

# **Batteryless telephone equipment with talk-back mode BLTS-1006**

Operating manual

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## **INTRODUCTION**

This Operating manual describes equipment of Battery less telephone system BLTS-1006 (hereinafter referred to as the System).

This operating manual (hereinafter – OM) describes composition, structure, specifications, System components and instructions to ensure correct and safe operation of the System (intended use, technical service, current repair, storage and transportation), as well as information on System components disposal.

Only those who have had general education in the area of radio communication and electronic devices, and those who have read and understood this document shall be permitted to operate with the System. In addition to the instructions given in this document, the safety regulations and rules applicable in the field shall be observed.

This operating manual applies to all variants of the System configuration.

The System may be scaled for any object due to different models of communication devices and scheme of user network design.

## TERMS AND ABBREVIATIONS

ACB	Automatic circuit breaker
AP	Amplifier and pre-amplifier of voice signals of external communication devices
BT	Battery less telephone
BTC	Battery less telephone communication
CB	Call button
CL	Check list
CUESU	Control unit for external signaling units
EG	Electric generator
ES	Energy storage
LC	Loudspeaker communication
LCD	Liquid crystal display
LI	LED «Inductor on»
MTH	Microtelephone headset
MC	Microcontroller
OD	Operational documentation
OM	Operating manual
PSU	Power supply unit
RMRS	Russian Maritime Register of Shipping
RRR	Russian River Register
SC	Signal converter
SPTA	Spare parts, tools and accessories
SUIC	Signaling unit of Incoming call
TS	Technical service
USU	User selection unit
VC1	Voltage converter №1
VC2	Voltage converter №2

## **1 DESCRIPTION AND OPERATION OF THE SYSTEM**

### **1.1 Description**

1.1.1 The System is designed to provide telephone communication both in routine operation (if power is available or absent) and emergencies caused by failure (or de-energization) of shipborne communication systems.

The System may also have an industrial application.

1.1.2 The SC may be installed in inner ship premises and on open deck.

SC maintain operating parameters under the following operation conditions:

a) operating temperature range:

- for SC installed inside  $-15\text{ }^{\circ}\text{C}\dots+55\text{ }^{\circ}\text{C}$ ;
- for SC installed on open deck  $-40\text{ }^{\circ}\text{C}\dots+55\text{ }^{\circ}\text{C}$ ;

b) under increased air humidity 100 % at temperature  $+50\text{ }^{\circ}\text{C}$ ;

c) under sinusoidal vibration within frequency bandwidth 1...200 Hz at the following oscillation amplitudes:

- amplitude  $\pm 1\text{ mm}$  – for frequencies 2.0...13.2 Hz;
- acceleration  $0.7g$  ( $7\text{ m/s}^2$ ) – for frequencies 13.2...100.0 Hz;

d) under mechanical impacts (multiple) lasting 10...15 ms and max. acceleration  $70\text{ m/s}^2$  ( $7g$ );

e) under roll and pitch with amplitude  $\pm 45^{\circ}$  and period 7...9 seconds;

f) under tilting angle  $45^{\circ}$  during 5 minutes;

g) under electromagnetic and magnetic interference;

h) under ingress of water, atmospheric precipitation (on SC of splash proof type).

1.1.3 The System equipment operates under effect of:

- a) limiting temperature  $-60\text{ }^{\circ}\text{C}\dots+70\text{ }^{\circ}\text{C}$ ;
- b) salt (sea) for.

1.1.4 The System is designed considering the following documents:

- Rules of Russian Maritime Register of Shipping;
- Rules of Russian River Register;
- Technical regulations on security of the marine transport;
- Technical regulations on security of the inland water transport.

## 1.2 Technical specifications

The System ensures:

- a) BTC user network organization using PSU (or without PSU);
- b) communication session, call and answering the call in BTC user network with / without connection to power mains;
- c) organization of autonomous BTC network with capacity from two to twenty-four users without application of commutator telephone or in addition to the existent switching network using telephones connected in parallel;
- d) communication if operation is carried out using an inductor (manual generator) or external PSU in the following modes:
  - pair communication – between two users;
  - general list or selective conference call – with all or selected users;
- e) length of one communication session (for pair communication) – at least 10 minutes after one rotation cycle of generator (max. speed 3 rot/sec during 3...5 seconds) or more, if an inductor handle was rotated for the second time;
- f) possibility to ensure communication:
  - in individual means of respiratory protection (using external communication devices with throat microphones);
  - in environment with increased level of noise (max. 130 dB) – using individual means of hearing protection (headset or intercom helmet);
- g) telephone communication in case of communication device cable is extended (headset or intercom helmet) up to 10 m;
- h) flashing sound and light signaling of devices and commutator telephones – while supplying a call. Commutator telephones additionally provide for light signaling of selected user line;
- i) flashing sound and light signaling of devices and commutator telephones – while receiving a call. Commutator telephones additionally provide for light indication of calling user;
- j) external call signaling units may be connected to the units and commutator telephones (except portable ones); they may also repeat incoming call signaling (if power supply is available) and mute (reset) current alarm;
- k) electric generator status (inductor) and power supply is controlled by constant LED glowing.

The System may operate connected to power mains and in autonomous mode (without connection to power mains).

Stored energy received from generator rotation is preserved by high capacity condensers located in equipment and commutator telephones.

The System may be connected to power mains 24 V DC if required.

The System is connected to AC power mains using the System's PSUs – PS-103, PS-103-20.

Power supply of signaling units is carried out from external DC network 24 V or AC network, 50 (60) Hz, voltage 220 V.

In case of power mains failure the System switches to powering from inductor automatically. In case of power failure, the System automatically switches to inductor power.

The System composition includes metal cabinets, protecting equipment against water in case of installation on open deck.

### **1.3 System composition**

Structure of BTC equipment is shown in Figure 1.



### 1.3.1 BTC equipment includes:

- a) stationary commutator telephones, wall or panel mounted for 6, 12, 20 lines of pair communication;
- b) commutator telephones with built-in amplifier and power supply unit 24 V for 12 and 24 user lines;
- c) user telephone units panel and wall mounted types:
  - stationary for 1, 12, 24 channels;
  - portable for 1, 12, 24 channels;
- d) flashing lamps and light, sound, and light-sound signaling units, and relay unit RBWSB;
- e) external communication devices – headsets or intercom helmets;
- f) power supply units: PS-103 with power 190 W and PS-103-20 with power 400 W;
- g) cables, type CE and sockets PB-HS, PB-24 types;
- h) cabinets BO-1 and BLTS-BO types.

The list of SC is represented in Table 1.

Table 1 – Equipment of the System

SC name	Code	Installation conditions
Telephone	PH-1LA	Compartment, bridge, engine and boiler space, tiller compartment, cargo hold, energy compartments IP44
	PH-1L	
	PH-12L	
	PH-24L	
	PH-1LR	Compartment, bridge, engine and boiler space, tiller compartment, cargo hold, energy compartments IP44
	PH-12LR	
	PH-24LR	
	PH-1LRW	Open stations outside the premises IP56
	PH-12LRW	
	PH-24LRW	
	PH-1LWP	Open stations outside the premises IP56
	PH-12LWP	

SC name	Code	Installation conditions
	PH-24LWP	
Commutator telephone	PH-6CA	Compartment, bridge, engine and boiler space, tiller compartment, cargo hold, energy compartments IP44
	PH-12CA	
	PH-20CA	
Switching unit	SB-12A	Special premises, bridge, central control stations, living premises enclosed IP22
	SB-24A	
Relay unit	RBWSB-24	Open stations outside the premises IP56
	RBWSB-220	
Socket	PB-HS	Open stations outside the premises IP56
	PB-24	
Casing	MBOX	Special premises, bridge, central control stations, living premises enclosed IP44
	MBOX2	
	WBOX	Special premises, bridge, central control stations, living premises enclosed IP22
	WBOX2	
Cabinet	BO-1	Open stations outside the premises IP56
	BLTS2-BO	
Headset	HS-3	Open stations outside the premises IP56
	HS-3P	
	HS-5	Open stations outside the premises IP56
	HS-5C	
	HS-5AC	
Intercom helmet	TH-4L-S	Open stations outside the premises IP56
	TH-4L-W	
	TH-4L-S-C	
	TH-4L-W-C	
	TH-4L-S-AC	
	TH-4L-W-AC	
	TH-4M-S	Open stations outside the premises IP56
	TH-4M-W	
	TH-4M-S-C	
	TH-4M-W-C	
	TH-4M-S-AC	
	TH-4M-W-AC	

SC name	Code	Installation conditions
Flashing light	RL-24-O	Open stations outside the premises IP56
	RL-24-B	
	RL-24-R	
	RL-24-G	
	RL-220-O	Open stations outside the premises IP56
	RL-220-B	
	RL-220-R	
	RL-220-G	
Light signaling unit	L-24-R	Open stations outside the premises IP56
	L-24-O	
	L-24-W	
	L-24-G	
	L-24-B	
	L-220-R	Open stations outside the premises IP56
	L-220-O	
	L-220-W	
	L-220-G	
	L-220-B	
Sound signaling unit	A-24	Open stations outside the premises IP56
	A-220	
Sound-light signaling unit	AL-24-R	Open stations outside the premises IP56
	AL-24-O	
	AL-24-W	
	AL-24-G	
	AL-24-B	
	AL-220-R	
	AL-220-O	
	AL-220-W	
	AL-220-G	
	AL-220-B	
PSU	PS-103	Special premises, bridge, central control stations, living premises enclosed IP22
	PS-103-20	
Cables	CE-1,5	Open stations outside the premises IP56
	CE-3	
	CE-5	
	CE-7	
	CE-10	
	CE-1,5BE	

SC name	Code	Installation conditions
	CE-3BE	
	CE-5BE	
	CE-7BE	
	CE-10BE	
	CE-1,5AC	
	CE-3AC	
	CE-5AC	
	CE-7AC	
	CE-10AC	

## 1.4 Structure and operation

Structure and composition of SC allows for creating manual BTC systems with various structure, functionality and user capacities.

The System ensures the networking types:

a) pair communication – to organize direct communication, see Figure 2;

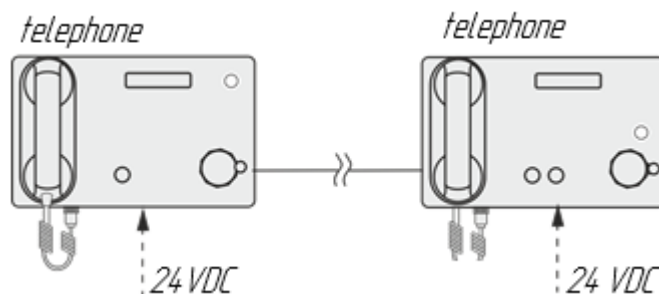


Figure 2 – Example of user network pair communication

b) communication with commutator telephones and telephones – to organize communication (pair and general list) between the main station and user group, see Figure 3;

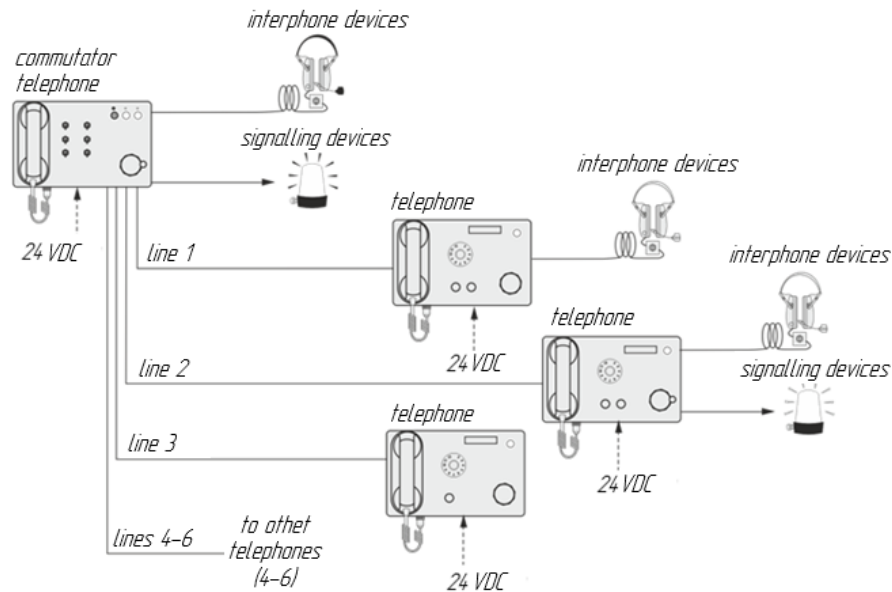


Figure 3 – Example of user network with commutator telephones and telephones

c) combined networking (using any combination of commutator telephones and telephones) – to organize communication (pair and general list) of the main station within its group and users of other groups, see Figures 4 and 5.

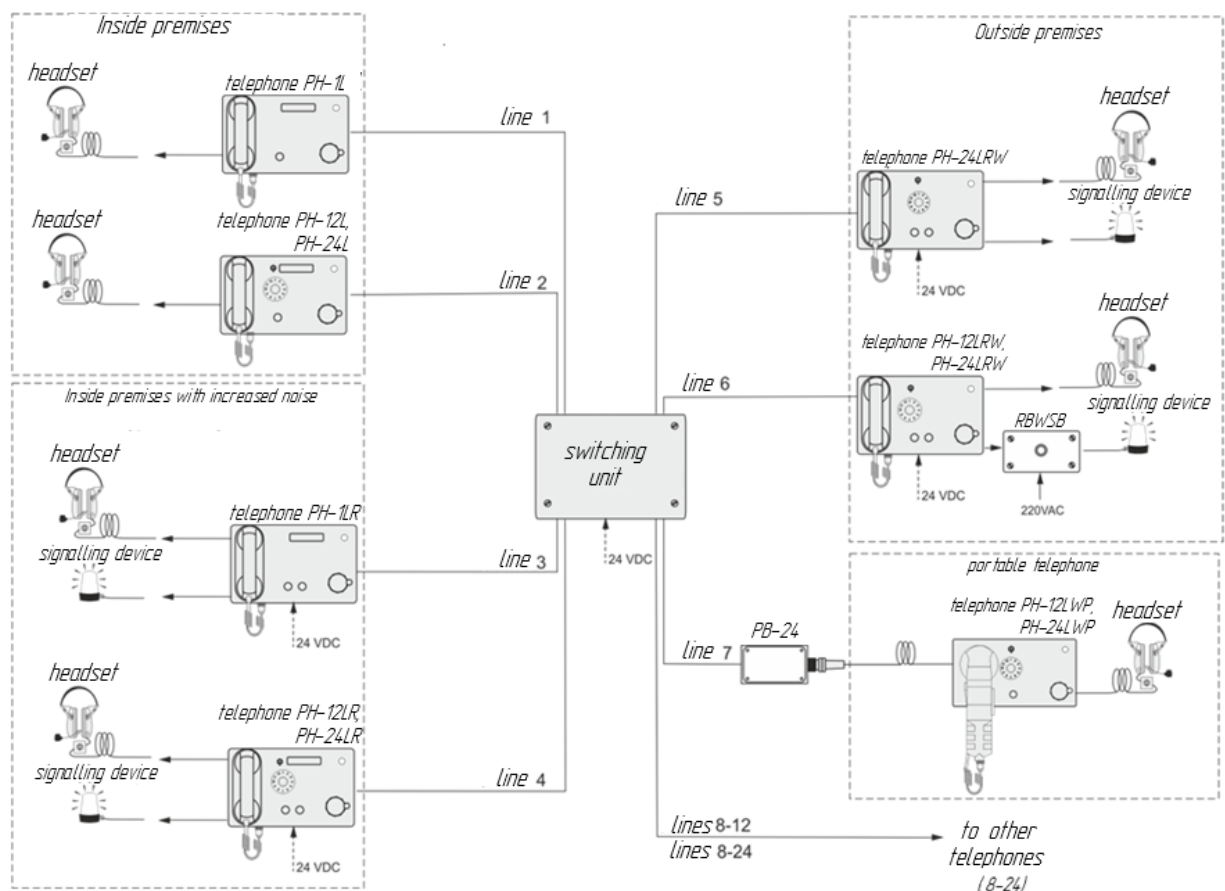


Figure 4 – Example of combined user network (based on switching unit)

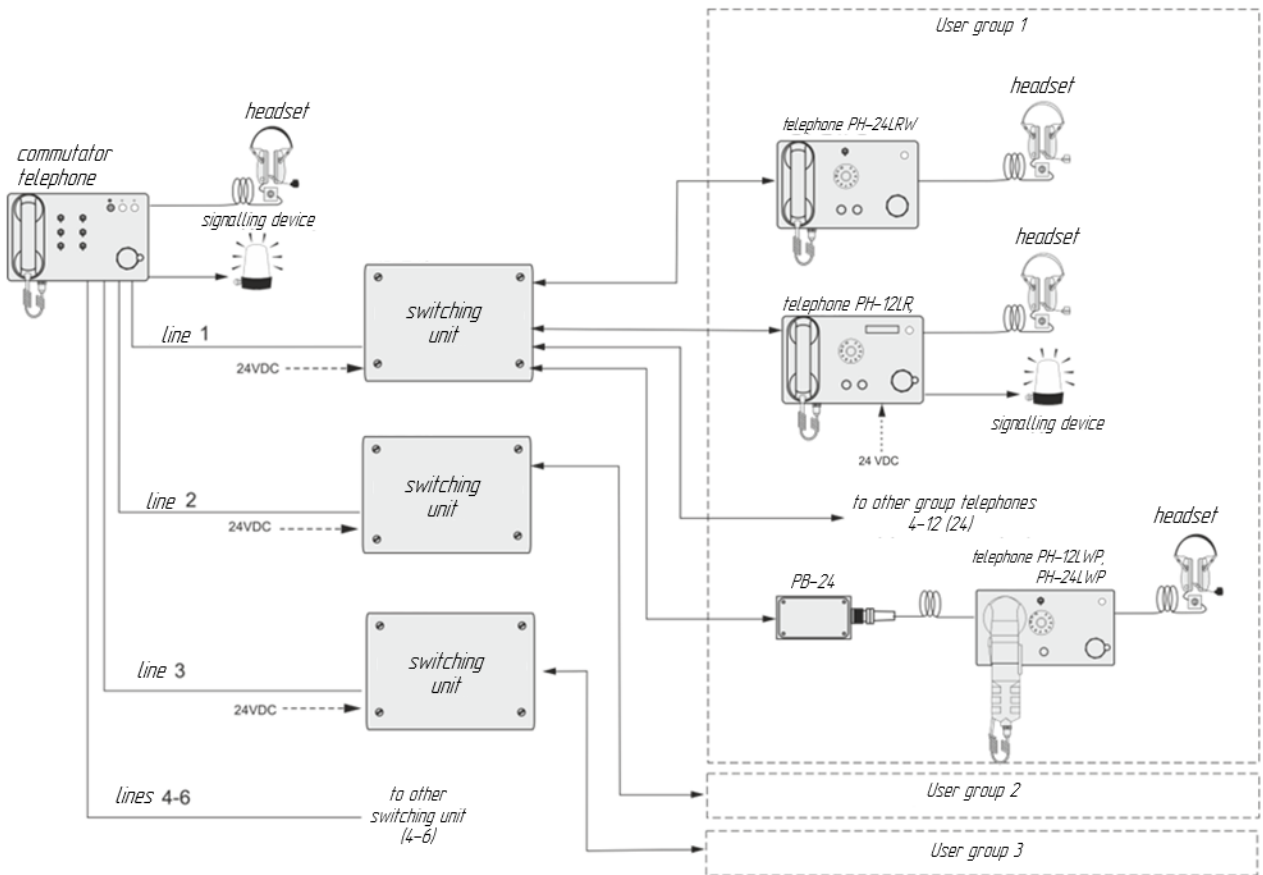


Figure 5 – Example of combined user network  
(based on commutator telephones)

SC are connected to each other directly at Customer's facilities.

The System ensures operation in two modes:

a) BTC mode – in case of power mains failure (loss), when the System users are powered from inductor (manual electric generator), which is integrated into the telephones (commutator telephones). The System's operation in this condition is not limited by time, all functions will be available, see 1.2, except external signaling units; depending on the station and power availability, they may remain in operation or disconnected condition;

b) LS mode – in case of power mains operability, the System users are powered from external power source. Telephones and commutator telephones in this mode operate as regular LS devices, herewith the call is supplied by corresponding button, and telephone communication in the user network is carried out from external PSU and do not require manual generator.

## **1.5 SC connection**

Connect SC according to the connection diagrams designed (if required) in compliance with list of technical requirements for particular object and delivered to enterprise designer (or Customer), if it was stated in Supply contract.

Examples of connection diagrams are represented on the Manufacturer's website ([www.unicont.com](http://www.unicont.com)) in Shipborne electronics.

## **1.6 Marking and sealing**

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

Commutator telephones are delivered with names of user line switches; the names are produced using laser printer and photograph paper, inserted under transparent film under a single toggle switch or group of toggle switches (depending on the model), using bold face «Arial», size 14. All centres of legends are shifted for 2.5 mm to the right for convenient use (reading).

Note – single-channel and multi-channel telephones do not have legends. Single-channel commutator telephones are not equipped with user line switch, but they have a user line name.

Electric installation organization has a right to open equipment for installation at Customer's facilities for further lead and assignment of cables.

Delivered SC are not sealed by the Manufacturer.

## **1.7 Packaging**

To ensure transportation and storage at warehouse SC and SPTA kit may be delivered in the following packaging:

- corrugated board boxes according to the relevant regulatory documents;
- wooden boxes according to the relevant regulatory documents;
- SPTA kit on additional request may be delivered in metal boxes according to the relevant industry regulatory documents.

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 OPERATION OF THE SYSTEM COMPONENTS

### 2.1 Description of the SC

#### 2.1.1 Commutator telephones

Commutator telephones allow for organization of BTC user networks with capacity 6, 12, 20 lines to ensure pair and group communication with users of their own network in pair and general list modes.

Use toggle-switches of the relevant user lines to select users.

All commutator telephones are equipped with a telephone receiver (corded) to provide for two-way communication with other users.

External communication devices (headsets and intercom helmets) may be connected to all commutator telephones directly or using special socket PB-HS type. Connections of external communication devices are shown in Figure 6.

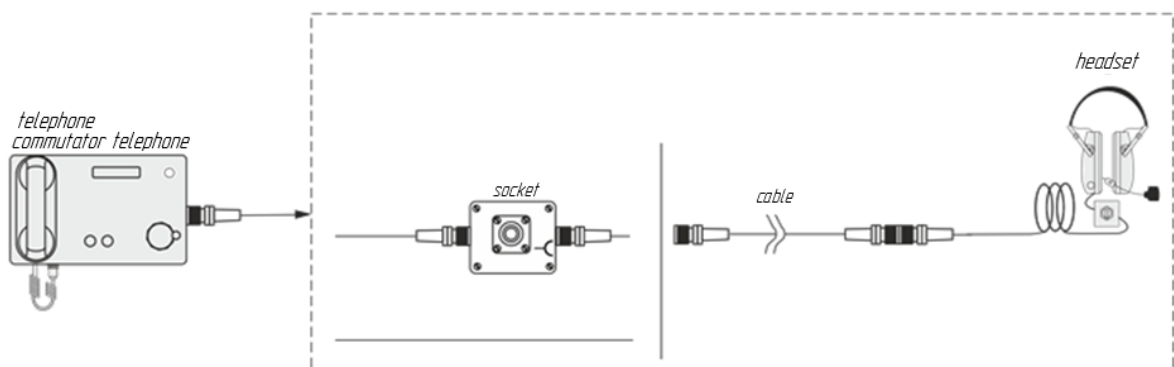
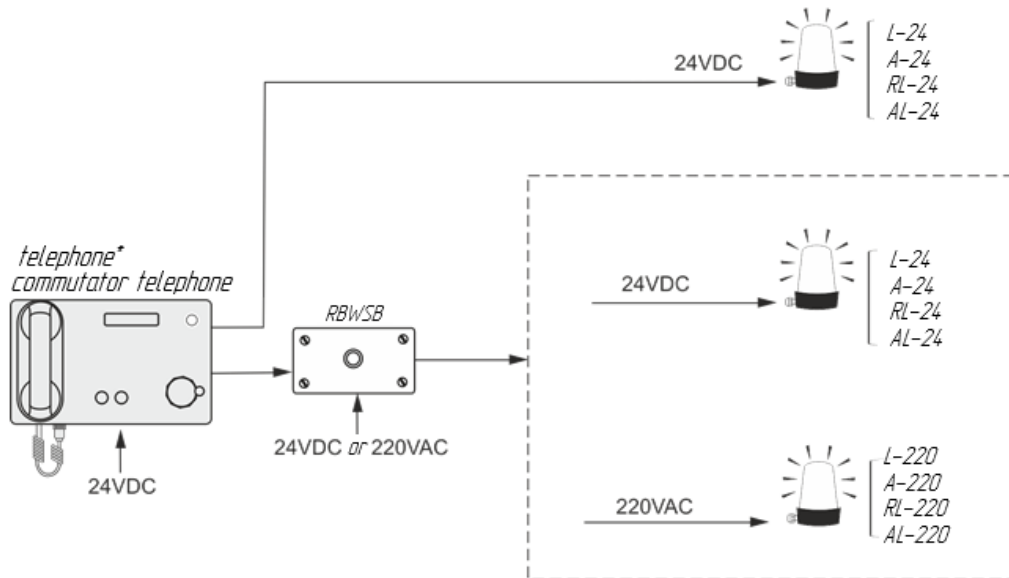


Figure 6 – Connections of external communication devices

All commutator telephones ensure control over external signaling units and repeat (if necessary) incoming call with light and (or) sound signaling. Connections of external signaling units are shown structurally in Figure 7.



