



SHIPBORNE METEOSTATION «PERISCOPE»

Operating manual



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INTRODUCTION

This operating manual (hereinafter referred to as the OM) covers structure, construction, specifications of Shipborne meteostation «Periscope» (hereinafter referred to as the System), its components and instructions required for the System's correct and safe operation (intended use, technical service, current repair), as well as disposal information for its components.

Only those who have read operational documentation shall be permitted to operate with the System.

Only those who have had general education in the area of electronic devices and read operational documentation shall be permitted to provide the System's service.

Terms and abbreviations

PSU	Power Supply Unit
UPS	Uninterruptible Power Supply
WS	Weather Sensor
LC	Liquid Crystal
SPTA	Spare parts, tools and accessories
ED	Engineering documentation
IK	Installation kit
LFGS	Large fine porous granulated silica gel
IEC	International Electrotechnical Commission
DC	Direct Current
OM	Operating Manual
MT	Measurement Tool
DC	Data combiner
TS	Technical Service
TS-1	Semi-annual TS
TS-2	Annual TS
TS-3	TS one time a two years
OPD	Overvoltage Protection Device



1 DESCRIPTION AND OPERATION OF THE SYSTEM

1.1 DESCRIPTION

The System is designed to measure climate characteristics of the environment using meteorological sensor (hereinafter – the meteosensor) and output these parameters as a visual information to the display's screen.

1.2 TECHNICAL SPECIFICATIONS

1.2.1 Main parameters and technical specifications of the System are represented in Table 1.

Parameter	Value	
Measurable atmospheric parameters (environment)	 - environmental temperature; - relative humidity; - atmospheric pressure; - wind speed; - wind direction; - amount of precipitation; - intensity of precipitation Number of measured parameters depends on the meteosensor type 	
Data reception from external units	 vessel course (from gyrocompass or GPS), vessel speed (from log or GPS), water temperature (from multisensor) (NMEA data according to IEC 61162-1, IEC 61162-2 standards) 	
Displayed data	 air temperature; water temperature; atmospheric pressure and barometric characteristic; wind direction and speed (true and relative wind gusts); air humidity; amount and intensity of precipitation Data presentation: numeric, analog (compass card) and in graphs (Update interval: 1 to 600 seconds) 	
Recording of weather data	 – available (to the display's memory; export to a USB storage is available); – recording interval: from 1 to 3600 seconds 	
Data output to the external units	rnal – available (by RS-232/RS-422) interfaces; – data baud rate from 4800 to 115200 bit/s	
Power supply	 application of PS-103 power supply unit: from AC power mains 50 (60) Hz 220 V and emergency (standby) DC mains 24 V; application of BPS-114-24 power supply unit: from AC power mains 50 (60) Hz, 220 V and emergency (standby) from built-in SB 24 V DC; without application of power supply unit: from DC power mains 24 V 	

Table 1 – Technical specifications of the meteostation

For the design specifications, power consumed by every unit, operational conditions and other parameters see technical description.



1.2.2 In case of general application the System ensures:

- data reception from the meteosensor, see Table 1;

- navigational data reception from gyrocompass, log and global positioning system;

- display of weather parameters in numeric, analog (graphical) or in graphs, as well data presentation in various (adjustable) measurement units;

- data output to the external units by RS-422 interface;

- recording and saving data with an option to back up on the external storage.

1.3 THE SYSTEM'S COMPOSITION

The list of units, which can be included in the System's composition, is represented in Table 2.

The System is delivered at default by meteorological sensor MS-315. The meteorological sensor can be changed to another sensor suggested by the Manufacturer on the Customer's demand.

Table 2 – The System's composition

Name	Identifier	Description	
Universal digital repeater	DR-209M	Designed to receive, process and display weather parameters, received by RS-422 interface, and output processed data (parameters) to the external units. Overvoltage protective device is included in the Sensor's scope of supply	
Meteorological sensor	MS-315	Designed to measure air temperature and humidity, atmospheric pressure, wind speed, amount and intensity of precipitation. The sensor includes overvoltage protective device (OPD-146)	
MS-PTW-315 Designed pressure, includes		Designed to measure air temperature and humidity, atmospheric pressure, amount and intensity of precipitation. The sensor includes overvoltage protective device (OPD-146)	
	MS-SDW-315	Designed to measure wind speed. The sensor includes overvoltage protective device (OPD-146)	
Analog-to-digital converter	ADPC-101	Designed to ensure analog-to-digital conversion of analog signals received from gyrocompass and log in NMEA 0183 format	
Summator-Combiner of NMEA signals (sentences)	NC-117	Designed to receive messages from signal sources through RS-232/422, combine received signals and output NMEA 0183 by 4 x RS-422	
Amplifier-MultiplierMDU-102Designed for multiplicationof NMEA signalsthrough RS-232/422/485 int		Designed for multiplication of signals at serial data transmission through RS-232/422/485 interfaces from one or two sources	
Power supply unitPS-103Designed to su 24 V if power mains 24 V D0		Designed to supply the equipment with unregulated DC power 24 V if powered from power mains 50 Hz 220 V and standby mains 24 V DC	



