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UNICONT

# Universal digital repeater
# DR-209M

Operating manual

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## INTRODUCTION

This operating manual (hereinafter referred to as the OM) covers the Universal digital repeater DR-209M (hereinafter referred to as the Repeater or the Product).

The OM is intended to describe operating principles, technical specifications and rules for the safe Product operation.

In addition to the instructions given in this document, the safety regulations and rules applicable in the field shall be observed.

Only those who have had general education in the area of electronic devices, and those who have read and understood this document shall be permitted to operate with the Repeater.

**Terms and abbreviations:**

GNSS – Global Navigation Satellite System;

NMEA – textual communication protocol NMEA 0183;

LCD – liquid crystal display;

SPTA – spare parts, tools and accessories;

OS – operating system;

S – software;

OM – operating manual;

TS – technical service;

CL – check list.

# 1 DESCRIPTION AND OPERATION OF THE PRODUCT

## 1.1 DESCRIPTION

The Product displays data received in NMEA sentences format from various ship systems and retransmits these data.

The Product is designed for sea- and river-going vessels, and general industrial application.

## 1.2 TECHNICAL SPECIFICATIONS

The Product ensures:

a. data interface with equipment via three asynchronous, serial, galvanically isolated ports RS-422 (with support of NMEA standard);

b. reception of data received via one of three ports (in NMEA format) in accordance with ANNEX A;

c. display of data (received by all ports) in graphic and digital format on the LCD monitor, herewith data storage and presentation in graphs, providing the following capabilities

– setting measurement units (from the list) and correction values;

– setting time intervals to monitor parameters (for graph mode);

– setting a data filter to output averaged values for the given time interval;

– display of the required parameters (from the received ones) in full screen (a single parameter is displayed on the whole screen in any mode) or in multi-screen mode using a random pattern (one from the accessible patterns, containing up to nine screens / windows with different layout of segments at the same time), selected by a user;

d. continuous transmission of received data to the external ship systems via the selected ports;

e. data display in English / Russian (as selected);

f. prior configuration of up to 10 data screens / windows (with different combinations of patterns and displayed parameters); change of screens by manual roundtrip scrolling (using touch screen), by pressing button “⮌” or by selecting a relevant screen number;

g. control using the relevant buttons on the front panel (power switch on / off, menu access (exit), backlight brightness adjustment, change of repeater screens);

h. manual adjustment of backlight brightness using the buttons on the front panel;

i. individual settings for each port (stop bit, parity bit, reception/transmission baud rate).

The Product's detailed specifications, environment conditions, overall and installation dimensions are represented in Technical description of the Product.

## 1.3 Structure and operation of the Product

### 1.3.1 General description

The Product is manufactured in metal casing (a front frame – aluminum, a rear panel – steel); a port to connect power cable and RS-422 serial interface ports to connect communication cables are located on the rear side under the protective cover. Controls and colour 8" LCD to display visual data are located on the front panel. The LCD has a resistive touch screen. A USB port to connect a removable media device is located on the right side of the casing. The Product's structural diagram is represented in Figure 1.

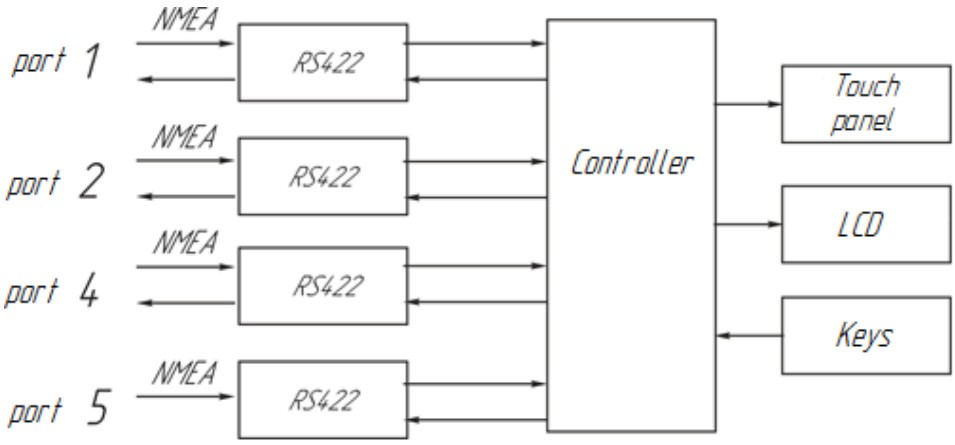


Figure 1 – The Product's structural diagram

### 1.3.2 The Product's controls

The Product's controls are located on the front panel, see Table 1 and Figure 2.


Figure 2 – General view and layout of the Product's controls

Table 1 – Description of Product's controls

| № | Name | Description |
|---|---|---|
| 1 | Button "☰" | To access the Product's settings menu |
| 2 | Button "▲» | To increase the backlight brightness |
| 3 | Button "▼» | To decrease the backlight brightness |
| 4 | Button «⮌" | To exit the settings menu; change of screens |
| 5 | Button "⏻" | To switch ON (OFF) power |

The Product is equipped with an LCD monitor and resistive touch panel, providing:

a. configuration of the Product (while commissioning);

b. troubleshooting (in operation and service modes);

c. screens can be changed by manual roundtrip scrolling or by choosing a number of the relevant screen;

d. display of current and service data (using the relevant operation mode).

**Caution!** LCD monitor with touch panel of resistive type (surface touch layer) is intended for application only with blunt smooth instruments. Sharp instruments (writing pen or pencil end) or harsh mechanical impact on the monitor is prohibited to avoid damage.

### 1.4 MEASUREMENT INSTRUMENTS, TOOLS AND APPLIANCES

Operability control of the Product is carried out using integrated controls and LEDs.

Consumables for TS are represented in Table 2.

### 1.5 MARKING AND SEALING

The nameplates, where the user can find a serial number, date of manufacturing, weight, IP rating, input voltage and power consumption are located on the Product's casing.

The sealing of the Product and package is not provided.

### 1.6 PACKAGING

The Product is packed in a corrugated board box ensuring its transportation and storage at the warehouse.

Transport packaging is also used as a returnable packaging for transportation of the Product to the repair location and back.

The sealing of the Product and package is not provided.

Table 2 – Amount of consumables required for the TS

| **Name and identifier of consumables** | **Weight of consumables** | **Note** |
|---|---|---|
| Cleaning cloth | 0.10 kg | 1 To clean surfaces and parts of the system – use clean cloth<br>2 To clean severe contamination – use alcohol-soaked cloth |
| Rectified hydrolytic technical ethyl alcohol | 0.05 *l* | To soak cloth while cleaning the screen |
| Varnish | 0.05 kg | To cover surfaces of the unit in case of paint coating damage |
| Abrasive cloth | 0.06x0.06 m | To polish surfaces of the unit in case of paint coating damage |

# 2 INTENDED USE OF THE PRODUCT

## 2.1 OPERATIONAL CONSTRAINTS

The Product shall have proper grounding, all cables shall be insulated; non-insulated / bare ends shall be absent.

The Product cannot be operated in the open deck environment.

To ensure convenient electrical installation and service, provide free passage to the Product and access to detachable parts.

Place for installation of the Product shall be selected in accordance with the operational constraints (operating temperature, IP rating).

## 2.2 USAGE PREPARATIONS

### 2.2.1 Safety features

While preparing the product to operation provide a visual check after unpacking and make sure that any mechanical damage is absent.

Before using the Product ensure the following steps:

a. train staff to use the Product and checkout equipment, as well as occupational safety applicable in the field;

b. use only standard fuses;

c. follow “Rules for Operation of Customers' Electrical Installations” and “Safety Rules for Operation of Customers' Electrical Installations” while testing electrical circuits and insulation resistance of the Product.

### 2.2.2 Method and sequence of the Product’s visual check

Before powering the Product on the user shall:

a. check visually the integrity and initial position of control elements;

b. clean any contamination or dust from the front panel with clean soft cloth, if present;

c. check reliable fastening of cable connectors to the Product.

### 2.2.3 Switch on instructions

To switch the Product on, transfer a circuit breaker on the mains switchboard to ON position, then the Product will automatically switch on.

## 2.3 USAGE OF THE PRODUCT

2.3.1 The Product is delivered with factory settings; the settings may be changed if necessary.

2.3.2 The Product's operation modes

The Product ensures operation in the following modes:

a. operation (working) mode;

b. configuration / Settings mode;

c. service mode.

The operation mode ensures intended use of the Product. In this mode the Product ensures:

a. data display (to monitor parameters);

b. data transmission in NMEA network;

c. emergency alarm, see Table 11.

The Product in the operation mode can be used as:

a. gyrocompass repeater;

b. log repeater;

c. depth finder repeater;

d. inclinometer repeater;

e. weather sensor or wind sensor/transducer repeater;

f. other systems and devices repeater;

g. repeater of several devices and systems simultaneously.

The configuration mode prepares the Product for use, providing the following:

a. prior configuration of the Product;

b. download of OS updates.

The service mode is used only by the manufacturer's service specialists / engineers or their authorized representatives (after entering service password) to ensure the following:

a. operation with the Product at the OS level;

b. manual OS update;

c. expanded diagnostics of troubles.

### 2.3.3 Information screens

Once the power is supplied, the Product automatically transfers to the operation mode. One of the information screens, which was pre-configured beforehand by a user, appears on the monitor.

To ensure convenient operation, a user can configure from 1 to 10 information screens with different combinations of patterns and displayed parameters.

Received data can be displayed in full-screen mode (single parameter displayed on the whole screen) and in multi-screen mode using a random pattern (simultaneous output of up to 9 screens with various layout on the monitor).

Several possible screens are represented in Figure 3.

