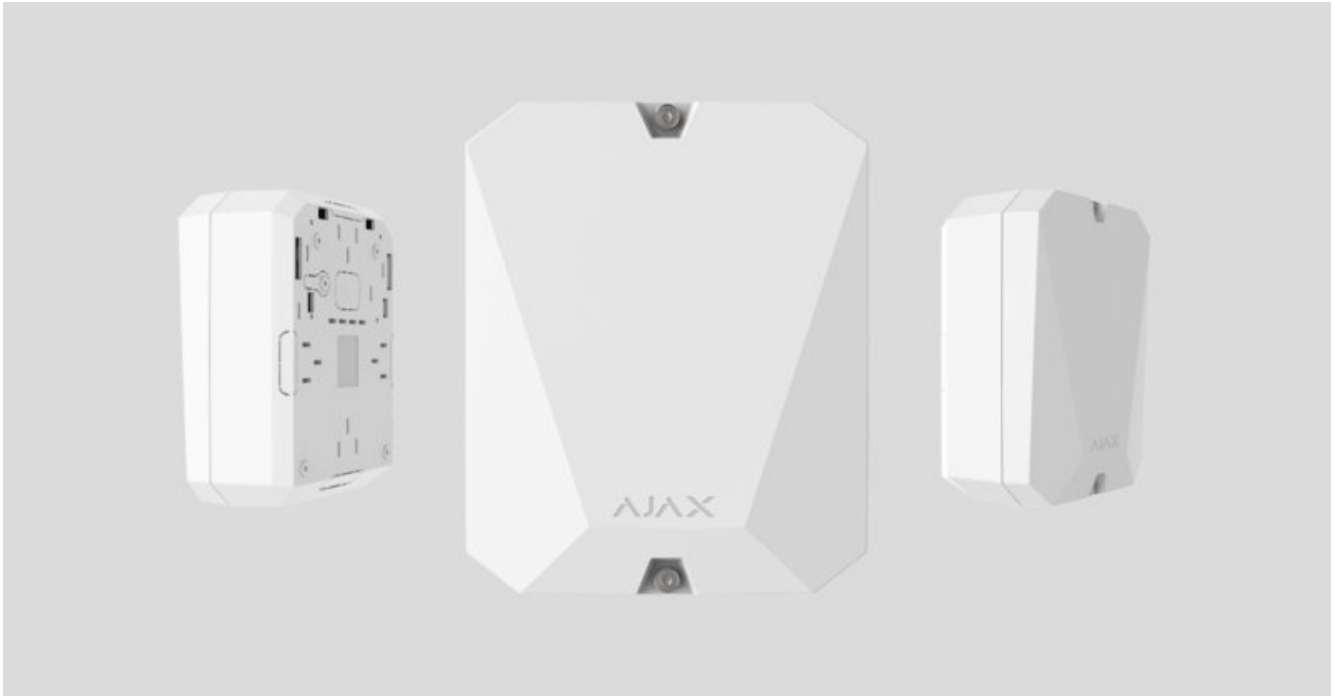# vhfBridge User Manual

Posted on February 7, 2022

vhfBridge is a module for connecting Ajax security systems to third-party VHF transmitters. It provides 8 transistor outputs for connection to third-party VHF transmitters.

The device is powered from 100–240V ~ mains and can be operated from a 12V⎓ backup battery.

The **vhfBridge** operates as part of the Ajax security system by connecting via the **Jeweller** secure radio communication protocol to the hub. The hub communication range is up to 1800 meters without obstacles. Comes in two configurations: with and without a casing.

Buy vhfBridge

Functional elements

Body elements
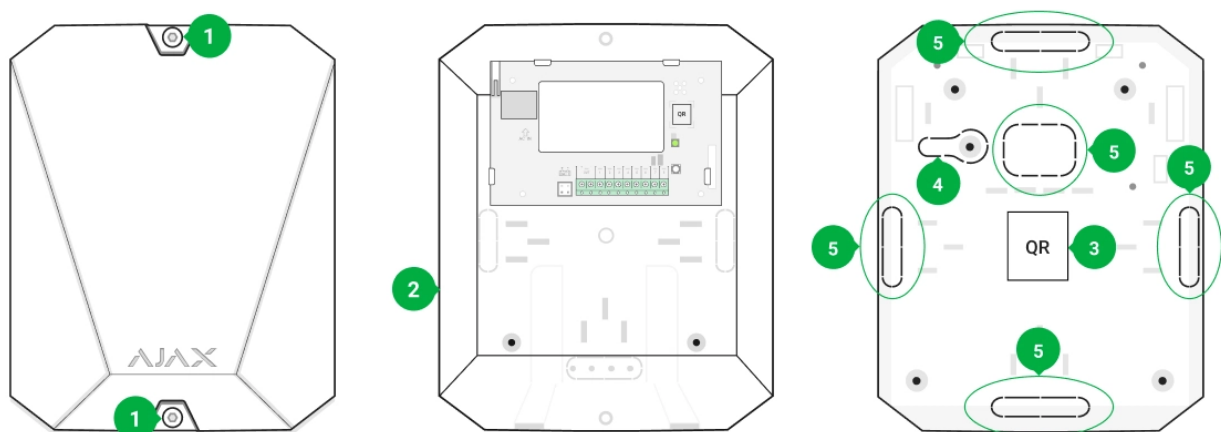
1. Screws securing the body lid. Unscrew with bundled hexagon key (Ø 4 mm).

