Limited Liability Company
“NPK Morsvyazavtomatica”

DC/DC CONVERTER
DC-108

Operating manual

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INTRODUCTION

This operating manual (hereinafter referred to as OM) is intended to describe the structure, operating principles, technical specifications and service of DC/DC converter DC-108-XXX-XX (hereinafter referred to as the Product, the DC).

Note – «XXX-XX» is a code (identifier) of the Product design.

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 PSU according to the applicable regulations.

Terms and abbreviations:

OM – operating manual;

SB – storage battery;

SC – short circuit;

TS – technical service;

CL – check list;

DC – DC/DC converter DC-108-XXX-XX;

LFSG – large fine-pored silica gel granular.

1 DESCRIPTION AND OPERATION OF THE PRODUCT

1.1 DESCRIPTION

1.1.1 The Product is designed to supply power to different shipborne equipment with regulated voltage 5 V, 12 V or 24 V DC (depending on the Product design) and ensure galvanic isolation of power supply.

1.2 TECHNICAL SPECIFICATIONS

1.2.1 The Product converts DC or AC unregulated voltage into DC regulated voltage of 5 V, 12 V or 24 V (depending on the Product design).

1.2.2 Technical specifications of the Product are represented in Tables 1, 2.

Table 1 – General technical specifications of the Product designs, rated output power 50 W

Parameter	**Design**				
	DC-108-24/5-50W	**DC-108-12/12-50W**	**DC-108-24/12-50W**	**DC-108-12/24-50W**	**DC-108-24/24-50W**
Input power supply voltage DC, V	24 (19 to 36)*	12 (9 to 18)*	24 (19 to 36)*	12 (9 to 18)*	24 (19 to 36)*
Output voltage, DC, V	5	12	12	24	24
Max. current, A	10.0	4.2	4.2	2.1	2.1
Rated power, W	50				
Efficiency, %	73	72	75	74	80
Fuse rating, A	5	8	5	8	5
Protection degree	IP22				
Operating temperature, °C	–15 to +55				
Limiting temperature, °C	–60 to +70				
Mounting	wall				
* Range of supply voltage is given in brackets.					

Table 2 – General technical specifications of the Product designs, rated output power 150 W

Parameter	**Design**			
	DC-108-24/12-150W	**DC-108-24/24-150W**	**DC-108-110/12-150W**	**DC-108-110/24-150W**
Input power supply voltage DC, V	24 (19 to 36)*		110 (72 to 144)*	
Input power supply voltage AC 50 Hz, V	–	–	110 (85 to 132)*	
Output voltage, DC, V	12	24	12	24
Max. current, A	12.5	6.3	12.5	6.3
Rated power, W	150			
Efficiency, %	75	77	79	82
Fuse rating, A	10	10	3	3
Protection degree	IP22			
Operating temperature, °C	–15 to +55			
Limiting temperature, °C	–60 to +70			
Mounting	wall			
* Range of supply voltage is given in brackets.				

1.3 OPERATION AND STRUCTURE OF THE PRODUCT

1.3.1 The Product is produced in metal casing; piano type on/off switch and fuse holder are located on the casing, see Figure 1.

