



# X5 Wireless Quick Start Guide





Safety notices in this manual are specified as follows:



**INFORMATION**

Respecting guidelines and regulations avoids errors



**CAUTION!**

Respecting guidelines and regulations avoids injuries or damage to material



**WARNING!**

Respecting guidelines and regulations avoids severe injuries or damage to material



**DANGER!**

Respecting guidelines and regulations avoids life-risks

X5 Wireless Quick Start Guide - ptn0723-05

Copyright © 2023 ON3 s.r.l. – Bari, Italy

Subject to change without notice

The information contained in this document is provided for informational purposes only. While efforts were made to verify the accuracy of the information contained in this documentation, it is provided “as is” without warranty of any kind.

Third-party brands and names are the property of their respective owners.

[www.exorint.com](http://www.exorint.com)

Software available in these products is based on OpenSource. Visit [oss.exorint.net](http://oss.exorint.net) for more details.



## TABLE OF CONTENTS

1	Introduction.....	5
1.1	Requirements .....	5
1.2	Key Shortcuts in X5 Wireless Handheld .....	5
2	Security Features .....	6
3	Applications with X5 Wireless .....	7
3.1	Client/Server Configuration (JMobile Client on Handheld).....	7
3.2	JMobile Runtime on Handheld.....	8
4	Setting Up a Minimal X5 Wireless System for Demonstration Purposes .....	9
4.1	Wiring X5 Base Station .....	10
4.2	Configuring X5 Base Station.....	11
4.3	Configuring X5 Wireless Handheld .....	14
5	Device Publisher.....	16
5.1	Forwarding Device Publisher Information to PLC/Controller .....	17
5.2	How to Receive Data from Device Publisher .....	18
6	Introducing Pairing App Version 2 .....	19
6.1	Base Station Selection .....	20
6.1.1	Base Station Settings.....	21
6.2	Pairing App Settings .....	21
6.2.1	Connect Automatically .....	22
6.2.2	List Sorting.....	22
6.2.3	Enable NFC .....	23
6.2.4	List Handling.....	23
6.3	Unpairing .....	24
6.3.1	Unpair.....	24
6.3.2	Flash Pairing Lamp .....	24
7	Using X5 Wireless - Application Notes.....	25
7.1	Auxiliary Unpairing Input.....	25
7.2	Using VNC Client for Easier Access to BS and Handheld .....	25
7.3	Pressing Multiple Keys in X5 Wireless Handheld.....	25
7.4	Haptic Response.....	25
Appendix A.	Differences between Pairing App V1 and V2.....	26





## 1 Introduction

This document serves as a comprehensive guide to establish a simple yet fully operational X5 Wireless sample system, encompassing all essential setup details.



### CAUTION!

This document is intended to supplement the X5 Wireless Installation Guide, the X5 Wireless User Manual and the JMobile User Manual by providing additional guidance and information. It is designed to complement, not replace, the product manuals. Make sure you have the required manuals available and up to date.

### 1.1 Requirements

X5 products are based on Linux BSP UN75 version 1.3.xxx and require JMobile version 4.5.0.xxx or later for programming activity.



### INFORMATION

X5 products are not compatible with programming using JMobile version 4.0 or earlier.

### 1.2 Key Shortcuts in X5 Wireless Handheld

Keypad shortcuts have been defined for switching on/off the X5 Wireless handheld as well as for starting the pairing application.



### INFORMATION

Press two keys simultaneously on the device keypad to create these combinations.

Switch on/Switch off X5 Wireless handheld device	<b>F2 and F5</b> Simultaneously press and hold the keys for approximately 2 seconds.
Start safety pairing application	<b>K1 and K4</b>



### INFORMATION

Key shortcuts are hardcoded and not customizable. No alternative methods are available for performing these two operations.



## 2 Security Features

The platform UN75 version 1.3.xxx is based on Linux and comes with built-in security features.

When starting a brand-new device, you must log-in before you can access System Settings.

Products are configured at manufacturing time with two users: "admin" and "user"

Each user has own password to authenticate the access.

**At first power-up**, the system will require users to replace the default password with a new one.

Default passwords are:

User	Password
admin	admin
user	user

The message you will see is:

### Authentication/Users

**Default password detected – please choose a more secure one. NOTE: system will reboot upon completion.**

Minimum password requirements are specified on screen.

When entering passwords for the **first time** you will not be required to insert the old (default) password.

