



*revolutionising  
hand hygiene technology*



HP

# Higenx Technical User Guide

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**1 December 2013**

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## Preface

### Audience

This document is intended for anyone involved in the installation and/or maintenance of HigenX hand-hygiene systems.

### Product Support

Product support and answers to any questions about the content of this document can be obtained by contacting Support at:

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## Higenx Technical User Guide

### Regulatory Statements for FCC and Industry of Canada s:

FCC ID: 2ABFL105REG (Register Unit)

IC ID: 11591A-105REG (Register Unit)

FCC ID: 2ABFL105TAG (Personal Tag, Zone Control and Dispenser)

IC ID: 11591A-105TAG (Personal Tag, Zone Control and Dispenser)

*This device complies with Part 15 of the FCC Rules and with Licence exempt RSS standards of Industry Canada.*

*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.*

*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.*

*WARNING: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. The term "IC:" before the radio certification number only signifies that Industry Canada technical specifications were met*

**Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.**



### System Overview

The system consists of:

- (a) A personal tag worn by the worker
- (b) Wall mounted unit which can detect the presence of a tag and identify the wearer
- (c) Soap / gel activity emitters
- (d) Zone control unit
- (e) Reporting software

Essentially the system is designed to encourage the worker to maintain good hand hygiene by washing hands regularly. This would generally involve the application of suitable gels or soap from a dispenser. The required regularity is determined by management but it is usually at least once per hour. There are also “zone-out” areas such as toilet or waste disposal areas, which necessitate hand-washing after a visit.

The tags are worn by the worker and each worker is supplied with a tag which they wear as part of their uniform. Each tag has a serial number so the system can track them - workers could be identified by the tag but this is not fundamental to how the system operates.

The tag has two LEDs which indicate its state – flashing red indicates an unsafe condition (the wearer has not washed their hands within the agreed time limit or after visiting a zone-out area) and a flashing green indicates a safe condition (hands have been washed).

The wall mounted unit is typically situated at the clock in station. This captures all the data from the individual tags and uploads the information to the reporting system.

The tag and Soap/Gel emitters can each detect the other when they are in close proximity – when the healthcare worker is using a gel dispenser the emitter sends a signal to the tag. The tag resets its internal timer to zero (and the tag flashes green) and records the hygiene activity which will be uploaded at the end of the shift when the worker clocks out.

If a pairing is not repeated within the specified time limit (say an hour) then the tag will begin flashing red to remind the worker and alert others to the situation – the worker can use any active dispenser to complete their required hand hygiene activity. This situation is repeated if the worker enters a zone-out area.

The Zone control unit will detect workers in an area that is considered unclean and emit a signal to the worker's tag to set it to the unclean state which necessitates the worker to perform hand-washing on returning to the clean area.

The data from the wall mounted unit is transferred to a database to provide detailed reports so the operator can determine overall levels of hand hygiene compliance within the facility. This information can be then used to drive behavioural change and to improve overall hygiene activity. It also provides useful information in the event of an audit.

Note that the recording is performed automatically – the worker never has to record or enter anything. All communications are performed using low power radio frequency identification (RFID) technology

## The Higenx Personal Tag

### Overview

The Higenx™ system utilizes tags worn by staff to communicate via RFID (Radio Frequency Identification) with wall-mounted readers each time hygiene activity such as hand washing takes place. The tags should be worn by employees at all times, tags not worn by a person have higher RF sensitivity and can pick up unwanted signals leading to inaccuracy in the data. Unused tags should be logged out, tags logged out are in sleep mode and do not pick up any signals. The tags have two LEDs: *Clean (green)* and *Wash (red)*.



Fig. 1 - The Higenx tag

### Logging in:

The tag should be logged out initially. This is indicated by both LEDs blinking in unison.

- Swipe the tag label side first along the side of the Register Unit (Fig. 2). The tag will beep and the tag ID will be displayed on the Register Unit (Fig. 3).
- Swipe with the tag's CE symbol close to the rear of the register unit.
  - When the tag beeps, pull the tag away.
  - If a swipe fails there will be an error message displayed on the register unit. Wait 30 seconds before attempting Login again with the same tag.
- The tag's *Wash (red)* LED will blink red until a dispenser is used for the first time.



Fig. 2 - Swipe vertically along the Register unit

Fig. 3 - Login screen

### Usage after Login:

- Initially after login the tag's *Wash (red)* LED will be blinking to indicate that a hand-wash is required.
- When you use a dispenser for the first time after logging in, the dispenser emits a RF signal to set the tag to the *clean* state. The *Clean (green)* LED will start blinking and the *Wash (red)* LED will stop blinking.
- A hand wash must take place every 30 minutes to keep the tag in the *Clean* state. If the 30 minutes limit is exceeded, a *Non-Compliance Wash (NCW)* warning is logged. The warning is sounded by the tag as a long beep and a long flash of the *Clean (green)* LED.
- **Zone-outs:** Areas of the workplace that are not considered to be a part of the clean work area such as bathrooms will contain a *Zone-Control* unit. If one of these areas is entered, the *Zone-Control* unit will detect the user and emit an RF signal to set the user's tag to *unclean* and the user will have to use a hand wash dispenser as soon as they return to a clean area. There is a 10 minute limit for users to use a dispenser after entering a *zone-out* area. A *Non-Compliance Zone-out(NCZ)* warning will be recorded if the 10 minute limit is exceeded. The warning is sounded by the tag as a short beep and a short flash of the *Clean(green)* LED.

### Logging out:

The tag holds the hygiene data for the user and must be logged out after every shift to upload the tag's data to the Register Unit.

- Swipe the tag along the side of the Register Unit. The tag will beep and the tag ID will be displayed on the Register Unit.
- The number of gel hand washes, soap hand washes, zone-outs and non-compliance warnings will be displayed (Fig. 4):

**G** = The number of gel-washes used.

**W** = The number of soap-washes used.

**Z** = The number of zone-outs that occurred.

**NCW** = The number of times the 30 minutes limit between washes was exceeded.

**NCZ** = The number of times the *zone-out* 10 minutes limit was exceeded.



Fig. 4 - Logout screen





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### Note on Logging in/out:

Once a personal tag is logged in or logged out, it cannot be swiped again for 12 seconds. An error message will be displayed on the Register Unit if a tag is swiped again too soon.

