

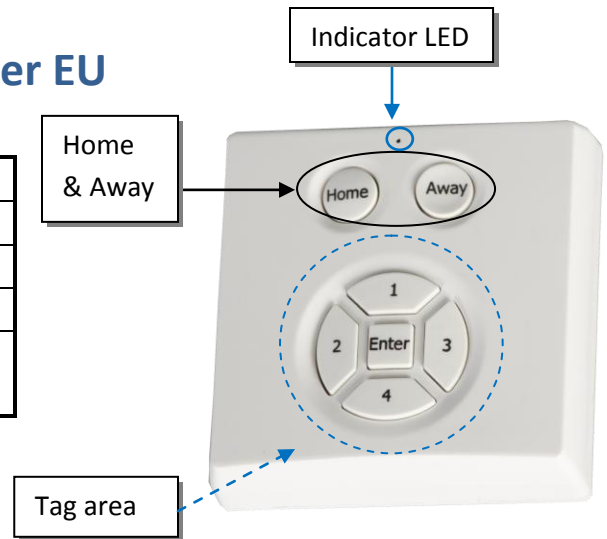
Quick start: Tag Reader EU

Technical specifications

Normal operating voltage	2x AA 1,5V batteries
Frequency range	868.42 MHz
Wireless range	Min. 150 meters in a mesh network
Protocols supported	ISO15693, ISO18000-3, Tag-it™, RFID
Buzzer-sound	Approximately 60dBa at 10 centimeter distance

Basic operations

- The *Tag Reader* can arm/disarm a security system.
- The *Tag Reader* can read RFID-tags.
- The *Tag Reader* has the possibility for the user to manually insert codes.
- The *Tag Reader's* indicator light will react differently on each action.
- The *Tag Reader* has a buzzer, which can be used as walk-in/walk-out notification (alarm is being disabled/activated).



How it operates

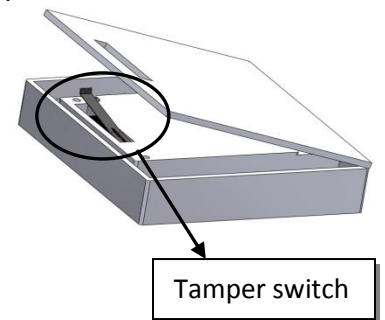
After a successful inclusion the *Tag Reader* can be mounted on the wall.

When pressing the Home or Away button you have one second to start using the manual code buttons. If you do not press any manual code buttons the Tag Reader will be starting up and you have six seconds to show a RFID-Tag in front of the reader.

With a controller you can request the battery level.

Mounting

1. Before mount, the *Tag Reader should* be included into a Z-Wave network and associated.
2. Use a flat screwdriver at the inlets on the sides to gently unlock the back cover.
3. Use the supplied screws to mount the cover to the wall.
4. Place two AA 1,5V batteries into the device.
5. Mount the *Tag Reader* onto the back cover.
6. Make sure to close it well on all sides.
7. Mounting is completed when the led blinks for a full second.



Include or exclude in Z-Wave network ¹

1. Press and hold the *tamper switch* for two seconds and release to start the inclusion or exclude process.
2. When classic inclusion failed, the product will start Network Wide Inclusion automatically.



¹ Make sure your Z-Wave controller is in the correct operation mode (include or exclude).

Technical Manual: Tag Reader EU

Caution:

- This device is using a radio signal that passes through walls, windows and doors. The range is strongly influenced by local conditions such as large metal objects, house wiring, concrete, furniture, refrigerators, microwaves and similar items. On average, the indoor range is approximately 30 meters.
- Do not expose this product to excessive heat or moisture.
- Prevent long term exposure to direct sunlight.
- Do not attempt to repair this product. If the product is damaged or if you are in doubt about the proper operation, take the product back to the place of purchase.
- Do not clean the product with any liquid.
- Indoor use only.

