Limited Liability Company
«NPK MORSVYAZAVTOMATICA»

SOUND RECEPTION SYSTEM
NS-201

Operating Manual

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INTRODUCTION

This operating manual (hereinafter referred to as OM) is intended to describe the structure, operating principles and technical service of Sound reception system NS-201 (hereinafter - the System).

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 read and understood this document and those who have had special training shall be permitted to operate with the System according to the applicable regulations.

TERMS AND ABBREVIATIONS

CL	Check list
CPAS	Command public address system
CU	Control unit
HP-15	Loudspeaker unit HP-15
LFGS	Large fine porous granulated silica gel
NS	Sound reception system
NS-201CU	Ceneral unit NS-201CU
NS-201M	Microphone unit NS-201M
NS-201R	Optional System unit NS-201R
RCP-CUS	Remote control panel RCP-CUS
Register	Russian Maritime Register of Shipping or Russian River Register
SC	System components
TS	Technical service
TS-1	Technical service №1
VDR	Video data recorder

1 DESCRIPTION AND OPERATION OF THE SYSTEM

1.1 DESCRIPTION

The System ensures external sound signals reception from all directions within the bandwidth 70 - 820 Hz (max. 2100 Hz at option), their conversion to digital signals and transmission to the bridge, indicating a direction of sound signals source.

1.2 TECHNICAL SPECIFICATIONS

Technical specifications of the System and its SC are represented in Tables 1–2. Outline and installation dimensions of the SC are represented in Appendix A.

Table 1 – Technical specifications of the System

Parameter	Value
Input voltage, V DC	24 (9.5…36.0)*
Max. loudspeaker power, W	– 5 – built-in; – 15 – external
Number of microphones, pcs.	3 (omnidirectional, combined in one unit)
Calculation and signal detection algorithm	phase-time
Max. time of direction detection, sec	3
Direction detection error	– «Fixed sector» mode: one (out of four) sector with fixed width 90º is illuminated in the direction where the signal is received from – star board (port), aft (fore); – «Floating sector» mode: sector with fixed width 90º is illuminated while moving together with the signal source
Display	– direction display: 0°…360° (24 LEDs, pitch 15°); – display of sensitivity threshold of microphone unit and sound intensity of received signal: 0%…100% (bar display, 6 LEDs)
Backlight	– buttons backlight; – brightness dimmer
Number of signals to be detected	1
Additional functions	– background noise suppression; – reception and reproduction of meaningful sounds; – manual backlight brightness dimming; – sensitivity adjustment of microphone unit; – 2 inputs of remote block (shutdown) of microphone unit; – «Backlight» test
* Supply voltage range is given in parenthesis.	

Table 2 – Technical specifications of the SC

Parameter	Values			
	NS-201CU, NS-201R	**NS-201M**	**HP-15**	**RCP-CUS**
Frequency bandwidth, Hz	70…820*	50…8000	330…8000	–
Max. power consumption, W	12	22 (heating circuit)	15	–
Max. number of connected additional panels, pcs.	1	–	–	–
Level of sound pressure, dB	86	–	108 (at 1 W/1 m)	–
Protection degree	Front panel IP44, Back panel IP10 (w/o casing)	IP56	IP56	IP22
Overall dimensions, mm	See Appendix A			
Weight, kg	0.84	1.95	1.70	0.23
Operating temperature, °C	–15…+55	–40…+55	–40...+55	–15…+55
* External sound reception system may receive signals within extended frequency bandwidth: max. 2100 Hz (at option).				

1.3 SYSTEM COMPOSITION

Table 3 – System composition

Name	Description
NS-201CU	Electronic module (with microcontroller), equipped with a built-in speaker, LEDs and buttons to provide for the main System settings
NS-201M	A set of combined moving coil microphones, waterproof
HP-15	To transmit voice communication and warning sound signals
RCP-CUS	To control NS-201CU remotely
NS-201R	Ensures additional display of registered data in case of remote installation

Manual air-operated horn may be additionally delivered with the System; its application may significantly simplify the System testing during its putting into commission and performing maintenance works (see Appendix C).

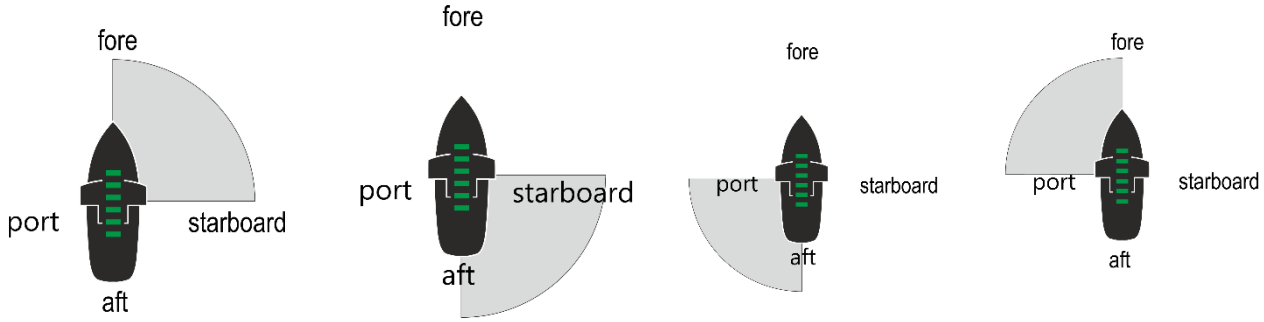
1.4 DESCRIPTION AND OPERATION OF THE SYSTEM

Received by NS-201M, external acoustic signals are supplied to NS-201CU, digitized and analyzed according to the set algorithm: background noise is suppressed, meaningful signal is extracted, if Typhoon horn signal is detected, the sector of signal direction is illuminated. At the same time the external received signal is transmitted to built-in and external (if available) loudspeakers. The direction detection is based on measurement of phase difference of received signal between the microphones.

The System illuminates a sector for 5 sec since Typhoon signal was detected.

The System operates in two modes.

The first mode of signal reception and processing, see Figure 1. One of four sectors is illuminated according to the direction of received Typhoon signal (I, II, III or IV quadrant of a circle). Illuminated sector in this mode is fixed – 90º.