\* Only relay unit RBWSB may be connected to PH-1LA

Figure 7 – Connections of external signaling units

All commutator telephones ensure light indicating of power status when power is supplied from the power source.

All commutator telephones have controls backlight which is activated automatically once the power is supplied to the commutator telephone from external source.

Use commutator telephones on open deck only mounted in cabinets BO-1 or BLTS2-BO.

### 2.1.2 Telephone units

Telephones provide for pair (in combination commutator telephone-telephone or telephone-telephone communication) and general list communication with BTC network users.

The System includes four types of wall-mounted and panel-mounted telephones:

- PH-1LA – with built-in amplifier and LCD;
- PH-1L, PH-12L, PH-24L, PH-1LR, PH-12LR, PH-24LR – with LCD;
- PH-1LRW, PH-12LRW, PH-24LRW – waterproof, without LCD;
- PH-1LWP, PH-12LWP, PH-24LWP – portable.

All telephones are equipped with telephone receiver (corded) to provide for two-way communication with other users.

External communication devices (headsets and intercom helmets) may be connected to all telephones directly or using special socket PB-HS type. Connections of external communication devices are shown in Figure 6.

External signaling units may be connected to telephones to repeat incoming call with light and (or) sound signaling. Connections of signaling units are shown in Figure 7.

Signaling units shall be powered from power mains.

All telephones ensure light indicating of power status when power is supplied from the power source.

All telephones have controls backlight which is activated automatically once the power is supplied to the telephone from external source.

Use telephones on open deck only mounted in cabinets BO-1 or BLTS2-BO.

Portable telephones are waterproof and may be used in premises with increased level of humidity and on pen deck with 5-meter cable to connect to socket PB-24 type.

### 2.1.3 Switching unit

Wall-mounted switching units with built-in amplifier connect 12 or 24 user lines to BTC network; for dry enclosed premises. Switching units require 24 V DC external power supply.

### 2.1.4 External communication devices

Communication devices ensure freedom to move around workplace, as well hearing protection against increased noise (decreasing level of acoustic disturbance due to people's work and surrounding mechanisms). The System includes throat microphones allowing for communication in means of respiratory protection.

The System includes the following external communication devices for telephones and commutator telephones:

- headsets – two-eared and one-eared;
- microphone-telephone intercom helmets, summer and winter types;
- throat microphone-telephone intercom helmets, summer and winter types.

Headsets are based on steel headband and may be adjusted individually for convenient use. Headsets are equipped with noise-protected microphone (for operation in noisy conditions).

Intercom helmets are used in conditions on increased noise to protect user's hearing. They are equipped with microphones having low noise sensitivity or throat microphones.

The System's intercom helmets are produced in three sizes. Specify a required size at order.

The devices ensure two-way communication in case of connection to commutator telephones and telephones.

Communication devices are equipped with connectors to connect to telephones (commutator telephones) or socket PB-HS type.

Headsets are equipped with three-position switch to connect and disconnect communication of communication device and telephone (commutator telephone).

Intercom helmets with character «P» in code (identifier) are equipped with three-position switch to connect and disconnect communication of communication device and telephone (commutator telephone).

Connection of headset or intercom helmet is carried out directly using relevant connectors or terminal block, or using external junction boxes and sockets PB-HS type, see Figure 6. The cable may be extended up to 10 m using cable CE type.

### 2.1.5 External signaling units

Signaling units repeat incoming call received on telephone (commutator telephone) with light, sound or both signaling types.

The System includes the following external signaling units:

- a) sound signaling unit type A with sound high tone signaling;
- b) light signaling unit type L with light impulse signaling and type RL with flashing light signaling;
- c) sound and light signaling unit type AL with light impulse and sound high tone signaling;
- d) relay unit type RBWSB to switch voltage to signaling units power circuits by control signals from telephone (commutator telephone).

Relay unit ensures call signal in one of the following modes:

- a) synchronous – call signaling lasts until incoming call is supplied;
- b) with delay – call signaling will last 10 seconds after the call is finished;

c) continuous – call signaling will last until its manual switching off by pressing «Reset call» button on telephone, commutator telephone or relay unit.

Relay unit is equipped with «Reset call» button to switch off (manually) the signaling which is operating in delay or continuous modes.

Signaling units installed on telephone stations shall be powered from power mains with rated voltage 24 V DC or 220 V AC, frequency 50 (60) Hz.

Signaling units A-24, AL-24, L-24, RL-24 types operate with power mains 24 V and may be connected to telephones (commutator telephones) directly and using relay unit (see Figure 7).

Signaling units A-220, AL-220, L-220, RL-220 types operate with power mains 220 V and shall be connected to telephones (commutator telephones) using relay unit.

#### 2.1.6 Sockets

Sockets PB-HS type ensures remote and operation connection of communication devices to telephone (commutator telephone), as well as connection of audio recorder of telephone (commutator telephone). Socket has a connector for headsets and intercom helmets and protective cover.

Sockets PB-24 type ensures of portable telephones to BTC network using quick connector. The socket has a connector with protective cover providing protection against water while communication device is not connected.

#### 2.1.7 Power supply units

Power supply units PS-103 and PS-103-20 ensure power supply of BTC equipment from AC power mains with 50 (60) Hz and rated voltage 110 V or 220 V. PSUs ensure automatic load switching to standby power in case of main power failure.

#### 2.1.8 Metal cabinets

Metal cabinets protect SC installed on open deck against atmospheric precipitation, water, wind, low temperature and accidental mechanical damage; they may also house peripheral equipment and SC when they are not in operation.

The System includes two types of cabinets:

- BO-1, overall dimensions (HxWxD) 300x329x240 mm;
- BLTS2-BO, overall dimensions (HxWxD) 327x544x273 mm.

Cabinet door has max. opening angle 105° and may be fixed in open position.

### 2.1.9 Cables

Cables CE types ensure extension of external communication devices cables.

Cables CE types are equipped with two waterproof connectors; cables CE types with «AC» characters in code (identifier) have waterproof connector on one side, and angle plug – on other side; cables CE types with «BE» characters in code (identifier) have waterproof connector on one side, and bare crimped ends – on other side. The System includes cables 1.5; 3.0; 5.0; 7.0 and 10.0 meters.

## 2.2 Operation of the SC

### 2.2.1 Commutator telephones

The System's commutator telephones are manufactured in metal painted steel casings. The units are wall-mounted and panel-mounted for installation in dry and humid premises. Use metal cabinets BO-1 and BLTS2-BO to install units on open deck.

All commutator telephones are delivered with telephone receiver. It is equipped with a PTT switch providing for connection to communication lines of commutator telephones. The receiver is placed in commutator telephones holder.

Controls of commutator telephones are represented in Table 2.

Table 2 – Description of commutator telephones controls

Control element	Description
«Call» button	To ensure an outgoing call (if power mains available) to called user
«Reset call» button	To mute / reset incoming call
Inductor handle	Rotate the handle on the built-in electric generator providing energy generation to power commutator telephones and ensure call in current connection
Brightness dimmer	To change backlight brightness (if power mains available)
Toggle-switch to select user line	To establish connection with user of selected line
Telephone receiver PTT switch	To connect microphone and receiver's speaker to communication lines of BTC network

Indication (LEDs) of commutator telephones and telephones are represented in Table 3.

Table 3 – Description of commutator telephones and telephones indication (LEDs)

Indication	Description
«Call»	1 Light signaling for incoming call 2 Light signaling for outgoing call
«Power»	Availability of external power supply
«Inductor on»	Light indication of inductor healthy status (while rotated)
LED «User»	1 Light signaling for selected user line 2 Light signaling for number of calling user line

Generally, a commutator telephone consists of USU (with toggle-switches and LEDs), built-in PSU, SUIC, CUESU, «Inductor on» LED, «Call» button, ES, VC1 and VC2, SC (provides for mixing and distribution of power voltage and voice signal), communication device, AP and EG.

For the functional diagram of commutator telephone see Figure 8.

Rotation of EG produces voltage which, in its turn, switches on LI, and then supplied to VC1 and VC2, through them it is supplied to AP и ES, and also led to USU; at the same time, block signal of external signaling units actuation is generated which then is supplied to CUESU.

Once user line toggle switch at USU is switched on, energy produced by inductor, actuates call signaling to SUIC, and, at the same time, it is supplied to user line, causing call signal actuation at corresponding user.

Operation of commutator telephone from external power mains via built-in PSU fully repeats operation from inductor (the latter is not used), but energy is supplied to USU and CUESU only after pressing CB.

Transmission of voice signals to user and back is provided by AP and SC, once PTT is pressed at the corresponding device.

Energy received by user line during incoming call is transmitted to SUIC and CUESU, and then starts actuation of incoming call signaling; at the same time, it is supplied to USU and switch on light signaling of user line (receiving the current call).

Once user line toggle switch is actuated on USU, energy from user line is supplied to inputs VC1 and VC2, using which then power is supplied to AP and ES. Transmission of voice signals to user and back after pressing a PTT switch on the corresponding communication device is provided by AP and SC.

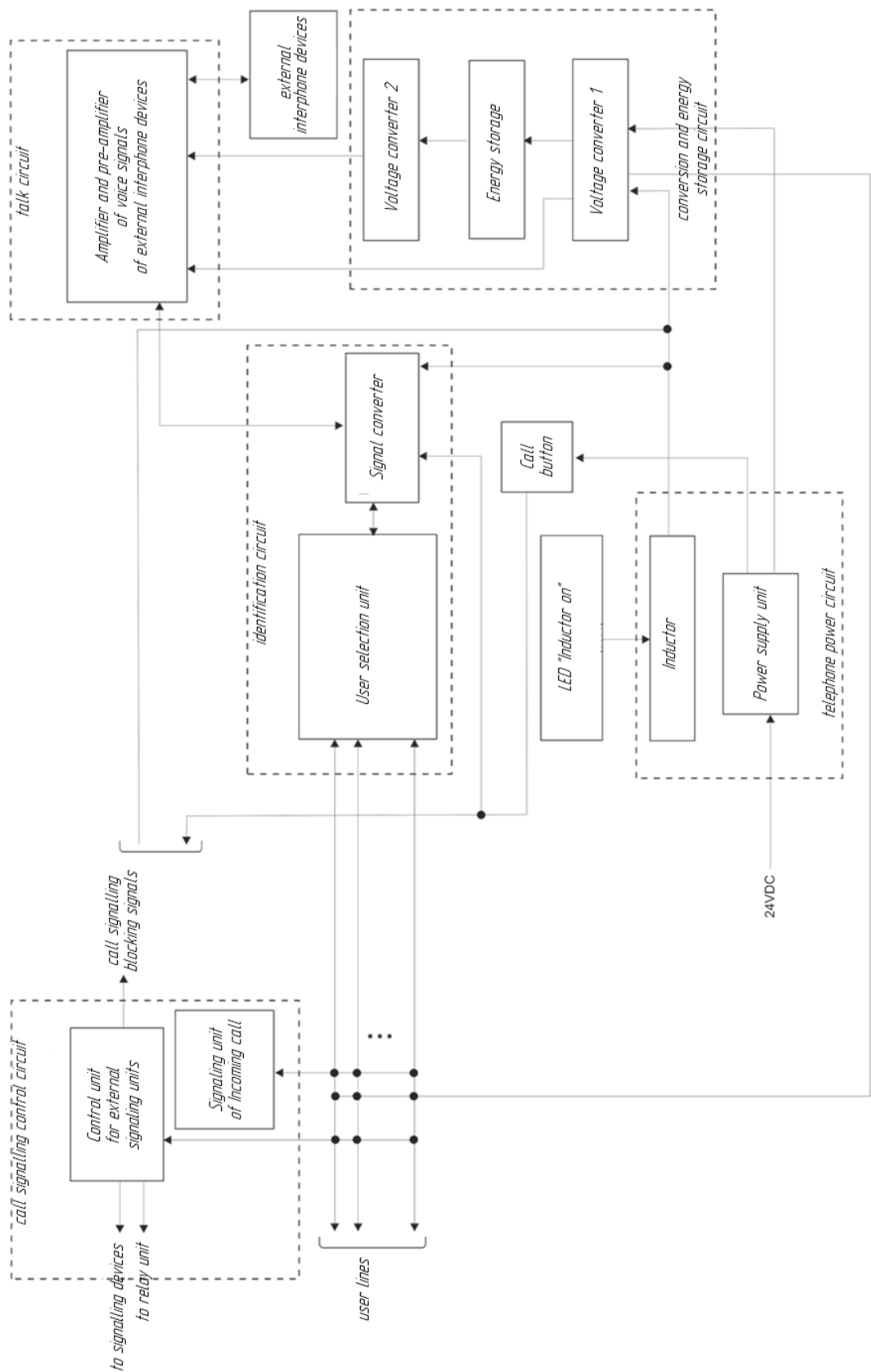


Figure 8 – Functional diagram of commutator telephone

### 2.2.2 Telephones

The System's telephones are manufactured in metal painted steel casings. The units are wall-mounted and panel-mounted for installation in dry and humid premises. Use metal cabinets BO-1 and BLTS2-BO to install telephones on open deck.

All telephones are delivered with receiver. It is equipped with a PTT switch providing for connection to communication lines of telephone. The receiver is placed in telephone holder.

Controls and indication (LEDs) of telephones are represented in Tables 4 and 5.

Before operation, assign a unique user number of BTC network to every telephone unit, see 3.2.3.

Table 4 – Controls of telephones

Control element	Description
«Call» button	To ensure an outgoing call (if power mains available) to called user
«Reset call» button	To mute / reset incoming call
Inductor handle	Rotate the handle on the built-in electric generator providing energy generation to power commutator telephones and ensure call in current connection
Brightness dimmer	To change LCD and controls brightness (if power mains available)
Switch to select user group	To select user line and establish connection with the selected line to provide for call in BTC network, see Table D.12
Selector switch	
Telephone receiver PTT switch	To connect microphone and receiver's speaker to communication lines of BTC network

Table 5 – Description of telephones indication (LEDs)

Indication	Description
«Call»	1 Light signaling for incoming call 2 Light signaling for outgoing call
«Power»	Availability of external power supply
«Inductor on»	Light indication of inductor healthy status (while rotated)
LCD	Displays current information on telephone status (if power mains available), see Table D.7

Generally, telephones consist of USU (selector switch), built-in PSU, SUIC, CUESU, LED «Inductor on», «Call» button, ES, CV1 and CV2, communication device, AP, EG.

For the functional diagram of telephone see Figure 9.

While putting a USU selector in required position (to number of selected user line), energy produced by EG, actuates light signaling of LI, then it is supplied to CV1 and CV2, ES, using which – to microcontroller and AP (if any) or via communication lines – to amplifier of connected commutator telephone or switching unit SB-12A or SB-24A, and, at the same time, it is transmitted to user line actuating corresponding call.

Functionality of telephone powered from external power mains via built-in PSU fully repeats operation from EG (the latter is not used), but energy is supplied to USU only after pressing CB; it is not supplied to LI.

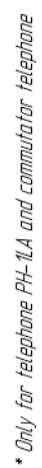


Figure 9 – Functional diagram of telephone

Transmission of voice signals to user and back is provided using built-in amplifier (AP or external amplifier of commutator telephone or switching unit) after pressing a PTT switch on the corresponding communication device.

During incoming call, energy received by user line, is transmitted to SUIC and CUESU, and then starts actuation of incoming call signaling (if relevant permission command was received from MC (microcontroller)); it is received on relevant MC circuits using which it is defined as «self» signal or other units', and supplies a permission signal to SUIC and CUESU, as well using user line power circuits, built-in PSU and CV1, CV2 to ES and AP (for telephones with built-in amplifier).

Transmission of voice signals to user and back after pressing a PTT switch on the corresponding device is carried out in the same way as it is carried out during incoming call via built-in amplifier (AP or external amplifier of commutator telephone or switching unit).

### 2.2.3 Switching units

Switching units have a select of 12 or 24 terminals in parallel (X1-X12 or X1-X24 depending on the model), whereto cables are led from the System telephones.

The terminals connect all user lines of connected telephones in parallel; this allows for organizing a network (or subnetwork) of BTC users.

Voltage of external power mains (18...26 V) is supplied to J19 terminal which is stabilized by built-in PSU at 24 V and supplied to telephone lines via corresponding terminal circuits X1-X24.

Technological electricity-conducting circuits of electronic circuitry form interruptible connections using which call or voice signals and supply voltage are transmitted to centre inputs from telephones and then transmitted to other telephones.

### 2.2.4 External communication devices

#### 2.2.4.1 Headsets

Headsets is an external communication device designed for two-way communication together with telephones and commutator telephones.

Headsets HS-3, HS-3P consist of microphone (middle noise immunity), two telephones fastened on the headband, and three-meter cable with bare ends for headset HS-3 type, plug male connector or angle connector for headset HS-3P type. Cable length (headset – PTT switch) – 0.8 m.

Headsets HS-5, HS-5C and HS-5AC types consist of microphone (low noise immunity), one telephone fastened on the soft (woven) headband, and PTT switch. Cable length (headset – PTT switch) – 0.8 m. The headset has a three-meter cable to connect to telephone, commutator telephone or socket PB-HS with crimped ends for headset HS-5 type, with waterproof male plug for headset HS-5C type or waterproof angle plug for headset HS-5AC type.

PTT switch is equipped with three-position toggle switch. In neutral position toggle switch ensures disconnection of communication circuits of communication device and telephone (commutator telephone); in other positions – their closing; at the same time, in one extreme position - toggle switch may be fixed, and in another – is shall be held during communication; once it is released – it comes back to initial neutral position.

Headsets HS-5, HS-5C and HS-5AC types operate under max. noise 80 dB, HS-3, HS-3P – max. 115 dB.

#### 2.2.4.2 Intercom helmets

Intercom helmet is a key external communication device. Intercom helmet is a head wear with integrated headset.

The System includes microtelephone intercom helmets TH-4M type and throat microphone helmets TH-4L type.

Intercom helmets consist of headset fastened on the helmet, PTT switch, microphone or throat microphone, and cable with crimped ends; waterproof plug or waterproof angle plug providing for connection of helmet to telephones, commutator telephones or socket PB-HS.

PTT switch is equipped with three-position toggle switch. IT functions in the same way as headset switch.

Intercom helmets have summer and winter types, see Appendix B.

Intercom helmets have special shock absorbers to protect a head against impacts; the back of the helmet has opening flip to protect against atmospheric precipitation.

Intercom helmets are delivered in one of three sizes. Conditional size of helmet corresponds with size of the head according to Table 6. Head size is defined by perimeter of circle in centimeters and measured by the most exceeding point of the head back in the back part, and above the brows - in the front part. Use centimeter line to measure the size.

Table 6 – Conditional size of intercom helmet

Conditional size of intercom helmet	Head size, cm
I	Max. 56 inclusive
II	57, 58, 59
III	60, 61

Before operation, put a helmet on the head and adjust its size using adjustments belts at the top of the head. Using adjustment belts under the chin regulate the convenient length. Fix throat microphone on the neck using neck belt adjusting its convenient length.

Intercom helmets do not require special settings or regulations.

Intercom helmets TH-4M and TH-4L ensure talk-back communication under max. noise 115 dB and 130 dB, respectively.

## 2.2.5 External signaling devices

### 2.2.5.1 Signaling device

The System includes light, sound and light-sound signaling units. All units are waterproof and may be installed on open deck. Signaling units are wall-mounted, or may be mounted on a bracket (any orientation).

Signaling units are powered from external power mains; in this circuit telephone (commutator telephone), or relay unit RBWSB are connected in series with signaling unit (in a line break).

During incoming call, telephone or commutator telephone actuates signaling unit independently by signal of CUESU or via relay unit closing its circuit.

Signaling units L, AL, A types are produced in plastic impact-resistant casings. Casings (from four sides) have special knock-out type plugs, providing for cable lead in the most convenient place.

Signaling units AL and A types have built-in sound generator and regulator module of sound pressure level providing for regulation within 30...105 dB.

Signaling units L and AL types are equipped with xenon lamp operating in impulse mode with frequency 60...90 impulses per minute.

Flashing lamp is produced in plastic transparent globe (specify colour at delivery), mounted in metal foundation. 40 W incandescent lamp is placed inside – for RL-220 or halogen 70 W – for RL-24, as well as mechanism with plastic mirror reflector and motor.

Once power is supplied, the lamp starts operation in continuous glowing mode; mechanism starts rotating mirror reflector around the lamp which provides for operation in flashing mode.

Emitted colour depends on globe colour and may vary depending on type, see Table 7.

Table 7 – Colour types of globes

Signaling unit type	Emitted colour (globe colour)				
	Red	Orange	White (transparent)	Green	Blue
RL	+	+	-	+	+
AL	+	+	+	+	+
L	+	+	+	+	+
Note 1 «+» – colour is available. 2 «-» – colour is not available.					

#### 2.2.5.2 Relay unit

Relay unit RBWSB type is manufactured in impact-resistant plastic; wall-mounted; may be installed on open deck. Received control signal actuate contacts which close input power circuits (220 V – for RBWSB-220, or 24 V – for RBWSB-24) on signaling unit circuit.

Cables are lead through cable glands. Relay unit is equipped with call reset button, call LED, and three parallel ports to connect signaling units and ensure signaling in three modes (2.1.5). Settings of call mode are carried out using jumpers JP1 and JP2 on the device board according to Table 8.

Table 8 – Settings of relay unit modes

Identifier	Type of settings	Description
JP1, JP2	Call mode setup	1 jumper JP1 is set – call signaling will last until «Reset call» button is pressed; 2 jumper JP2 is set – call signaling will last for 10-12 seconds after call is finished; 3 jumpers JP1 and JP2 are not set – call signaling will last unless calling user finishes the call; 4 jumpers JP1 and JP2 are set – call signaling will last until «Reset call» button is pressed

### 2.2.6 Sockets

The System includes sockets PB-HS and PB-24 types. They are wall-mounted, waterproof, equipped with protective cover, providing air-tight protection of connector's contact parts against water; may be installed on open deck.

Sockets are manufactured in metal painted casings. From the front side they have a quick connector with waterproof cover. Cable glands are also located on the casings.

### 2.2.7 Power supply units

PSUs are used as additional unit when it is required to connect System to power mains with voltage 220 V or 110 V.

The System's PSUs are manufactured in painted metal casings; they are wall-mounted and designed for installation in dry premises. PSUs connect up to three loads for PS-103, and up to four loads for PS-103-20.