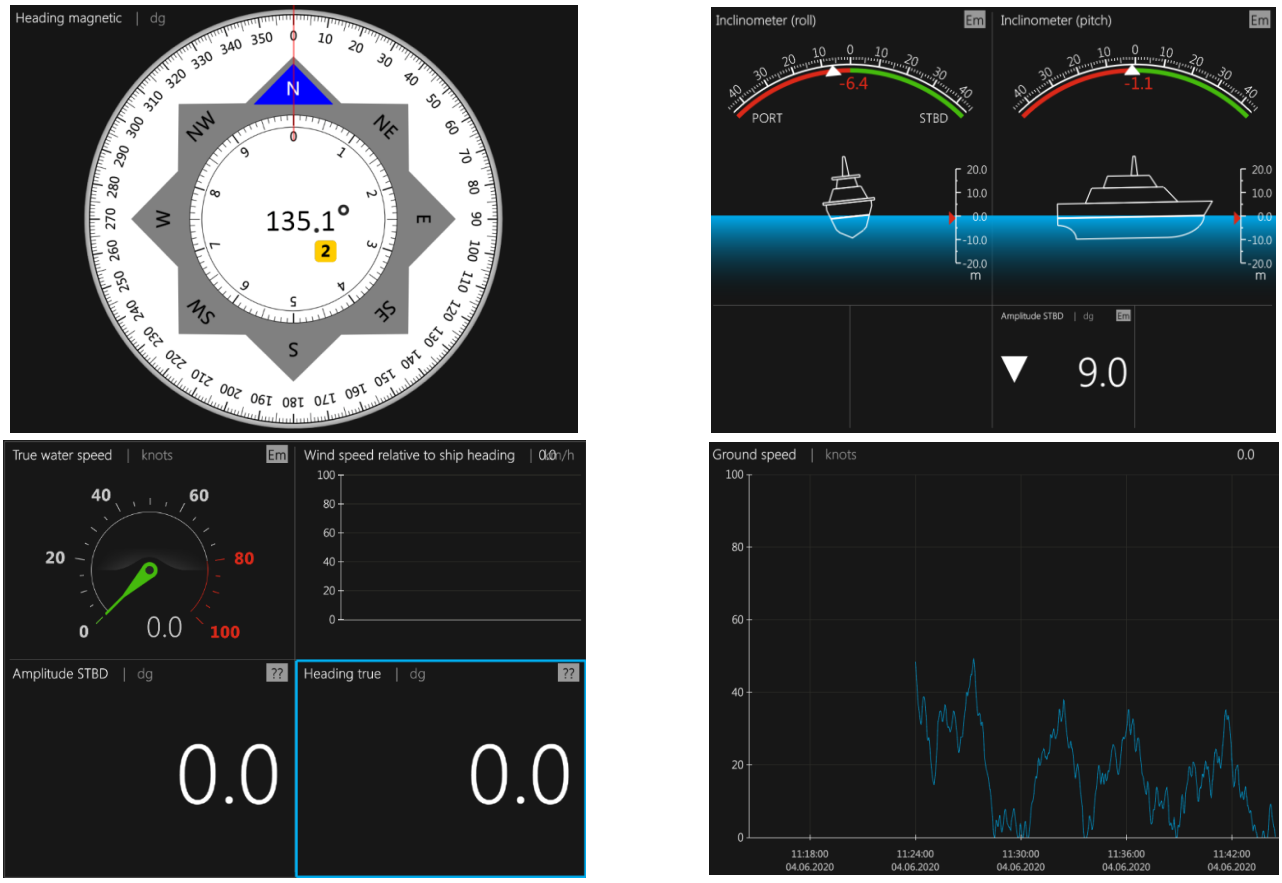


Figure 3 – Sample screens of the Product

### 2.3.4 The Product's operation mode

Once the Product is switched on, it automatically transfers to the operation mode. One of the information screens, which was pre-configured beforehand by a user, appears on the monitor.

The following operations are available for a user in the operation mode:

a. switching over from one information screen to another by:

– scrolling (swiping) image to the left-right using touch screen;

– pressing button "↩" on the front panel;

– making a direct choice of the required screen by tapping / touching interactive button bottom-up with a number of the relevant screen;

b. transfer to configuration mode.

### 2.3.5 Select of active screen

The Product allows for configuration of up to 10 screens. Each screen can be configured to display required NMEA data in any of three available modes: graphic, digital of in graphs.

The user changes the screens manually in the same order as they were pre-configured, by scrolling them using "↩" button on the front panel.

Since the Product is equipped with a touch screen, the screens can be changed by swiping to the left-right.

The screens can be also changed by pressing touch buttons «1», «2»… «10» on the pop-up panel located at the bottom, see Figure 4. To call out letter/symbol panel the user shall imitate screen swiping from bottom to top.

As soon as the Product is switched on (after de-energizing due to power failure or the Product shut down), the screen will display the content, which was on the screen before de-energizing for more than 10 seconds or the previous screen (less than 10 seconds).


Figure 4 – Touch buttons to transfer to the required screen

### 2.3.6 Configuration / settings menu

To access the configuration menu of the Product, tap button "☰" on any information screen. The structure of the configuration menu is represented in Figure 5.


Figure 5 – Structure of the configuration menu

Configuration menu includes the following tab pages, see Table 3.

Table 3 – Main menu tab pages

| Name | Settings |
|---|---|
| Common | Language settings, inclinometer parameters (if one is operated at the facility), alarm interval, emulation switching on (off), language select. |
| Alarm | Activation of alarms by the data received from the connected systems and devices. |
| Measurement units | Setting measurement units / values of the displayed data. |
| Displays | Configuration of information screens, display modes and types of the displayed data. |
| COM | Configuration of reception-transmission ports, selection of NMEA data transmitted by the selected port. |
| Rx | Diagnostic check of ports operability. |
| System settings | Settings up current time, OS update, screen calibration and operation in the service mode. |

### 2.3.7 Data display modes

Received data are displayed on the LCD in the following modes:

a. graphic;
b. digital;
c. in graphs;
d. without indicator (data are not displayed on the screen).

#### 2.3.7.1 Graphic display mode

The following data are displayed in the graphic display mode, see Table 4.

Table 4 – The data displayed in the graphic mode

| Parameter | Description | Parameter | Description |
|---|---|---|---|
| Speed | wind | Depth | sensor |
| | true | | keel |
| | relative | | surface |
| | true water | Temperature | water |
| | ground | | air |
| | rate of turn[1, 2] | Pressure | atmospheric |
| | drift | Inclinometer | inclinometer[1] |
| Humidity | absolute | | pitch |
| | relative | | roll |
| Heading | true | Course | true |
| | magnet | | magnet |
| Notes<br>1 Data may be displayed in different views.<br>2 «+» and «-» serve to change scale calibration in the operation mode. | | | |

In graphic display mode the Repeater simulates point indicators of various analog devices, see Figure 6.

For more information on the screen settings in graphic mode, see cl. 2.3.12.2.

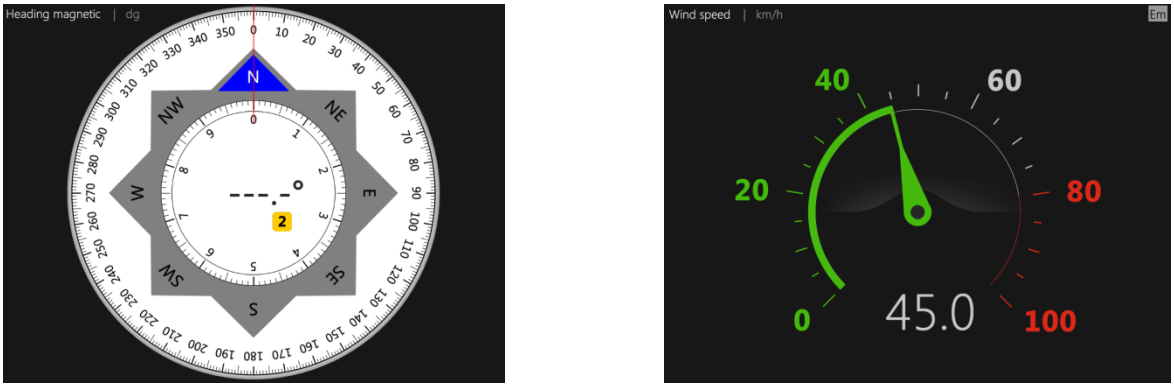


Figure 6 – Samples of graphic data display

### 2.3.7.2 Digital mode

The Product represents data in numbers in the digital mode, see Figure 7.

All received types of NMEA may be displayed in the digital mode, see Table 5.

Table 5 – The data displayed in the digital mode

| Parameter | Description | Parameter | Description |
|---|---|---|---|
| Humidity | absolute | Depth | sensor |
| | relative | | keel |
| Amplitude | STBD | | surface |
| | PORT | Pitch | – |
| | roll | Speed | wind |
| Pressure | atmospheric | | true |
| Heave | heave | | relative |
| | down velocity | | true water |
| | down acceleration | | ground |
| Temperature | water | | rate of turn* |
| | air | | drift |
| Angle | pitch | | closing |
| Time | time | Date | date |
| | time UTC | | date UTC |
| Longitude | longitude | Latitude | latitude |
| | destination longitude | | destination latitude |
| Course | true | Wind direc-tion | true |
| | magnetic | | relative |
| Drift direction | true | | true |
| | magnetic | | magnetic |
| Heading to steer to destination waypoint | true | Bearing | origin to destination, true |
| | magnetic | | origin to destination, magnetic |

| | | | |
|---|---|---|---|
| Heading | magnetic | | present position to destination, true |
| | true | | present position to destination, magnetic |
| Time remaining | | Roll period | |
| Time zone | | Range to destination | |
| Cross track error | | Total distance travelled in the water | |
| Depth below surface | | Coordinates destination | |
| Geographic coordinates | | Origin waypoint | |
| Date and time | | Destination waypoint id | |
| Distance travelled in the water | | Number of satellites | |
| Major semi-axis ellipse of errors | | Minor semi-axis ellipse of errors | |
| The angle of rotation of the ellipse errors | | Ellipsoid | |
| Longitudinal speed source | | Vertical speed | |
| Location determination | | West East Speed | |
| Track angle | | North South Speed | |
| NK mode | | Cross track error | |
| * The data may be displayed in different views. | | | |

For more information on screen settings in the digital mode, see cl. 2.3.12.2.

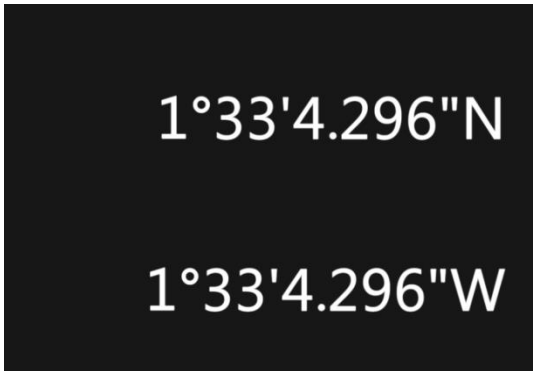


Figure 7 – Sample screen in the digital mode

### 2.3.7.3 Data display in graphs

The Product allows for analyzing changes / variability of input data using graphs which are built according to the selected parameters for different time intervals, see Figure 8. The following data may be used to be represented in graphs, see Table 6.

Table 6 – Data to build graphs

| Parameter | Description | Parameter | Description |
|---|---|---|---|
| Humidity | absolute | Speed | wind |
| | relative | | true |
| Amplitude | STBD | | relative |
| | PORT | | water |
| | roll | | ground |
| Pressure | atmospheric | | rate of turn[2] |
| Heave | | | drift |
| Angle | pitch[1] | | West East |
| Depth | sensor | | North South |
| | keel | | vertical |
| | surface | Temperature | water |
| Pitch | – | | air |
| Notes<br>1 Data can be displayed in different views.<br>2 «+» and «-» serve to change scale calibration in the operation mode. | | | |

For more information on screen settings in graph mode, see cl. 2.3.12.2.

