

Aperio™ Online Quick Installation Guide

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1 Introduction

Purpose

The main purpose of this manual is to provide necessary information for a quick installation of Aperio Online based products using the Aperio Online Programming Application.

The manual is intended for installation personnel, project managers and people with similar responsibilities.

Scope

This quick installation guide covers a standard installation of a complete Aperio online system including communication hubs and locks/sensors.

For a complete description of all functionality and possible settings in an Aperio online installation, refer to the Aperio Online Programming Application Manual, ref [1]. This manual is applicable to version 2.6.4 of the Aperio Online Programming Application.

Applicable Products

This manual can be used for all versions of communication hubs.

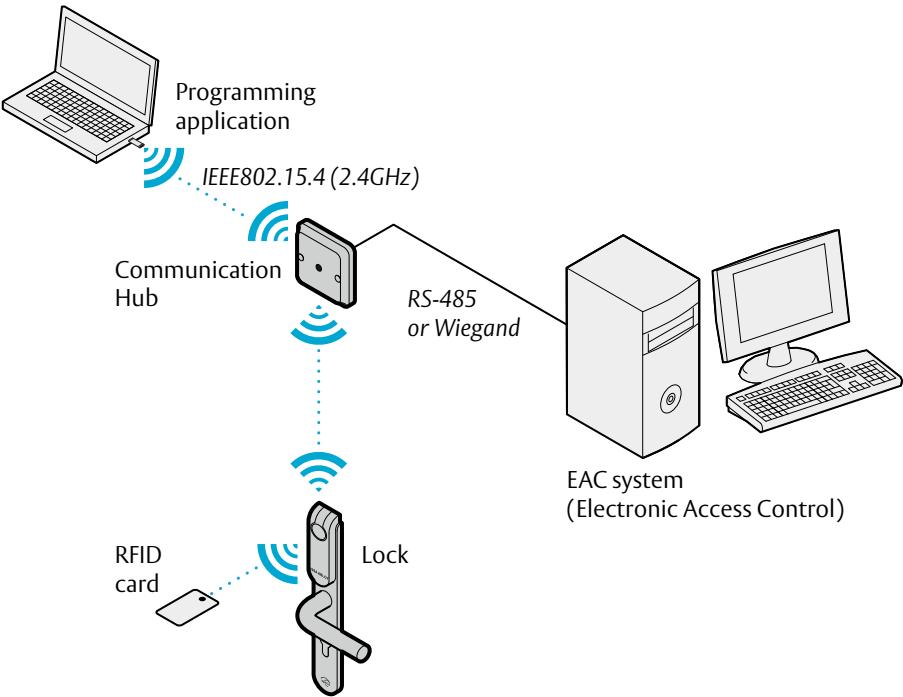
Abbreviations and Definitions

Abbreviation	Definition
EAC	Electronic Access Control. The system controlling access decisions.
DIP	Dual in-line Package. A manual electric switch used for settings on the communication hub.
RFID	Radio Frequency Identification. The credential technology used.

References

[1]	ST-001323-Aperio Online Mechanical Installation Manual
[2]	ST-001321-Aperio Online Programming Application Manual

Figure 1.
Aperio technology
overview



The Aperio system

The Aperio system is used in the following way: The user holds an RFID card in front of the lock. The lock sends card credentials wirelessly to the Communication Hub and the Communication Hub (wired through RS-485 or Wiegand) then communicates with an EAC (Electronic Access Control) system. The EAC system then makes the access decision. The decision is sent via the Communication Hub to the lock and access is granted or denied.

The Aperio Programming Application

The Programming Application is used for the configuration of a door installation. It is installed on a laptop. The laptop has an Aperio USB radio device connected to one of its USB ports. The USB radio device enables the application to connect via a Communication Hub to the door lock. The lock communicates via the Communication Hub either with the EAC or with the Programming Application. Read more in the Aperio Online Programming Application Manual.

Regulatory and security information

Refer to the Programming Application manual for regulatory and security information.

Communication hub versions and EAC interface

There are four communication hub types according to the table below:

Version	Interface	Maximum number of locks/units	
AH15	Wiegand/RS 485*	1	
AH20	Wiegand	1	
AH30	RS-485	8	1
		(EAC address 1-15)	(EAC address 15-63)

*) The firmware type loaded into the communication hub controls what interface is enabled.

3 Quick Installation of Aperio lock and Communication Hub

A quick installation of Aperio lock and communication hub starts with pairing the hardware. In some cases lock/communication hub are pre-paired from the factory. If not, pairing can be done in two ways:

- **Automatic pairing** – The communication hub automatically pairs with nearby Aperio lock/sensor.
- **Pairing with the Aperio Programming Application** – The pairing is manually performed, which gives access to detailed settings and encrypted communication.

Automatic pairing

Automatic pairing is obtained by setting the DIP Switch in Pairing mode (refer to the Mechanical installation manual/communication hub manual).



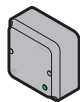
Automatic pairing will only be made with unpaired locks.



Communication hub and locks are often sold pre-paired from factory. If this is the case, the following pairing procedure is not necessary. However, configuration using the Aperio Programming Application is still needed.

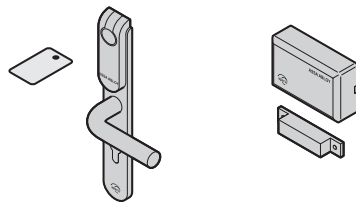
To perform pairing with communication hubs set in Pairing mode, do the following:

- 1) Power cycle the communication hub if necessary and check that the LED is constant yellow.



Pairing active  Yellow

- 2) Hold the credential in front of the lock to activate it, or engage the magnet for the sensor.



Result: Communication hub pairs with lock and indicates with one green flash.



Pairing succeeded  Yellow + one green flash

- 3) After successful pairing, power off the Communication hub.
- 4) Set the DIP switch 1-5 to desired RS-485 address (1-15 for communication hubs with one or several locks paired. 1-31 for communication hubs with one lock paired.)
This will also deactivate pairing mode. (For devices operating in Wiegand mode, set the DIP switch 5 to OFF, to turn off Pairing mode.)
- 5) Power the communication hub to start up for normal operation.