### Non-compliance warnings:

- There is a 10 minute limit for users to use a dispenser in the clean area after entering a *zone-out* area. A *Non-compliance zone-out(NCZ)* warning will be recorded if the 10 minute limit is exceeded.
  - The warning is a short beep and short blink of the *Clean(green)* LED.
- A hand wash must take place every 30 minutes to keep the tag in a *Clean* state. If the 30 minutes limit is exceeded, a warning(*NCW*) is logged.
  - The warning is a long beep and a long flash of the *Clean(green)* LED.
- These are logged in reports.

### The different Tag states

Tag State	LED indicators	Cause(s)
Logged out	<i>Clean(green)</i> and <i>Wash(red)</i> LEDs blink in unison	The tag is logged out and is in sleep mode.
Unclean - wash needed in clean area	Only <i>Wash(red)</i> LED blinks	<ul style="list-style-type: none"> <li>● The tag is just logged in and a hand wash is required.</li> <li>● A hand wash has not happened within 30 minutes since last hand wash.</li> <li>● Zoned-out - you have entered an area which requires you wash your hands immediately upon return to the clean area. There is ten minutes to comply.</li> </ul>
Clean	Only <i>Clean(green)</i> LED blinks	A dispenser has been used within 30 minutes. The user is considered clean.
Gross Non-conformance	<i>Clean(green)</i> and <i>Wash(red)</i> LEDs blink out of order	A logged-in tag has been idle for 2 hours and has entered Gross Non-conformance sleep mode. It must be logged out and then logged in

		before it can be used again.
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Table 1 Personal Tag operating states

## The Higenx Register Unit

### Overview

The Higenx Register Unit is used for logging in and logging out the Higenx Tags. When a user logs in at the start of a shift the Higenx Register Unit activates their Tag. When a user logs out at the end of a shift, the Register Unit will download all the Tag's usage data from the Tag itself and put the Tag to sleep.

On a regular basis the collected hygiene data from the Tags will be collected from The Register Unit and uploaded to the Higenx servers where it will be used to generate hygiene reports for the customer. The method of collecting the data from the Higenx Register Unit varies by customer and more information can be found in the documents *Higenx data collection/Manual Data Collection*.

### Using the Register Unit



- 1 The user swipes their tag vertically along the side of the Register Unit and pulls away when the tag beeps.
- 2 A login confirmation screen will appear confirming the Tags ID number. The Tag is now logged in.
- 3 At the end of the shift the Tag must be logged out. The user swipes the tag vertically along the side of the Register Unit as in step 1 and a confirmation screen will appear detailing the hygiene data collected from the tag.
- 4 If the tag is logged in or out on the Register Unit it cannot be swiped for 30 seconds, this built in delay is to avoid rapid log on/log off by this user.



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5 Leaving the tag stationary on the side of the Register Unit may create an error. The Reed switch under the CE Mark is designed for swipe action.

### Setting up and location of Higenx Register Unit

It is recommended to place the Higenx Register Unit near the entrance to the workplace to encourage users to wash their hands and not to transfer bacteria in or out of the workplace. A suitable location is near any clock-in facilities a workplace may have.

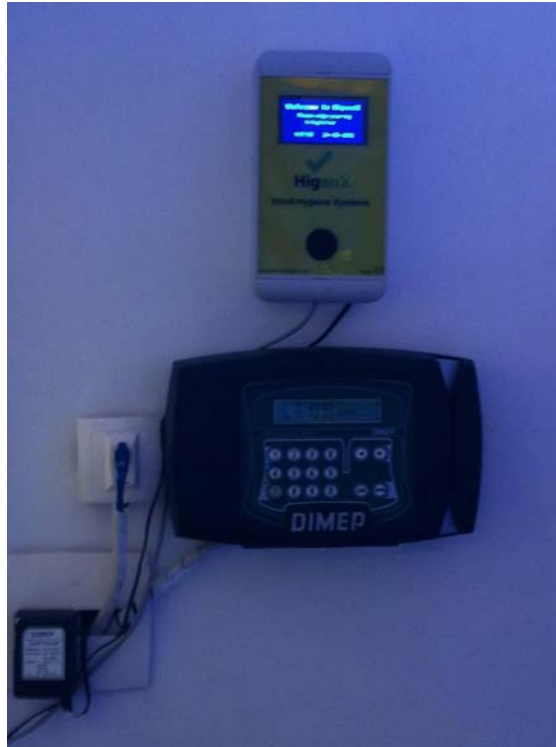


Fig 10

#### *Installation requirements*

- The Higenx Register Unit requires a power outlet for its 9V power adapter.
- Its dimensions are: 200 mm x 110 mm x 60 mm.
- If the customer is using the LAN version of the Higenx Register Unit then a Cat 5 straight through cable and connection point to the customer's LAN are required. A port has to be opened on the customer's network.
- If the customer is using the GSM version of the Higenx Register Unit then a location is needed for the GSM modem and antenna.
- If the customer is using a permanent PC connection for automatic data collection then a USB-B male to male USB-A cable and a Windows PC are required.

### Opening the unit

You will need:

- A star-head screwdriver
- Ensure the unit is not connected to a power outlet.



Fig 11

1) On the front of the unit are flaps located at the top and the bottom. Open the flaps to reveal screws in each corner. Open the screws.

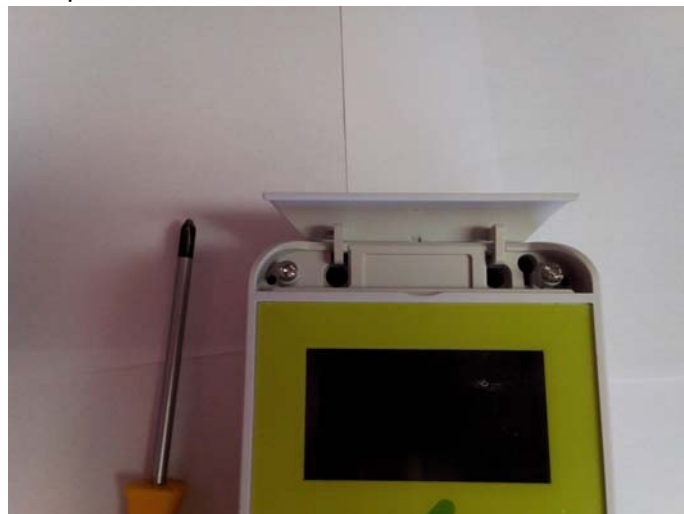


Fig 12

2) The unit will separate into two halves. Be careful as the two halves are joined by the power cables. The back case can be drilled through for wall mounting purposes.

