

Power Supply unit / charger PCH-205

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 power supply/automatic battery charger PCH-205 (hereinafter referred to as the Product, PCH).

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;

PCH – Power Supply unit / charger PCH-205;

DTS-135 – Temperature sensor DTS-135;

BCP-136 – Accumulator batteries control panel BCP-136 (BCP-136-01);

AU-106 – Alarm unit AU-106;

AU-206 – Alarm unit AU -206;

LCD – liquid crystal display;

SB – storage battery;

TS – technical service;

CL –check list;

SC – short circuit;

CU – charging unit;

PSU – power supply unit;

LFSG – large fine-pored silica gel granular.

1 DESCRIPTION AND OPERATION OF THE PRODUCT

1.1 DESCRIPTION

The Product is designed to operate with single-phase mains 50 (60) Hz 110; 220 V AC and provide regulated voltage of 24 V DC to different shipborne and industrial equipment. The PCH ensures charge of connected storage batteries in automatic mode.

1.2 MAIN TECHNICAL SPECIFICATIONS

1.2.1 The Product ensures:

a) charge of connected storage batteries; load power supply with regulated voltage of 24 V DC;

b) in case of a main power failure the Product automatically switches over the load to the storage battery and vice versa;

c) charge current and voltage of SB can be set up using a keyboard located on the Product's casing, see Figure 1;

d) the following additional units can be connected:

– BCP-136 to provide remote settings and control of the PCH, and to repeat the alarm signaling;

– AU-106 (AU-206) to repeat the alarm signaling of PCH;

– DTS-135 to control SB temperature.

Note – General technical specifications of these units are represented in Annex B;

e) short circuit protection of the output contacts;

f) light and visual alarm in case of:

– power mains failure;

– SB reverse polarity connection;

– PCH switching on when SB is disconnected or SC circuit rupture;

– excessive voltage in power circuit;

– overload or SC in SB circuit;

– exceeding the limits of charge current or voltage;

g) built-in protection in case of:

- voltage overload in power mains;
- reverse polarity power connection;
- reverse polarity SB connection;
- overload or SC in SB circuit;
- SC in load connection circuit.

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

Table 1 – General technical specifications of the Product designs

| Parameter | | Value | | | |
|--|------------|---------------------------------|---------------------|---------------------------|---------------------|
| | | PCH-205 (integrated control) | | PCH-205 (basic design) | |
| Input voltage AC, frequency | | 220 (180 to 264)* | 110 (90 to 132)* | 220 (180 to 264)* | 110 (90 to 132)* |
| Output voltage DC, V | | 24 ± 10 % | | | |
| Output voltage if powered from Storage battery (hereinafter – SB), V | SB 24 V | 19.2 to 30.0 | | | |
| | SB 12 V | 9.8 to 18.0 | | | |
| Output current of built-in charger, A | | 0.2 to 20.0 | | | |
| Output voltage of built-in charger, V | | 9.0 to 30.0 | | | |
| Rated output current, A | | 37 | | | |
| Rated power of built-in power supply, W | | 1000 | | | |
| Rated power of built-in charger, W | | 600 | | | |
| Power consumption, W | | 1826 | | | |
| Capacity of connected SBs, A·h | SB 24 V | 200 | | | |
| | SB 12 V | 200 | | | |
| SB charge time up to 80 % capacity, hours | | max 10 | | | |
| Number of terminals to connect load to built-in power supply, pcs. | | 7 | | | |
| Terminals of built-in charger to connect SB, pcs. | | 1 | | | |
| Operating temperature, °C | | –15 to +55 | | | |
| Limiting temperature, °C | | –60 to +70 | | | |
| Protection degree | | IP22 | | | |
| Mounting type | | wall | | | |
| Discharge | current, A | accuracy ±0.2 | | | |
| | voltage, V | accuracy ±0.1 | | | |

| Parameter | Value | |
|--|--|---|
| | PCH-205 (integrated control) | PCH-205 (basic design) |
| Built-in protection | <ul style="list-style-type: none">– galvanic isolation of output power from power mains;– reverse polarity SB connection;– deep discharge protection of SB (at option);– overheating protection if applied DTS-135 | |
| Functions of control and monitoring | <ul style="list-style-type: none">– keyboard to control SB charge current and voltage;– select of deep discharge mode;– digital LCD for SB’s current and charge;– LEDs for operation modes;– built-in sound and light alarm signaling;– alarm mute button (sound) | <ul style="list-style-type: none">– LED for operation mode;– built-in sound and light alarm signaling;– alarm mute button (sound) |
| Alarm signal sources | <ul style="list-style-type: none">– built-in: relay contacts, sound signal, light indicator (LED);– external (connected additional units): AU-106 (AU-206), BCP-136 | |
| Alarm | <ul style="list-style-type: none">– loss (failure) of power supply voltage;– exceeding the preset limits of SB charge current and voltage;– no connection to SB (SB circuit rupture, reverse polarity SB connection, SC in SB circuit);– SB discharge | |
| * Power supply voltage range is given in brackets. | | |

1.3 OPERATION AND STRUCTURE OF THE PRODUCT

1.3.1 General information

The Product consists of two modules: a power supply unit and battery charger. The modules are self-contained; they are connected by switching unit.

When power supply is available, the switching unit connects load to power supply unit; in case of power supply loss it automatically switches the load to SB power supply. Once the power supply is restored, the switching unit automatically switches the load to the power supply unit; the storage battery charge continues in automatic mode.

The Product allows for automatic charging of connected SBs and, at the same time, ensures output voltage of 24 V DC to power the load.

SB is charged according to the combined method: operation is carried out in the mode of current stabilization in the phase of main charge, with switching over to voltage stabilization mode in the final phase.

1.3.2 Controls and LEDs

The Product's appearance is represented in Figure 1.