Locks/sensors and communication hubs that are paired with pairing mode will communicate in Manufacturer mode. It is required to activate Customer mode by using the Programming Application when finalizing, according to next section, to obtain encrypted communication.

Pairing with the Aperio Programming Application

The Programming Application is used to access detailed settings and encrypted communication (Customer mode) during the pairing process of locks/sensors and communication hubs.

Using the Programming Application also allows you to establish encrypted communication between locks/sensors and communication hubs. This is achieved with a customer key, obtained from your ASSA ABLOY supplier.

This chapter describes a complete installation, applicable for most EAC system using a standard configuration.

To communicate with communication hubs and locks/sensors through the Programming Application, you also need an USB Radio dongle. For installation of the Programming Application and the USB Radio dongle, refer to the Aperio Online Programming Application manual, ref [1].

Information of encryption key

To obtain secure communication between communication hubs and locks/sensors an Encryption key is used. This Encryption Key should be handled with the same care as the Master Key in a traditional Master Key System. A person with access to the Encryption key can gain unauthorized access to any Aperio door in the system. Once loaded into the Programming Application, it will be stored encrypted in a local database and should be erased from the hard drive. A copy should be stored safely.

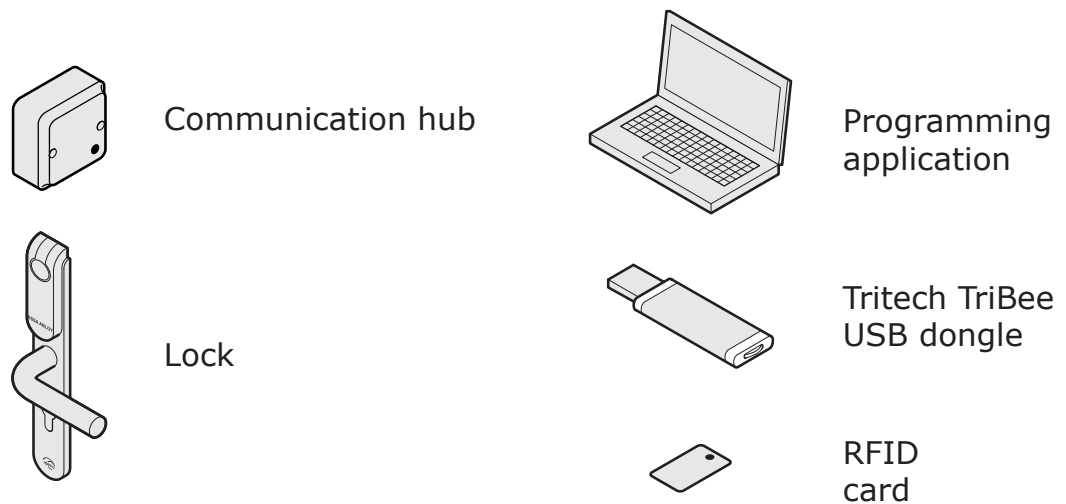


Proper handling of encryption keys is essential to lock/sensor security!

It is absolutely necessary to use the customer encryption key by setting all communication hubs and locks/sensors in Customer mode to ensure a secure and encrypted communication with the lock/sensor.

Checklist for pairing and configuration of locks/sensors and communication hubs

Figure 1.
Equipment needed.



A complete configuration includes the following steps:

- **Preparation:** Installation of software and powering the Aperio hardware.
- **Step 1:** making a door installation
- **Step 2:** scanning for communication hubs
- **Step 3:** pairing with locks/sensors
- **Step 4:** configuring locks and communication hubs: setting security mode, addressing mode, override credentials etc.
- **Step 5:** Apply saved configuration on several locks
- **Step 6:** testing after configuration

For some configurations a number of additional advanced settings can be necessary, such as:

- configuration of status and alarm messages,
- configuration of the radio communication.

These and a number of other advanced settings are described in the Aperio Online Programming Application manual, ref [1].



The quick installation process does NOT require that the EAC is connected to the Aperio hardware. Quick installation can be performed on hardware not yet mechanically installed.

Preparation before quick installation

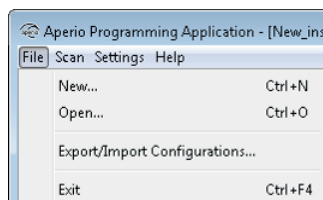
- Install the Programming Application and USB Radio dongle drivers on your laptop. Refer to ref [2], Aperio Online Programming Application manual for instructions.
- Make sure the communication hub is powered (8-24V) and that batteries are installed in the lock.

Step 1 - Making a new door installation

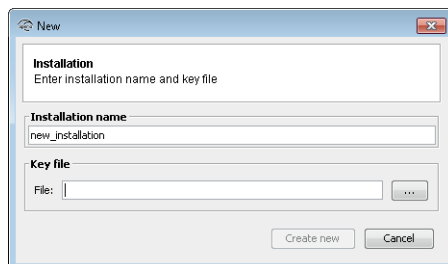
The first step is to create a new door installation, which will handle all the communication hubs and Aperio locks/sensors in the access control system.

Insert the USB Radio dongle and start the Aperio Programming Application.

- 1) Select *File–New* in the Programming Application.

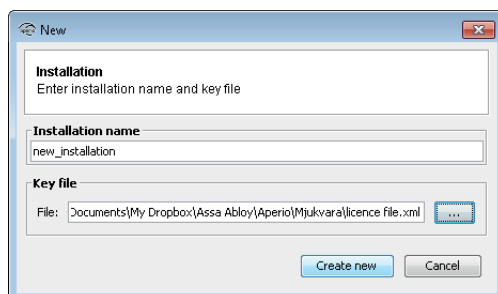


- 2) Enter a name for the installation and click the button in the *Key file* field to add the Encryption key.



- 3) Select the key file and click *Select*. (The xml-file (key file) containing the encryption keys should be delivered via encrypted e-mail or on a USB memory stick.)

- 4) Click *Create new*.



- 5) Enter a password of at least 8 characters for the door installation and confirm it. Click OK.

