



Ecolab Hand Hygiene Program

HHCM915 Installation Tool User's Guide (92053074)

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1.0 Introduction to the Compliance Monitoring System

The Ecolab Hand Hygiene Compliance Monitoring System (HHCMS) is a state-of-the-art wireless hand hygiene reminder system designed to encourage best practices for hand hygiene in a healthcare facility. The system can be divided into three parts, hardware components, the proprietary wireless network and the dashboard web-based user interface.

1.1 Hardware Components

The HHCMS consists of individual devices that work together to deliver near real-time individual hand hygiene status directly to HCWs. The main components of the HHCMS are the Healthcare worker badge (also referred to as the HHCM Badge), the dispenser beacon and the bed beacon.

1.1.1 Healthcare Worker Badge/HHCM Badge

The HHCM badge is a wireless device worn by the HCW to provide real-time notification of the HCW's current hand hygiene status. Notification is provided by both visual and audible alerts (configurable).

1.1.2 Dispenser Beacon

The dispenser beacon is embedded within monitored soap or sanitizer dispensers in the patient care area. Its function is to communicate with the HHCM badge worn by the HCW, collect dispense event data, and then transmit the data to the **proprietary** wireless network.

1.1.3 Bed Beacon

The bed beacon mounts to patient beds or stretchers. Its function is to communicate with the HHCM badge when the HCW comes close to the patient bed (or stretcher). The bed beacon collects data from the badge and transmits the collected data to the **proprietary** wireless network.

1.2 HHCMS Proprietary Wireless Network

The Ecolab HHCMS uses a proprietary, wireless network to transmit data collected by dispenser beacons and bed beacons to cloud servers for processing and archiving. The proprietary wireless network is composed of two types of devices: hubs and gateways.

1.2.1 Hubs

Hubs are installed throughout the healthcare facility and communicate with nearby bed and dispenser beacons. Hubs receive data and relay it to the next nearest hub, with the process being repeated until the data reaches a gateway.

1.2.2 Gateways

The gateways receive data generated by dispenser and bed beacons either directly, or from the hubs, which act as repeaters. The gateways then transmit the data to a cloud server via a secure cellular modem for processing and archiving.

1.3 The Dashboard Reporting Portal

The Dashboard collects, processes and archives data sent by the onsite Gateway. The Dashboard provides a user-friendly interface, providing access to your hospital's hand hygiene data, statistics and reports compiled from event data.



COMPLIANCE MONITORING SYSTEM COMPONENTS



Figure 1: Ecolab eHHCMS Components

2.0 Purpose of the Installation Tool

The purpose of the Installation Tool (also referred to as the “Install Tool”) is to simplify installing and maintaining the Ecolab Hand Hygiene Monitoring System. The Installation Tool can display a beacon’s device ID, firmware revision, battery level and range setting. The beacon Installation Tool can also be used to test the range of a beacon and the beacon’s communication to the wireless network. The Installation Tool can be used to adjust beacon ranges for either dispenser or bed beacons. The Installation Tool can be used to switch the operating mode of bed beacons. In addition to beacon installation, the Installation Tool can be used to test HCW badges, external antennas, AC power line sensors, and the signal strength of nearby hubs in the proprietary wireless network.