Electrical diagram of PSU includes a switcher, stepdown transformer, rectifier with filter, current overload protection device: fuse – for PS-103 and automatic circuit breaker – for PS-103-20 and module of automatic load switchover to emergency power.

Power LED is located on the casing side (as a part of power on and off button).

### 2.2.8 Metal cabinets

The System includes metal cabinets BLTS2-BO and BO-1 type: wall-mounted, waterproof type, designed for installation on open deck.

Every cabinet is a metal cabinet from painted steel with a door. The door is equipped with a single-point for BO-1, or three-point for BLTS2-BO lock mechanism, opened / closed outside by double bitted key. Opened door is fixed in open position by special mechanism (stop) which is activated at full opening and released manually. Lower part has cable glands for external connections.

The cabinets may house any telephone or commutator telephone with a set of communication devices.

### 2.2.9 Cables

Cables CE type are designed to extend standard cables of external communication devices and designed in the following models:

- with two waterproof connectors (plug and socket);
- with waterproof connector and bare crimped ends;
- with waterproof connector from one side, and waterproof angle connector on the other.

Cables are waterproof type.

### **3 INTENDED USE**

#### **3.1 Operational constraints**

The SC system connections on the order must match the schema and connection table for this order.

All SC shall have reliable grounding.

#### **3.2 Usage preparations**

##### **3.2.1 Safety features**

When preparing the system for use, you must:

- train personnel in the use of the system's SC, control and verification equipment, and safety procedures for compliance with the requirements of the safety qualification group no lower than III;
- familiarize personnel with grounding points of all SC systems and check the reliability of grounding;
- before connection the SC must be switched off, all units must be properly grounded;
- use only standard Fuse links (for PS);
- 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 SC on, the staff shall:

- observe visually the cable integrity and initial position of the controls (on commutator telephone, all switches (toggle switches) for selecting subscribers must be moved to the down position);
- clean the SC from dust and dirt by clean soft cloth, if necessary;
- check reliable cable connections to the SC and their proper grounding.

##### **3.2.3 Telephones settings**

Before start of operation, assign a user number for each telephone; dialing this number ensures actuation of incoming call signaling. Assign a number before the first connection or change of applied telephone network.

Assign a number only if power supply is available (external 24 V, or reserved – created by inductor operation).

To assign a number, provide the following steps:

- assign a group number: set a jumper J1 to position «1» (contacts 2 and 3); if assigned number is within 1 – 12; or in position «2» (contacts 1 or 2), if assigned number is 13 and more;
- set a user number: use a group of DIP-switches SW2 and SW3 (see Figure D.1) for relevant number of user according to Table D.6;
- supply external power 24 V DC to telephone, or in case of power absence – rotate a handle of generator during 5 seconds with max. speed 5 rot/sec;
- press and hold during 3 seconds SW4 button to record the selected number to non-volatile memory of the telephone (SW4 button is available for all telephones except single-channel ones). Record corresponds with LCD display (if available), see Table D.7.

#### 3.2.4 Instructions on SC switching on

These steps are carried out if the System has a connection to external power supply.

Supply the power to SC:

- switch on the power of all PSUs;
- check «Power» LED operability on all telephones and commutator telephones;
- check backlight of controls and LCD on all telephones and commutator telephones.

In case of power failure, do not provide any of abovementioned steps. The System is ready for operation immediately.

### 3.3 Use of the System

Before start of operation, provide for 3.2.2 and 3.2.4.

#### 3.3.1 Select of user

The System users may be selected from any commutator telephone.

Single-channel telephones have fixed wired connection only to one commutator telephone and do not ensure dialing of any other user.

Multi-channel telephones have fixed wired connection with a group of telephones of BTC network and may provide a select using selector switch of other user for selective call.

To select a user, group or all users, transfer toggle switch of user select «User» to top position. If power is available, LED of the selected user line starts glowing, and if power is not available – LED will glow only during call while handle rotation of EG.

### 3.3.2 Call. All users call

User call of BTC network may be carried out from any System telephone or commutator telephone.

Before the call, pick up a receiver or put on external communication device and, after the call, wait for the answer; prior to that, set up a connection with called user on the commutator telephones – switch on corresponding toggle switch.

If power is available, press and hold Call button to call; if power is not available – rotate a cycle of inductor until the user answer. In both cases, Call LED will start glowing and low intermittent sound signal; and in the second case – LI will switch on additionally.

Group of users call or all users is carried out from commutator telephone in the same way; but switching on the corresponding toggles.

During the call, incoming call signaling will be actuated on the called telephone, and called user will reply with a voice communication; then a communication session is set up.

To stop the call, release Call button or stop rotating the inductor.

### 3.3.3 Call acceptance

Built-in light and sound signaling will be actuated during incoming call on telephone or commutator telephone. External signaling (if any connected units and power supply) will be actuated as well. Additionally, light indication of calling line will be switched on commutator telephone.

To reset call signaling, press PTT of receiver or communication device, or «Call reset» button on the telephone or relay unit, or transmit a voice communication to the calling user with information on readiness to communication, so that calling user stops the call.

Before answering, additionally switch on relevant toggle on the commutator telephone.

### 3.3.4 Communication and answering the call

Before communication, set a connection with the required user, ensure a call or accept a call.

To transmit and listen to voice communication, pick up a receiver, press and hold PPT switch on the receiver.

If you use a headset or intercom helmet with manual switch, use the switch as described below:

- «Top» position – switch on and fixed (connection to telephone communication circuits);
- «Bottom» position – switch on and hold (connection to telephone communication circuits);
- «Middle» (neutral) position – switched off.

To stop the call, release PTT switch on the receiver and put the receiver down to holder.

If you use a headset, switch it off.

### 3.3.5 Conference call

Conference called is set with commutator telephone by select of all users or relevant group of users (see 3.3.1); conference participants may communicate with each other in talk-back mode at the same time.

Provide general list (group) call in conference call mode according to 3.3.2.

Conference call from multi-channel telephones is carried out with preliminary consequent call of all participants one by one, providing an invitation to communication; conference participants may communicate with each other in talk-back mode at the same time.

### 3.3.6 Backlight dimming

Telephones and switching, units powered from the power mains, provide backlight of controls and LCD. Brightness dimming is carried out by pressing a button with brightness icon. It is changed cyclically: from higher level to the lower one (eight levels in).

Controls backlight as well as backlight dimming function are powered only from power mains.

Every time after power restore, the brightness will be initially set to the middle level (fourth level). Adjust if necessary.

To display current level of brightness, press brightness button once (for telephones with LCD only).

### 3.3.7 Missed calls

If during incoming call and in case of power mains availability, the receiver on the telephone with LCD has not been picked up (PTT has not been pressed), LCD will show missed calls data.

To reset these data, call back to the missed number or answer the call in case of repeated incoming call. Data on missed calls in BTC mode is not saved on LCD.

## 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 all types of TS:

- TS-0 – daily TS;
- TS-1 – semi-annual TS;
- TS-2 – annual TS.

TS-0 is organized and controlled by a department commanders and shall be provided by the staff on the running equipment.

TS-1 is organized and controlled by a person in charge and shall be provided by the staff on the running equipment. The TS-1 results are registered in log of operation (duty log).

TS-2 works organized and controlled by a person in charge and shall be provided by the staff on the running equipment. TS-2 results are registered to the System certificate.

### 4.2 Safety features

When doing TS, you must follow the instructions in 3.2.1.

### 4.3 Maintenance routine

The list of works for all types of TS is given in Table 9. Maintenance routine procedure is given in checklists (hereinafter – CL), represented in Tables 10-13.

Table 9 – List of works by TS types

CL №	Work	Type of TS		
		TS -0	TS -1	TS -2
1	Visual check of the SC	+	+	+
2	Operability test of the SC	+	+	+
3	Test of public address modes	–	–	+
4	Check of scope of delivery, SPTA kit condition and operation documentation	–	–	+
Note: 1 «+» – work is obligatory. 2 «–» – work is not obligatory.				

Table 10 – Checklist № 1. Visual check of the SC

To do	Works	Man-hours per 1 SC
Visually examine the SC	<p>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, fastening telephone receiver and external inter-phone device.</p> <p>2 Clean up the SC surfaces with clean cloth.</p> <p>3 Remove severe contamination, parts of corrosion, oil spots:</p> <ul style="list-style-type: none"> <li>- from front surfaces – using soap form preventing it against penetration inside the SC, then all surfaces clean dry by clean cloth and dry up;</li> <li>- from other surfaces – using alcohol soaked cloth.</li> </ul> <p>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</p>	1 person 5 minutes
Check reliability of cable and bus connection to the SC	<p>1 Check that connectors and attaching screws are fastened tight; provide further fastening if needed.</p> <p>2 Check the cable integrity (mechanical damage shall be absent) within visibility</p>	1 person 5 minutes

Table 11 – CL № 2. SC operability check

Fault	To do	Man-hours per 1 SC
Check operability of telephones and commutator telephones	<p>1 Check that Power LED is on and controls backlight is operating (if checked telephone (commutator telephone) is connected to power supply); adjust backlight if necessary</p> <p>2 Check inductor operability – rotate it and make sure that LED «Inductor on» is glowing</p>	1 person 5 minutes

Table 12 – CL № 3. LS and BTC modes check

To do	Works	Man-hours per 1 SC
Check SC operability and communication	Provide test calls from each telephone and commutator telephone according to the list of users: <ul style="list-style-type: none"> <li>– while setting a connection, check LEDs operability of selected user line (only for commutator telephones);</li> <li>– while calling, check actuation of outgoing call signaling (intermittent sound signal and «Call» LED actuation);</li> <li>– while calling from inductor, check actuation of LI;</li> <li>– on the called telephone (commutator telephone), check actuation of incoming call signaling – local (call signal and Call lamp) and external (external signaling units).</li> </ul>	2 persons 1 hour
	Set a control call (using telephone receiver and external communication device), control communication, connections, transmission of voice communication and communication quality (speech clearance and legibility); during communication make sure that PTT switches of communication devices operate correctly (no malfunctions or noise).	2 persons 1 hour
	For portable telephones, additionally control statuses of their connectors and matching sockets; test every socket, connect it and set a communication with users, test a connector for headset by intended use.	2 persons 1 hour

Table 13 – Checklist №4. Check of scope of delivery, SPTA kit condition and operation documentation

To do	Works	Man-hours per 1 SC
Check of scope of delivery, SPTA kit condition and operation documentation	1 Compare SPTA kit items to operational documentation represented in section 4 «The scope of delivery» of the System Certificate. 2 Check the quality of every SPTA kit item, storage time and full recompletion of SPTA kit in case of its use (according to 4.4). 3 Recomplete SPTA kit	2 person 1 hour

#### **4.4 Instructions on use of SPTA kit**

SPTA kit is delivered together with the System and used to support operating condition of the System by replacing failure SC.

SPTA kit composition shall comply with the list represented in section 4 «The scope of delivery» of the System Certificate.

#### **4.5 Preservation**

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

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

If necessary, represervation is carried out by the buyer or by the ship's personnel.

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

The represerved System, SPTA kit and set of operational documents are placed in package.

The storage time for the represerved System – 2 years.

## **5 CURRENT SYSTEM REPAIR**

### **5.1 General description**

Within time of warranty the System is opened in the presence of the Manufacturer representative drawing up an Act of opening.

If the System is used outside its regular place of use, and SC failed, replacement of fuses and LEDs, etc. from portable SPTA kit is allowed without presence of the Manufacturer representative. Relevant record is made in the System Certificate.

Once the System is returned back to the regular place of use, a representative of the Manufacturer should be called in to draw up a damage claim.

Recomplete SPTA kit at regular place of use from basic SPTA kit.

### **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.

Use rubber rug in front of power supply units and power amplifiers.

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

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

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

## 6 CURRENT REPAIR OF SC

### 6.1 Commutator telephones and telephones

The System's commutator telephones and telephones operability is controlled by LEDs located on the front panels of the SC.

The list of possible malfunctions and troubleshooting is represented in Table 14.

The staff shall eliminate malfunctions of commutator telephones and telephones using SPTA kit portable.

Table 14 – The list of possible malfunctions and troubleshooting

Malfunction	Possible reasons	Instructions
1 «Power» LED is not glowing	PSU failure (power is not supplied)	Replace the fuse (de-energize the SC)
		Supply power to PSU
		See table 15
2 «Call» button does not work	Fuse malfunction on telephone (commutator telephone) on power circuit	Replace the fuse
3 No buttons backlight (dimming button does not operate)	Power supply to the unit was not included in project	No actions required
While rotating handle of electric generator, «Inductor on» LED is not glowing.	Electric generator malfunction, or inductor circuit contact malfunction	Replace the telephone (commutator telephone)
While rotating handle of electric generator, call is not supplied (but LEDs «Inductor on» and «Call» are glowing)	Contact malfunction (connection) in user line or connector	Check communication line and connection reliability, switching on connectors and terminals contacts
	Contact malfunction in switch circuit (toggle) of user select (only for commutator telephones)	1 Check the toggle circuit, restore contact. 2 Replace the commutator telephone
No local (and external) signaling of incoming call («Call» LED is not glowing and no sound signal)	Contact malfunction (connection) in user line or connector	Check communication line and connection reliability, switching on connectors and terminals contacts
External signaling units do not operate during incoming call	No power mains for signaling units	Supply power to signaling units (switch on power mains)
	Fuse malfunction on signaling unit control circuit	Replace the fuse
	Contact malfunction (connection) in signaling unit connection circuit	1 Check the connection circuit, restore contact. 2 Replace the unit
	Signaling unit malfunction	Replace the unit; replace a bulb in flashing lamp

Malfunction	Possible reasons	Instructions
No connection with calling user, incoming call is set $\tau$ (only for commutator telephones)	Contact malfunction in switch circuit (toggle) of user select	1 Check the toggle circuit, restore contact. 2 Replace the commutator telephone
No transmission of voice communication between users (including commutator telephones in case of correct signaling for user connection)	Not enough power for telephones operation (commutator telephones)	Rotate the handle of inductor
	No contact in receiver connection circuit	Check and restore contact in the receiver connection circuit
	No contact in external communication device connection circuit	Check and restore contact in the external communication device connection circuit (communication lines, connectors, socket, manual headset switch, intercom helmet)
	Telephone receiver malfunction (microphone module or speaker)	Replace the telephone receiver
	Headset (helmet) malfunction	Replace the headset (helmet)

## 6.2 Power supply units

Operability of the PSU is controlled by LED of Power switch (power supply mains availability) and by checking constant voltage 24 V on the output terminals of PSU.

The list of possible malfunctions and troubleshooting of PSU is represented in Table 15.

Troubleshooting of PSU malfunctions is carried out by staff using SPTA kit portable.

Table 15 – The list of possible malfunctions and troubleshooting of PSU

Malfunction	Possible reasons	Instructions
No power indication if power button is switched on	No power mains	Provide external power mains
No output voltage; power indication is on	Fuse malfunction	Replace the fuse
	Transformer malfunction	Replace the transformer
	Board malfunction	Replace the board
No output voltage in case of main power failure (no switch-over to standby power supply)	No power of standby network	Supply power from standby network
	Switching circuit on board is faulty	Replace the board
	Standby connection is not included in project	No actions required

### 6.3 Relay unit

Table 16 – The list of possible malfunctions and troubleshooting of relay unit

Malfunction	Possible reasons	Instructions
No power indication if power button is switched on	No power mains	Provide external power mains
No output voltage; power indication is on	Fuse malfunction	Replace the fuse
	Transformer malfunction	Replace the transformer
	Board malfunction	Replace the board
No output voltage in case of main power failure (no switch-over to standby power supply)	No power of standby network	Supply power from standby network
	Switching circuit on board is faulty	Replace the board
	Standby connection is not included in project	No actions required

## **7 TRANSPORTATION AND STORAGE**

The Product must be stored in packaging inside areas complying with the required storage conditions (+5...+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.

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.

After storage or transportation of the SC below +10 °C, it must be unpacked only in heated premises and left in normal climate conditions for 12 hours beforehand.

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



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

## APPENDIX A

### SPTA KIT LIST

Table A.1 – SPTA kit

Name	Quantity, pc.
Fuse link (5x20 mm) 0,5 A	6
Fuse link (5x20 mm) 1 A	6
Fuse link (5x20 mm) 2 A	6
Fuse link (5x20 mm) 3 A	1
Fuse link (5x20 mm) 5 A	4
Fuse link (5x20 mm) 10 A	3
Bushing tips, for wire 2,5 mm <sup>2</sup>	100
Crimping pliers for bushing tips 0,4...4,0 mm <sup>2</sup>	1
Phillips screwdriver, tip PH1	1
Slotted screwdriver, slot width 3,5 mm thickness 0,6 mm	1
SC system (see 1.3.1)	0 or more*
* The name and quantity of SC system is specified when placing an order.	

## APPENDIX B

### DESCRIPTION OF THE SC

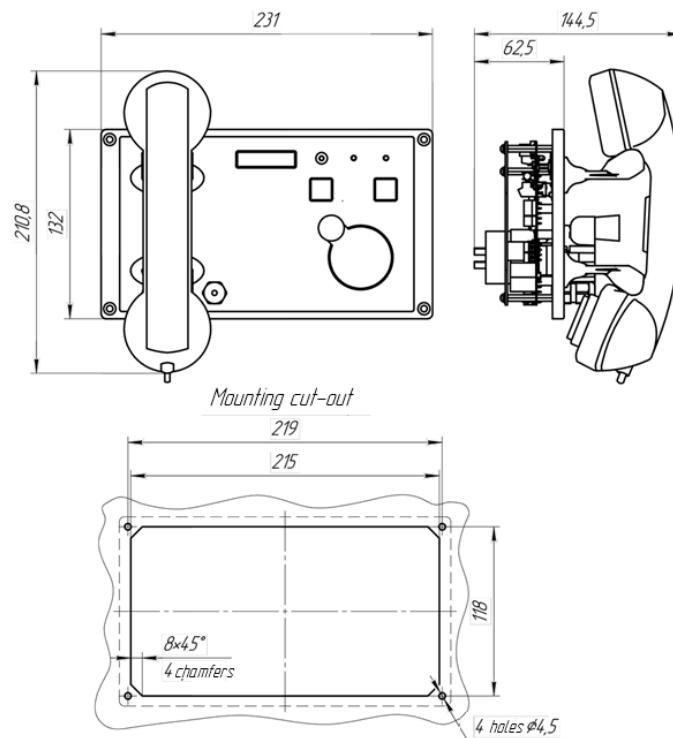


Figure B.1 – Telephone PH-1LA

#### Telephone PH-1LA

**Description:** single-channel telephone, equipped with built-in amplifier. For application in battery less pair communication.

##### Features:

- Operation in modes BTC and LS;
- equipped with built-in amplifier;
- LCD and controls backlight;
- Incoming call LEDs, Indicator on LED, external power LED;
- External signaling units may be connected;
- Headset may be connected.

##### Technical specifications:

- max. power consumption: 3 W;
- number of lines: one;
- IP rating: IP44;
- operating temperature: -15...+55 °C;
- weight: 1.70 kg.

##### Mounting type:

- panel;
- wall with casing MBOX, WBOX;
- desk-top with casing WBOX.

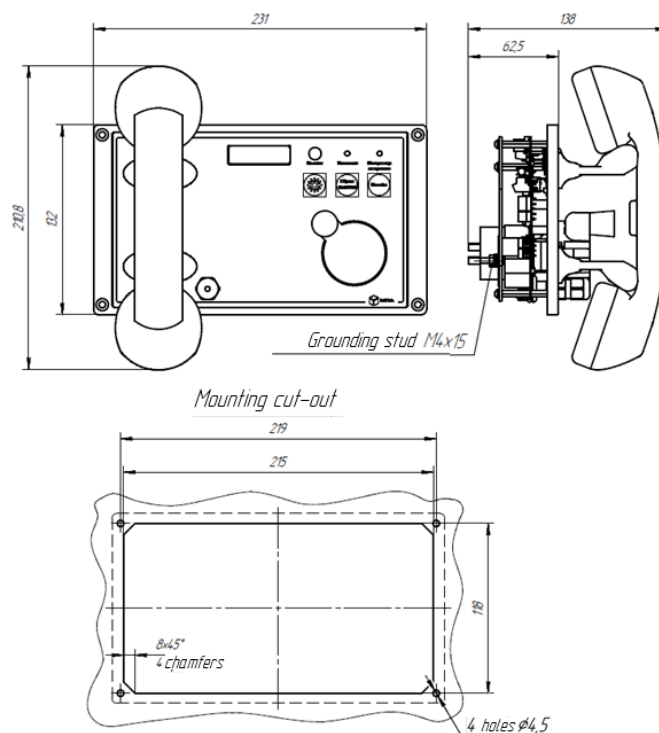


Figure B.2 – Telephone PH-1L

### Telephone PH-1LA

**Description:** single-channel telephone for application in battery less communication systems.

**Features:**

- Operation in modes BTC and LS;
- LCD and controls backlight;
- Incoming call LEDs, Inductor on LED, external power LED;
- Headset may be connected.

**Technical specifications:**

- max. power consumption: 3 W;
- number of lines: one;
- IP rating: IP44;
- operating temperature: -15...+55 °C;
- weight: 1.70 kg.

**Mounting type:**

- panel;
- wall with casing MBOX, WBOX;
- desk-top with casing WBOX.

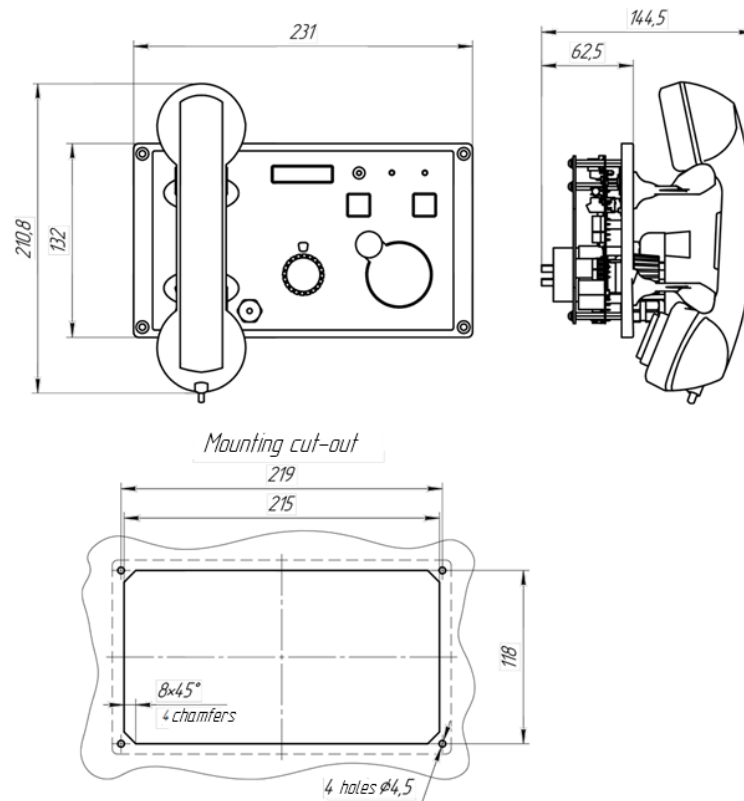


Figure B.3 – Telephone PH-12L, PH-24L

### Telephone PH-12L, PH-24L

**Description:** telephone for 12, 24 lines for application in battery less communication systems.

**Features:**

- Operation in modes BTC and LS;
- LCD and controls backlight;
- Incoming call LEDs, Inductor on LED, external power LED;
- Headset may be connected.

**Technical specifications:**

- max. power consumption: 3 W;
- number of lines: 12, 24;
- IP rating: IP44;
- operating temperature: -15...+55 °C;
- weight: 1.70 kg.

**Mounting type:**

- panel;
- wall with casing MBOX, WBOX;
- desk-top with casing WBOX.