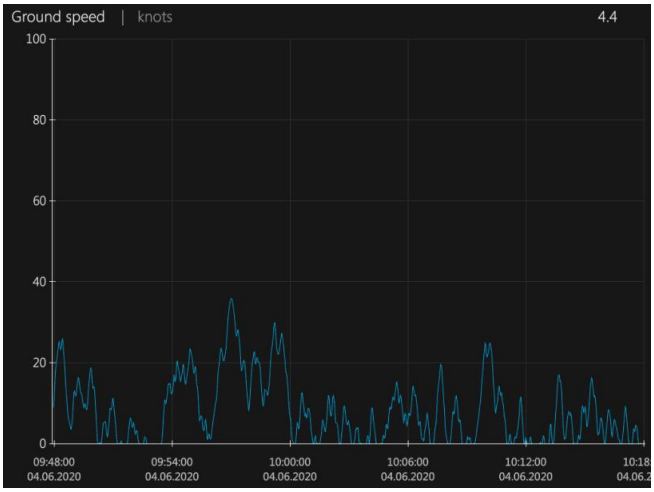


Figure 8 – Sample of graph

### 2.3.8 Settings of the parameters

Prior to operation the user shall carry out the relevant settings of the parameters (data display and reception / transmission).

The Product's settings are carried out using the LCD touch screen.

To access configuration menu, press button "☰" on the front panel.

### 2.3.9 Tab page *Common*

After pressing *Menu* screen takes the view shown in Figure 9.

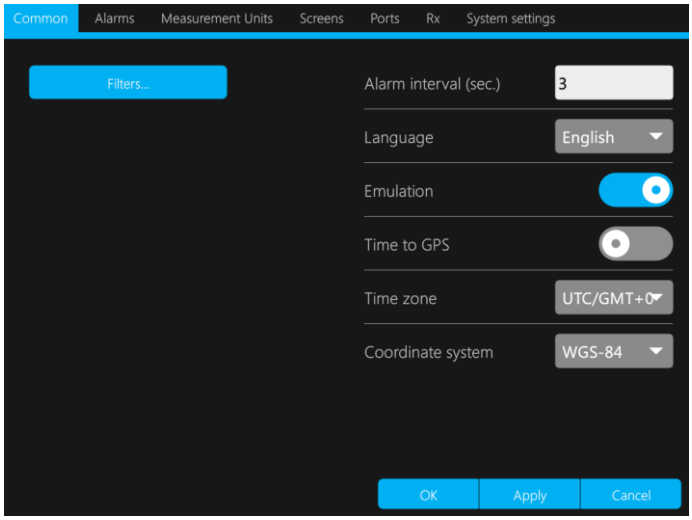


Figure 9 – Tab page *Common*

The following controls are located in the tab page *Common*, see Table 7.

Table 7 – Tab page *Common*

| Name | Function |
|---|---|
| OK | To confirm the select |
| Apply | To apply (save) the selected settings |
| Cancel | To cancel the selected settings |
| Alarm interval (sec.) | To set up a time interval, during which displayed data are valid; if setting up a filter – time interval, during which average values are displayed |
| Language | To select the language (for displayed parameters) |
| Emulation | To switch on/off emulation mode |
| Time to GPS | To set up GMT time (by data received from a satellite) |
| Filters | To switch on a filter for average value output of the required parameter |
| Time zone | To select a time zone (world coordinate time (average time) GMT time, correction for time zone) |
| Coordinate system | To select system of coordinates depending on the tasks |

If *Time to GPS* is on, displayed time is automatically corrected and presented in true time UTC (GMT).

*Alarm interval* indicates a time interval during which the displayed data are valid.

As soon as the interval expires, the data will not be displayed and take a view of « – – – ».

Once an averaged value filter *Filter* is switched on, a screen to edit parameters, required for average values display, is opened, see Figure 10.

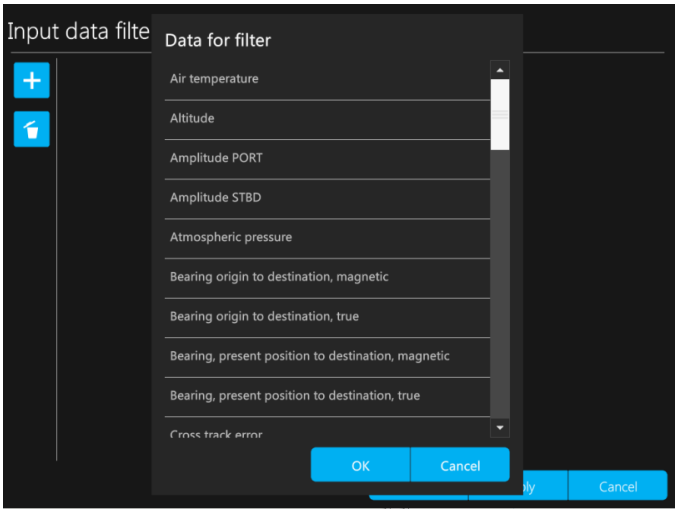


Figure 10 – Adding parameters to display an averaged value

The following controls are presented in drop-down list *Data for filter*, see Table 8.

Table 8 – Controls of filter list

| Name | Function |
|---|---|
| OK | To confirm the select |
| Cancel | To cancel the selected settings |
| + | To add a filter |
| | To delete all filters |

Time intervals to average values of the given parameter shall be entered into white fields after select of filter parameters, see Figure 11.

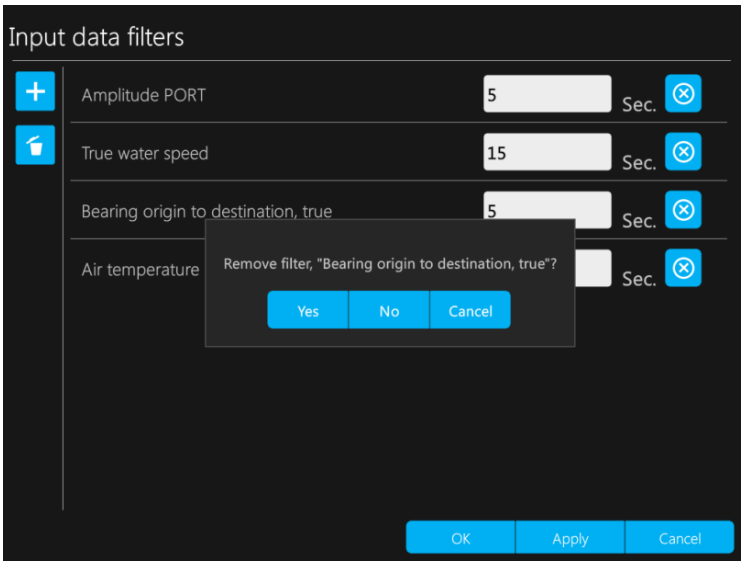


Figure 11 – Adding parameters to get an averaged value

The following controls are located in *Filters the input data*, see Table 9.

Table 9 – Controls of tab page *Filters the input data*

| Name | Function |
|---|---|
| OK | To confirm the select |
| Apply | To apply (save) the selected settings |
| Cancel | To cancel the selected settings |
| Yes | To confirm the filter deletion |
| No | To refuse the filter deletion |
| Cancel | To cancel the filter deletion |
|  | To add a filter |
|  | To delete all filters |
|  | To delete the selected filter |

*Time zone* parameter allows for setting local (ship) time relative to UTC (GMT) received in NMEA sentences if *Time to GPS* is switched on.

*Coordinate system* parameter sets up a coordinate system (WGS-84, СК-42, СК-95, ПЗ-90, ПЗ-90.02) to display received data. At the same time the output to the external devices (ports) is still carried out in coordinate system – WGS84.

### 2.3.10 *Alarms* tab page

*Alarms* tab page ensures settings of alarm activation by the data received from the external devices and systems, see Figure 12.

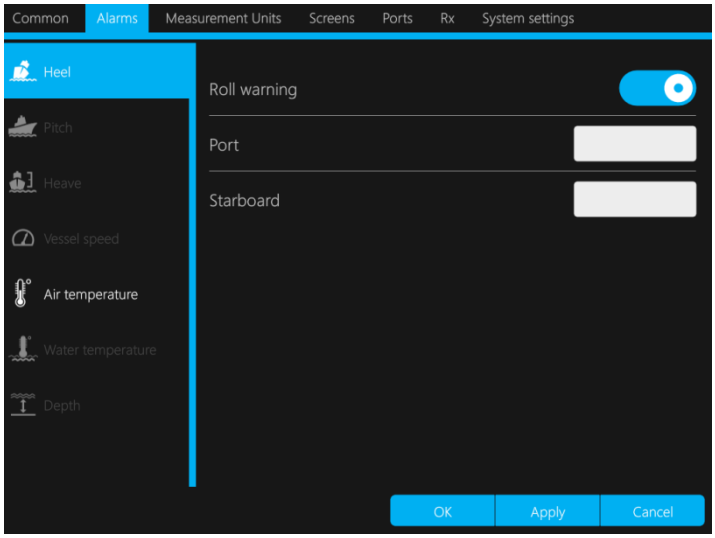


Figure 12 – *Alarms* tab page

The following controls are located in *Alarms* tab page, see Table 10.

Table 10 – Parameters of *Alarms* tab page

| Tab name | Alarm message | Description |
|---|---|---|
| Heel | Warning roll | Pop-up message of critical heel on the port or starboard (indicated) |
| | Port | Specification of max permissible heel value on the Port |
| | Starboard | Specification of max permissible heel value on the Starboard |
| Pitch | Warning pitch | Pop-up message of critical pitch on the port or starboard (indicated) |
| | Bow of the ship | Specification of max permissible pitch value on the Port |
| | Stern | Specification of max permissible pitch value on the Port |
| Heave | Warning heave | Pop-up message of critical heave |
| | Upper bound | Specification of max permissible value for submergence upper bound |
| | Lower bound | Specification of max permissible value for submergence lower bound |
| Speed vessel | Warning the speed of the vessel | Pop-up message of changed vessel speed, dissatisfying with selected settings |
| | Respecting | Respective of specified herein parameter, speed vessel is measured (respective of ground or water) |
| | Activation condition | Pop-up message (speed vessel higher/lower/within range/ out of range) |
| | Lower | Specification of min permissible value of vessel speed |
| Air temperature | Warning the air temperature | Pop-up warning message of air temperature |
| | Activation condition | Pop-up message (air temperature lower/higher/within range/out of range) |
| | Higher | Specification of max permissible value of air temperature |
| Water temperature | Warning the water temperature | Pop-up warning message of water temperature |
| | Activation condition | Pop-up message (water temperature lower/higher/within range/ out of range) |
| | Lower | Specification of min permissible value of water temperature |
| Depth | Warning about the depth | Pop-up warning message of depth |
| | Starting point | Setting a starting point (surface, transducer, keel) |
| | Activation condition | Pop-up message (depth lower/higher/within range/ out of range) |
| | Lower | Specification of min permissible value of depth |
| OK | – | To confirm the select |
| Apply | – | To apply the selected settings |
| Cancel | – | To cancel the selected settings |

If set values of permissible parameters are exceeded, warning pop-up messages appear on the screen, see Figure 13, represented in Table 11.

