Limited Liability Company
«NPK MORSVYAZAVTOMATICA»

AUTOMATIC BATTERY CHARGERS CH-105, CH-105-24

Operating manual

v.1.0

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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 Automatic battery chargers CH-105 and CH-105-24 types (hereinafter referred to as – the Product, the CH).

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 Product according to the applicable regulations.

Terms and abbreviations:

OM – operating manual;

SB – storage battery;

SC – short circuit;

TS – technical service;

CL – check list;

LCD – liquid-crystal display;

LFSG – large fine-pored silica gel granular;

AU-106 – alarm unit AU-106;

AU-206 – alarm unit AU-206;

DTS-135 – temperature sensor DTS-135;

BCP-136 – accumulator batteries control panel BCP-136 (BCP-136-01).

1 DESCRIPTION AND OPERATION OF THE PRODUCT

1.1 DESCRIPTION

The Product operates with AC single-phase mains 50 (60) Hz, voltage 110; 220 V or 24 V DC and automatically charges SBs of shipborne equipment, communication systems and other industrial and transportation equipment.

1.2 MAIN TECHNICAL SPECIFICATIONS

1.2.1 The Product ensures:

a) SB charge;

b) display of present current and voltage values both on local control panel and on BCP-136;

c) integrated alarms:

– main power failure;

– SB reverse polarity connection;

– switching on the Product with disconnected SB (or SB circuit breakdown);

– overload or SC in SB circuit;

– excess of set limits for charge current or voltage;

d) integrated protection against:

– reverse polarity power connection;

– overload or SC in load circuit;

– overcurrent in SB circuit (overload or SC);

e) the Product additionally provides:

– SB deep discharge protection (function may be disabled);

– SB overheating protection if DTS-135 is used;

f) alarm signaling in case of input power failure if AU-106 (AU-206) or BCP-136 are used.

Note – Peripheral equipment (BCP-136, DTS-135, AU-106 (AU-206)) is specified in the scope of supply.

1.2.2 Technical specifications of the Product are represented in Table 1.

Table 1 – General technical specifications of the Product's types

Parameter		Value	
		CH-105	**CH-105-24**
Input voltage, V	AC, frequency 50 (60) Hz	110 (99 to121) [1]; 220 (198 to 242) [1]	–
	DC	–	24 (19 to 36)[1]
Power consumption, W		690	
Max. output power, W		600	500
Charge voltage DC, V		9 to 30	
Charge current, A		0.2 to 20.0	0.2 to 16.0
Rated capacity of recharged batteries, A·h		Max. 200	Max.160
Max. charge time of SB, h		10	
Measurement error	current, A	±0.2, max.	
	voltage, V	±0.1, max.	
Accuracy of adjustment	current, A	0.1	
	voltage, V	0.1	
Alarm signaling		Built-in: relay contacts, sound signaling, light signaling; External (connected) devices: AU-106 or AU-206, BCP-136	
Protection degree		IP22	
Weight, kg		7.1	6.3
Operating temperature, °C		–15 to +55	
Limiting temperature, °C		–60 to +70	
Mounting		wall	

[1] Supply voltage range is given in parenthesis.

1.3 STRUCTURE AND OPERATION OF THE PRODUCT

1.3.1 Functional elements, controls and LEDs

The Product appearance is shown in Figure 1.

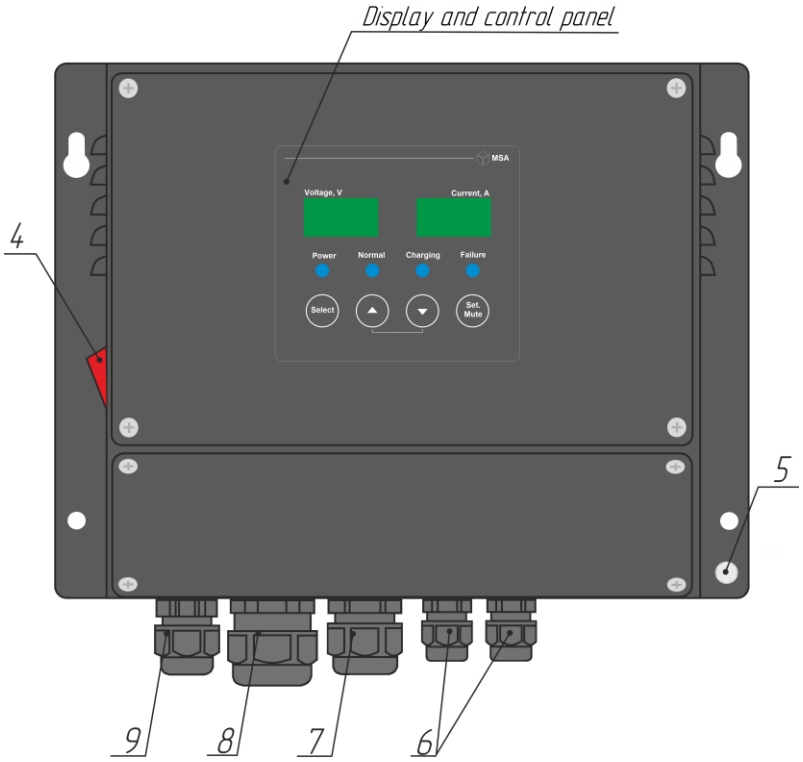


Figure 1 – The Product appearance

Display and control panel is located on the Product's casing, see Figure 2.

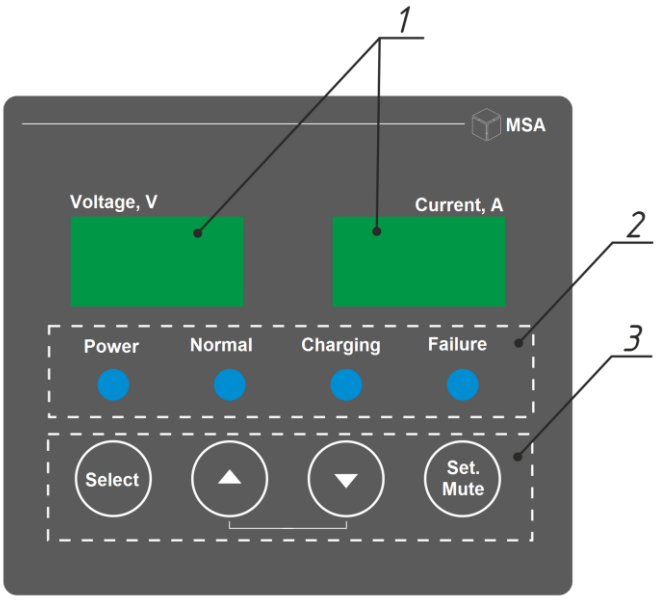


Figure 2 – Control and display panel

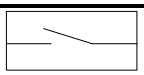
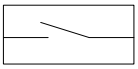
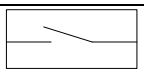
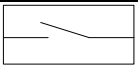
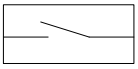
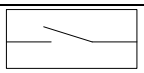
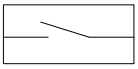
For more information on the Product functional elements, controls, LCDs and LEDs, see Table 2.