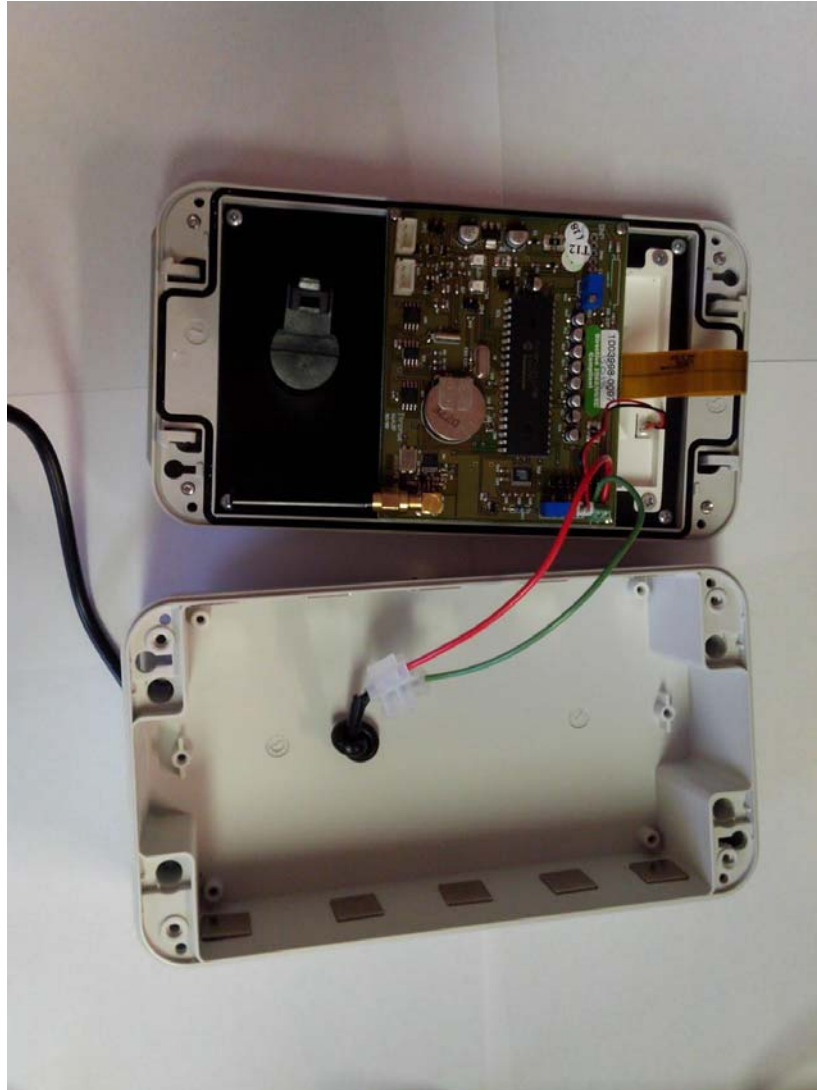


Fig 13

3) Reassemble.

## The Higenx Zone Control unit

### Overview

The Zone Control unit is used to change user's tags to unclean if they leave the clean zone, so that they must wash their hands immediately on returning to the clean zone.

The Zone Control unit is placed in areas which are considered less hygienic than the work area such as locker rooms, delivery areas or bathrooms. When a user enters an area where a zone-out is placed, they will be detected by the zone-out, it will emit an RF signal and their Tag will be set to the *unclean* state. The user will must wash their hands immediately upon returning to the clean area. If the user does not wash their hands using a dispenser in the clean area within 10 minutes of being zoned out, their Tag will sound a reminder beep and register a non-compliance warning (NCZ).

### Placing the Zone Control unit

The Zone Control unit is placed in areas which are outside of the work area such as locker rooms or bathrooms. The Zone Control unit uses a *PIR* sensor to detect movement in an area and should be placed so that it has a clear line of sight of the required area.

When the Zone Control unit detects movement it emits a RF signal to set any Tag present in the area to the *unclean* state. The Zone Control unit should not be placed too close to a clean area to prevent it affecting Tags in the clean area.



Examples of Zone control placement





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### Setting up the Zone Control unit:

Required:

A phillips/star head screwdriver.

2 x D-Cell batteries.



Fig. 14 - Equipment

### *Installing the batteries*

1) Open the Zone control unit by using the screwdriver to open the four screws on the front corners of the unit.

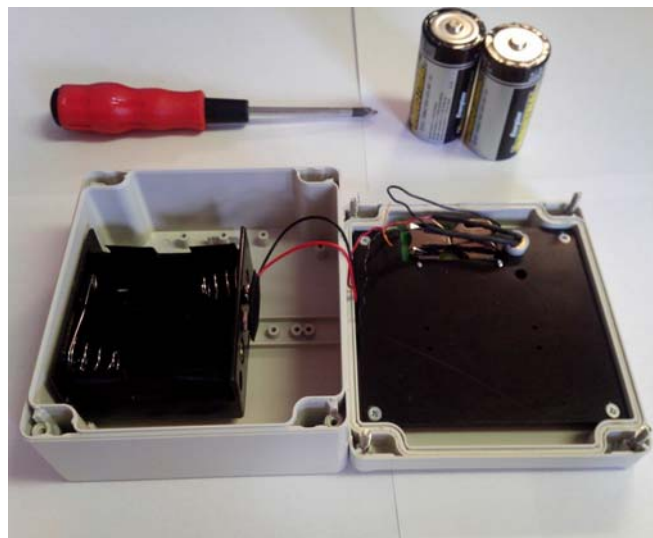


Fig. 15 – Open the Zone control unit

2) Insert the batteries.