Table 11 – Pop-up warning messages

| Alarm type | Message |
|---|---|
| General alarms | «System failure»;<br>«Power failure»;<br>«No data from inclinometer» |
| Warning of critical roll | «Critical roll on the starboard»;<br>«Critical roll on the port»;<br>«Heel angle warning» |
| Warning of critical pitch | «Critical pitch on the bow»;<br>«Critical pitch at the stern» |
| Warning of critical level of the heave | «Critical level of the heave»;<br>«Surfacing» |
| Warning of vessel speed change respective of provided settings | «Water speed»;<br>«Ground speed»;<br>«less»;<br>«more»;<br>«in the range»;<br>«out of range». |
| Warning of water/air temperature | «Air temperature»;<br>«Water temperature»;<br>«less»;<br>«more»;<br>«in the range»;<br>«out of range». |
| Warning of depth change respective of provided settings | «Depth from surface»;<br>«Depth sensor»;<br>«Depth from keel»;<br>«less»;<br>«more»;<br>«in the range»; Inside<br>«out of range» outside |

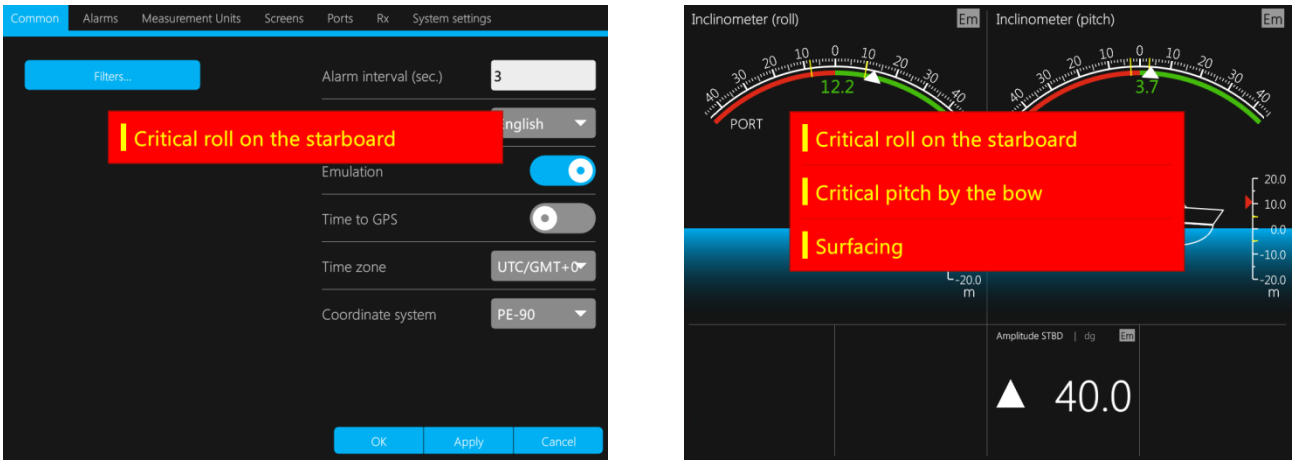


Figure 13 – Sample pop-up warning messages

### 2.3.11 Measurement units tab page

Tab page *Measurement units* ensures settings of measurement units and data correction. The structure is shown in Figure 12. Measurement units can be set by selecting a relevant option from the drop down list for each specified parameter, see Figure 14.

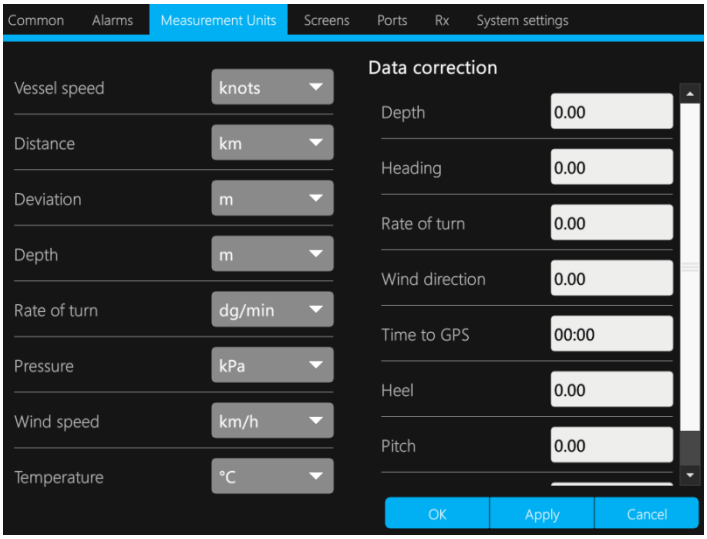


Figure 14 – Tab page *Measurement units*

The following controls are located on tab page *Measurement units*, see Table 12.

Table 12 – Parameters of tab page *Measurement units*

| Name | Function |
|---|---|
| Speed vessel | Setting of data measurement units, selected from the drop down list: knots, m/s, km/h, mph, mph(st), m, km, ft, mile, fathom, mille (st), inch, dg/min, dg/sec, kPa, Pa, hPa, mmHg, inHg °C, °F |
| Distance | |
| Deviation | |
| Depth | |
| Rotation speed | |
| Pressure | |
| Wind speed | |
| Temperature | |
| **Correction data:** | |
| Depth | To ensure settings of correction data of the relevant parameters |
| Heading | |
| Wind direction | |
| Time to GPS | |
| Heel | |
| Pitch | |
| Heave | |
| OK | To confirm the select |
| Apply | To apply the selected settings |
| Cancel | To cancel the selected settings |

Along with the settings of measurement units in this tab, a user can also set up the correction values, which are added to the specific parameters automatically. For example, to correct the value of measured keel depth, the user shall enter correction value of distance from keel to water surface (water line).

Correction values are entered into the fields on the right. Once the required characteristic is selected, the numeric panel opens, see Figure 15, using which the user can set the relevant correction value.

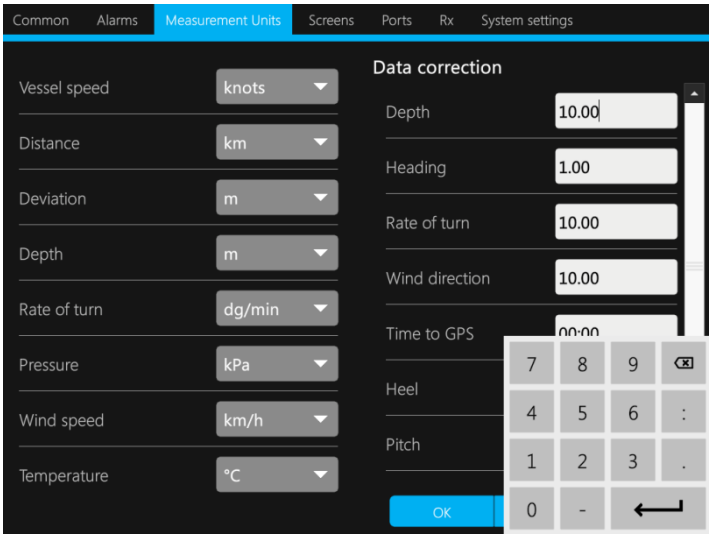


Figure 15 – Tab page *Measurement units* with numeric panel

The description of the numeric panel buttons is represented in Table 13.

Table 13 – The description of the numeric panel buttons

| Name | Function |
|---|---|
| «0», «1», «2», «3», «4», «5», «6», «7», «8», «9», « . », « : », « - » | To add a relevant symbol into an entry field |
| «⌫» | To delete one symbol from the left in the selected entry field |
| « ↵ » | To confirm the changes and hide the numeric panel |

### 2.3.12 Tab page *Displays*

*Displays* tab page is designed to select a screen layout, configure modes of data display, select types and sources of the displayed data, and edit configured screens, see Figure 16.

The structure of *Displays* tab page is represented in Figure 16. The following controls are located on *Displays* tab page, see Table 14.

Table 14 – The controls of *Displays* tab page

| Name | Function |
|---|---|
| «0», «1», «2», «3», «4», «5», «6», «7», «8», «9», «10» | Buttons to change the current screens |
| + | To add a screen (window) |
| ✎ | To edit a screen (window) |
| 🗑 | To delete a screen (window) |
| OK | To confirm the select |
| Apply | To apply the selected settings |
| Cancel | To cancel the selected settings |

To add a new screen (if less than 10 screens are pre-configured), press « + » in the right bottom corner.

To provide settings or edit a screen, press « ✎ ».

If several screens have already been set, only that screen which was currently displayed on the monitor is available for the editing. To edit another screen, press the relevant number (1, 2, 3…10) at the monitor bottom.