Name Identifier D		Description	
Power supply unit	BPS-114-24	Designed to supply the equipment with uninterruptible stabilized DC power supply 24 V if powered from power mains 50 Hz 220 V and unregulated voltage 24 V DC if powered from built-	
		in storage battery.	
DC/DC converter	DC-108	Designed to convert 24 V DC into 12 V DC, supply power to shipborne equipment operating with this voltage type	
		Additional equipment	
Meteorological sensor	WXT532	Designed to measure wind speed and direction	
	WXT533	Designed to measure wind speed and direction, amount and intensity of precipitation.	
	WXT535	Designed to measure air temperature and humidity, atmospheric pressure, amount and intensity of precipitation	
WXT536		Designed for uninterruptible monitoring of changes in wind speed and direction, precipitation, atmospheric pressure and temperature (with heating at option)	
	110WX	Designed to measure air temperature and humidity, atmospheric pressure, wind speed and direction	
	120WXH	Designed to measure atmospheric pressure, wind speed and direction and define vessel's roll angle	
	150WX	Designed to measure air temperature and humidity, atmospheric pressure, wind speed and direction and define vessel's roll angle, and location using built-in GPS and two-axis compass	
220WX D pr an WindObserver 65 D		Designed to measure air temperature and humidity, atmospheric pressure, wind speed and direction, and define vessel's roll angle, and location using built-in GPS and three-axis compass	
		Designed to measure wind speed and direction	
Surge ProtectorWSP150Designed for protection against transient surg thunderstorm protection). Installed in close meteosensor (not more than 3 m)		Designed for protection against transient surges (ESD and thunderstorm protection). Installed in close proximity to meteosensor (not more than 3 m)	
Visibility sensor	PWD12/ PWD22	Designed to measure visibility (meteorological optical range, MOR)	
Cloud-range meter	CL 31	Designed to measure cloud height and vertical visibility	
Wave height sensor	WG5	Designed to measure wave height	
Current sensor	4830R	Designed to measure current speed and direction	

1.4 THE SYSTEM'S STRUCTURE AND OPERATION

In terms of construction the System is based on one repeater DR-209M, meteosensor MS-315, MS-PTW-315, MS-SDW-315 and special software «Periscope». It is designed to process data received from the meteosensor, and represent weather parameters on the repeater's display. Structural diagram is shown in Figure 1.

Two meteosensors can be included into the System's composition: main and standby; they ensure uninterruptible reception and processing of weather data in case one of them fails. If simultaneous operation of two meteosensors is required, provide their



power supply 24 VDC from external power mains, as well as use summator-combiner of NMEA signals (sentences) NC-117.



Figure 1 – The System's structural diagram

1.5 SOFTWARE DESCRIPTION

The System's software is designed to ensure functionality represented in 1.2.

The System's software contains the following:

 software installed on the repeater DR-209M, designed to display and process weather parameters received from a meteosensor;

software installed on the meteosensor MS-315, MS-PTW-315, MS-SDW-315, designed to measure environmental parameters.

The meteosensor MS-315, MS-PTW-315, MS-SDW-315 casing is protected against unauthorized access by sealing.

Repeater and meteosensor's software must be accessed only at Manufacturer's facilities.

Preset values of weather parameters are protected against changes by calibration; access is limited by password and available only for NPK MSA LLC representatives.



1.6 MEASUREMENT TOOLS, INSTRUMENTS AND APPLIANCES

Operability control of the System units is carried out using tools of integrated control and System's indication.

TS of the System is carried out using tools and consumables represented in Tables 3 and 4.

Table 3 – Tools and instruments required for the TS

Name	Identifier
Screwdriver (cross, tightened)	PH-2, 100 mm
Screwdriver (cross)	PH-1, 80 mm
Open wrench	7 mm

Table 4 – Number of consumables required for the TS

Name and identifier of consumables	Weight of consumables	Note
	0.10 kg	1 To clean surfaces and parts of
Cleaning cloth		the system – use clean cloth.
Cleaning cloui		2 To clean severe contamination
		 use alcohol-soaked cloth
Rectified hydrolytic technical ethyl	0.01.1	To soak cloth while removing
alcohol	0.011	contamination
Vornish	0.05 kg	To cover surfaces of the unit in
V di IIISII	0.05 Kg	case of paint coating damage
Abrasiva cloth	0.06 x 0.06 m	To polish surfaces of the unit in
Abiasive cloui		case of paint coating damage

1.7 MARKING AND SEALING

The System's marking plate has information about the System's name, serial number, Manufacturer's details. The marking plate is located on the repeater's DR-209M casing.

The units included in the System also have marking plates (nameplates) with information about serial number, weight, protection degree, input voltage and power consumption. They are located on the units' casings.

The meteosensor MS-315, MS-PTW-315, MS-SDW-315 is sealed. Sealing of other units is not provided.

1.8 PACKAGING

The System units are packed in a corrugated board box and inner packaging (each unit has an individual packaging) ensuring its transportation and storage at the warehouse.

Transport packaging is also used as a returnable packaging for transportation of the System units to the repair location and back. Packaging sealing is not provided.



2 DESCRIPTION AND OPERATION OF THE SYSTEM UNITS

2.1 MULTIPURPOSE DIGITAL REPEATER DR-209M

Multipurpose digital repeater DR-209M has a metal painted casing (front frame – aluminum, rear side – steel); on the back side under the protective cover are located: a port to connect a power cable and ports of serial interface RS-422 to connect communication cables. USB port to connect a removable drive is located on the right side of repeater's casing.