I quadrant 0º…90º | II quadrant 90º…180º | III quadrant 180º…270º | IV quadrant 270º…360º

Figure 1 – Direction of signal source (fixed sector)

The second mode of signal reception and processing, see Figure 2. The second mode also illuminates 90º fixed sector, indicating direction of signal source. Additionally, in this mode the sector is moving together with the movement of signal source.

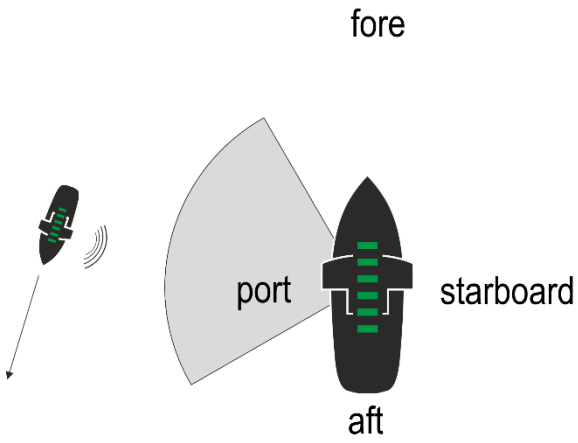


Figure 2 – «Floating» sector

Note – The first mode is available on customer's request. The System is set in the second mode by default.

The Manufacturer delivers the System with the settings according to Table 4.

Table 4 – Factory System settings (default settings)

Parameter	**Value**
Backlight brightness level	100 %
Internal loudspeaker volume	50 %
Noise suppression threshold	50 %
Sensitivity threshold	50 %

Note – Sensitivity threshold is set using specialized software delivered on request.

SC are connected according to the general connection diagram (see Figures 3 and 4).

Note – VDR connection is optional.