**2.** Cavity for a 12V backup battery.

> ℹ️ Battery not included with vhfBridge set.

3. QR code and ID (serial number) of the device.

4. Perforated part of the body. It is necessary for tamper triggering in case of dismounting attempts.

5. Perforated part of the body for the output of wires of connected detectors and devices.

> ℹ️ The presence of the casing depends on the vhfBridge package. Devices come in two configurations: with and without a casing.

vhfBridge board elements
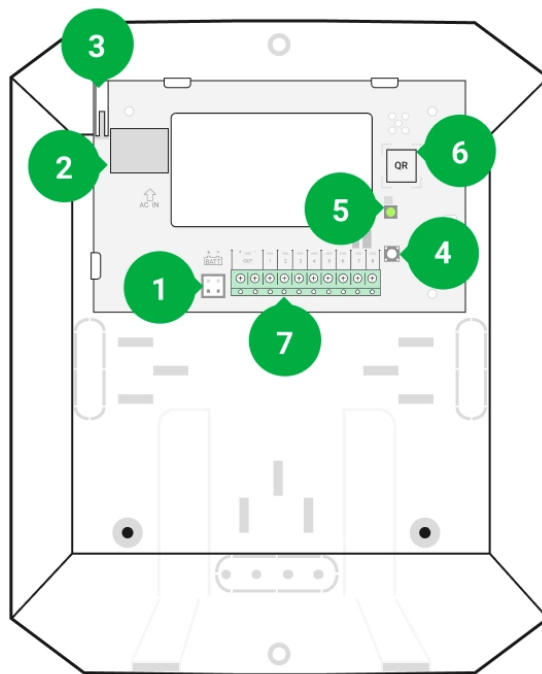
1. Terminals for connecting a 12 V⎓ backup battery.

2. Power supply input 100–240 V~.

3. Tamper button. Signals if vhfBridge body lid is removed.

4. Power button.

5. LED indicator.

6. QR code and ID (serial number) of the device.

7. Terminals for connecting a third-party VHF transmitter.

vhfBridge terminals
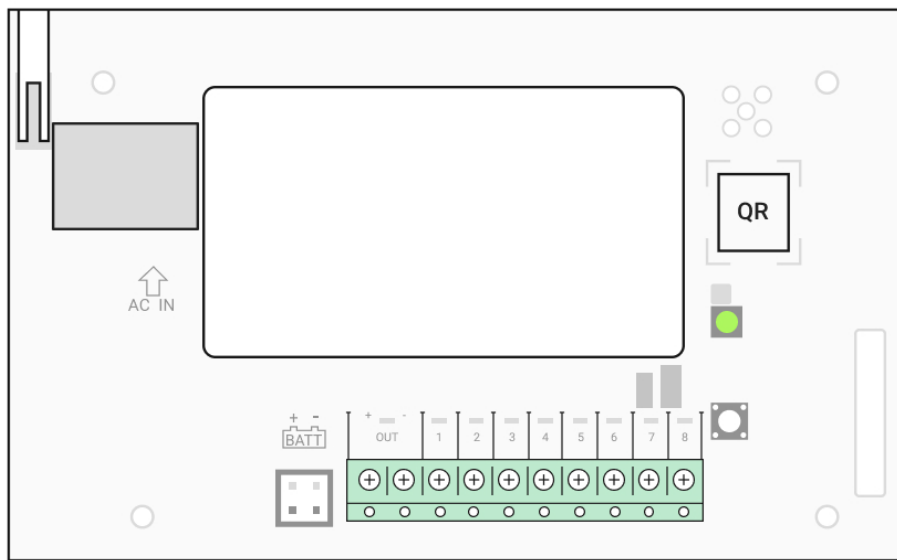
- **BATT** — input for 12 V⎓ backup power connection

- **OUT** — power output for the 12 V⎓ VHF transmitter (maximum output current 2 A)

- **OUT 1…8** — vhfBridge outputs for connecting a third-party VHF transmitter

LED indication
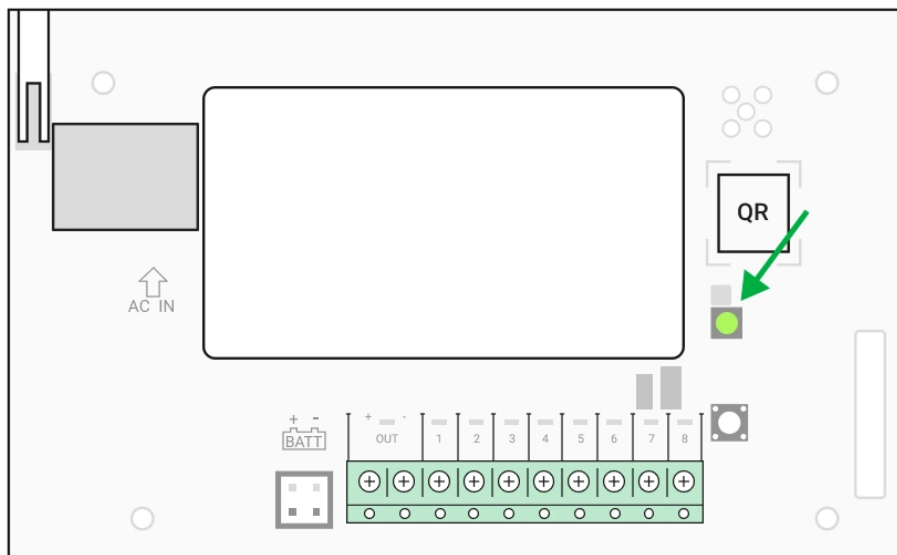
vhfBridge LED indicator may light up white, red, or green, depending on the status of the device.