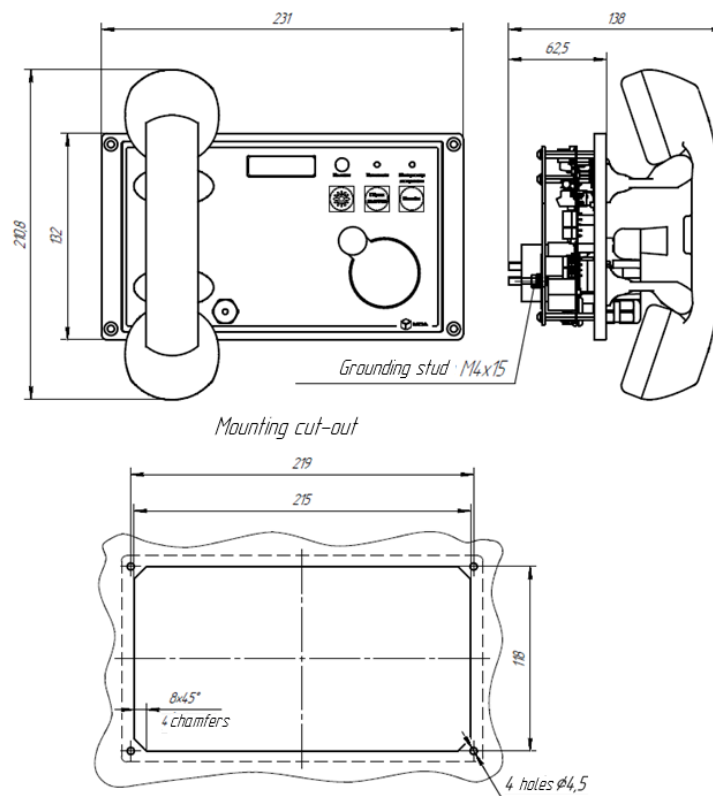


Figure B.4 – Telephone PH-1LR

### Telephone PH-1LR

**Description:** single-channel telephone (external alarm may be connected) for application in battery less communication systems.

**Features:**

- Operation in modes BTC and LS;
- equipped with built-in amplifier;
- LCD and controls backlight;
- Incoming call LEDs, Indicator on LED, external power LED;
- External signaling units may be connected;
- Headset may be connected.

**Technical specifications:**

- max. power consumption: 3 W;
- number of lines: one;
- IP rating: IP44;
- operating temperature: -15...+55 °C;
- weight: 1.70 kg.

**Mounting type:**

- panel;
- wall with casing MBOX, WBOX;
- desk-top with casing WBOX.

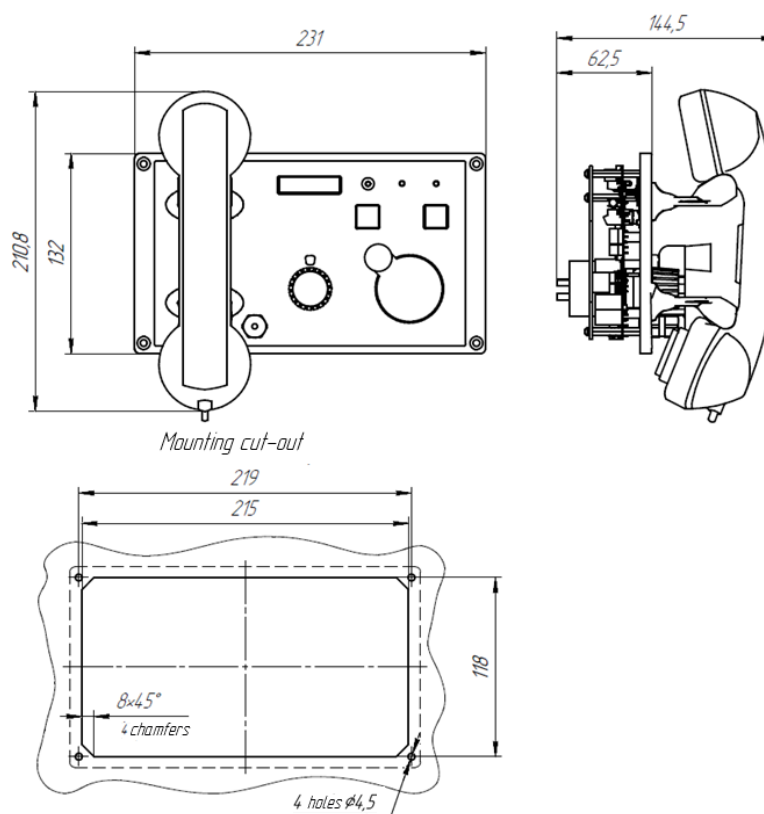


Figure B.5 – Telephone PH-12LR, PH-24LR

### Telephone PH-12LR, PH-24LR

**Description:** telephone for 12, 24 lines (external alarm may be connected) for application in battery less communication systems.

**Features:**

- Operation in modes BTC and LS;
- equipped with built-in amplifier;
- LCD and controls backlight;
- Incoming call LEDs, Inductor on LED, external power LED;
- External signaling units may be connected;
- Headset may be connected.

**Technical specifications:**

- max. power consumption: 3 W;
- number of lines: 12, 24;
- IP rating: IP44;
- operating temperature: -15...+55 °C;
- weight: 1.70 kg.

**Mounting type:**

- panel;
- wall with casing MBOX, WBOX;
- desk-top with casing WBOX.

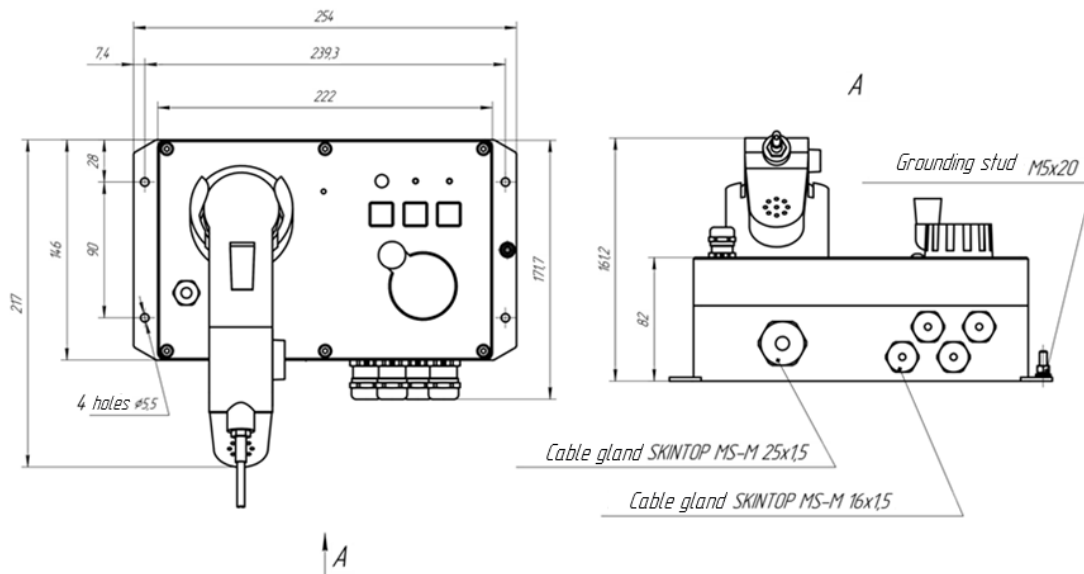


Figure B.6 – Telephone PH-1LRW

### Telephone PH-1LRW

**Description:** single-channel telephone (external alarm may be connected) for application in battery less communication system.

**Features:**

- Operation in modes BTC and LS;
- equipped with built-in amplifier;
- LCD and controls backlight;
- Incoming call LEDs, Indicator on LED, external power LED;
- External signaling units may be connected;
- Headset may be connected.

**Technical specifications:**

- max. power consumption: 3 W;
- number of users: one;
- IP rating: IP56;
- operating temperature: -40...+55 °C;
- weight: 2.50 kg.

**Mounting type:** wall.

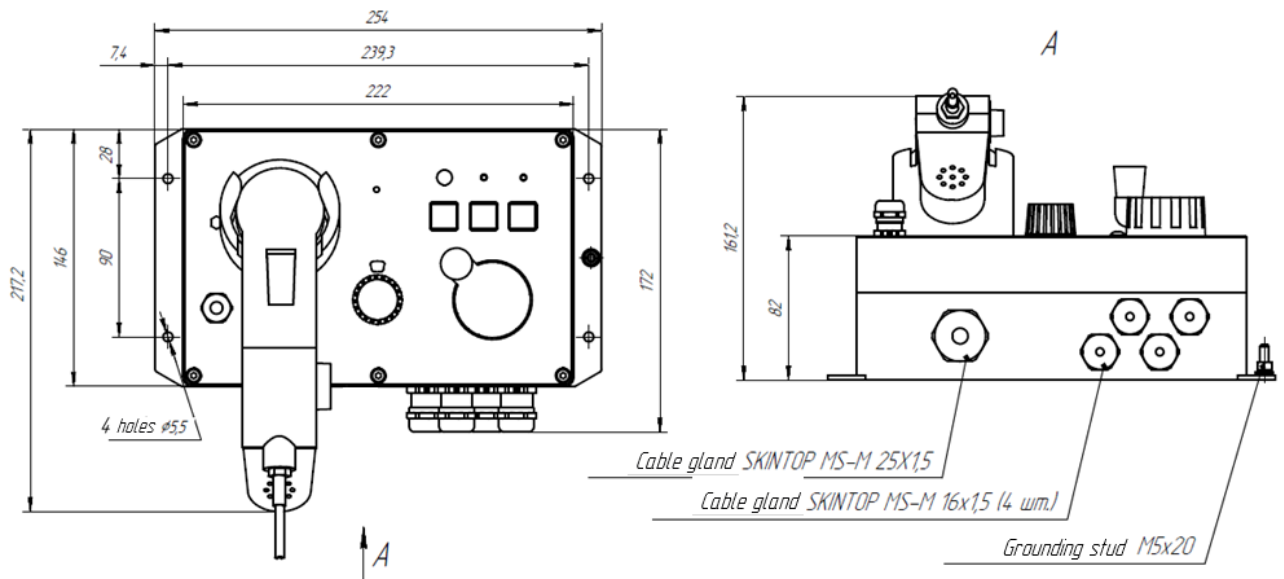


Figure B.7 – Telephone PH-12LRW, PH-24LRW

### Telephone PH-12LRW, PH-24LRW

**Description:** Telephone for 12, 24 lines (external alarm may be connected) for application in battery less communication system.

**Features:**

- Operation in modes BTC and LS;
- equipped with built-in amplifier;
- LCD and controls backlight;
- Incoming call LEDs, Inductor on LED, external power LED;
- External signaling units may be connected;
- Headset may be connected.

**Technical specifications:**

- max. power consumption: 3 W;
- number of users: 12, 24;
- IP rating: IP56;
- operating temperature:  $-40...+55\text{ }^{\circ}\text{C}$ ;
- weight: 2.50 kg.

**Mounting type:** wall.

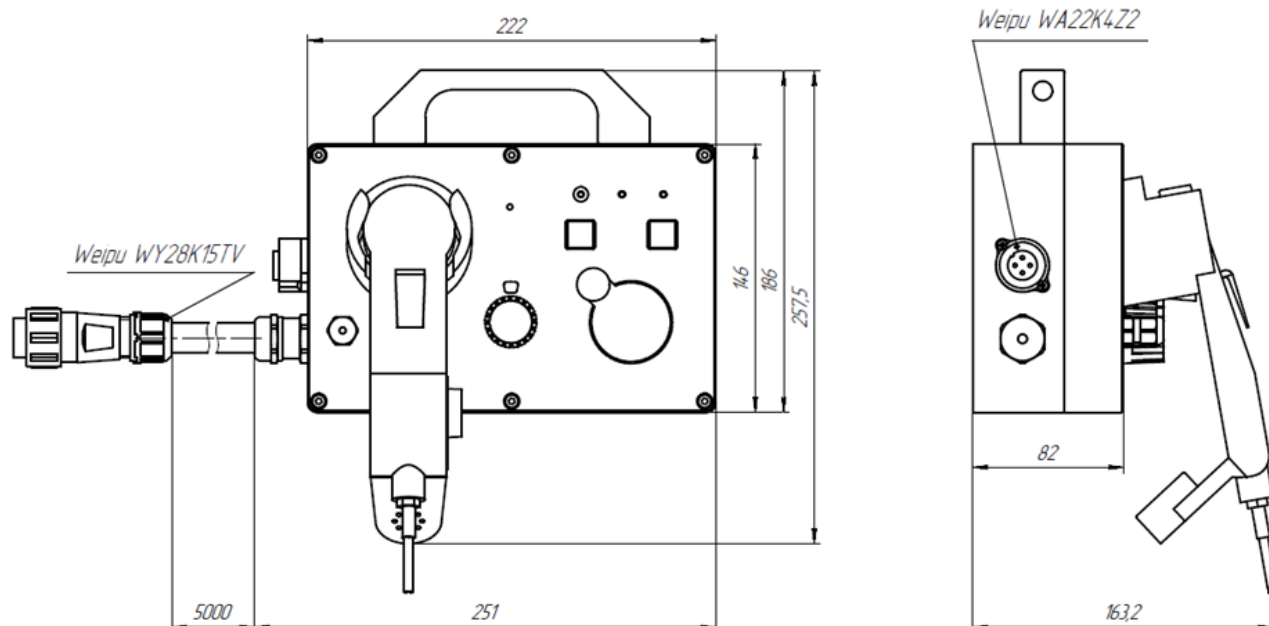


Figure B.8 – Telephone PH-1LWP, PH-24LWP, PH-12LWP

### Telephone PH-1LWP, PH-24LWP, PH-12LWP

**Description:** Telephone portable for one, 12, 24 lines for application in battery less communication systems.

#### Features:

- Operation in modes BTC and LS;
- Controls backlight;
- Incoming call LEDs, Indicator on LED, external power LED;
- Headset may be connected (connector on the casing side).

#### Technical specifications:

- max. power consumption: 3 W;
- number of users: one, 12, 24;
- cable length: 5 m;
- IP rating: IP56;
- operating temperature: -40...+55 °C;
- weight: 2.50 kg.

**Mounting type:** portable.

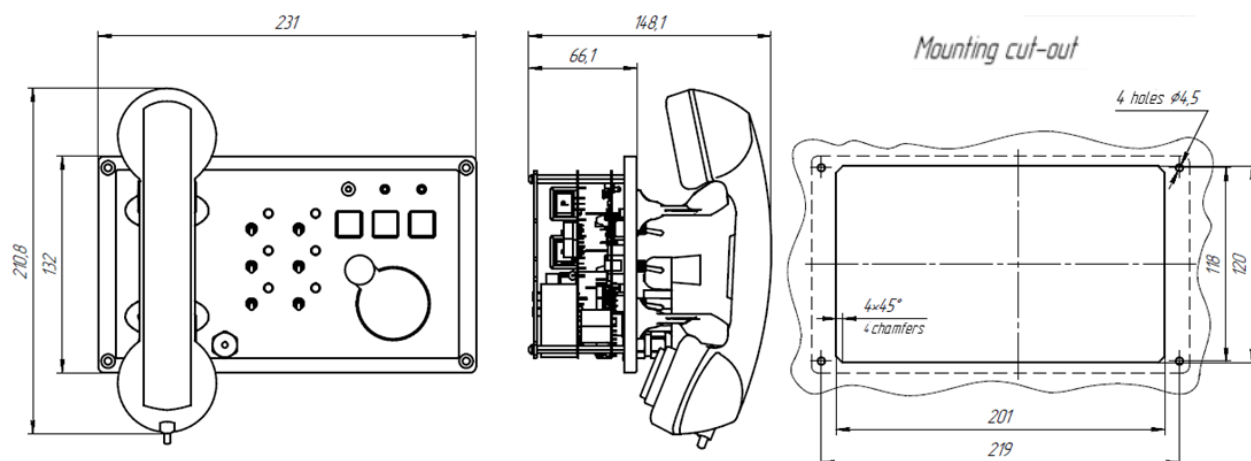


Figure B.9 – Commutator telephone PH-6CA

### Commutator telephone PH-6CA

**Description:** commutator telephone for six lines (isolated connection of users) for application in battery less communication systems.

**Features:**

- Operation in modes BTC and LS;
- Controls backlight;
- Incoming call LEDs, Inductor on LED, external power LED;
- Headset may be connected.

**Technical specifications:**

- Power consumption:
  - call mode 15 W;
  - wait mode 3 W;
- Number of users: one, six;
- IP rating: IP44;
- operating temperature: -15...+55 °C;
- weight: 1.70 kg.

**Mounting type:**

- panel;
- wall with casing MBOX, WBOX;
- desk-top with casing WBOX.

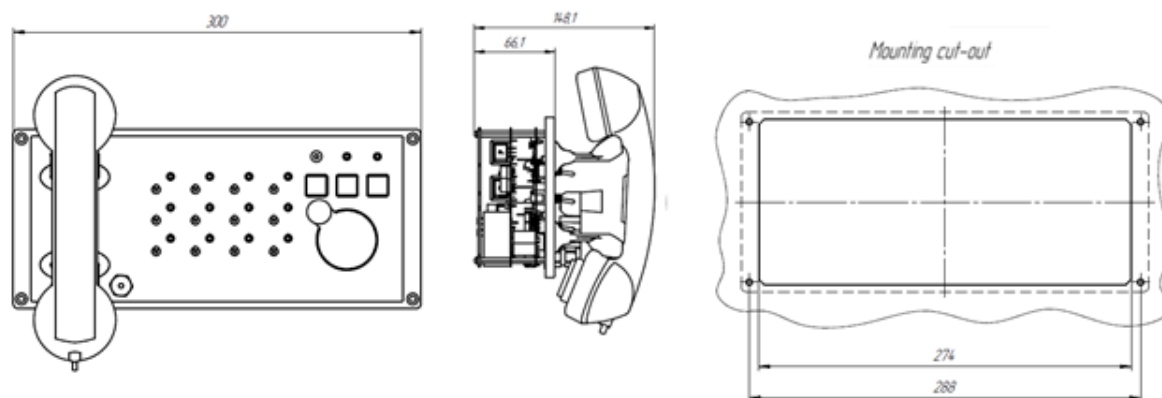


Figure B.10 – Commutator telephone PH-12CA

### Commutator telephone PH-12CA

**Description:** commutator telephone for 12 lines (isolated connection of users) for application in battery less communication systems.

**Features:**

- Operation in modes BTC and LS;
- Controls backlight;
- Incoming call LEDs, Inductor on LED, external power LED;
- Headset may be connected.

**Technical specifications:**

- Power consumption:
  - call mode 15 W;
  - wait mode 3 W;
- Number of users: one or 12;
- IP rating: IP44;
- operating temperature: -15...+55 °C;
- weight: 2.20 kg.

**Mounting type:**

- panel;
- wall with casing MBOX2, WBOX2;
- desk-top with casing WBOX2.

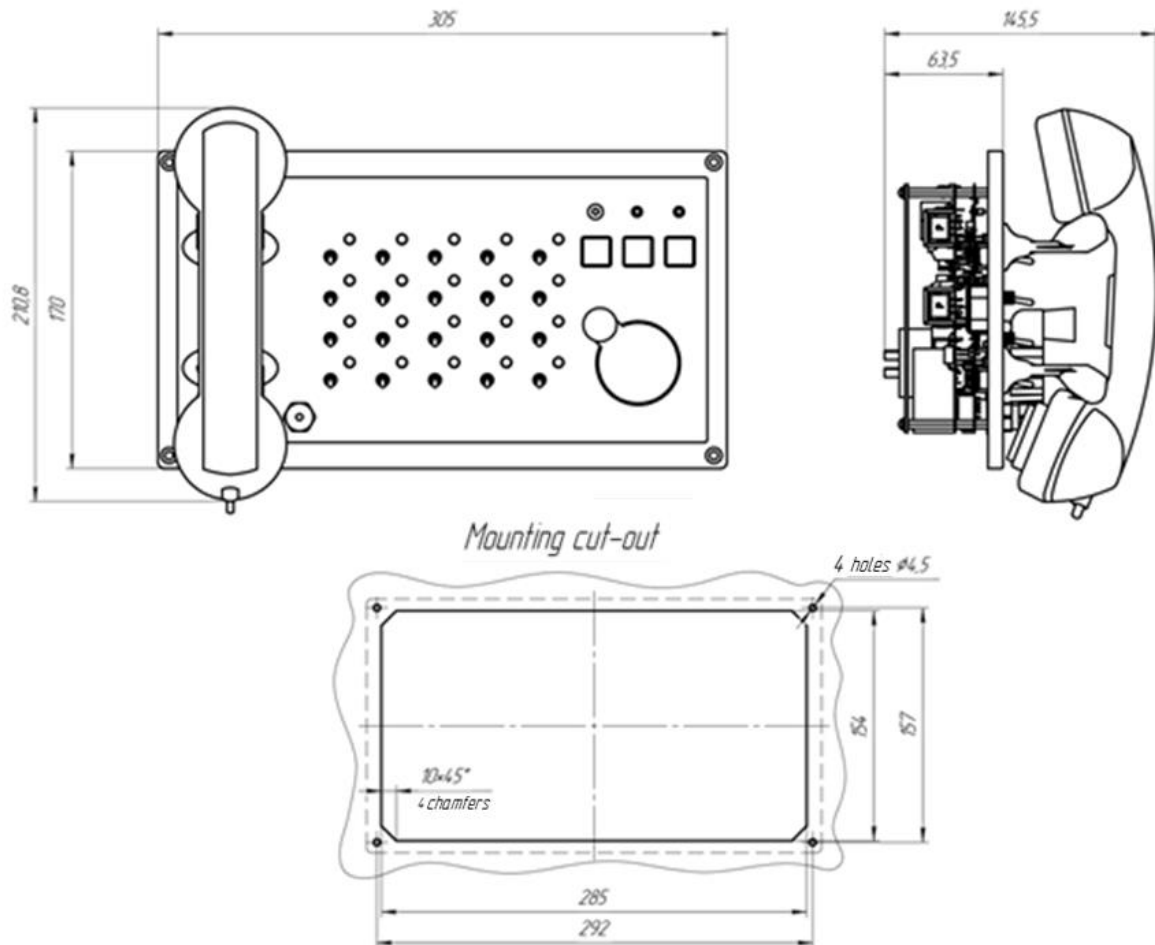


Figure B.11 – Commutator telephone PH-20CA

### Commutator telephone PH-20CA

**Description:** commutator telephone for 20 lines (isolated connection of users) for application in battery less communication systems.

**Features:**

- Operation in modes BTC and LS;
- Controls backlight;
- Incoming call LEDs, Indicator on LED, external power LED;
- Headset may be connected.

**Technical specifications:**

- Power consumption:
  - call mode 15 W;
  - wait mode 3 W;
- Number of users: one or 20;
- IP rating: IP44;
- operating temperature: -15...+55 °C;
- weight: 2.20 kg.

**Mounting type:**

- panel;
- wall with casing MBOX2, WBOX2;
- desk-top with casing WBOX2.

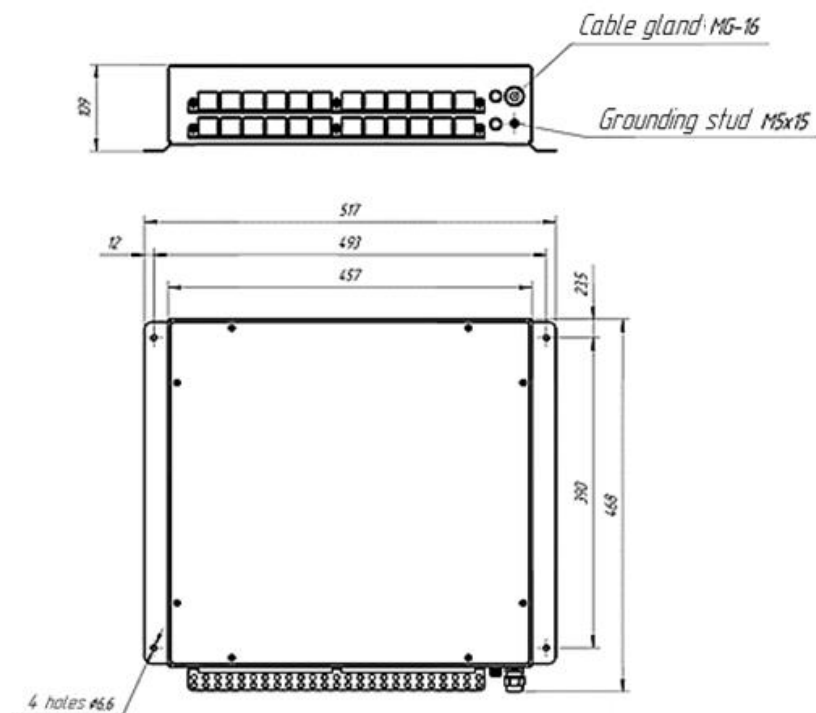


Figure B.12 – Switching unit SB-12A, SB-24A

### Switching unit SB-12A, SB-24A

**Description:** ensures centralized distribution of telephones power supply, convenient telephones connection and organization of telephone network..