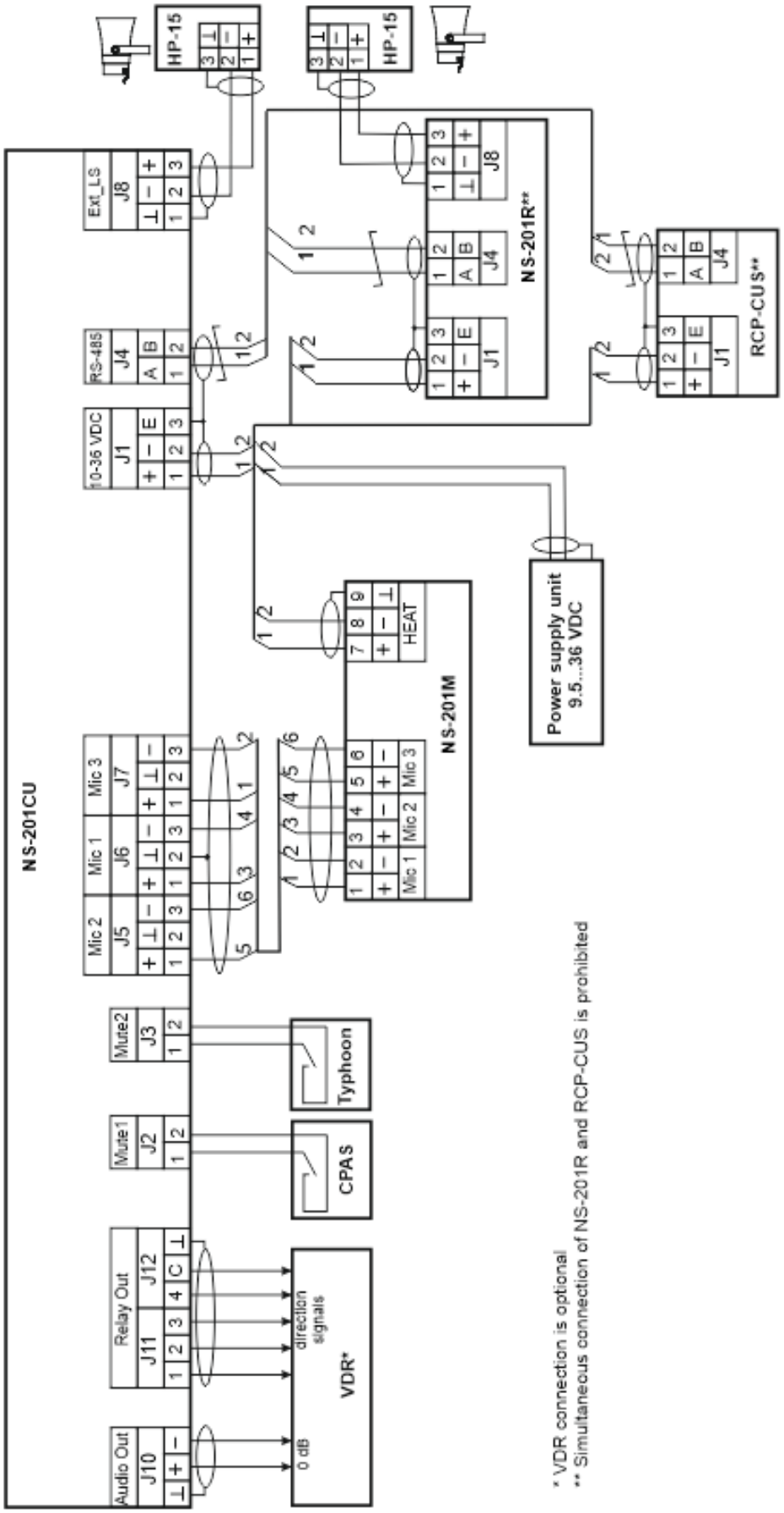


Figure 3 – The SC connection

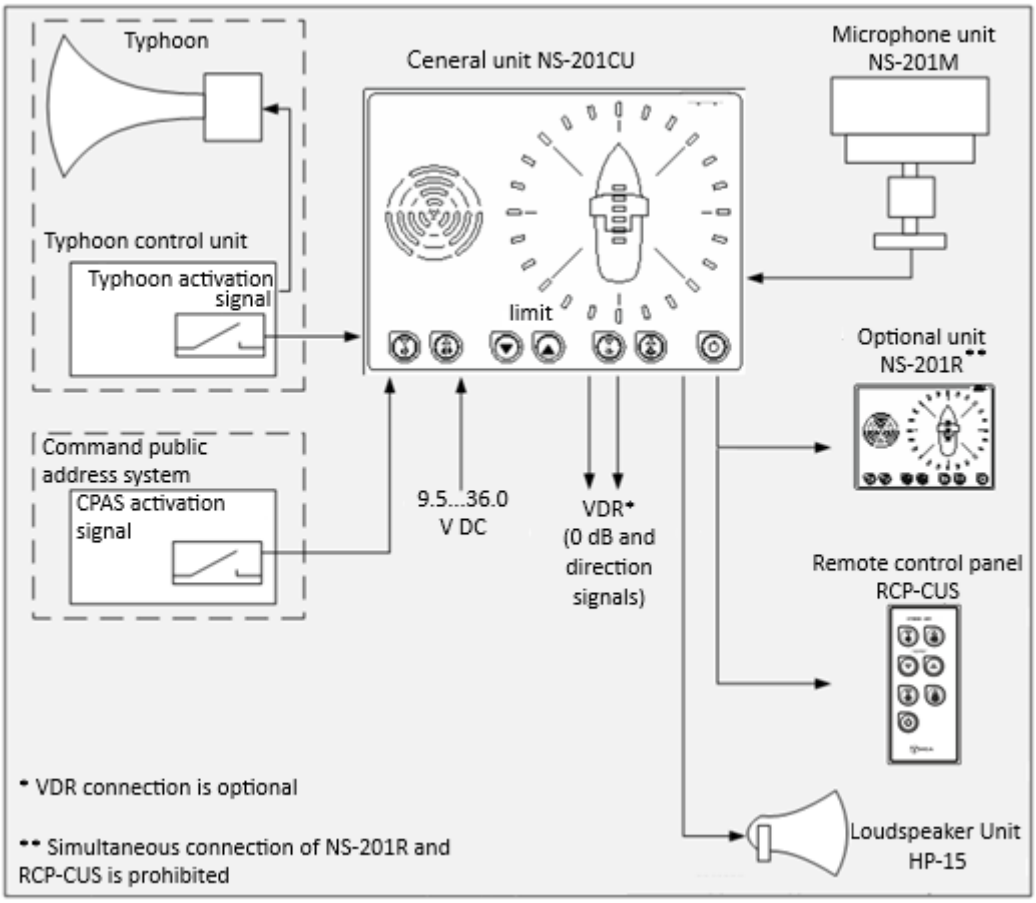


Figure 4 – The general connection diagram of the SC and external devices

1.5 MEASUREMENT TOOLS, INSTRUMENTS AND APPLIANCES

Consumables required for the TS are represented in Table 5.

Table 5 – Consumables required for the TS

Name and identifier of consumables	Amount of consumables	Note
Cleaning cloth	0.10 kg	1) To clean surfaces and parts of the system – use clean cloth 2) To clean severe contamination – use alcohol-soaked cloth
Rectified hydrolytic technical ethyl alcohol	0.05 l	To soak cloth while removing contamination
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

1.6 MARKING AND SEALING

The System's nameplate has information on the System's name, serial number, Manufacturer's details. The nameplate is located on the casing of NS-201CU.

The SC also have nameplates, indicating as a rule serial number, weight, IP protection degree, input voltage and power consumption.

Sealing of SC is not provided.

1.7 PACKAGING

At the time of delivery all SC are packed in packing and inner packaging ensuring its transportation and storage at the warehouse.

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

Packaging sealing is not provided.

2 DESCRIPTION AND OPERTION OF THE SYSTEM

2.1 CENTRAL UNIT

NS-201CU is an electronic module (with microcontroller), equipped with a built-in speaker, LED indicators and buttons that provide for the main System settings (volume adjustment, backlight dimming, and noise suppression threshold). The exterior look is shown in Figure 5.

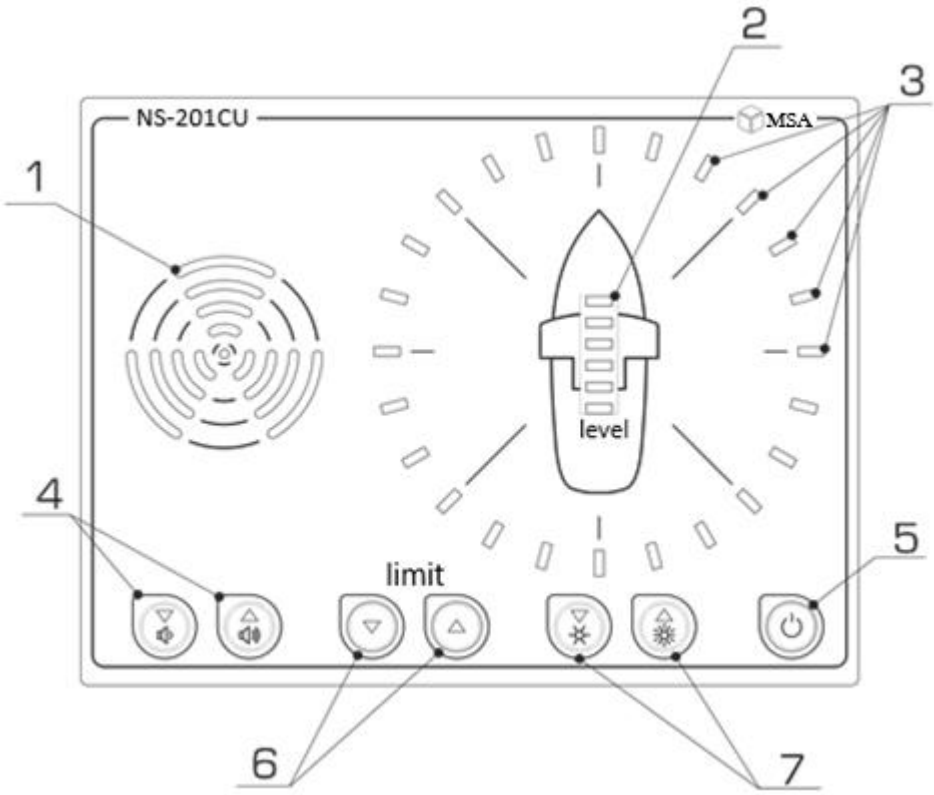
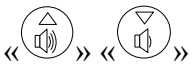
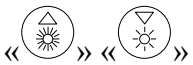