Table 2 – Functional elements, controls, LCDs and LEDs

№	Element	Type, size, identifier	Description
1	LCD	"Voltage, V"	Displays current charge (discharge) voltage and menu items: "U", "I", "t", "Pdd"; for more information see 2.3.5
		"Current, A"	Displays present charge (discharge) current, defined values of current or charge, SB temperature and deep discharge protection status "OFF" or "ON"; for more information see 2.3.5
2	Operation mode LEDs	"Power"	Glowing if power is available
		"Normal"	Glowing during final stage of SB charge, i.e. when charger is in voltage stabilization stage (the SB is approaching values defined by user)
		"Charging"	Glowing during main stage of SB charge, i.e. when charger is in current stabilization stage
		"Failure"	Glowing in case of SB discharge or the Product malfunction or no input voltage
3	Controls	"SELECT"	Menu select button
		▲	Navigation buttons to set values of relevant menu item
		▼	
		"SET MUTE"	Switches on (off) alarm mute function. Button to confirm (save) selected value and mute sound signal while light alarm signaling is still working
4	Piano type switch (on/off) with backlight	–	Switches on (off) the charger
5	Stud	M5x15	Main grounding element of the Product
6	Cable gland	MG-16	Connect the Product to power mains and peripheral equipment: DTS-135, BCP-136, AU-106 (AU-206)
7	Cable gland	MG-25	
8	Cable gland	MG-32	
9	Cable gland	MG-20	
Note – Numbers are shown in Figures 1 and 2.			

The Product includes visual, sound and relay alarm of abnormal situation, see Table 3.

Table 3 – Alarm conditions

Alarm condition	Alarm		
	Red LED	Built-in buzzer	Relay alarm
The Product input power failure	+	+	
Switching on the Product with disconnected SB or SB rupture (switching on and off every 5 minutes)	+	+	
SB reverse polarity connection	+	+	
Current overload or SB short circuit	+	+	
Overvoltage in SB circuit (time of alarm operation until next check; check every 5 sec)	+	+	
Charge current exceeds set limits	+	+	
Reverse polarity power connection (only for CH-105-24)	+	+	
Note – "+" light or sound signaling.			

1.3.2 Connection of peripheral devices

1.3.2.1 DTS-135 is installed on rechargeable SB and controls its current temperature. Use DTS-135 only with gel batteries in order to prevent them from "thermal runaway" in case of their buffer connection. DTS-135 is connected to "TS" terminal, see Figure 3.

1.3.2.2 AU-106 (AU-206) ensures visual and sound signaling in alarm mode. AU-106 (AU-206) is used when charger is placed beyond line of sight, where the vessel is typically controlled from; the units also ensure alarm in case of charger input power failure.

AU-106 (AU-206) is connected to group of terminals "AU-106", see Figure 3. Opening (closing) of special charger relay contacts ensures alarm switching on/off: when alarm is switched on – "Alarm" contacts open, when alarm is switched off – close.

1.3.2.3 BCP-136 ensures remote control of the Product, present charge or discharge current and voltage, visual and sound signaling in case of transition to alarm mode.

BCP-136 is connected via standard RS-422 interface; it is connected to “Remote/Bat_control” charger terminal, see Figure 3.

Forced connection of SB to load circuit is carried out by closing contacts of “Forced start key” terminal, see Figure 3.

Use “Forced start key” together with the Product operation mode №1, see 2.3.1, and switched connection type, see Figure 5.

Note – If forced SB connection was activated, SB deep discharge protection is switched off (not depending on the selected operation mode).

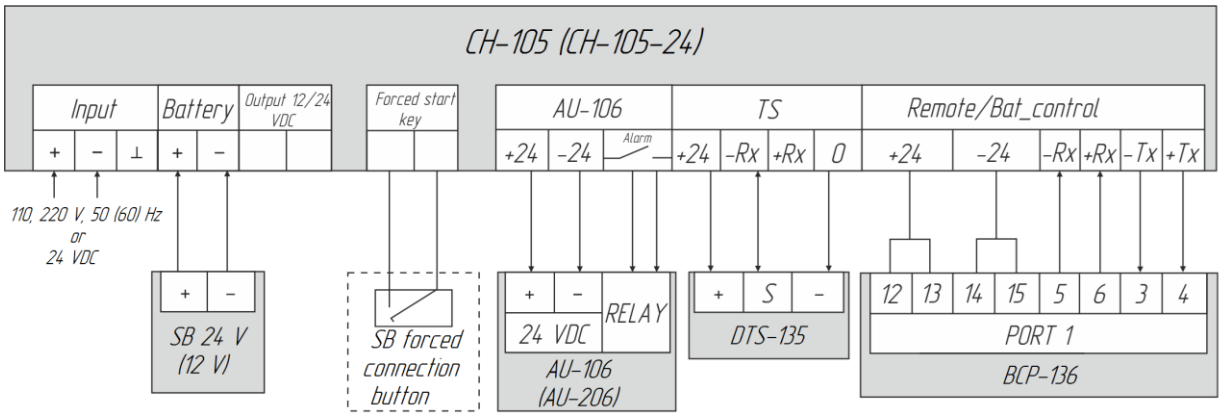


Figure 3 – The Product's connection diagram

1.3.2.4 Load may have direct and switched connection to SB, see Figures 4–5, respectively.

Direct type of connection is used for loads with consumption current more than 30 A, i.e., power exceeds maximum permissible for the Product.

Switched connection is used for loads with max. consumption current 30 A.

Switched type of connection allows for using SB deep discharge protection function, see. 2.3.7. Enable (disable) this function in the Product menu, see 2.3.2.

Selected type of connection (direct or switched), as well as switching of connection type may lead to the limited use of some functions or change the Product's operation.

Note – Voltage of the Product "Output 12/24 VDC" terminal, see Figures 3–6, is directly connected to voltage of SB connected to Product "BATTERY" terminal, see Figures 3–6; thus, if SB with voltage 12 V is connected to charger, voltage of "Output 12/24 VDC" terminal is 12 V; if SB with voltage 24 V is connected to charger, voltage of "Output 12/24 VDC" terminal is 24 V.