Controls and LCD 8" (colour) to display visual information are located on the front panel. The display is equipped with resistive touch panel. The repeater's controls are shown in Figure 2. Description of the controls is represented in Table 5. For the description of USB port 2.0, see Table 6.



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

Table 5 – Description	of the repea	ater's controls
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N.	Name	Description	
1	«Menu» button	Transfer to the repeater's settings menu	
2	«▲» button	Increase backlight brightness	
3	«▼» button	Decrease backlight brightness	
4	«Exit» button	Exit the settings menu; change of the repeater's screen	
5	«Power» button	Power ON (OFF) buttons	

Table 6 – Description of USB 2.0 connector pins

Туре	Pin №	Description
1234	1	+ 5 V (VCC)
	2	data – (D –)
	3	data + (D +)
(connection side view)	4	GND



The repeater is equipped with an LCD and resistive touch screen, providing:

- settings of repeater (at the start of operation);
- diagnostics of malfunctions (in operation and service modes);
- display of current and service data (in relevant operation mode).

CAUTION!

LCD with resistive touch screen (with tactile layer) can be operated only with smooth blunt instruments. Sharp items (end of pen or pencil) and harsh mechanical actions are prohibited to avoid screen damage.

The repeater receives data from the meteosensor, log and gyrocompass.

Then the received data is displayed as calculated data in user-friendly format, and used to create reports.

The repeater allows for providing settings and displaying measurement values of weather data.

The repeater has a memory storage – non-volatile solid state disk, where service and measured data are stored, located inside the display.

The repeater allows for supplying DC power 24 (12) V (with an option to choose nominal value) to the meteosensor. The nominal value is set by the Manufacturer's specialists.

2.2 SUMMATOR-COMBINER OF NMEA SIGNALS (SENTENCES) NC-117

Summator-Combiner of NMEA signals (sentences) NC-117 is designed to «combine» received NMEA-data from log, gyrocompass and other sources in NMEA format and output combined data by one communication channel to the repeater. NC-117 function is to combine and retransmit input signals through RS-232/422 interface.

2.3 METEOROLOGICAL SENSOR MS-315, MS-PTW-315, MS-SDW-315

Meteorological sensor MS-315, MS-PTW-315, MS-SDW-315 is a module for measurement of environmental climate parameters (air temperature, humidity, atmospheric pressure, wind speed and direction) with a function to transmit measured data by serial channel.

The meteosensor MS-315, MS-PTW-315, MS-SDW-315 is equipped with overvoltage protective device OPD-146 against overvoltage; it prevents the meteosensor's output from failure in case of lightning strike.



The module WSP-150 with similar function is provided for meteosensors WXT and WX type.

All meteosensors are delivered with preset software. Some models of sensors are equipped with heating function, see Table 2.

The meteosensor MS-315, MS-PTW-315, MS-SDW-315 is mounted on the mast using an IK. The installation site is selected considering representative measurements of environmental parameters. For more details, see 4.5.

2.4 AMPLIFIER-MULTIPLIER OF NMEA SIGNALS MDU-102

Amplifier-Multiplier of NMEA signals is designed for signal multiplication in the following modes:

select of active channel;

- signal multiplication.

2.5 ANALOG-TO-DIGITAL CONVERTER ADPC-101

Analog-to-digital converter operates on vessels with gyrocompasses and logs which do not provide current values in NMEA-0183 format (IEC-61162) to navigational equipment; it converts received course and speed data into digital format. ADPC-101 can be also installed on vessels due to upgrading (re-equipment) of their identification system and represent a function of coupling device between out-of-date logs and compasses.

ADPC-101 has the following functions:

- reception of current course values from gyrocompasses with selsyn- and steeper-type interface;

 – current speed values from logs with stepper-type interface or interface based on closing contact;

- presentation of current speed and course values on the built-in display;

- received data conversion to NMEA-0183 format (IEC- 61162);

- transmission of converted course and speed values, and ship turn rate through standard interface RS-422 to external units in NMEA-0183 format (IEC-61162).

Operation modes of ADPC-101 are set up in the menu, see 3.4.



2.6 CLOUD-RANGE METER CL 31

CL31 measures height of clouds and vertical visibility. CL31 uses the laser pulsed diode technology. The device is capable to detect up to three cloud layers.

CL31 includes an integrated software which has a self-test function and do not require settings. It operates with other equipment using RS-485 or RS-232 network.

2.7 WAVE HEIGHT SENSOR WG5

WG5 is designed to measure waves' height. Measurements are provided in three positions; a wave level, roll period and wave direction are also measured.

WG5-DR-EX is an explosion-proof model; the casing is produced of chromized aluminum.

All sensors' measurements are sent to computing unit by network channel. The computing unit is designed to receive, process and output data. The data can be stored on the external USB storage or transmitted by the network using Ethernet or RS-232 interfaces.

2.8 CURRENT SENSOR 4830R

The sensor 4830R has a built-in compass and roll sensor; it also allows for water temperature measuring. The measured values are output by RS-232, RS-422 interfaces and can be dived at a depth of max. 300 m.

2.9 VISIBILITY SENSOR PDW 12, PWD 22

Visibility sensor PDW 12, PWD 22 is an optical sensor which ensures measurement of visibility (meteorological optical range, MOR). The sensor's operation is based on forward scattering principle.