Please note that the LED indicator is not visible when the body lid is closed. The LED indicator is used at the stage of connecting and configuring the vhfBridge. In

the future, the state of the device can be monitored in the Ajax app.

LED indication	Event	Note
Lights white.	Connection with the hub is established, external power supply is connected.	
Lights red.	There is no connection with the hub, external power supply is connected.	For example, the hub is turned off or vhfBridge is outside the coverage area of the hub's wireless network.
Goes out for 0.5 seconds, then lights up green and turns off.	Enabling vhfBridge.	
Goes out for 0.5 seconds, then lights up green and fades out over 3 seconds.	Disabling vhfBridge.	
Blinks red once per second.	vhfBridge is not assigned to a hub.	
Lights up for a second once every 10 seconds.	No external power supply is connected to vhfBridge.	The colour of the indication depends on the status of connection with the hub: • lights up white if there is connection with the hub; • lights up red if there is no hub connection.
During an alarm, gradually lights up and goes out once every 10 seconds.	No external power supply and discharged external battery of vhfBridge.	The colour of the indication depends on the status of connection with the hub: • lights up white if there is connection with the hub; • lights up red if there is no hub connection.

LED indication of output status

| LED indication	Output status in case of alarm

High potential output (positive trip).	Lights up green.
Low potential output (negative trip).	Goes out.

Operating principle

vhfBridge is designed to connect third-party VHF transmitters to create an additional channel for transmitting events to the CMS.

The communication channel with the CMS created using vhfBridge can be used as the only or as a backup channel for communicating with the CMS (more reliable option). This means that the hub can simultaneously transmit all events and alarms to the monitoring station of the security company not only through SIA, Contact ID, and other proprietary protocols but also using vhfBridge.

The transponder receives information about alarms and events from the hub via the Jeweller radio channel. vhfBridge then transmits it to a third-party VHF transmitter over the wires. The VHF transmitter, in turn, transmits all events and alarms to the CMS via a radio channel.
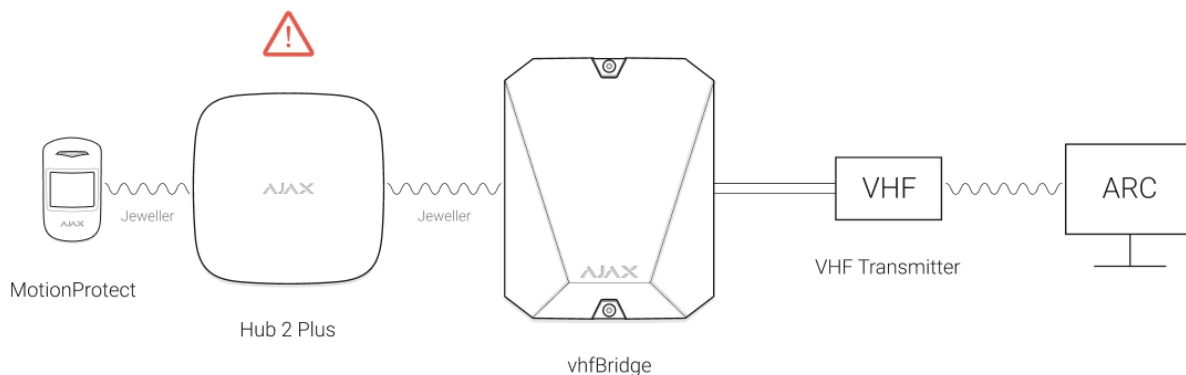
Events can be transmitted to the CMS via the internet and vhfBridge in parallel. Transmission via the internet works as the main channel because of greater reliability and informativity. The transmitted events may contain the zone number of the triggered detector, group number, user number, and other data.

vhfBridge works as a backup communication channel and duplicates all events transmitted via the internet. The delivery speed of events and alarms in both cases

does not exceed 1 second.

An example of the algorithm of actions in case of an alarm from a MotionProtect motion detector:

1. MotionProtect has detected an alarm.

2. MotionProtect transmits the alarm to the hub via the Jeweller radio protocol.

3. The hub receives the MotionProtect alarm and transmits it to vhfBridge via the Jeweller radio protocol.

4. vhfBridge receives the alarm from the hub and transmits it to the third-party VHF transmitter over a wired connection.

5. The VHF transmitter receives the alarm and transmits it to the radio receiver on the CMS side via the radio channel.

6. The radio receiver receives the alarm and transmits it to the CMS software.

7. The CMS receives and processes the alarm.

Output types

vhfBridge has 8 potential outputs for connection to a VHF radio transmitter. There are two types of outputs:

1. High potential output (positive trip).

2. Low potential output (negative trip).

> ⓘ The positive trip (high-potential output) does not supply voltage in the normal state. As soon as an alarm or event occurs, the output supplies a voltage of 12–14 V⎓. The negative trip (low-potential output) works the other way around. In the normal state, the voltage is maintained at 12–14 V⎓, and when an alarm or event occurs, the voltage drops to 0 V.