Technical details

Normal operating voltage	2x AA 1.5V batteries From 2.3Vdc to 4.0Vdc Do not use rechargeable batteries
Frequency range	868.42 MHz
Wireless range	Approximately 100 meters in line of sight Min. 150 meters with good mesh network (max 4 hops)
Battery lifetime	Normal usage will give approximately 5 years lifetime Notice: long and big networks will increase the battery lifetime
Protocols supported	ISO15693, ISO18000-3, Tag-it™, RFID
Tag read distance	Approximately one centimeter in front of the enter button
Buzzer-sound	Approximately 60dB at 10 centimeter distance
Storage temperature	-5 °C to +65 °C
Storage humidity	10% to 70%
Operating temperature	10 °C to 40 °C
Operating humidity	30% to 80%

Product dimensions (length x width x height)

Tag Reader = 62 x 62 x 20 mm

Indication mode

The indicator light gives various statuses of the device as follows:

- | | |
|--------------------------------|------------------------------------------|
| 1. Ready for learn mode: | indicator light blinks every second |
| 2. Learn in progress (add): | indicator light 2 times every second |
| 3. Learn in progress (remove): | indicator light 3 times every 1.5 second |
| 4. Learn mode success: | indicator light is on for one second |
| 5. Tamper released | indicator light blinks 6 times rapidly |
| 6. Mounting successful | indicator light is on for 1 second |
| 7. RF message send failed | indicator light blinks 6 times rapidly |



Control

The *Tag Reader* operates as an access control device, using the combination of the USER_CODE command class and the ALARM_V2 command class.

User codes are to be stored in the *Tag Reader*, using the USER_CODE_SET command.

When the user codes are stored in the *Tag Reader*, the ALARM_REPORT_V2 will have the corresponding USER_ID with the used USER_CODE.

There are two types of access control with user codes:

1. Manually by using the buttons on the *Tag Reader*
2. Using the RFID reader and Tags

The difference in using one of the above mentioned methods is:

1. When pressing Home/Away, the manual codes (1-4) can be pressed within one second. After entering the code the user must press ENTER and the USER_CODE_REPORT or ALARM_REPORT_V2 will be sent.
2. When the user waits one second after pressing Home/Away, the RFID reader is started and a Tag can be presented in front of the *Tag Reader*. After successful read, the USER_CODE_REPORT or ALARM_REPORT_V2 will be sent.

Because the RFID code is not readable on the Tags, the *Tag Reader* has some special procedures. Some examples are given at the **typical operation diagrams** chapter in the **Technical Manual**.

There are some situations:

1. **In case an unknown Manual Code entered or unknown Tag presented:**
In this case, the *Tag Reader* will send an unsolicited USER_CODE_REPORT with **UserID 0** and **UserID Status 0**.
A controller will receive this report and can initiate a USER_CODE_SET to the *Tag Reader*.
2. **In case a known Manual Code or Tag is presented:**
This means, this code was previously SET using the USER_CODE_SET command.
Then the *Tag Reader* will respond with a ALARM_REPORT_V2 with **Type 6** and **Event 0x05 or 0x06**.
When the user presses **Home**, event **0x06** (Keypad Unlock) will be used.
When the user presses **Away**, event **0x05** (Keypad Lock) will be used.

Supporting command classes

Basic type: BASIC_TYPE_ROUTING_SLAVE

Generic type: GENERIC_TYPE_ENTRY_CONTROL

Specific type: SPECIFIC_TYPE_NOT_USED

Listening: FALSE, Z-Wave Lib: 4.54

class: 0x85 COMMAND_CLASS_ASSOCIATION

class: 0x80 COMMAND_CLASS_BATTERY

class: 0x84 COMMAND_CLASS_WAKE_UP

class: 0x86 COMMAND_CLASS_VERSION

class: 0x72 COMMAND_CLASS_MANUFACTURER_SPECIFIC_V2

class: 0x71 COMMAND_CLASS_ALARM_V2

class: 0x70 COMMAND_CLASS_CONFIGURATION

class: 0x25 COMMAND_CLASS_SWITCH_BINARY

class: 0x63 COMMAND_CLASS_USER_CODE



Not listening routing slave

This Z-Wave product will be used as routing slave. Slave nodes are nodes in a Z-Wave network that receive commands and perform actions based on the command. This device will always be in sleep mode because it works on batteries. In sleep mode the device is not active listening, the device will wake up according to the wakeup command class.

Include initiator

The include initiator is used when Primary and Inclusion Controllers include nodes into the network. When both the include initiator have been activated simultaneously the new node will be included to the network (if the node was not included previously).