Output of PDW 12, PWD 22 is a digital serial interface. Two modes of digital serial interfacing are available:

- PWD 12, PWD 22 can send digital messages automatically in preset time intervals;

- the repeater can provide polling of the sensor.

PDW 12, PWD 22 is controlled by the software which ensures a set of commands and test procedures (self-test) to configure and monitor different functions of PDW 12, PWD 22 sensor. The sensor ensures continuous operation.



2.10 POWER SUPPLY UNIT PS-103

The unit provides electric power supply of 24 V DC unregulated voltage to the System's equipment.

In case of power mains failure PS-103 automatically switches over connected equipment to the external storage battery.

PS-103 is connected to the repeater and summator-combiner NC-117, multiplicator MDU-102 and analog-to-digital converter ADPC-101 if they are included in the System.

2.11 POWER SUPPLY UNIT BPS-114-24

Power supply unit provides uninterruptible power of 24 VDC unregulated voltage to the System's equipment.

In case of power mains failure BPS-114-24 switches over connected equipment to a built-in storage battery. When this switchover occurs, voltage is unregulated.

BPS-114-24 is connected to the repeater DR-209M and summator-combiner NC-117, amplifier-multiplier MDU-102 and analog-to-digital converter ADPC-101 if they are included in the System.

2.12 DC/DC CONVERTER DC-108

DC/DC converter DC-108 is designed to provide regulated electric power of 12 V DC to the System's equipment.

DC-108 is connected to the repeater DR-209M and summator-combiner NC-117, amplifier-multiplier of NMEA signals MDU-102 and analog-to-digital converter ADPC-101 if they are included in the System.



3 INTENDED USE

3.1 OPERATIONAL CONSTRAINTS

The System's installation site must be selected according to the operational constraints (operating temperature and protection degree).

The System units must be connected only according to the relevant drawings and tables (corresponding to the order). All System units must have proper grounding; all cables must have insulation; non-insulated cable ends must be absent.

CAUTION!

Installation site of the System units must not be less than 1 m from a magnetic compass!

3.2 PREPARATION FOR THE SYSTEM'S OPERATION

3.2.1 Safety features

While preparing the System units to operation provide the visual check and make sure the mechanical damage is absent.

Connection of the units to the power mains must be provided only considering input power requirements.

Before connecting the System units they must be switched off and grounded.

The staff shall follow «The technical rules for operation of electric installation» and «Safety rules for operation of electric installation» while testing electrical circuits and insulation resistance.

3.2.2 Method of the visual check

Before switching the System units on, the staff shall:

- observe visually the cable integrity and initial position of the controls on the front panels;

- clean front panels from dust and dirt by clean soft cloth, if necessary;

- check reliable cable connections to the units and proper grounding.

3.2.3 Switching the Product on instructions

Before switching the units on, the staff shall make sure that power mains voltage complies with the requirements represented in Table 1.

Before connecting the System unit it must be grounded.



For the intended use of the System it must be powered, therefore:

- make sure that power mains voltage complies with the input power requirements;

- transfer the circuit breaker of switchboard to the «OFF» position;

- connect power cable and interface cables to the System units;
- transfer the circuit breaker of switchboard to the «ON» position;
- switch on power supply unit if it is included in the System's scope.

Wait for the software to start. If operation occurs in normal mode it takes not more than 5 minutes.

To power the System off, follow the steps in reversed order:

power the System off by pressing «Power» on DR-209M and hold it for several seconds;

- switch off the power supply unit it is included in the System's scope;
- transfer the circuit breaker of switchboard to the «OFF» position;
- disconnect power cable and interface cables to the System units.

3.3 USAGE OF THE SYSTEM

Once the power is supplied and DR-209M is switched on, the display will take the view as in Figure 3.



Figure 3 – Main screen of software



The System's user interface ensures visualization of operating data and settings of the System's network parameters.

Before the start of operation it is recommended to provide the System settings.

3.3.1 Unit settings

Before providing any settings switch emulation mode off, see Figure 5.

3.3.2 General description

The System's software allows for the following settings:

- select measuring values of displayed data;
- select language of user interface;
- select current data and time;
- select type of the meteosensor to be used;
- set up wind corrections;
- provide ports' settings;
- select type of NMEA-data;
- set up an interval of meteosensor polling interval;
- set up an interval to record measured data to the log book;
- data reception and output from water temperature sensor (at option);
- switch on and off emulation mode.

3.3.3 «Settings» window

To open settings window press « ** », and then select a tab «Settings». To set date and time in a drop-down panel use fields «Date» or «Time».

Screen calibration is carried out automatically once the button «Touchscreen calibration» is pressed.

Updates are also set automatically once the button «Install updates» is pressed.

To enter the service mode, press the button «Service mode». This mode is used to make the changes of the software.



Measurement Units Data Port	s System settings	
Service mode		Date
Touchscreen calibration		Time
Install updates		
Firmware version 1.0.5		
		Apply
Log 🌖 Gyrocompass 🄵	3.04.2020 16:08:32	www.unicont.com

Figure 4 – «Settings» window

3.3.4 «Measurement units» window

The window is opened by tabs **«** »** and **«**Measurement units»; it provides for different dimensions and units. It also allows for setting the polling timeout and intervals of the meteosensor (in seconds), and language of user interface.



