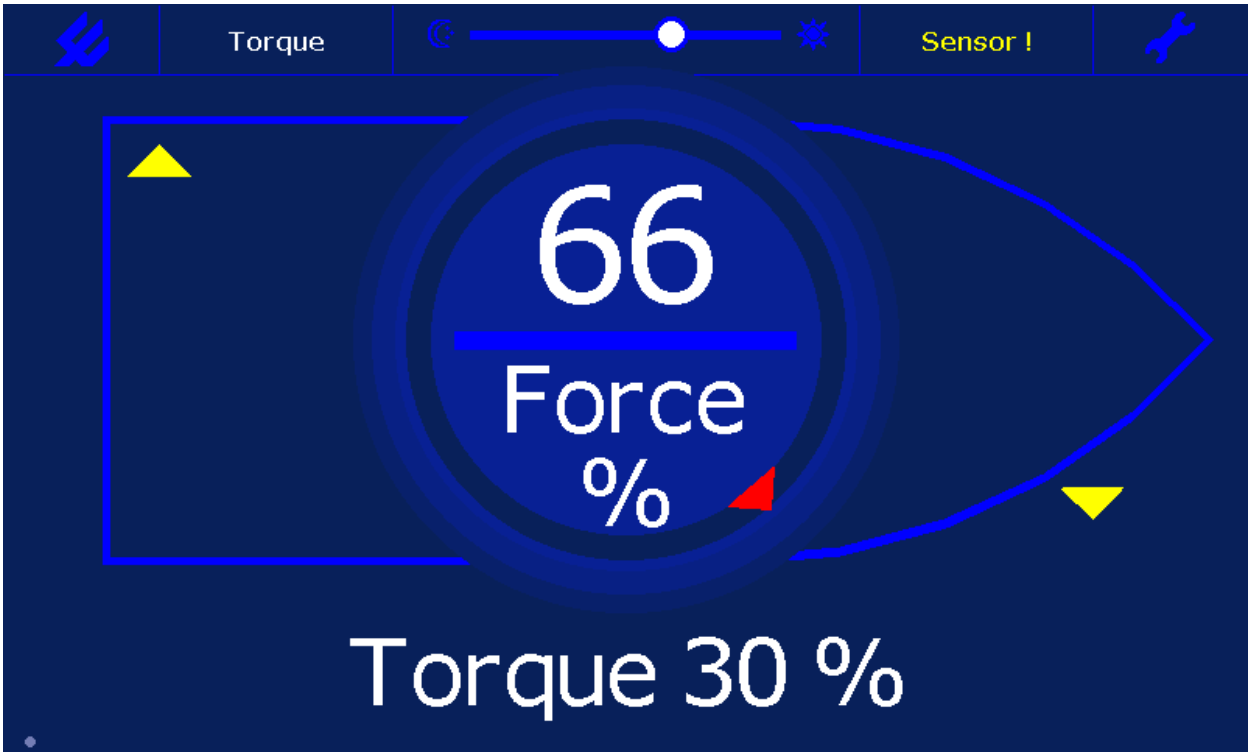
The “Steering & Propulsion Display shows the angle of the rudder, the speed of the shaft and the pitch of the of the vessel.

It is a dedicated screen for the Observator propriety NMEA-sentence “POBSTRP”.