The vhfBridge output type and alarm pulse duration are configurable in Ajax apps.

VHF transmitter power supply

vhfBridge can supply a third-party VHF transmitter with 12 V⎓ power (maximum output current 2 A).

If the VHF transmitter has a current consumption of more than 2 A, it can be powered by the vhfBridge battery. In this case, disable battery charge tracking in the vhfBridge settings so that the system users do not receive notifications about the vhfBridge battery charging too long.

vhfBridge event transmission to the monitoring station

Ajax security system can also connect to the CMS and transmit alarms to the monitoring station in Sur-Gard (Contact ID), SIA (DC-09), and other proprietary protocol formats. See a complete list of supported protocols here.

Which CMSs can the Ajax security system be connected to

The vhfBridge loop (zone) number can be found in the device states:

1. Sign in to the **Ajax app**.

2. Go to the **Devices** ⊟ menu.

3. Select vhfBridge. The loop (zone) number is displayed at the very bottom of the page.
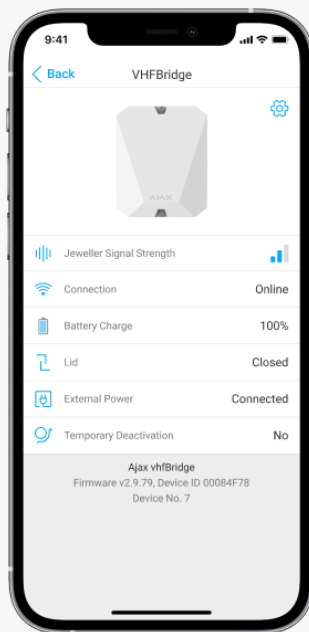
The vhfBridge loop (zone) number is also available in the **Groups** menu (Ajax app → Devices ➖ → Hub → Settings ⚙ → Groups). To learn the loop (zone) number, select the group in which the transponder or the required connected device is located. The **Device number** corresponds to the loop (zone) number.

Adding to the system

> ⚠️ vhfBridge does not work Hub, ocBridge Plus, uartBridge, and third-party security central units. Only user with administrator rights in Ajax PRO application can add and configure devices.

Before adding a device

1. Install the **Ajax PRO app**. Create an **account**. Add a hub to the app and create at least one virtual room.

2. Check that the hub is on and has access to the internet (via Ethernet cable, Wi-Fi, and/or mobile network). You can do this in the Ajax app or by checking the hub logo on the faceplate. The logo should light up white or green if the hub is connected to the network.

3. Ensure that the hub is **disarmed** and **does not start updates** by checking its status in the Ajax app.

> ⚠️ Only one vhfBridge can be connected to one compatible Ajax hub.

In order to connect vhfBridge

1. Open the Ajax app. If your account has access to multiple hubs, select the one to which you want to add vhfBridge.

2. Go to the **Devices** ➖ tab and click **Add device**.

3. Name the transponder, scan or enter the QR code manually (located on the device body and packaging), and select a room and a group (if the group mode is activated).

4. Click **Add**; the countdown will begin.

5. Switch on vhfBridge by holding the power button for 3 seconds. Keep in mind that the hub connection request is only transmitted when the integration module is switching on.

> ℹ️ For the detection and pairing to occur, the transponder should be located within the coverage area of the hub's wireless network (at the same guarded object).

If the connection has failed, disconnect vhfBridge for 5 seconds and try again. If the transponder has already been assigned to another hub, turn off vhfBridge and then follow the standard addition procedure.