Exclude initiator

The exclude initiator is used by Primary and Inclusion Controllers to exclude nodes from the network. When the exclude initiator and a slave initiator are activated simultaneously, it will result in the slave being excluded from the network (and reset to Node ID zero). Even if the slave was not part of the network it will still be reset by this action.

Z-Wave compatibility

Because this is a Z-Wave device, it means it can co-operate with other Z-Wave devices of other manufacturers. It can co-exist in a Z-Wave network existing with product from other manufacturers.

Hops & retries

The Z-Wave range has a range of up to 30 meters in line of sight. This signal is not limited to the 30 meter range due to routing the Z-Wave message to other nodes in the network. This way the range of the Z-Wave network can be expanded to 150 meters indoors (limit of 4 hops).

class: 0x63 COMMAND_CLASS_USER_CODE

The purpose of the User Code command class is to configure the *Tag Reader* to accept certain RFID Tags or codes. This is typically done by some kind of static controller or Gateway (for instance the Internet Gateway from BeNext).

After sending a User Code Set, including a unique User Identifier (UID), the in-use state (0x01) and the Tag code or keypad sequence using ASCII codes, the *Tag Reader* will accept the codes and notify any other device using the Alarm command class.

This other device can be configured using the Association command class and is typically the same controller or Gateway.

When a tag or code is not known to the *Tag Reader*, it will send an unsolicited report to the devices in its association group with the UID 0x00. The value in this message can be used to configure new tags.

Note: Code length must be 4 to 10 ASCII digits.

class: 0x86 COMMAND_CLASS_VERSION

This Command Class is used to obtain information about the *Tag Reader*. The Z-Wave library type, the Z-Wave protocol version and the application version will be reported.

class: 0x72 COMMAND_CLASS_MANUFACTURER_SPECIFIC_V2

This will report information about the manufacturer. This product will contain the manufacturer ID of *BeNext*. Manufacturer ID of *BeNext* is 138, the ID of this product is 7.

This command class can also be used to request the serial number of the device.

class 0x20 COMMAND_CLASS_BASIC

The Basic command class only has a supporting role and is mapped to the Switch Binary command class.

class 0x25 COMMAND_CLASS_SWITCH_BINARY

The Switch Binary command class is used to enable or disable the notification sound. This sound is typically used to notify a user when the alarm system is being activated. See also the 'Sound Notification' section.

class: 0x80 COMMAND_CLASS_BATTERY

This class is used to request and report battery levels for a given device.

When battery level is lower than 20% the Tag Reader will send a battery warning (value 255) after every wake up notification. A battery get will report the actual value even if below 20 %.

An unsolicited (without receiving a BATTERY_GET) BATTERY_REPORT is sent when the Tag Reader has measured that the battery level has dropped.

Note that the following points apply for the unsolicited BATTERY_REPORT:

- When new batteries applied a report is sent with the current value
- The report will always be lower than the previous sent value
- The battery level in the report is maximum 2% lower than the previous sent value

class: 0x85 COMMAND_CLASS_ASSOCIATION

The Association command class is used to associate the *Tag Reader* to other devices. When a tag or code is read, the *Tag Reader* will send a notification to the Z-Wave devices in its association group. It will also report the state of the tamper alarm to the devices in this association group.

Number of groupings: 1

Maximum supported nodes per group: 5

class: 0x84 COMMAND_CLASS_WAKE_UP

The Wake Up command class is used at battery-operated devices. This class allows the *Tag Reader* to wake up occasionally to notify others devices, that the *Tag Reader* is ready to receive commands. After receiving the commands the *Tag Reader* will go into sleep mode again. The wake up interval can be set using the WAKE_UP_INTERVAL_SET command.

The default value is 0x1C20 = 7200 sec = 2 hour

The default node is 0xFF = 255 (broadcast)

It is possible to send a **wake up notification** on user interaction. Besides sending a Wake Up Notification automatically every two hours (or any other time that is configured using the Wake Up Interval Set command), the *Tag Reader* also sends a Wake Up Notification when:

- The tamper alarm state changes (*Tag Reader* is mounted or removed from the wall)
- A tag read
- A code is entered using the keypad

When the wake up time is set to 0 a **wake up notification** is never send periodically, only on user interaction.

class: 0x70 COMMAND_CLASS_CONFIGURATION_V1Configure parameters:**1. Set to default**

Description: Set all configuration values to default values (factory settings).
Read more in chapter Configuration Reset.