3.16 Home screen Torque

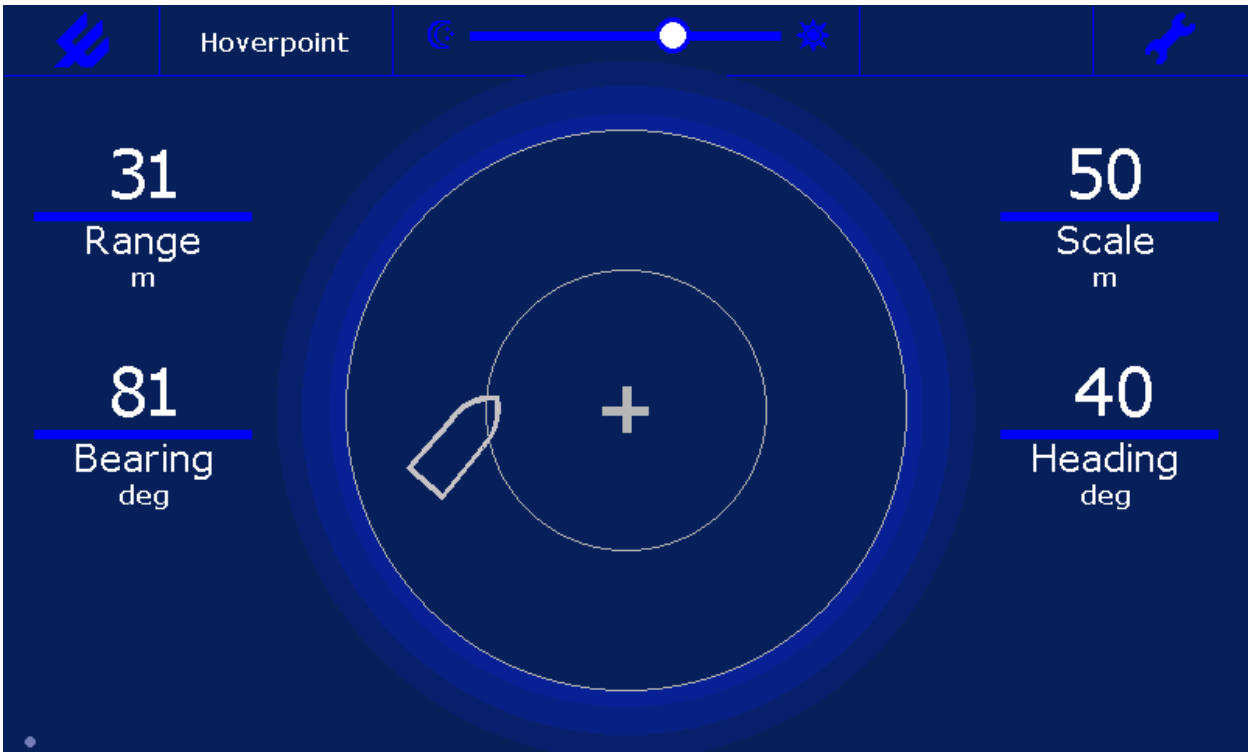
Display shows force as percentage and direction of the force.
It is a dedicated Torque screen for the Observator propriety NMEA-sentence “POBSTRP”.



Yellow arrows show force direction on Aft & Bow.
Torque is presented in % of maximum torque.
In the middle force in % of maximum, red arrow shows direction.

3.17 Home screen Hover

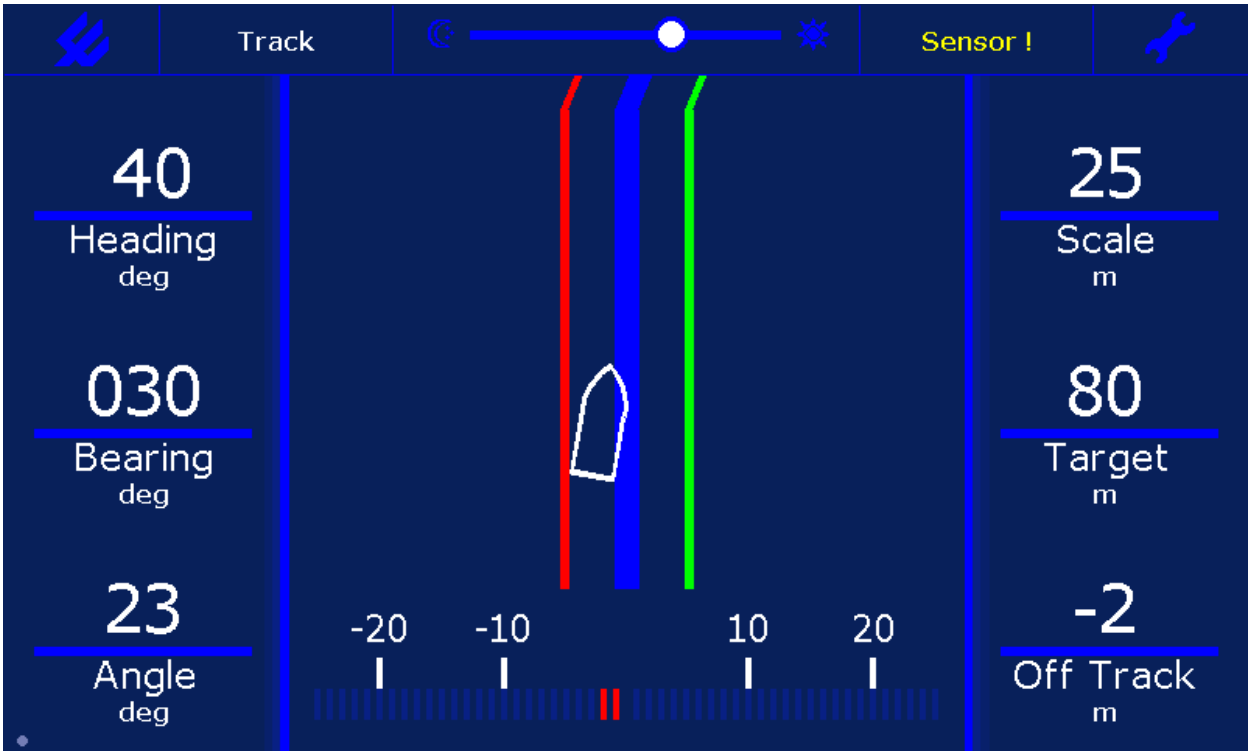
It is a dedicated Hoover screen for the custom “TDHIH” and “TDAER” sentences.
Display shows position of vessel to Hoover waypoint.