Figure 5 - «Measurement units» window



«Screen switching interval» (period of time for a displayed parameter to be changed with the following one), «Logging interval» (period of time between previous and the following records in the device's log book).

Once the necessary settings are carried out, press the button «Apply» and «OK». To reset the input data press «Cancel».

3.3.5 «Data» window

All weather parameters data are displayed by default. To display only necessary parameters switch off not required data by toggle buttons located next to each parameter. See Figure 6, where «Air temperature» parameter is switched off.

«Wind direction offset» field is used to enter wind direction corrections in case the meteosensor's zero mark (point) was not set accurately relative to ship's bow. Values are entered in degrees, in range +180 to -180.

Measurement Units	Data P	orts System set	tings		
Air temperature			Wind direction	n offset	0.0
Water temperatu	re	•	Preferred mod	de	Relative win d
Wind disturbance			Calculate true	and relative w	ind 💽
Rainfall			Averaging inte	erval (s)	0
Humidity			Use averaged	wind direction	\bigcirc
Pressure			Use averaged	wind speed	\bullet
Pressure tendenc	ÿ	•)		
			ОК	Apply	Cancel
Log 😑 🛛 Gyrocom	ipass 😑 📗	03.04.2020	16:09:26	(www.unicont.com

Figure 6 – «Data» window

3.3.6 «Wind» parameter

«Preferred mode» field includes three possible modes, see Figure 7.

Relative – the wind measured by the meteosensor (without application of gyrocompass, log and GPS).

True – the wind relative to vessel's course (the vessel is considered permanent).

Apparent – the wind displayed relative to true north (magnet or true). Readings of gyrocompass or GPS are required to display absolute wind.



Once the mode of automatic calculation of true and relative wind is switched on, the System starts automatic calculations of true wind, using data from gyrocompass, log and GPS. If this toggle button is switched off, true wind data are obtained from NMEA sentences.

To receive averaged weather data for the required time period, a user should enter time (in seconds) into «Averaging interval».

Wind speed and direction constantly change due to turbulence of air flows. To receive averaged value a user should switch on modes «Use averaged wind direction» and «Use averaged wind speed».

Once the required settings are carried out a user should press the button «Apply» and «OK». To reset data entered previously, press «Cancel».

Measurement Units Data	Ports Sy	ystem settings			
Air temperature		•	Wind direction o	offset	0.0
Water temperature	•		Preferred mode	_	Relative wind
Wind disturbance		•	Calculate true a	nd relativ 🗸	Apparent wind Relative wind
Rainfall		•	Averaging interv	val (s)	True wind
Humidity		•	Use averaged w	vind directio	n 📀
Pressure		•	Use averaged w	vind speed	•
Pressure tendency					
			ОК	Apply	Cancel
Log 😑 🛛 Gyrocompass 😑	03.04.20	020	16:11:23		www.unicont.com

Figure 7 - Select wind parameter «Preferred mode»

3.3.7 «Ports» window

To ensure the repeater's correct operation, provide settings of its ports to exchange data with external devices, see Figure 8.



Measurement Un	nits Data <mark>Ports</mark> S	system settings		
COM1 Receiving	9600 None 1 WXT520, SBE38, M ¹	WD, M Transmitting	MWD, MWV, MDA	., vwt, 🔅
COM2 Receiving	9600 None 1 BRG	Transmitting		
			OK Apply	Cancel
Log 😑 🛛 Gyrc	ocompass 😑 🛛 03.04.2	2020 16:11:53	<u>ال</u>	www.unicont.com

Figure 8 - «Ports» window

To provide settings for each port, press « >>> next to the necessary port. The window will have the following view, see Figure 9. Parameters are set in the end of port settings, see Table 7.

Measurement Units Data P	orts System settings	
COM1	Receiving	Transmitting
Baudrate 9600 🔻	Sensor WXT520	Meteodata MWD
Parity None 🔻	Sensor SBE38	Meteodata 💽
Stopbits 1	Meteodata	Meteodata <u> </u>
	Meteodata	Meteodata
	Meteodata 📀	Meteodata
	Meteodata 🛛 💽	Meteodata 💽 🗸
		K Apply Cancel
Log 😑 🛛 Gyrocompass 😑 🛛	03.04.2020 16:12:16	🥡 www.unicont.com

Figure 9 – COM 1 port settings

Once the required settings are carried out, press «Apply» and «OK». To reset data entered previously, press «Cancel».



Table 7 – Th	e list and	description	of ports'	settings
		1	1	0

Data type	Description	Notes
«Sensor WXT520»	Weather data reception from sensor WXT520	ASCII auto format
«Weather data reception MWD» «Weather data transmission MWD»	Wind speed and direction data received and transmitted in NMEA MWD sentences	Wind is indicated by the magnetic or true north
«Weather data reception MWV» «Weather data transmission MWV»	Wind speed and direction data received and transmitted in NMEA MWV sentences	True wind is indicated or relative to vessel's bow
«Weather data reception MDA» «Weather data transmission MDA»	Data about pressure, temperature, relative humidity, wind speed and direction received and transmitted in NMEA MDA sentences	Wind is indicated by the magnetic or true north
«Data reception XDR»	Data about pressure, temperature, relative humidity, wind speed and direction	
«Course reception HDG»	Vessel's course data	Vessel's course relative to magnet north (or magnet compass)
«Course reception HDT»	Vessel's course data	Vessel's course relative to true north (from gyrocompass and GPS)
«Course reception VTG» «Speed reception VTG»	Vessel's course and speed data	Vessel's course and speed relative to ground by the magnet or true north
«Speed reception VBW»	Vessel speed data	Vessel's speed relative to ground / water
«Weather data output VWT»	Wind speed and direction data	True speed and direction of wind from 0° to 180° relative to starboard
«Weather data output VWR»	Wind speed and direction relative to ship's bow	
«Weather data output UMD»	Relative wind speed and direction	(relative)

3.3.8 Parameters display mode

Analog (graphical) mode of weather data display is shown in Figure 10. Numeric mode of data display is shown in Figure 11; for «Graph» display mode, see Figure 12; for «Report» display mode, see Figure 13.