Size: 1 byte*

Param1: if 0xFF then set to default

Param2,3,4: Not used

2. Feedback time

Description: To configure the time the beep is automatically turned off in seconds.

Default: 0x0F

Param1: 0x00 means disabled, 0xFF is endless

Param2, 3, 4: Not used

Size: 1 byte*

3. Feedback timeout

Description: To configure the timeout to wait for a
WAKEUP_NO_MORE_INFORMATION before the error beep is
automatically sound.
The error beeps are fixed 8 beeps shortly after each other.

Default: 0x00

Param1: 0x00 means disabled

Param2,3,4: Not used

Size: 1 byte*

4. Feedback beeps per second

Description: To configure the number of beeps per second. Every beep is fixed
about 10ms.

Default: 0x02

Param1: Number of beeps per second

Param2,3,4: Not used

Size: 1 byte*

5. The mode

Description: To configure the operating mode.

Default: 0x01

Size: 1 byte*

Param1: Mode 1: Normal operating mode.
Mode 3: Z-Wave chip is always on to request e.g. version or
manufacturer id.
Any mode other than 3. That value will be reported after a get but will
be handled in SW as mode 1.

Param2, 3, 4: Not used

6. RFID circuit startup time

Description:	The time (*10 ms) that the RFID circuit is started after home or away is pressed.
Default:	0x64 (100 * 10 ms = 1 s)
Size:	1 byte*
Param1:	The time * 10 milliseconds, minimum 0 seconds, maximum 2,55 seconds
Param2, 3, 4:	Not used

* If a size is other than given size the frame is ignored totally so configuration values are **not** changed.

class: 0x71 COMMAND_CLASS_ALARM_V2

In the *Tag Reader*, this command class has two purposes:

1. Identify the state of the tamper alarm. The device will send an unsolicited report to the devices in its association group if tampering is detected. The state of the tamper alarm can also be requested by any other device.
2. Report tags or codes that are entered. The *Tag Reader* will send an unsolicited report to the devices in its association group with the UID that belongs to the code or tag and whether the alarm system should be armed (Away) or disarmed (Home).

Every other alarm type that is requested will be ignored by application.

Configuration reset

The Tag Reader supports a configuration reset function. Configuration reset means:

- All configuration values are defaulted
- Wake up interval is defaulted

This function can be activated by sending a configuration set frame:

CONFIGURATION_SET

Parameter: 0x01
Size: 0x01 (can't be different from 1)
Value: 0xFF (can be any value except for 0x55)

When the value of configuration value is requested 2 possible values can be returned.

CONFIGURATION_REPORT

Parameter: 0x01
Value 0x55: Configuration settings of the device are altered.
The device will report this even if the configuration parameters are changed back to the default value.
Value 0xAA: Configuration of the device is untouched.
Note that this value will not change to 0x55 upon modifying the wake up interval and that re-setting the value to 0xAA will always reset the wake up interval.

Always awake mode

The always awake mode is used to request different values from the device e.g. version and manufacturer specific.

Note: in always awake mode the batteries will be drain very fast, we do not recommend to use this mode for a longer period. Always awake mode should only be used in order to configure the device.

Note: it is not possible to use the buttons of the *Tag Reader* while it is operating in always awake mode.

The always awake mode can be activated by:

CONFIGURATION_SET

Parameter: 0x05
Size: 0x01 (can't be different from 1)
Value: 0x03 (mode 3)

The LED of the device will toggle on and off every second to notify you that it is functioning in always awake mode.

The always awake mode can be deactivated by:

CONFIGURATION_SET

Parameter: 0x05
Size: 0x01 (can't be different from 1)
Value: Any value except 3

A second option to deactivate mode 3 is:

1. Remove batteries
2. Wait ca 10 seconds
3. Replace batteries

Sound notification

The *Tag Reader* is capable of playing a notification sound. This feature is typically used to notify a user that an alarm system is being activated. Since the *Tag Reader* is a non-listening device, the feature can not be controlled at all times. It requires the *Tag Reader* to wake up and send a Wake Up Notification.

After sending a notification that a tag/code is read (either an unknown or already configured code), the *Tag Reader* will send a Wake Up Notification.