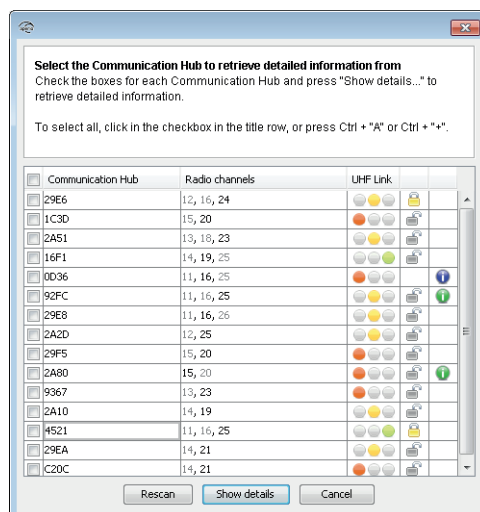


Step 2 - Scanning for Communication hubs

Follow these steps to scan for doors:

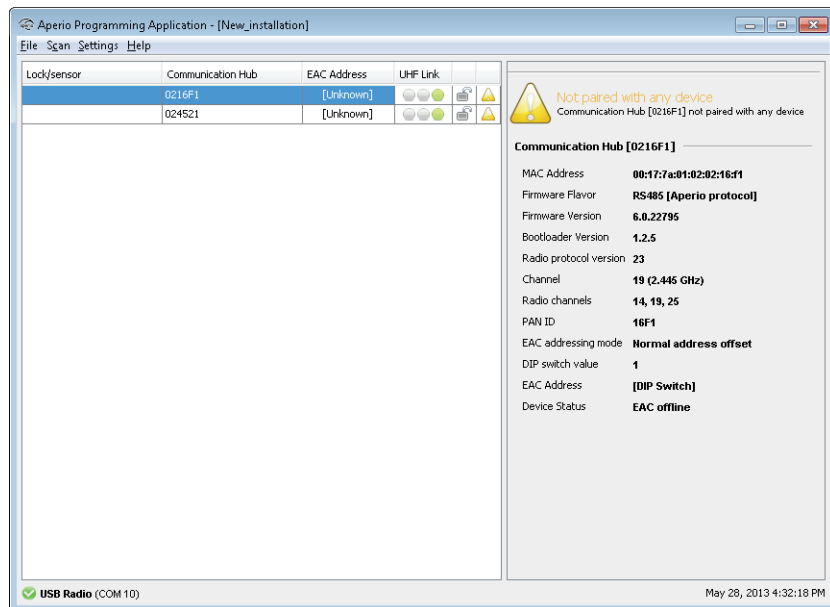
- 1) Select *Scan-Quick* scan to find communication hubs. (Or open a earlier created installation)

Result: All communication hubs within reach of the USB Radio device of your computer are displayed in the scan result table.



- 2) Locate a communication hub by the last four characters of the communication hub MAC address (ex. 01CF) in the scan result table. The same characters should be on a label on the cover of the communication hub. Click *Rescan* if the communication hubs that you want to configure are not shown in the list.

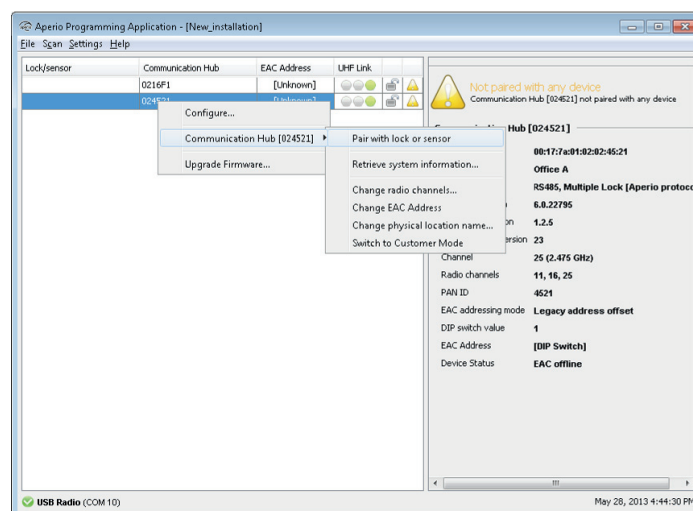
- 3) Select the communication hub(s) that you want to include in your installation. Click *Show details* to view detailed information in the installation view.



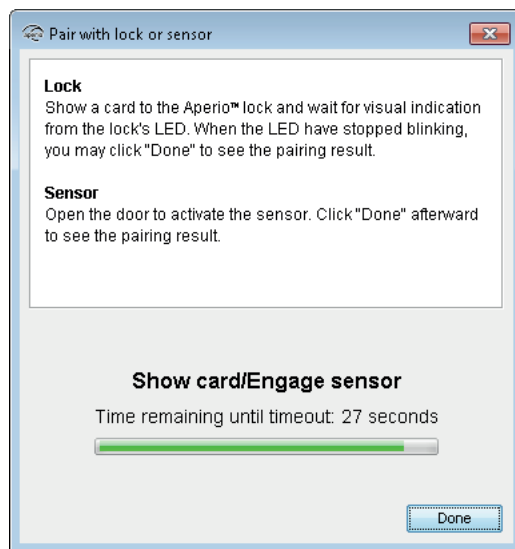
Step 3 - Pairing locks/sensors with communication hub

AH30 version of the communication hub can be paired with a combination of up to 8 locks/sensors. AH15/AH20 can manage one lock/sensor.

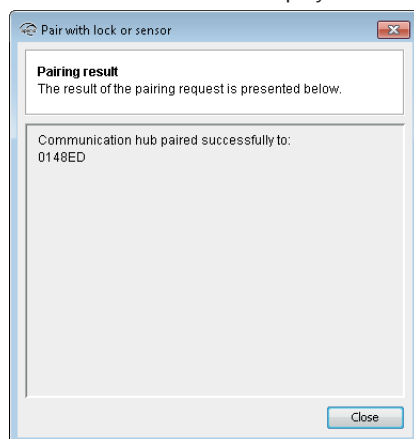
- 1) Right click and select *Communication hub - Pair with lock or sensor*.



- 2) The pairing process starts. Hold the credential at the lock, or engage the magnet for the sensor to pair the hardware with the communication hub.



