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Certification Exhibit

**FCC ID: U4A-AHGUHF00
IC: 6982A-AHGUHF00**

**FCC Rule Part: 15.247
IC Radio Standards Specification: RSS-210**

ACS Report Number: 10-0344.W06.11.A

**Manufacturer: Assa Abloy
Model: AH13**

Manual

Aperio

Hub

Installation & Integration Instructions

WFMN5A
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FCC Statement:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is Connected.
- Consult the dealer or an experienced radio/TV technician for help."

Industry Canada:

This Class B digital apparatus meets all requirements of the Canadian Interference Causing Equipment Regulations. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Cet appareillage numérique de la classe B répond à toutes les exigences de l'interférence canadienne causant des règlements d'équipement. L'opération est sujette aux deux conditions suivantes: (1) ce dispositif peut ne pas causer l'interférence nocive, et (2) ce dispositif doit accepter n'importe quelle interférence reçue, y compris l'interférence qui peut causer l'opération peu désirée.

Warnings:

Changes or modifications to this device not expressly approved by ASSA ABLOY could void the user's authority to operate the equipment.

"This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter."

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Chapter 1: Technical Specifications

- Radio standard IEEE 802.15.4
- Wireless Frequency Range
 - 2400 – 2483.5MHz 16 channels (11-26)
 - (11-25) US only
- Receiver Sensitivity
-100dBm 20% PER
- Wireless Transmit Power 10dBm/MHz
- Wireless Operating Range in office environment
Indoors - up to 50 feet (15m)
- Internal Antenna
Two cross polarized dipoles
- IP Classification: IP20
- Electronic Requirements
 - Input Voltage: 8-24 VDC
 - Current 250mA
- External Antenna
 - One reverse polarity SMA external antenna connector. AH20 or AH13/AH30 is certified to be used with external antenna AH-ANTENNA-1. If other external antenna should be used than AH-ANTENNA-1 from ASSA ABLOY, the antenna should be of same type (dipole) and not have larger antenna gain than 3.9dBi.
 - If coaxial cable need to be connected to AH20 or AH13/AH30 plastic SMA extender AH-COAX-1 will be required to tighten the coaxial cable SMA connector to AH20 or AH13/AH30 SMA connector.
- Operating Temperature
5°C to 35°C
- Humidity
95% maximum (non-condensing)
- Safety and Emissions
 - FCC 47CFR Part 15 subpart B and subpart C
 - IC RSS-210
 - EN ETSI 301 489-17 v2.1.1

Chapter 2: System Overview

Introduction

This manual supports installation personnel, project managers, and individuals with similar responsibilities when installing and configuring Aperio technology version 2.3.0 and later.

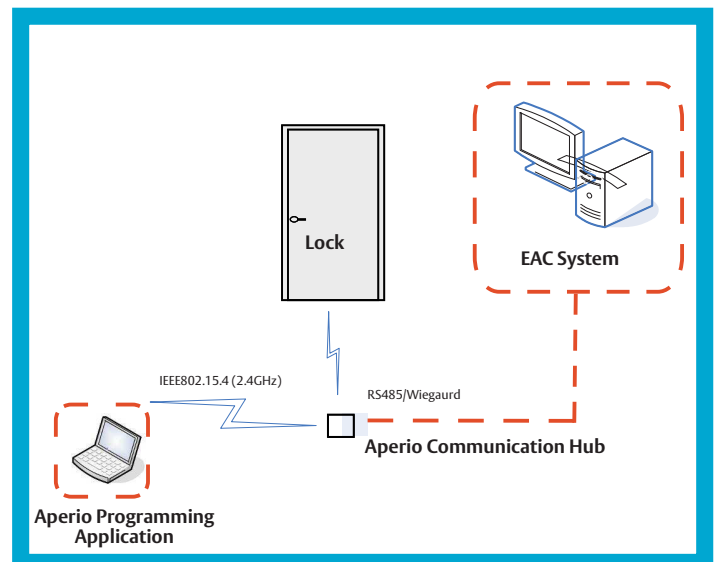
System Description

When a user presents a supported credential to the lock the Aperio system is designed to send the credential wirelessly to the Communication Hub. The Communication Hub (wired through RS-485 or Wiegand) then communicates with an EAC (Electronic Access Control) system. The EAC system provides the access decision to the Communication Hub where access to the lock is either granted or denied.