3.0 Features of the Tool

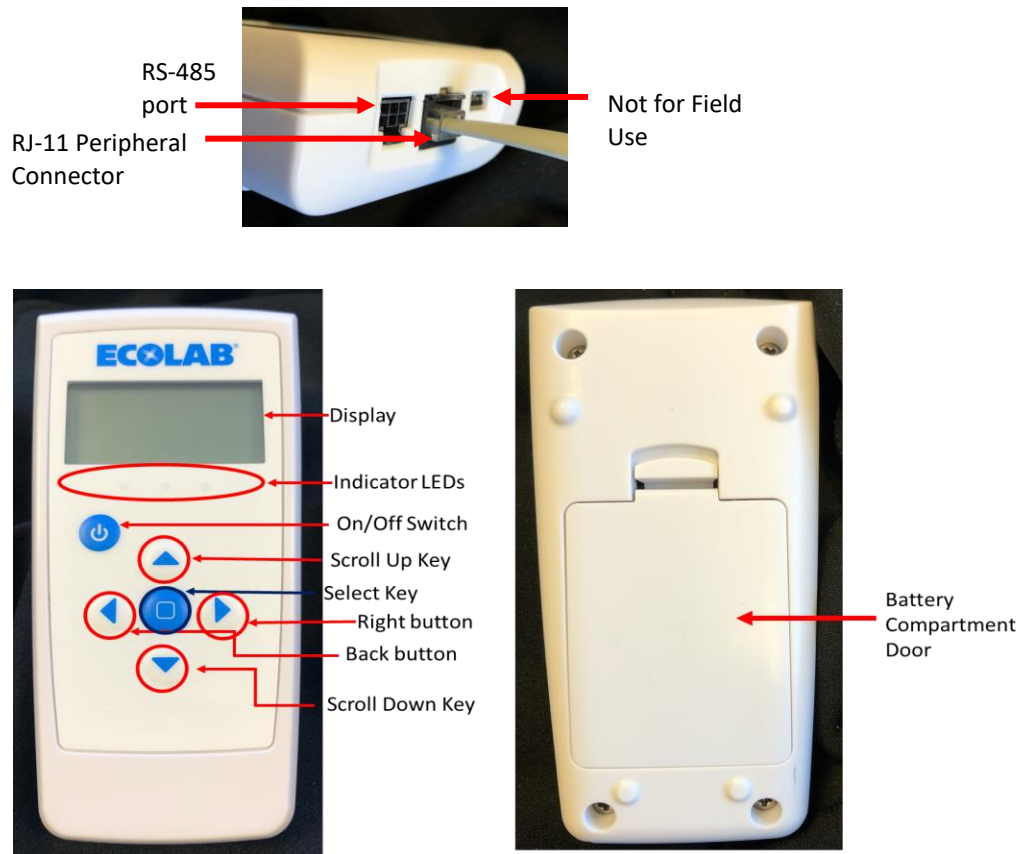


Figure 2 – 92053074 Installation Tool's Features

Power Switch: Turns the Tool on and off. To turn on, press and hold until device powers on (usually a few seconds).

Programming Port: Used to update the firmware of the Installation Tool (only for authorized users).

Peripheral Connector: Used to connect either an external antenna, a mat or floor antenna, or an AC Line Sensor for testing.

3 Indicator LEDs: Indicate the state of the communications between the Installation Tool and the beacon.

Display: Displays information about the last device the Installation Tool has completed communications with. The display is also used to indicate what mode the Installation Tool is currently in.

Scroll Up Key: (1) Increases the beacon's range when in "Change NF Range" mode; (2) used to move cursor up in a menu

Down Key: (1) Decreases the beacon's range when in "Change NF Range" mode; (2) used to move cursor down in a menu.

Select Key: (1) Used to select a menu item; (2) used to confirm a range setting (3) used to confirm an option.

Battery Compartment: Holds three AA alkaline batteries which power the Installation Tool.



5.0 Installation Tool Operation

5.1 Boot Post

When the power is turned on, the Installation Tool will display the message “HHCM Install Tool”, along with the firmware version, and the battery level of the Install Tool. All three indicator LEDs will flash in sequence as the Installation Tool performs an internal power on self-test, and the audible alert will beep for about 1 second. This is normal and provides feedback that the display, all three LEDs, and the audible alert are functioning properly. The Installation Tool will then display the Main Menu and is ready for use. **Note: if any of the axes fails to tune, a short beep will be emitted for each axis that fails. While the Install Tool can function with one axis failing to tune, if 2 or more fail to tune, the Install Tool will need to be returned for repair.*

5.2 Changing Modes

To change the beacon Installation Tool mode, navigate to the main menu screen (if you aren’t already on it, then push the left arrow button until you arrive at the main menu), then use the Up and Down arrow keys to move the cursor next to the desired mode. Next press the Select (center) key and the beacon Installation Tool will enter the desired mode.

5.3 Turning the Backlight On

The backlight for the display screen makes the screen easier to read, but also consumes more power. In order to conserve power, the backlight will automatically switch off within 15 seconds of the last command (configurable). Pressing the center button will cause the backlight to turn back on again.

5.4 Install Tool Modes

The **Installation Tool** has 6 basic modes of operation.