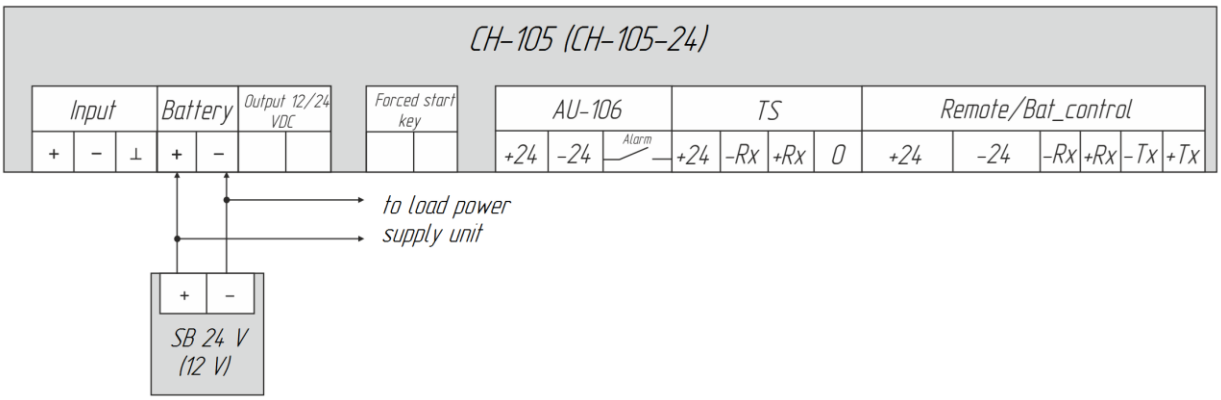


Figure 4 – Diagram of load to SB direct connection

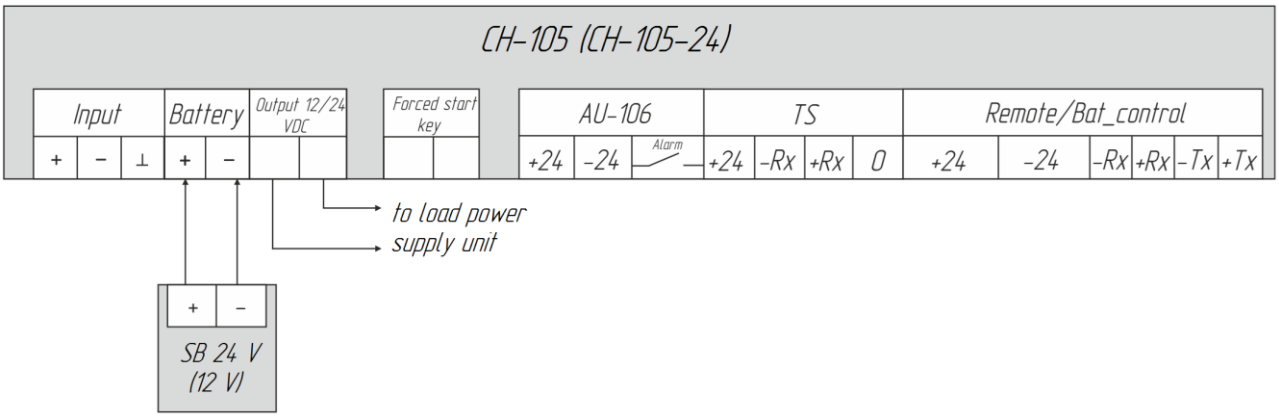


Figure 5 – Diagram of load to SB switched connection

Do not use the Product with connected SB to power the load (i.e., in buffer mode), because the load connected to SB circuit may be limited in power output by the Product (e.g., in case of SC in SB circuit or in case of high drop in charge voltage in case of deeply discharged SB connection). To provide reliable power supply, power the load from separate PSU (see Figure 6).

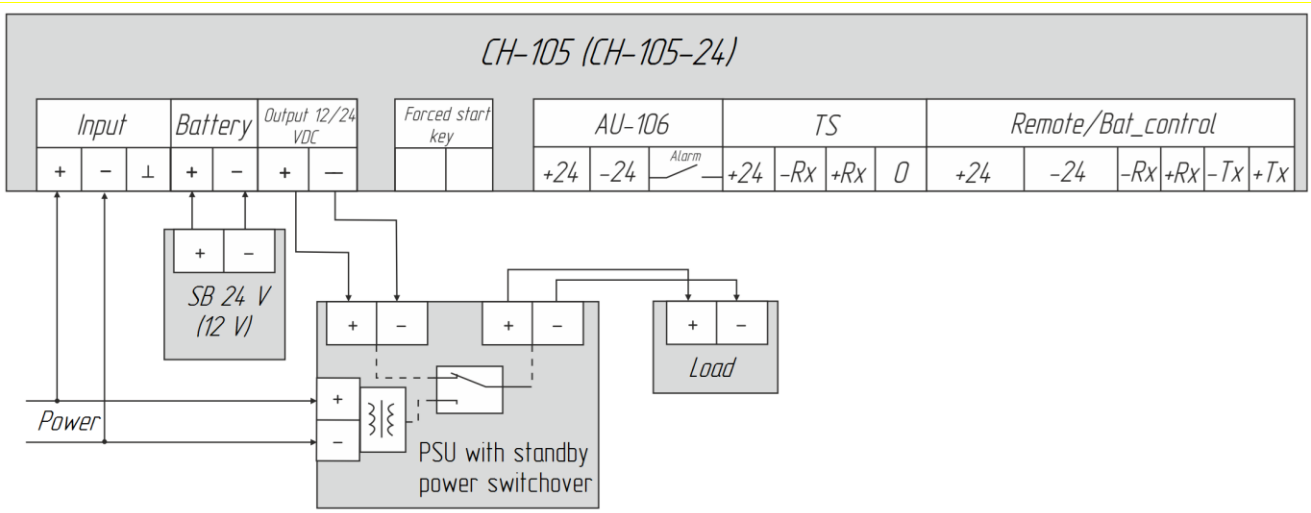


Figure 6 – Load connection using separate PSU

1.4 MEASUREMENT INSTRUMENTS, TOOLS AND APPLIANCES

Consumables required for the TS are represented in Table 4.

Table 4 – Consumables required for the TS

Name and identifier of consumables	Amount of consumables	Note
Cleaning cloth	0.10 kg	To clean contamination from the surfaces
Rectified hydrolytic technical ethyl alcohol	0.01 l	1 To remove severe contamination 2 To clean the Products surface in case of coating damage
Varnish	0.05 kg	To cover surfaces of the Product in case of paint coating damage
Abrasive cloth	0.06 x 0.06 m	To polish surfaces of the Product in case of paint coating damage

1.5 MARKING AND SEALING

The Product has a nameplate indicating name, serial number, date of manufacturing, weight, protection degree, input voltage, charge voltage, charge current and max. 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 an installation place in compliance with operational constraints (operating temperature and protection degree).

It is prohibited to stretch cables connected to Product!

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 Product on:

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

– check the absence of dust and dirt on the Product casing; clean with a soft cloth if necessary;

– check that cable connectors are securely connected to the Product, and it has a reliable grounding.

2.2.3 Switching on instructions

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

– transfer circuit breakers of main power switchboard to “ON” position»;

– transfer a piano type switch on the Product's casing to "ON" position.

To switch The Product off:

– transfer a piano type switch on the Product's casing to "Off" position;

– transfer circuit breakers of main power switchboard to "Off" position.

2.3 USAGE OF THE PRODUCT

2.3.1 The Product operation modes

Set operation modes in the Product menu "Pdd" using "Forced Start Key" terminal depending on the selected load connection type, see Figures 4–5.