**Features:**

- equipped with built-in amplifier;
- distribution of external power to telephones (galvanic isolation);
- applied in communication schemes «multi-channel general list » and «combined».

**Technical specifications:**

- input voltage: 24 V DC;
- number of terminals to connect telephones:
  - for SB-12A – 12;
  - for SB-24A – 24;
- power consumption: 75 W;
- IP rating: IP22;
- weight:
  - for SB-12A – 9.00 kg;
  - for SB-24A – 9.20 kg.

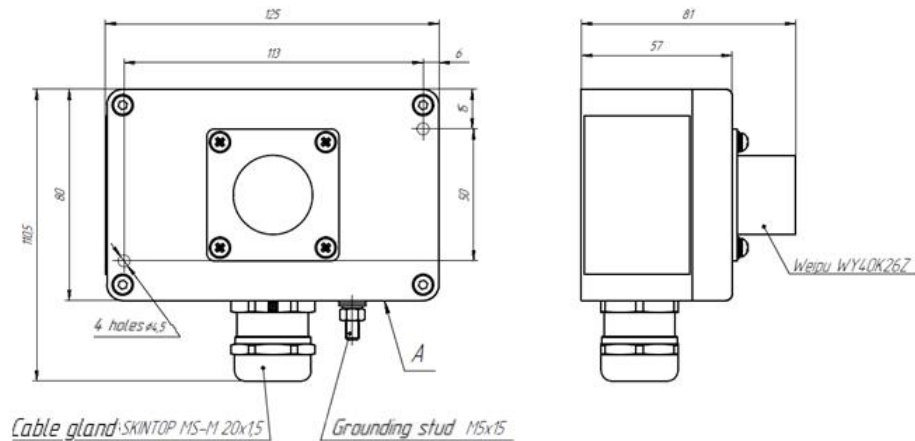


Figure B.13 – Socket PB-24

### Socket PB-24

**Description:** socket PB-24 is designed to connect portable telephones PH-1LWP, PH-12LWP, PH-24LWP.

#### Technical specifications:

- operating temperature: -40 ... +55 °C;
- IP rating: IP56;
- weight: 0.80 kg.

**Mounting:** wall.

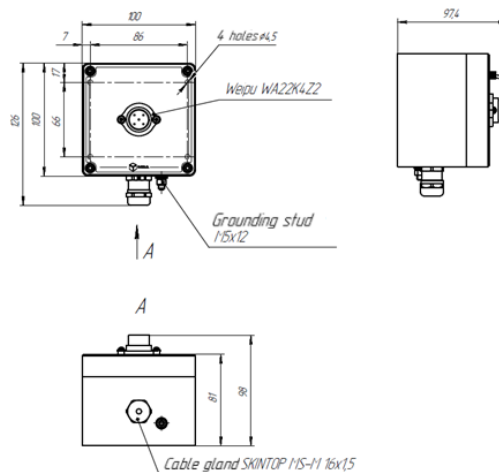


Figure B.14 – Socket PB-HS

### Socket PB-HS

**Description:** remote connection point for headset to telephone.

#### Features:

- waterproof type;
- equipped with waterproof connector with protective cover.

#### Technical specifications:

- material: aluminum;
- IP rating: IP56;
- operating temperature: -40°C...+55 °C;
- weight: 0.80 kg.

**Mounting:** wall.

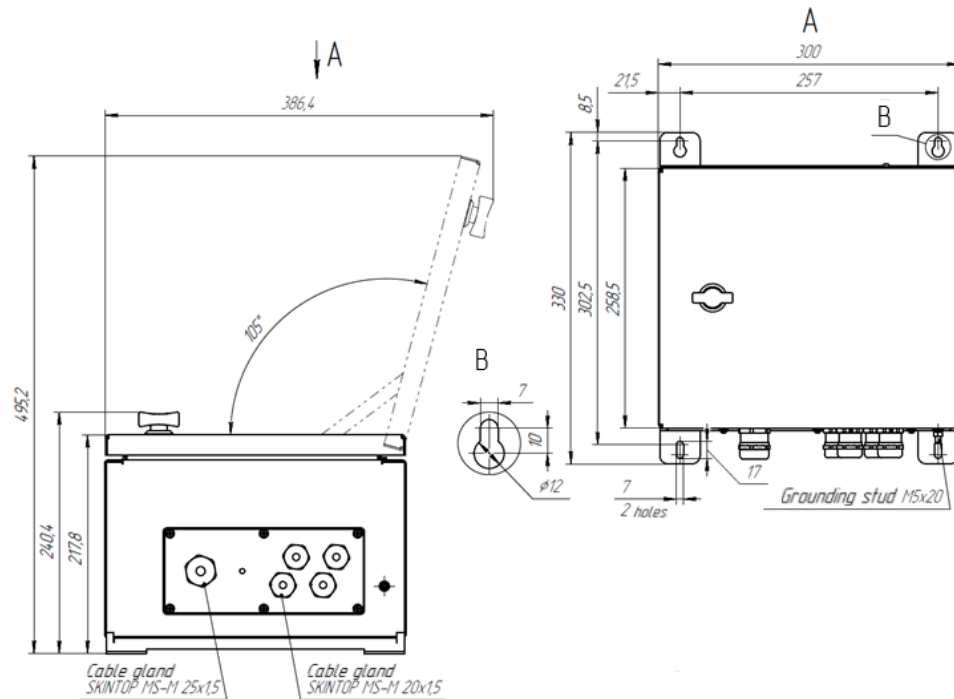


Figure B.15 – Metal waterproof cabinet BO-1

### Metal waterproof cabinet BO-1

**Description:** Metal waterproof cabinet to house telephones PH-1LA, PH-1L, PH-12L, PH-24L, PH-1LR, PH-12LR, PH-24LR, PH-6CA with telephone receiver.

#### Features:

- equipped with a door to access to integrated SC and internal mounting panel;
- door is equipped with a lock (unlock) mechanism and door stop in opened condition;
- recommended for telephones installed on open deck.

#### Technical specifications:

- material: steel (painted);
- door opening angle: 105°;
- IP rating: IP56;
- weight: 8.00 kg.

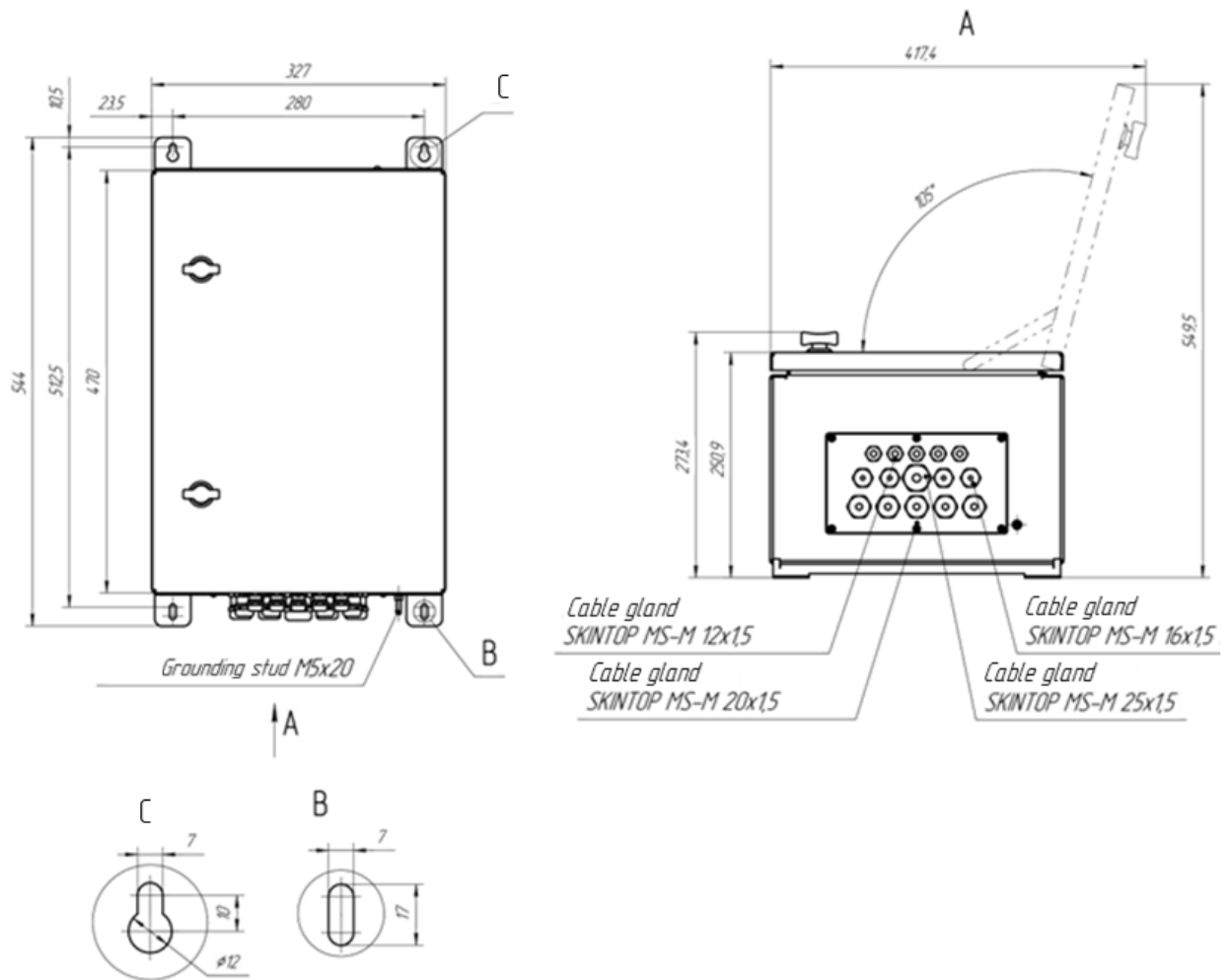


Figure B.16 – Metal waterproof cabinet BLTS-BO

### Metal waterproof cabinet BLTS-BO

**Description:** Metal waterproof cabinet designed to house SC on open deck and protect them against moisture ingress.

**Features:**

- equipped with a door to access to integrated SC and internal mounting panel;
- door is equipped with a lock (unlock) mechanism and door stop in opened condition;
- recommended for telephones installed on open deck.

**Technical specifications:**

- operating temperature: -40 ... +55 °C;
- IP rating: IP56;
- weight: 12.40 kg.

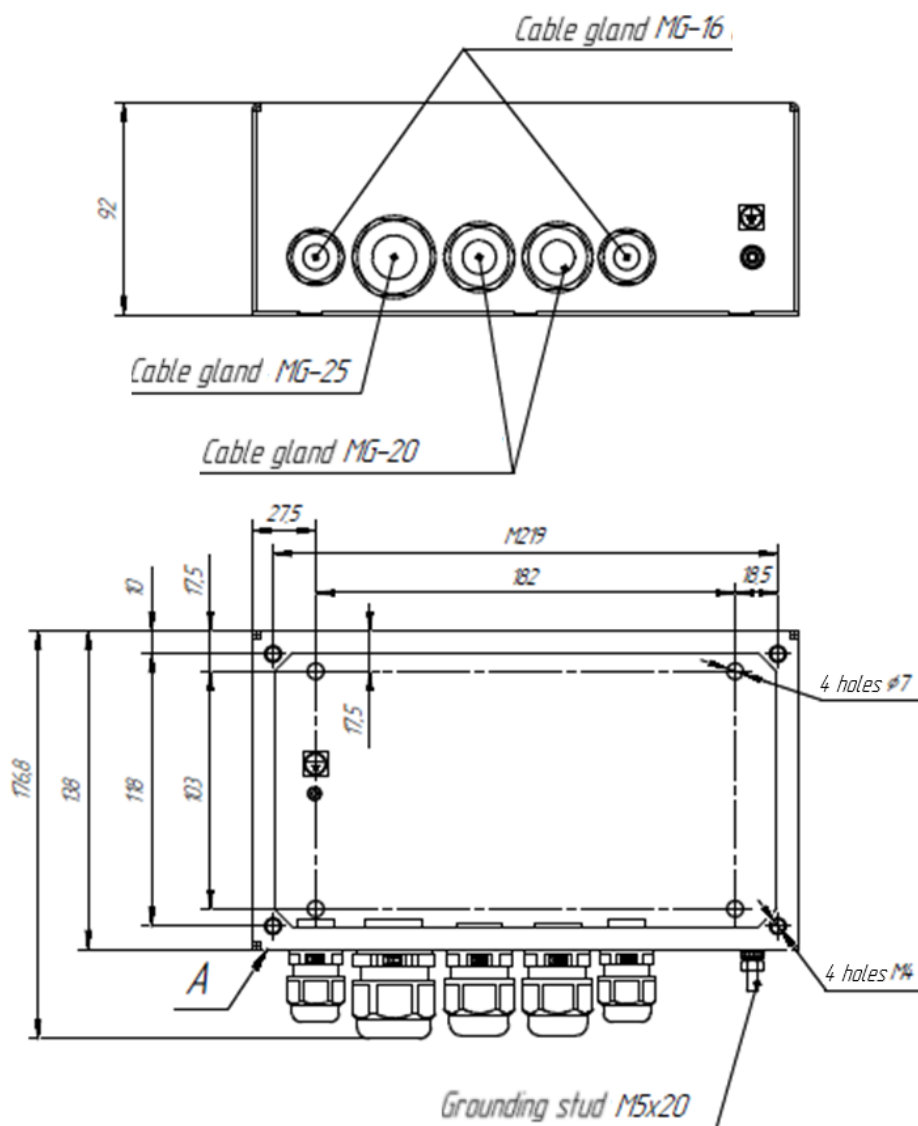


Figure B.17 – Wall casing MBOX

### Wall casing MBOX

**Description:** designed to mount telephones on a vertical bulkhead. Used with telephones PH-1LA, PH-1L, PH-12L, PH-24L, PH-1LR, PH-12LR, PH-24LR, PH-6CA, PH-12CA.

### Technical specifications:

- material: steel;
- IP rating: IP44;
- weight: 1.40 kg.

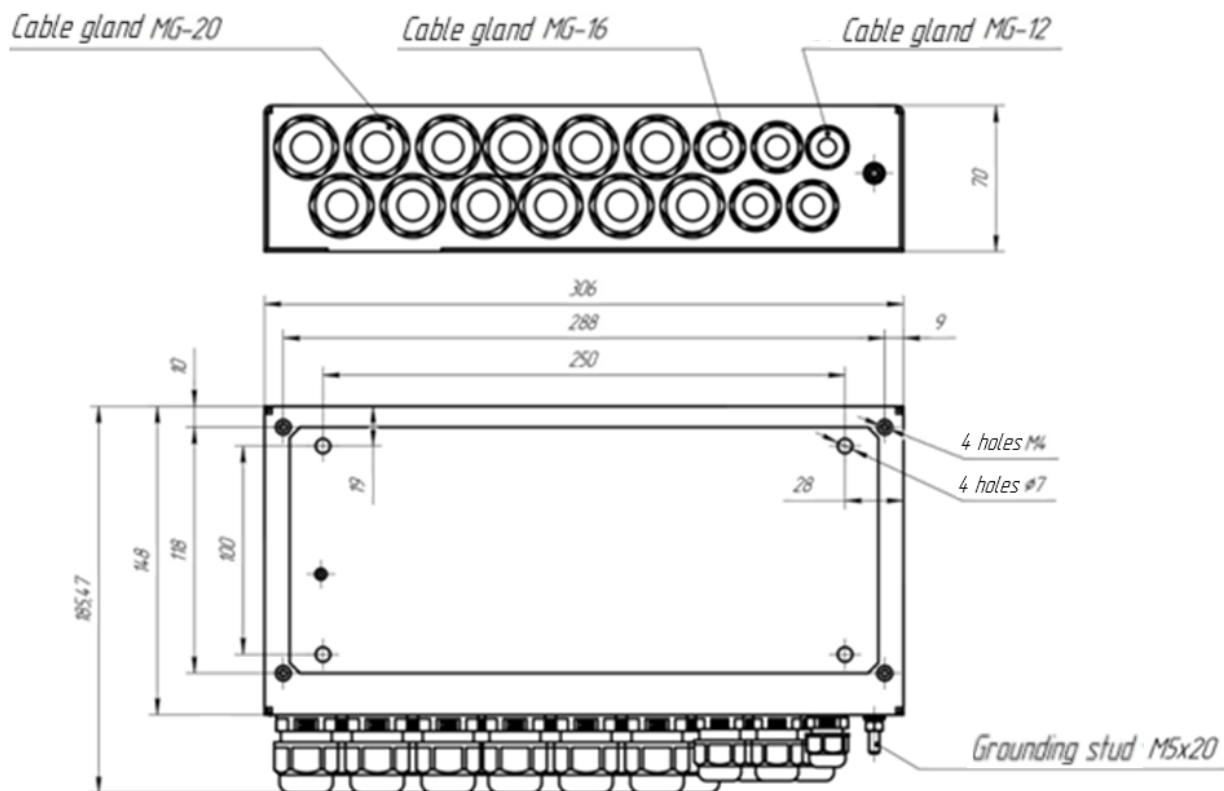


Figure B.18 – Wall casing MBOX2

#### Wall casing MBOX2

**Description:** designed to mount telephones on a vertical bulkhead. Used with telephones PH-20CA, PH-12CA.

#### Technical specifications:

- material: steel;
- IP rating: IP44;
- weight: 1.60 kg.

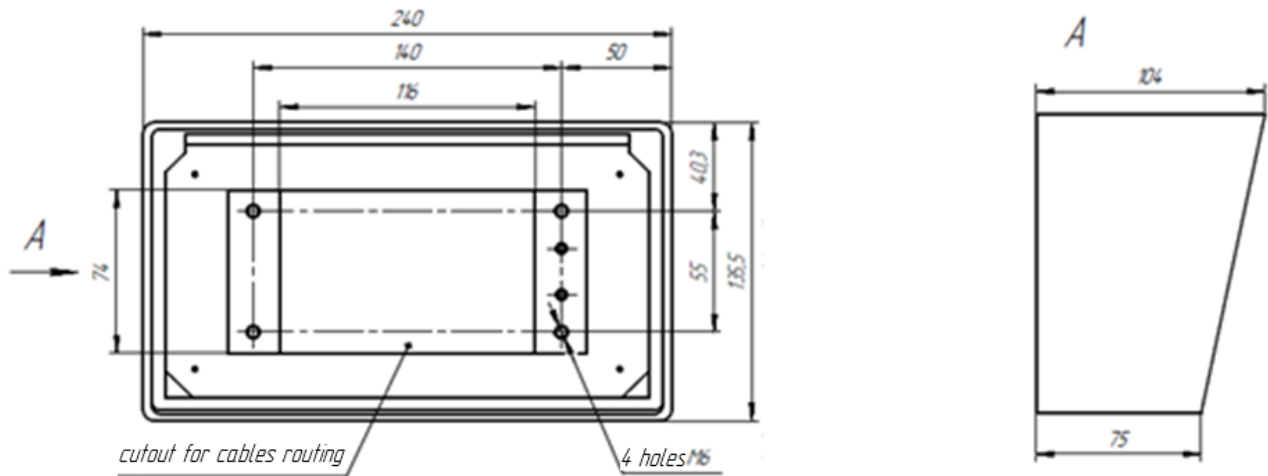


Figure B.19 – Wall casing WBOX

**Wall casing WBOX**

**Description:** designed to mount telephones on a vertical bulkhead or horizontal surface. Used with telephones PH-1LA, PH-1L, PH-12L, PH-24L, PH-1LR, PH-12LR, PH-24LR, PH-6CA, PH-12CA, PH-20CA.

**Technical specifications:**

- material: wood (oak);
- IP rating: IP22;
- weight: 0.80 kg.

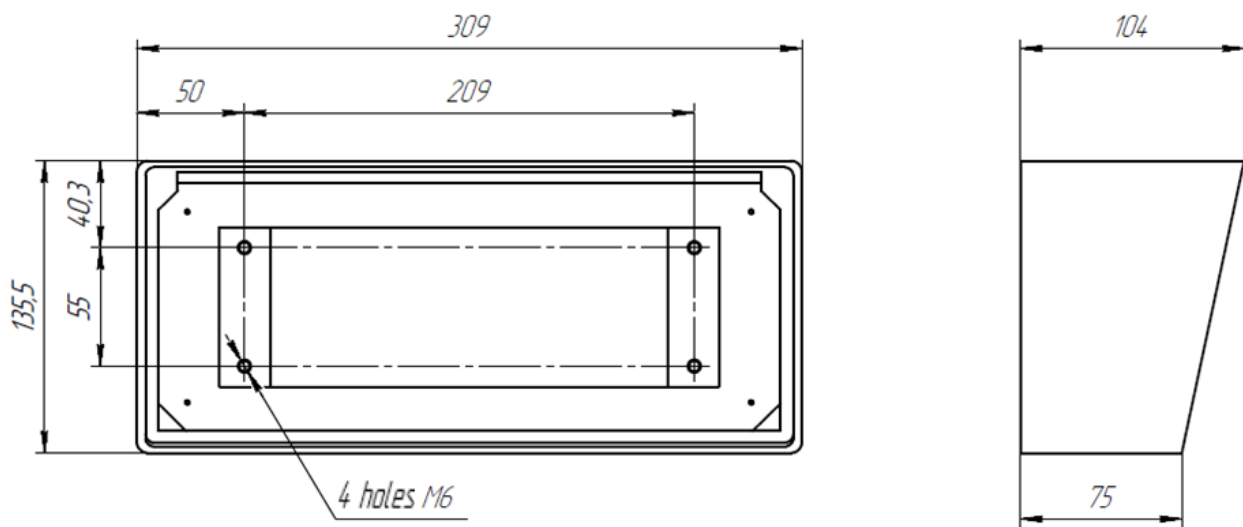


Figure B.20 – Wall casing WBOX2

**Wall casing WBOX2**

**Description:** designed to mount telephones on a vertical bulkhead or horizontal surface. Used with telephones PH-12CA, PH-20CA.

**Technical specifications:**

- material: wood (oak);
- IP rating: IP22;
- weight: 1.00 kg.

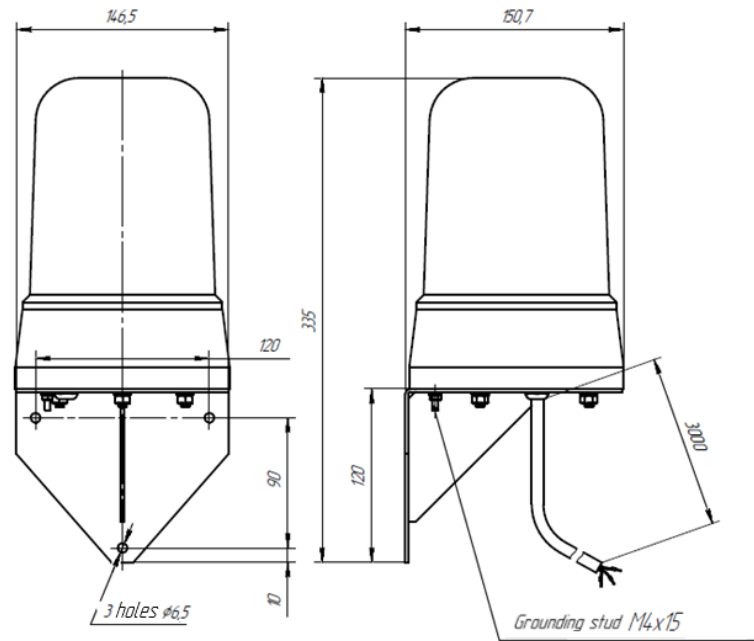


Figure B.21 – Flashing lamp RL-24, RL-220

### Flashing lamp RL-24, RL-220

**Description:** flashing lamp (rotating) to ensure light signaling of incoming call in noisy environment.

**Features:**

- globe colours: red, orange, green, blue;
- lamp connection:
  - RL-24 to relay unit RBWSB-24 and telephones (except portable ones);
  - RL-220 only to relay unit RBWSB-220;
- bracket at option.