The connected transponder will appear in the list of hub devices in the app. Updating device statuses depends on **Jeweller** settings. The default status update period in the app is 36 seconds.
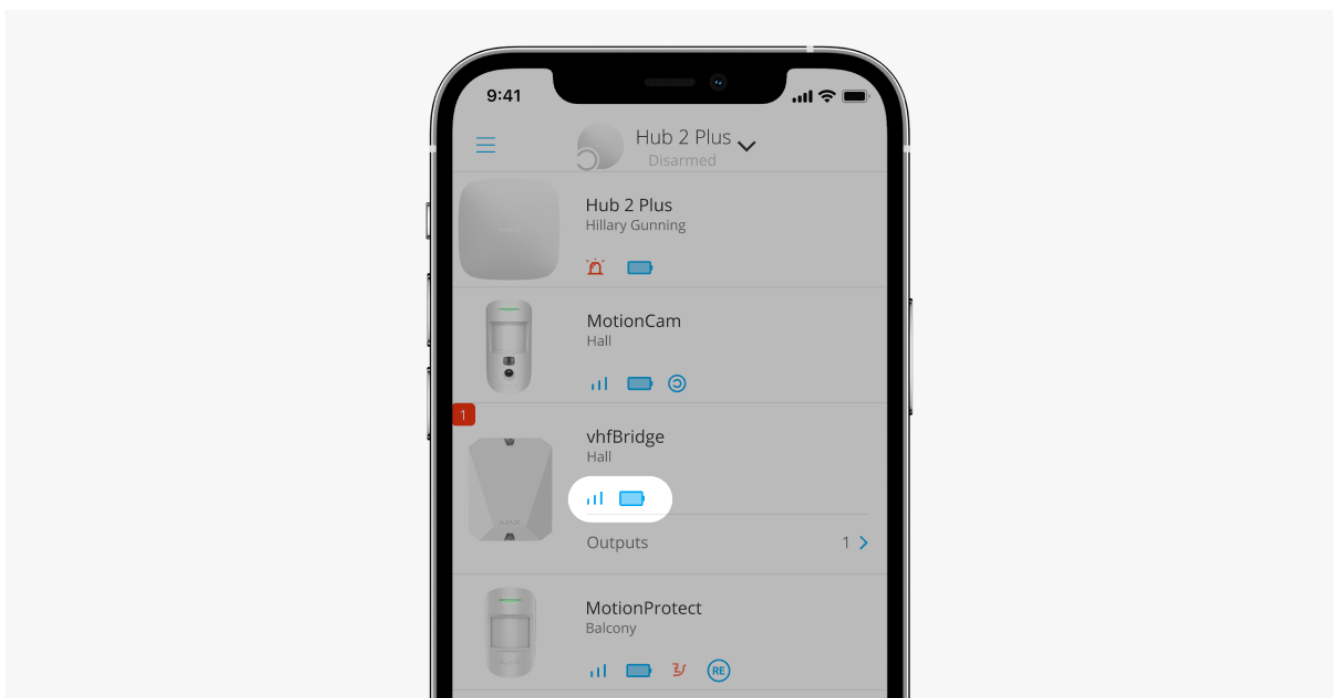
Faults counter
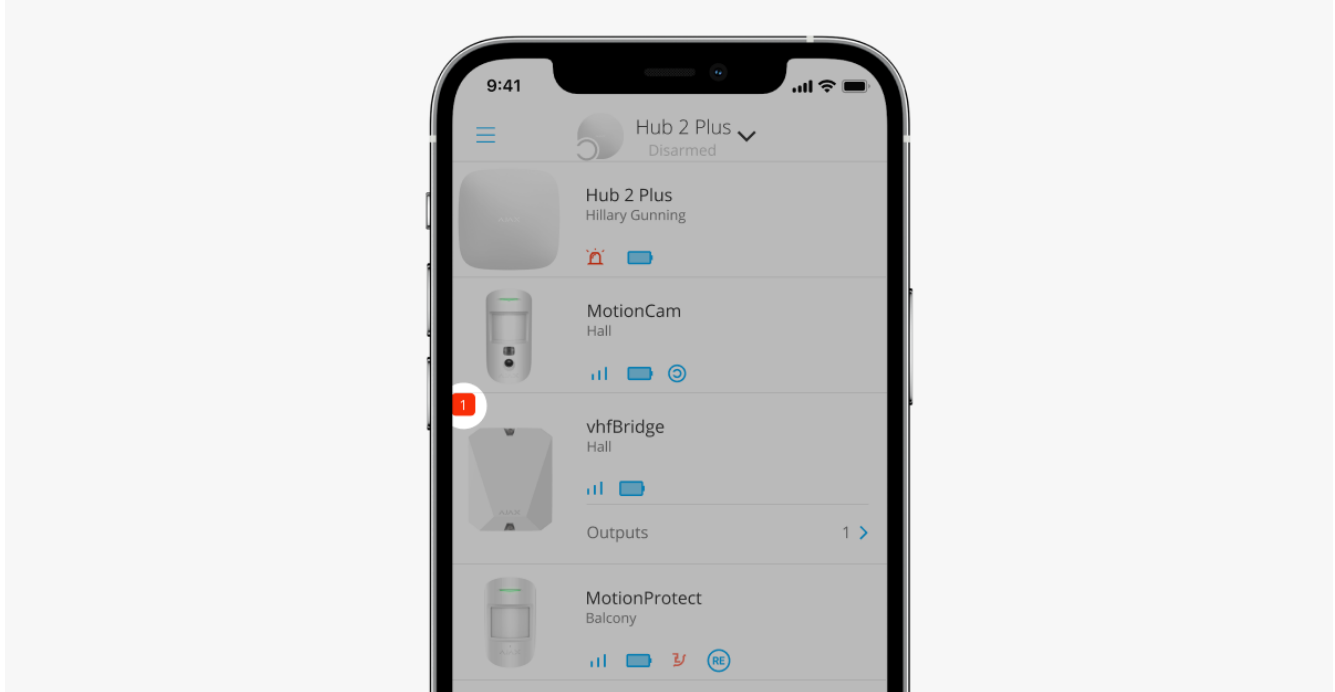
When a vhfBridge malfunction is detected (e.g., no external power), the Ajax app will display a red icon with a number in the upper left corner of the device icon. The number indicates the number of faults.

All faults can be seen in the transponder states. Fields with faults will be highlighted in red.

Icons

Icons display some vhfBridge states. You can view them in the Ajax app, in the **Devices** 🔲 tab.

Icon	Meaning
ıll	Jeweller Signal Strength. Displays the signal strength between the hub and vhfBridge. The recommended value is 2-3 bars.
🔋	The charge level of the battery connected to vhfBridge.
RE	Displays when vhfBridge is operating via a **radio signal range extender**.
⚙	vhfBridge is temporarily disabled. **Learn more**
🔁	vhfBridge tamper triggering events are temporarily disabled. **Learn more**

States

States can be found in the **Ajax app**:

1. Go to the **Devices** 🔲 tab.

2. Select vhfBridge from the list.

Parameter	Meaning
Malfunction	Click ⓘ to open the list of vhfBridge malfunctions. The field is displayed only if a battery charge fault is detected.
Jeweller Signal Strength	Signal strength between the hub and vhfBridge.