- 3) When the lock has stopped blinking you can click *Done* to see the pairing result.
Result: The result is displayed.



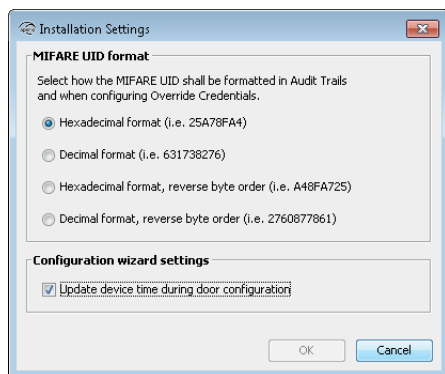
- 4) Repeat this pairing process for all communication hubs and locks/sensors within reach of the USB Radio Dongle.

Step 4 – Configuring locks and communication hubs Wizard

This procedure describes a configuration example of locks and communication hubs using: Override credential card, secure communication and DIP Switch addressing mode.

For other settings and addressing modes, refer to Aperio Online Programming Application manual, ref [1].

- Before configuration, check that Update device time during door configuration is activated. Enter the *Settings - Installation Settings* window.

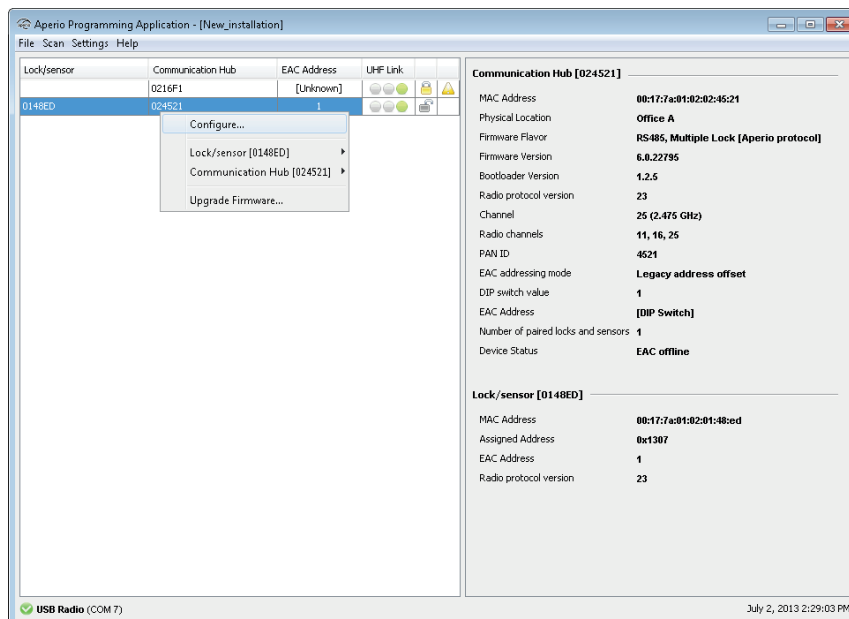


Follow the steps below to perform a default configuration of locks/sensors and communication hubs:

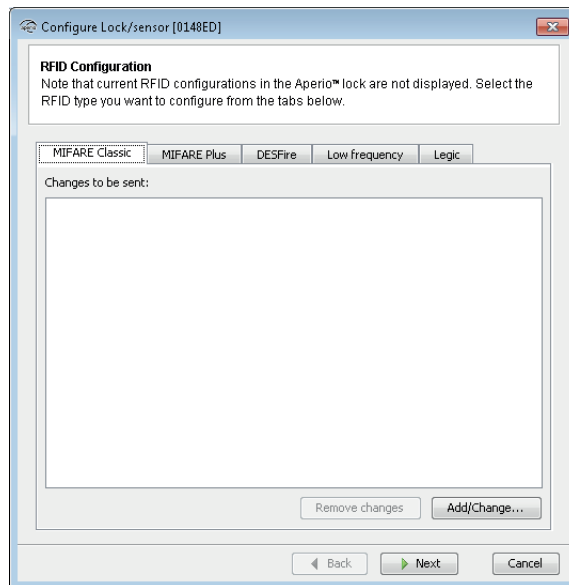


The changes you make during the update of the door configuration are not carried out until you perform the device update on the last page in the wizard.

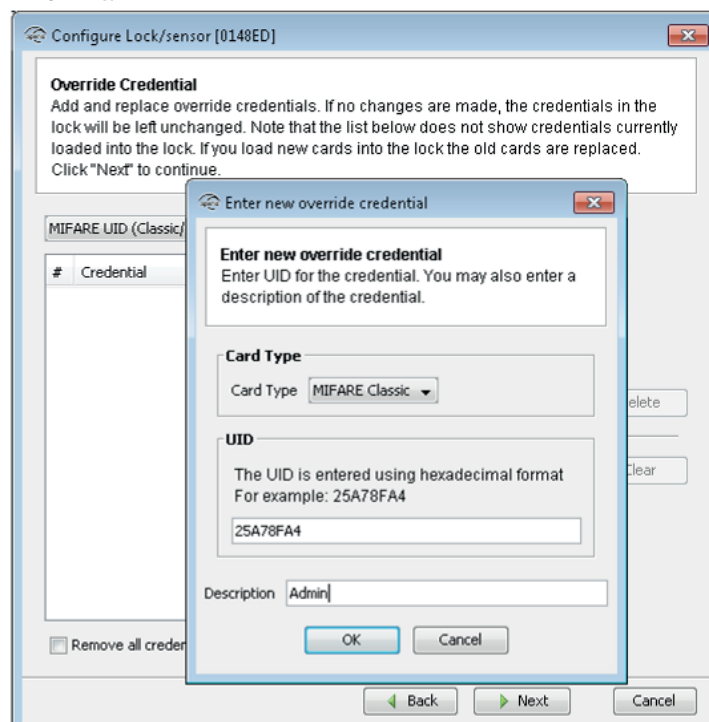
- 1) Select a lock in the scan result table, right click and select *Lock - Configure* (or *Lock/sensor - Configure* if several locks are paired).