Figure 5 – Exterior look of NS-201CU

Table 6 – Controls and LEDs of NS-201CU

Pos.	Name	Description
1	Loudspeaker	Reproduces incoming sound signals received by the System's microphone unit
2	Group of LEDs «LEVEL»	Visually displays sound intensity of the signal received by the System's microphone unit
3	Group of LEDs «SIGNAL DIRECTION»	Visually displays directions to the source of sound signal (relative to the ship's fore) received by the System's microphone unit

Pos.	Name	Description
4	Buttons «VOLUME» 	For volume adjustment of the System's built-in and external microphones. Volume of built-in and external microphones is adjusted at the same time. Press and hold these buttons for 3 sec simultaneously to activate function «Microphone test», used to transmit sound signal from NS-201M directly to the System loudspeakers (the function is used to listen to acoustic signals). While «Microphone test» function is active, sound signal is supplied by the System with or without signal detection. «Microphone test» function switches off automatically 10 sec after activation. This function is individual for each module
5	Button «Power» 	To switch the System on and off. To switch the System on, short press this button; to switch it off – hold it for at least 3 sec
6	Buttons «LIMIT» 	To set a threshold for the System actuation; the System will detect signals (received by NS-201M) higher than the set threshold, and consider signals that are lower to be background noise surrounding NS-201M. Group of LEDs «LEVEL» indicate selected noise suppression threshold (during the time of threshold settings)
7	Buttons «BRIGHTNESS» 	To control buttons backlight brightness and LEDs. Press and hold these buttons for 3 sec simultaneously to activate function «Test Lamp»; this function switches on all LEDs and controls backlight with the set brightness and switches them off as soon as the buttons are released

2.2 MICROPHONE UNIT

NS-201M is a set of moving coil microphones combined in a compact waterproof unit and designed for mounting on open deck. NS-201M has a heating function, icing and low-temperature resistance.

2.3 LOUDSPEAKER

HP-15 is designed to reproduce voice communication and warning signals.

HP-15 is connected to NS-201CU and applied in cases when NS-201CU built-in microphone is not capable to ensure the required volume level (10 dB higher than ambient sounds) in the bridge.

2.4 OPTIONAL UNIT NS-201R

NS-201R is an electronic module (with microcontroller), equipped with a built-in speaker, LED indicators and buttons that provide for the main System settings (volume adjustment, backlight dimming, and noise suppression threshold).

Adjustment of noise suppression threshold on NS-201R is repeated on NS-201CU.

NS-201R has the same exterior look and controls as NS-201CU.

2.5 REMOTE CONTROL PANEL RCP-CUS

The panel ensures remote control over NS-201CU. RCP-CUS has the same controls as NS-201CU (Figure 5, positions 4–7).

3 USAGE OF THE SYSTEM

3.1 OPERATIONAL CONSTRAINTS

SC connections at order shall be compliant with diagram and table of connections of this order. All SC shall have reliable grounding, all cables shall be isolated.

To avoid self-excitation effect, install loudspeakers at minimum distance of three meters from communication devices microphones.

Install the System according to the outline and installation dimensions.

Place for SC installation shall be selected considering operational constraints (operating temperature, IP protection degree).

3.2 USAGE PREPARATIONS

3.2.1 Safety features

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

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

Before connection the SC must be switched off, all units must be properly 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 Visual check procedure

Before switching the System on, the staff shall:

– observe visually the cable integrity and initial position of the controls on the front panel of the SC;

– clean the SC from dust and dirt by clean soft cloth, if necessary;

– check reliable cable connections to the SC and their proper grounding.

3.3 USAGE OF THE SYSTEM

To make the System ready for operation, connect NS-201CU and NS-201M to each other, and supply power to them. Connect RCP-CUS or NS-201R to NS-201CU if necessary.

The System is delivered from the Manufacturer’s facilities in healthy operation condition, adjusted and suitable for installation on the ship.

Once the SC are installed and connected, make sure that the System is operating properly and functioning correctly. Provide the following tests and settings:

a) All System units shall be securely fastened and grounded using common grounding stud of NS-201CU;

b) The SC cables shall be connected according to the diagram (Figure 4);

c) The System's cables and cable glands shall be securely fastened and tightened;

d) Supply power and switch the System on.

Immediately after switching on, the System will provide a self-diagnostics procedure for 3 sec (it tests data reception by microphone channels, switches on controls backlight, switches on and then off all LEDs of direction indicator and received signal level one by one), and then transfer to operation mode;

e) Adjust controls and direction indicator backlight using buttons «BRIGHTNESS». Brightness may be adjusted at any time of the System operation depending on the intensity of illumination. It shall be sufficient to read the information from the ship control place. Backlight brightness on NS-201CU or NS-201R is adjusted on that SC where it is carried out. Backlight dimming on RCP-CUS is repeated on NS-201CU;

f) To check proper connection of NS-201M, activate «Microphone test» function of direct sound transmission from NS-201M to the bridge and listen to the received sounds. Adjust volume if necessary;

g) Using buttons «LIMIT» set the required threshold of noise suppression (the System actuation threshold). The threshold shall be set as low as possible, however, the System shall not be activated by the background noise and continuous sounds (operating motor and mechanisms, sounds produced by gas outlet system, etc.).

Threshold level is adaptive; the System calculates based on frame by frame analysis of received data. In case of the white noise occurrence (general wind noise or falling water, water pressure noise, etc.) constantly or slowly varied in time, the System will automatically (from 2 to 3 minutes) readjust to background conditions and ignore such background noise, excluding false actuation. The System will also ignore too short sounds (popping sounds, clapping sounds, knocks lasting less than 1 sec);

h) Check the operation quality of NS-201M and accuracy of direction detection of signal source.

To test reception accuracy of sound signal, use an additional device, e.g., manual air-operated horn or similar device that imitates ship Typhoon signal and supplies harmonic signals (frequency range 70 - 820 Hz, at option – max. 2100 Hz) with higher sound intensity than ship background noise.

Using the additional device supply a sound signal from each side (star board, port, aft, fore) of NS-201M at minimum distance of 5 m and check:

1) Direction indicator of NS-201CU – accuracy of the direction to the sound signal source. The System shall detect at least approximate direction of sound signal received from the ship's star board, port, aft, fore;

2) Sound reproduction into the bridge – audibility and signal identity reproduced by the additional device and internal loudspeaker of NS-201CU;

3) Time required for meaningful signal detection. The signal produced by the System shall be reproduced not later than 3 sec after control signal with simultaneous indication of signal source direction;

4) Check that the System blocks incoming sound signals in the bridge while ship's Typhoon or CPAS is activated.