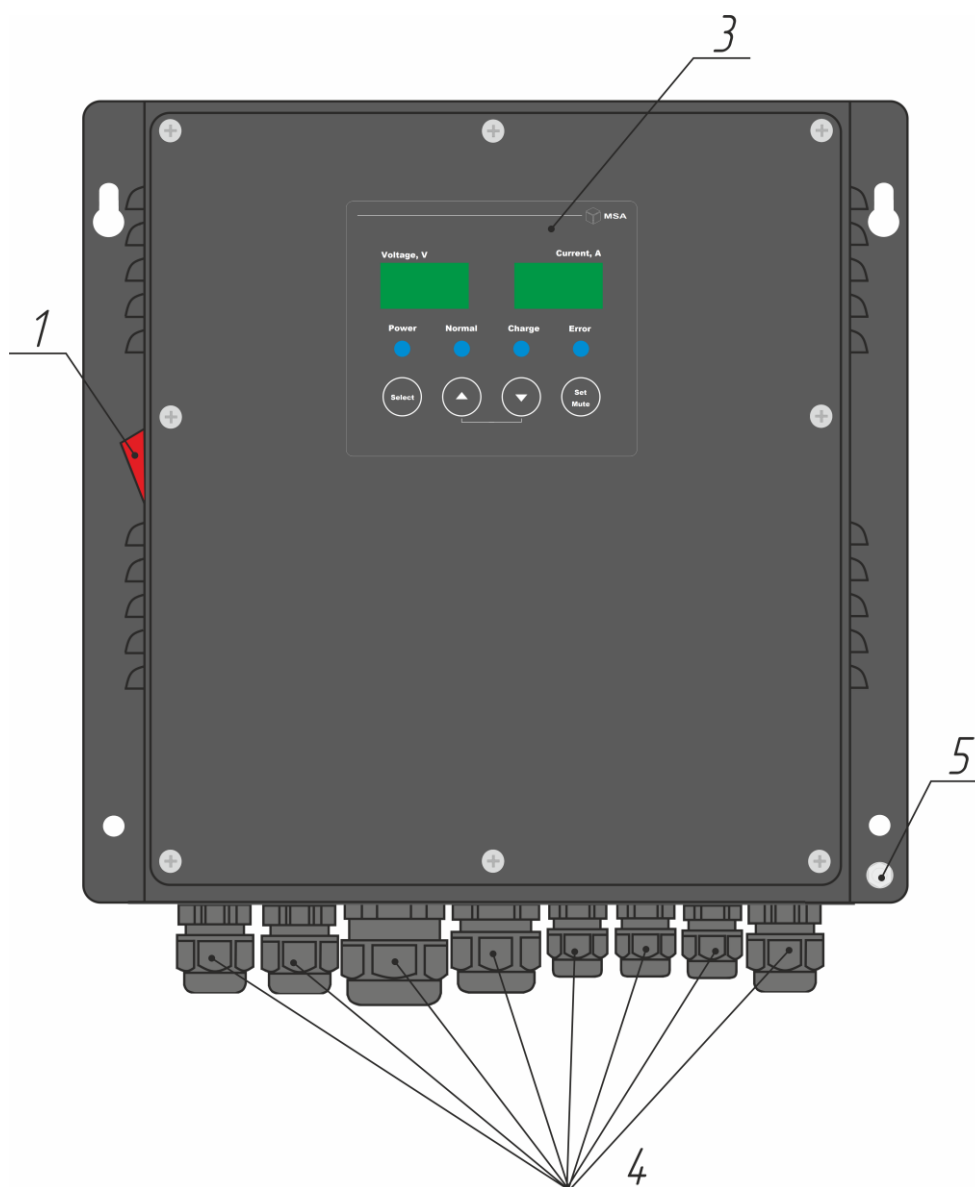


Figure 1 – Functional elements, controls and indication of the PCH with an integrated control

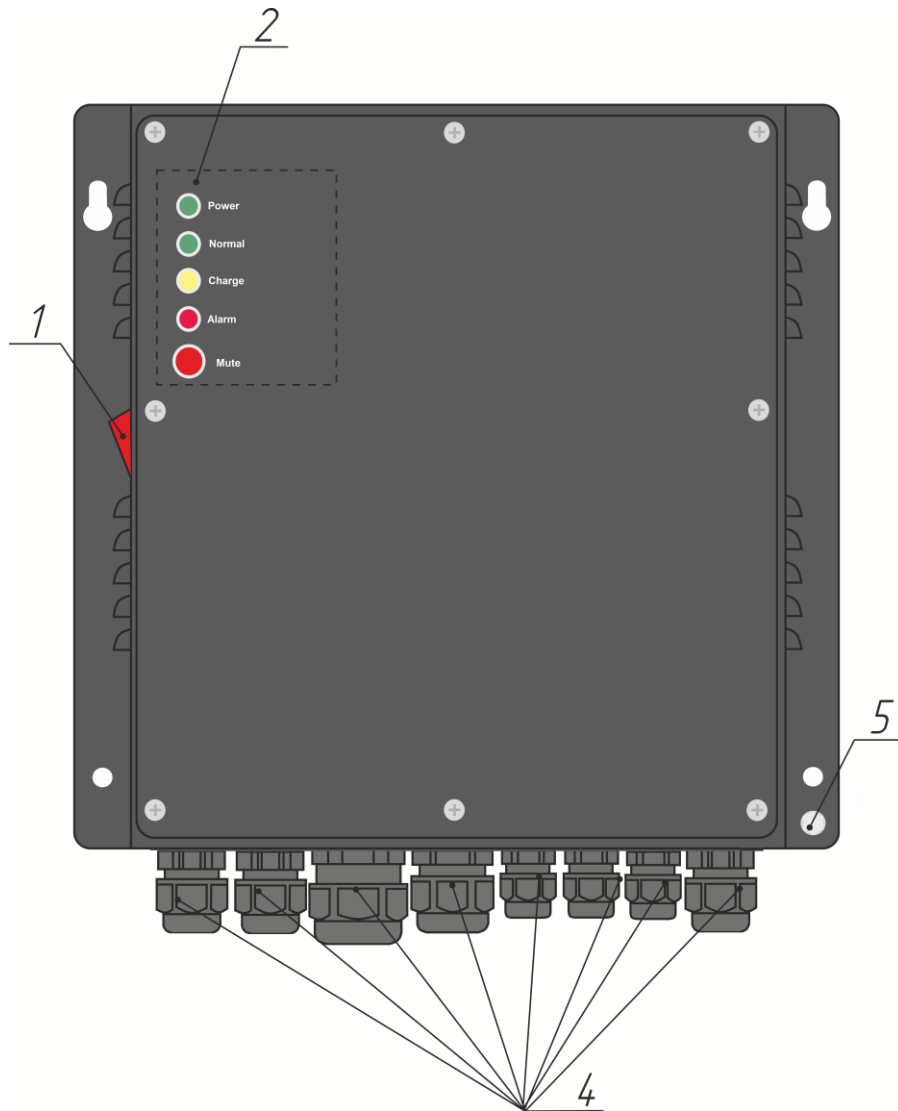


Figure 2 – Functional elements, controls and indication of PCH basic model

Table 2 – Description of the functional elements, controls and indication of the PCH

| N. | Element | Identifier | Description |
|----|-------------------|------------|--|
| 1 | Piano type switch | “ON/OFF” | Piano type switch to turn power on (off), with backlight |
| 2 | LEDs | “Power” | Power mains available |
| | | “Normal” | Glowing green at the final phase of SB charge, i.e. when the charger is in the phase of voltage stabilization. By this time SB voltage reaches the voltage value which was set up by a user. |
| | | “Charge” | Glowing yellow during the main phase of SB charge, i.e. when the charger is in the current stabilization mode. |
| | | “Alarm” | Glowing red when SB is discharged or Product operates in abnormal mode. |
| | Button | “Mute” | Mute the sound alarm. |

| N. | Element | Identifier | Description |
|--|----------------|--------------|--|
| 3 | LCD | “Voltage, V” | Displays current charge (discharge) voltage of SB |
| | | “Current, A” | Displays present charge current |
| | LEDs | “Power” | Glowing when power supply is available. |
| | | “Normal” | Glowing green at the final phase of SB charge, i.e. when the charger is in the phase of voltage stabilization. By this time SB voltage reaches the voltage value which was set up by a user. |
| | | “Charge” | Glowing yellow during the main phase of SB charge, i.e. when the charger is in the current stabilization mode. |
| | | “Alarm” | Glowing red when SB is discharged or Product operates in abnormal mode. |
| | Buttons | “Select” | Button to select main menu items |
| | | “▲” | Navigation buttons to set up the values in the relevant menu items. |
| | | “▼” | |
| | | “Set/Mute” | Button to confirm or save the selected value of the relevant menu item and mute sound signal when the sound alarm is actuated. |
| 4 | Cable glands | – | To connect PCH to power mains; to connect to PCH – DTS-135, BCP-136, AU-106 (AU-206) |
| 5 | Grounding stud | M5x25 | The main element of Product grounding. |
| Note – See the numbers in Figures 1 – 2. | | | |