**Technical specifications:**

- power supply voltage:
  - for RL-24 – 24 V DC;
  - for RL-220 – 220 V AC, 50 (60) Hz;
- power:
  - for RL-24 – 65 W;
  - for RL-220 – 45 W;
- light:
  - for RL-24 – halogen bulb;
  - for RL-220 – incandescent bulb;
- rotation frequency: 180 rotations per minute;
- operating temperature: -15...+55 °C;
- IP rating: IP56;
- weight:
  - for RL-24 – 1.50 kg;
  - for RL-220 – 1.50 kg.

**Mounting type:** wall, on a bracket.

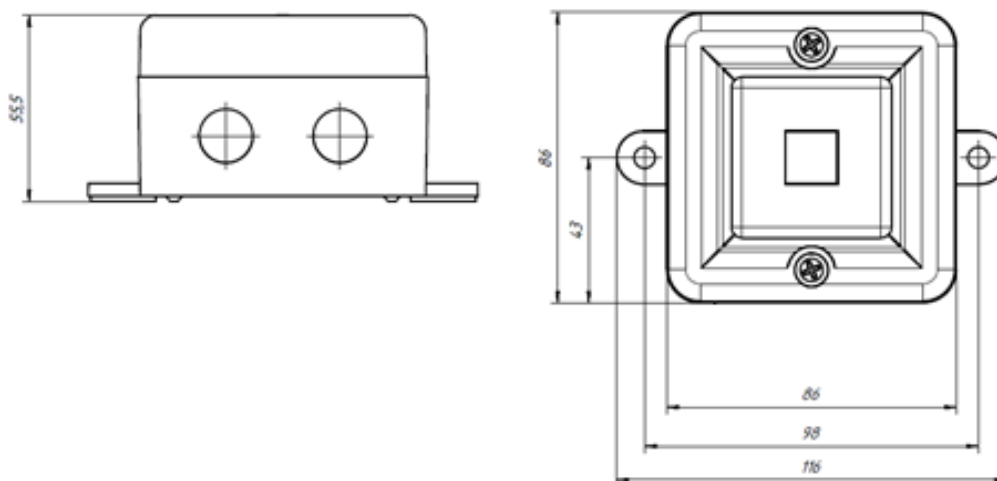


Figure B.22 – Sound signaling unit A-24, A-220

### Sound signaling unit A-24, A-220

**Description:** Sound signaling unit for outgoing call in noisy environment.

**Features:**

- waterproof type;
- 10 signal tones;
- Signaling unit connection:
  - A-24 – to relay unit RBWSB-24 and telephones (except portable);
  - A-220 – only to relay unit RBWSB -220;
- Casing colours: grey, red;
- Delivered with cable glands;
- Cable is led using a hole «knock-out» blank plug (performed by stamping).

**Technical specifications:**

- material – impact-resistant plastic;
- power supply voltage:
  - for A-24 – 24 V DC;
  - for A-220 – 220 V AC, 50 (60) Hz;
- power:
  - for A-24 – 0.6 W;
  - for A-220 – 3.0 W;
- frequency of signal:
  - for A-24 – 420...1200 Hz;
  - for A-220, depending on settings – 420...2900 Hz;
- max. sound pressure: 100 dB (adjustment within 30...100 dB)
- IP rating: IP56;
- operating temperature: -40 ... +55 °C;
- weight: 0.30 kg.

**Mounting type:** wall.

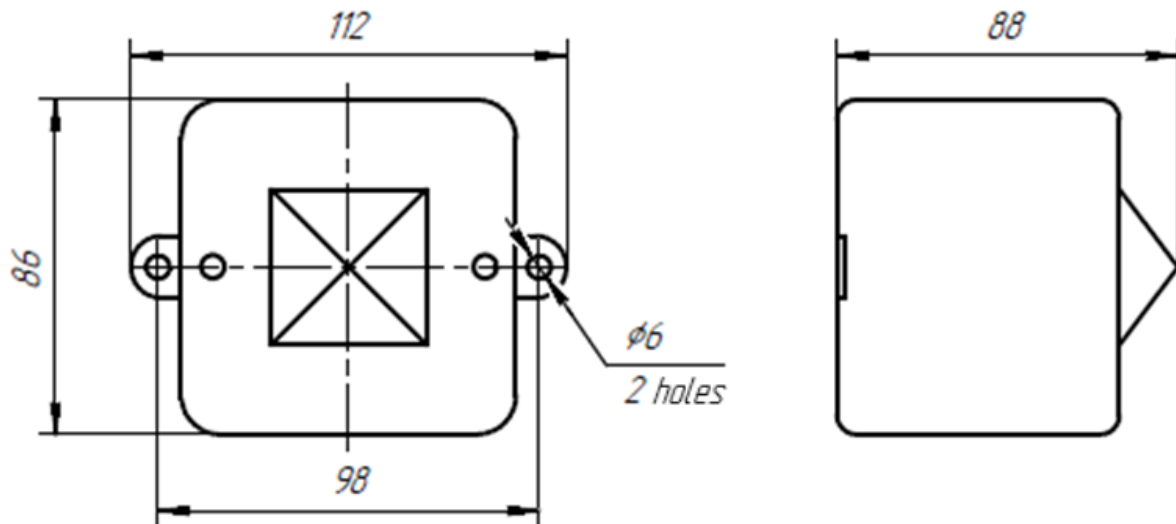


Figure B.23 – Light signaling unit L-24, L-220

### Light signaling unit L-24, L-220

**Description:** Light signaling unit for incoming call in noisy environment.

**Features:**

- globe colours: amber, blue, white, green, red, yellow;
- signaling unit connection:
  - L-24 – to relay unit RBWSB-24 and telephones (except potable);
  - L-220 – only to relay unit RBWSB-220;
- cable is led using a hole «knock-out» blank plug (performed by stamping).

**Technical specifications:**

- material: polycarbonate (impact-proof);
- power supply:
  - for L-24 – 24 VDC;
  - for L-220 – 220 VAC 50 (60) Hz;
- power:
  - for A-24 – 7.5 W;
  - for A-220 – 8.5W;
- flashes: 60...90 flashes per minute;
- bulb type: xenon;
- light intensity: 250 cd;
- operating temperature: - 25 ...+55 °C;
- IP rating: IP56;
- weight 0.20 kg.

**Mounting type:** wall.

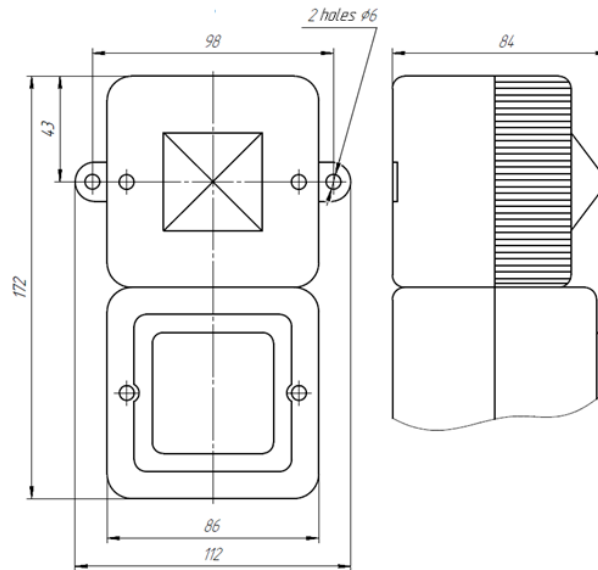


Figure B.24 – Sound-light signaling unit AL-24, AL-220

### Sound-light signaling unit AL-24, AL-220 type

**Description:** Sound-light signaling unit for incoming call in noisy environment.

**Features:**

- waterproof;
- 10 signal tones;
- signaling unit connection:
  - AL-24 to relay unit RBWSB-24 and telephones (except portable);
  - AL-220 only to relay unit RBWSB-220;
- casing colours: grey, red, white;
- globe colours: amber, blue, green, red, yellow;
- equipped with cable glands metal or plastic;
- cable is led using a hole «knock-out» blank plug (performed by stamping).

**Technical specifications:**

- material: plastic, impact-proof;
- power:
  - for AL-24 – 8 W;
  - for AL-220 – 11 W;
- power supply:
  - for AL-24 – 24 V DC;
  - for AL-220 – 220 V AC 50 (60) Hz;
- signal frequency (depending on settings):
  - for AL-24 – 420...1200 Hz;
  - for AL-220 – 420...2900 Hz;
- flashes: 1 Hz;
- brightness: 200 cd (xenon);
- max. sound pressure: 105 dB (adjustment within 30...105 dB);
- operating temperature: -15 ... +55 °C;
- IP rating: IP56;
- weight: 0.50 kg.

**Mounting type:** wall.

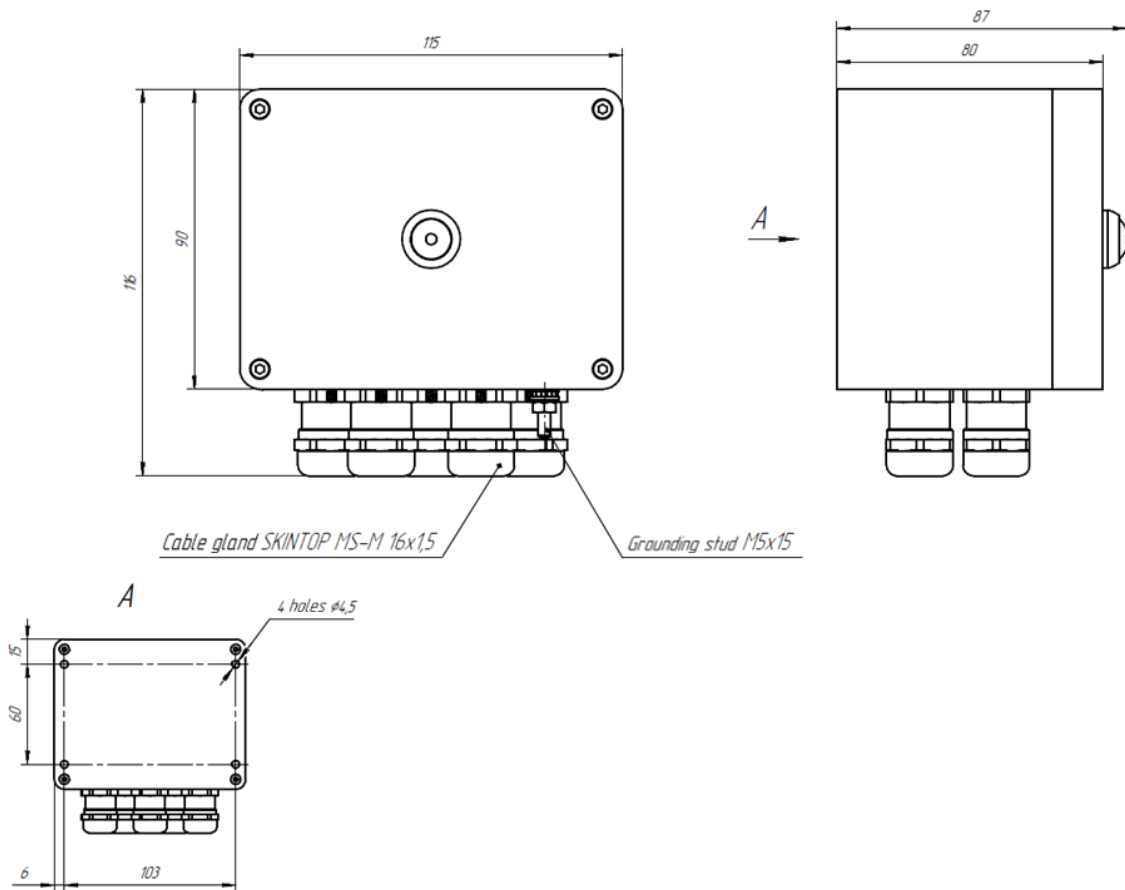


Figure B.25 – Relay unit *RBWSB-24, RBWSB-220*

### Relay unit *RBWSB-24, RBWSB-220*

**Description:** external signaling unit to connect external alarm units; ensures switching of external power to connected devices.

#### Features:

- used with all telephones (except portable);
- light and sound signaling units may be connected (power from 220 V or 24 V);
- call reset button and incoming call LED;
- supplies call signal to alarm units;
- ensures call signaling (after call is ended by user) in modes: continuous (until reset), with delay 10 seconds, immediate end.

#### Technical specifications:

- material: plastic;
- input voltage:
  - for *RBWSB-220* – 220 V AC 50 (60) Hz;
  - for *RBWSB-24* – 24 V DC;
- switching current: max. 10 A;
- connected loads: max. three;
- control signal: dry contact;
- reset button with input port to reset external devices;
- IP rating: IP56;
- operating temperature: -40 ... +55 °C;
- weight:
  - for *RBWSB-220* – 0.50 kg;
  - for *RBWSB-24* – 0.45 kg.

**Mounting type:** wall.

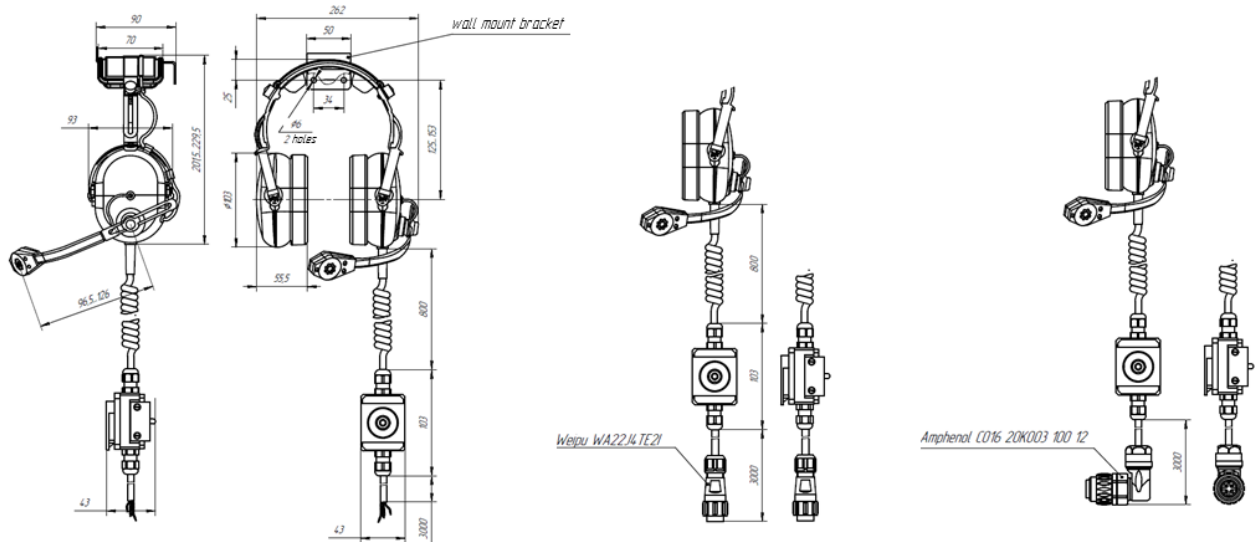


Figure B.26 – Headset HS-3, HS-3P, HS-3P with angle connector

### Headset HS-3, HS-3P, HS-3P with angle connector

**Description:** external communication device to conduct talk-back communication in noisy environment.

#### Features:

- freedom to move;
- PTT switch;
- may be connected to telephones and commutator telephones;
- delivered with a bracket;
- CE cable may be used;
- cable length from headset to PTT: 0.8 m;
- cable HS-3 with bare ends;
- cable HS-3P with plug type connector;
- cable HS-3P with angle plug type connector.

#### Technical specifications:

- headset type: passive, monophonic;
- close-talking response at frequency 300... 3400 Hz (idle run): 16 dB;
- roughness of close-talking response microphone frequency characteristic within 300...3400 Hz: 12 dB;
- output voltage of electroacoustic interaction of headset transmission at noise pressure 104 dB at load 600 Ohm: 1.25...1 mV;
- noise suppression within 100...400 Hz: at least 8 dB;
- operation at noise: max. 115 dB;
- operating temperature: -40...+55 °C;
- IP rating: IP56;
- weight: 0.70 kg.

**Mounting type:** wall (storage).

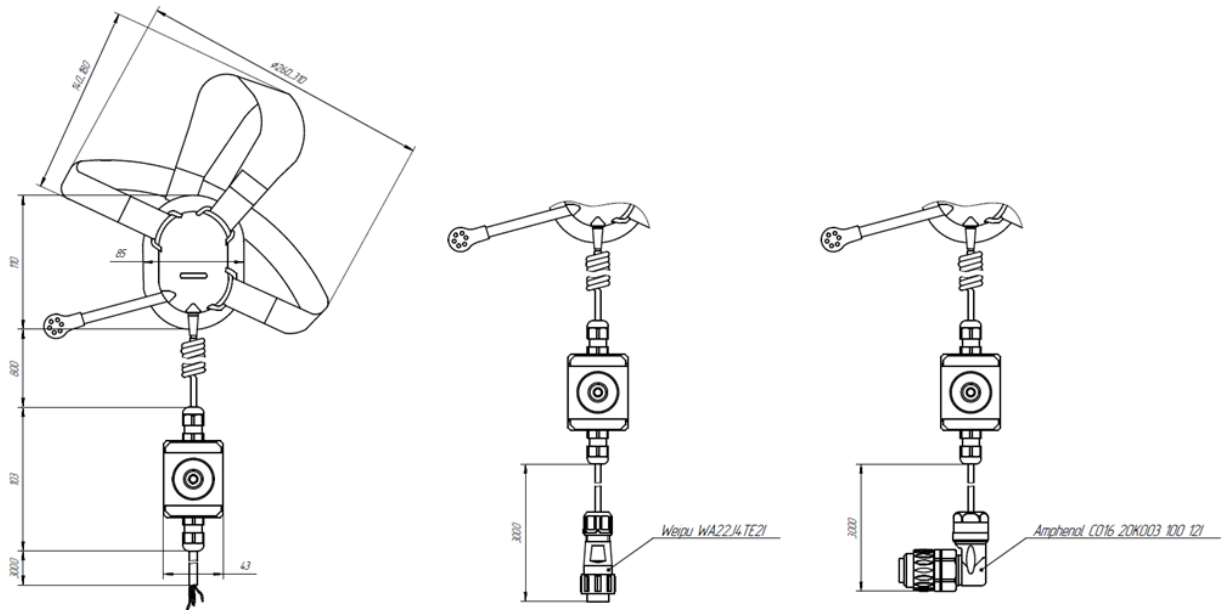


Figure B.27 – Headset HS-5, HS-5C, HS-5AC

### Headset HS-5, HS-5C, HS-5AC

**Description:** external communication device to conduct talk-back communication in normal noisy environment.

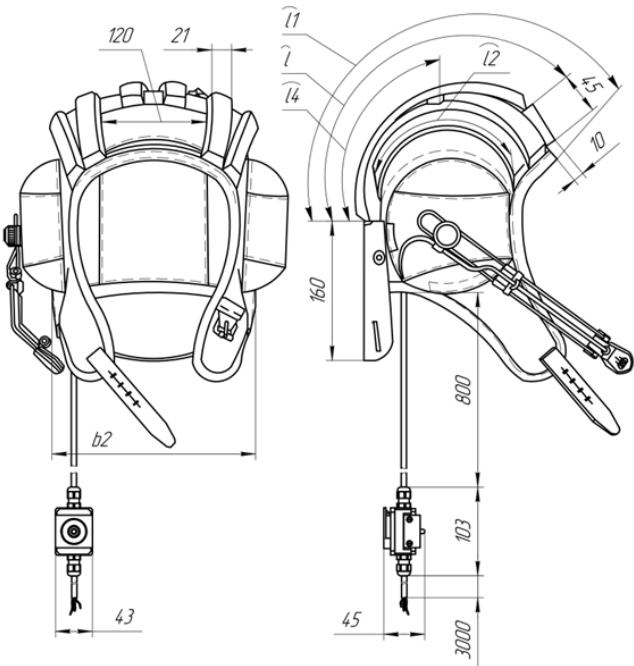
**Features:**

- one-eared;
- freedom to move;
- PTT switch;
- adjusted headband;
- flexible adjusted microphone and fixed;
- connected to telephones and commutator telephones;
- cod CE type may be used;
- cable HS-5 with bare ends;
- cable HS-5C with plug type connector;
- cable HS-5AC with angle plug type connector».

**Technical specifications:**

- headset type: passive, monophonic;
- operating frequency range: 150...7000 Hz;
- close-talking response at frequency 1000 Hz (idle run): 0.4...1.1 mV/Pa;
- roughness of close-talking response microphone frequency characteristic within 150...7000 Hz: 15 dB;
- output voltage of electroacoustic interaction of headset transmission at noise pressure 1000 Hz at load 3 kOhm: 10 mV;
- operation at noise: max. 120 dB;
- operating temperature: -40...+55 °C;
- IP rating: IP56;
- weight: 6.00 kg.

**Mounting type:** wall, on a bracket (storage).



Intercom helmet type		Size measurement, mm										
		<i>l</i>	<i>l</i> <sub>1</sub>	<i>l</i> <sub>2</sub>	<i>l</i> <sub>3</sub>	<i>l</i> <sub>4</sub>	<i>l</i> <sub>5</sub>	<i>b</i>	<i>b</i> <sub>1</sub>	<i>b</i> <sub>2</sub>	<i>s</i>	<i>s</i> <sub>1</sub>
TH-4M-S (I)		310	325	238	120	153	160	21	45	200	10	10
TH-4M-S (II)	TH-4M-W (I)	323	338	242	120	161	160	21	45	205	10	10
TH-4M-S (III)	TH-4M-W (II)	336	351	246	120	169	160	21	45	210	10	10
	TH-4M-W (III)	349	364	250	120	182	165	21	45	215	10	10

Note – I, II or III –intercom helmet size.

Figure B.28 – Intercom helmet microphone  
TH-4M-S, TH-4M-W, TH-4M-S-C, TH-4M-W-C, TH-4M-S-AC, TH-4M-W-AC

**Intercom helmet microphone**  
**TH-4M-S, TH-4M-W, TH-4M-S-C, TH-4M-W-C, TH-4M-S-AC, TH-4M-W-AC**

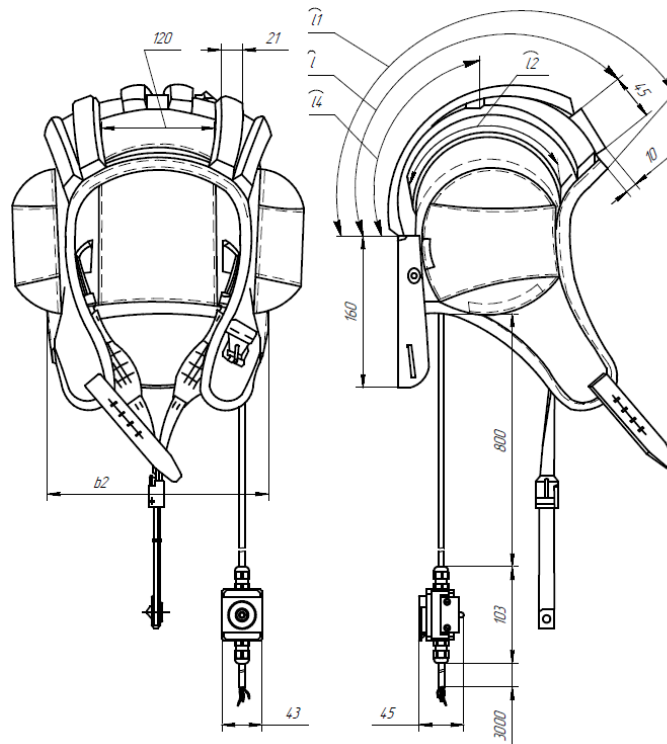
**Description:** external communication device.