1. **Beacon Info:** used to retrieve information about a beacon and to adjust the beacon’s settings
2. **Badge Info:** used to check the functioning of a system badge
3. **Test Badge Mode:** used to make the Install Tool function as a badge for adjusting beacon ranges.
4. **Network Range:** used to search for nearby Hubs in the proprietary wireless network.
5. **Antenna/Sensor Test:** used to verify the operation of the AC Power Line Sensor or an external antenna
6. **Install Tool Status:** used to change the configurable settings on the Install Tool.

5.5 Beacon Info Mode

When the “Beacon Info” option is selected, the Install Tool will behave like an HHCM Badge. The near-field receiver will be enabled and listening for an HHCM Beacon to transmit a near-field message. At any time, pressing the left button will cancel the operation and return to the Main Menu.

Note that the LEDs will behave like an HHCM915 Test Badge. Red will indicate that a near-field message was received but was corrupt, yellow will indicate that a near-field message was successfully received, and green will indicate that a UHF reply was successfully received.

From the Main Menu, use the up or down arrow keys to get the cursor next to “Beacon Info Mode”, then press the center button to select.

The display screen will appear as shown in the picture below, showing the beacon’s: address (device ID), firmware version, battery level, near field (“bubble”) communication range setting (1-10), and mode (or “N/A” for dispenser beacons).

“NF Range” (near-field range) and “Mode” (Bed Beacon only) settings may be adjusted by moving the cursor to that line and pressing the select key. The new settings will be uploaded to the Beacon when the next near-field broadcast is received. Selecting “Update” will cause the Install Tool to repeat the Beacon Information operation



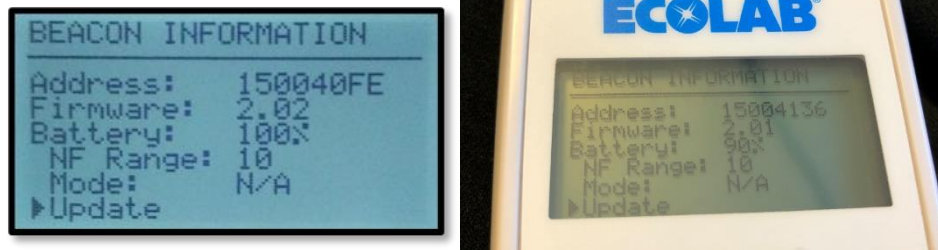


Figure 3: Beacon Information Mode Display

5.6 Adjusting a Beacon's Range

The Installation Tool can be used to adjust the near field/LF range of either a bed beacon or dispenser beacon. The Installation Tool must first complete a communication transaction with the beacon to get the beacon's current range setting, address and other information. See below for full instructions on the 3 step process of range adjustment.

(A) Create a communication transaction between the beacon and Install Tool:

- a. For a dispenser beacon: bring the tool into close to the dispenser, and then activate the dispenser. You should see the LEDs on the Install Tool flash, indicating communication with the beacon has occurred. **Note: Badges/Test badges should be moved out of range at this time, so they don't preferentially communicate with the dispenser and prevent information exchange with the Install Tool.**
- b. For a bed beacon: bring the Install Tool within the patient zone (*beacon must either be in stretcher mode, or in bed mode with the bed plugged in so that the "bubble" is broadcasting*).

The Install Tool screen should now display the beacon's address, firmware version, battery level, Near Field (NF) range (wake up bubble strength) and mode (populated for bed beacon only).

(B) Update the beacon's range

- Move the cursor up or down so it is next to the NF range line, then hit the "Select" (center) button.
- Use the up and down arrow keys to increase or decrease the range as needed.
- When the desired range setting is displayed, hit the "Select" button. **(Range options are 1-10; 1 is the smallest range, 10 is the largest range).**

(C) Ensure that the range has been updated:

- From the Beacon Info screen, repeat step A (the process of either activating the dispenser, or bringing the Install Tool within the patient zone of the bed beacon) and then confirm that the Beacon information shown includes the updated value for the NF Range.