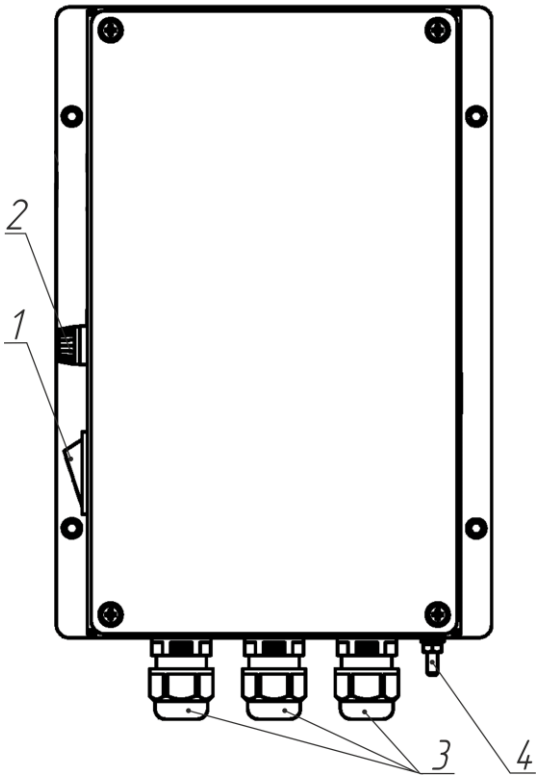

Figure 1 – The Product's appearance

Functional elements and controls of the Product are represented in Table 3.

Table 3 – Functional elements, controls and indication of the Product

N.	Element	Type, identifier, unit size	Description
1	Piano type switch	"ON/OFF"	To switch on/off the Product
2	Fuse holder	–	To install a fuse for the Product protection against SC
3	Cable gland (input)	MG-16	To connect power supply and loads
4	Grounding stud	M4x15	The main element of Product grounding point
Note – See the numbers in Figure 1.			

1.3.2 Power supply is connected to terminals “+” and “–”, loads are connected to terminals “–V” and “+V”, see Figure 2.

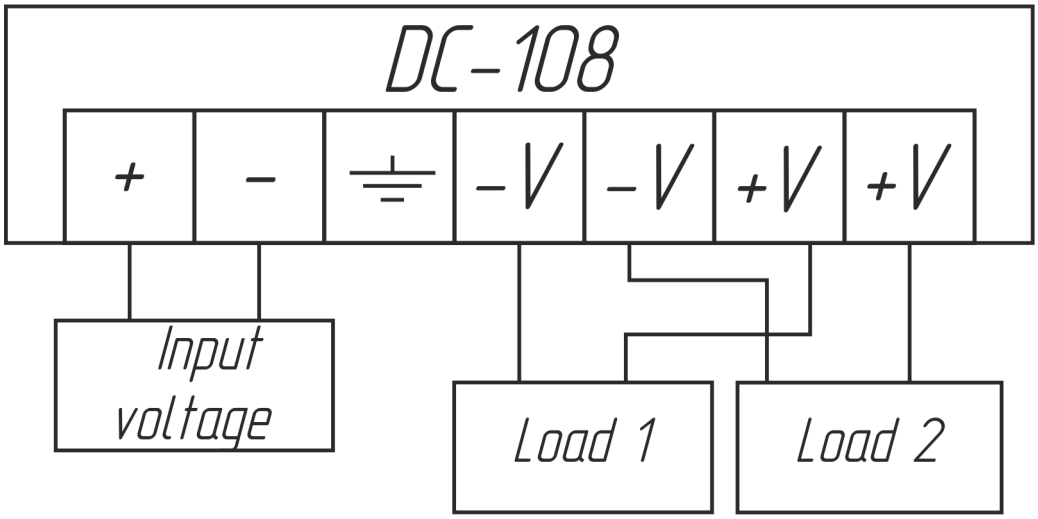

Figure 2 – The Product’s connection diagram

1.4 MEASUREMENT TOOLS, INSTRUMENTS AND APPLIANCES

Amount of consumables required for TS is represented in Table 4.

Table 4 – Amount of consumables required for TS

Name and identifier of consumables	Amount of consumables	Note
Cleaning cloth	0.10 kg	1 To clean surfaces of the unit. 2 To clean severe contamination from surfaces of the unit – soaked in alcohol
Rectified hydrolytic technical ethyl alcohol	0.05 l	To soak cloth to delete contamination from the screen
Varnish	0.05 kg	To cover surfaces of the unit in case of paint coating damage
Abrasive cloth	0.06 x 0.06 m	To polish surfaces of the unit in case of paint coating damage

1.5 MARKING AND SEALING

The nameplates are located on the Product, where the user can find a serial number, date of manufacturing, weight, protection degree, input voltage and output voltage if operated from power mains, output voltage if operated from SB, SB's rated output power and CU's rated output power.