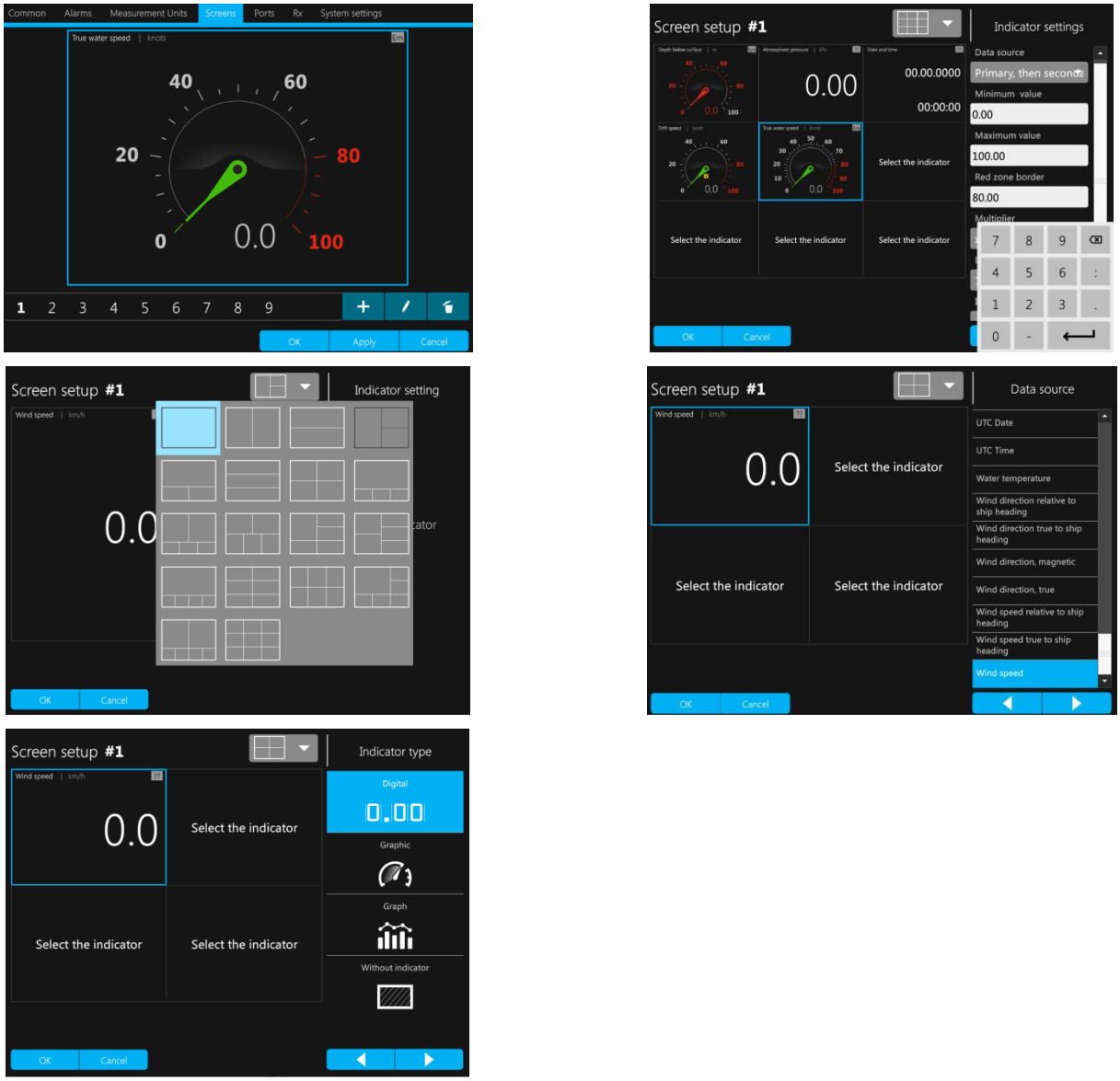


Figure 16 – *Displays* tab page

2.3.12.1 Select of screen layout (Screen setup)

The required parameters can be displayed on the screen in full-screen mode and in multi-screen mode.

Each of available screens can be split into 9 segments. The user can select a pattern for each screen, see Figure 17, and types of data to be displayed on each particular screen segment.

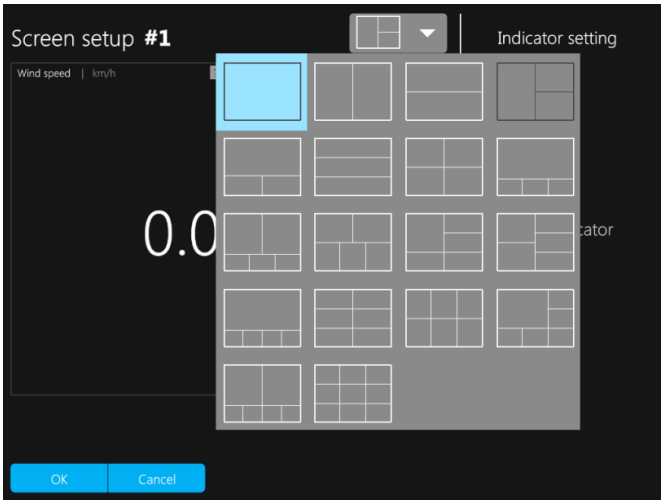


Figure 17 – Variants of screen patterns

The following controls are located on *Screen setup* tab page, see Table 15.

Table 15 – The controls of *Screen setup* tab page

| Name | Function |
|---|---|
|  | To select a multi-screen pattern from the drop-down list |
| OK | To confirm the select |
| Cancel | To cancel the selected settings |

To set up an appropriate pattern, press «  » and select a relevant icon from the drop-down list, se Figure 17.

Then press button OK after the select.

Note – Not all display modes and not all data types are available for every pattern.

2.3.12.2 Display mode select

After selecting a pattern in multi-screen mode, a user should set up a data display mode.

To configure a display mode or edit a screen - highlight it, see Figure 18. As you can see in the Figure, the screen is highlighted with blue.

If you do not need to display data in one of the screens, press «  » while editing the relevant screen.

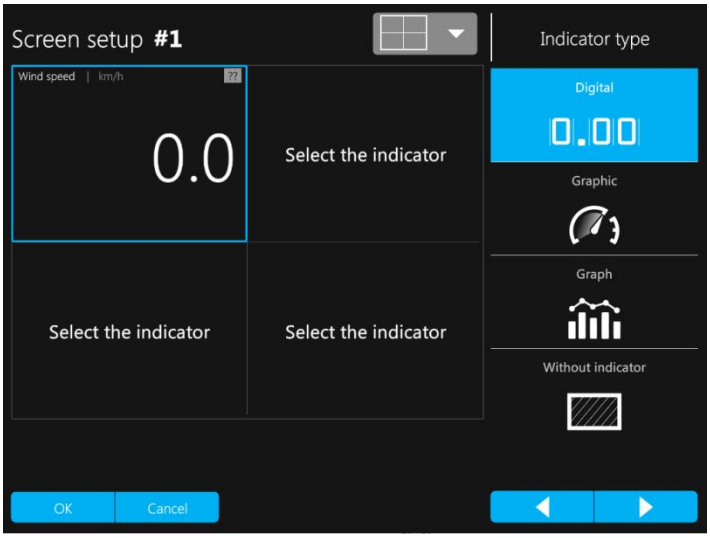


Figure 18 – Configuration of data display mode

The following controls are presented in *Screen Setup* tab page, see Table 16.

Table 16 – The controls of *Screen Setup* tab page

| Name | Function |
|---|---|
|  | To select a multi-screen pattern |
| OK | To confirm the select |
| Cancel | To cancel the selected settings |
| «◀» | Back to *Screen setup* |
| «▶» | To drop-down list *Data source*<br>Repeated click transfers to data source settings |
|  | *Graph* mode |
|  | *Graphic* mode |
|  | *Digital* mode |
|  | Mode *without indicator* |

2.3.12.3 Select of displayed data types

Select a screen to set / change type of displayed data in the editing mode.

Select the required data type for each segment on a drop-down list *Data source*, see Figure 19.

Once you press OK to confirm the select, the Product will exit the select mode and the screen will show the data displayed according to the provided settings.

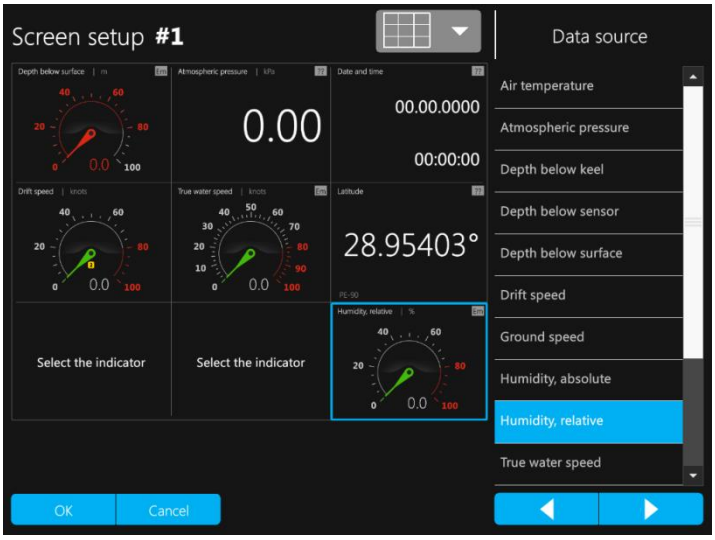


Figure 19 – Select of displayed data type

### 2.3.12.4 Configuration of data source

*Displays* tab page also provides a possibility to configure a data source. Individual settings may be provided for each display mode, see Figures 20–22. For example, a user can set up a screen as a Primary or Secondary one; order of NMEA sentences reception (i.e., order of sentences transmission) can be also configured: data of Primary or Secondary source are received and processed as a primary value. If data are received from the Primary source (Secondary, then Primary), the screen shows «1». If data are received from the Secondary source (Primary, then Secondary) – icon «2». Type of data display can be configured in any mode: entering numeric values of interval length, min. and max. scale values, etc. The settings are carried out manually on the drop-down numeric panel.

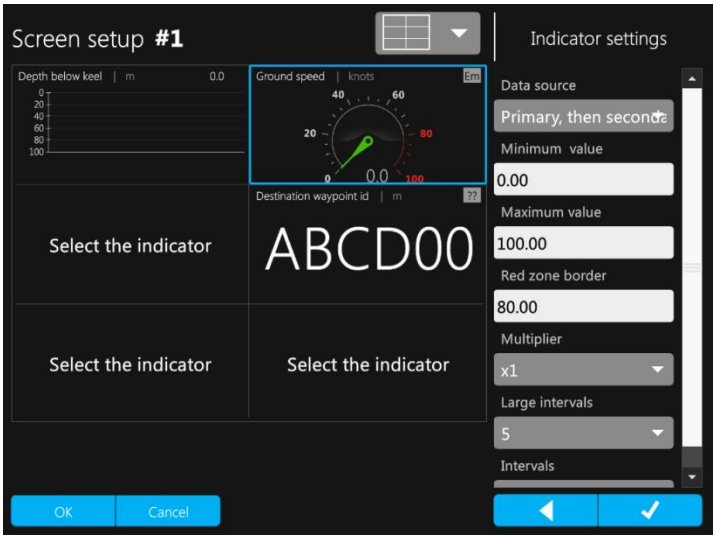


Figure 20 – Sample of configuration in *Graphic* data display mode

The description of indicator settings in *Graphic* data display mode is represented in Table 17.

Table 17 – The description of indicator settings in *Graphic* data display mode

| Name | Function |
|---|---|
| Primary | To display data from the Primary source |
| Secondary | To display data from the Secondary source |
| Primary, then Secondary | To set a status for data source *Primary* |
| Secondary, then Primary | To set a status for data source *Secondary* |
| Minimum value | To set a min. value for measured parameter |
| Maximum value | To set a max. value for measured parameter |
| Border red zone | To set a starting point for critical values of measured parameter |
| Multiplier | To set a scale value |
| Large intervals | To split all scale to set number of segments |
| Intervals | To split each segment into set number of divisions |
| OK | To confirm the select |
| Cancel | To cancel the selected settings |
| «◀» | Back to S*creen setup* |
| «▶» | To confirm the select of data source settings |

The description of indicator settings in *Graph* data display mode is represented in Table 18.