Activate consequently the ship's Typhoon and CPAS, and make sure that the System's loudspeakers do not switch on during Typhoon and CPAS activation;

i) After engine start while ship propulsion (during operation of ship's all main parts and mechanisms) provide the System's final settings: set the required noise suppression level, required volume (sound intensity), reproduced by the System in the bridge.

ATTENTION!

Minimum level of reproduced sound shall exceed the noise level in the wheelhouse for 10 dB.

Volume of built-in and external loudspeakers is adjusted at the same time.

4 TECHNICAL SERVICE OF THE SYSTEM

4.1 GENERAL DESCRIPTION

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

In order to provide safe and reliable operation for the System, the staff shall maintain TS-1 – semi-annual TS;

TS-1 shall be provided by the staff on the running equipment.

4.2 SAFETY FEATURES

While maintaining TS, the staff shall follow the instructions, see 5.2 of the OM.

4.3 MAINTENANCE ROUTINE

The list of works for all types of the TS is given in Table 7. Maintenance routine procedure is given in CL, represented in Tables 8–9.

Consumables for the TS are represented in Table 5.

Table 7 – List of works by TS types

CL №	Work	TS-1
1	Visual check of the SC	+
2	Operability test of the SC	+
Note: «+» – work is obligatory.		

Table 8 – CL № 1. Visual check of the SC

To be done	Routine	Man-hours per 1 SC
Visually examine the SC	1) check completeness and appearance of the SC; mechanical damage, paint defects must be absent; marking plates shall be present; legends are to be read easily; 2) clean up the SC surfaces with clean cloth; 3) remove severe contamination, parts of corrosion, oil spots: – from front surfaces; – using soap form preventing it against penetration inside the SC, then all surfaces clean dry by clean cloth and dry up; 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 5 mins
Check reliability of cable and bus connection to the SC	1) check that connectors and attaching screws are fastened tight; provide further fastening if needed; 2) check the cable integrity (mechanical damage shall be absent) within visibility	1 person 5 mins

Table 9 – CL № 2. Operability check of the System

To be done	Routine	Man-hours per 1 SC
Test of System operability	1) Connect all SC and supply power to the System; 2) Press Power button on NS-201CU, and check visually that controls backlight is present during self-diagnostics; 3) Imitate external sound signal using horn EcoBlast or another source of sound signal; 4) Make sure that sound signal was received and displayed on NS-201CU; 5) Imitate sound signal from different sides	1 person 5 mins

4.4 PRESERVATION

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

Represervation time – 2 years from the System packaging at the Manufacturer's facilities.

The preservation is done in full terms, for 2 years.

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

Represerved SC and documents are placed in packaging boxes.

5 CURRENT REPAIR

5.1 GENERAL DESCRIPTION

The System operability is controlled by backlight of the relevant LEDs.

To provide diagnostics of the System malfunctions, use information in Table 10.

To diagnose other malfunctions, contact the Manufacturer's service center.

5.2 SAFETY FEATURES

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

Check SC grounding before any repair works.

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

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

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

5.3 CURRENT REPAIR OF THE SYSTEM

The staff may conduct troubleshooting listed in Table 10.

Troubleshooting of other malfunctions may be provided only by the Manufacturer's specialists or authorized representatives.

Table 10 – The list of possible malfunctions and troubleshooting

Malfunction	Possible reasons	To be done
The System does not detect sound signals	NS-201M is not connected	Connect NS-201M according to the connection diagram
	Too high noise suppression threshold is set	Decrease the noise suppression threshold, using function «Microphone test»
	Too low threshold of microphone sensitivity is set	Increase the threshold of microphone sensitivity
Wrong display of sound direction	NS-201M is installed incorrectly	Install NS-201M strictly to the ship's fore
	NS-201M is connected to NS-201CU improperly	Connect the SC according to the connection diagram
	Communication cable is damaged	Replace communication cable or repair the damaged cable
	Improper place for NS-201M installation	Change the NS-201M installation place
	Environmental effect, decreasing the signal detection quality: – excessive background noise; – signal shadowing by surrounding structures; – rereflection of sound waves	Remove the reason of negative environmental effect
	Foreign objects prevent NS-201M from normal functioning	Remove foreign objects
No sound or too low sound reproduction while displaying the direction	Too low volume is set	Increase the volume
NS-201R (RCP-CUS) does not respond to operator's actions	NS-201R (RCP-CUS) is not connected to NS-201CU	Check the connection of NS-201R (RCP-CUS) to NS-201CU
NS-201R (RCP-CUS) does not switch on after power supply.	Fuse malfunction	Replace the fuse

6 STORAGE

The System must be stored in packaging inside heated and ventilated premises with air-conditioning at temperature +5 °C…+40 °C and relative humidity no more than 80 % at +25 °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 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 System 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 System 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 System 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 de-vices. (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 MSA», LLC, section Support.

Address and contacts of the Manufacturer's service centre:

«NPK MSA», 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**

APPENDIX A
(MANDATORY)
OUTLINE AND INSTALLATION DIMENSIONS OF THE SC

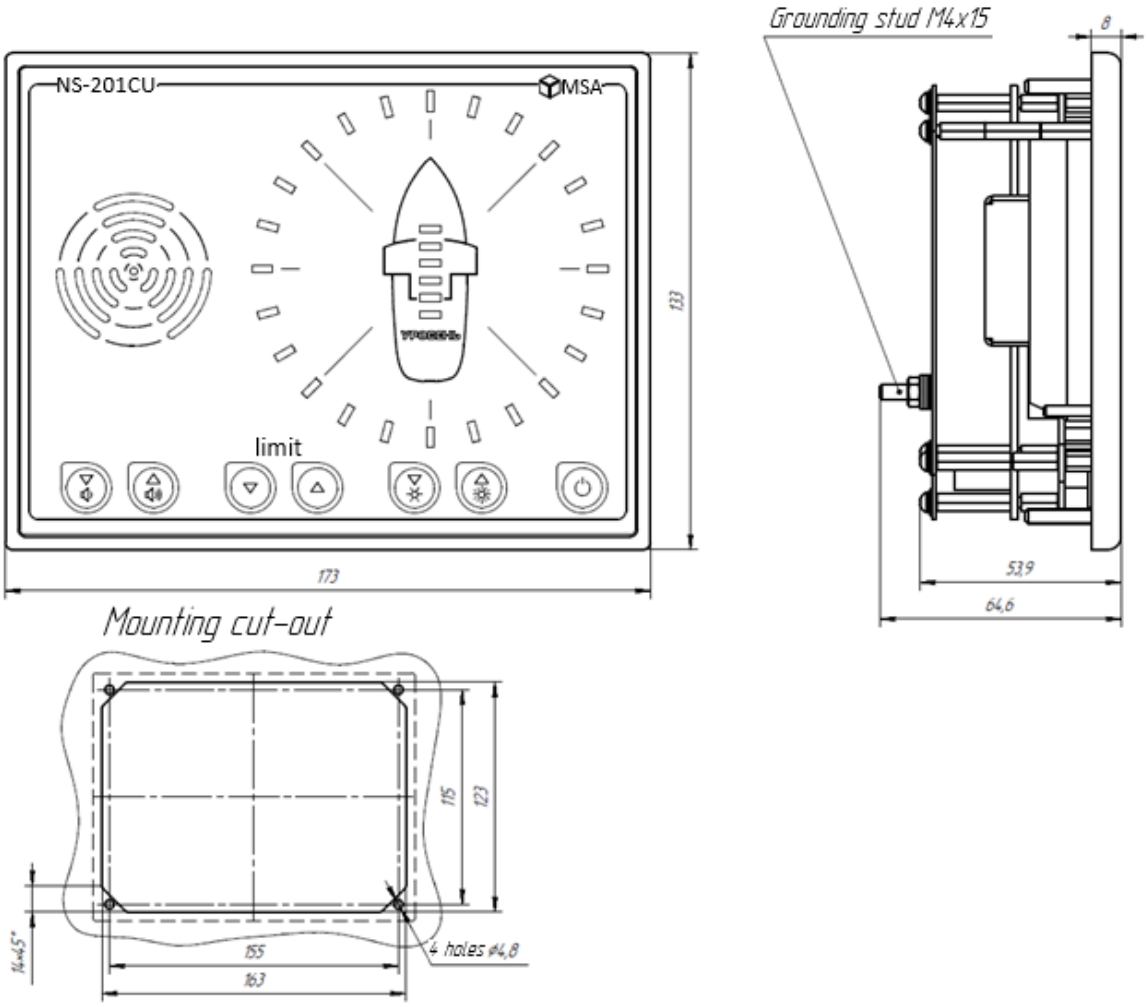


Figure A.1 – Outline and installation dimensions of NS-201CU (NS-201R)