The sealing of the Product is not provided.

1.6 PACKAGING

At the time of delivery the Product is packed in a corrugated board box and inner packaging (air bubble film) 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 transport packaging is not provided.

2 INTENDED USE OF THE PRODUCT

2.1 OPERATIONAL CONSTRAINTS

Select the installation site in compliance with operational constraints (operating temperature and protection degree – IP).

Caution! Distance between the installation site and magnetic compass shall not be less than 1 m!

2.2 USAGE PREPARATIONS

2.2.1 Safety features

While preparing the Product for operation, check it visually after unpacking mechanical damage shall be absent.

Connection to power mains shall be provided only in compliance with input power requirements.

Before connecting the Product shall be switched off and have a proper grounding.

While using the Product 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.

2.2.2 Visual check procedure

Before switching the units on, the staff shall:

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

b) check the absence of dust and dirt on the Product casing; clean with a soft cloth if necessary, see Table 4;

c) check that cable connectors are securely connected to the Product and proper grounding.

2.2.3 Switching on instructions

While connecting the Product and preparing it for operation follow the steps below:

a) transfer circuit breakers of main power switchboard to “OFF” position;

b) connect de-energized power cable to input terminals;

c) transfer circuit breakers of main power switchboard to “ON” position;

d) transfer a piano type switch on the Product’s casing to “ON” position.

2.2.4 Switching the Product off is carried out in the following order:

a) transfer a piano type switch on the Product’s casing to “OFF” position;

b) transfer circuit breakers of main power switchboard to “OFF” position;

c) disconnect de-energized power cable from the Product.

2.3 USAGE OF THE PRODUCT

To use the Product:

a) switch on a circuit breakers of main power switchboard;

b) transfer a piano type switch on the Product’s casing to “ON” position.

3 TECHNICAL SERVICE OF THE PRODUCT

3.1 GENERAL DESCRIPTION

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 semi-annual TS.

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

3.2 SAFETY FEATURES

While maintaining the TS, observe 4.2.

3.3 MAINTENANCE ROUTINE

The list of works for all types of TS is given in Table . Maintenance routine procedure is given in CL, represented in Tables 6–7.

Consumables required for the TS are represented in Table 4.

Table 5 – List of works by TS types

CL №	Work	TS
1	Visual check of the Product	+
2	Test of output voltage compliance	+
Note – “+” – work is obligatory.		

Table 6 – 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; 2 clean up the Product surfaces with clean cloth; 3 remove severe contamination, parts of corrosion, oil spots from the metal surfaces – using ethyl alcohol, avoiding its penetration inside the Product; 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 Product	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 7 – CL № 2. Operability check of the Product

To be done	Routine	Man-hours per 1 Product
Test of output voltage compliance	1 switch off power supply; 2 connect voltmeter to output contacts of the Product; 3 supply power; 4 measure voltage on the output terminals of the Product	1 person 15 mins

3.4 PRESERVATION

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

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

The represerved Product and documents are placed in package.

4 CURRENT REPAIR OF THE PRODUCT

4.1 GENERAL DESCRIPTION

To diagnose the problem, see Table 8.

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 8.

Table 8 – The list of possible malfunctions and troubleshooting

Malfunction	Possible reasons	To be done
The Product does not switch on	NO power mains	Provide the mains power supply
	Piano type ON/OFF switch of the Product is in position "OFF"	Transfer the switch to "ON" position
	Fuse malfunction	Replace fuse

5 STORAGE

The units must be stored in packaging inside areas complying with the required storage conditions (+ 5 to + 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 unpacked only in heated premises and left in normal climate conditions for 12 hours beforehand.