Display center is the set ‘Hoover’ waypoint.
On the left Distance and Bearing to the waypoint are presented.
Scale is the outer ring and heading is gyro information.

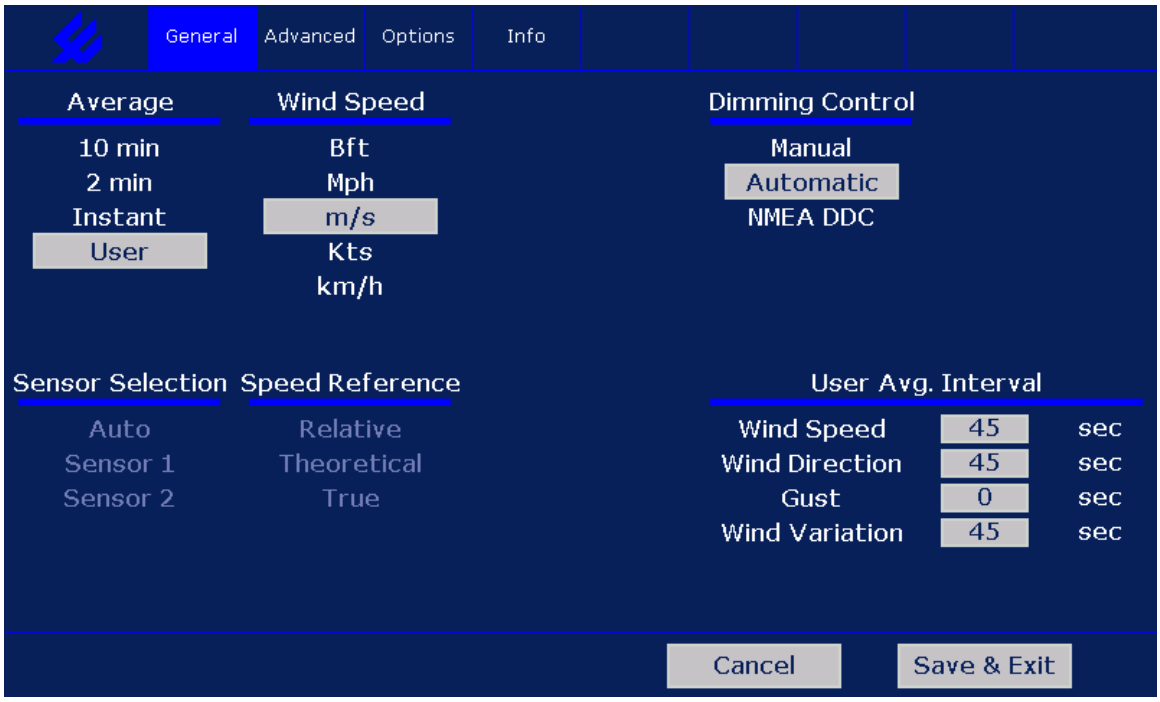
3.18 Home screen Track

It is a dedicated Track screen for the custom “TDHIT” & “TDAER” sentence.
Displays shows current track segment with angle to the next.



Heading: Heading of vessel
Bearing: Bearing of track segment
Target: Distance to target waypoint.
Angle: Angle between tracks (angle to next track segment)
Off Track: Distance to center of the track.

3.19 General Settings Screen

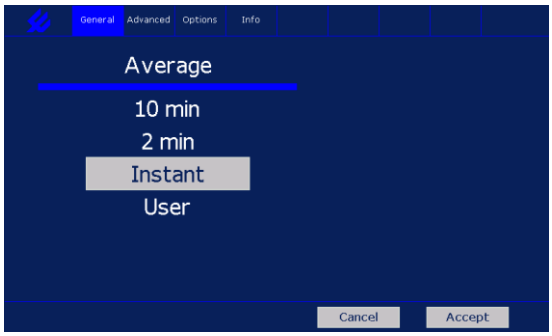


The General Settings Screen is accessible for all users, but some functions can be locked by the administrator, while others might not be available for other reasons.