The Aperio Programming Application

- A PC, running on Windows Vista, Windows XP or Windows 7 and USB2.0
- Java runtime environment version 6 or later
- USB radio with the latest firmware

Figure 1. EAC System



Chapter 3: Install the Communication Hub

Instructions

Placement of the Hub

Note: Note: It is recommended to always verify the radio link quality. To do so see **WFMN4A Aperio Programming Application Instructions** for more information.

For a stable and reliable radio link it is recommended that the distance between the lock and the Communication Hub is limited to 15 feet (5m). However, under good conditions (free air between the units and limited radio interference from other transmitters) it is sometimes possible to increase the distance to 35-45 feet (10-15m). Under poor conditions (heavy radio interference, etc.) it may be necessary to keep the distance between the lock and the Communication Hub well below 15 feet (5m). There is no minimum distance. If suitable, several Communication Hubs can be positioned together as long as the Hub-to-Hub distance is 1 foot (.2m) or more.

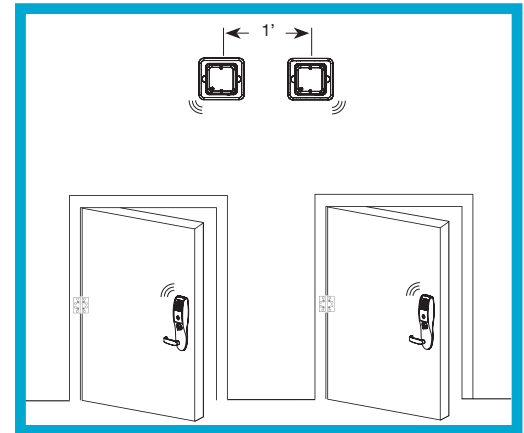


Figure 2. Placement of Communication Hub

Typically, the LED on the Communication Hub cover should “point” to the lock.

- The Communication Hub should be placed on the non-secure (key or card) side of the door. Shorter distance and “light” materials in the walls permits placement on opposite sides.
- Be aware of that metallic sheet or mesh will attenuate the radio signal. Inner ceiling is, for example, sometimes covered with foil or metallic mesh.
- Mirrors and larger metallic objects (like cable ladders) should be kept at least 1 foot (2m) away from lock or Communication Hub.
- WiFi / WLAN routers and other radio transmitters operating in the 2.4 GHz band should be kept at least 11-12 feet (3-5m) from the Communication Hub and lock.
- Other possible sources of interference include microwave ovens, electric motors and other high power electrical equipment. Keep at least 8-10 feet (2.5m) distance between the Communication Hub and lock.

AH20 Integration (Wiegand)

AH20 DIP Switch Configuration

The AH20 Communication Hub communicates to the EAC System through Wiegand data and dry contacts. To connect follow these steps:

1. Set configuration options on DIP switch (S101)
2. Connect the Wiegand signals and dry contact outputs to the EAC System (J100 and J103)
3. Connect to the supply voltage by wiring 8 to 24 V (positive voltage) and GND (ground).

Note: The Communication Hub must be powered with a voltage between 8 VDC and 24 VDC. If communication is established, the LED will have a steady green light.

DIP switches 1-9 in the “OFF” position on the Communication Hub yield a default Wiegand configuration that is compatible with most EAC systems. But better performance and increased functionality can result from a customized configuration.

DIP 1: Controls use of RED LED signal to deduce Access Space Decisions.

ON: RED LED signal input is used.

OFF: RED LED signal input is ignored.

- If a signal is available that asserts access denied decision from EAC. ENABLE DIP 1 “ON” and attach signal to J100, RED.
- If EAC system does not have RED LED output, only GREEN or does not use LED outputs to assert access decisions, DIP 1 should be disabled “OFF”. Use lock relay output or similar EAC output (J100 GREEN) instead.
- Local override cards **should not** be used in conjunction with DIP 1 disabled (“OFF”) as this configuration may produce an access denied based on a time out.

DIP 2: Reserved for future use.

DIP 3: Controls addition of parity bits if required:

ON: Addition of parity bits ENABLED.

OFF: Addition of parity is DISABLED transmitted as received.

- When enabled, addition of one even parity bit (before) and one odd parity bit (after) is applied to the actual credential.
- Typically parity bits are already included in the credential. In this case when DIP 3 is disabled (“OFF”) transmitted credential may include parity.

DIP 4: Controls byte orders of transmitted credentials.

ON: The byte order is reversed compared to what is received as input to the Hub Wiegand EAC interface component.

OFF: The byte order is left as is.