Table 18 – The description of indicator settings in *Graph* data display mode

| Name | Function |
|---|---|
| Primary | To display data from the Primary source |
| Secondary | To display data from the Secondary source |
| Primary, then Secondary | To set a status for data source *Primary* |
| Secondary, then Primary | To set a status for data source *Secondary* |
| Minimum value | To set a min. value for measured parameter |
| Maximum value | To set a max. value for measured parameter |
| Count row | To set a number of rows along a coordinate axis |
| Period (setting) | To set a period of parameter change |
| Period (units) | To set values (units) for period of parameter change |
| OK | To confirm the select |
| Cancel | To cancel the selected settings |
| «◀» | Back to *Screen setup* |
| «▶» | To confirm the select of data source settings |

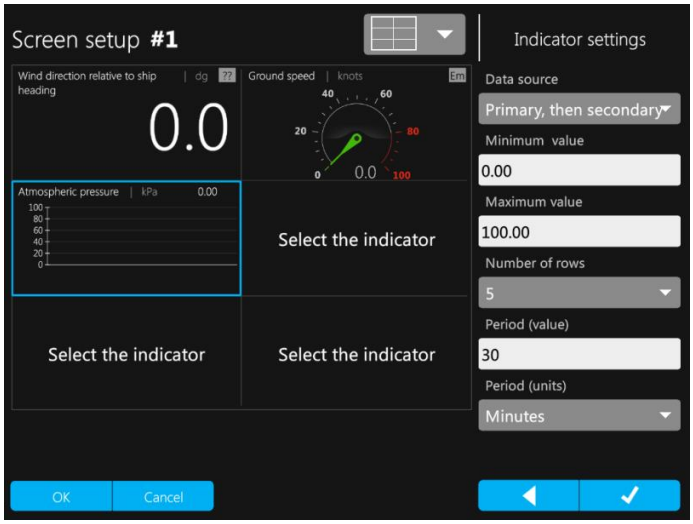


Figure 21 – Sample of settings in *Graph* data display mode

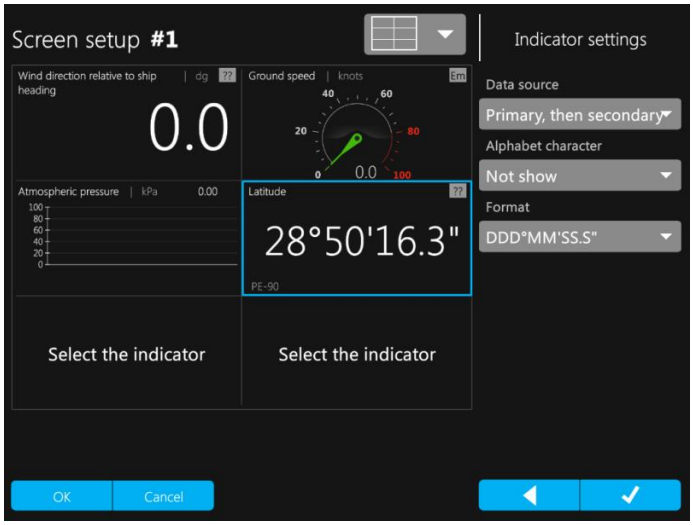


Figure 22 – Sample of settings in *Digital* data display type

The description of indicator settings in *Digital* data display mode is represented in Table 19.

Table 19 – The description of indicator settings in *Digital* data display mode

| Name | Function |
|---|---|
| Primary | To display data from the Primary source |
| Secondary | To display data from the Secondary source |
| Primary, then Secondary | To set a status for data source *Primary* |
| Secondary, then Primary | To set a status for data source *Secondary* |
| Show dynamic | Positive dynamics («not set», «arrow up», «arrow left», «arrow down», «arrow right»);<br>Negative dynamics («not set», «arrow up», «arrow left», «arrow down», «arrow right») |
| OK | To confirm the select |

| | |
|---|---|
| Cancel | To cancel the selected settings |
| «◄» | Back to *Screen setup* |
| «►» | To confirm the select of data source settings |

### 2.3.13 Tab page COM

The structure of *Ports* tab page is represented in Figure 23. *Ports* tab page, see Figure 24 is intended to configure reception / transmission of data for each port, to set parameters of NMEA sentences received by each port, as well as to provide individual settings for each port (baud rate, stop bits, parity, type).

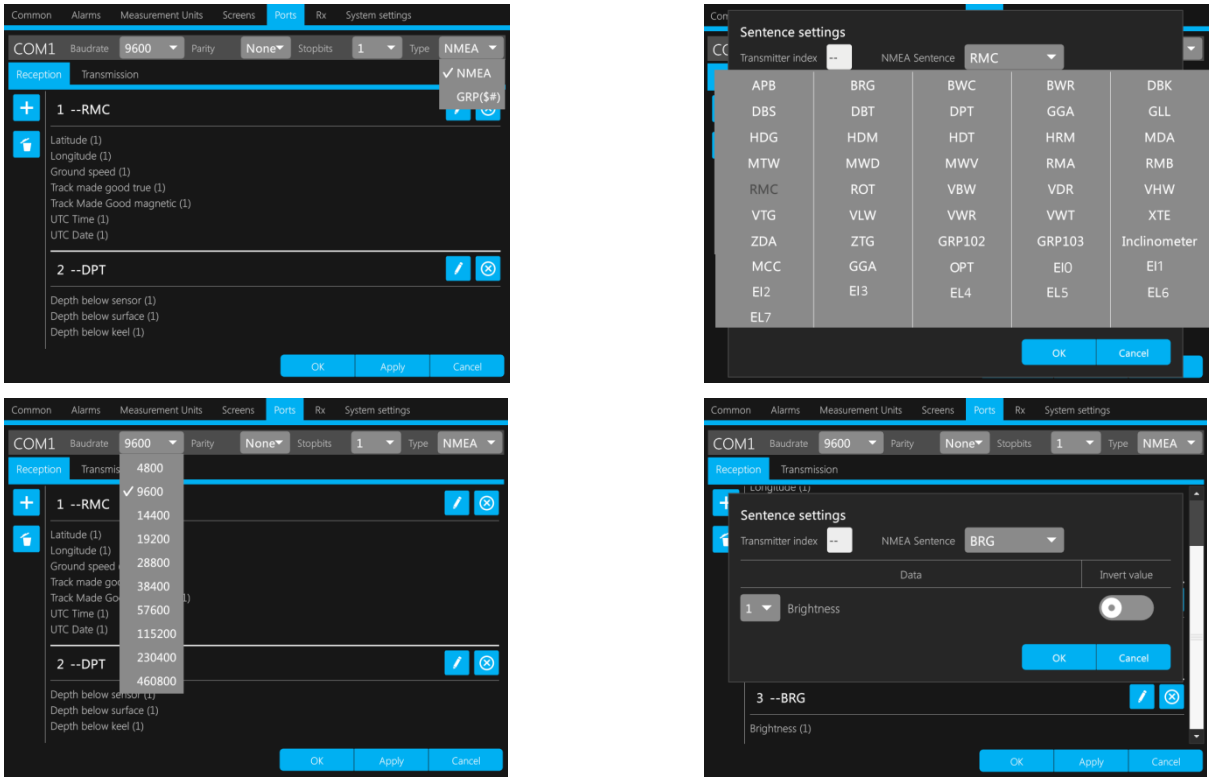


Figure 23 – The structure of COM tab page

#### 2.3.13.1 Configuration of data reception / transmission

To provide settings (edit) of data reception / transmission, select a port, e.g. COM1. In the field of this port opposite to the selected NMEA data in *Transmitting* press «⚙», see Figure 23.

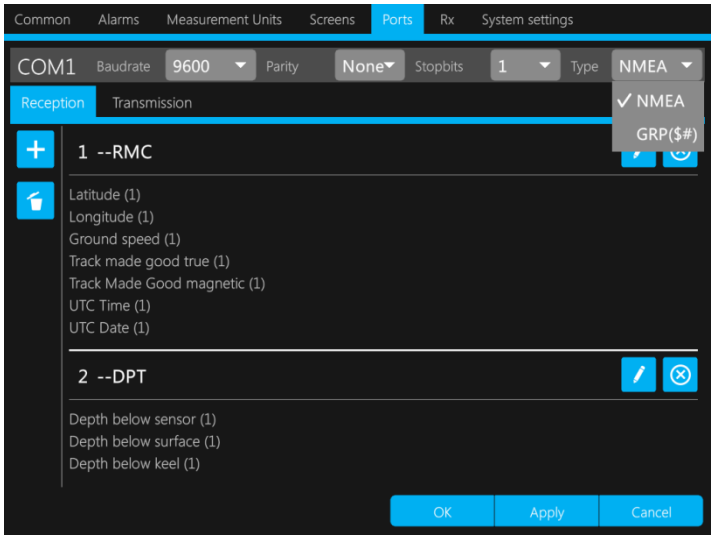


Figure 24 – Settings of ports

Once you press «» in *Receiving* – you open the menu to edit a sentence received by this port. Provide all required sentence settings, see cl. 2.3.13.2 and Figure 24, press «OK» and continue with editing the new sentence.

To configure continuous data transmission, provide the above mentioned settings for all NMEA sentences, herewith all received sentences by each port shall be in accordance with Appendix A in full. To add NMEA sentences, press «».To configure selective data reception, press «». Using this button the user can remove all NMEA sentences, which are excluded from selective data reception or transmission. To remove all NMEA sentences, received by this port, press «».

The controls of tab page *Ports* are represented in Table 20.

Table 20 – The controls of tab page *Ports*

| Name | Function |
|---|---|
| OK | To confirm the select |
| Apply | To apply the selected settings |
| Cancel | To cancel the selected settings |
| | To edit port settings |
| | To remove the selected NMEA sentence from port traffic |
| | To add the selected NMEA sentence to port traffic |
| | To remove all NMEA sentences from port traffic |
| | To transfer to Editing mode |

### 2.3.13.2 Settings and editing NMEA sentences

To set / edit type of NMEA data, press a button to select the sentence, see Figure 25.

The controls of *Settings suggestions* tab page are represented in Table 21.

Table 21 – The controls of *Settings suggestions*

| Name | Function |
|---|---|
| OK | To confirm the select |
| Cancel | To cancel the selected settings |
| Transmitter index | To set a transmitter index |
| NMEA sentence | To select NMEA sentence out of drop-down list |

In the drop-down list select a type of sentence for reception (transmission) by this port, see Figure 25.

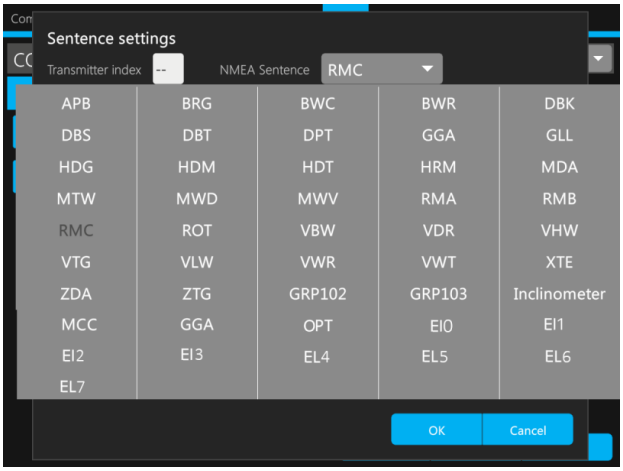


Figure 25 – Select of NMEA sentences

Set up a transmitter index, and other sentence parameters, see Figure 26.