5.7 Changing a Bed Beacon's Mode

Bed beacons have 6 different operating modes, as listed below:

- 1 = Bed Mode using Internal Antenna Only
- 2 = Bed Mode using External Antenna Only
- 3 = Bed Mode using Internal and External Antenna (toggle between internal and external antenna)
- 4 = Stretcher Mode using Internal Antenna Only
- 5 = Stretcher Mode using External Antenna Only
- 6 = Stretcher Mode using Internal and External Antenna (toggle between internal and external antenna)

Note:

Bed Modes (1-3) - AC Power Cord Sensor must detect AC power to broadcast the near-field (125kHz) signal.

Stretcher Modes (4-6) – the 125kHz signal is always broadcast. No AC Power Cord Sensor required.

To change modes:

- (1) use the up and down arrow keys to position the cursor next to “Mode”
- (2) Use the Up and Down arrow keys to increase or decrease the Mode setting until the desired setting is reached.
- (3) When the desired mode setting is displayed, press the center (select) button, to choose that mode
- (4) The Installation Tool requires that a communication cycle be completed to save the new setting to the bed beacon. Bring the Install Tool into the patient zone (*the bed beacon must be in a stretcher mode, or in a bed mode with bed plugged in so that the “bubble” is broadcasting*). The Install Tool LEDs will flash, and it will make an audible beep, indicating that communication has taken place.
- (5) To ensure that the mode has been updated, while still on the Beacon Info screen repeat the process of bringing the Install Tool within the patient zone of the bed beacon, and then confirm that the Beacon information shown includes the updated value for the NF Range.

For more information on the various bed beacon mode options, please consult the HHCM915 Bed Beacon User's Manual

5.8 Badge Information

When the “Badge Info” operation is selected, the Install Tool will behave like an HHCM Beacon. The near-field transmitter will broadcast a message. The UHF radio will then wait for a reply from the HHCM Badge. At any time, pressing the left button will cancel the operation and return to the Main Menu.

IMPORTANT: Make sure there is only one badge near the Install Tool before using the Badge Info mode to test or read info from a particular HHCM Badge.



When a reply is received from the HHCM Badge, the Install Tool will respond by transmitting an acknowledgment to the Badge. The Install Tool will then display the Badge's Address, firmware version, user role and the Badge's current hygiene state.

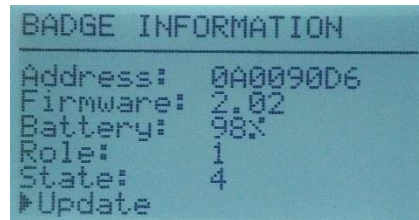


Figure 4: Badge Information Mode Display

Selecting "Update" will cause the Install Tool to repeat the Badge Information operation.

5.9 Network Range

When the "Network Range" operation is selected, the Install Tool will behave like an HHCM Beacon communicating with the system network. It will enable its UHF receiver at 915MHz and wait for a network SYNC message. Note that it may take up to 20 seconds for a SYNC message to be received by the Install Tool.

When a SYNC message is received, from a Hub within range, the Install Tool will be synchronized to the network. At this time, the Install Tool will broadcast Discovery Messages to all Hubs within range. If not too busy, each Hub will reply. The Install Tool will store the addresses of up to five (5) Hubs found. It will then transmit a second message (PING) to each Hub. When each Hub transmits a reply, the Install Tool will display each Hub's address and RSSI (Receive Signal Strength Indicator) value (in dBm) on the LCD. The Install Tool will transmit a PING message every 200ms.



Figure 5: Network Range List View of Hubs Found

As the Install Tool is moved, the RSSI values of each Hub can be observed, in real-time, as they change with location. At any time, pressing the left button will cancel the operation and return to the Main Menu. Selecting "Update" will cause the Install Tool to repeat the Network Range operation. Selecting one of the Hubs will cause the Install Tool to display a real-time graph of the selected Hub's RSSI value. The graph is updated once every 200ms and provides about 20 seconds of continuous historical RSSI data. At any time, pressing the left button will cancel the graph operation and return to the Network Range list view of Hubs where a different Hub may be selected.