Figure 10 – Graphical (compass card) mode of data display

Figure 11 – Numeric mode of data display







In «Graph» mode, setup panel for graphs' time interval is located along the right edge of the screen, see Figures 14 and 15.

Enter accurate value of graph plotting end into the «Date» and «Time» fields. If the fields are left empty, current date and time will be used as values of graph plotting end. «Period» field and toggle switch of time units indicate the interval for graph plotting. If no data were entered or data were deleted, the last correct data will be used.



🗰 Digital 💿 Graphics	s 🗹 Graph 📳 f	Report	Emulation	Rx	¢°	🚺 Digital 💿 Grap	ohics 🗹 Graph	📕 Report	Emulation Rx 🇬
Wind Speed (Relative) (m/s)	/^v~-	\sim	Date			Wind Speed (Relative) (m/s)		\sim	Date
16:12:00 03.04.2020									Time
Atmospheric Pressure (hPa)		16:15:00 03:04:2020	Leave t empty trackin	this fields to enter in g mode		Relative Humidity (%)		16:16:00 03:04:2020	Leave this fields empty to enter in tracking mode
49.7 4 16:12:00 03.04:2020 Rainfall (mm/h) 5.9		16:16:00 03.04.2020	Period	5		49.7			Period 5
5.6 16:12:00 03.04:2020 Air Temperature (*C)			7 8	Mipute	æ	Air Temperature (°C)			Minutes ▼ Seconds
20.3 20.1 16:12:00 03.04:2020	16:14:00 03.04.2020		4 5	6	:	20.1			→ Minutes Hours
	1°		1 2	3			¢,, 👔		Days
	03.04.2020	16:16:57	0 -	←		Log 😑 🛛 Gyrocompa	os 😑 03.04.2020		🕷 www.unicont.com

Figure 14 – Setting an interval for graph plotting

Figure 15 – Setting values for «Date» and «Time»

The following elements of control and indication are intended for control and visualization, see Table 8.

Table 8 – Controls and LEDs

Name	Description
Numeric	Tab of numeric data display mode
(Analog	Tab of graphical data display mode
N Graph	Tab of data display mode in graphs
Report	Tab of report export mode and data display in tables
Rx	Tab of service data display mode
**	Tab of «Settings» mode
Emulation	Operation in emulation mode
Log ●	LED of log normal operation
Gyrocompass 🧶	LED of gyrocompass normal operation
	«Day / night» mode button



3.3.9 «Day/night» mode

«Day/night» mode of the repeater enables the convenient operation during different time of the day; use « to switch it on.

The difference between day and night modes is shown in Figures 16 and 17.





Figure 16 – Tab in night mode

Figure 17 – Tab in day mode

3.3.10 Product's notifications

In every mode the Product can additionally provide informational notifications, see Table 9 and Figure 18.

In case of log or gyrocompass malfunction data correction doesn't work.





Table 9 – Informational notifications

LEDs	Notification
Log 🔴	Notification of no data from log
Gyrocompass 🔴	Notification of no data from gyrocompass
	Notification of errors, see Figure 18

. .

10



3.3.11 Button to select weather parameters

To display or hide the required weather parameter in program window on the repeater's screen, press the relevant button, see Table 10.

All selected weather parameters are displayed at the first repeater's start-up. To display or hide one or several weather parameters, press the relevant buttons in the left lower corner.

¥7:	Description
Table 10 – Buttor	is to select weather parameters ad enter data

View	Description
	To switch on / off values of wind turbulence (max. and min.)
ľ	To switch on / off values of water and air temperature
	To switch on / off values of relative air humidity and amount of precipitation
BAR	To switch on / off values of atmospheric pressure and bar tendency (pressure increase or decrease)
	To switch on / off values of wind parameters
«ALL»	Simultaneous switch on / off of all available weather parameters
C	Repeated display of weather parameters (one by one) in cyclic mode
	Deletes one symbol on the left in the selected entry field
	Applies changes and hides pop-up keyboard
«0»«9» «.», «:»	Adds the relevant symbol into the entry field

3.3.12 Export and saving of weather data

«Report» tab enables to present data in tables (according to preset intervals) and export data to other storages. «Export» button in the tab ensures data export from table into «*.csv» file (see Figure 21), which allows for its further opening in Excel.

Press «Export» to export and save data in «Report» tab, see Figures 13, 19. The name of USB storage and USB folders are displayed in this window. Select the required folder to save the report data, see Figure 20.