**Features:**

- freedom to move;
- PTT switch type;
- may be connected to telephones and commutator telephones;
- CE type cable may be used;
- summer and winter types.

**Technical specifications:**

- operating frequency range: 150...7000 Hz;
- word intelligibility at acoustic noise max. 120 dB: at least 92 %;
- operating temperature: -40...+55 °C;
- IP rating: IP56;
- weight of intercom helmet:
  - summer, max. 0.95 kg;
  - winter, max. 1.05 kg.



Intercom helmet type		Size measurement, mm										
		$l$	$l_1$	$l_2$	$l_3$	$l_4$	$l_5$	$b$	$b_1$	$b_2$	$s$	$s_1$
TH-4L-S (I)		310	325	238	120	153	160	21	45	200	10	10
TH-4L-S (II)	TH-4L-W (I)	323	338	242	120	161	160	21	45	205	10	10
TH-4L-S (III)	TH-4L-W (II)	336	351	246	120	169	160	21	45	210	10	10
	TH-4L-W (III)	349	364	250	120	182	165	21	45	215	10	10

Note – I, II or III –intercom helmet size.

Figure B.29 – Intercom helmet throat microphone  
TH-4L-S, TH-4L-W, TH-4L-S-C, TH-4L-W-C, TH-4L-S-AC, TH-4L-W-AC

### Intercom helmet throat microphone TH-4L-S, TH-4L-W, TH-4L-S-C, TH-4L-W-C, TH-4L-S-AC, TH-4L-W-AC

**Description:** external communication device of LS sub-stations to conduct talk-back communication in normal noisy environment.

#### Features:

- freedom to move;
- PTT switch type;
- may be connected to telephones and commutator telephones;
- CE type cable may be used;
- summer and winter types.

#### Technical specifications:

- operating frequency range: 300...3400 Hz;
- noise stability at acoustic max. 133 dB: at least 16 dB;
- word intelligibility at acoustic noise max. 133 dB: at least 94 %;
- operating temperature: -40...+55 °C;
- IP rating: IP56;
- weight of intercom helmet:
  - summer, max. 0.95 kg;
  - winter, max. 1.05 kg.

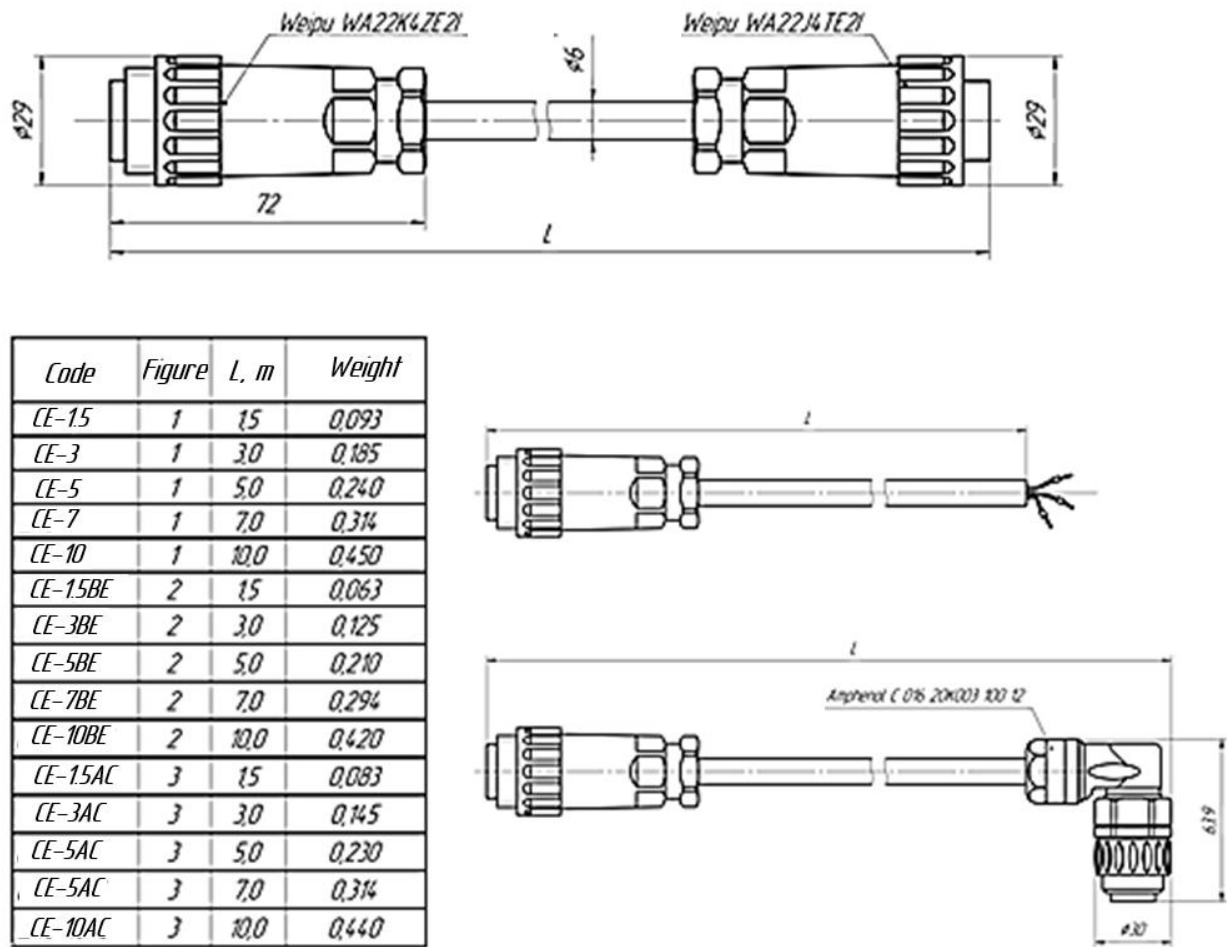


Figure B.30 – Cable CE

### Cable CE

**Description:** to extend standard cable of LS external communication devices.

**Technical specifications:**

- IP rating: IP56;
- operating temperature: -40...+55 °C.

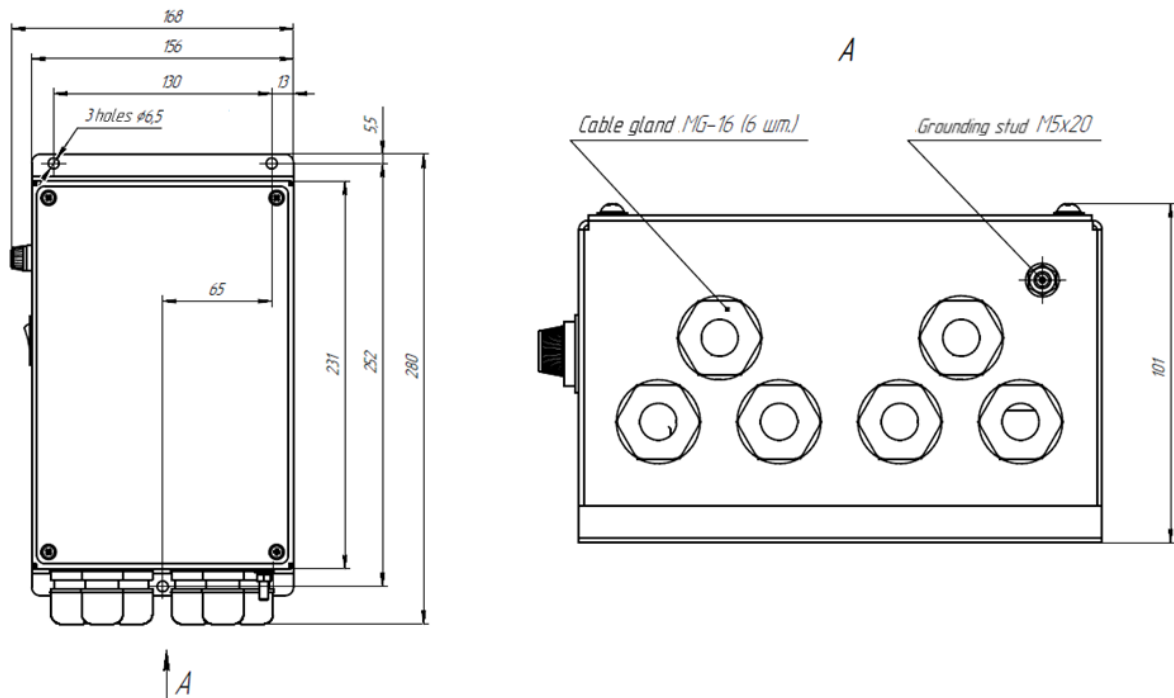


Figure B.31 – Power supply unit PS-103

### Power supply unit PS-103

**Description:** Power supply unit PS-103 designed to power with unregulated DC voltage 24 V to different shipborne equipment as well as industrial equipment.

**Features:**

- contacts to connect external signaling unit (for power failure signaling);
- galvanic isolation of output power from power mains;
- built-in automatic load switch to standby power supply.

**Technical specifications:**

- power supply: 110 V or 220 V AC 50 (60) Hz;
- input voltage: 24 V DC;
- terminals to connect load: three;
- rated load current: 8 A;
- rated power: 192 W;
- operating temperature: -20 ... +55 °C;
- IP rating: IP22;
- weight: 5.00 kg.

**Mounting type:** wall.

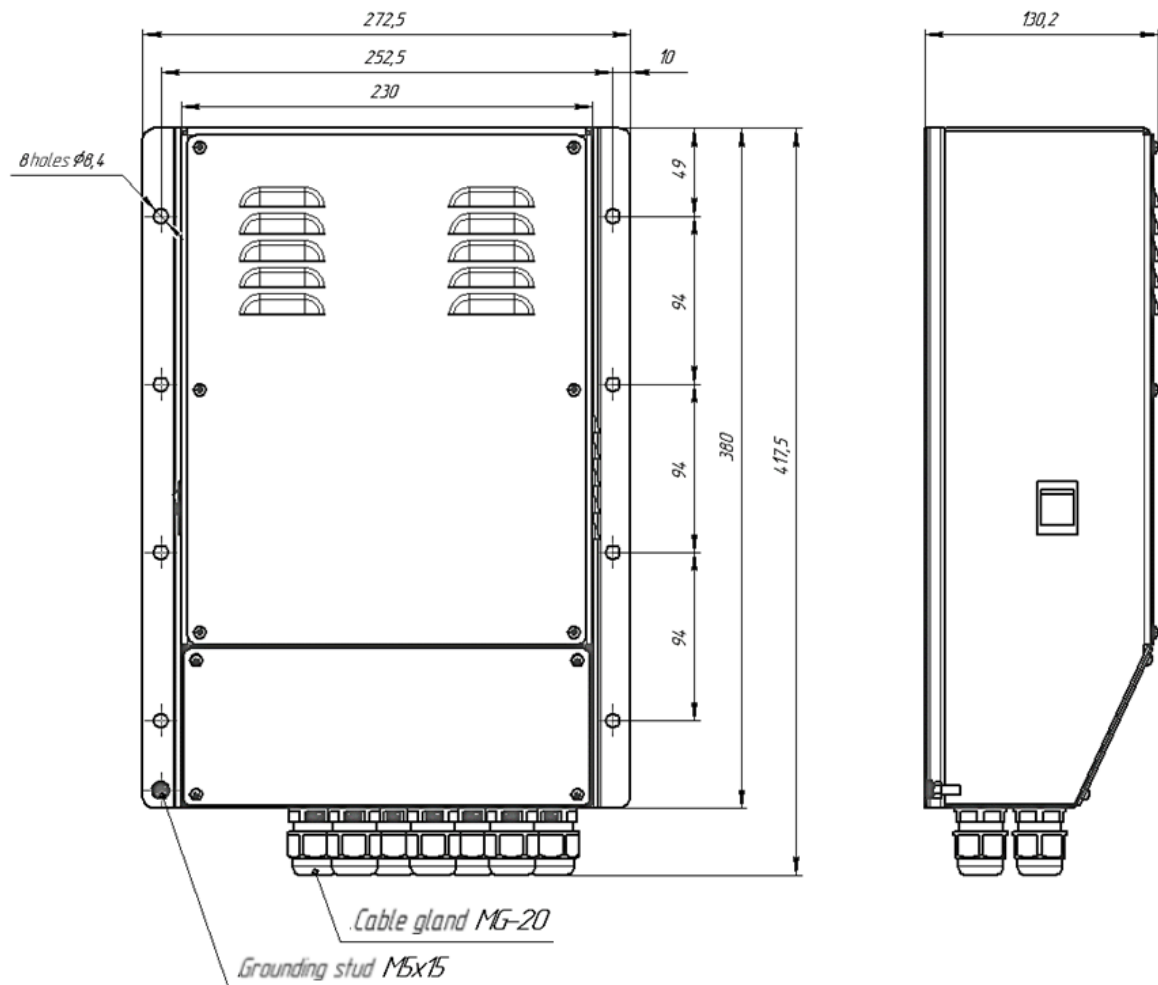


Figure B.32 – Power supply unit PS-103-20

### Power supply unit PS-103-20

**Description:** Power supply unit PS-103-20 designed to power with unregulated DC voltage 24 V to different shipborne equipment as well as industrial equipment.

**Features:**

- contacts to connect external signaling unit (for power failure signaling);
- galvanic isolation of output power from power mains;
- built-in automatic load switch to standby power supply.

**Technical specifications:**

- power supply: 110 V or 220 V AC 50 (60) Hz;
- output voltage: 24 V DC;
- terminals to connect load: four;
- rated load current: 20 A;
- rated power: 500 W;
- power consumption: 600 W;
- operating temperature: -20 ... +55 °C;
- IP rating: IP22;
- weight: 10.00 kg.

**Mounting type:** wall.

## APPENDIX C

### SET OF OPERATION AND MAINTENANCE DOCUMENTS

Table C.1 – Set of operation and maintenance documents

Name	Note
List of System elements BTS-1006 for order № ...	One per object
Electrical diagram for System BTS-1006 for order № ...	* One per object
Battery less communication equipment BTS-1006. Operating manual.	One per object
Battery less communication equipment BTS-1006. Certificate	** One per object
Battery less communication equipment BTS-1006. SPTA kit list.	*** One per object
Register certificate	**** One per object
* Developed (if necessary) according to Technical description to assign System to particular object and delivered to ship constructor (customer) ** Delivered on request. *** Delivered if SPTA is ordered. **** Delivered with order. Additionally to current documents or in place of the documents, documents of another assignment or type may be delivered.	

**APPENDIX D**  
**SYSTEM SETTINGS**

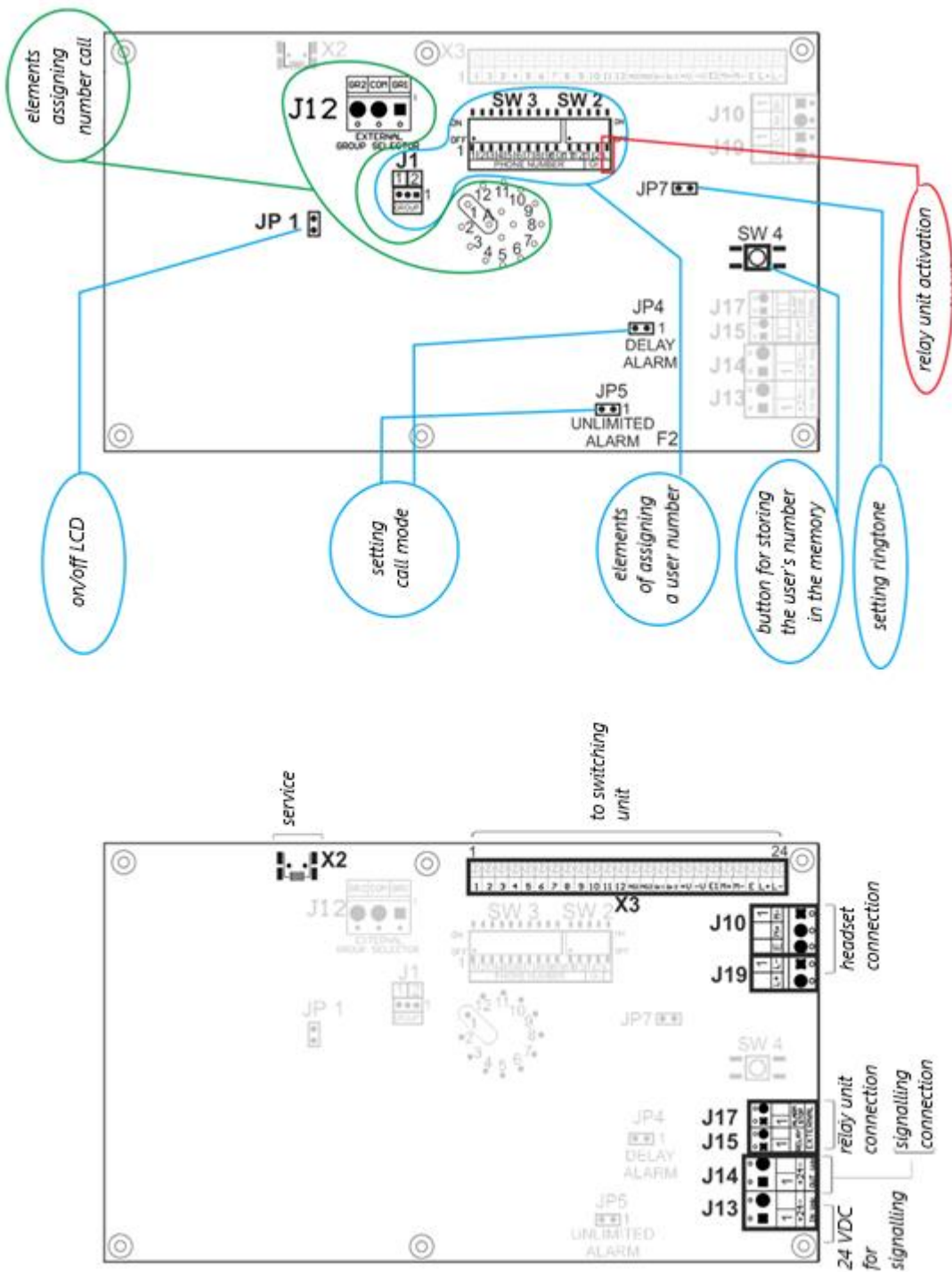


Figure D.1 – Description and layout of ports and control of telephones PH-xL, PH-xLR, PH-xLRW (x – 1, 12 or 24)

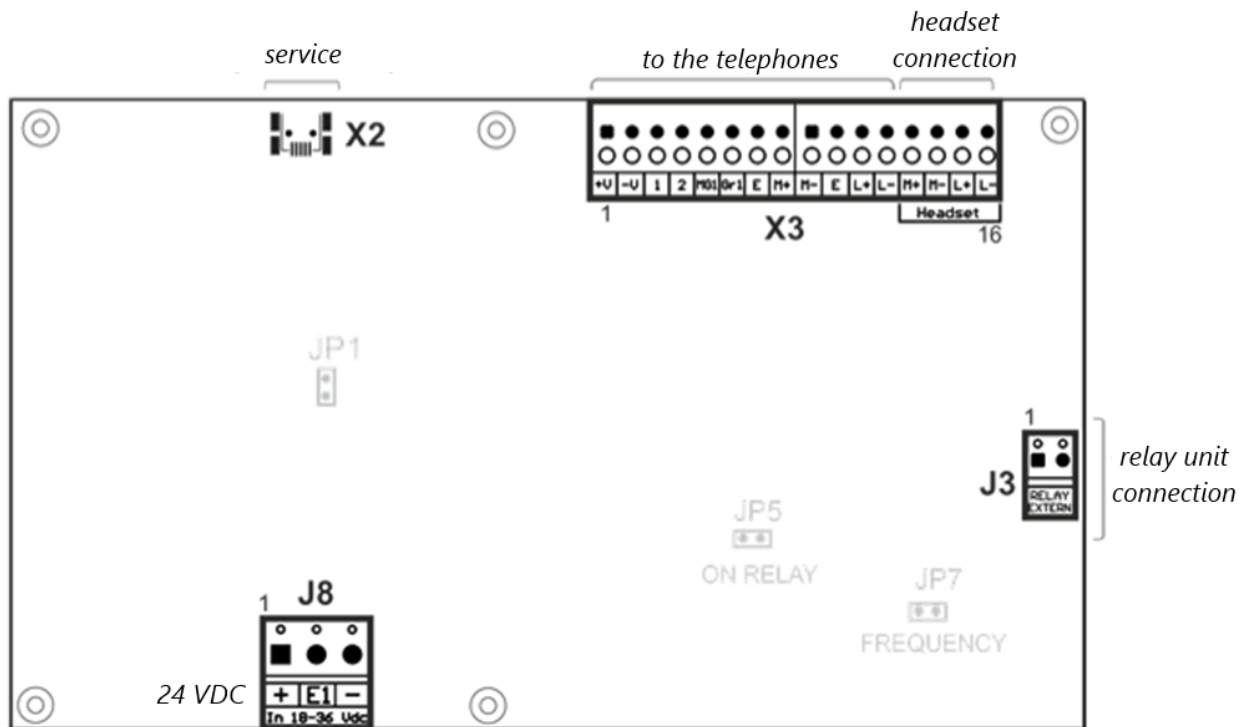


Figure D.2 – Description of ports and controls of telephone PH-1LA

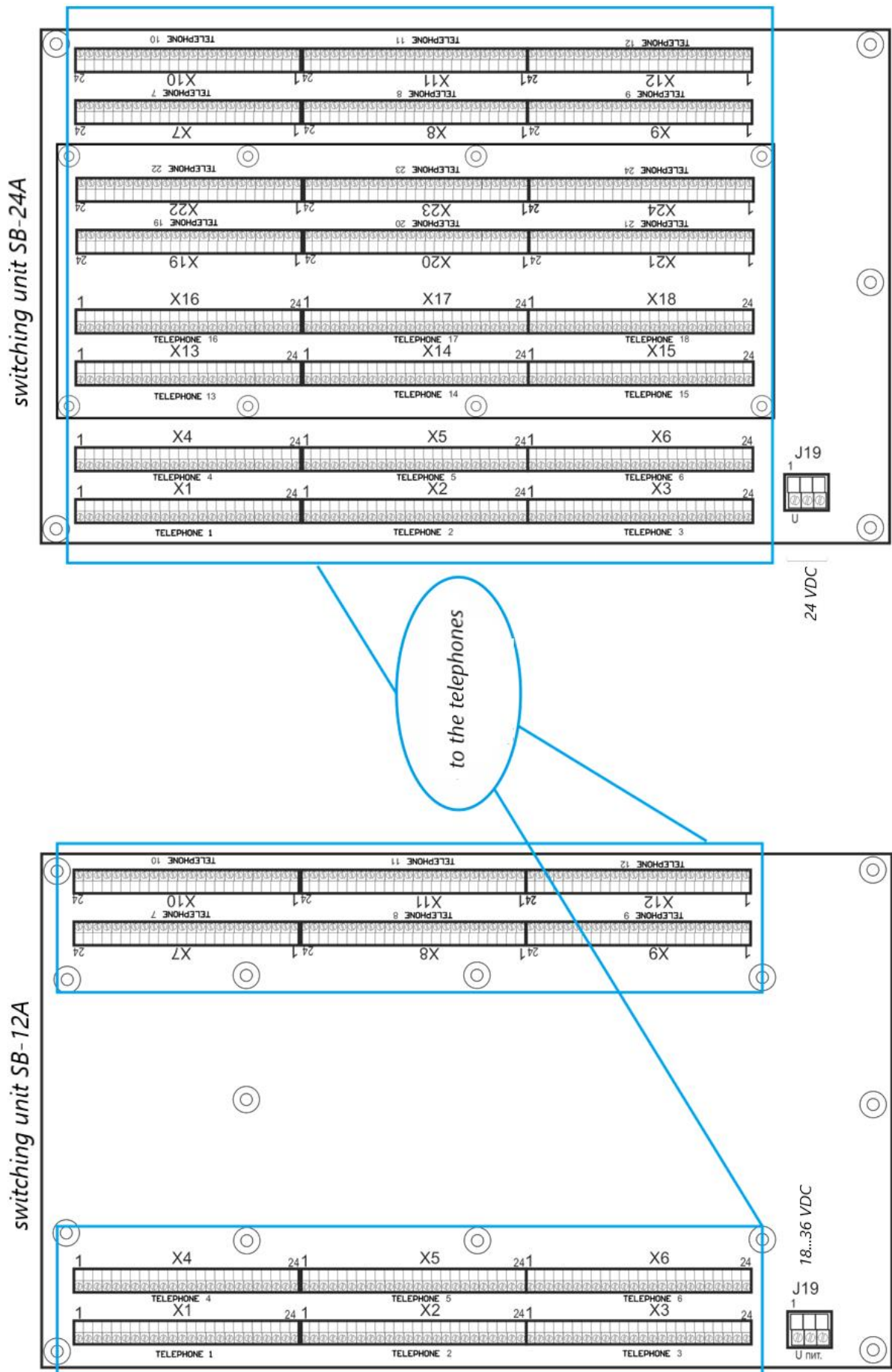
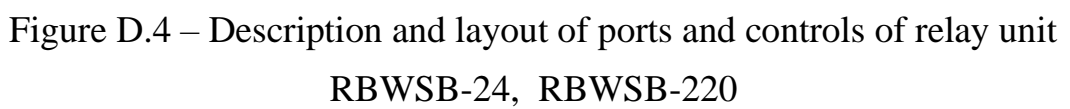