NOTE: General settings display the stored DEFAULT settings, which will be used whenever the display is started. Settings done via the Home screen are considered temporarily changes and not automatically stored in the default settings.

Grayed out blocks are not accessible. For example: the ‘User Average Period’ is only accessible when ‘User’ is selected at ‘Average Period’.

The screen is divided in blocks.
Touching it will zoom in and allow you to make changes.



Use ‘Save & Exit’ to store your changes and return to the Main screen. Otherwise use ‘Cancel’ to discard all changes and return to the Main screen. Display will also return to normal operation if no touch is detected for 1 minute.

3.19.1 Average (wind only)

Set the interval over which all data (except Gust) will be averaged.
Gust will be given over the selected interval (2 & 10 minutes), since last reset (Instant) or at User setting (User).

Wind direction data is averaged taking wind speed in account.

Normally wind information is reported in 10 minute average data. During specific changing conditions you will need to change to 2 minutes average. The OMC-140 can detect those conditions and change automatic between 10 & 2 minute average if 'Marked Discontinuity' is set in 'Advanced Settings (default is off).

3.19.2 Wind Speed *(wind only)*

Selection of wind speed unit.

3.19.3 Dimming control

Select how you would like to control the brightness of the screen.

Manual: Brightness is set by the slider bar only
Automatic: Brightness is controlled by the build in light sensor. The slider bar can be used to set an offset.
NMEA DDC: Brightness is controlled by the NMEA DDC protocol. This can be another display or any other device using the NMEA DDC protocol.
The slider bar can be used to set an offset.

3.19.4 Sensor Selection

Only selectable when 2 sensors are connected, otherwise it will be grayed out.

Auto: Sensor with highest wind speed will be selected
Sensor 1: Data of sensor on port 1 will be displayed
Sensor 2: Data of sensor on port 2 will be displayed

3.19.5 Speed reference *(wind only)*

Options are only selectable if the required data is available (see chapter 6)

Relative: Wind direction & speed data related to the bow of the vessel
Theoretical: Wind direction & speed data related to the bow of the vessel as if the vessel would have no speed (True wind related to the bow).
True: Wind direction & speed data related to true North

3.19.6 User Avg.(Average) Interval *(wind only)*

Set the values for the ‘User’ settings at ‘Average’.

- For Wind Speed, Direction & Variation this is the Average interval in seconds.
- For Gust this is the reset time (Gust is always a 3s average).
- Valid values are 0 – 600 (seconds).

4 Advanced functions

This menu is meant for the system administrator and therefore password protected.
Besides installation parameters it allows to lock and unlock settings in the General menu, which can be accessed by the Operator.

5 Wind Display Orientation: Relative vs Theoretical vs True

5.1 Wind display orientation

Depending on available data the OMC-140 display is able to display the wind data up to 3 orientations in the marine mode. This mode is fixed during installation, in land mode only the True to North mode is available: a wind rose is displayed and the area between the logo and dim control bar will be empty.

Relative orientation:
- vessel symbol is displayed
- Wind is displayed as measured on board,
  Wind is displayed relative to the bow off the vessel.

True orientation:
- Wind Rose is displayed
- Wind is displayed as if the vessel would not move heading North.
  Wind is displayed True to North.

Theoretical orientation:
- Vessel symbol is displayed
- Wind is displayed as if the vessel would not move
  The wind is displayed True to the bow of the vessel.

True and Theoretical wind speed will always be identical, direction difference will be the heading of the vessel (or course if no heading data is available).
When the vessel is heading North, Theoretical & True values will be identical.

5.2 Drift

5.2.1 Heading vs Course

To compensate for drift the display requires heading data (from gyro) besides course over ground (cog) and speed over ground (sog) data (from gps).

Without heading data, the display will display True & Theoretical wind once the ships speed is above 1kt. The display will assume the heading is identical to the course for True and Theoretical calculations. Keep in mind this can lead to deviations in situations where you experience significant drift or if the vessel is reversing!

5.2.2 Speed through water (VHW from speed log) vs Speed over ground (gps)

Speed through water can be used instead of speed over ground.
The display will not compensate for drift, but will give the theoretical & true wind data as if the vessel would be still in the water (not necessarily according to ground).