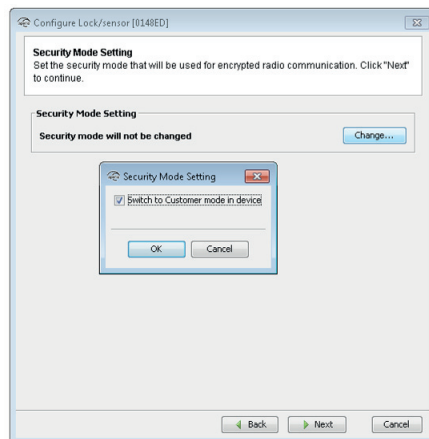
- 2) On the RFID Configuration page, click Next without any changes.



- 3) If advanced mode is activated the *Keypad configuration* page will appear. Leave without changes by clicking Next.
- 4) On the *Override Credential* page it is recommended to add a credential. Select the credential type in the drop down list and click Add and enter credential information (in this case MIFARE Classic UID). This credential can for example be used to gain access through all doors during installation and when the EAC is offline.



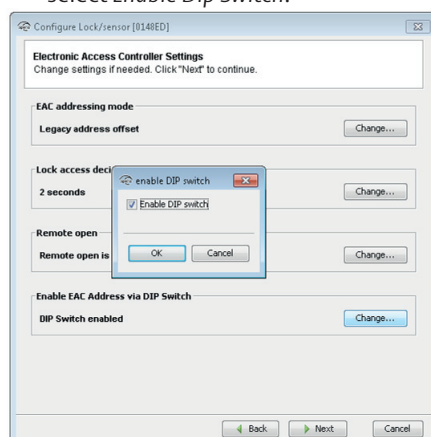
- 5) Click *OK* followed by *Next* in the Wizard main window.
- 6) On the *Security mode Setting* page, click *Change* to switch to *Customer mode* in both the lock and communication hub, to obtain secure communication using the Encryption key.



Proper handling of Encryption keys is essential to lock/sensor security!

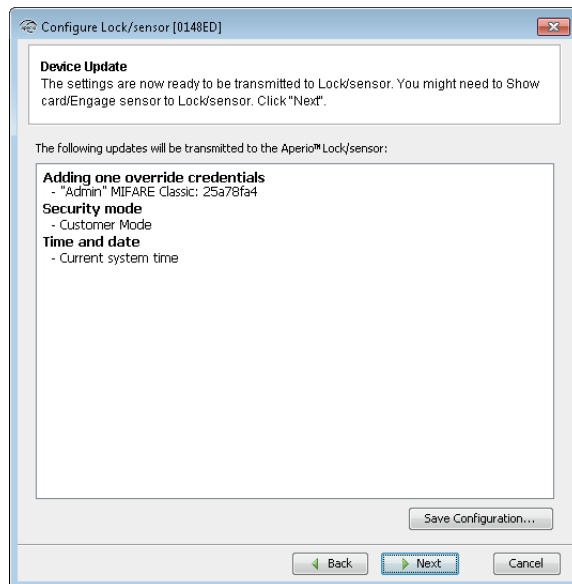
If the installation and first configuration is not performed correctly by setting all locks in customer mode, the radio communication will not be secure and the locks will therefore be vulnerable to intrusion attempts.

- 7) To enable secure communication using the encryption key, select *Switch to customer mode* in device, click *OK* and then *Next* in the wizard main window.
- 8) On the *Electronic Access Controller Setting* page, in the *Enable EAC Address via Dip Switch* field, click *Change* and select *Enable Dip Switch*.

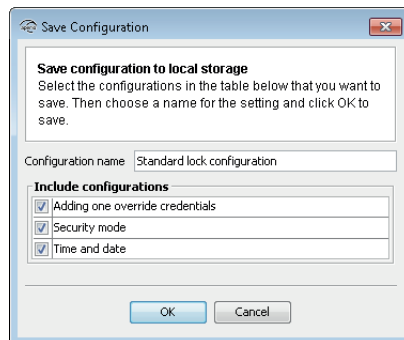


- 9) Click *OK* followed by *Next* in the wizard main window.
- 10) If advanced mode is activated the Advanced Settings and Advanced Lock/Sensor Settings will appear. Leave both pages without changes by clicking *Next*.

- 11) On the *Device Update* page, check that the summary of the configuration tasks that will be sent to the lock is correct.

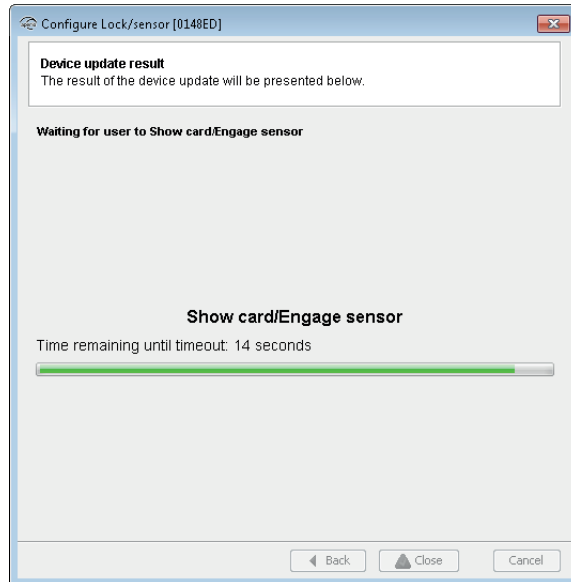


- 12) Click *Save configuration* to facilitate further lock configurations (for other hubs/locks) using the same communication hub. Enter a configuration name and click *OK*.

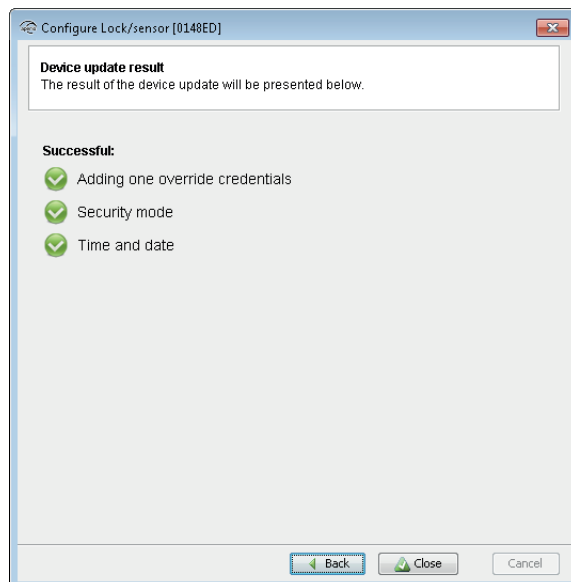


- 13) Click *Next* in the wizard main window to download the configuration to the lock.