1.3.3 Connection diagram

PCH’s Connection diagram of additional units and description of connector terminals are represented in Figure 3 and in Table 3.

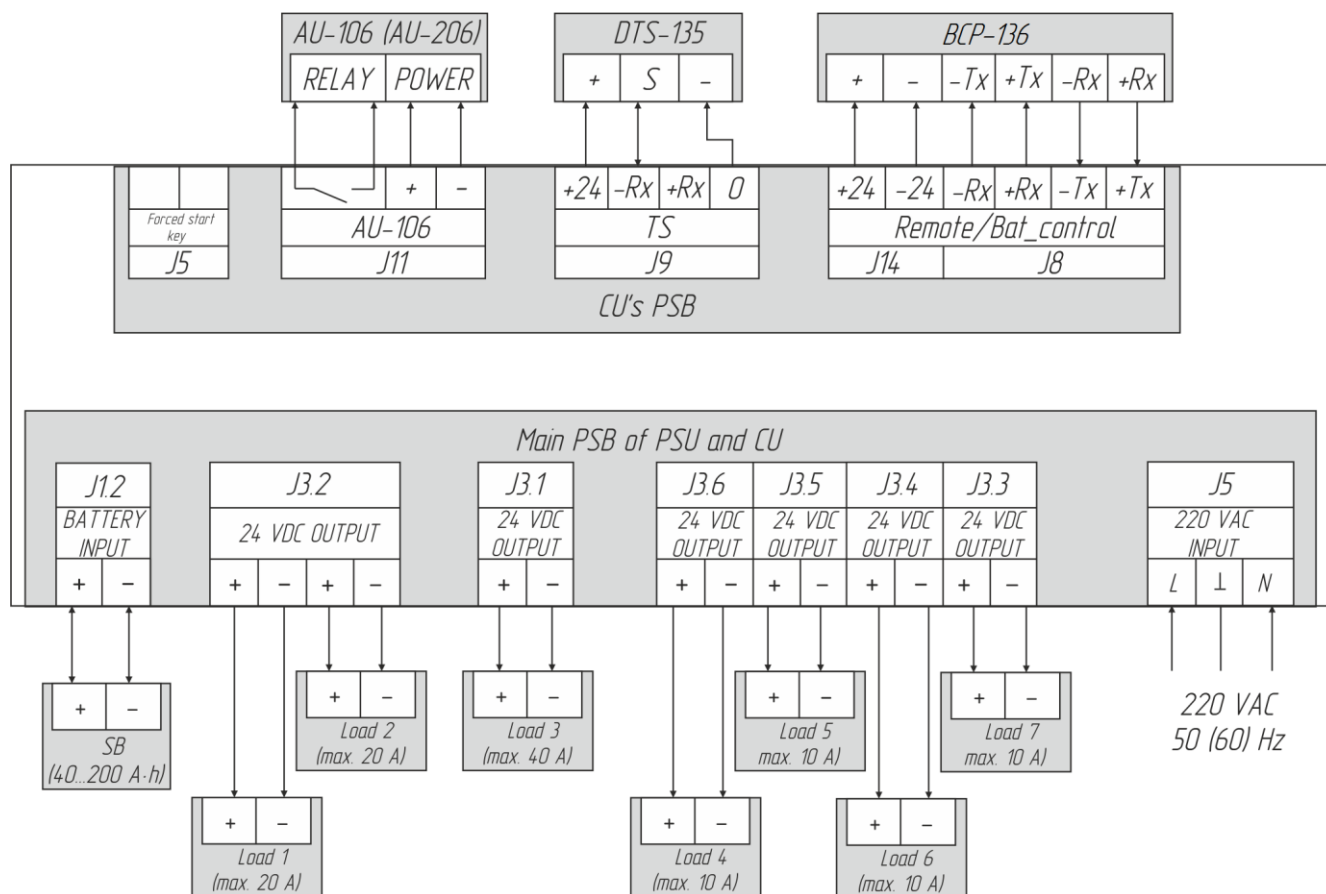

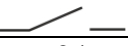


Рисунок 3 – Connection diagram of additional units to PCH

Table 3 – Description of PCH's connector terminals

| Connector | Terminal № | Description |
|-----------|------------|-------------------------|
| J1.2 | + | To connect SB |
| | — | |
| J3.1 | + | To connect Load 3 |
| | — | |
| J3.2 | + | To connect Load 1 and 2 |
| | — | |
| | + | |
| | — | |
| J3.3 | + | To connect Load 7 |
| | — | |
| J3.4 | + | To connect Load 6 |
| | — | |
| J3.5 | + | To connect Load 5 |
| | — | |

| Connector | Terminal № | Description |
|-----------------|--|-------------------------------------|
| J3.6 | + | To connect Load 4 |
| | — | |
| J5 (CU's PCB) | | To connect remote switch on button |
| J5 (PSU/CU PCB) | L | To connect input power |
| |  | |
| | N | |
| J8 | —Rx | To connect BCP-136 to transmit data |
| | +Rx | |
| | —Tx | |
| | +Tx | |
| J9 | +24 | To connect DTS-135 |
| | —Rx | |
| | +Rx | |
| | 0 | |
| J11 | + | To connect AU-106 (AU-206) |
| | — | |
| |  | |
| J14 | +24 | To connect BCP-136 power |
| | —24 | |

1.4 MEASUREMENT TOOLS, INSTRUMENTS AND CONSUMABLES

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

Table 4 – Amount of consumables required for TS

| Name of consumables | Amount of consumables | Note |
|-------------------------|-----------------------|--|
| Cleaning cloth | 0.10 kg | To clean surfaces of the unit |
| Technical ethyl alcohol | 0.01 l | 1 To clean severe contamination from surfaces of the unit; 2 To clean by rubbing surfaces with paint coating damage |
| 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 USAGE OF THE PRODUCT

2.1 OPERATIONAL CONSTRAINTS

The Product shall be installed only according to its overall and installation dimensions.

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:

- observe visually the cable 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.