Figure D.3 – Description and layout of connectors SB-12A, SB-24A



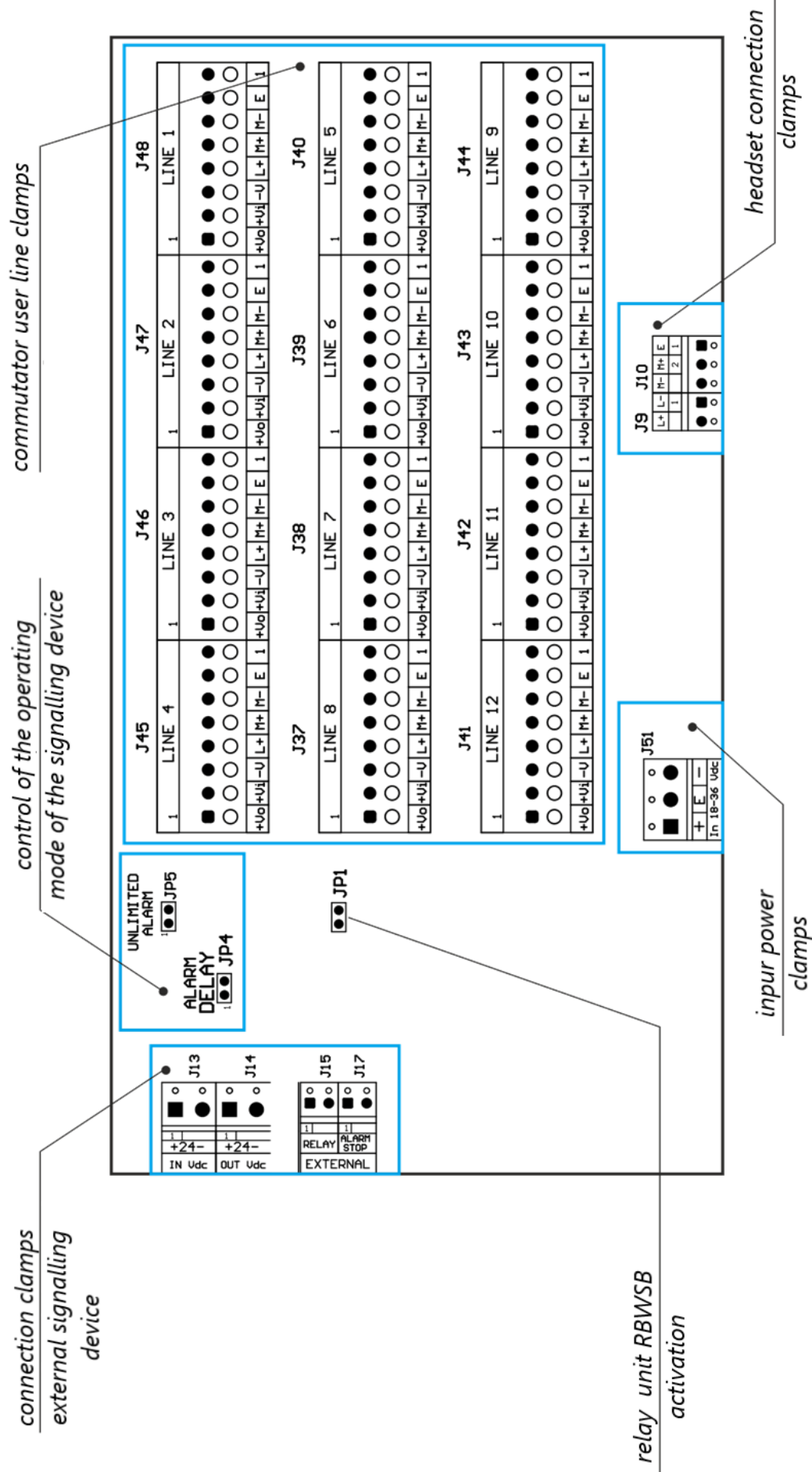


Figure D.5 – Description and layout of ports and controls of commutator telephone PH-12CA

Table D.1 – Terminals assignment of telephones, switching units, headsets and relay unit

Module	Terminal	Assignment
PH-1L, PH-12L, PH-24L, PH-1LR, PH-12LR, PH-24LR, PH-1LRW, PH-12LRW, PH-24LRW	X3	To connect telephone to switching unit
	J13	To connect external power supply 18...36 V DC of signaling units
	J14	To connect signaling units
	J15,J17	To connect relay unit
	J9,J10	To connect headset
PH-1LA	J8	To connect external power supply 18...36 V DC of signaling units
	X3 (1-12)	To connect telephone to another telephone at pair communication
	X3 (13-18)	To connect headset
SB-12A, SB-24A	X1-X24	To connect telephones
	J19	To connect external power supply 18...36 V DC

Table D.2 – Assignment of SC controls

SC	Element	Assignment
PH-1L, PH-12L, PH-24L, PH-1LR, PH-12LR, PH-24LR, PH-1LRW, PH-12LRW, PH-24LRW PH-1LA	JP1	To switch on / off LCD
	J12+variator	Elements of called number assignment
	SW4	Button to record number to memory
	SW1, SW2, J1	Elements of user number assignment
	JP7	To set call signal
	SW2-5 (L)	To activate relay unit
	JP4, JP5	To set call mode
PH-1LA	JP7	To set call signal
	JP8	To control relay unit
	JP1	To switch on / off LCD
	JP3	To connect relay unit
RBWSB-24, RBWSB-220	JP3, JP4	Place to store unused jumpers
	JP1, JP2	To set call mode
	J3, J4	To connect to telephone
	J2	External power supply 220 V AC, 50 (60) Hz or 24 V DC
	J6, J7, J8	To call signaling units

Table D.3 – Layout of controls of single-channel telephones at pair communication


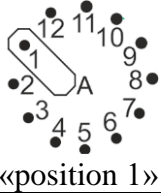
Controls	Single-channel telephones
	Controls layout
User number assignment	
SW2, SW3	
J1	Bridge contacts 2 and 3 («position 1»)
Called number assignment	
J12	Bridge contacts 1 and 2 (COM and GR1)
Variator of called user select	
Button SW4	a) for telephones without LCD – no actions required; b) for telephones with LCD press and hold during 3 seconds button SW4 <sup>1)</sup> (not all telephones are equipped with SW4); record of assigned number to telephone memory matches displayed number on LCD (if any), see Table D.7
<sup>1)</sup> Second pressure of «SW4» button during 2...3 seconds will record again the number to the same, if position of controls was not changed (SW2 and SW3); if at least one position was changed, current number will be changed. Note – Switch SW2-5 with character «L» do not participate in assignment, it is described in D.8.	























Table D.4 – Layout of telephones controls at multi-channel communication

Controls	Single-channel telephones	12-channel telephones	24-channel telephones
	Controls layout		
User number assignment			
SW2, SW3	Set according to assigned user number		
J1	1 for network from 12 users – bridge contacts 2 and 1		No actions required
	2 for network from 24 users – bridge contacts 2 and 3		
Called number assignment			
J12	1 for network from 12 users – bridge contacts 1 and 2 (COM and GR1)		No actions required
	2 for network from 24 users – bridge contacts 2 and 3 (COM and GR2)		
variator	Set a jumper in controls of user number assignment on circle variator of user select; solder jumper between centre of variator (character «A», see Table D.3) and one of variator holes, where the call is supposed to be supplied from single-channel telephone.	No actions required	No actions required
button SW4	for telephones without LCD – no actions required; for telephones with LCD press and hold during 3 seconds button SW4 <sup>1)</sup> (not all telephones are equipped with SW4); record of assigned number to telephone memory matches displayed number on LCD (if any), see table D.7		
<sup>1)</sup> Second pressure of «SW4» button during 2...3 seconds will record again the number to the same, if position of controls was not changed (SW2 and SW3); if at least one position was changed, current number will be changed.			

Table D.5 – Settings of commutator telephones

Controls	Purpose	Description
P2	Volume control of incoming voice	Trimming potentiometer ensures control of sound volume of incoming voice from min. to max. values
JP4, JP5	Call mode settings	a) jumper JP5 is set – call signaling will last until Reset button is pressed; b) jumper JP4 is set – call signaling will last during 10...12 seconds after the call is stopped; c) jumpers JP4 and JP5 are not set – call signaling will last until the call is finished; d) jumpers JP4 and JP5 are set – call signaling will last until Reset button is pressed.
JP7	Call signal settings	Jumper sets frequency of call signaling pause – 3.0 Hz (long pauses). No jumper sets frequency of call signaling – 4.5 Hz (short pauses)
JP8	Relay unit control	Set jumper if connect relay unit RBWSB

Table D.6 – Controls layout of user numbers assignment

User numeration		Switch positions of SW2, SW3	Jumper position J1
entire	group		
1	1-1		2-3
2	1-2		2-3
3	1-3		2-3
4	1-4		2-3
5	1-5		2-3
6	1-6		2-3
7	1-7		2-3
8	1-8		2-3
9	1-9		2-3
10	1-10		2-3
11	1-11		2-3
12	1-12		2-3
13	2-1		1-2
14	2-2		1-2
15	2-3		1-2
16	2-4		1-2
17	2-5		1-2
18	2-6		1-2
19	2-7		1-2
20	2-8		1-2
21	2-9		1-2
22	2-10		1-2



User numeration		Switch positions of SW2, SW3	Jumper position J1
entire	group		
23	2-11		1-2
24	2-12		1-2
Note – Switch SW2-5 with character «L» do not assign user number; it is described in table D.8.			

Table D.7 – Information displayed on LCD

LS mode (mains power)	BTC mode (inductor)
Call (pressed Call button or during inductor rotation): <div>Call to: 2 gr.1 Power: mains supply</div>	Call (during inductor rotation): <div>Call to: 2 gr.1 Charge=75%</div>
Incoming call: <div>User 4 gr.1 Incoming call</div>	Incoming call: <div>User 4 gr.1 Incoming call</div>
Wait mode: screen scrolling <div>Selected: 2 gr.1 Power: mains supply</div> <div>Selected: 2 gr.1 No missed calls</div> <div>Selected: 2 gr.1 Post 1 gr.1</div>	Wait mode (after end of inductor rotation) <sup>1)</sup> : screen scrolling <div>Selected: 2 gr.1 Charge=94%</div> <div>Selected: 2 gr.1 No missed calls</div> <div>Selected: 2 gr.1 Post 1 gr.1</div>
Wait mode if missed calls <sup>2)</sup> <div>Selected: 2 gr.1 Missed from: 4 3</div>	Wait mode if missed calls <sup>3)</sup> <div>Selected: 2 gr.1 Missed from: 4 3</div>
Line busy <sup>4)</sup> <div>Line is busy Power: mains supply</div>	—
Backlight dimming <div>Backlight level: 7 Power: mains supply</div>	—
User number assignment <sup>5)</sup> <div>Set address User 1 gr.1</div>	User number assignment <sup>5)</sup> <div>Set address User 1 gr.1</div>
<sup>1)</sup> LCD will operate unless energy (provided by inductor and ES) is finished, see Table D.3. <sup>2)</sup> To reset information on missed calls displayed on LCD, call back to user or answer to the repeated call. <sup>3)</sup> In BTC mode information on missed calls is not saved. <sup>4)</sup> Occurs during call time from one system user to another (during inductor rotation or pressing Call button ) at all other users. <sup>5)</sup> set (assign) user number to telephone at first connection or when communication mode is changed in case of power supply (external 24 V, or reserved – produced using inductor).	

Table D.8 – Additional settings and telephone controls assignment

Controls	Purpose	Description
JP1	LCD (on and off)	Telephones with LCD are always delivered with set jumper JP1, LCD will be activated; Take off jumper JP1 to switch off LCD
JP7	To set call signal	Same as for commutator telephones (Table D.5)
JP5, JP4	To set call mode	Same as for commutator telephones (Table D.5)
SW2-5 («L»)	To activate relay unit	«OFF» – relay unit is off. «ON» – relay unit is on
LCD switching off eases efforts to rotate the handle; if there are many telephones in the System, rotation may be complicated.		




Table D.10 – Settings and assignment of relay unit controls

Controls	Purpose	Description
JP1	To set call mode	a) jumper JP5 is set – call signaling will last until Reset button is pressed; b) jumper JP4 is set – call signaling will last during 10...12 seconds after the call is stopped; c) jumpers JP4 and JP5 are not set – call signaling will last until the call is finished; d) jumpers JP4 and JP5 are set – call signaling will last until Reset button is pressed

Table D.11 – System settings at delivery from Manufacturer

Name	Position	Settings
Switches SW2 and SW3	Set in «OFF» position	No user number assigned
J1	Set in position (contacts 2 and 3)	Telephone does not belong to group «1»
SW2-5 («L»)	«OFF»	Relay unit control is switched off
JP 1	Set	LCD is on
JP 7	Set	Frequency of call signals pause 3 Hz
JP 4	-	Call signal will be supplied unless the calling stop the call.
JP 5	-	
JP 8 (only PH-1LA)	-	Relay unit control is switched off
J12	For single-channel telephones closed contacts 1 and 2	Called user number of single-channel telephone will be set to call the first user
Variator	For single-channel telephones used at pair communication jumper is soldered in position 1. For others – not set	

Table D.12 – Select of call line

Numeration		Selector switch position	Group select toggle position	
entire	group			
1	1-1	1	1	
2	1-2	2	1	
3	1-3	3	1	
4	1-4	4	1	
5	1-5	5	1	
6	1-6	6	1	
7	1-7	7	1	
8	1-8	8	1	
9	1-9	9	1	
10	1-10	10	1	
11	1-11	11	1	
12	1-12	12	1	
13	2-1	1		2
14	2-2	2		2
15	2-3	3		2
16	2-4	4		2
17	2-5	5		2
18	2-6	6		2
19	2-7	7		2
20	2-8	8		2
21	2-9	9		2
22	2-10	10		2
23	2-11	11		2
24	2-12	12		2

The diagram illustrates a complex wiring setup for a 24-channel system. The central component is a 24x0.5 connector strip with pins numbered 1 to 24. The wiring is organized into several sections:

- SB-24A (X1-X24):** A 19x0.5 connector strip with pins 1 to 19. It is connected to a 24x0.5 strip via a 19x0.5 connector.
- PH-1L, PH-12L:** A 2x2x0.5 connector strip with pins 1 to 24. It is connected to a 24x0.5 strip via a 19x0.5 connector.
- PH-24L:** A 2x2x0.5 connector strip with pins 1 to 24. It is connected to a 24x0.5 strip via a 19x0.5 connector.
- PH-1LR, PH-12LR, PH-1LRW, PH-12LRW:** A 2x2x0.5 connector strip with pins 1 to 24. It is connected to a 24x0.5 strip via a 19x0.5 connector.
- PB-24:** A 19x0.5 connector strip with pins 1 to 19. It is connected to a 24x0.5 strip via a 19x0.5 connector.
- PH-24LWP:** A 2x2x0.5 connector strip with pins 1 to 24. It is connected to a 24x0.5 strip via a 19x0.5 connector.
- PH-24LR, PH-24LRW:** A 2x2x0.5 connector strip with pins 1 to 24. It is connected to a 24x0.5 strip via a 19x0.5 connector.

The diagram also includes a 24 VDC power supply connection at the bottom left, labeled "24 VDC".

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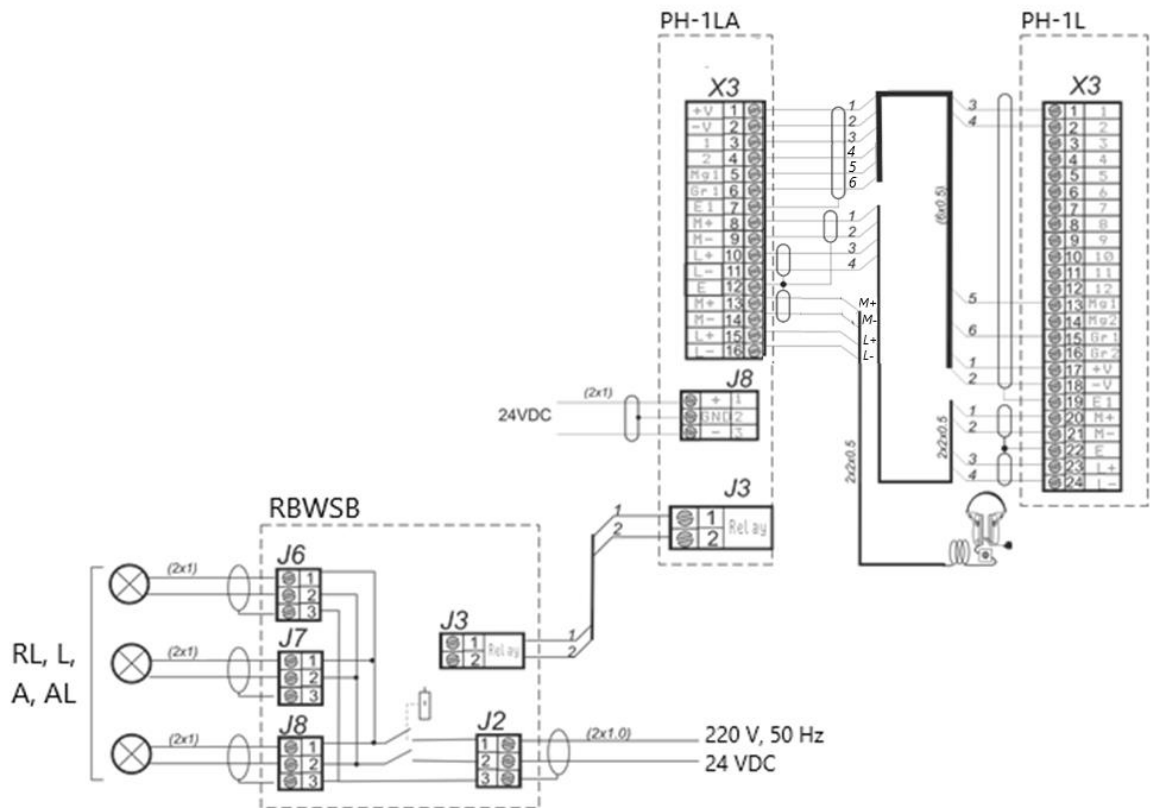


Figure E.2 – Connection of relay unit and telephone PH-1LA

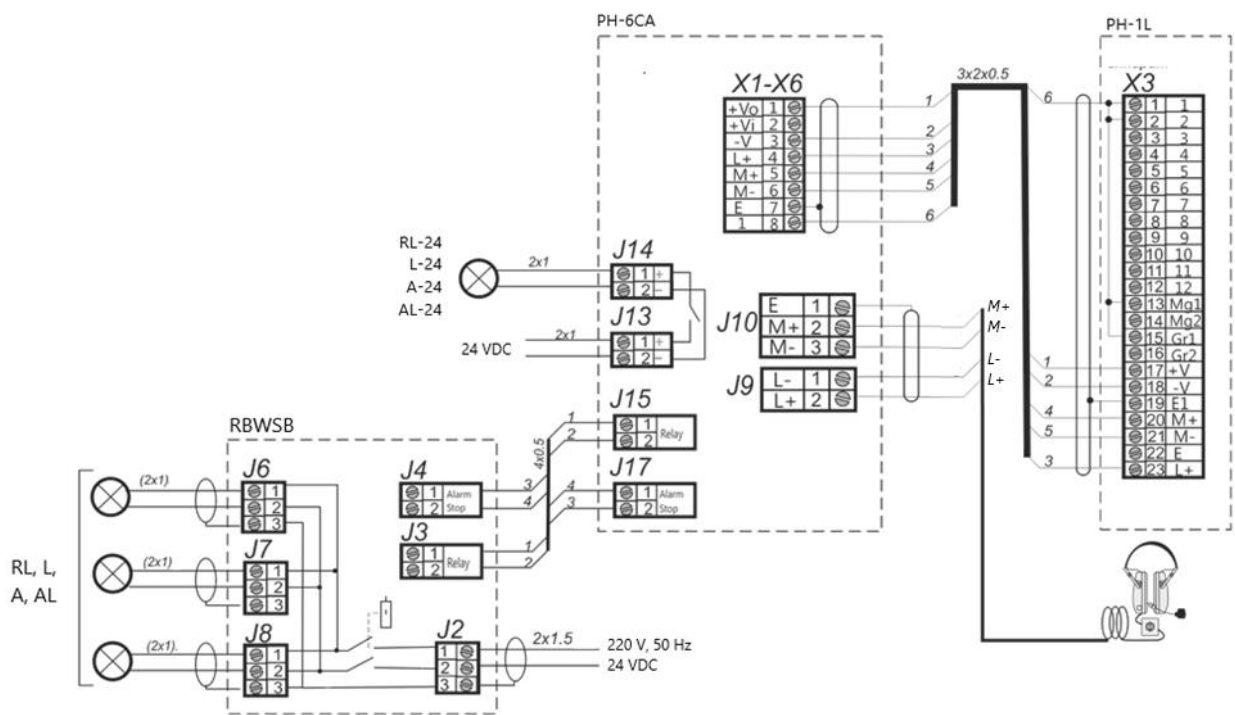


Figure E.3 – Connection of relay unit and telephone PH-6CA

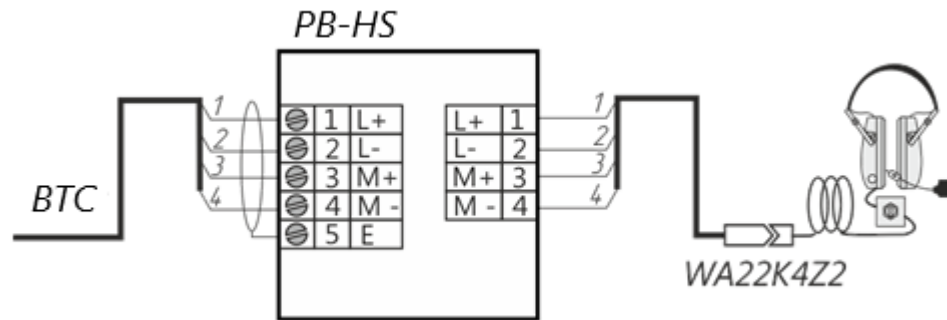


Figure E.4 – Connection of socket PB-HS to telephones