14) If necessary hold the credential in front of the lock to activate the radio.



15) After successful update, click *Close*.

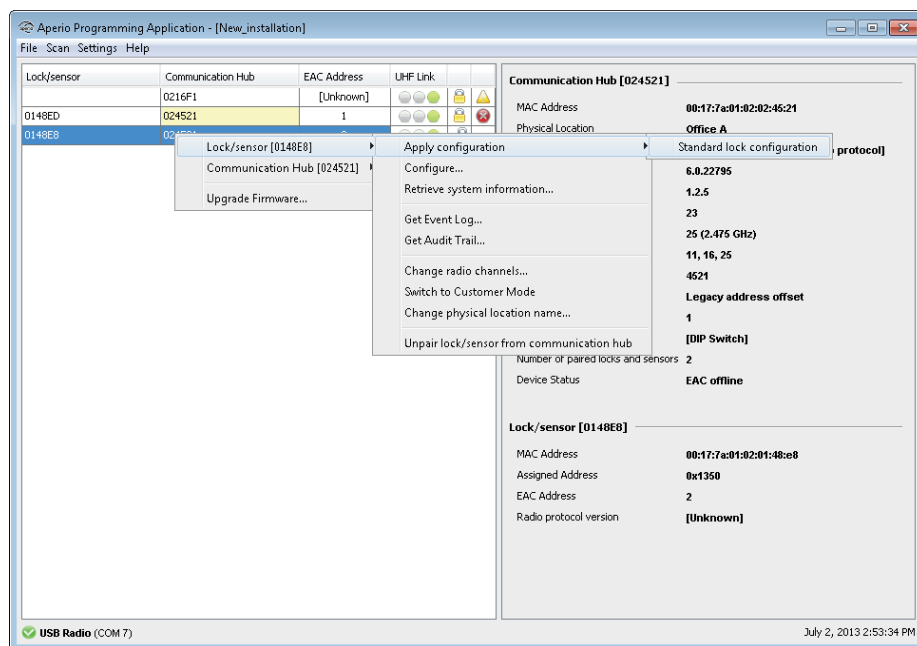


Using the wizard for a communication hub with only one lock paired, customer mode is set both for the lock and communication hub. For communication hubs with several locks paired a security conflict will appear.

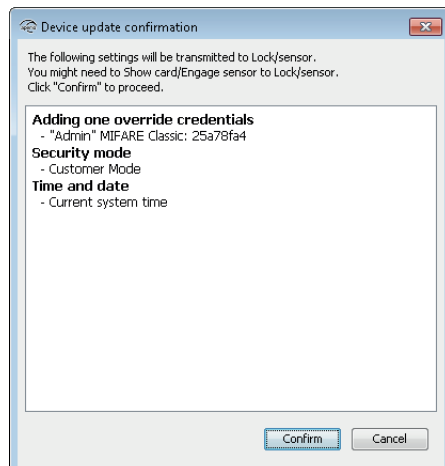
Step 5 - Apply saved configuration on several locks

If you have more than one lock that will use the same configuration you can apply the recently saved configuration on any lock in your installation.

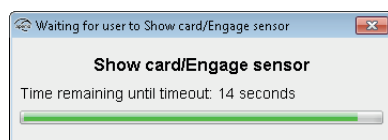
- 1) Right click on a lock and select *Lock/sensor – Apply configuration – [your configuration]*



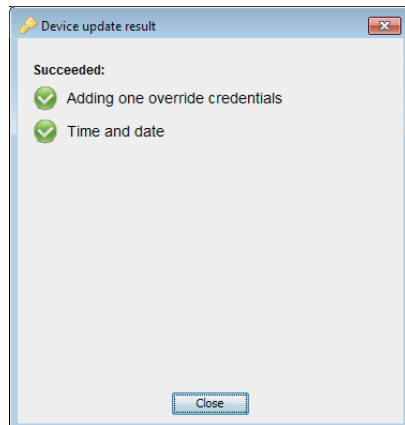
- 2) Confirm the update by clicking *Confirm*.



- 3) Hold the credential in front of the lock/sensor to download the configuration.

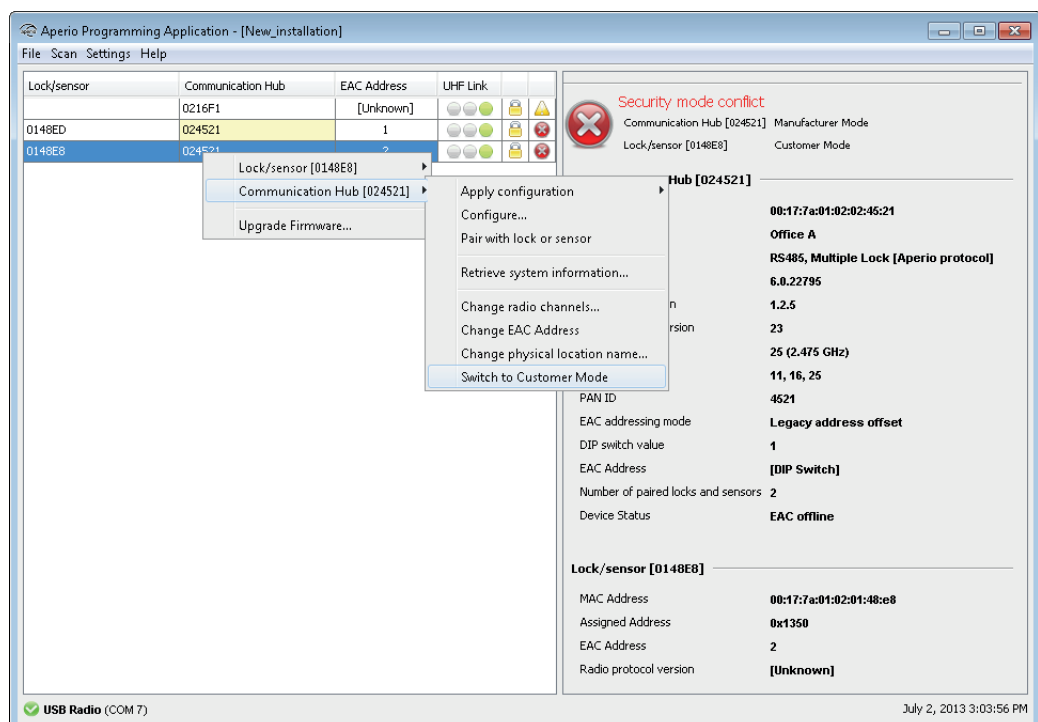


4) After successful update, click *Close*.