6 Wind Orientation Reference Requirements

Required NMEA data for specific Reference:

Relative:	MWV Relative
Theoretical:	MWV Theoretical MWV relative + Speed (VTG/GGA* or VHW)
True:	MWD MWV Relative + Speed (VTG/GGA* or VHW) + Heading (THS or HDT)** MWV Relative + Speed (VHW) AND Heading (THS or HDT)

** VTG will be ignored if the SOG < 1kt to avoid incorrect COG data.*

*** Optional: Heading data is required to compensate for drift. Without heading data, drift will result in a deviation.*

7 Data logging

The OMC-140 Multifunctional NMEA display has a data logging function if enabled by the administrator.
If this function is enabled Meteo data can be stored on a MicroSD card at a regular interval.
See installation manual for details.
If this function needs attention the warning SD Fault will appear on the main screen.
Via the settings menu - tab NMEA page additional info can be found on the bottom line.

SD card status:	SD-Card OK
Insert SD-Card	SD-card missing, not accessible or full. Insert or replace SD-card (max 32GB Micro SDHC)

(Available storage) in GB	It will take 1 Storage interval for the correct value is displayed (after card-insertion or power cycle).

8 Terms, Abbreviations & Symbols list

8.1 Terms & Abbreviations used in this manual.

Advanced	Advanced menu protected by password
Average	Interval over which the average wind speed & direction is calculated
COG	Course Over Ground
Course	Actual direction the vessel is moving (over ground).
Dimming Control	Selected means of regulation of the backlight
Heading	Direction the bow of the vessel is pointing.
Options	Option slot information
QFE	Barometric Pressure at Runway Level
QNH	Barometric Pressure at Sea level
Relative	Wind direction & speed as measured.
Sensor 1	Sensor connected to port 1 of the display
Sensor 2	Sensor connected to port 2 of the display
SOG	Speed Over Ground
STW	Speed Through Water
True	True wind direction & speed related to North
Theoretical	Wind direction & speed as if the vessel would have no speed; True wind speed & direction related to the bow of the vessel.
Wind Variation	The variation in wind direction over the selected Average interval.

8.2 Symbols

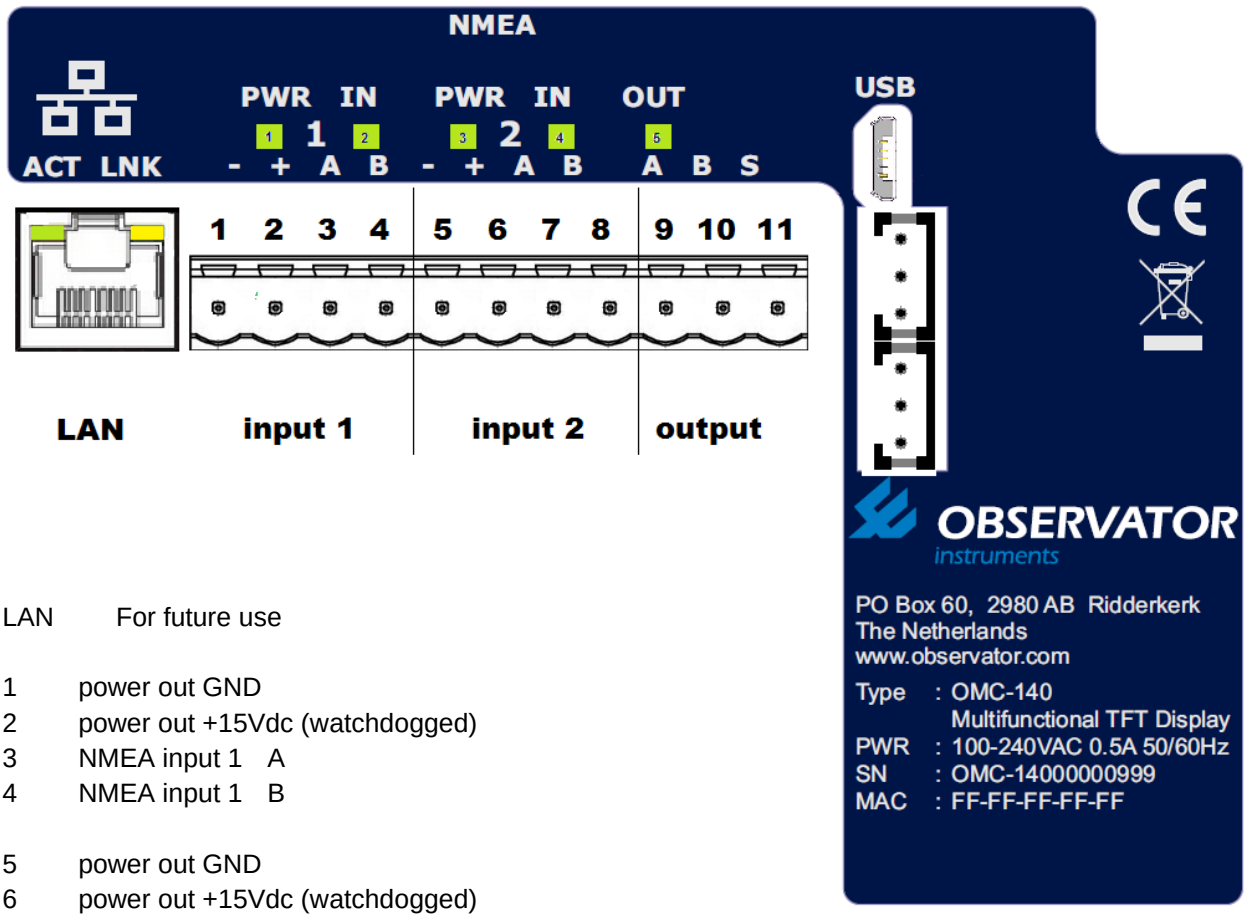
Select between Day or Night mode.
In Night mode a darker color palette reduces the emitted light intensity.