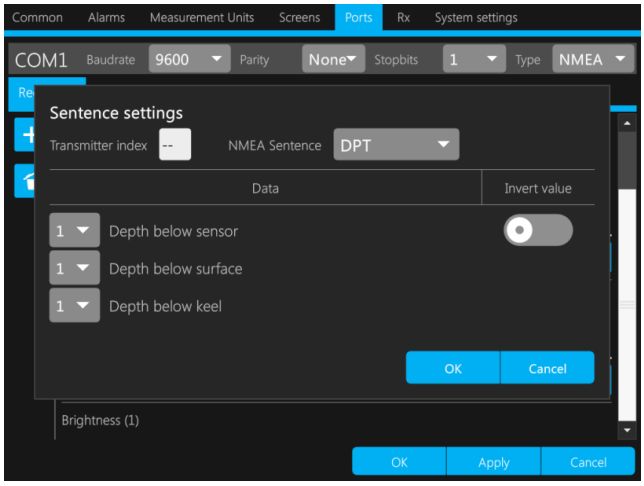


Figure 26 – Settings of NMEA sentence

To set up a transmitter index for each NMEA sentence, use a drop-down keyboard / panel which appears after you press Transmitter index. The description of keyboard is represented in Table 22.

Table 22 – The description of letters on the panel

| Name | Function |
|---|---|
| «A»… «Z» | To add a relevant letter / symbol to an entry field |
| « ⌫ » | To delete one letter / symbol from the left in the highlighted entry field |
| « ↵ » | To confirm the changes and hide the panel |

If a selected NMEA parameter shall be transmitted from the Primary source, put a tick in a drop-down list opposite «1». If a selected NMEA parameter shall be transmitted from the Secondary source, put a tick in a drop-down list opposite «2».

Provide these steps for all parameters.

If a selected NMEA parameter shall be excluded from the sentence, put a tick opposite «–», and the parameter will be ignored by the system during reception / transmission.

2.3.13.3 Individual settings for each port

Baud rate of reception / transmission, parity and stop bits can be also configured for each port in *Ports* tab page.

The controls for settings of data reception / transmission are represented in Table 23.

Table 23 – The controls for settings of data reception / transmission

| Name | Function |
|---|---|
| OK | To confirm the select |
| Apply | To apply the selected settings |
| Cancel | To cancel the selected settings |
| 460800 | To set up reception / transmission baud rate |
| 230400 | |
| 115200 | |
| 57600 | |
| 38400 | |
| 28800 | |
| 19200 | |
| 14400 | |
| 9600 | |
| 4800 | |
| None | To set parity None/Even/Odd |
| Even | |
| Odd | |

| Name | Function |
|---|---|
| «1» | To set up stop bits |
| «2» | |
| | To edit port settings |
| | To add the selected type of NMEA data to port traffic |
| | To delete all types of NMEA data from port traffic |
| | To delete the selected current NMEA sentence from port traffic |

#### 2.3.13.4 Inclinometer settings

The Product may receive data of pitch and heel angle, roll period, amplitude port and starboard from inclinometer.

In this case the Product operates as a secondary display unit and recommended for application on stations with low level of responsibility.

To display data received from the inclinometer, a user shall select *Inclinometer* in drop-down list of NMEA sentences.

To set up / edit inclinometer data, provide the similar settings for other NMEA sentences as described in cl. 2.3.13.2.

### 2.3.14 *Rx* tab page

Tab page *Rx* ensures a diagnostic check of ports operability, see Figure 27. All received data are displayed on the screen regardless of pre-configured port settings.

The controls of *Rx* tab page are represented in Table 24.

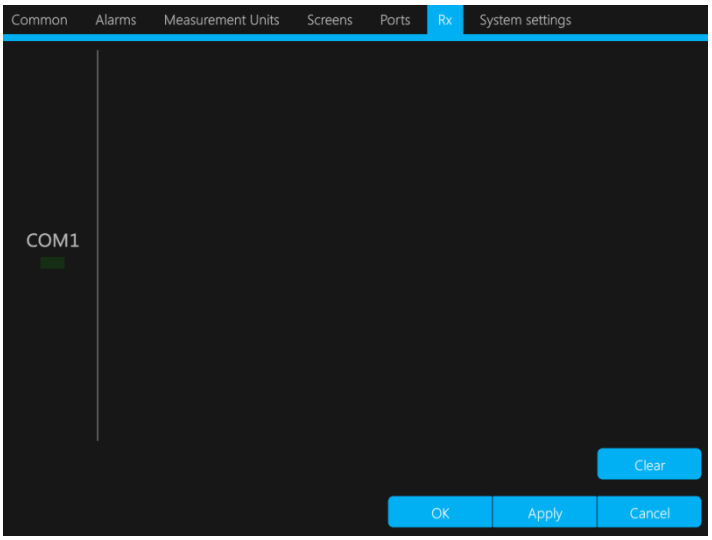


Figure 27 – *Rx* tab page

An LED indicator is located in the field of each port. At the moment of transmission it is periodically glowing.

Table 24 – «Rx» tab page

| Name | Function |
|---|---|
| Clear | To delete a list of data transmitted by the given port |
| OK | To confirm the select |
| Apply | To apply the selected settings |
| Cancel | To cancel the selected settings |

### 2.3.15 *System* tab page

*System* tab page is used to ensure the TS, install or update OS, and to set up date and time, see Figure 28. From this tab page a user can transfer to the service mode, carry out touch screen calibration and install OS update. The current version of OS is represented in this tab page.

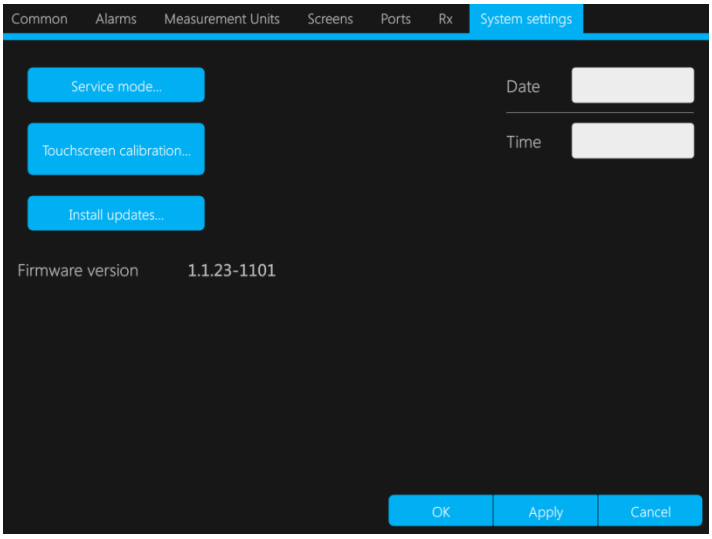


Figure 28 – *System* tab page

The controls of *System* tab page are represented in Table 25.

Table 25 – *System* tab page

| Name | Function |
|---|---|
| OK | To confirm the select |
| Apply | To apply the selected settings |
| Cancel | To cancel the selected settings |
| Service mode | Unavailable for user (only for manufacturer's service engineers) |
| Touchscreen calibration | Automatic touch screen calibration |
| Install updates | To download and install updates from the removable data carrier via USB port |
| Date | To set up current date |
| Time | To set up current time |

# 3 TECHNICAL SERVICE

## 3.1 GENERAL INSTRUCTIONS

The TS shall be provided by the staff acquainted with its composition, structure and operation features.

In order to provide safe and reliable operation for the Product, the staff shall maintain a schedule of the TS:

a. technical service №1 (TS-1) – semi-annual TS;

b. technical service №2 (TS-2) – annual TS.

TS-1 shall be organized and controlled by a person in charge, and provided by the staff on the running equipment.

TS-2 shall be organized and controlled by a person in charge, and provided by the staff on the running equipment.

## 3.2 SAFETY FEATURES

While maintaining the TS, observe cl. 4.2.

## 3.3 MAINTENANCE ROUTINE

The list of works for all types of TS is given in Table 26.

Maintenance routine procedure is given in CL, represented in Tables 27 – 29.

A recommended amount of consumables required for the TS is shown in Table 2.

Table 26 – List of works by TS types

| CL № | Work | Type of TS | |
|---|---|---|---|
| | | TS-1 | TS-2 |
| 1 | Visual check of the Product | + | + |
| 2 | Completeness check, SPTA kit condition check and check of operational documentation | – | + |
| 3 | Product operability check | – | + |
| Note:<br>1 “+” – work is obligatory.<br>2 “–” – work is not obligatory. | | | |

Table 27 – CL № 1. Visual check of the Product

| To be done | Routine | Man-hours per 1 Product |
|---|---|---|
| Visually examine the Product | 1 check completeness and appearance of the Product; mechanical damage, paint defects must be absent; marking plates shall be present; legends are to be read easily;<br>2 clean up the Product surfaces with clean cloth;<br>3 remove severe contamination, parts of corrosion, oil spots:<br>from the metal surfaces - using soap foam, avoiding its penetration inside the Product, then clean the surface with clean cloth and dry up;<br>from the screen – using alcohol-soaked cloth; use of hard cloth, paper, cleaning agent for glass or chemicals is prohibited; while cleaning the screen do not push hard on the surface and do not spray the liquid directly onto the screen;<br>4 If varnish paint coating is damaged, polish it with sand paper, then clean with alcohol-soaked cloth, cover with varnish and dry up | 1 person<br>5 minutes |
| Check reliability of cable and bus connection to the Product | 1 check that connectors and attaching screws are fastened tight; provide further fastening if needed.<br>2 check the cable integrity (mechanical damage shall be absent) within visibility | 1 person<br>5 minutes |

Table 28 – CL № 2. Completeness check, SPTA kit condition and operational documentation

| To be done | Routine | Man-hours per 1 Product |
|---|---|---|
| Check the presence of operational documentation and SPTA kit from the scope of supply | 1 check the compliance of SPTA kit and operational documentation with those listed in Scope of supply of the Product's certificate;<br>2 check the quality of each item of SPTA kit, storage time and re-composition of SPTA kit in case of use;<br>3 provide SPTA kit re-composition | 1 person<br>10 minutes |

Table 29 – CL № 3. Operability check of the Product

| To be done | Routine | Man-hours per 1 Product |
|---|---|---|
| Operability check of the Product | 1 power the Product on;<br>2 make sure that OS has been successfully loaded and the screen displays graphic data;<br>3 check that received data are displayed on the screen and make sure that image has a high quality;<br>4 adjust backlight brightness if necessary;<br>5 check the controls (buttons) operability;<br>6 check the response of touch screen;<br>7 activate the screen menu, open tab page «Rx» and check the reception (transmission) of NMEA sentences and compliance of received and transmitted data by three ports with the settings | 1 person<br>15 minutes |

### 3.4 PRESERVATION

The Product and set of operational documents are stored in preserved condition in Manufacturer's packaging boxes.

The time of re-preservation – 2 years from the Manufacturer's commissioning.

The preservation is done in full terms, for 2 years, applying protection and packaging.

The re-preservation is done in heated rooms in the same order as the preservation.

The re-preserved Product, SPTA kit and documents are placed in package. The time of storage for re-preserved Product is 2 years.

# 4 CURRENT REPAIR OF THE PRODUCT

## 4.1 GENERAL DESCRIPTION

The Product's operability is controlled by the presence and quality of the image displayed on the screen.