- This setting is ignored as input to the hub in the case of the credential length does not make complete bytes
- The byte order received as input to the hub in the case of a 32 bit MIFARE UID credential is UID[3], UID[2], UID[1], UID[0]. This means that the byte order is already reversed earlier in the chain compared to the order specified in RFID interface standard ISO 14443-3.

DIP 5: Used for “Pairing Mode”.

ON: Pairing mode active.

OFF: Normal use.

- When enabled/active the next time an unpaired lock attempts to pair, it will be paired with the hub. For unpairing the APA tool must be used. Reboot the hub for changes to take effect.

DIP 6-9: Unused in AH-20

DIP 10: Controls use of external antenna if required.

ON: Selects use of internal antenna.

OFF: Selects use of external antenna.

AH20 DIP Switch Configuration Table

This section provides a quick reference to DIP switch configurations for AH20 to the EAC system at use of a Wiegand interface.

DIP SWITCH NUMBER	LABEL	DESCRIPTION
1	A0	Controls use of LED Red signal to deduce access decision. ON => LED Red is used. OFF => LED Red is ignored.
2	A1	Set to OFF by default. Reserve for future use.
3	A2	Controls addition of parity bits if required. ON => Addition of parity bits is enabled. OFF => Addition of parity is disabled. Credentials are transmitted as received.
4	A3	Controls byte order of transmitted credentials. ON => The byte order is reversed compared to what is received as input to the Hub Wiegand EAC interface component. OFF => The byte order is left as is.
5		Used in "Pairing Mode". ON => Starts in pairing mode. OFF => Normal use.
6-9	A4	Not used.
10	INT/EXT	Internal/External Antenna Use, ON = Internal

Connections for AH20 (J100)

Communication Hub hardware version AH20 has four Wiegand signals plus ground. The purpose and connection of these signals are described in the table below.

HUB CONNECTOR DESIGNATION	DESCRIPTION	CONNECTION
DATA 1	Wiegand Data 1 signal. Output from Communication Hub. Used to transmit credentials.	Connect to Wiegand Data 1 on EAC system.
DATA 0	Wiegand Data 0 signal. Output from Communication Hub. Used to transmit credentials.	Connect to Wiegand Data 0 on EAC system.
RED	Wiegand RED LED signal. Input to Communication Hub. Used to deduce an access decision.	Connect to Wiegand RED LED output on EAC system. Leave unconnected if DIP switch 1 is selected "OFF".
GREEN	Wiegand Green LED signal. Input to Communication Hub. Used to deduce an access decision.	Connect to Wiegand Green LED output on EAC system. See DIP 1 on previous page for alternate instructions.
GND	Ground	Connect to EAC System ground.
8-24 VDC	8-24 VDC	

Connections for AH20 (J103)

On the AH20 four form C relays are available. The purpose of the four relays is to perform Wiegand communication with an EAC System. The relay contacts are labeled and specified as:

NCL: Normal Closed

COM: Common

NOP: Normal Open

Relay 1: DPS

Relay 2: RX

Relay 3: Battery Alarm Output

Relay 4: Tamper Alarm Output

Note: Tamper output energized by default, all other outputs are de-energized by default.

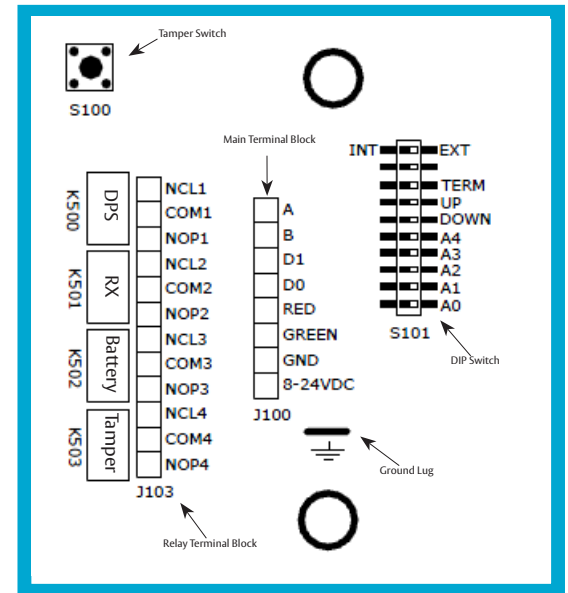


Figure 3. AH20 Connectors

Tamper Switch (AH20)

The tamper switch will be activated if AH20 is removed from its bottom cover or plastic adapter plate. If mounting to other than the plastic adapter plate as shown in the adapter plate installation instructions it is necessary to align the tamper switch with a special tamper tower post. See instructions provided with the optional mounting box.