Table 5 – The Product operation modes

Operation modes	Menu settings	Status of "Forced Start Key" terminal contacts
№ 1	"Pdd" value "OFF"*	opened
№ 2	"Pdd" value "OFF"*	closed by jumper
№ 3	"Pdd" value "ON"*	opened
Note – "*" means enabling (disabling) deep discharge protection function.		

Operation mode № 1 – in case of power failure the Product disconnects SB circuit (load from SB, external signaling units AU-106 (AU-206) and BCP-136, and then disconnects itself). As the Product shuts off completely integrated alarm is not activated.

Note – connect AU-106 (AU-206) power directly to SB or separate PSU (if AU-106 (AU-206) are used together with the Product in this mode).

Operation mode № 2 – in case of power failure the Product is still connected to SB, power, loads and external signaling units AU-106 (AU-206) and BCP-136 are switched to SB power supply. SB deep discharge protection is not active in this mode.

Operation mode № 3 – in case of power failure the Product is still connected to SB, power, loads and external signaling units AU-106 (AU-206) and BCP-136 are switched to SB power supply. SB deep discharge protection is active in this mode.

The Product is delivered from the Manufacturer's plant with set operation mode № 3.

For more information on operation modes at direct and switched connection types, see Table 6.

Table 6 – Description of the Product operation depending on the selected operation mode and connection diagram

Connection type	Operation mode №	The Product status in case of power mains failure	Deep discharge protection
Direct	1	1 The Product is disconnected from SB circuit; 2 SB charge is not controlled; display of current voltage is not available; 3 SB is discharged by load (uncontrolled); 4 Integrated alarm is not active	Not active
	2	1 The Product is powered from SB; 2 SB discharge is not controlled; display of current voltage is available; 3 SB is discharged by load (uncontrolled); 4 Integrated alarm is active	Not active
	3	1 The Product is powered from SB; 2 SB discharge is not controlled; display of current voltage is available; 3 Integrated alarm is active	Not active
Switched	1	1 The Product is disconnected from SB circuit; 2 SB is disconnected from load; 3 Integrated alarm is not active	Not active
	2	1 The Product is powered from SB; 2 SB discharge is controlled; display of present voltage and current is available; 3 Integrated alarm is active	Not active
	3	1 The Product is powered from SB; 2 SB discharge is controlled; display of present voltage and current is available; 3 Integrated alarm is active	Active

Recommendations on operation modes:

– use operation mode № 1 in case of direct connection. Use operation mode № 2 to observe current voltage on SB and ensure active alarm of power supply failure;

– use operation mode № 3 in case of switched connection. Use operation mode № 1 to save SB capacity and use manual load connection to SB.

2.3.2 Menu structure

Menu of automatic chargers CH-105 and CH-105-24 has the following structure, see Figure 7 and Table 7.

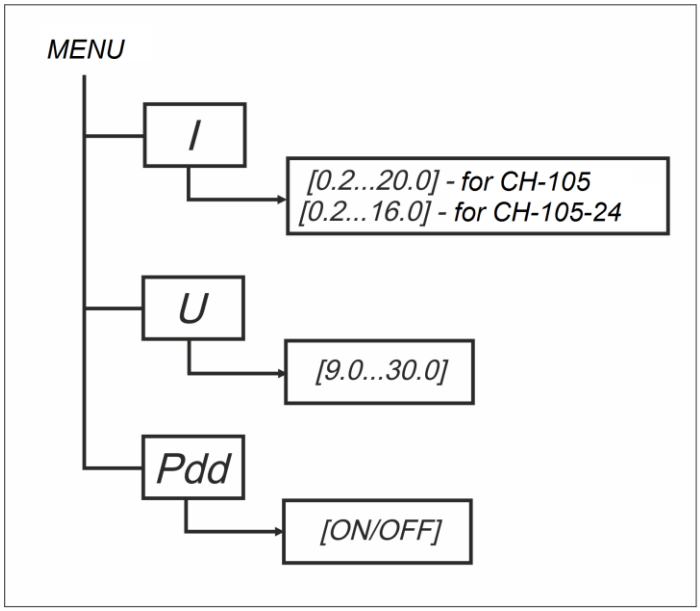


Figure 7 – the Product's menu structure

Table 7 – Description of the Product's menu items

Menu item	Description
Charge current "I"	To select SB charge current value within the range: for CH-105 0.2 to 20.0 A; for CH-105-24 0.2 to 16.0 A
Charge voltage "U"	To select SB charge voltage value within the range 9 to 30 V
Operation mode "Pdd"	To activate SB deep discharge protection: – To switch on - "ON"; – To switch off - "OFF"

2.3.3 Protection

The Product ensures the following protection:

a) inductive-capacitive filters (built-in) ensure protection against transient processes in power circuit. The filters suppress interference in power circuit ensuring uninterruptible operation;

b) electronic lock of power output ensures protection against current overload and SC in SB circuit. Once SC or overload occurs, the Product registers the rise of out-

put current and cuts off the power from power output, activating alarm signaling (sound signal switches on; LED is glowing red; relay contacts open). Power output is switched off until the reason of overload or SC is removed; once it is done, the lock is automatically released; the Product starts operation and SB is charged in standard mode;

c) product's electromechanical switch off from SB ensures protection against SB reverse polarity connection with alarm signaling (sound signal activates; LED "Error" is glowing red; relay contacts open). After connection with relevant polarity the Product automatically connects to SB and continues charging in standard mode;

d) the Product software protects SB against overheating by choosing a charging mode. To activate this protection, use DTS-135 fastened directly on the SB side. DTS-135 transmits current SB temperature via communication cable. Once the temperature increases, the Product automatically decreases charge voltage and current to prevent SB from heating. Alarm is not activated, because charge parameters are changed in dynamic mode;

e) order of power phase connection is not essential; the Product will operate without malfunctions at any order. This type of protection is not supported by alarm and applied only to CH-105 type.

2.3.4 AU-106 (AU-206) or BCP-136 connection

To ensure alarm signaling, use AU-106 (AU-206) or BCP-136; the units provide sound and visual signaling of no input power or transition to emergency operation mode.

Alarm activation of AU-106 (AU-206) is based on dry contacts closing (opening), see 1.3.2.

BCP-136 receives alarm signal from the Product in digital form via RS-422 channel, see 1.3.2.

AU-106 (AU-206) and BCP-136 are powered from rechargeable SB, or, if necessary, from other independent power sources.

2.3.5 The Product's settings

2.3.5.1 To set charge current, use built-in keyboard and provide the following steps:

– Press and hold "SELECT" button on the casing until character "I" appears on the left LCD. The right LCD displays the charge current which was set before;

– using ▲ and ▼ set the charge current value;

– press “SET. MUTE” to confirm the choice and record it in the non-volatile memory.