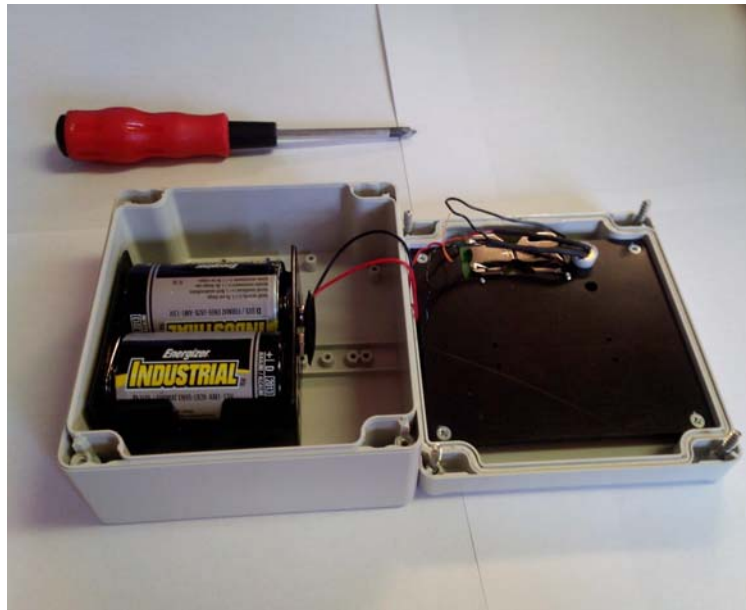


Fig. 16 – Insert batteries

3) The unit is now on. Place it in a suitable area where it has a clear line of sight with any users entering the area.



Fig. 17 – Reassemble

## The Higenx Dispenser

### Overview

The purpose of the dispenser in the Higenx system is to recognise when a user has dispensed soap and turn the user's personal tag green in response. There are two types of dispenser in a Higenx system; manual and automatic. Both perform the same task.

### How the manual dispenser works

Inside the dispenser there is a specialised Higenx transmitter that emits an RF signal whenever the dispenser is used. The RF signal emitted by the dispenser will turn the user's Tag to the *clean* state.

Inside a Higenx-equipped manual dispenser is a transmitter, a battery holder and also a carefully placed magnet. The magnet is placed on a moving part inside the dispenser so that when the dispenser is used, the magnet swipes past the lower right hand corner of the dispenser transmitter which activates it. In the automatic version the transmitter is powered off of the dispensers battery pack and the activating signal is taken from the dispenser.

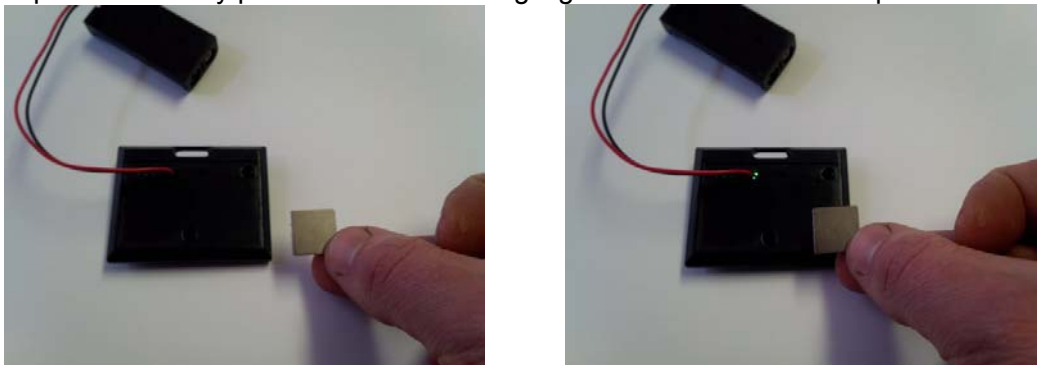


Fig 18. – A reed switch in the tag activates the tag when the magnet moves past

### Using a dispenser

The Higenx enabled dispenser is used in the same way as any other dispenser. The user should stand directly in front of the dispenser for a period of at least 6 seconds. This ensures they get the clean RF signal and their body prevents the RF affecting other tags.

The system calibration requires that all active tags are worn by a person. Active (not in sleep mode) tags have higher sensitivity when not worn, tags in sleep mode i.e. logged out, have no active RF communication.

### Setting up the Higenx dispenser

The manual dispenser requires 2xAAA batteries and the battery holder is easily accessible by opening the dispenser. The automatic version draws power from the dispenser's own batteries.

Each dispenser has an identification number and liquid-type for maintenance and reporting purposes:

The *type* indicates whether the dispenser contains soap or hand-gel.

The *identification number* is used to identify individual dispensers.

The installer should ensure the right transmitter type is with the right dispenser, and take note of dispenser's ID and location.

### Maintaining the manual dispenser

Changing the batteries:

*Higenx reports will inform you whether a dispenser battery needs to be changed.*

If the batteries of the transmitter need changing they can be easily accessed by opening up the dispenser (Fig. 2). The battery holder is located in an easy to reach location inside the dispenser. If the battery holder and transmitter are in a difficult location they can be lifted off their adhesive backing and replaced after the batteries have been changed.

Changing the batteries will not affect the dispenser transmitter.

Changing the transmitter:

If the installer wishes to try a different strength transmitter they can open up the dispenser and change out the transmitter for one with a different setting. The transmitter is easily accessible once the dispenser is opened (Fig. 2). The transmitter and battery holder can be lifted off and the new version can be installed.

- The transmitter sits on the sloped grey plastic insert.
- The upper left hand corner of the transmitter should be flush with the top of the dispenser.
- The battery holder sits at the back of the dark grey plastic insert.
- The magnet attached to the *Press* lever should be swiping past the lower right-hand corner of the transmitter when the dispenser is pressed.