2.2.3 Switching on instructions

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

- transfer circuit breakers of main power and PSU on the power mains switchboard to “OFF” position;

- connect de-energized cable of main power and SB to input terminals;
- transfer circuit breakers of main power and SB on the power mains switchboard to “ON” position;
- transfer a piano type switch on the Product’s casing to “ON” position;
- check that the Product is connected properly and main power is available by green LED glowing on the piano type switch, located on the Product casing;
- check the Product’s operability by present indication of “Normal” or “Charge” LEDs located on the Product casing and by absent dry contact alarm;
- once the Product is powered on, it transfers to operation mode and display current values of SB voltage;
- set up the value of charge current (compliant with that of the connected SB) in the menu, see 2.3.1.2 and 2.3.1.3. Make sure that the Product operates normally: current and voltage shall not exceed the preset values, green and yellow LEDs shall be glowing (the last condition is available only for PCH with integrated control).

Switching off is carried out in the reverse order: transfer piano type switch on the casing to “OFF” position, then transfer circuit breakers of main power and SB on the power mains switchboard to “OFF” position, disconnect the cables.

2.3 USAGE OF THE PRODUCT

2.3.1 Settings of the Product

2.3.1.1 The structure of PCH menu with an integrated control is shown in Figure 4 and Table 5.

The Product has the following operation modes:

- menu item “Pdd” has a value “ON” – SB is switched off if SB voltage is decreased to 19.2 V;
- menu item “Pdd” has a value “OFF” – SB is switched off in case of power mains failure (cut off);
- menu item “Pdd” has a value “OFF” and jumper is set on J5 terminal on the PCB, in case of power mains failure – power from SB until the full discharge.

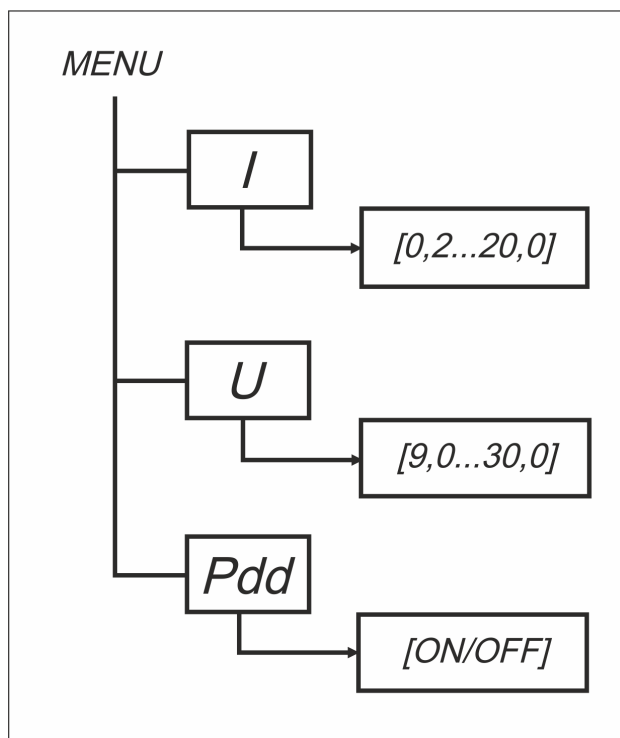


Figure 4 – Structure of the Product's menu

Table 5 – Description of the menu items

| Menu item | Description |
|--|--|
| Charge current "I" | Select of SB charge current which changes within 0.2 to 20.0 A |
| Charge voltage "U" | Select of SB charge voltage which changes within 9.0 to 30.0 V |
| Operation mode "Pdd" | SB deep discharge protection: – "ON" SB is switched off in case of voltage decrease to 19.2 V; – "OFF" SB is switched off in case of power mains failure |
| * For the Product's normal operation this menu item shall always have "ON" status. | |

2.3.1.2 Setting up charge current for PCH with an integrated control

To set up charge current, use a keyboard located on the Product's casing. To set up the required value, follow the next steps:

- press "Select" unless the left LCD displays letter "I". The right LCD will display the previous charge current;
- using "▲" and "▼" set up the required charge current value;
- press "Set/Mute" button to confirm the set value and record it to the non-volatile memory of the Product.

2.3.1.3 Setting up charge voltage for PCH with an integrated control

To set up charge voltage, use a keyboard located on the Product's casing. To set up the required value, follow the next steps:

- press “Select” unless the left LCD displays letter “U”. The right LCD will display the previous charge voltage;
- using “▲” and “▼” set up the required charge voltage value;
- press “Set/Mute” button to confirm the set value and record it to the non-volatile memory of the Product.

2.3.2 Recommendations to set up charge current

To recharge the SB, set up the current value recommended by the SB manufacturer.

If manufacturer's parameters are unknown, it is recommended to set up charge current value not more than 10 % from SB capacity.

If the SB capacity (C) – 150 A·h, charge current shall be equal to $C_{150} * 0.1 = 15$ A.

This value will prevent the SBs from damage if too high current is supplied.

2.3.3 Recommendations to set up charge voltage

The SB charge voltage is set up according to the SB documentation.

If manufacturer's parameters are unknown, it is recommended to set up charge voltage 28.4 V for 24 V SBs, and 14.2 V – for 12 V SBs.

The given charge voltage is optimal for the major part of shipborne SBs.

Note – If the Product is operated without DTS-135, control the SB temperature after setting up the recommended charge voltage to the CU and during the first operation day; in case of obvious overheating a user shall decrease the preset charge current and voltage unless the optimal heating mode is found. DTS-135 shall be mandatory installed in case of gel cells application, connected by the buffer circuit (i.e. if load is powered from CU and SB, without power supply unit).

Caution! The manufacturer strongly suggests using the relevant SB documentation every time while setting up charge values

By default the Product is delivered with settings to connect SB with operating voltage 24 V and has the following preset values: $U = 28.4$ V, $I = 20$ A.

2.3.4 The Product's alarms

The Product includes light, sound and relay alarms signaling about abnormal operation/emergency, see Table 6.

Table 6 – Abnormal operation/emergency alarms

| Emergency type | Indicator (red) | Buzzer | Jumper on PCB (NC/NO)* |
|---|-----------------|--------|------------------------|
| PCH input voltage failure (loss) | Blinking | Signal | NO |
| PCH is switched on with disconnected SB or SB rupture (polling interval is 5 mins) | Glowing | Signal | NC/NO |
| Reverse polarity connection of SB (actuates only if the Product is switched on) | Glowing | Signal | NC/NO |
| Overvoltage in PSU power circuit | Blinking | Signal | NC/NO |
| Current overload or SC in SB circuit | Glowing | Signal | NC/NO |
| Overvoltage in SB circuit (polling interval is 5 mins) | Blinking | Signal | NC/NO |
| Charge current exceeds the preset values | Blinking | Signal | NC/NO |
| * Relay contacts status is selected by JP6 jumper on the PCB: “NO” – normally opened, “NC” – normally closed. | | | |

In case of any abovementioned emergencies the Product automatically activates built-in alarms, as well as external signaling units AU-106 (AU-206), BCP-136, if present. To deactivate sound alarm, press “Mute” button; light alarm continues operation unless the cause of alarm is removed.