AH13/AH30 Integration (RS485)

The AH13/AH30 Communication Hub communicates with the EAC System through RS485. To connect follow the below steps:

1. Set configuration options on DIP switch (S101).
2. Connect the RS485 signals to the EAC System (J100).
3. Connect to the supply voltage by wiring the 8 to 24 V (positive voltage) and GND (ground) terminal.

Note: The Communication Hub must be powered with a voltage between 8 VDC and 24 VDC. If communication is established, the LED will have a steady green light.

AH13/AH30 DIP Switch Configuration

DIP 1-DIP4: Controls RS485 addressing BIT 0-BIT 3.

ON: Address bit set.

OFF: Address bit NOT set.

- Addresses “1” to “15” are available using dip switch configuration.
- Each Communication Hub connected to the same RS485 bus must have a unique RS485 address.
- An address of “0” disables the EAC interface of the Communication Hub **DO NOT** use this configuration for normal installations. It also sets the Communication Hub in constant pairing mode.
- See RS485 Addressing Reference on Page 9.

DIP 5: Not used.

DIP 6: Controls use of RS485 pull down resistor.

ON: 620 Ohm pull down connected /enabled.

OFF: 620 Ohm pull down disconnected /disabled.

DIP 7: Controls use of RS485 pull up resistor.

UP: 620 Ohm pull down connected /enabled.

DOWN: 620 Ohm pull down disconnected /disabled.

DIP 8: Controls use of termination resistor between RS485 A and RS485 B.

ON: 100 Ohm connected /enabled.

OFF: 100 Ohm disconnected /disabled.

DIP 9: Not used.

DIP 10: Controls use of external antenna if required.

ON: Selects use of internal antenna.

OFF: Selects use of external antenna.

AH13/AH30 DIP Switch Configuration Table

DIP SWITCH NUMBER	LABEL	DESCRIPTION
1-4	A0	Controls RS485 addressing BIT 0-BIT 3.
	A1	ON => Address bit set.
	A2	OFF => Address bit NOT set.
	A3	See RS485 Addressing Reference on Page 9.
5	A4	Not Used.
6	DOWN	Controls use of RS485 pull down resistor. ON => 620 Ohm pull down connected /enabled. OFF => 620 Ohm pull down disconnected /disabled.
7	UP	Controls use of RS485 and pull up resistor. ON =>620 Ohm pull up connected /enabled. OFF => 620 Ohm pull up disconnected /disabled.
8	TERM	Controls use of termination resistor between RS485 A and RS485 B. ON =>100 Ohm termination resistor connected /enabled. OFF => 100 Ohm termination resistor disconnected /disabled.
9		Not used.
10	INT/EXT	Controls use of external antenna if required. ON =>Selects use of internal antenna. OFF => Selects use of external antenna.

Connections for AH13/AH30

A and B is the RS485 interface that should be connected to EAC system. GND is the signal ground and should be connected to EAC system GND and power supply GND.

A: RS485 Data A

B: RS485 Data B

D1: N/C

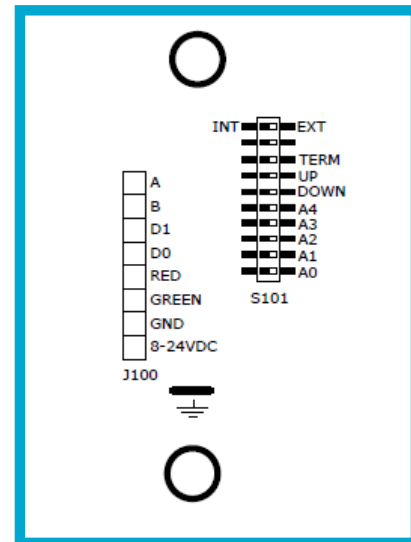
D2: N/C

RED N/C

GREEN: N/C

GND: N/C

8-24VDC



Select EAC Address

The EAC address of the Communication Hub can be set in two ways:

- By configuration from the Aperio Programming Application.
- By use of the DIP switch (See Dip1-Dip4 on Page 9).