Figure 19 – «Export» tab



 Apport
 COV Fine (* and ****)

 Report 03.64.2020
 COV Fine (* and ****)

 Report 03.64.2020
 Report 03.64.2020

 Report 03.64.2020
 Report 04.2020

 Report 03.64.2020
 Report 04.2020

 Report 04.2020
 Report 04.2020
 <

Figure 20 – Select folder to save the data

Figure 21 – Enter file name «*.csv»



3.3.13 Service data viewing. «Rx» window

Use «Rx» window for test view of ports' operability; it displays all received data not depending on the ports' settings.

3.4 Settings of analog-to-digital converter ADPC-101

Once the power is supplied, ADPC-101 starts to display course and speed data, compass or log readings are represented in zeroes at the same time; the signal will be absent on the output.



4 TECHNICAL SERVICE OF THE SYSTEM

4.1 GENERAL DESCRIPTION

TS shall be provided by the staff acquainted with the System's composition, structure and operation features.

In order to provide safe and reliable operation for the System units, the staff shall maintain a schedule of the TS-1, TS-2, TS-3.

TS-1 is organized and controlled by a person in charge and carried out by the staff on the running equipment.

TS-2 is organized and controlled by a person in charge and carried out by the staff. TS-2 results are registered into the system's status record.

TS-3 is organized and controlled by a person in charge and carried out when it is required. In case of no calibration procedure and test certificate for the particular unit of the System, TS-3 should not be carried out.

TS-3 results are registered into the system's status record.

4.2 SAFETY FEATURES

While carrying out the TS follow the instructions given in 5.2 of this OM.

4.3 MAINTENANCE ROUTINE

The list of works for all types of the TS is given in Table 11.

Table $11 - 1$ he list of the 1S work

CL №	Name of work	TS type		
		TS-1	TS-2	TS-3
1	Visual check of the Product	+	+	+
2	Test for the unit operability	_	+	+
3	Calibration test	—	_	+/
Notes				
1 «+» – work is obligatory.				
2 «–» – work is not required.				

Maintenance routine procedure is given in the CL, represented in Tables 12 – 14.



Table 12 – CL № 1. Visual check

To be done Routine		Man-hours ner 1 Product
X7' 11 '		
Visually examine	I check completeness and appearance of the Product;	I person
the Product	mechanical damage, paint defects must be absent;	5 mins
	legends are to be read easily;	
	2 clean all surfaces by clean cloth;	
	3 remove severe contamination, parts of corrosion, oil	
	spots:	
	– from metal surfaces: by suds, avoiding its penetration	
	inside the device; all surfaces clean dry by clean cloth	
	and dry up;	
	– from LED: by alcohol soaked cloth.	
	Do not use hard cloth, paper, glass cleaning liquids or	
	chemicals; Do not press hard on the surface while	
	cleaning; Do not spray liquid directly to the surface of	
	the Product;	
	4 in case of varnish damage clean it with abrasive	
	cloth, then alcohol soaked cloth, cover with varnish	
	and let dry	
Check reliability of	1 make sure that connectors and attaching screws are	
cable connections	fastened tight, provide further fastening if needed;	1 person
and grounding	2 check integrity (no mechanical damage) of leading	5 mins
buses	cables which are visible	

Table $13 - CL \ge 2$. Check of the Product operability

To be done	Routine	Man-hours per 1 Product	
Check the	1 power the Product on;	1	
operability of the	2 wait for the software to load – the following image	1 person	
Product	will appear on the repeater's screen		



|--|

To be done	Routine	Man-hours ner 1 Product
System settings	After the Product's power supply is on and repeater is switched on, start the system settings: - set up the system date and time; - set up the input language and keyboard layout; - set up the type of output NMEA data (if connected to the meteostation of external systems); - set up the system units' ports for data reception and transmission; - enter correction of zero mark position for the weather data sensor (if required); - set up required measurement units of displayed weather data; - select sensor type of weather data; - set up polling intervals for meteosensor; - set up interval of data recording to the log book. Please make sure that all data recieved by the repeater is valid (correct) and errors are absent. Caution! Before the start of operation finish emulation process in the service window «Settings»	1 person 1 hour

4.4 PRESERVATION

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

The time of represervation -2 years from the Manufacturer's commissioning.

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

The represerved Product, SPTA kit and documents are placed in package. The time of storage -2 years.

4.5 INSTALLATION AND DISASSEMBLY ON THE PRODUCT

4.5.1 General description

Optimal procedure of the System installation requires open space in the radius of 150 m around the mast.

Choose a site where environmental conditions are convenient for installation; unpack the System, keep the transportation package and all packing materials for further transportation if required.



Installation procedure:

- install and fasten the mast;

- install the meteosensor and OPD module onto the mast, provide sensor's alignment, connect an OPD module and sensor to the power supply and repeater DR-209M.

4.5.2 MS-315, MS-PTW-315, MS-SDW-315 installation on the mast

The meteosensor is installed only vertically on the mast with a diameter 30 mm, see Figure 22.



Figure 22 – MS-315, MS-PTW-315, MS-SDW-315 installation

For installation use a screwdriver PH2 and open wrench 7 mm. Loosen the screws with lock nuts (pos. 2) using screwdriver PH2 and open wrench. Put on the sensor on the mast rotating the foundation of sensor until it cannot be moved upwards or downwards.

Tighten the screws (pos. 2), but do not tighten them against stop.

Install the bird spikes. Fasten the spikes using six self-tapping screws and screwdriver PH1, see Figure 23.