6 TRANSPORTATION

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

Types of shipment:

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

b) air transportation (in sealed and heated compartments);

c) 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

ANNEX A
(MANDATORY)
OUTLINE AND INSTALLATION DIMENSIONS

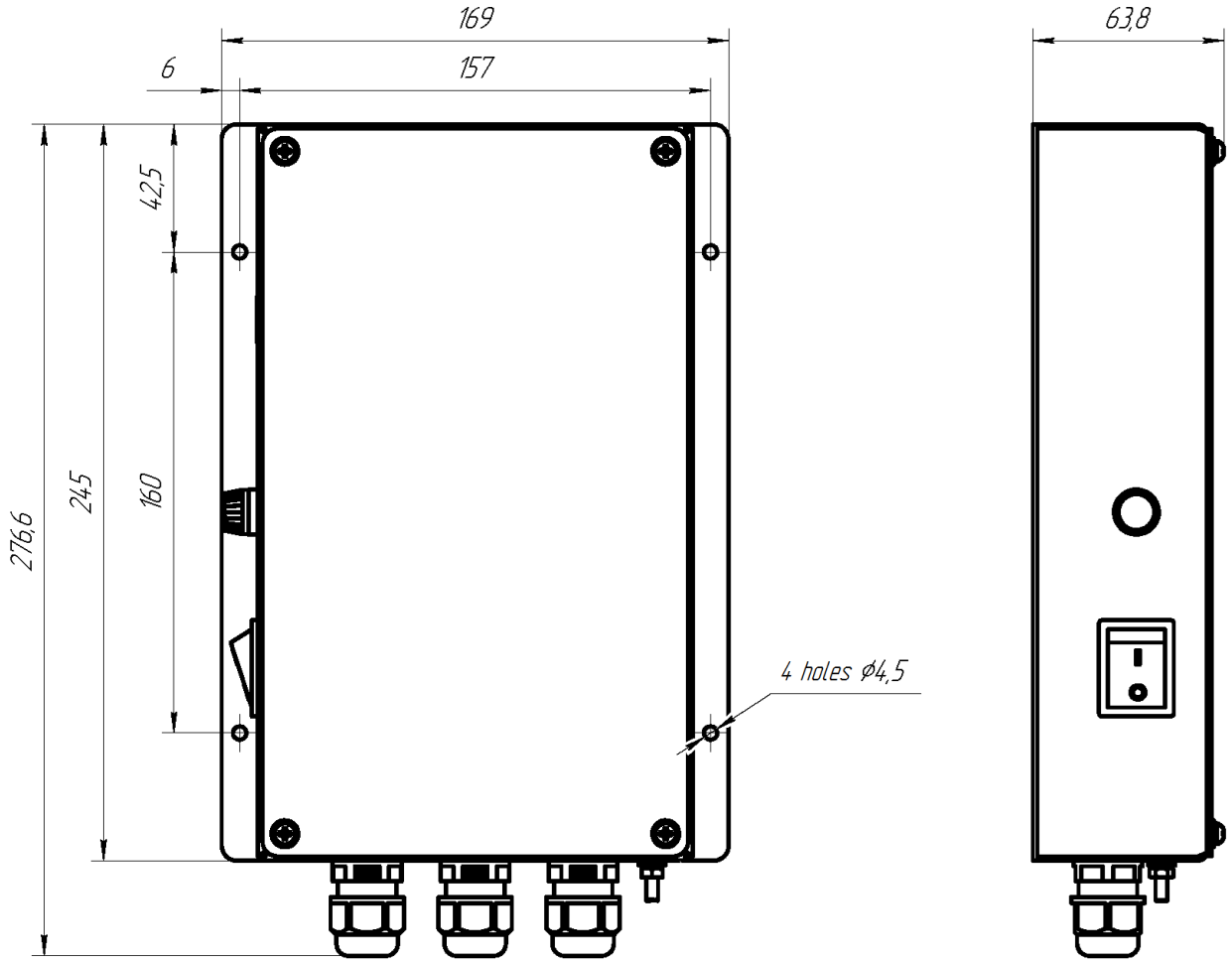

Figure A.1 – Outline and installation dimensions of the Product