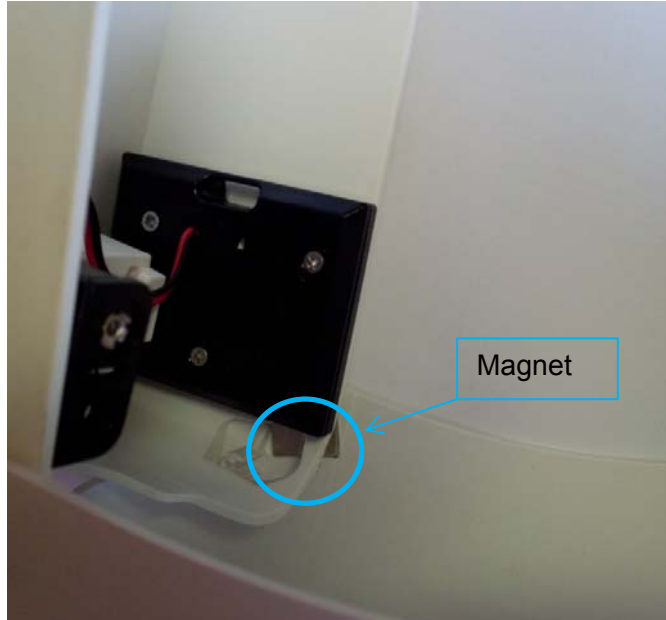


Fig.19 – Transmitter and battery holder location in manual dispenser (varies according to the make of dispenser)

### Automatic Dispensers

Automatic dispensers work in the same way as the manual dispensers. When the dispenser is used it transmits a signal to the user's personal tag to turn it clean.

### Maintenance

The automatic version draws power from the dispensers own power supply and so needs no maintenance itself.

### Identifying Higenx dispensers

Some customers will have a mix of Higenx enabled and standard dispensers. A good way to identify a dispenser that has been equipped with a Higenx transmitter tag is to look for an extra wire on the battery holder.



Fig 20 – Higenx enabled dispenser identification

## Higenx Data Collection

### Overview

In order for Higenx to issue reports to customers, Personal Tag usage data must be gathered from customer sites. The Tag data is stored on the Register unit until it can be collected. Once the data is uploaded to the Higenx servers a hygiene report can be issued.

### Methods of data collection

The hygiene data records for all tags are held in the Register unit. These records must be uploaded to Higenx servers before reports can be issued to customers. There are currently three methods of collection that are used as standard depending on the customer and the customer's location. The collection methods are:

- GSM modem connection to the Register unit.
- Permanent PC connection at the customer site.
- Manual downloading and emailing of the records by the customer.

### Data Collection with GSM enabled Higenx Register Unit

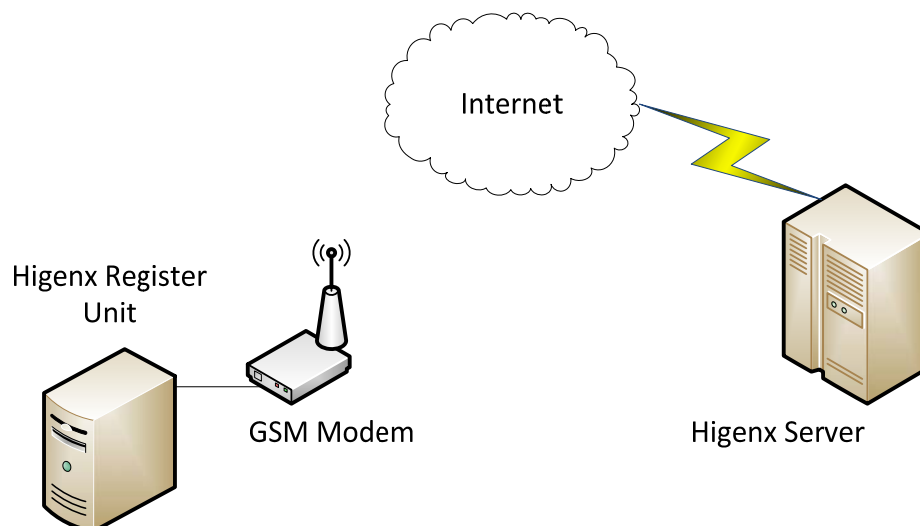


Fig 21 GSM data collection

Higenx register units enabled with a GSM modem will automatically transfer hygiene records from the register unit to the Higenx servers.

### Automatic data collection via a permanently connected PC

The customer allows a PC to be permanently connected to the register unit and Higenx can download the reports automatically. This requires:

- A Windows PC installed with a remote desktop application (usually included in PRO editions of the Windows operating system). Email the IP address to Higenx. The PC must be left on permanently and have the Higenx software installed.
- If the Register Unit does not have a USB lead attached then a male to male USB cable is required to connect the PC to the Register unit.

Connect the Register unit to the PC and email the PC's IP address to Higenx. A member of Higenx support staff will access the PC via the remote desktop application and download the data from the Register Unit.

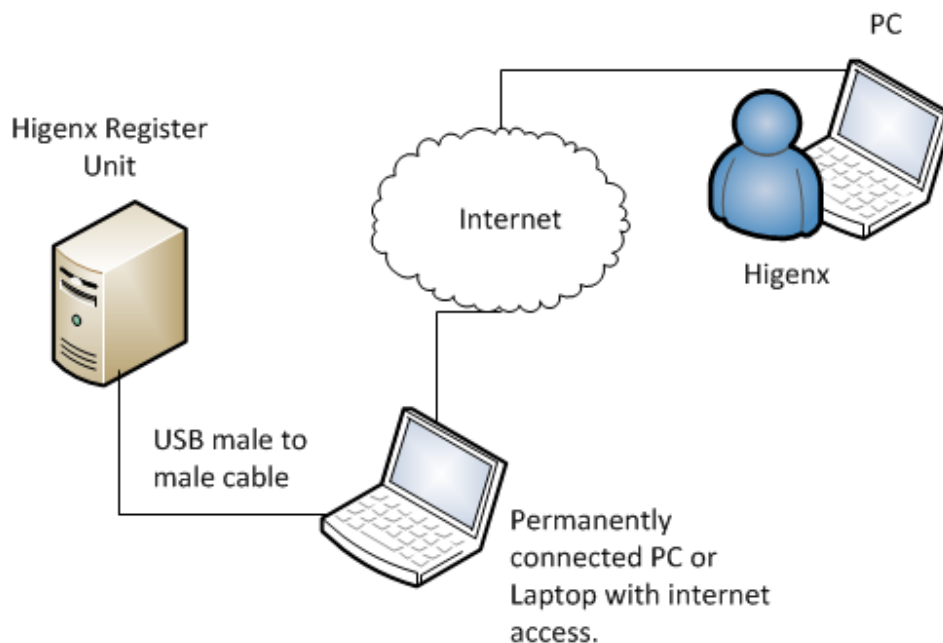


Fig. 22 – Diagram of permanent PC setup



## Manual Data Collection

### Manual downloads by customer

The user connects a laptop/pc to the main Higenx Register Unit via USB and runs Higenx software to download a data file from the Register Unit. The user then emails the data to Higenx. Reports are issued by Higenx via email. Installation instructions for the Higenx software are in the following chapter.