The notification sound can be turned on/off upon receiving any Wake Up Notification. See the section about the Wake Up Command Class for information on when a Wake Up Notification is send.

Notification sound and acknowledgement

The *Tag Reader* supports three types of notification sound configurations:

1. Notification sound disabled (configuration parameter 2 set to zero)
2. Notification sound enabled (*default*, configuration parameter 2 set to auto-stop time).
3. Notification sound and acknowledgement enabled (configuration parameter 3 set to acknowledgement timeout).

In the first mode, any Basic or Switch Binary commands that are received are ignored.

The second mode, the default, can be used to inform a user that the alarm system is armed or disarmed. To use this, you can send a Basic or Switch Binary set on (0xFF) after receiving an Alarm Report and the Wake Up Notification following it.

The last mode can be used in situations where, for example, users can only disarm the alarm system at certain times. In this case, the user can be notified whether or not its code or tag is accepted.

By configuring configuration parameter 3, you can set an acknowledge timeout. Whenever a Lock/Unlock Alarm Report containing an UID is send by the *Tag Reader*, the acknowledgement timeout timer is started.

After this there are two possibilities:

1. The *Tag Reader* does not receive anything (or receives a Wake Up No More Information upon its Wake Up Notification). It starts the error sound to notify the user of the unaccepted code.
2. The *Tag Reader* receives either a Basic (or Switch Binary) on (to start the normal notification sound) or off (to silently acknowledge the code). The acknowledgement timer is stopped.

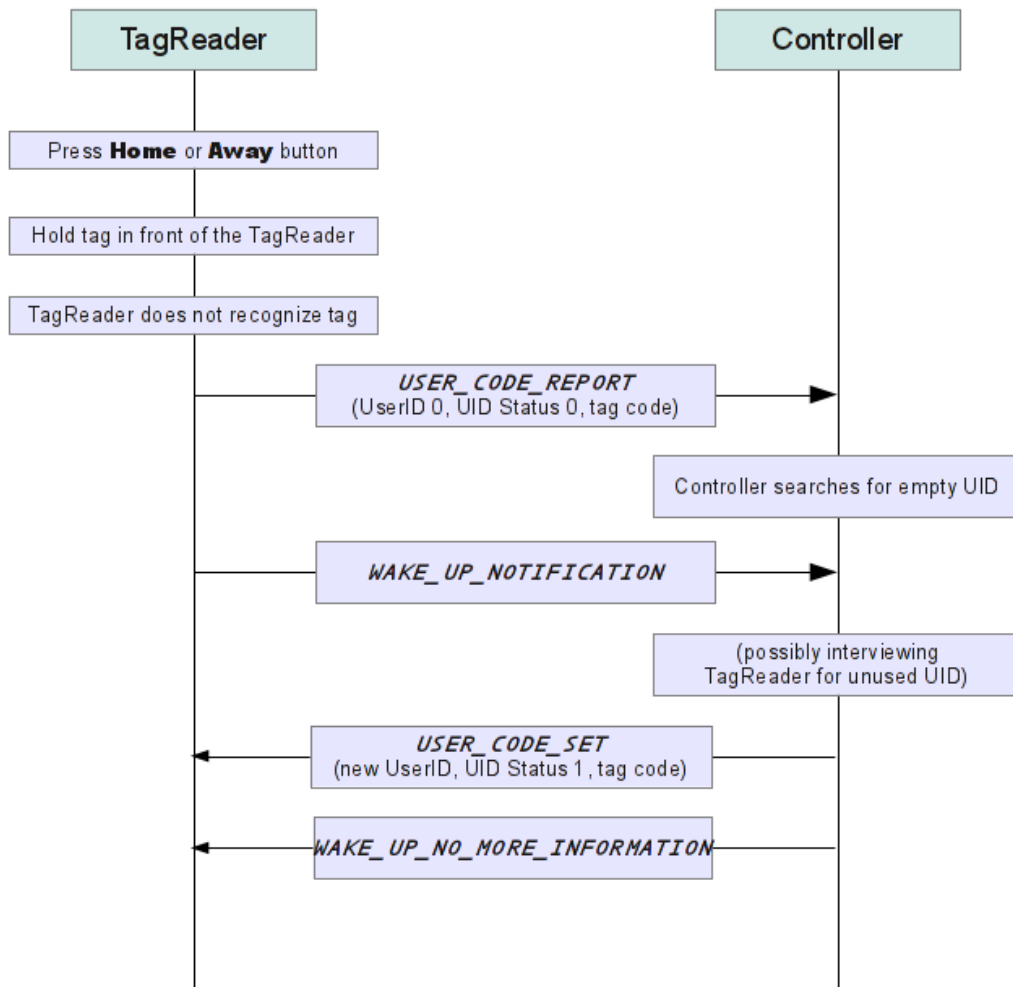
Note that it is actually possible to disable notification sound, but enable acknowledgement. In this case a silent acknowledgement can be both a Basic/Switch Binary on (0xFF) or off (0x00).