2.3.5 Alarms in case of switchover to standby power source

The PCH, as well as BCP-136 and AU-106 (AU-206), provides built-in visual and sound alarms which are activated in case of power mains failure and switchover to standby power source. Built-in alarms are powered from standby electric power source.

As soon as power mains supply is restored, the alarm automatically stops and resumes initial operation.

Sound alarm signaling can be muted (manually).

The Product in the alarm mode functions in the following way:

a) in case of power mains failure, see Table 7;

Table 7 – Status of alarm units

| Product | Visual alarm | Sound alarm | Relay contacts |
|---------|---------------------------------------|--------------------------------------|--|
| PCH-205 | Red blinking LED “Error” | Intermittent (periodic) sound signal | Closed |
| BCP-136 | Red blinking LED “AC Alarm” | Intermittent (periodic) sound signal | Actuation if relay contacts are opened (if analog channel is used) |
| AU-106 | Red blinking LED in button “NO Power” | Intermittent (periodic) sound signal | Actuation if relay contacts are opened or closed |
| AU-206 | Red blinking LED “Emergency” | Intermittent (periodic) sound signal | Actuation if relay contacts are opened or closed |

b) mute (switching off) of alarm signal is carried out using the following controls, see Tables 8 and 9.

Table 8 – Controls of alarm and alarm signaling muting

| Unit | Control element |
|---------|---|
| PCH-205 | Button “Set/Mute” of PCH with an integrated control, see Figure 1. Button “Mute” of PCH (basic design), see Figure 2 |
| BCP-136 | Button “Mute/Test” |
| AU-106 | Button “Mute” |
| AU-206 | Button “Mute” |

Table 9 – Status of signaling units after muting the alarm

| Product | Visual alarm | Sound alarm | Opening of relay contacts |
|---|---|-----------------|---------------------------|
| PCH-205 | Red LED glowing: – “Error” of PCH with an integrated control; – “Alarm” of PCH (basic design) | No sound signal | + |
| BCP-136 | Red LED glowing “AC Alarm” | No sound signal | – |
| AU-106 (AU-206) | Red LED glowing in the button “Mute” | No sound signal | – |
| Notes 1 “+” means that relay contacts are opened. 2 “–” means that these Products do not have relay contacts. | | | |

2.3.6 SB’s deep discharge protection

The Product ensures the protection of SB against deep discharge, which allows for using the SB’s capacity parameters with maximum efficiency. It also enables to maintain its life time as long as the manufacturer stated.

The SB’s deep discharge protection is based on the following: the SB is disconnected from the load as soon as it reaches the min. charge level of 19.2 V (for 24 V SB).

Discharge lower than this value leads to the SB power loss, reduced lifetime and failure due to irreversible damage of the inner parts.

Note – The Product is delivered from the Manufacturer's plant with an activated function of deep discharge protection.

2.3.7 SB's current temperature view

The PCH with an integrated control allows a user to view temperature of the battery being charged. The SB's heating is controlled by DTS-135 which is connected to the product on one side and fixed (mechanically) to the SB on the other side.

To activate this function do the following: once a user presses “▼” in the main operation mode, the left LCD will display “t” and the right - current SB temperature (if temperature sensor is not available the right LCD will show “— —”).

In 10 sec the Product transfers to the main operation mode and LCDs show current charge voltage and current values; if a user presses “▼” the second time while viewing the temperature, the Product transfers back to the operation mode.

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 all types of technical service:

- 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

The list of works for all types of TS is given in Table 10. Maintenance routine procedure is given in checklists (hereinafter – CL), represented in Tables 11, 12, 13, 14.

Consumables required for the TS are represented in Table 4.

Table 10 – List of works by TS types

| CL № | Work | Type of TS | |
|---|--|------------|------|
| | | TS-1 | TS-2 |
| 1 | Visual check of the Product | + | + |
| 2 | Test for the Product operability | – | + |
| 3 | Insulation resistance test of power circuits | – | + |
| 4 | Check for compliance of output voltage with the normal voltage | – | + |
| Notes 1 “+” means that work is obligatory. 2 “–” means that work is not obligatory. | | | |

Table 11 – 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 12 – CL № 2. Operability check of the Product

| To be done | Routine | Man-hours per 1 Product |
|----------------------------------|---|-------------------------|
| Check operability of the Product | 1 switch on power supply; 2 check the operability of the Product by viewing present charge voltage and current values on the LCDs; 3 charge voltage and current values shall not exceed the preset values, green or yellow LEDs shall be glowing; 4 check the presence of power voltage supplied to the load. Transfer switch to “On” position on the load. If piano type switch backlight is present it means load power is available | 1 person 5 mins |

Table 13 – CL № 3. Insulation resistance test of power circuits

| To be done | Routine | Man-hours per 1 Product |
|--|--|-------------------------|
| Insulation resistance test of power circuits | Check contact resistance between the grounding clamps. Check by megohmmeter insulation resistance between conductors and the Product casing; the value shall not exceed 1 Megaohm | 1 person 15 mins |

Table 14 – CL № 4. Check for compliance of output voltage with the normal voltage

| To be done | Routine | Man-hours per 1 Product |
|--|---|-------------------------|
| Check for compliance of output voltage with the normal voltage | Connect voltmeter to the Product's output contacts. Measure voltage on the output terminals | 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

Main power supply of the Product is indicated by the presence of piano type switch backlight.

To diagnose the problem, see Table 15.

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 OF THE PRODUCT

The list of malfunctions that can be eliminated by own employees is represented in Table 15.

The repair of other malfunctions can be done only by Manufacturer's specialists or Manufacturer's authorized representatives.

Table 15 – The list of possible malfunctions and troubleshooting

| Malfunction | Possible reasons | To be done |
|---|--|---|
| No sound alarm (power mains failure (loss)) | No JP7 jumper on the PCB | Check the jumper presence |
| | Oxidizing connectors of JP7 jumper | Take off the jumper, clean the connectors, install the jumper |
| SB is not charged (no charge current) | Charge voltage in the PCH's settings was set up less than voltage level of connected SB* | Set up relevant charge voltage |
| | SB circuit rupture | Switch the PCH off. Remove the rupture. Switch on the PCH. |

| Malfunction | Possible reasons | To be done |
|---|--|---|
| | SB malfunction | Replace the SB. |
| The PCH is not switching on | NO power mains | Provide the mains power supply |
| | Piano type ON/OFF switch located on the left side of the Product is in position "OFF". | Transfer the switch to "ON" position. |
| Zero values on the PCH's LCDs, SB is not being charged | SB is not connected to the PCH | Connect SB to the PCH |
| Digital LCDs do not work | Stub which connects indication board with central board is not connected or disconnected | Connect the stub to the relevant boards' connectors |
| The PCH's Control buttons do not work | The sub which connects buttons board to the central board is disconnected. | Connect the stub to the relevant boards' connectors |
| No load voltage | Fuse's malfunction | Replace the fuse |
| * For the basic design of the PCH charge voltage settings are carried out using BCP-136 if present. | | |