Brightness slider bar.
In Automatic or NMEA control mode use this to set an offset.

Settings menu

9 Connections

9.1 Main connections



LAN For future use

1 power out GND
2 power out +15Vdc (watchdogged)
3 NMEA input 1 A
4 NMEA input 1 B

5 power out GND
6 power out +15Vdc (watchdogged)
7 NMEA input 2 A
8 NMEA input 2 B

9 NMEA output A
10 NMEA output B

11 Shield connection

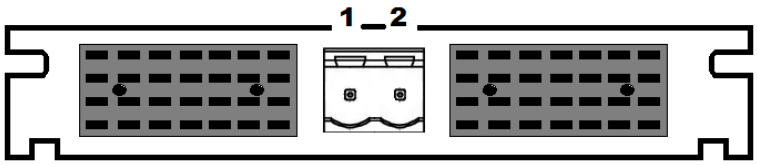
USB Micro USB connection for advanced programming and firmware updates.

Display Bus Interconnection bus between displays

LED Function

1 Power input 1
2 Data input 1
3 Power input 2
4 Data input 2
5 Data output

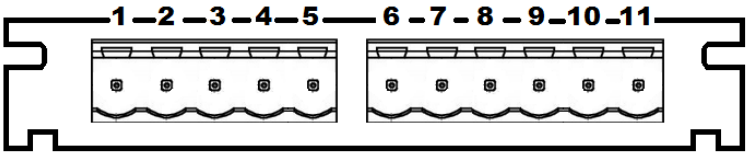
9.2 DC power module connections



DC power

1 GND
2 Power +9 – 30VDC

9.3 Remote keypad and relay module



Remote Keypad
1.. 5 not specified.

Relay outputs

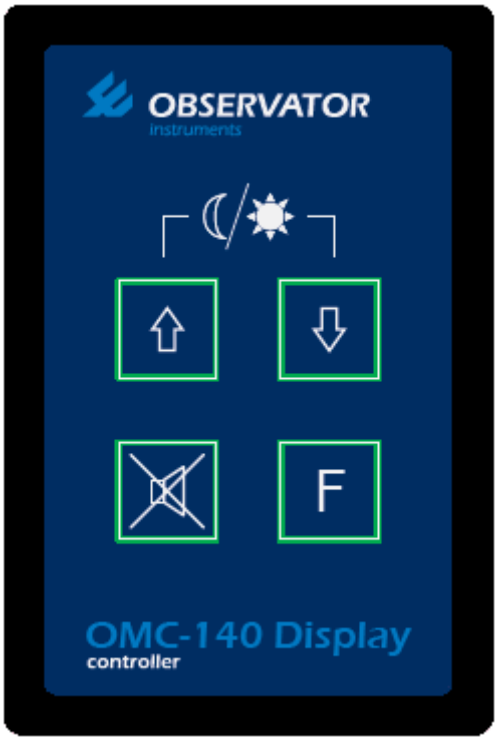
6 Relay 1 NO contact
7 Relay 1 Common
8 Relay 1 NC contact

9 Relay 2 NO contact
10 Relay 2 Common
11 Relay 2 NC contact

10 Options

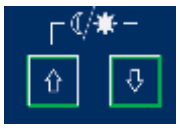
10.1 Remote control unit

The optional remote controller has 4 buttons to control some functions remotely on the **Main** screen.



Increase the brightness

Decrease the brightness.



Pressed together toggles between **Nigh**t and **Day** mode.

Alarm acceptance button.