	The recommended value is 2-3 bars.
Connection	Connection status between the hub and vhfBridge: • **Online** — the device is connected • **Offline** — no connection to the device
Battery charge	Battery charge level of the device. Displayed as a percentage. ### How battery charge is displayed in Ajax apps Also, this field can display the battery status: • **Charging** — displayed while the battery is being charged • **Error** — displayed if the battery has been charging for more than 40 hours
Lid	The status of tampers that respond to detachment or violation of the integrity of the body. ### What is a tamper
External power	The presence of external power supply 100–240 V: • **Connected** — external power supply is connected • **Disconnected** — external power supply is disconnected
ReX "range extender name"	Radio signal range extender connection status: • **Online** — the device is connected • **Offline** — no connection to the device

	Please note that the field is displayed if vhfBridge is operated via a **radio signal range extender**.
Temporary Deactivation	Shows the status of the device temporary deactivation function: • **No** — the device operates normally and transmits all events • **Lid only** — the hub administrator has disabled notifications about triggering on the device body • **Entirely** — the device is completely excluded from the system operation by the hub administrator. The device does not follow system commands and does not report alarms or other events
Firmware	vhfBridge firmware version.
ID	vhfBridge ID (serial number). Also located on the device box, its board, and the body.
Device №	Number of the device loop (zone).

vhfBridge settings
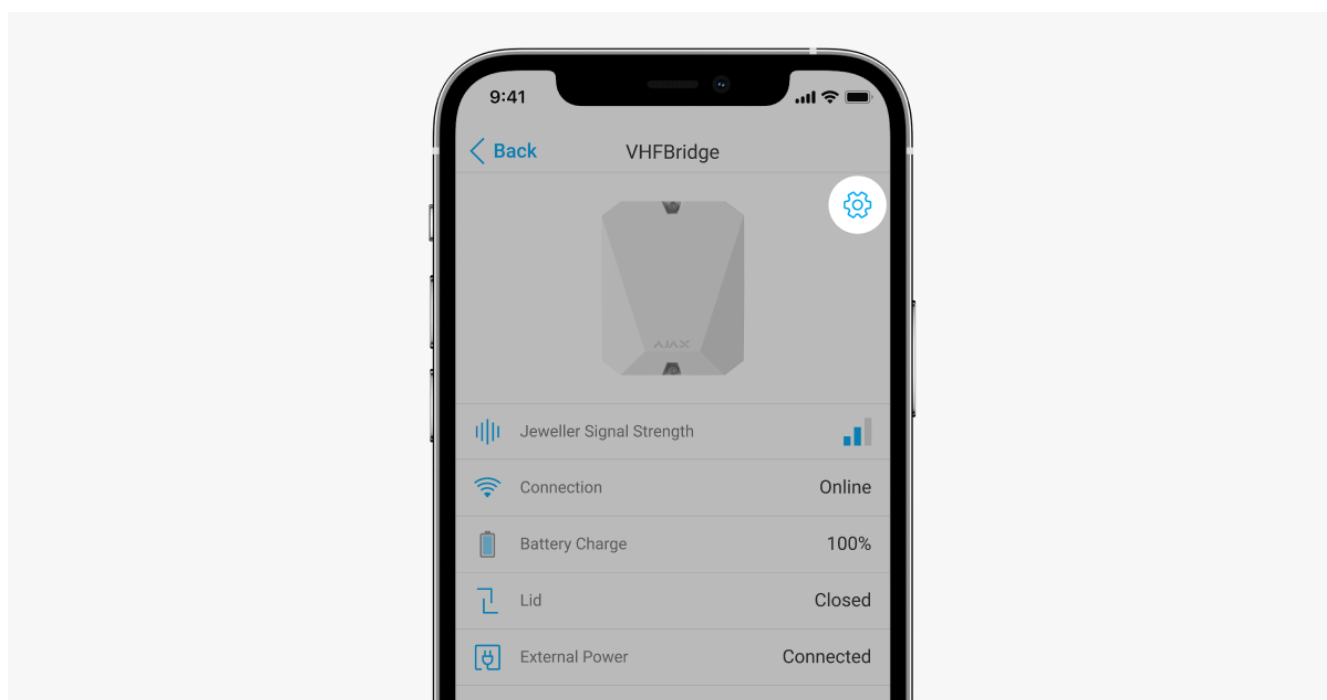
Settings can be changed in the **Ajax app**:

1. Go to the **Devices** ⊟ tab.

2. Select vhfBridge from the list.

3. Go to **Settings** by clicking on the ⚙ icon in the upper right corner.

4. Set the required parameters.

5. Click **Back** to save the new settings.

> ⓘ Note that after editing the settings, you should click the **Back** button to save them.

Setting	Meaning
First field	vhfBridge name. It is displayed in the text of SMS and notifications in the event feed. To change the device name, click on the pencil icon ✏. The name can contain up to 12 Cyrillic characters or up to 24 Latin characters.
Room	Selecting the virtual room to which vhfBridge is assigned. The room name is displayed in the text of SMS and notifications in the event feed.
Monitoring of the battery charging duration	Set up of the battery charging duration. When this option is enabled, the system will send a malfunction notification if the battery connected to vhfBridge has been charging more than 40 hours. Disable monitoring if the third-party VHF radio transmitter is powered directly from the battery and not from the vhfBridge power terminals.