5 STORAGE

The units must be stored in packaging inside areas complying with the required storage conditions (+5°C 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 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 OF THE PRODUCT

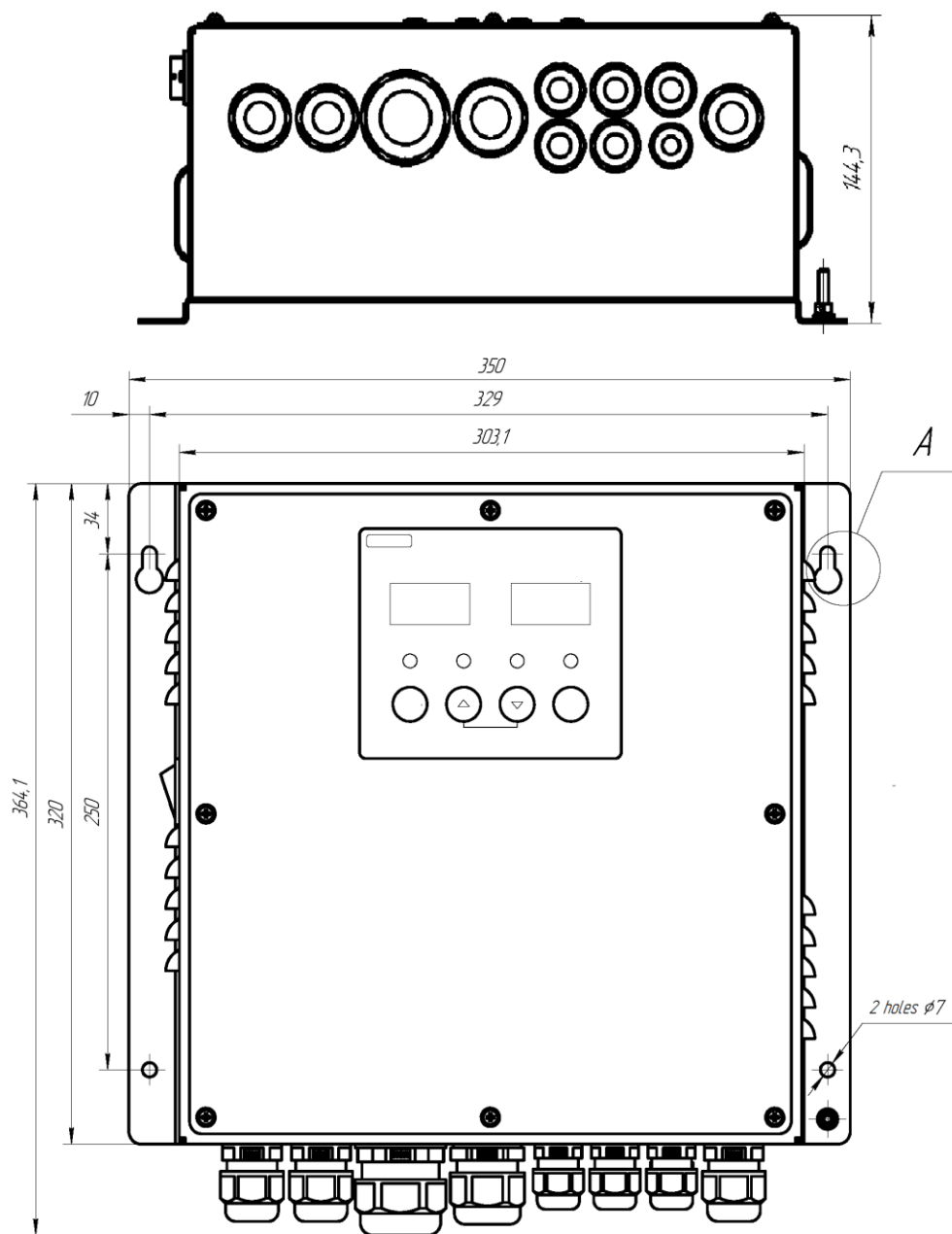


Figure A.1 – Outline and installation dimensions of the PCH with an integrated control panel

Note – Basic design of PCH-205 has the same outline and installation dimensions with the PCH with an integrated control panel.

ANNEX B (MANDATORY) DESCRIPTION AND FUNCTIONS OF ADDITIONAL UNITS

B.1 ALARM UNIT AU-106

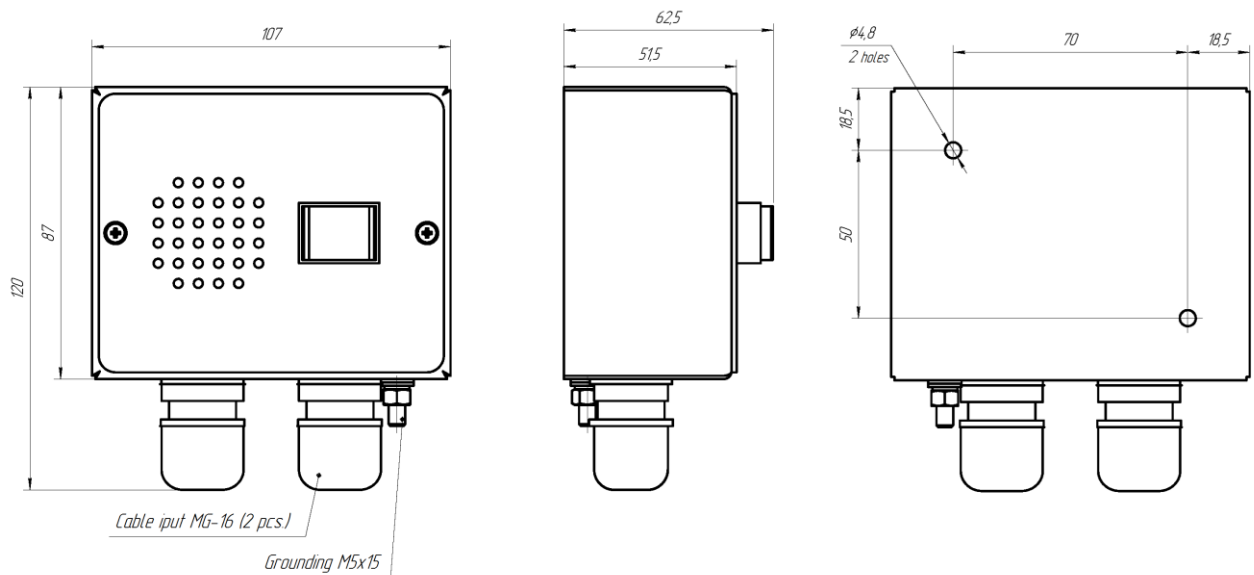


Figure B.1 – Outline and installation dimensions of AU-106

Description:

Designed to provide alarm signaling (light and sound signals)

Features:

Sound signaling can be muted

Technical specifications:

- *power supply: 9.0 to 36.0 V DC*
- *max. power consumption: 2 W*
- *max. current consumption on the “Relay” input: 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

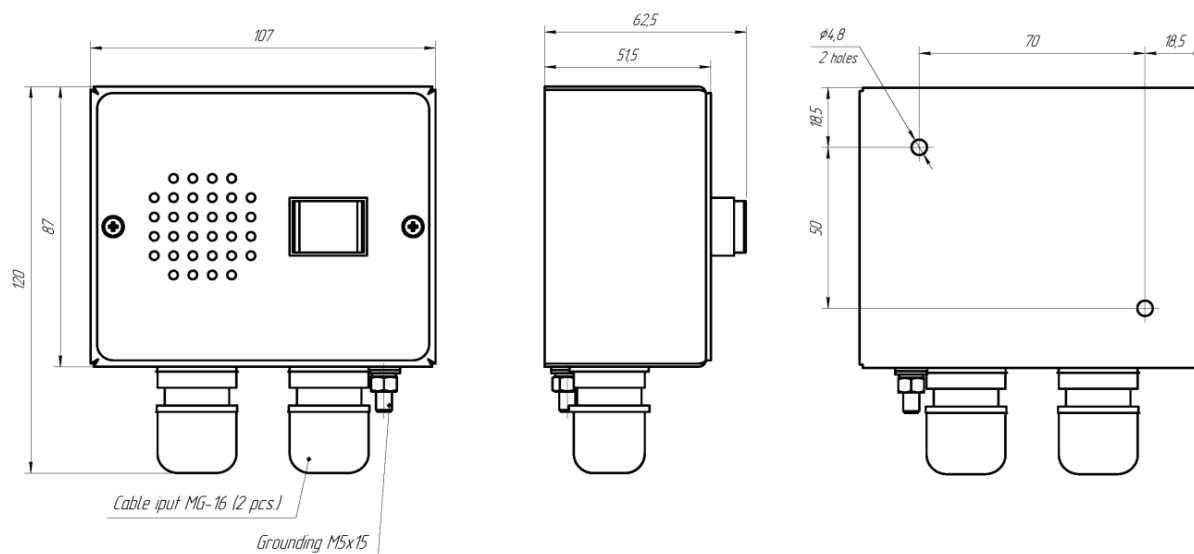


Figure B.2 – Outline and installation dimensions of AU-206

Description:

Designed to provide alarm signaling (light and sound signals)

Features:

Sound signaling can be muted.

Technical specifications:

- power supply: 9.0 to 36.0 V DC
- max. power consumption: 3 W
- max. current consumption on the “Re-lay” input: 15 mA
- operating temperature: $-15\text{ }^{\circ}\text{C}$ to $+55\text{ }^{\circ}\text{C}$
- protection degree: IP22
- weight: 0.66 kg

Mounting type:

- console
- wall

B.3 ACCUMULATOR BATTERIES CONTROL PANEL BCP-136

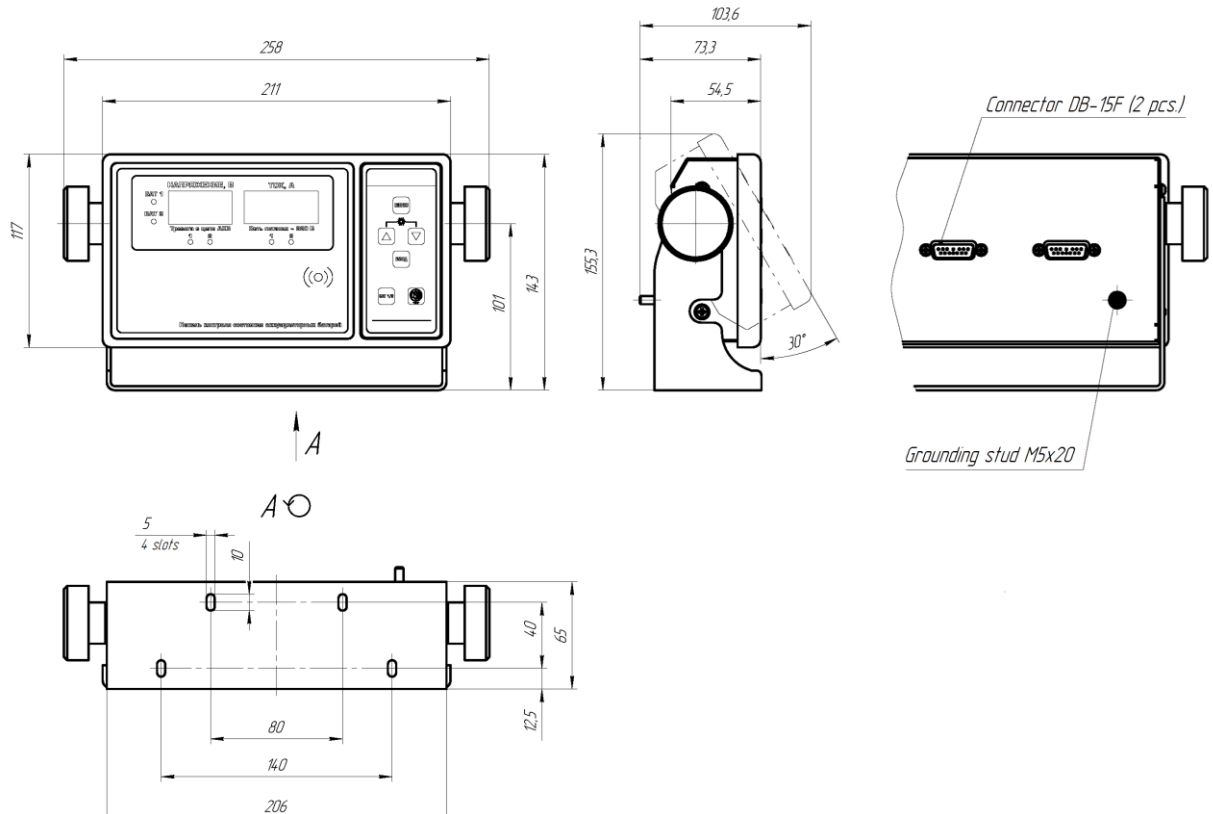


Figure B.3 – Outline and installation dimensions of BCP-136

Description:

Designed to provide remote control of automatic battery charger, display current values of charge (discharge) voltage and current, and to repeat alarms of automatic charger supplying sound and light alarm signals

Features:

- Sound signaling can be muted
- Can control two automatic chargers
- Integrated function of "lamp test" (mode to test indication and sound signaling unit)
- Supports digital and analog types of interfaces

Technical specifications:

- power supply: 10.0 to 36.0 V DC
- power consumption: 3 W
- measurement accuracy by analog channel of:
 - current 0.01 A
 - voltage 0.01 V
- operating temperature: -15°C to $+55^{\circ}\text{C}$
- limiting temperature: -55°C to $+70^{\circ}\text{C}$
- protection degree: IP22
- weight: panel - 1.46 kg;
- weight desk-top on a bracket - 1.57 kg