5) Repeat the configuration for all locks paired to the communication hub.

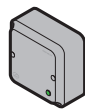
6) Finally activate customer mode for the communication on the right click menu, *Communication hub - Switch to customer mode*.



Step 6 - Testing after configuration

Follow these steps to test that the installation and first configuration of each communication hub and lock has been performed correctly and that the hardware is working:

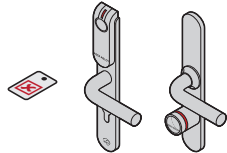
- 1) Check that the communication hub LED has a steady green light (if connected to EAC). This indicates that the installation and configuration have been performed correctly



Online  Green

- 2) Hold a credential, configured in the EAC, in front of the lock.

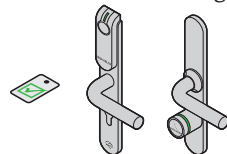
Result: Access is denied and the lock LED flashes red once.



Access denied,
EAC online  One red flash
(1 second)

- 3) Hold a credential, configured in the EAC, in front of the lock.

Result: Access is granted and the lock LED flashes green once.



Access granted,
EAC offline or online  One green flash
(1 second)

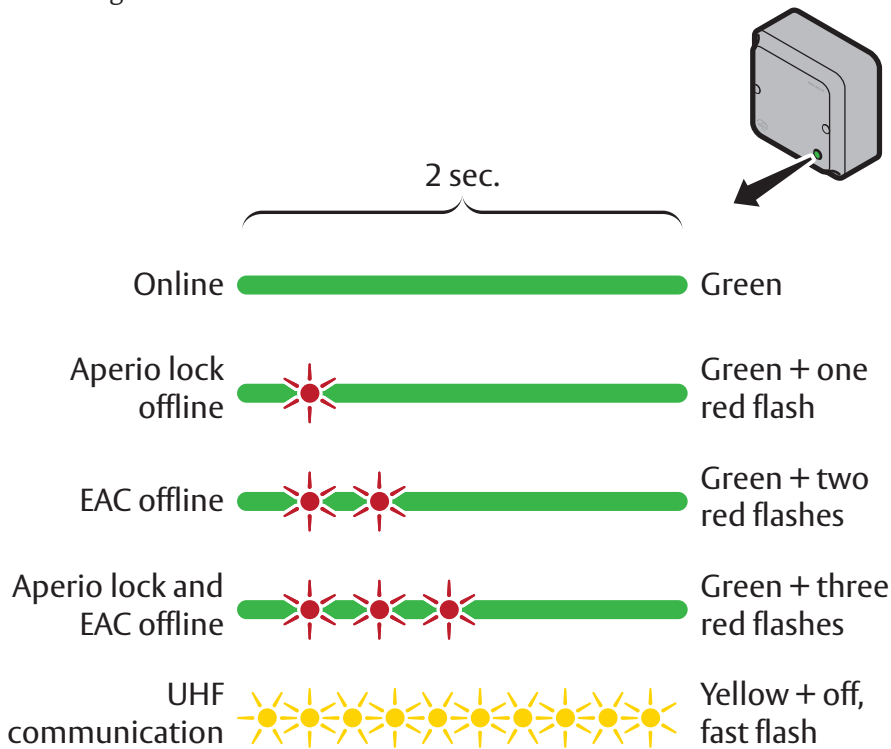
See next chapter for details on the LED indications for communication hub and lock.

4 LED Indications

Communication Hub LED indications

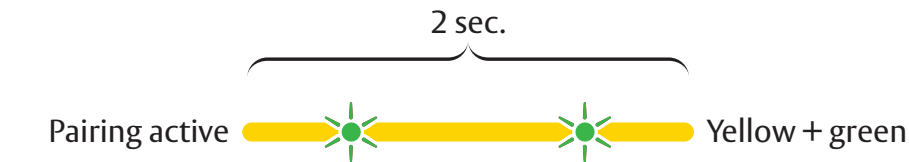
The communication hub has a single LED. It supports an optical scheme with red, green and yellow. The indication scheme is described by the two figures below:

Figure 2. Communication hub normal operation LED indication



Some special LED indication schemes are used during lock maintenance actions:

Figure 3. Communication Hub maintenance LED indication



Lock LED indications

The lock has three LEDs. They support an optical scheme with red, yellow and green. The indication scheme is described by the figures below:

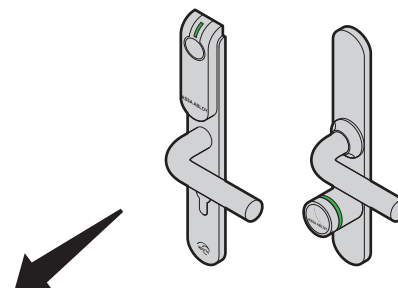


Figure 4. Lock normal operation LED indication

Card read (configurable)		One yellow flash (.25 second)
Access granted, EAC offline or online		One green flash (1 second)
Force closed in remote open/office mode		Five yellow flashes and one red flash (.25 second)
Busy blink, com hub busy with other locks		Continuous yellow flashes (.25 seconds every second)
Access denied, EAC online		One red flash (1 second)
Access denied, EAC offline		Three red flashes (.5 second each)
Lock mechanism is blocked when closing ²⁾		Continuous red flashes (.125 seconds every 1 sec.)