Pulse duration	Pulse time on an event (from 1 to 255 seconds). Set in increment of 1 second. The default value is 5 seconds.
Jeweller Signal Strength Test	Switches vhfBridge to the Jeweller signal strength test mode. The test allows you to check the signal strength between the hub and vhfBridge and determine the optimal installation location. **What is Jeweller Signal Strength Test**
Temporary Deactivation	Allows the user to disable the device without removing it from the system. Two options are available: • **Deactivate entirely** — the device will not execute system commands or participate in automation scenarios, and the system will ignore device alarms and other notifications • **Deactivate lid notifications** — the system will ignore only notifications about the triggering of the device tamper button **Learn more about temporary deactivation of devices**
User Guide	Opens vhfBridge User Guide in the Ajax app.
Unpair Device	Unpairs vhfBridge, disconnects it from the hub, and deletes its settings.

Configuring vhfBridge outputs

By default, vhfBridge outputs are configured as follows:

- 1st output — intrusion

- 2nd output — panic button

- 3rd output — malfunction

- 4th output — tamper

- 5th output — loss of vhfBridge power supply

- 6th output — power loss of the hub

- 7th output — hub battery discharged

- 8th output — loss of communication between the hub and vhfBridge

The settings of outputs can be changed in the **Ajax app**:

1. Go to the **Devices** ➖ tab.

2. Find vhfBridge in the list of devices.

3. Go to the **Outputs** menu.

4. Find the output in the list and go to its **Settings** by clicking on the gear icon ⚙.

5. Set the required parameters.

6. Click **Back** to save the new settings.

Setting	Meaning
Event type	Selection of the event type to which vhfBridge output reacts. A complete list of event types and their icons is **available below**
Connection type of the output	Selection of the output type: • High potential output (positive trip). • Low potential output (negative trip).

Event types of vhfBridge outputs

Event type	Description	Icon
Not assigned	Output disabled	
Intrusion alarm	The alarm of opening, movement, and breaking of detectors	
Fire	Fire alarm	
Medical alarm	Medical alarm Button	
Panic button	• Panic button clicking in Ajax apps • Clicking DoubleButton • Clicking Button in panic button mode • Clicking a panic button connected to Transmitter or MultiTransmitter	

Any alarm	Alarm of any connected detector	
Malfunction	Any malfunction of the connected detectors	
Power loss of the transponder	Loss of main power of vhfBridge	
Transponder battery discharged	vhfBridge battery discharged	
Power loss of the hub	Loss of hub main power	
Hub battery discharged	The hub battery is discharged	

Lid	Tamper triggering of any device	
Change of security modes	Changing the security mode of an object or a group (bistable output)	
Confirmed intrusion alarm	Confirmed alarm (according to PD 6662: 2017) **Learn more**	
Confirmed hold-up device alarm	Confirmed hold-up device alarm (according to PD 6662:2017) **Learn more**	
Lost connection with vhfBridge	Loss of vhfBridge connection with the hub via Jeweller channel	

The following vhfBridge outputs work in the bistable mode:

- Arming status

- Hub power

- vhfBridge power

- Hub battery status

- vhfBridge battery status

All other outputs work in the pulse mode.

Connecting VHF transmitter to vhfBridge

List of recommended VHF transmitters

- Hawk VHF Alarm Transmitter from FSK Electronics

- TX750C from RDC

- TR-41 from Puper

> ⓘ vhfBridge can be connected to any VHF transmitter with relay inputs. Connection via UART, RS-485, and other interfaces is not supported.

How to connect a VHF transmitter to vhfBridge

> ⚠️ When connecting the VHF transmitter, do not twist the wires together, but solder them. The ends of the VHF transmitter wires, which will be inserted into the vhfBridge terminals should be tinned or crimped with a special sleeve.

1. Turn off the vhfBridge power (if power was connected).

2. Turn off vhfBridge.

3. Select vhfBridge outputs to which you want to connect the VHF transmitter.

4. Pull the VHF transmitter wires into the vhfBridge body through the holes.

> ⓘ There are perforated sections on the body that can be broken off and the cable can be pulled through them.

5. Connect the VHF transmitter to the control outputs of vhfBridge according to the wiring diagram in the User Guide supplied by the VHF radio transmitter manufacturer.

6. Fasten the cable securely to the vhfBridge terminals using a straight screwdriver (slot PL 3.0).

7. Connect the power to the third-party VHF transmitter.

> ⓘ If a VHF transmitter requires 12 V power to operate, it can be connected to the power terminals of the corresponding vhfBridge zone. Do not connect the external power supply to the transmitter power terminals, as this may damage the device.

8. Connect power to vhfBridge.

9. Turn on vhfBridge.

vhfBridge functionality testing

Integration module functionality tests do not begin immediately, but not later than over a single ping period of the hub — detector (36 seconds with the standard settings of the hub). You can change the ping period of devices in the Jeweller menu of the hub settings.

Tests are available in the device settings menu:

1. Sign in to the **Ajax app**.

2. Go to the **Devices** 🟦 menu.

3. Select vhfBridge.

4. Go to **Settings** ⚙️.

Available tests:

- Jeweller Signal Strength Test

Selecting vhfBridge placement

The placement of vhfBridge determines its distance from the hub and the presence of obstacles between them that impede the passage of the radio signal: walls, inter-floor constructions, or large-sized objects located in the room.