To provide diagnostics of the problems and defects, use information in Table 30.

If you cannot diagnose the problem, contact the Manufacturer's service centre.

## 4.2 SAFETY FEATURES

Any repair works must be provided by personnel examined and received proper qualifications in the area of the occupational safety.

Check grounding of the PSU before providing any repair works.

It is PROHIBITED to put a poster "DO NOT switch on! Under Operation!", when power supply switch is in OFF position.

| |
|---|
| Replacing damaged parts, boards, modules **is PROHIBITED** if power supply of the repaired unit is on |

| |
|---|
| Installation, aligning and repair works are **PROHIBITED** in the room, where less than 2 people are present |

## 4.3 CURRENT REPAIR

The list of malfunctions that can be eliminated by own employees is represented in Table 30.

The repair of other defects shall be provided only by the Manufacturer's specialists or authorized representatives.

Table 30 – The list of possible malfunctions and troubleshooting

| **Malfunction** | **Possible reasons** | **To be done** |
|---|---|---|
| No image on the screen | No voltage supplied from the power source | Check power cable connection to the Product, provide the voltage |
| | Fuse malfunction | Check the fuse and replace if necessary |
| | Low image brightness | Adjust screen backlight brightness |
| No data is displayed | No connection with signal source | Check the data reception from the source («Rx» tab page) |
| | | Check the cable integrity and RS-422 connector pins |
| Spots on the screen | Lack of pixels<br>Bright pixels<br>Screen has outside dirt | Switch off the power and then switch it on |
| | | Remove dirt |
| | | Constantly absent pixel may be a natural defect which occurs while operation |
| Image is too pale or too bright | Wrong settings of backlight brightness | Adjust backlight brightness |

# 5 STORAGE

The units must be stored in packaging inside areas complying with the required storage conditions (+5…+40 °C) with the concentration of dust, oil, moisture and aggressive impurities in the air within the required limits for the working areas of production facilities.

After storage or transportation of the device below +10 °C, it must be un-packed only in heated premises and left in normal climate conditions for 12 hours be-forehand.

# 6 TRANSPORTATION

The Product must be transported in the Manufacturer's transportation package in closed means of transport.

Types of shipment:

– motor vehicle and railroad transportation in closed means of transport (covered cars, Universal containers);

– air transportation (in sealed and heated compartments);

– sea transportation (in dry service premises).

The units must be transported in compliance with transportation rules applicable for each means of transport.

During loading / unloading operations and transportation, the requirements indicated on warning labels on the boxes/packaging must be observed, and no impacts are permitted since they can affect the safety and performance of the Product.

Inside the means of transport, the packed device must be firmly secured / fastened.

# 7 DISPOSAL

New equipment, the parts of the Product damaged during operation, and any overage equipment must not be disposed as standard household wastes, since they contain the materials suitable for re-use.

Decommissioned and non-used components of the Product must be delivered to a special waste disposal center licensed by local authorities. You can also send an overage equipment / unit to the manufacturer for its further disposal.

Proper disposal of Product components allows avoiding possible negative environmental and health impacts, and it also allows for proper restoration of components with substantial energy and resources saving.

| |
|---|
| **During operation and upon completion of its service life, the equipment is not hazardous for health and environment** |

| |
|---|
| **This unit must be disposed according to the rules applied to electronic devices.** |

| | |
|---|---|
|  | **Any products marked with a crossed trash bin must be disposed separately from standard house-hold wastes** |

# 8 WARRANTY

The Manufacturer shall have warranty obligation in case of the Product's proper use, according to OM. In case of misuse of equipment the Manufacturer shall not accept damage claims.

For more warranty details visit our website www.unicont.com, section Support.

Address and contacts of Manufacturer's service centre:

NPK MSA LLC

26E, Kibalchicha Str., St Petersburg, Russia, 192174

Tel.: + 7 (812) 602-02-64, 8-800-100-67-19; fax: +7 (812) 362-76-36

e-mail: service@unicont.com

# ANNEX A
# NMEA SENTENCES

Table A.1– NMEA sentences

| Type | Characteristic | Units | Correction |
|---|---|---|---|
| APB | Cross track error | m, km, fathom, ft, mile, mile (st), inch | + |
| | Bearing origin to destination, true | dg | – |
| | Bearing origin to destination, magnetic | dg | – |
| | Destination waypoint id | m | – |
| | Bearing, present position to destination, true | dg | – |
| | Bearing, present position to destination, magnetic | dg | – |
| | Heading to steer to destination waypoint, true | dg | – |
| | Heading to steer to destination waypoint, magnetic | dg | – |
| BRG | Brightness | – | – |
| BWC | Time UTC | – | – |
| | Destination latitude | – | – |
| | Destination longitude | – | – |
| | Bearing, present position to destination, true | dg | – |
| | Bearing, present position to destination, magnetic | dg | – |
| | Range to destination | m, km, fathom, ft, mile, mile (st), inch | – |
| | Destination waypoint id | m | – |
| BWR | Time UTC | – | – |
| | Destination latitude | – | – |
| | Destination longitude | – | – |
| | Bearing, present position to destination, true | dg | – |
| | Bearing, present position to destination, magnetic | dg | – |
| | Range to destination | m, km, fathom, ft, mile, mile (st), inch | – |
| | Destination waypoint id | m | – |
| DBK | Depth from keel | m, km, fathom, ft, mile, mile (st), inch | + |

| Type | Characteristic | Units | Correction |
|---|---|---|---|
| DBS | Depth from surface | m, fathom, ft, mile, mile (st), inch | + |
| DBT | Depth sensor | m, km, fathom, ft, mile, mile (st), inch | + |
| DPT | Depth sensor | m, km, fathom, ft, mile, mile (st), inch | + |
| | Depth from surface | m, km, fathom, ft, mile, mile (st), inch | + |
| | Depth from keel | m, km, fathom, ft, mile, mile (st), inch | + |
| GGA | Latitude | – | – |
| | Longitude | – | – |
| | Time UTC | – | + |
| | Number of satellites | – | – |
| GLL | Latitude | – | – |
| | Longitude | – | – |
| | Time UTC | – | + |
| HDG | Heading magnetic | dg | + |
| | Heading true | dg | + |
| HDM | Heading magnetic | dg | – |
| HDT | Heading true | dg | + |
| HRM | Heel angle | Digital, graph | – |
| | Roll period | Digital | – |
| | Amplitude PORT | Digital, graph | – |
| | Amplitude STBD | Digital, graph | – |
| MDA | Atmospheric pressure | kPa, Pa, hPa, mmHg, inHg | – |
| | Air temperature | °C | – |
| | Water temperature | °C | – |
| | Humidity relative | % | – |
| | Humidity absolute | % | – |
| | Wind direction true | dg | + |
| | Wind direction magnetic | dg | + |
| | Wind speed | knots, m/s, km/h, mph | – |

| Type | Characteristic | Units | Correction |
|---|---|---|---|
| MTW | Water temperature | °C | – |
| MWD | Wind direction true | dg | + |
| | Wind direction magnetic | dg | + |
| | Wind speed | knots, m/s, km/h, mph | – |
| MWV | Wind direction relative | dg | + |
| | Wind direction true | dg | + |
| | Wind speed relative | knots, m/s, km/h, mph | – |
| | Wind speed | knots, m/s, km/h, mph | – |
| RMA | Latitude | – | – |
| | Longitude | – | – |
| | Ground speed | knots, m/s, km/h, mph, mph (st) | – |
| | Track made good true | dg | – |
| | Track made good magnetic | dg | – |
| RMB | Cross track error | m, km, fathom, ft, mile, mile (st), inch | – |
| | Origin waypoint id | m | – |
| | Destination waypoint id | m | – |
| | Destination latitude | – | – |
| | Destination Longitude | – | – |
| | Range to destination | m, km, fathom, ft, mile, mile (st), inch | – |
| | Bearing, present position to destination, true | dg | – |
| | Destination closing velocity | knots, m/s, km/h, mph, mph (st) | – |
| RMC | Latitude | – | – |
| | Longitude | – | – |
| | Ground speed | knots, m/s, km/h, mph, mph (st) | – |
| | Heading true | dg | – |
| | Heading magnetic | dg | – |
| | Time UTC | – | – |
| | Date UTC | – | – |
| ROT | Rate of turn | dg/min, dg/s | – |

| Type | Characteristic | Units | Correction |
|---|---|---|---|
| VBW | True water speed | knots, m/s, km/h, mph, mph (st) | – |
| | Ground speed | knots, m/s, km/h, mph, mph (st) | – |
| VDR | Drift direction true | dg | – |
| | Drift direction magnetic | dg | – |
| | Drift speed | knots, m/s, km/h, mph, mph (st) | – |
| VHW | Heading true | dg | + |
| | Heading magnetic | dg | + |
| | True water speed | knots, m/s, km/h, mph | – |
| VLW | Total distance travelled in the water | m, km, fathom, ft, mile, mile (st), inch | – |
| | Distance travelled in the water | m, km, fathom, ft, mile, mile (st), inch | – |
| VTG | Track made good true | dg | – |
| | Track made good magnetic | dg | – |
| | Ground speed | knots, m/s, km/h, mph, mph (st) | – |
| VWR | Wind direction relative | dg | + |
| | Wind direction relative | knots, m/s, km/h, mph | – |
| VWT | Wind direction true | dg | + |
| | Wind speed | knots, m/s, km/h, mph | – |
| XTE | Cross track error | m, km, fathom, ft, mile, mile (st), inch | + |
| ZDA | Time UTC | – | + |
| | Date UTC | – | – |
| | Correction for time zone | – | – |
| ZTG | Time UTC | – | + |
| | Time remaining | – | – |
| | Destination waypoint id | m | – |
| MCC | Heel angle | | |
| | Pitch angle | | |
| | Heave | | |

| Type | Characteristic | Units | Correction |
|---|---|---|---|
| GRP102 | Heel angle | – | – |
| | Pitch angle | – | + |
| | Heave | – | + |
| | Down velocity | – | – |
| | Down acceleration | – | – |
| GRP103 | Heel angle | – | – |
| | Pitch angle | – | + |
| | Heave | – | + |
| | Down velocity | – | – |
| | Down acceleration | – | – |
| Inclinometer | Heel angle | | |
| | Pitch angle | | |
| | Roll period | | |
| | Amplitude PORT | | |
| | Amplitude STBD | | |
| EL6 | Major semi-axis ellipse of errors | m | |
| | Minor semi-axis ellipse of errors | m | |
| | The angle of rotation of the ellipse errors | dg | |
| EL0 | Ellipsoid | | |
| | Longitudinal speed source | | |
| | Location determination | | |
| | NK mode | | |
| EL1 | Track angle | dg | |
| EL4 | Vertical Speed | knots | |
| EL4 | West East Speed | knots | |
| EL4 | North South Speed | knots | |
| | Cross track error | dg | |

Notes
1 «+» – value correction is available.
2 «–» – value correction is not available.