Keep note of the passwords you have defined. If you forget them, you must restore the X5 device to factory default, wiping out the whole configuration.

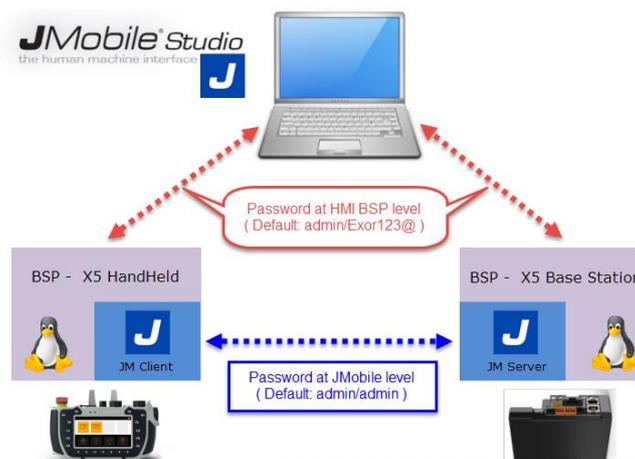
Please note that without authenticating as a valid user you cannot access System Settings or Start-up page in your X5 devices.

Access the system as "admin" whenever you need to change any property in System Settings.

You can change again BSP passwords at later time; use the option "Authentication" in System Settings for this. Remind that you will be required to enter the old password to be able to change to a new one.

Remind that there are cases where the system may ask users logging-in with credentials different from these system credentials.

For instance, the connection JMobile Server <-> JMobile Client has its own credentials, defined using JMobile Studio. See figure as a reminder for these different user management options.



### 3 Applications with X5 Wireless

X5 Wireless works with two primary system configurations. Each configuration presents distinct strengths and weaknesses.

#### 3.1 Client/Server Configuration (JMobile Client on Handheld)

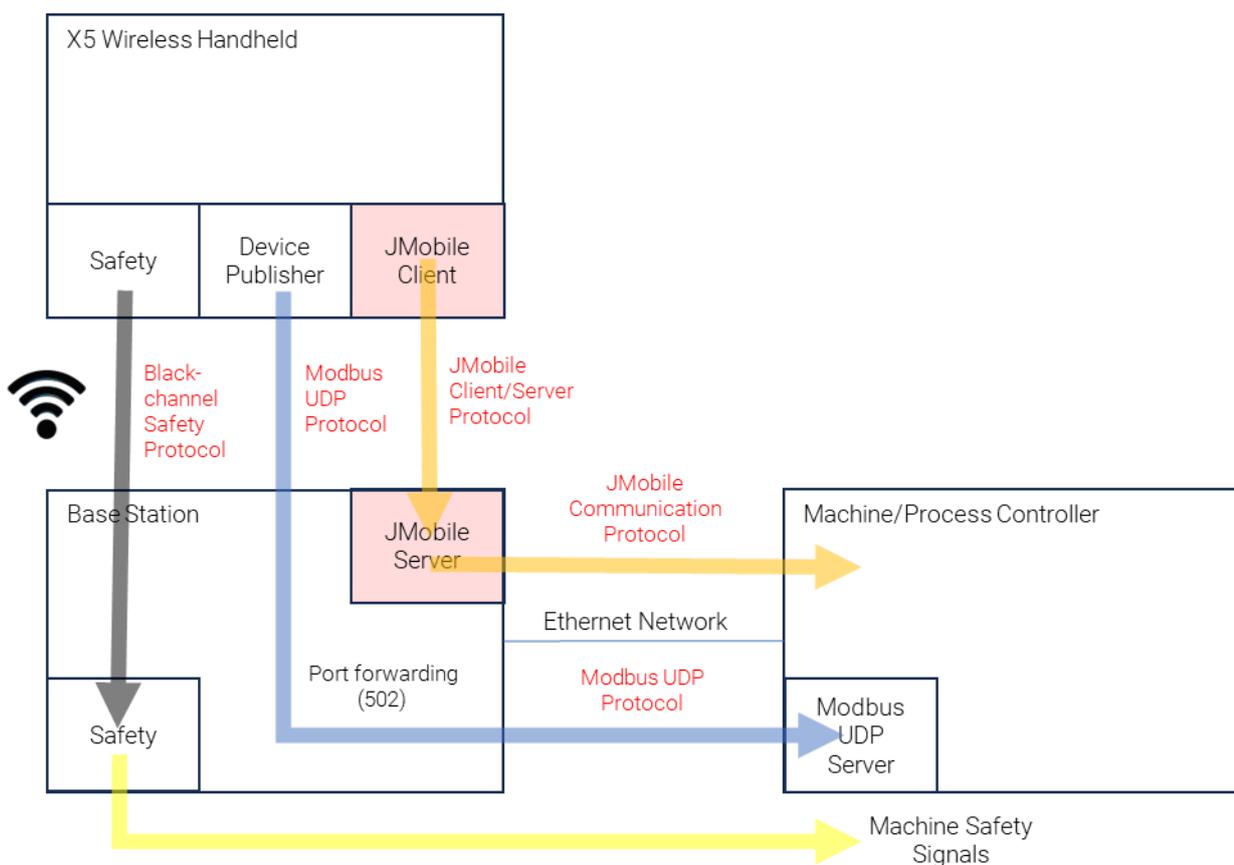
JMobile runtime is running on Base Station. X5 Wireless handheld runs JMobile client and connects to Base Station through the Wi-Fi network.