Selecting the **RS-485 address from DIP switch** through the Aperio Programming Application tool: the APA tool maybe used to remotely set or override the physical dip switch address setting. When the Communication Hub is set with the APA tool the physical dip switch settings are ignored. If new firmware is loaded into the communication hub the address must be reset by using the APA tool or the Communication Hub defaults go back to the dip switch settings.

RS485 Bus Connection

The RS-485 bus consists of a twisted-pair cable with a characteristic impedance of between 90 Ohm and 120 Ohms. Maximum bus length is 1000m. Depending on the EAC system, a maximum of 16 units, including the EAC system, can be connected to the same bus.

If there is more than one Communication Hub to connect, the hubs should be connected in a daisy chain, not as a star so that all RS485 A connectors are connected together and all RS485 B connectors are connected together on the RS-485 bus (Fig. 5). Both ends of the RS-485 bus must be terminated. To terminate a Communication Hub at the end of the bus, switch 8 of the DIP switch must be in the ON position. All other Communication Hubs in the chain must have switch 8 of the DIP switch set to the OFF position. Refer to the EAC documentation for proper termination of the bus on the EAC side.

Pull up and pull down-resistors should be enabled once bus. Refer to EAC documentation for use of pull up or pull down on the EAC side. If pull up and pull down from the EAC system is not used, one Communication Hub on the bus should have DIP switches 6 and 7 set to the ON position.

Two examples of connection of multiple Communication Hubs to a single RS-485 bus of an EAC system:

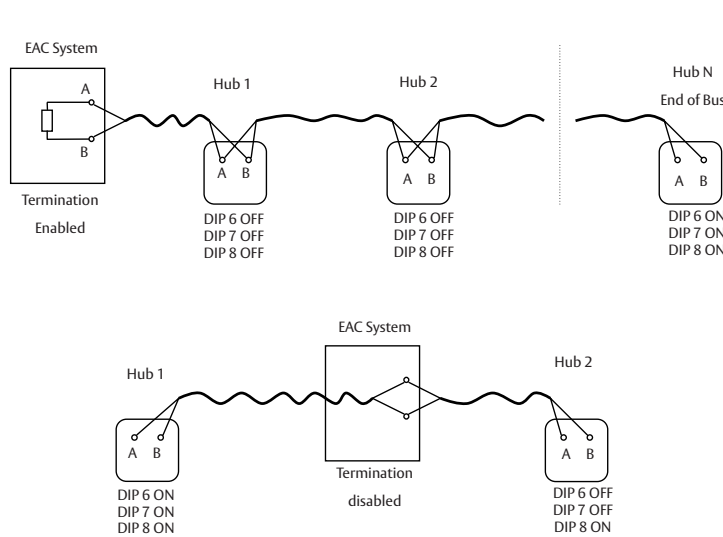


Figure 4. Examples, Communication Hub Connections

ADDRESSES	A0	A1	A2	A3
0	ON			
1		ON		
2	ON	ON		
3			ON	
4			ON	
5	ON		ON	
6		ON	ON	
7	ON	ON	ON	
8				ON
9	ON			ON
10		ON		ON
11	ON	ON		ON
12			ON	ON
13	ON		ON	ON
14		ON	ON	ON
15	ON	ON	ON	ON

Figure 5. Address Examples

Physical Hub Installation

Communication Hub Adapter Plate Installation

To install the Communication Hub, follow the following steps:

Note: Complete all Wiegand and DIP switch configuration prior to installing the Communication Hub.

1. Remove the plugs from the interior of the mounting plate.
2. Secure the Communication Hub to the box with two screws.

Note: The square box assembly requires a plaster ring to be secured to the box prior to securing the mounting plate to the assembly.

3. Place the plugs in the through holes of the mounting plate.
4. Place the Communication Hub on top of the adapter plate.
5. Insert two screws in the through holes of the Communication Hub.