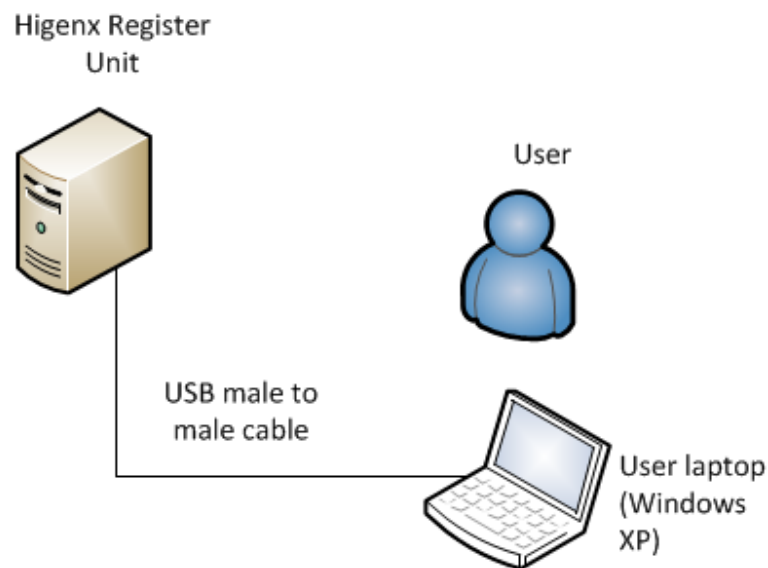


Fig 23. Diagram of manual download configuration

### Collecting the data

#### 1) Connect to the Register Unit with a Laptop/PC

The administrator connects to the Register Unit with a Laptop/PC using a USB male to male cable.



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Fig 24. Example of manual download setup

### 2) Run the Higenx software

Start the Higenx software by double clicking the desktop shortcut or by selecting the program from the Windows start menu. Select the COM port from the drop down list. The Register Unit is usually the last COM on the list. Click on the *Download Records* button and a new window will appear.

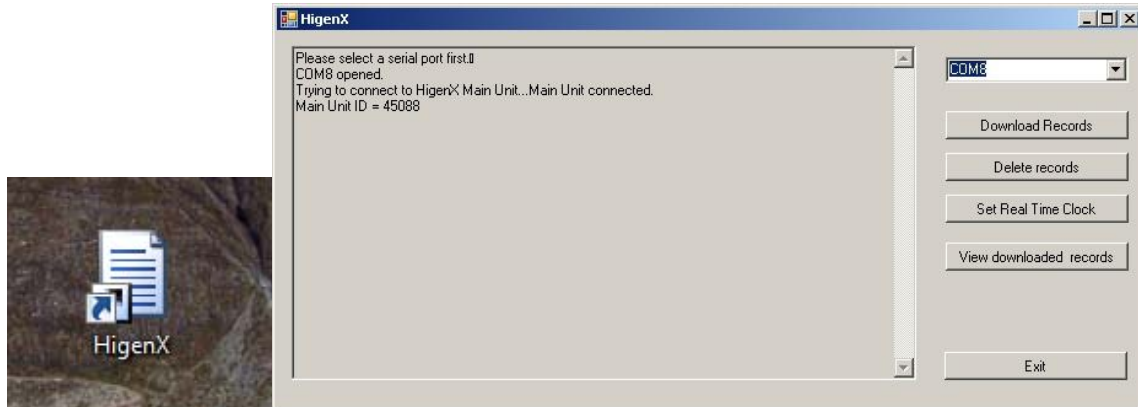


Fig 25. The Higenx desktop shortcut and Start window

### 3) Download the records

In the new window (fig 4) click on the *Download Now* button (fig 5) and the data will be downloaded from the Higenx Register Unit to the Higenx software.