> ℹ️ Be sure to check the signal strength at the installation site. If the signal strength is low (a single bar), we cannot guarantee a stable operation of the security system. At the very least, relocate the device as repositioning even by 20 cm can significantly improve the signal reception.

If after moving the device still has a low or unstable signal strength, use a **radio signal range extender**.

When choosing the installation location, consider the distance between vhfBridge and the VHF transmitter — the cable length should be sufficient for connection.

⚠️ The minimum distance between vhfBridge and the radio transmitter is 2 meters and the maximum distance is 7 meters. The minimum distance is required to avoid signal overlapping. The maximum distance allowed will help avoid signal attenuation in the cable.

The material and cross-section of the cable for connecting the VHF transmitter are determined by the requirements of the manufacturer of the VHF transmitter and the maximum current value. All requirements can be found in the manual or from the customer service of the VHF transmitter manufacturer.

vhfBridge installation

⚠️ Prior to mounting vhfBridge, ensure that you have selected the optimal place to install the device corresponding to these instructions.

The transponder body should be mounted on a vertical surface. If installed on a horizontal surface, the tamper will not work when attempting to dismantle the transponder.

To install a transponder:

1. Secure the body to the surface with bundled screws using at least two fixing points. In order for the integration module tamper to respond to a dismantling attempt, be sure to fix the body at the point with the perforated section.

2. Install the vhfBridge card into the body on the racks. If available, connect a backup battery. Note that a power supply should not be connected to the terminals.

ℹ️ We recommend using a 12 V battery with a capacity of 4 or 7 Ah. For such batteries, special racks in the body are designed. You can also use similar batteries of a different capacity, of matching size, with the maximum full charge time of no more than 30 hours. The maximum battery size for installation in the body is 150 × 64 × 94 mm.

3. Connect the VHF transmitter to vhfBridge.

4. Turn on vhfBridge.

5. Install the lid on the body and fix it with the bundled screws.

> **i** After installation, be sure to check the vhfBridge tamper status in the Ajax app.

Do not install vhfBridge:

- Outdoors. Doing so may cause the device to malfunction or not work properly.

- Near metal objects or mirrors (for example, in a metal cabinet) They can shield and attenuate the radio signal.

- Inside premises with temperature and humidity outside the permissible limits. Doing so may cause the device to malfunction or not work properly

- At a distance less than 1 meter from the hub or a range extender. This could result in the loss of connection with the hub.

- At a distance less than 2 meters from the VHF transmitter or a range extender. The minimum distance is required to avoid signal overlapping.

- At a distance more than 7 meters from the VHF transmitter. The maximum distance allowed will help avoid signal attenuation in the cable.

Maintenance

Check the functionality of vhfBridge regularly. The optimal frequency of checks is once every three months. Clean the body from dust, cobwebs, and other contaminants as they emerge. Use a soft, dry cloth that is suitable for equipment care.

Do not use any substances containing alcohol, acetone, petrol, and other active solvents to clean the device.

Technical Specifications

General characteristics	
Colour	White, black
Installation	Indoors
Compatible with central units	Operates with **Hub 2**, **Hub Plus**, **Hub 2 Plus**
Compatible with range extenders	+
Connections	
Communication protocol	Jeweller: two-sided encrypted radio protocol that transmits events and alarms
Radio signal range	Up to 1,800 meters in a line of sight
	Learn more

Operating frequences	868,0–868,6 МГц 868,7–869,2 MHz 863,0–870,0 MHz (depends on region)
Maximum radio signal power	≤ 25 mW
Third-party VHF radio transmitters integration	
Number of potential outputs	8
Output types	High-/low-potential outputs (set by the administrator in the app)
Transmission types	Pulse and bistable (depends on the output type; the pulse duration is set in the app)
Alarms photo verification	No
Recommended VHF transmitters	Hawk VHF Alarm Transmitter from FSK Electronics TX750C from RDC TR-41 from Puper
Power supply	
Main power supply	100–240V~, 50/60 Hz
Backup power	12V⎓ (backup battery not included)
Supported battery type	12V battery with a full charge cycle of up to 30 hours. The maximum battery size for installation in the body is 150 × 64 × 94 mm
Recommended battery type	12V battery with a capacity of 4 or 7 A·h
VHF Transmitter Power	10.5–15.5 V⎓ (maximum output current 2 A)
Anti-sabotage protection	
Tamper	+
Ping interval	12–300 sec (set by the administrator in the application)
Radio frequency hopping	+
Forgery protection	+

Body and configuration	
Operating temperature range	From -10°C to +40°C
Operating humidity	Up to 75%
Dimensions	196 × 238 × 100 mm(with a casing) 145 × 89 × 51 mm (without a casing)
Weight	840 g (with a casing) 165 g (without a casing)

Complete set

1. vhfBridge.

2. Power cable.

3. 12 V battery connection cable.

4. Installation kit.

5. Body (depends on the configuration).

6. Quick Start Guide.

Warranty

Warranty for the AJAX SYSTEMS MANUFACTURING Limited Liability Company products is valid for 2 years after the purchase.

If the device does not work correctly, you should first contact the support service. In half of the cases, technical issues can be solved remotely.

Warranty obligations

User Agreement

Subscribe to the newsletter about safe life. No spam

Email

Subscribe