Typical operation diagrams

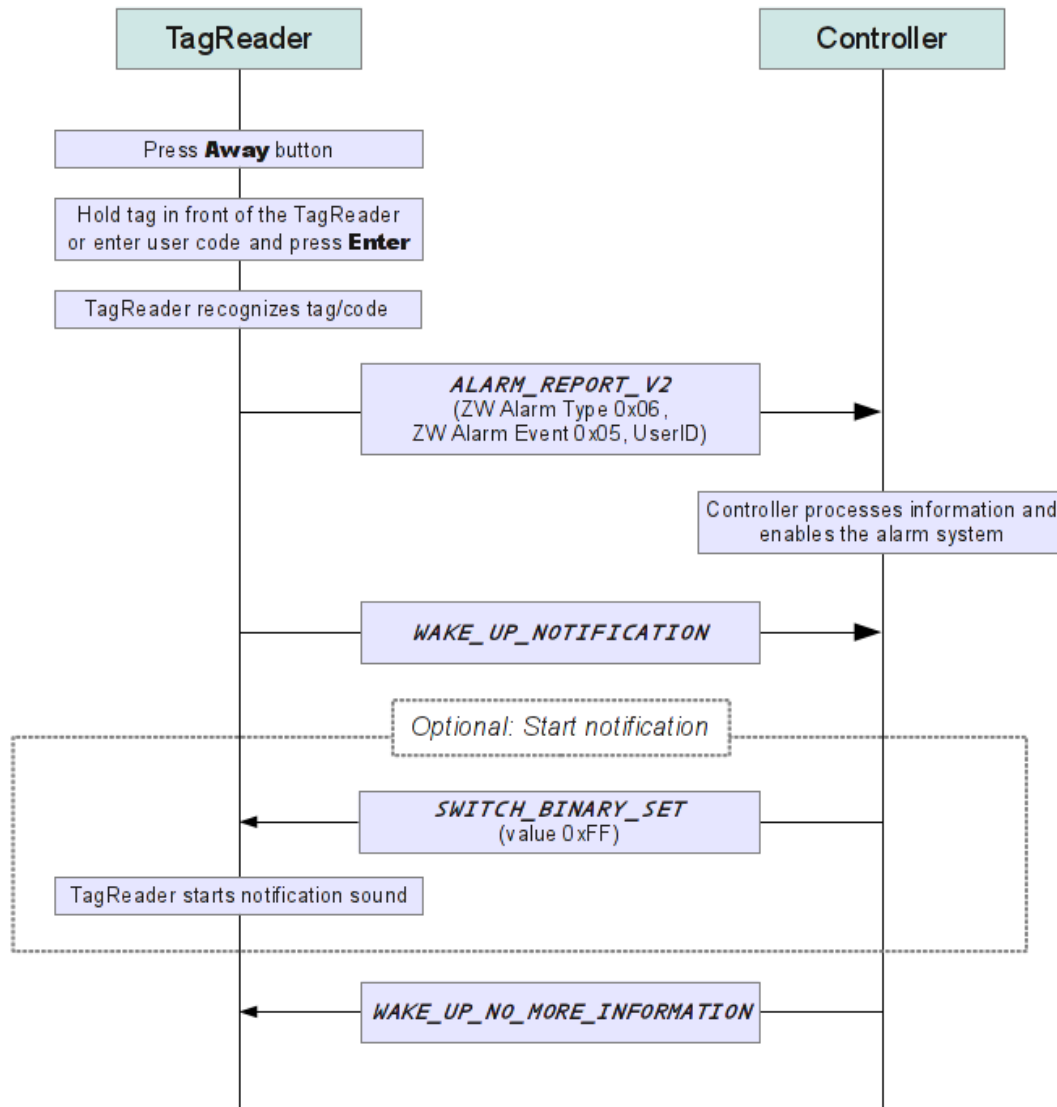
The following diagrams show the user action that is required and the messages which are being sent from/to the *Tag Reader* for several basic operations, including optional functionality as the sound notification and UID acknowledgement.