Default the remote is in Brightness control mode. If no button press has been detected for 10 seconds it will return to this mode.

Toggles function in field left of the brightness slide bar.

Example:

Wind display: Relative, Theoretical & True

11 Specifications

11.1 Inputs/Outputs

- 2 NMEA0183 inputs
- 1 NMEA0183 output
- Micro USB (programming purposes)
- RJ45 LAN connector

More I/O possible through the option boards

11.2 TFT touch screen

- 8,5” Super Wide Viewing Angle 170° LCD with long life and low power LED backlight
- Active display area: 184.8 x 110.9 mm
- Resolution: WVGA 800x480

11.3 Electrical

- 100..240 Vac, 50/60 Hz, max 50 VA
- 9-30V VDC via Optional DC Power Module
- Sensor 1 and 2 power output 15..16.5 Vdc max 1.5 W
- Connections, pluggable screw terminals for max 2.5 mm²

11.4 Environmental specifications

- Operating temperature –15ºC..+55ºC
- Storage temperature –30ºC..+80ºC
- Humidity: 10..93 %RH
- Vibration: IEC 60068-2-6 test Fc
- EMC: IEC 60945; IEC 61326-1
- IP rating: IP22 when fully flush mounted (228 x 142mm)

11.5 Dimming possibilities

- From 0,5..700 cd/m2
- Day and night pallet selectable
- Manual by means of ‘slider bar’
- Automatic by means of ambient light sensor
- Central by means of NMEA DDC input

11.6 Dimensions (see drawings on following page)

- Packing 30 x 30 x 40 cm
- Weight 1.2 kgs (excl packing)
- Weight 3 kgs (incl packing & mounting materials)