2.3.5.2 To set charge voltage, use built-in keyboard and provide the following steps:

– press and hold “SELECT” button on the casing until character “U” appears on the left LCD. The right LCD displays the charge voltage which was set before;

– using ▲ and ▼ set the charge voltage value;

– press “SET. MUTE” to confirm the choice and record it in the non-volatile memory.

2.3.5.3 To switch on/off SB deep discharge protection function, use built-in keyboard and provide the following steps:

– press and hold “SELECT” on the casing until the left LCD displays characters “Pdd”. The right LCD displays current function status “OFF” or “ON”;

– using ▲ and ▼ set status “ON” – or “OFF”;

– press “SET. MUTE” to confirm the set status and record it in the non-volatile memory.

CAUTION! Observe 2.3.1 before switching on SB deep discharge protection.

2.3.6 Display of current SB temperature

The Product may display temperature of rechargeable SB. SB heating is controlled by DTS-135 which is fastened directly on SB.

To activate this function:

– in standard operation mode press ▼, the left LCD displays character “t”, the right one – current SB temperature (if DTS-135 is not used, the right LCD shows “– – –”);

– in 10 sec the Product will transfer to main operation mode and LCDs will display present charge voltage and current strength (press ▼ again during displaying data on SB temperature and the Product will return to standard operation mode).

Note – This function is available if DTS-135 is included in the scope of supply.

2.3.7 SB deep discharge protection

Function of deep discharge protection allows for the most efficient use of SB capacitive characteristics and prolongs its lifetime. To activate the function, select menu item “Pdd” and set “ON” status. If “OFF” status is selected, the function is switched off.

SB deep discharge protection may be used only if load switched connection is used, see Figure 5.

If direct connection is used, see Figure 4, protection function shall be switched off.

SB deep discharge protection activates at residual voltage 19.2 V – for SB 24 V and 9.6 V – for SB 12 V.

2.3.8 Energy saving mode

Energy saving mode enables to prolong time of load powering from SB. Digital LCDs (to display present values of charge current and voltage) are switched off in this mode.

Energy saving mode is activated automatically in case of power mains failure.

To activate LCDs, press “SELECT” button on the casing; they will start displaying within 3 sec.

In case of main power recovery energy saving mode is switched off.

2.3.9 Recommendations on charge current values

To recharge SB, set the current values in compliance with the Manufacturer’s recommendations (factory parameters) given in SB certificate.

If, for any reason, it is impossible, the Manufacturer recommends to set charge current values not more than 10 % from SB capacity.

Sample calculation:

at SB capacity (C) – 150 A·h, charge current equals C_{150} * 0.1 = 15 A.

Note – This current value prevents SB from damage in case of overcurrent.

2.3.10 Recommendations on charge voltage values

SB charge voltage shall be set in compliance with SB documentation (factory charge voltage parameters).

If, for any reason, it is impossible, the Manufacturer recommends to set charge voltage values 28.4 V for SB with voltage 24.0 V, and 14.2 V for SB with volt-

age 12.0 V. If SB is placed far remotely from the Product, slightly increase charge values in order to compensate loss due to power line length.

Note – Given charge voltage values are optimal for the majority of shipborne SBs.

If the Product is used without DTS-135, control the SB temperature during first 24 hours after setting recommended charge voltage; in case of obvious overheating decrease the set current and charge values unless you find the optimal thermal regime. DTS-135 installation is mandatory for gel batteries having buffer connection when load is powered directly from SB (PSU is absent).

CAUTION! The manufacturer highly recommends to observe SB documentation in every particular case of use.

3 TECHNICAL SERVICE OF THE PRODUCT

3.1 GENERAL DESCRIPTION

The Product's 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 all types of TS:

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

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

TS-1 and TS-2 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

List of works by TS types is represented in Table 8. Maintenance routine procedure is given in CL, represented in Table 9–12.

The list of works for all types of TS is given in Table 4.

Table 8 – List of works by TS types

CL No.	Work	TS Type	
		TS-1	TS-2
1	Visual check of the Product	+	+
2	The Product operability test	+	+
3	Power circuit insulation resistance check	–	+
4	Output voltage compliance test	–	+
Notes 1 "+" – work is obligatory. 2 "–" – work is not obligatory.			

Table 9 – 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 AK-113 and dry up	1 person 5 minutes
Check reliability of cable and bus connection to the Product	1 check that connectors and attaching screws are fastened tight; provide further fastening if needed; 2 check the cable integrity (mechanical damage shall be absent) within visibility	1 person 5 minutes

Table 10 – CL № 2. Operability check of the Product

To be done	Routine	Man-hours per 1 Product
Check the Product's operability	1 switch the power on; 2 make sure that power On (Off) button backlight is glowing green	1 person 5 minutes

Table 11 – CL № 3. Power circuit insulation resistance check

To be done	Routine	Man-hours per 1 Product
Power circuit insulation resistance check	1 check insulation resistance between conductors and Product casing using megaohmmeter (generator type); 2 the insulation resistance shall not exceed 1 Mohm	1 person 15 minutes

Table 12 – CL № 4. Test of output voltage compliance

To be done	Routine	Man-hours per 1 Product
Test of output voltage compliance	1 connect voltmeter to the Product's output contacts; 2 measure voltage on output terminals.	1 person 15 minutes

3.4 PRESERVATION

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

The time of 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.

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

The Product's operability is controlled by piano type switch backlight glowing green.

To diagnose the problem, see Table 13.

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 13.

Table 13 – The list of possible malfunctions and troubleshooting

Malfunction	Possible reasons	To be done
The Product does not switch on	No power mains	Provide power mains
	The piano type switch located on the Product casing is in OFF position	Transfer the piano type switch to On position
	Circuit breaker of the Product network is switched off or actuated	Transfer circuit breaker to on position
Alarm signal of power supply failure is absent	Operation mode № 1 is selected	Set relevant operation mode (see 2.3.1)

Malfunction	Possible reasons	To be done
SB is not recharging	The Product's set charge voltage is lower than voltage level of connected SB	Set relevant charge voltage (see 2.3.5.2)
	SB circuit rupture	Switch the Product off. Remove the rupture. Switch the Product on.
	SB malfunction	Replace SB
The Product does not supply voltage to SB connection terminals (in case of not connected SB)	The Product shows zero voltage without connected SB	Connect SB to the Product (supply voltage to SB connection terminals)
The Product LCD show zero	SB is not connected to the product	Connect SB to the Product
	Reverse polarity connection of SB and the Product	Change the polarity
Digital indicators do not operate	Indication board to central board flat cable is not connected or disconnected	Connect the tail to the relevant board connectors
	The Product is in energy saving mode	see 2.3.8
The Product controls do not work	Buttons board to central board flat cable is not connected or disconnected	Connect the tail to the relevant board connectors

5 STORAGE

The Product 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:

- 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 Product 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