Configure a new tag

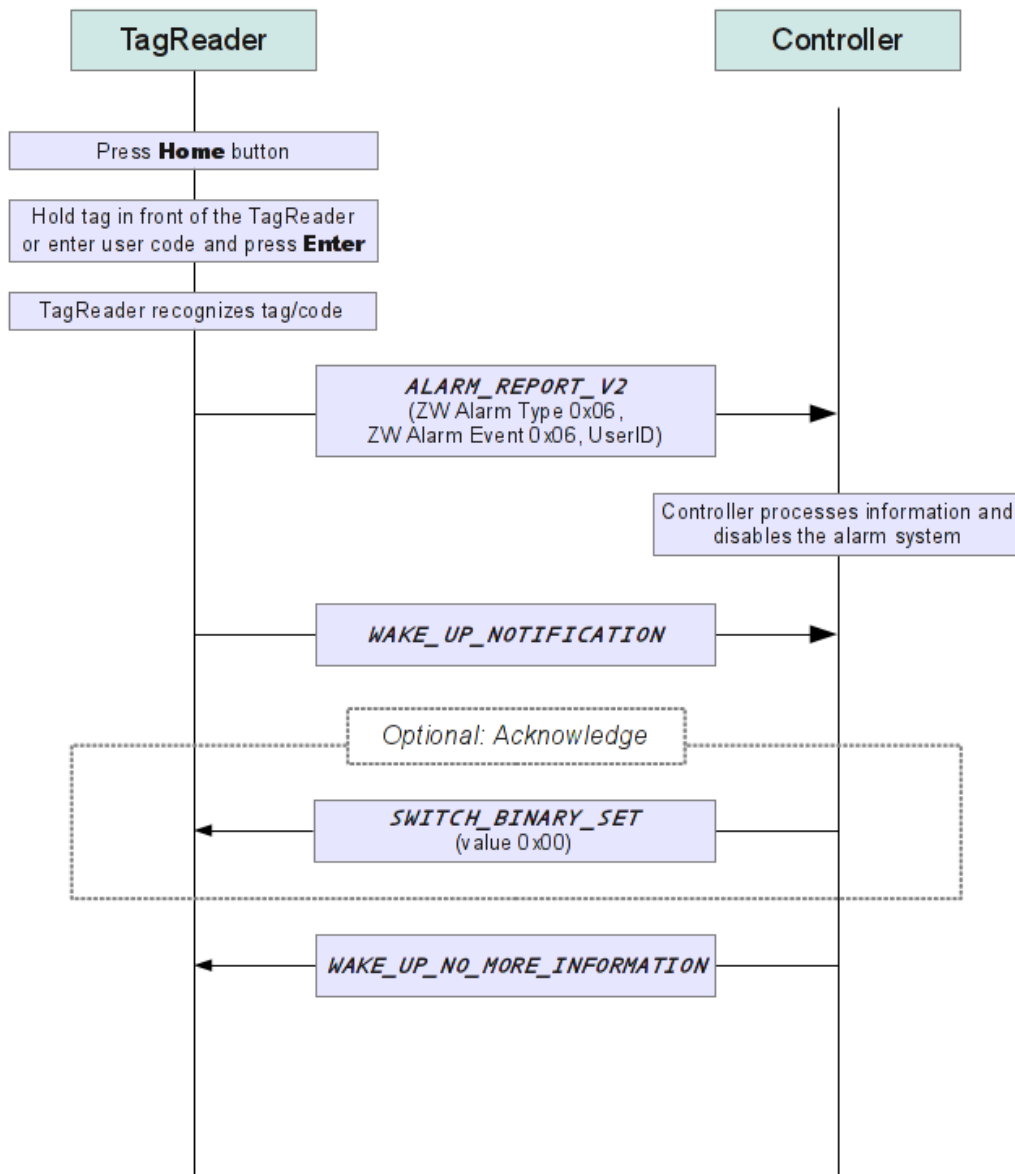
(For configuring new codes, you can skip directly to the WAKE_UP_NOTIFICATION).