Strengths:

- in case of configurations with multiple base stations and a single handheld, the handheld is automatically loading the HMI program when connecting to the Base Station. There is no need of advance planning.
- JMobile application running on Base Station can continue operation and data acquisition also when the handheld is not connected. For instance, data acquisition/trend programmed in the JMobile application can be always active, disregard of the status of the handheld.
- there is no need to dedicate wireless band to complex PLC communication protocols.

Weaknesses:

- depending on the size of JMobile project, Client/Server connection may require a significant amount of time to be ready for operation.



**INFORMATION**

Software version of JMobile Client and JMobile Server **must** be the same.



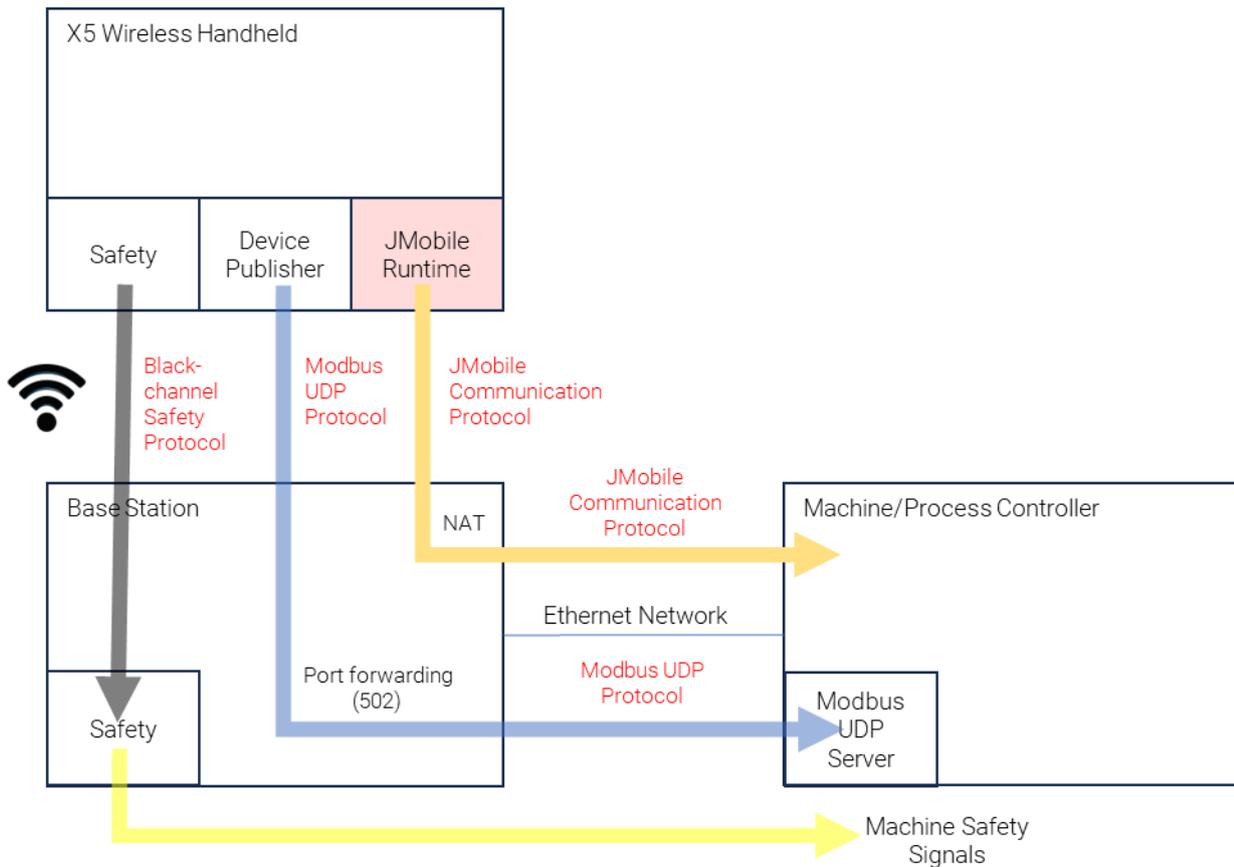
### 3.2 JMobile Runtime on Handheld

Strengths:

- Fast starting of JMobile application on handheld

Weaknesses:

- extra band load on wireless network due to the PLC communication protocol. Performance to be evaluated case by case.
- PLC protocol requires routing through Base Station. Performance to be evaluated case by case.
- in case of configurations with multiple base stations and a single handheld, the handheld must be programmed with an HMI program suitable for use with all machines.