1) When the lock mechanism is blocked (lock jammed) the knob must be turned to release it.



2) The “Error in lock” indication is also shown instead of the POST flashes if the battery is not accepted as new after a power-on-reset.

Some special LED indication schemes are used during lock maintenance actions:

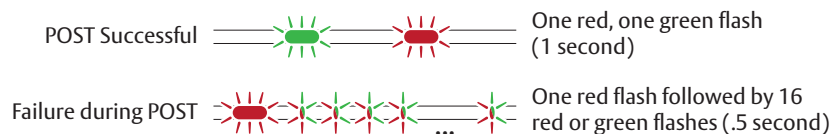
Figure 5. Lock hub normal operation LED indication

Enter configuration mode		Five yellow flashes (.125 second each)
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Lock self test LED indication

After replacing the battery, a Power on Self Test (POST) is performed. The result is indicated using a series of red and green LED flashes as is described by the figure below:

Figure 6. Lock POST LED indication



The first flash is always red. If the POST fail, the color of the 16 trailing flashes indicate the status of each individual test as described by the following table:

Blink	Meaning if red	Code in event log
2	Main board firmware corrupt	0x0001
3	Override list corrupt	0x0002
4	Production data corrupt	0x0004
5	Security data corrupt	0x0008
6	Configuration data corrupt	0x0010
7	Load Circuit Error	0x0020
8	Configuration data corrupt 2	0x0040
9	Secure Area Encryption Key error	0x0080
10	Secure Area Motor error	0x0100
11	Secure area communication error	0x0200
12	Secure area memory corrupt	0x0400
13	Secure area sensor or motor error	0x0800
14	Radio modem communication error	0x1000
15	Radio modem memory corrupt	0x2000
16	Radio modem configuration error	0x4000
17	Radio modem RF circuit error	0x8000



If the battery is not accepted as new after a power on reset, no POST is performed, instead the 10 quick red flashes used to indicate “Error in lock” is shown.

5 Troubleshooting

The tables below shows possible problems when using the Aperio technology, and how to solve them:

During door installation and update

Problem indication	Cause	Action
Not possible to pair communication hub and lock/sensor	<ul style="list-style-type: none"> You are using a credential configured as an override credential. The lock/sensor and the hub are on different radio channels. 	<ul style="list-style-type: none"> Use a credential that is not on the override credentials list. Check the radio channel settings for the lock/sensor and the hub so that they match.
Not possible to use override credentials	No default override credentials are configured for the installation.	Add the credentials one by one in the door configuration wizard.
The device update fails	You have not shown the credential to the lock within 30 seconds.	Perform device update again and show the credential to the lock within 30 seconds.

During scanning

Problem indication	Cause	Action
The communication hub and lock/sensor are not found when scanning = no connection between the Programming Application/laptop and the communication hub	<ul style="list-style-type: none"> All channels are busy. The communication hub is not working. The communication hub is not powered. 	<ul style="list-style-type: none"> Repeat the scanning process by selecting <i>Scan /Scan all</i>. Change the radio channel. See the Programming Application manual ref [1].
None or not all of the communication hubs are found when scanning	<ul style="list-style-type: none"> The communication hub(s) are out of range. The communication hub(s) are not powered. Too many communication hubs are using the same channel. ^[1] 	<ul style="list-style-type: none"> Repeat the scanning process by selecting <i>Scan /Scan all</i>. Change the radio channel. See the Programming Application manual ref [1]. Temporary reduce the number of powered up Hubs within radio range during configuration.
n/a is shown for the installation in the communication hub field and in the Lock/sensor field of the scan result table	<ul style="list-style-type: none"> The communication hub and/or communication hub paired with a lock/sensor belongs to another installation and has another encryption key. The lock/sensor is not paired with the communication hub. 	<ol style="list-style-type: none"> Switch installation or create a new installation with the correct encryption key. Pair the lock/sensor and communication hub in the Configure door wizard of the Programming Application.
Unstable communication between communication hub and lock/sensor even though the MAC address is displayed at scan.	<ul style="list-style-type: none"> A probable cause is bad radio conditions or limited radio range. 	<ul style="list-style-type: none"> Try moving the USB radio closer to the communication hub or moving the USB radio to a higher location. Either by moving the laptop or by using an A-A USB extension cable to distance the USB radio from the PC.

^[1] Aperio Hubs are default configured to select the best channel out of three possible, if the selected channel is disturbed a new channel selection will be done automatically. Communication hubs in an Aperio system normally distribute themselves on different channels but a synchronized power up of all Hubs may cause them to initially choose the same channel. (Note that this problem does not affect performance of already installed and paired lock/cylinders/sensors and Hubs, only Programming Application scan functionality is affected)

During configuration

Problem indication	Cause	Action
The program application reports an update failure. The device does not support the desired configuration.	<ul style="list-style-type: none"> The firmware on the device is outdated. 	<ul style="list-style-type: none"> Check the current firmware on the device and perform an upgrade if needed. Also check the intended new configuration.

During normal operation

Problem indication	Cause	Action
The communication hub LED is flashing red once = no connection between the lock/sensor and the communication hub	<ul style="list-style-type: none"> The lock/sensor and communication hub are not paired. The lock/sensor and the communication hub have different channel masks. The battery of the lock/sensor has run out. 	<ul style="list-style-type: none"> Repeat the scanning process by selecting <i>Scan /Scan all</i>. Pair the lock/sensor and communication hub in the Configure door wizard of the Programming Application. Change the radio channel. See the Programming Application manual, ref [1]. Change the battery of the lock/sensor. See the Programming Application manual, ref [1].
The communication hub LED is flashing red twice = no connection between the EAC system and the communication hub	<ul style="list-style-type: none"> The EAC address is not properly configured in the communication hub. The EAC system is not properly configured. 	<ul style="list-style-type: none"> Configure the EAC address. Refer to the Aperio mechanical installation manual.
Unstable radio communication between lock/sensor and communication hub	<ul style="list-style-type: none"> Poor radio link quality. The lock/sensor and the communication hub have different channel masks. 	<ul style="list-style-type: none"> Change the radio channel. See the Programming Application manual, ref [1].

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