Figure 23 – Installation of bird spikes

Provide the sensor's alignment using a magnet compass and image of the arrow painted on the device's casing.

With the help of compass define the north and fix the initial point on the horizon.

Provide the sensor's orientation so that the south and north were adjusted with the fixed point of north on the horizon, see Figure 24.



Figure 24 - MS-315, MS-PTW-315, MS-SDW-315 alignment

It should be taken into consideration, that geographical north (convergence of meridians point) differs from magnet north (direction of compass arrow) on one value of magnetic variation. At the same time variation in the European latitudes is small and it can be disregarded. The more detailed information about magnetic variation can be received from cartographic atlases.



The sensor is aligned only once during the installation.

Fasten the sensor by tightening screws and lock nuts against stop.

After installation provide the mounting of the OPD module. It is mounted on the mast using a clamp (made of perforated metal band) with tightening, see Figure 25.



Figure 25 – Installation of OPD-146

Lead the metal band through the bracket on the casing of OPD-146. Wrap the clamp around the mast. Lead the ends of band into the clamping rings. Bend the ends using pliers; move the clamping rings and fasten them with the help of clamp.

4.5.3 Earthing

The earthing stud is located on the mast. The stud is at the same time connected with earthing screw of the sensor and earthing bolt OPD-146, creating a continuous loop.

After the assembly install the mast and reliably fasten it. The next step is a system connection.



Figure 26 – Sensor's earthing screw



Figure 27 – Earthing bolt of OPD-146



4.5.4 Installation of meteosensors WX, WXT, Windobserver 65

Installations features and recommendations, overall and installation dimensions of the meteosensors WX, WXT, Windobserver 65 type are listed in Technical description.

To install the meteosensors, use general rules, see 4.5.1; installation features and recommendations are represented in Manufacturer's documentation for every unit.



5 CURRENT SYSTEM REPAIR

5.1 GENERAL DESCRIPTION

The System's operability is controlled by the power LED located on the power supply unit and by displaying the following window if Periscope software was installed on the System.

To provide diagnostics of the problems and defects, use information in Table 15.

5.2 SAFETY FEATURES

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

All the System units must be grounded.

Replacement of fuse links or defective parts, boards and modules when power is ON is STRICTLY PROHIBITED.

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

Installation and repair works are PROHIBITED in the room, where less than 2 people are present.

5.3 CURRENT REPAIR

The personnel can only eliminate defects which are listed in Table 15.

All other defects shall be carried out only by the Manufacturer's specialists or the Manufacturer's representatives.



Problem / defect	Possible reasons	To do	
Display's power supply	Power cable is not connected	Connect power cable to DR-209M	
is absent («Power» LED	Power cable malfunction	Replace power cable	
is absent, «main» screen	Bower source melfunction	Replace power source	
does not appear	Fower source manuficuon	Replace fuse	
On the Rx tab:	Cable is not connected (check the	Replace cable	
data are transmitted, but	connection to active COM port)	Check port's settings (speed,	
they do not comply with	connection to active conviport)	parity, stop bit)	
NMEA format	Sensor malfunction	Replace sensor	
	DR-209M malfunction	Replace DR-209M	
	Meteosensor, log or GPS's	Check the operability of sensor,	
On the Ry tab	malfunction	log or GPS	
No data	Cable is not connected	Check the connection of	
		meteosensor	
	DR-209M malfunction	Please contact Manufacturer's	
		service centre	
	Cable is not connected	Check and replace cable if	
		required	
	ADPC-101 malfunction	Replace ADPC-101	
The screen does not	Gyrocompass malfunction or incorrect Replace gyrocompass		
display weather data	data	Trephace Byrocompuss	
values by the port	Log malfunction or incorrect data	Replace log	
connected to ADPC-101	If ADPC-101 is connected to data	Replace NC-117 or connect	
	combiner, the data combiner is	ADPC-101 directly to DR-209M	
	malfunctioning or there's no		
	connection with NC-117		

ng



6 STORAGE

The Product must be stored in packaging inside areas complying with the required storage conditions ($+5^{\circ}$ C to $+40^{\circ}$ 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 Product below $+10^{\circ}$ C, it must be unpacked only in heated premises and left in normal climate conditions for 12 hours beforehand.



7 TRANSPORTATION

The System 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, multipurpose containers);

- air transportation (in sealed and heated compartments);

- sea transportation (in dry service premises).

The System 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 System.

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



8 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 the 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.

Attention!

The Power supply unit BPS-114-24 includes rechargeable batteries, be careful when disposing.

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 (Federal Law dated 24.06.98 No. 89-FZ On Production and Consumption of Waste as amended of 30.12.2008 No.309-FZ)



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



9 WARRANTY

The Manufacturer is under warranty obligations in case of correct System exploitation according to the OM. In case of incorrect operation or service damage claims are not considered by the Manufacturer.

More information about warranty terms you can find on the official site of «NPK Morsvyazavtomatica» LLC, section **Support**.

Address and contacts of the Manufacturer's service centre:

«NPK Morsvyazavtomatica» LLC

26E, Kibalchicha str., 192174, St Petersburg, Russia Tel.: + 7 (812) 602-02-64, 8-800-100-67-19 fax: +7 (812) 362-76-36 e-mail: **service@unicont.com**



FOR NOTES