Mounting type:

- desk-top with a bracket
- panel

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

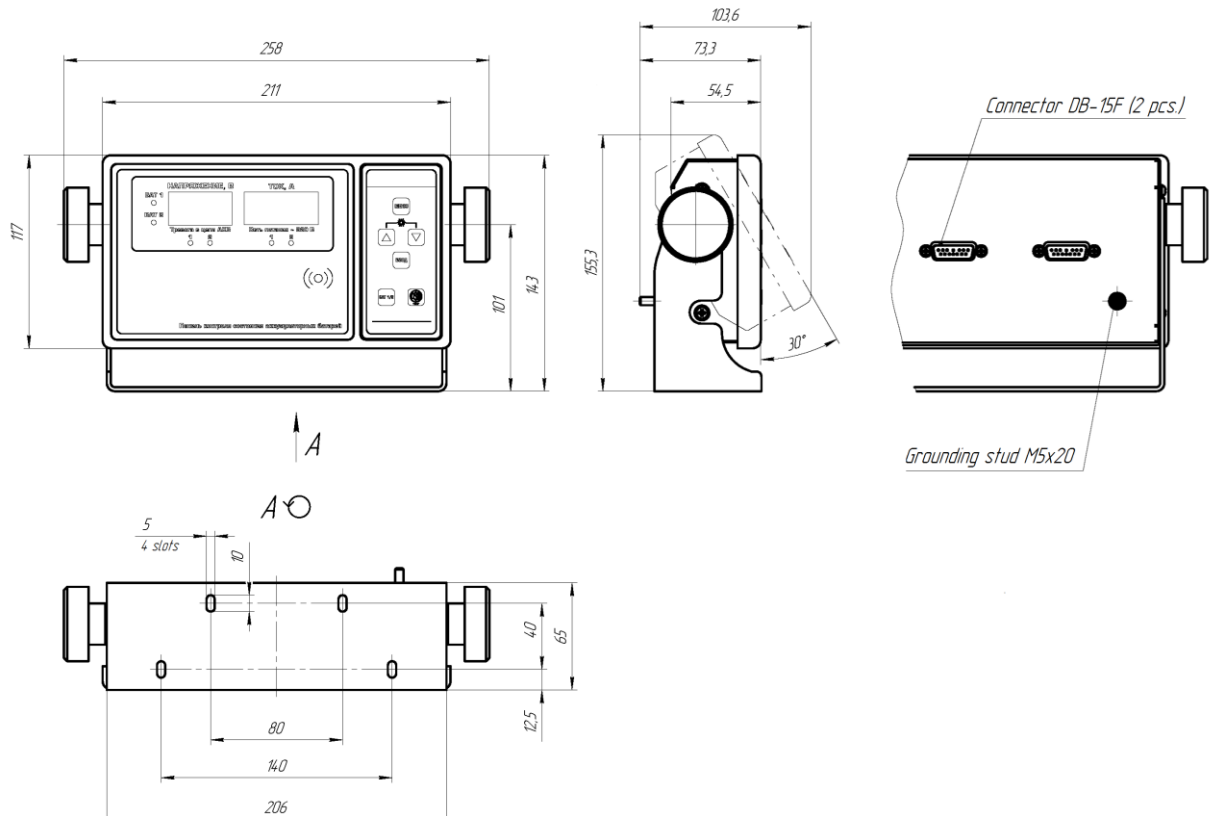


Figure B.4 – Outline and installation dimensions of BCP-136-01

Description:

Designed to provide remote control of automatic battery charger, display current values of charge (discharge) voltage and current, and to repeat alarms of automatic charger supplying sound and light alarm signals

Features:

- Sound signaling can be muted
- Can control two automatic chargers
- Integrated function of “lamp test” (mode to test indication and sound signaling unit)
- Supports digital interface

Technical specifications:

- power supply: 10.0 to 36.0 V DC
- power consumption: 3 W
- operating temperature: -15°C to $+55^{\circ}\text{C}$
- limiting temperature: -55°C to $+70^{\circ}\text{C}$
- protection degree: IP22
- weight: panel - 1.46 kg;
- weight desk-top on a bracket - 1.57 kg

Mounting type:

- desk-top with a bracket
- panel

B.5 TEMPERATURE SENSOR DTS-135

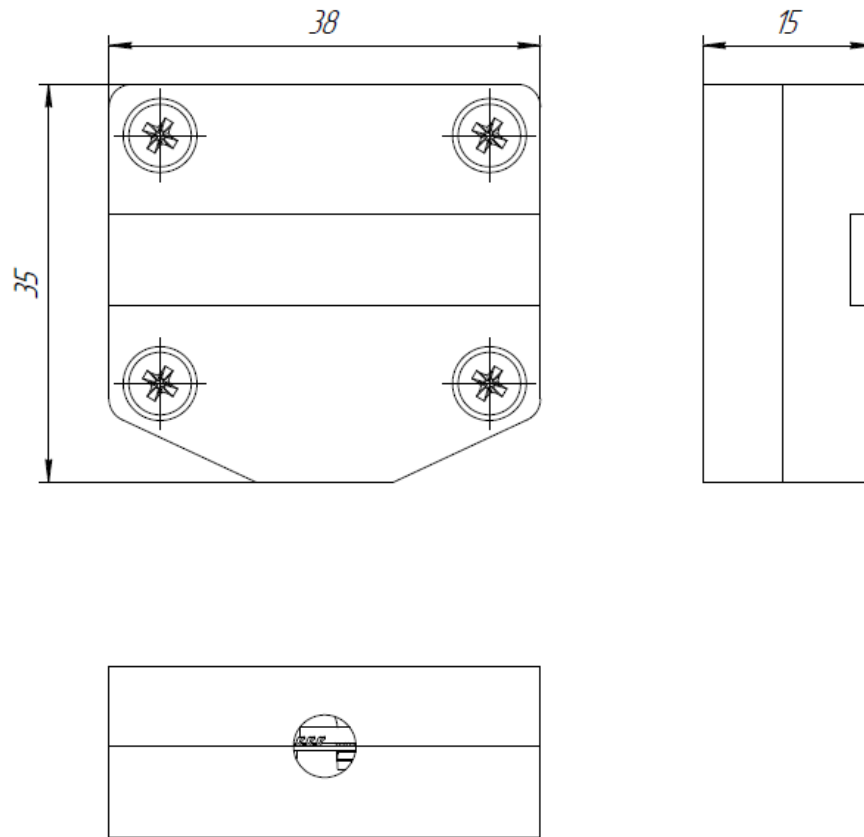


Figure B.5 – Outline dimensions of DTS-135

Description:

Ensures measurement of SB current temperature and transmits the measured value by digital channel of «one-wire» type.

Features:

- digital
- delivered with a standard 3 m cable

Technical specifications:

- power supply: 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:

- hinged onto the SB casing using glue or mounting band