APPENDIX A
(MANDATORY)
OUTLINE AND INSTALLATION DIMENSIONS

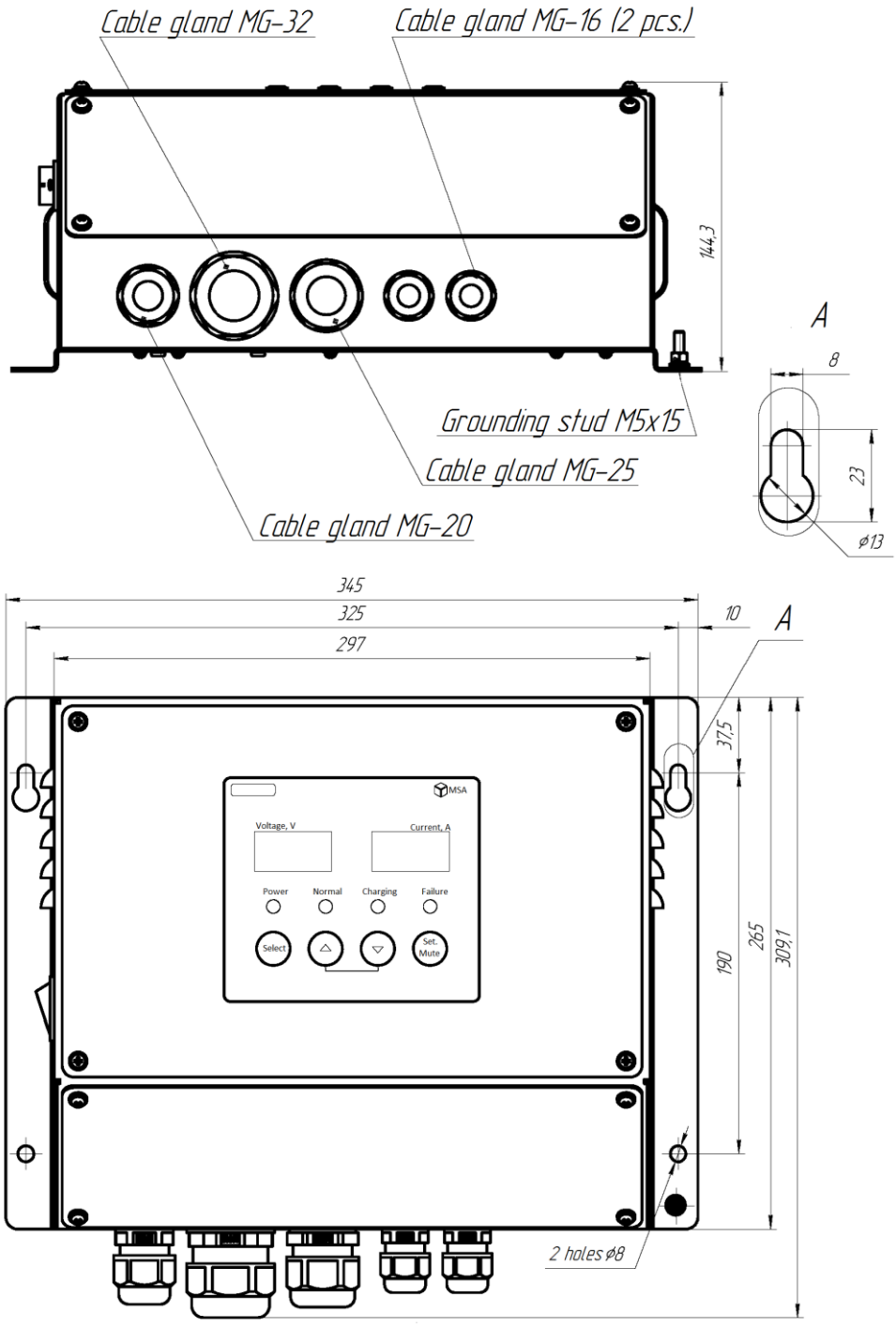


Figure A.1 – CH-105, CH-105-24 outline and installation dimensions

APPENDIX B
(MANDATORY)
DESCRIPTION AND PURPOSE OF PERIPHERAL UNITS

B.1 ALARM UNIT AU-106

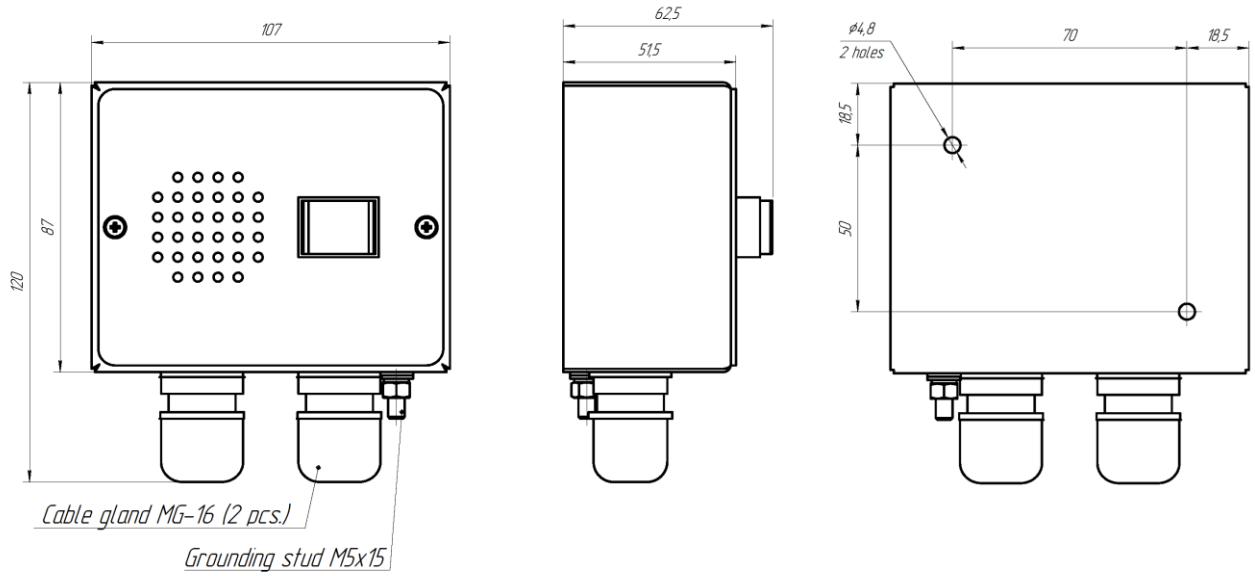


Figure B.1 – AU-106 outline and installation dimensions

Description:

Ensures alarm signaling (light and sound signals)

Features:

Sound alarm mute

Technical specifications:

- *rated input voltage: 24 V DC*
- *max. power consumption: 2 W*
- *max. consumption current on input "Relay": 5 mA*
- *operating temperature: –15 °C to +55 °C*
- *protection degree: IP22*
- *weight: 0.5 kg*

Mounting type:

- *console*
- *wall*

B.2 ALARM UNIT AU-206

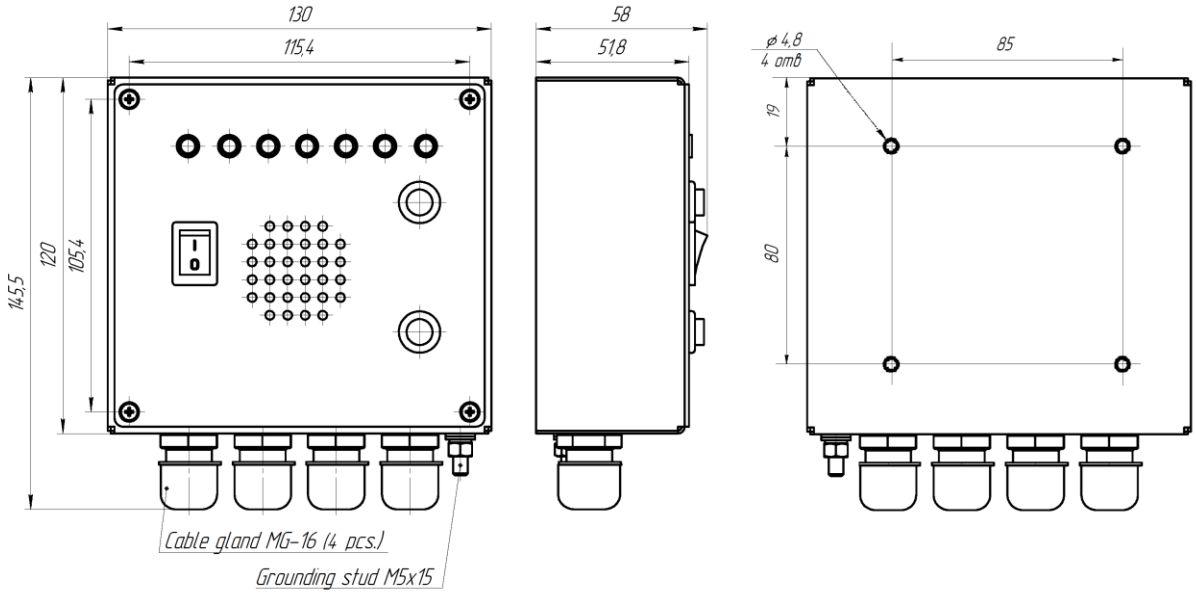


Figure B.2 AU-206 outline and installation dimensions

Description:

Ensures alarm signaling (light and sound signals)

Features:

Sound alarm mute

Technical specifications:

- *rated input voltage: 24 V DC*
- *max. power consumption: 3 W*
- *max. consumption current on input "Relay": 15 mA*
- *operating temperature: –15 °C to +55 °C*
- *protection degree: IP22*
- *weight: 0.66 kg*

Mounting type:

- *console*
- *wall*

B.3 ACCUMULATOR BATTERIES CONTROL PANEL BCP-136

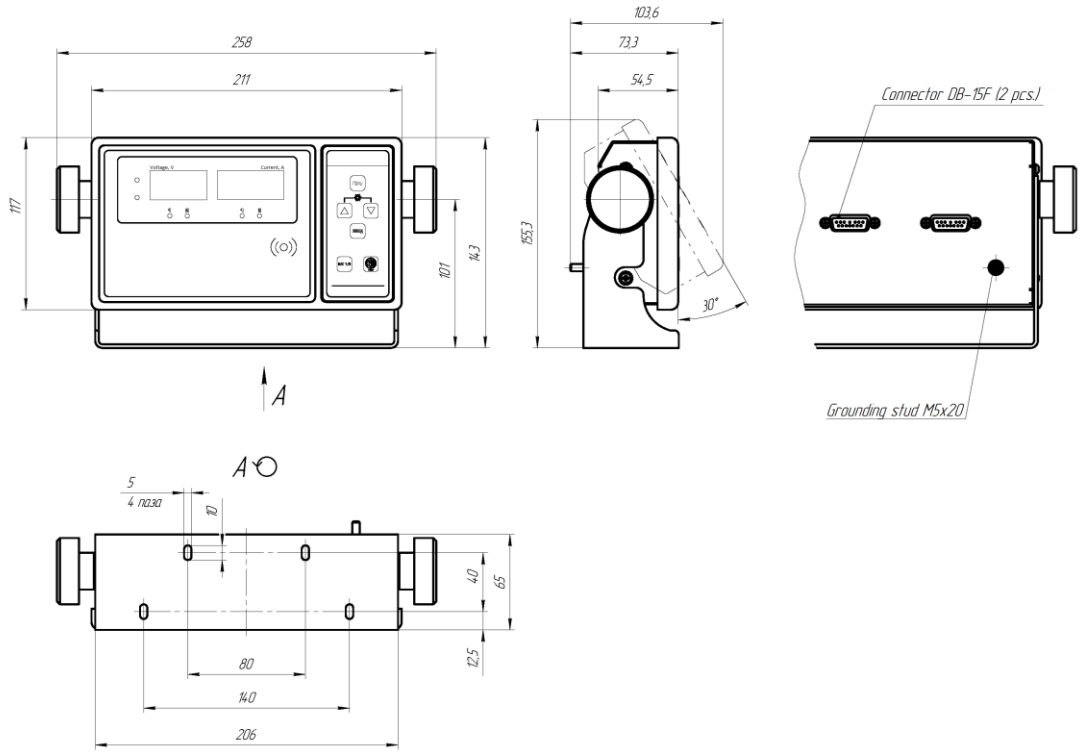


Figure B.3 – BCP-136 outline and installation dimensions

Description:

Ensures charger remote control; displays present values of charge (discharge) current and voltage; repeats charger alarms with sound and light signaling

Features:

- *sound alarm mute*
- *control over two automatic chargers*
- *integrated function "lamp test" (mode to test operability of sound alarm and indication)*
- *digital and analog interface support*

Technical specifications:

- *rated input voltage: 24 V DC*
- *power consumption: 3 W*
- *analog channel measurement accuracy:*

– current 0.01 A

– voltage 0.01 V

- *operating temperature: –15 °C to +55 °C*
- *limiting temperature: –55 °C to +70 °C*
- *protection degree: IP22*
- *weight: panel - 1.46 kg;*
- *weight desk-top on a bracket - 1.57 kg*

Mounting type:

- *desk-top on a bracket*
- *panel*

B.4 ACCUMULATOR BATTERIES CONTROL PANEL BCP-136-01

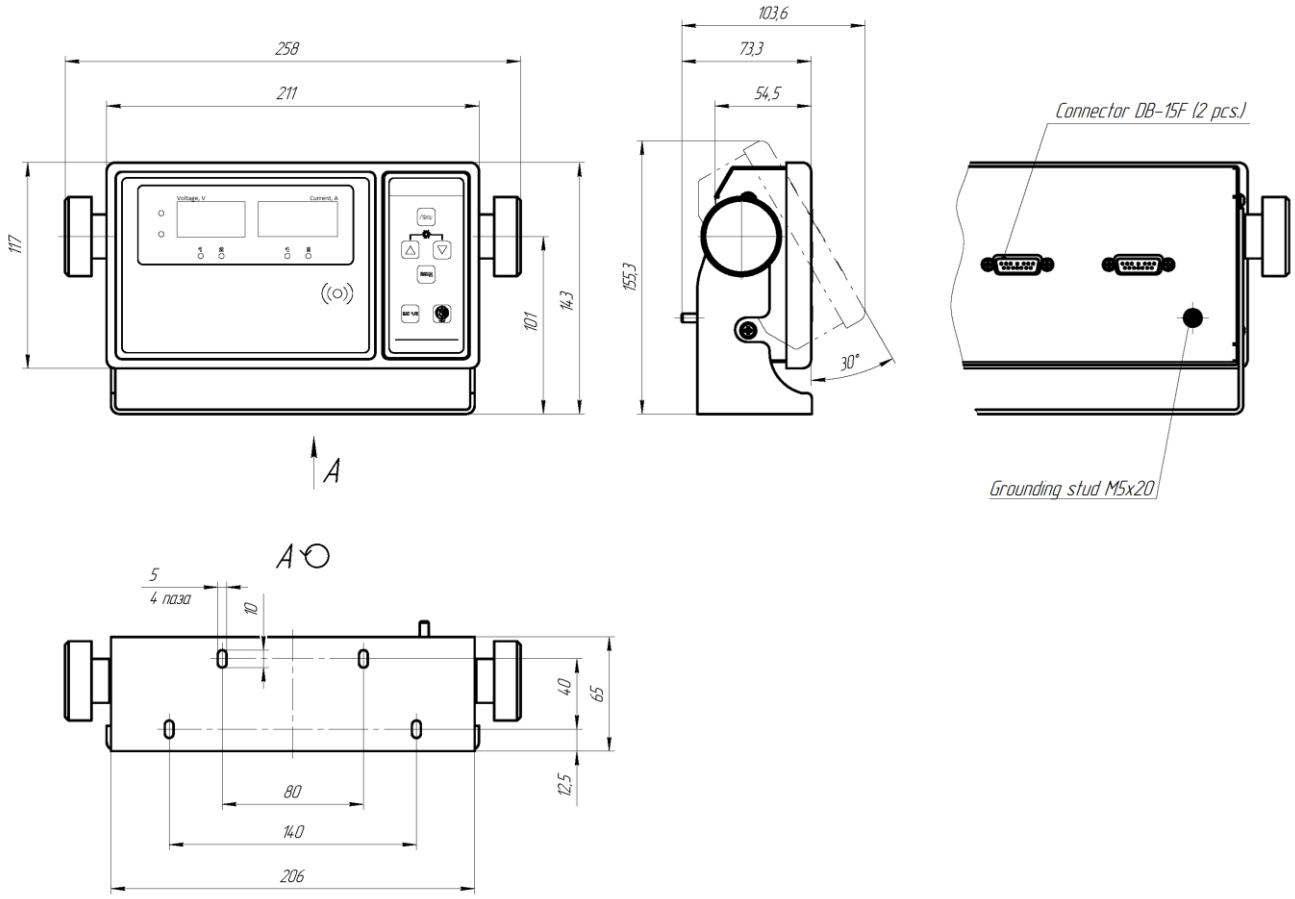


Figure B.4 – BCP-136-01 outline and installation dimensions

Description:

Ensures charger remote control; displays present values of charge (discharge) current and voltage; repeats charger alarms with sound and light signaling

Features:

- *sound alarm mute*
- *control over two automatic chargers*
- *integrated function "lamp test" (mode to test operability of sound alarm and indication)*
- *digital and analog interface support*

Technical specifications:

- *rated input voltage: 24 V DC*
- *power consumption: 3 W*
- *operating temperature: –15 °C to +55 °C*
- *limiting temperature: –55 °C to +70 °C*
- *Protection degree: IP22*
- *weight: panel - 1.46 kg;*
- *weight desk-top on a bracket - 1.57 kg*

Mounting type:

- *desk-top on a bracket*
- *panel*

B.5 TEMPERATURE SENSOR DTS-135

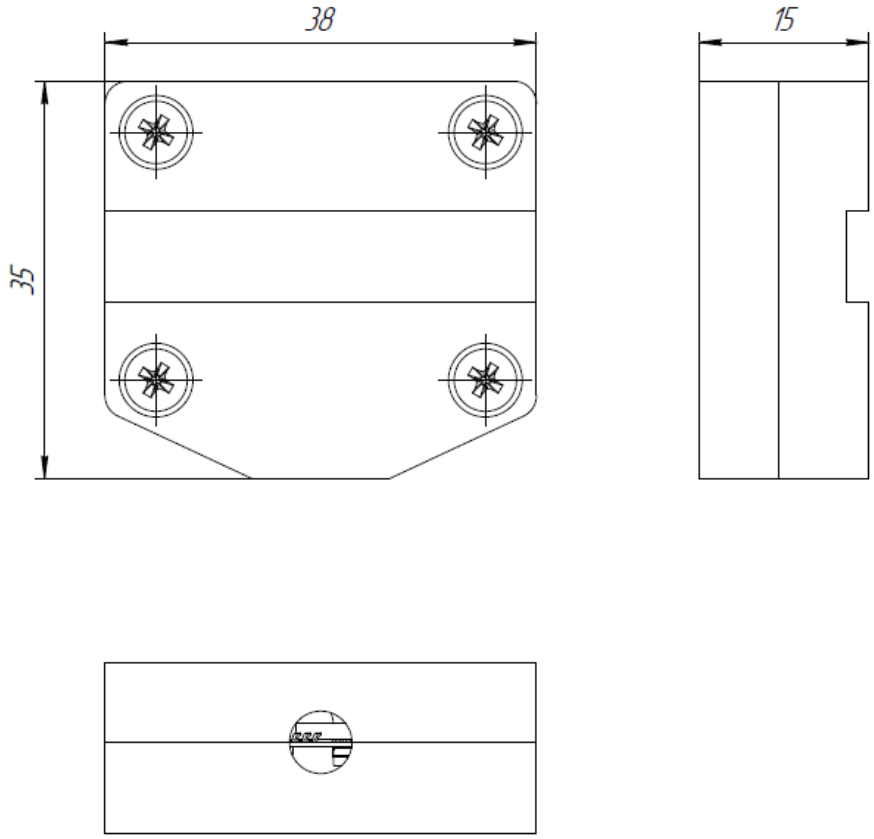


Figure B.5 – DTS-135 outline and installation dimensions

Description:

Measures current SB temperature and transmits received data by digital channel of "one-wire" type

Features:

- *digital*
- *delivered with standard 3 m cable*

Technical specifications:

- *input voltage: 3.0 to 5.5 V DC*
- *max. power consumption: 0.1 W*
- *measurement error: ±0.5 °C*
- *measurement range: –55 °C to +125°C*
- *Protection degree: IP44*
- *weight: 0.13 kg*

Mounting type:

- *fastened to SB casing using glue or tape*