## 4 Setting Up a Minimal X5 Wireless System for Demonstration Purposes

In this chapter, the objective is to establish a straightforward, yet fully operational, configuration designed specifically for demonstration purposes. Despite its simplicity, this configuration effectively highlights key features within X5 Wireless. Notably, it showcases the concept of safety pairing and the status of safety control devices, providing a comprehensive understanding of their functionality. This demonstration configuration offers valuable insights into the Device Publisher functionality, emphasizing its efficiency and the speed of updates. The JMobile project file that will be developed for this configuration operates in client/server mode, a method that adds substantial value to the X5 presentation.

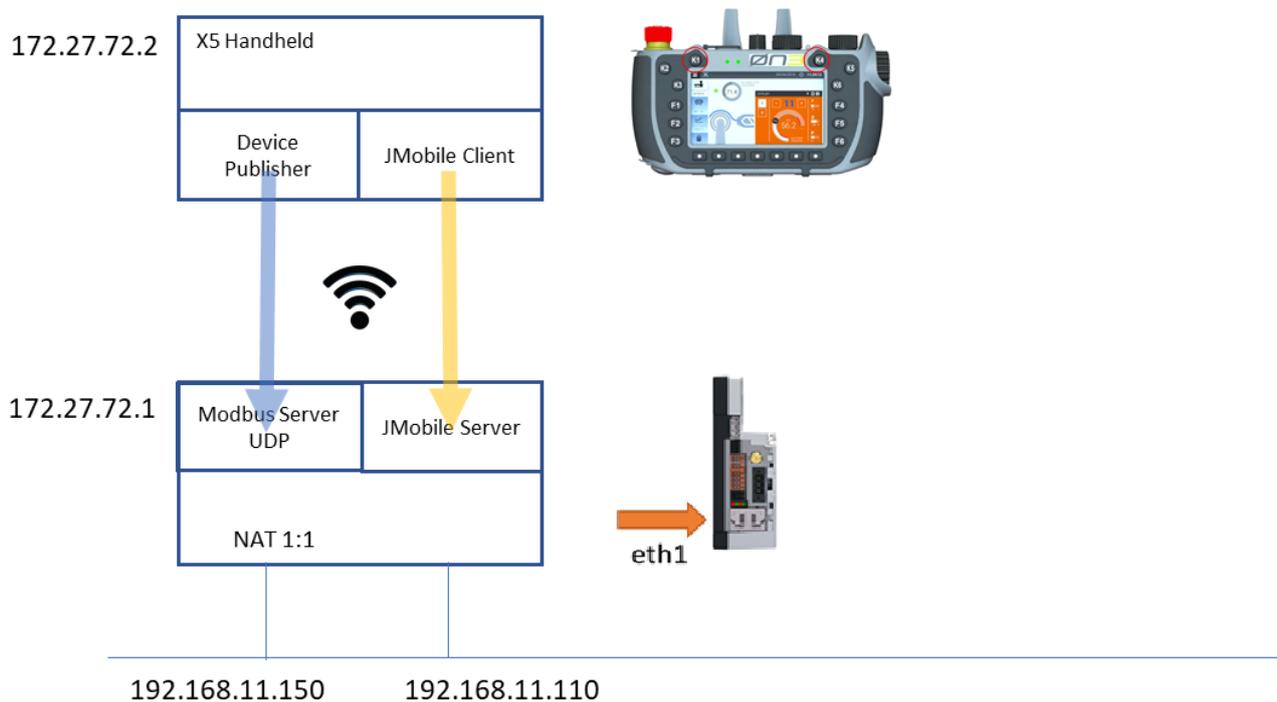
Moreover, this uncomplicated setup serves as a foundation for expansion. It can be effortlessly extended to achieve connectivity with an external PLC, broadening its potential applications. By the end of this chapter, you will have a clear understanding of setting up a basic yet impactful configuration, gaining proficiency in utilizing X5's essential features.