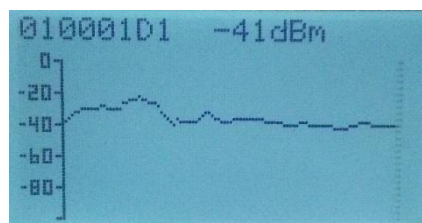


Figure 6: Graph of Selected Hub's RSSI Value



5.10 Antenna/Sensor Test

When the “Antenna/Sensor Test” operation is selected, the Install Tool may be used to test the continuity of an external Bed Beacon loop antenna or the output of an AC Line Sensor. At any time, pressing the left button will cancel the operation and return to the Main Menu.

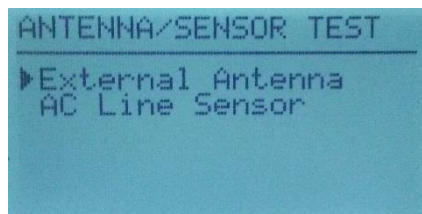


Figure 7: Antenna/Sensor Test

By selecting “External Antenna”, the Install Tool will display the real-time status of the connected external Bed Beacon antenna. The antenna will be connected to the 6-pin RJ-11 connector (J7) located on the front end of the Install Tool. The Install Tool will send a 3VDC pulse through one end of the antenna while waiting to detect the pulse on the other end. If a pulse is detected, “Continuity: YES” will be displayed. Otherwise, “Continuity: NO” will be displayed. This will be repeated every 200ms. At any time, pressing the left arrow button will cancel external antenna continuity test and return to the “Antenna/Sensor Test” menu.

By selecting “AC Line Sensor”, the Install Tool will display the real-time status of the connected AC Line Sensor. The sensor will be connected to the 6-pin RJ-11 connector (J7) located on the front end of the Install Tool. The Install Tool will provide 3VDC power to the sensor and wait to detect the sensor’s output, which is high when an AC field is detected. If a field is detected, “AC Detected: YES” will be displayed. Otherwise, “AC Detected: NO” will be displayed. This will be repeated every 10ms. At any time, pressing the left arrow button will cancel the AC Line Sensor test and return to the “Antenna/Sensor Test” menu.

5.11 Install Tool Status

When “Install Tool Status” is selected, the Install Tool will display its current status including firmware version, battery level, power off timeout, backlight timeout and tuning of the 3-axis near-field antenna.



Figure 8: Install Tool Status

Selecting “Power OFF” will display the current power off timeout, which determines how long the Install Tool will wait before automatically shutting down when there is no button activity. Pressing the up or down arrows will change the timeout to a value of 1 minute to 5 minutes in 1-minute increments. Press the center “Select” button to select the new timeout value and return to the “Install Tool Status” menu.

Selecting “Backlight” will display the current backlight timeout, which determines how long the Install Tool will wait before automatically turning off the backlight when there is no button activity. Pressing the up or down arrows will change the timeout to a value of 0 seconds to 15 seconds in 1 second increments. Press the center “Select” button to select the new timeout value and return to the “Install Tool Status” menu.

Selecting “Tuning” will display the current tuning capacitor values for each axis of the 3-axis near-field receiver antenna. At any time, pressing the left arrow button will return to the “Install Tool Status” menu.



5.12 Replacing the Batteries

Open the battery compartment on the back of the Installation Tool by sliding the battery door towards the bottom end of the tool. Remove all three old AA alkaline batteries from the battery compartment and discard. Place three new AA alkaline batteries in the battery compartment following the polarity markings inside the battery compartment. Replace the battery door back on the Installation Tool.

6.0 Appendix A - Certification and Safety Approvals

FCC Statement

NOTE: 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 causes harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and 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.

WARNING: Changes or modifications not expressly approved by Ecolab could void the user's authority to operate the equipment.

RF EXPOSURE:

"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."

Industry Canada

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.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This radio transmitter (IC:10060A-92053074) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated.



Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio (IC:10060A-92053074) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

Magnetic Loop Antenna

Ceramic Chip Antenna: -1 dBi

RF Exposure: This equipment complies with Industry Canada 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.

Exposition aux radiofréquences : Cet équipement est conforme aux limites d'exposition par rayonnements définies par l'industrie du Canada pour une utilisation dans un environnement non clos. Cet équipement doit être utilisé à une distance minimale de 20 cm entre l'émetteur de radiation et votre corps. Cet émetteur ne doit pas être situé au même endroit qu'un autre émetteur et ne doit pas être connecté à une antenne différente.