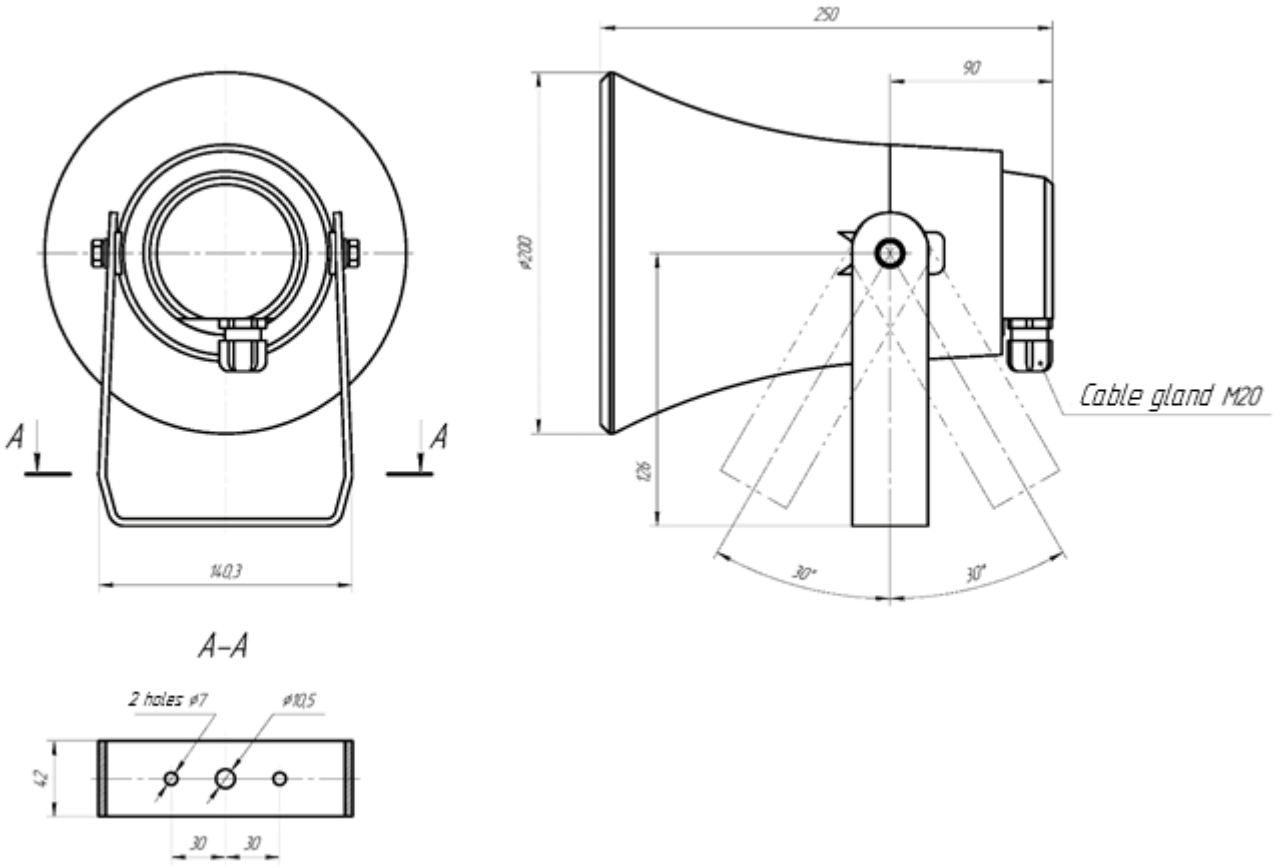


Figure A.2 – Outline and installation dimensions of HP-15

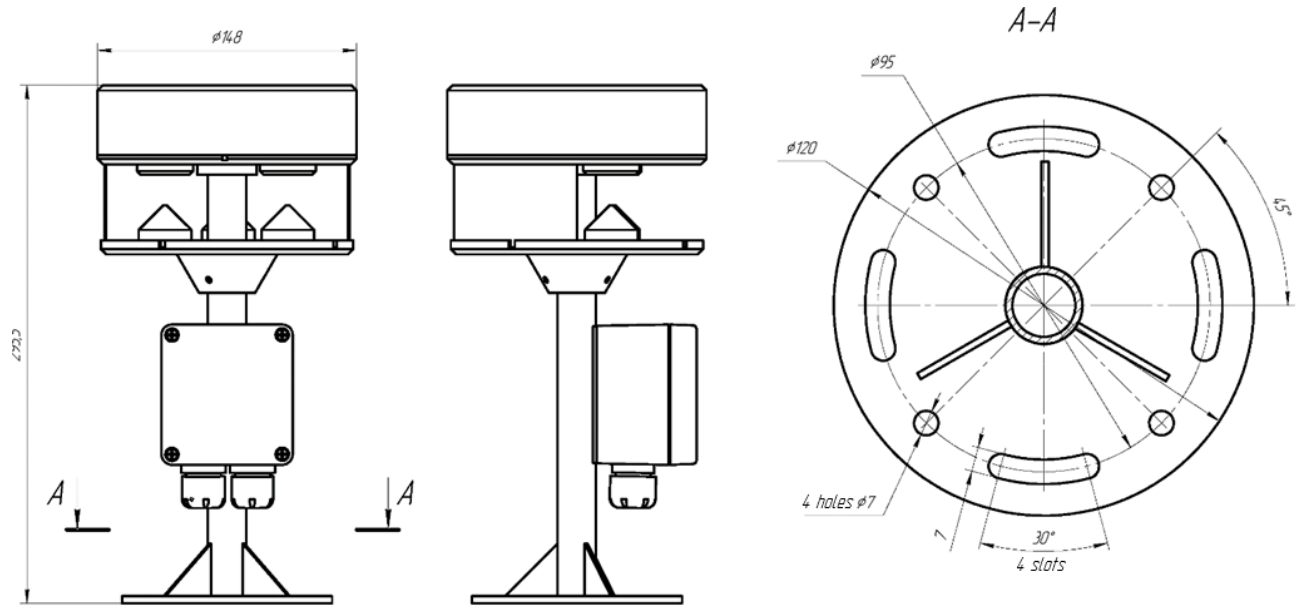


Figure A.3 – Outline and installation dimensions of NS-201M

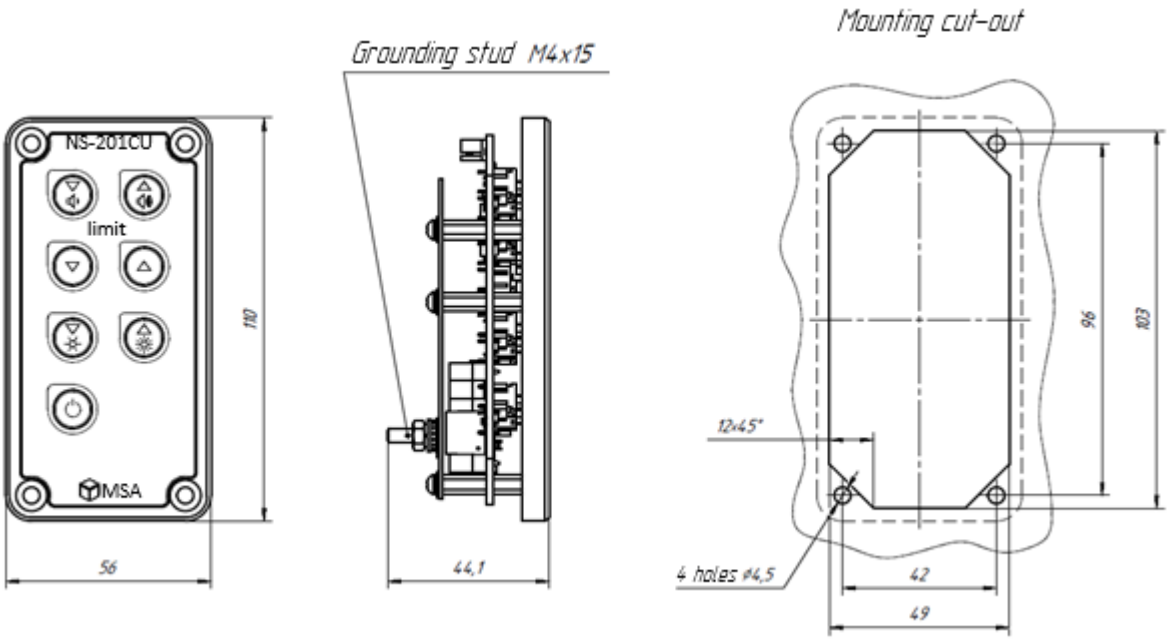


Figure A.4 – Outline and installation dimensions of RCP-CUS

APPENDIX B
(INFORMATIVE)
RECOMMENDATIONS ON INSTALLATION AND CONNECTION OF THE SC

B.1 Installation of the SC

B.1.1 Installation of NS-201CU (NS-201R)

NS-201CU (NS-201R) shall be installed in the bridge ensuring its visibility from the ship main control station, and audability of sounds reproduced by the System from any place inside the bridge.

If a built-in loudspeaker does not ensure the required audability of sound signals, use HP-15.

HP-15 is installed according to the installation drawings.

NS-201CU may be mounted on a bulkhead or into a panel (cut-out) according to the installation drawings.

If selected place of NS-201CU installation does not ensure convenient operation, use RCP-CUS.

B.1.2 Installation of NS-201M

Comply with the following regulations while installing NS-201M:

– NS-201M shall be installed outside the bridge (outside, over the bridge);

– NS-201M shall be installed vertically with its receiving part directed upwards on the horizontal surface;

– Prepare a bracket or special mounting place before installation;

– Distance between the receiving part of NS-201M and horizontal surface shall be at least 300 mm.

Before fastening NS-201M place the mark towards the ship fore in such a way that an axis coming through the mark and middle part of NS-201M was parallel to the ship roll axis (see Figure B.1).

For convenient installation and positioning, NS-201M foundation has special elongated holes (marks), ensuring placing of NS-201M along its own axis.