### *i* INFORMATION

When utilizing out-of-the-box X5 products, it is necessary to undergo a sequential yet straightforward configuration process.

The initial step involves the configuration of the Base Station. Once this phase is completed, you can then proceed to configure the handheld device.

The straightforward system setup presented in this chapter is illustrated in the figure.



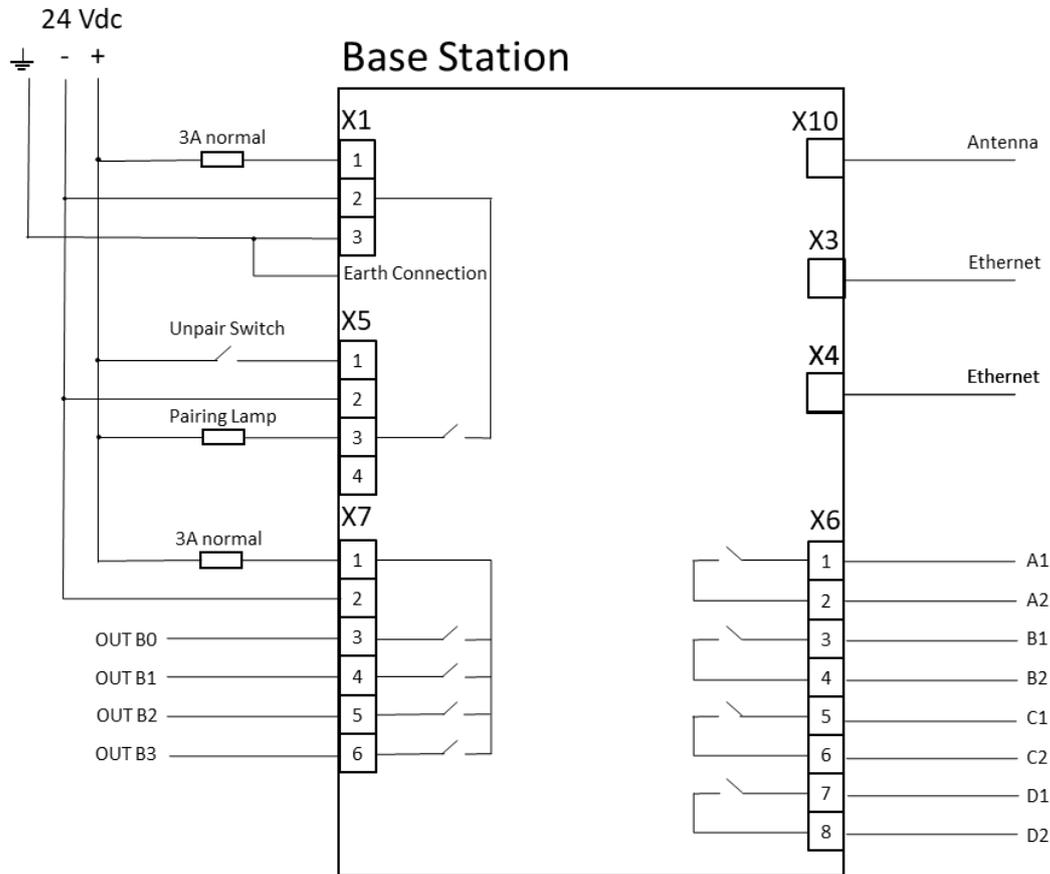
Please note that Ethernet network IP addressing may vary depending on the available network metrics. The values provided here are merely examples.

Additionally, it is important to understand that addresses within the Wi-Fi network are predetermined in the X5 Wireless design and cannot be altered.