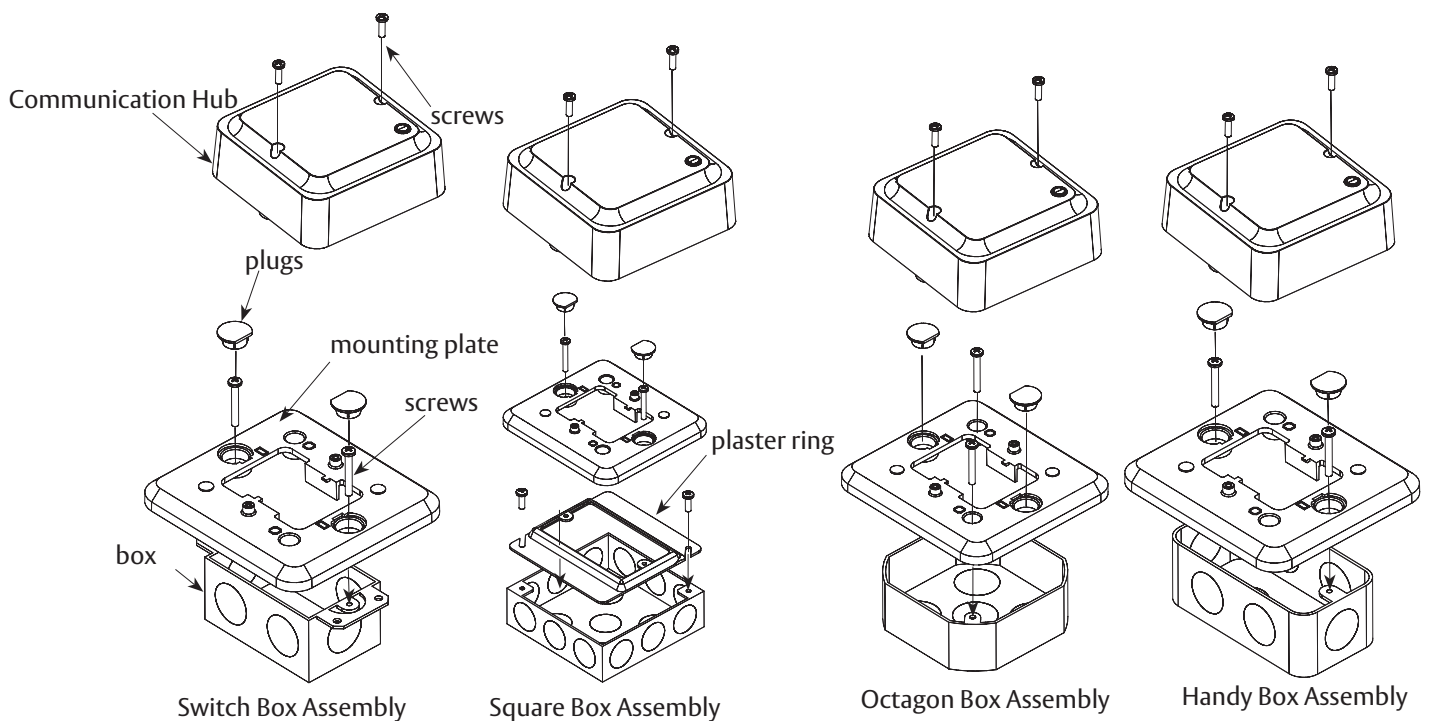


Figure 6. Communication Hub Assembly

Hub LED Indications

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

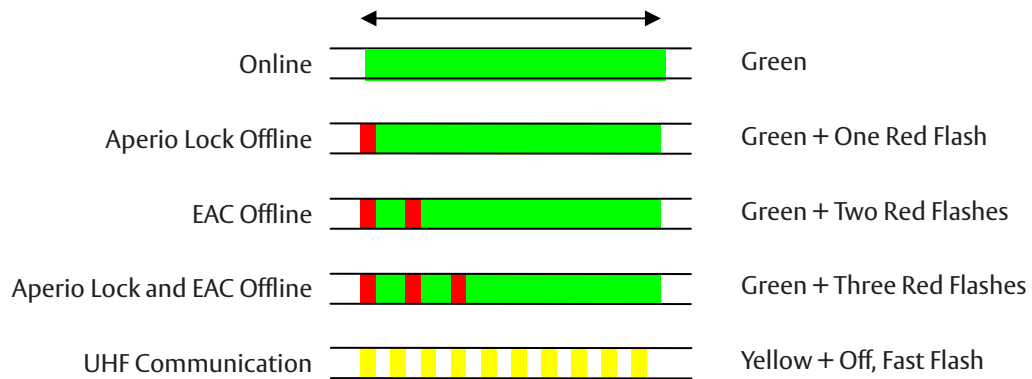


Figure 7. Communication Hub Normal LED Indications

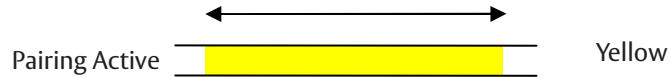


Figure 8. Communication Hub Normal LED Indications

ASSA ABLOY is the global leader in door opening solutions, dedicated to satisfying end user needs for security, safety and convenience