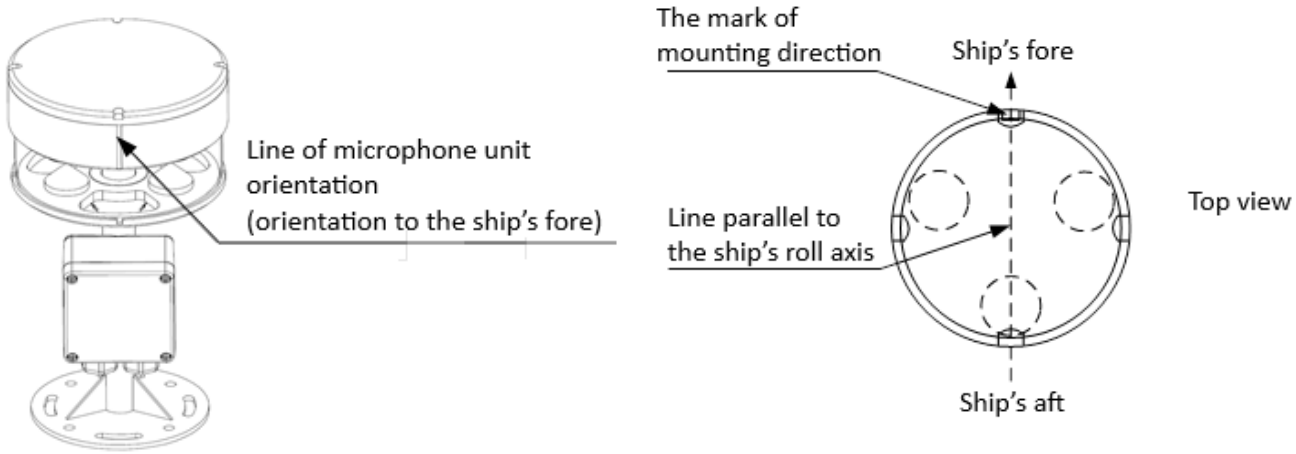


Figure B.1 – MU orientation at mounting

B.1.3 Instructions on installation places of NS-201M

Install NS-201M in a quiet place not blocked with foreign objects or having minimum angles of blocking; the distance from ship noise sources shall be the most reasonable and allow for decreasing induced noise from wind and mechanical vibration.

The selected installation place directly affects the efficiency of NS-201M operation and operation of the System in whole. To operate the System in the most efficient way, comply with the following requirements:

a) Installation place of NS-201M shall be exposed to minimum wind influence (due to the ship movement as well) and vibration produced by the ship's main operating parts and mechanisms, making it possible to detect long-distance signals;

b) Do not install NS-201M too close to NS-201CU in order to avoid the System's self-excitation due to reproduced sounds;

c) Do not install NS-201M too close to obstacles, which may reflect the significant part of the signal backwards in the direction of NS-201M. The reflected sound may affect the signal phases between the microphones; therefore, the System may stop detecting signal direction correctly.

Make sure that NS-201M is not installed close to obstacles, which may reflect the significant part of the signal backwards to the microphones.

Separately standing masts, pipes, antennas with max. diameter 20 cm, located behind or in front of NS-201M at distance more than 1 m, as well as vertical walls and structures of ship elements located at distance not more than 10 m, do not have a negative effect on the System operation;

d) Install NS-201M in order to ensure the minimum level of acoustic disturbance from noise sources on the ship. This will prevent the System from false actuations;

e) NS-201M reaches its optimum performance when clear acoustic signals may be received from all directions;

f) While installing NS-201M, it is recommended to put a communication cable of NS-201M in a shape of loop just before a connector of NS-201M. This allows for decreasing vibration effect from the ship's operating main parts and mechanisms on the sensitive microphone elements.

B.1.4 Recommendations on used cables

To connect SC to power supply and control circuits, only use cables brands approved by the Register suitable for marine applications and having external shield of copper braid. Separate signal cables from power cables while conducting cabling.

Characteristics of terminals and recommendations on cable select are represented in Tables B.1 and B.2.

Table B.1 – Characteristics of SC terminals

Terminal data	**System unit**		
	NS-201CU (NS-201R, RCP-CUS)		**NS-201M**
Identifier	J1	J2…J8, J10…J12*	1…9
Nominal wire cross-section, mm^2	1.5	1.5	2.5
* To connect VDR (at option).			

Table B.2 – Recommendations on cable select

Cable type*	**SC terminal (terminal assignment)**	
	NS-201CU (NS-201R, RCP-CUS)	**NS-201M**
(3×2×0.75)э	J5…J7 (microphone signals)	1…6 (microphone signals)
(2×1)э	J1 (power); J8 (loudspeaker); J10, J11, J12 (VDR, audio 0 dB, direction signals)**; J2, J3 (to connect CPAS and Typhoon CU)	7…9 (heating circuit)
(2×2×0.75)э	J4 (RS-485, NS-201CU connection circuit (NS-201R, RCP-CUS)	–
* Application of other cables is allowed, provided that shielding is preserved, current terminals, connectors and cable glands are not replaced. ** VDR connection is optional.		

Grounding of all units (cables) shall be done using common grounding bolt of NS-201CU, located on the back side of NS-201CU.

APPENDIX C
(INFORMATIVE)
AIR-OPERATED HORN

Rechargeable air-operated fog horn (reusable) EcoBlast completed with a pump may be used on yachts, motor boats and boats as a sound signaling device while maneuvering, moving in fog, etc.

To make the horn ready for operation, provide the following:

– Pull a cover of chamber until hermetic condition;

– Pull of the signal lever, providing an access to nipple;

– Insert a pump into the nipple and pump in air with pressure 4 - 5 bar;

– Disconnect the pump and place the lever back in the initial position.

To supply acoustic signal, press the lever. While testing the System, supply acoustic signals lasting at least 1 sec.

One charge is normally enough for 5–6 acoustic signals. To recharge the chamber (if necessary), repeat the abovementioned steps.

Table C.1 – EcoBlast horn specifications

Parameter	Value
Horn sound pressure power	30…125 dB (adjustable)
Frequency of reproduced acoustic signal	800 Hz (rf harmonic)
Operating pressure	2…5 bar (max. 7 bar)

Figure C.1 – Exterior look of air-operated horn EcoBlast with a pump