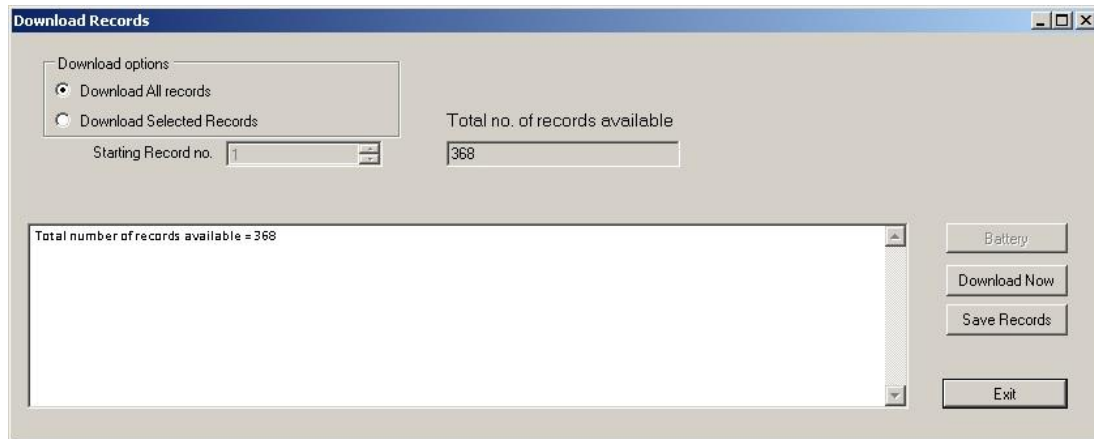


Fig 26. Download records window

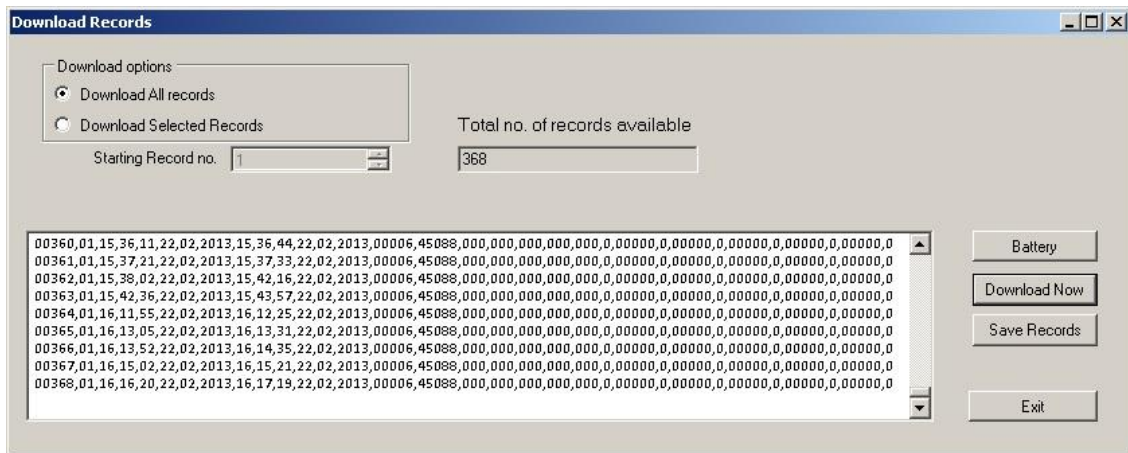


Fig. 27 – Click the *Download Now* button to download the data from the unit

#### 4) Save the data

Click on the *Save Records* button. Choose the save location and name the file in the following format:

*CustomerName\_Date*

The data is saved in a text file to the PC. Email the data file to ***higenxreports@higenx.com***.

#### 5) Checking the battery status of the tags and dispensers

The Higenx system collects information on Tag and Dispenser battery condition. It is good practice to check the battery status of the Tags and Dispensers regularly.

After Step 3 above, click on the *Battery* button to open a window which details the battery condition of individual dispensers and tags. Each tag and dispenser has a corresponding ID and status which will warn the administrator if a battery is running low.

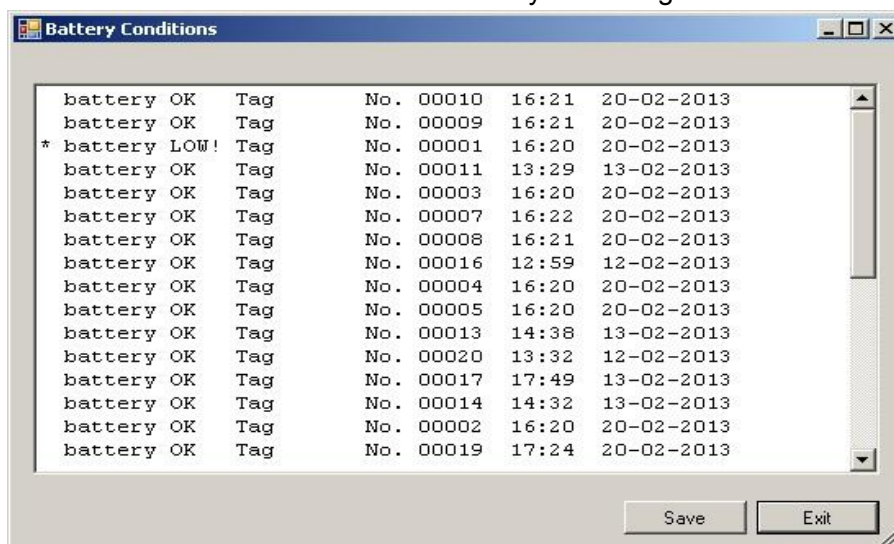


Fig. 28 – Battery Conditions screen

## Installation Instructions for Higenx manual data collection software

The Higenx software is used to download hygiene data from the Higenx Register Unit and to provide information on Tag and Dispenser battery status.

1) Run the **Setup** application from the supplied CD.

### 2) Security Warning

If prompted click on *Run*.

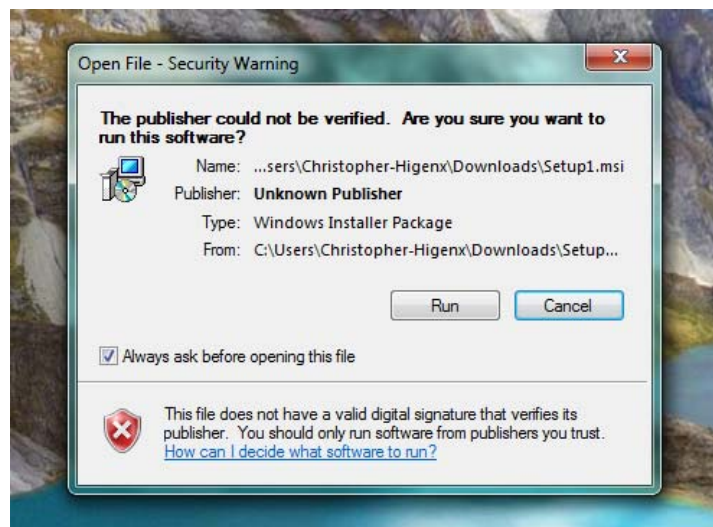


Fig. 29

### 3) Welcome screen

On the welcome screen click on the *Next* button to start the installation.



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Fig. 30

### 4) Select Installation Folder

If you want to select an installation folder other than the default location you can change it. Choose whether other accounts on your PC have access to the Higenx software. Click *Next*.

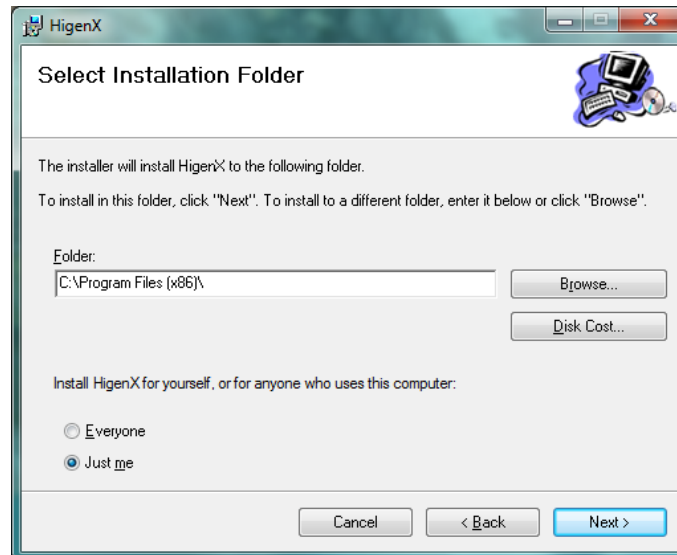


Fig. 31

### 5) Confirm Installation

Click the *Next* button to install the software, otherwise click the *Cancel* button to cancel the installation.