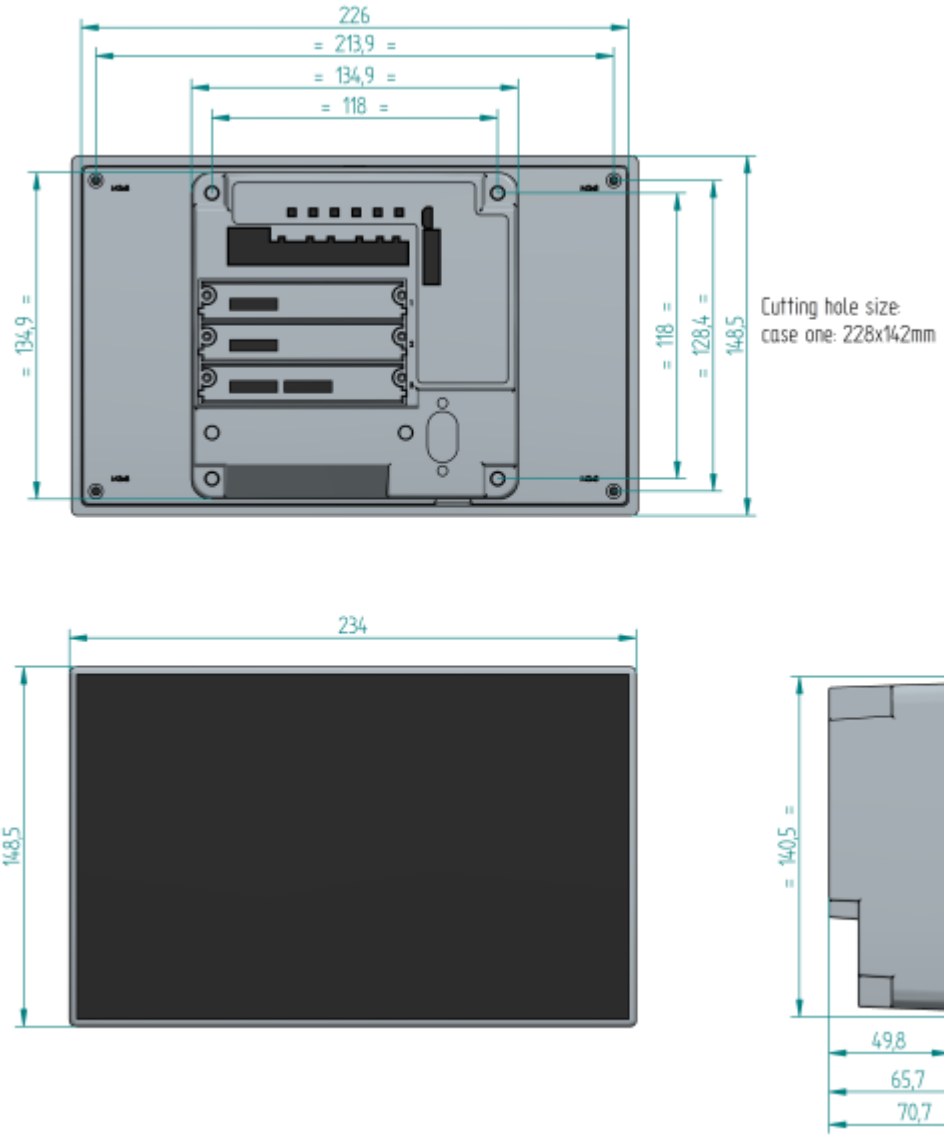
11.7 Alarms

- Build-in alarms on parameters and system functioning
- Outputs, potential free relay outputs through optional OMC-140-2 module

11.8 In accordance with

- DNVGL-CG-0339
- EMC Directive 2014/30/EU
- LV Directive 2014/35/EU
- RoHS Directive 2011/65/EU
- EMC: ESD IEC 61000-4-2; Radiated Immunity IEC 61000-4-3; Conducted Immunity IEC 61000-4-6; Fast Transients IEC 61000-4-4; Surge IEC 61000-4-5
- Electrical safety: IEC 61010:2010
- NMEA 0183 version 4.10 / IEC 61162-1:2010
- IEC 62288:2008 Draft IEC 62288:2012
- All relevant IMO resolutions
- WMO / ICAO / CAP

12 Dimensional drawings



13 Menu structure Touch screen


Opens settings menu

General

Dimming Control:

Manual
Automatic
NMEA DDC

Sensor selection:

Auto
Sensor 1
Sensor 2

Average *(Wind only)*

10 minute
2 minute
Instant
User (settings from User Average Interval)

Wind Speed *(Wind only)*

Bft
Mph
m/s
kn
km/h

Wind Reference *(Wind only)*

Relative
Theoretical
True

User Average Interval *(Wind only)*

Wind Speed
Wind Direction
Gust
Wind Variation

Advanced

Keypad

085 Shows Operator available codes'
0851 Terminal input 1
0852 Terminal input 2

Offset Sensor 1 *(Wind only)*

Offset Sensor 2 *(Wind only)*

Display Mode

Landscape
Portrait

Marked Discontinuity (On / Off) *(Wind only)*

Wind Alarm (On / Off) *(Wind only)*

Wind Alarm (settings) *(Wind only)*

Wind Alarm
Pre Alarm
Hysteresis
Alarm Delay

Output Baudrate
4800
9600
19200
38400

Secure User Items

Average (un)lock *(Wind only)*
Wind Speed (un)lock *(Wind only)*
Dimming Control (un)lock
Sensor Selection (un)lock
Wind Reference (un)lock *(Wind only)*

System Name (GPS only)

Edit GPS names (GPS only)

Options

Displays installed option boards

Info

Displays System & Product info.

Front *(only visible in Advanced Menu)*

Edit data fields in Front screen

Sensors *(only visible in Advanced Menu)*

NMEA VER Message Table

14 Appendix: Declaration of Conformity

OBSERVATOR
instruments

Observator Instruments B.V.

Rietdekkerstraat 6
2984 BM Ridderkerk
The Netherlands

P.O. Box 60
2980 AB Ridderkerk
The Netherlands

Tel.: +31 (0)180 463411
Fax.: +31 (0)180 463530

Email: info@observator.com
Internet: www.observator.com
CoC: 24172722

EU DECLARATION OF CONFORMITY

(1) Apparatus model: **OMC-140**

(2) Manufacturer:
Observator Instruments B.V.
Rietdekkerstraat 6
2984 BM Ridderkerk
The Netherlands

(3) This declaration of conformity is issued under the sole responsibility of the manufacturer.

(4) Object of the declaration:

OMC-140	Multifunctional TFT Display
OMC-140-01	DC power supply option module
OMC-140-02	Remote control & relay output module

(5) The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:
- Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility
- Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment
-

(6) References to the relevant harmonised standards used:

EN IEC 60945:2002 including EN IEC 60945/C1:2008
EN IEC 61326-1:2013
EN IEC 61010-1:2010 including EN IEC 61010-1/C!:2011 and /C2:2013
EN 50581:2012
EN IEC 62923-2:2018

(7)

(8) Ridderkerk, 11 October 2021,
Observator Instruments B.V.

dr. R. de Vries
CEO

Since 1924 Observator has evolved to be a trend-setting developer and supplier in a wide variety of industries. Originating from the Netherlands, Observator has grown into an internationally oriented company with a worldwide distribution network and offices in Australia, Germany, the Netherlands, Singapore and the United Kingdom.