Arm the alarm system



Disarm the alarm system



Example more explained

NOTE: If you readout the **Tag** for the first time you will receive a “UserCodeReport” (note the report is not ASCII but raw hex data).

With this user code you can configure an empty User_ID inside the Tag Reader with that TAG-code. The same way you can configure a manual user code (like home + 1,2,3,4 + enter), you will send a User_Code_Set to the User_ID.

Let me make an example.

You have a TAG (=from a customer called Paul) with hex raw value 0x8F086C2C500001000000 (according the usercode report). You will send this code back to the Tag Reader that you want to make a new user with User_ID= 1.

The next time that Paul will show the tag in front of the reader it will not send this user_code_report anymore because it recognizes that this is a valid user with User_ID=1. Now the Tag Reader will send an Alarm_Report_v2 with the User_ID=1 (to tell the controller that Paul entered his tag and pressed on button home (unlock) or pressed on away (lock)).

See the flowchart diagrams above.

This same trick will happen when you configure a manual user code inside the Tag Reader like (1,2,3,4 + enter) for this example you have configured this usercode_set 0x31323334000000000000 (ascii value 1,2,3,4 always fill it up with zeros to let it work) to a new user which will be User_ID=2

The next time you will enter home + 1234+enter the Tag Reader will report an AlarmReportV2 with Unlock alarm by user_id=2.

The controller will have to handle this alarm message and disable the alarm or active a special scene.

A short description of the alarmclass v2.:

class: 0x71 COMMAND_CLASS_ALARM_V2

In the Tag Reader, this command class has two purposes:

Identify the state of the tamper alarm. The device will send an unsolicited report to the devices in its association group if tampering is detected. The state of the tamper alarm can also be requested by any other device.

Report tags or codes that are entered. The Tag Reader will send an unsolicited report to the devices in its association group with the UID that belongs to the code or tag and whether the alarm system should be armed (Away) or disarmed (Home).

Every other alarm type that is requested will be ignored by the application.

Troubleshooting

Frequently Asked Questions

Q: Why doesn't the *Tag Reader* read tags?

- A:**
1. The device is not (correctly) included in a Z-Wave network. Include the device and try it again.
 2. Are you using the right tags? The supported protocols are ISO15693, ISO18000-3, Tag-it™.
 3. The batteries are so empty that the device cannot startup; it is advised to replace your batteries.
 4. The tamper switch is not fully or properly pressed. You should hear a clicking sound when the tamper switch is pressed in completely.

Q: The buttons don't work, even when the batteries are in.

- A:**
1. The tamper switch is not fully or properly pressed. You should hear a clicking sound when the tamper switch is pressed in completely.
 2. The batteries could be empty. Please put new batteries in and try it again.

Q: I can't have the *Tag Reader* included into my Z-Wave network, what am I doing wrong?

- A:**
1. Is the controller ready to include any device into the Z-Wave network? If the controller is not in Include or exclude mode, the *Tag Reader* will not be included or excluded.
 2. The *Tag Reader* is already included in a Z-Wave network. Exclude the *Tag Reader* and try to include it again.

Q: I have configured a value but when I request it, it is not changed?

A: It is mandatory that the correct size is used while configure a parameter; go to the documentation about the configuration command class to check if the right size is used during configuration. If the wrong size is used the frame is ignored totally.

Q: I have configured a new value and when I request it the correct value is returned but the behavior is still the same?

A: Some configuration parameters have limits of what they can do, go to the documentation about configuration to check if the value of the configured parameter is out off limit.

Q: When I mount the *Tag Reader* it performs its standard mounting routine but after 8 seconds the indicator light doesn't go on for one second but blinks 6 times.

A: Blinking 6 times can mean:

1. *Tag Reader* is not included
2. *Tag Reader* is not associated
3. *Tag Reader* can't reached his destination

If all three options are corrected, the *Tag Reader* will operate correctly and can be mounted again.

Q: What is the distance the tag can be read?

A: This is approximately one centimeter in front of the enter button of the *Tag Reader*.