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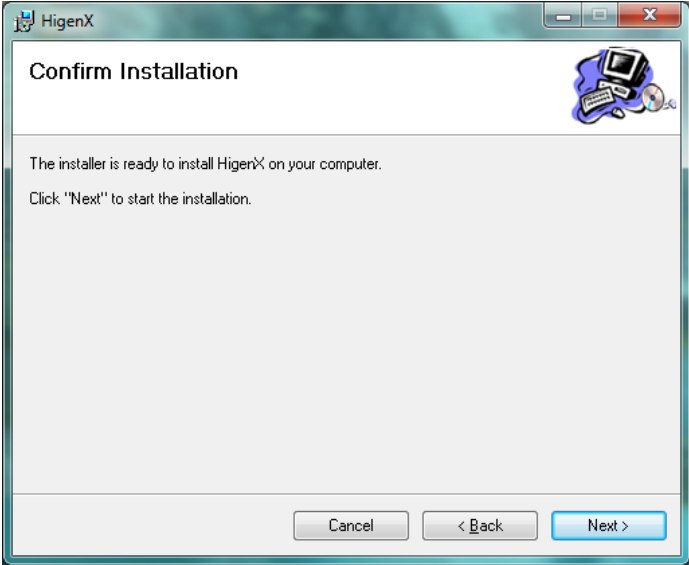


Fig. 32



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### 6) Installing Higenx

Higenx software is now installing, please wait for installation to complete.

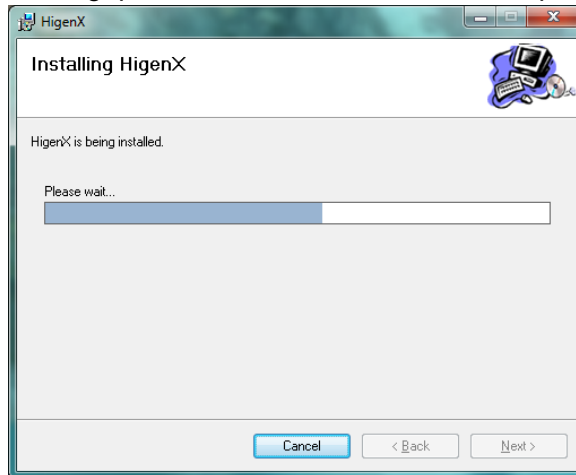


Fig. 33

### 7) Installation Complete

The installation is complete, click on the *Close* button to finish.

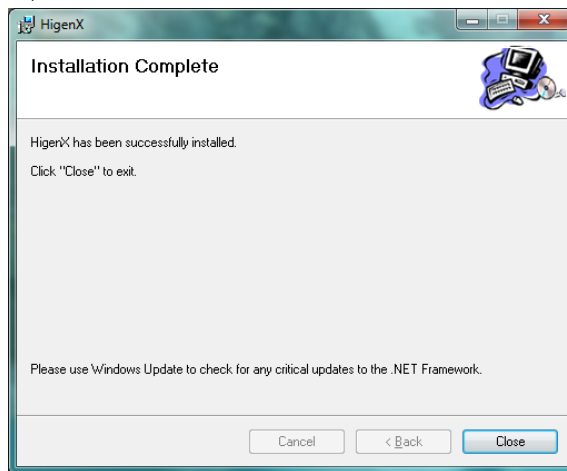


Fig. 34

8) There is now a Higenx shortcut on the desktop and the Higenx software can now be started from the programs menu.

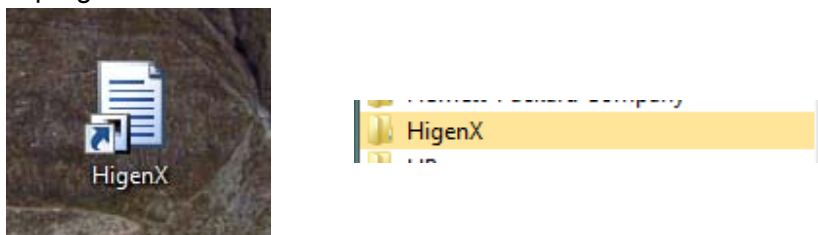


Fig. 35





## Higenx Technical User Guide



## Higenx Technical Guide

### Technical Specifications

<b>Product name</b>	<b>Operating Frequency</b>	<b>Types of modulation; (Ex: ASK, FSK)</b>	<b>Powered by</b>
<b>Personal Tag</b>	434.099 MHz	FSK	3V, 1 x CR2432 coin cell
<b>Zone control</b>	434.099 MHz	FSK	3V, two 1.5 Volt D batteries
<b>Register unit</b>	434.099 MHz	FSK	AC/DC adapter Input: 100 to 220 V Output 6V, 1 A.
<b>Electronic dispenser RF unit</b>	434.099 MHz	FSK	3V supply from dispenser batteries.
<b>Manual dispenser RF unit</b>	434.099 MHz	FSK	3V, 2 x 1.5V AAA batteries

Table 2 Higenx Technical Specifications



### Device address assignment in HigenX system

A device address is 16-bit wide, thereby giving a total of 65536 (0 to 0xFFFF) different addresses. A different range of addresses is allocated to a given device type. These are described in the table below\*.

Device	Range (hex)	Number of addresses available
Reserved	0000 – 0FFF	4096
Personal Tag	1000 – AFFF	40960
HigenX main unit	B000 – B7FF	2048
PC Transceiver	B800 - BFFF	2048
Zone Control Unit	C000 – C7FF	2048
Reserved	C800 – CFFF	2048
Soap dispenser unit	D000 – D7FF	2048
Reserved	D800 –FFFF	10240

Table 3 Device address assignment

\*The above only applies to certain systems/customers.