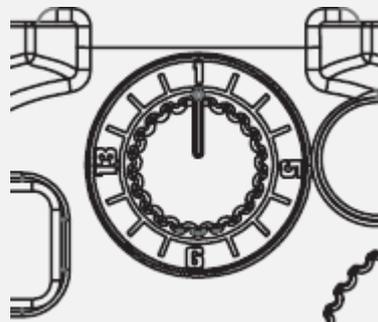
### 4.1 Wiring X5 Base Station

Operating X5 Base Station requires appropriate wiring. Refer to product Installation Guides and User Manual for details.



#### *i* INFORMATION

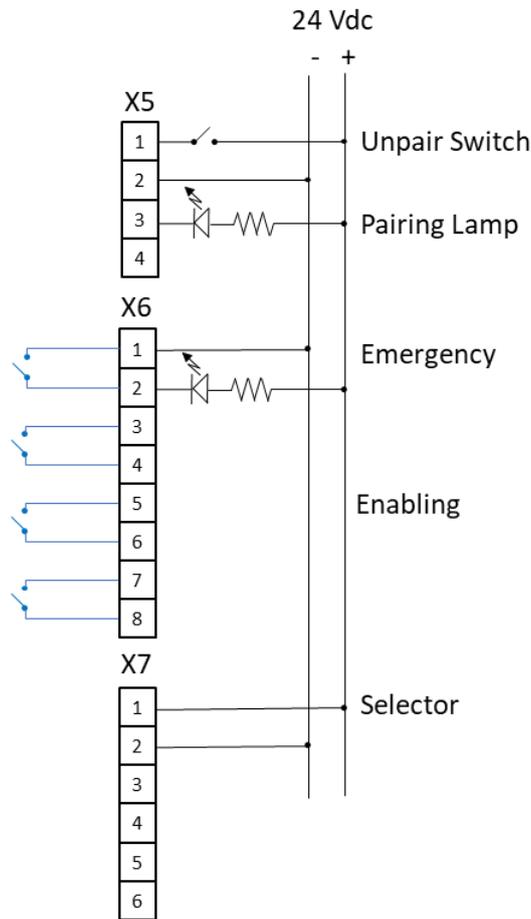
Pairing lamp is required to carry out the pairing process. 24 Vdc power must be applied to connector X7 in addition to powering the Base Station itself at connector X1. This is required also when Selector outputs are not used. Failing to apply this connection will result in pairing error when Selector is moved to any position different from "1".



Pairing app will report error code "Lost pair (Base error)". Any further attempt to start pairing procedure will result in the error "Base Station rejected pairing request". Base Station must be reset with a power cycle to restore operation.



Minimum wiring required for test operation is shown in figure.  
 Connect to X5 connector a 24 Vdc lamp (0.5 A max) or a LED with a 2K7 resistor in series.



## 4.2 Configuring X5 Base Station

You must complete the configuration of Base Station first. It will serve as the access point for the safety network.

1	<p>Switch on Base Station (BS).          Allow about one minute to complete boot phase.</p> <p>Find IP address assignment of Base Station Ethernet ports.          This is a process common to all EXOR eXware7xx devices. The port Eth0 is by default set to DHCP so the Base Station may obtain an IP address from your network. The port Eth1 has a default IP address of 192.168.0.1 with a subnet of 255.255.255.0, You can use this port if you connect point to point to a computer with an IP address in that same network.          You may also use the service:  <b>Run&gt; Manage Target&gt; Board</b>          in JMobile Studio ManageTarget to find out the address of the device.          The device may have been assigned an Auto-IP address or may have received an address from a DHCP server.          This example assumes you will use port Eth1.</p>
---	---



2 Connect to device System Settings using a computer running a browser.  
[https://ipaddress/machine\\_config](https://ipaddress/machine_config)  
 System is security protected by default.  
 If you are using a device for the first time you will be asked to change default passwords.  
 Read chapter [Security Features](#) in this manual for more information.  
 Base Station will reboot after changing passwords.

3 Settings/Localization:  
 Select  
 Country Code = [the country where you are]  
 You may enter the first characters of the desired country to quickly locate the code in the list.

4 Settings/Network:  
 Assign fixed IP Address, Netmask and Gateway to Eth1  
 Enable Wireless Networking and "Safety WiFi Network"  
 Select Wi-Fi channel.

**Network Interfaces**

Name	Label	MAC	DHCP	Address	Netmask	Gateway
eth0	WAN	00:30:d8:09:95:c9	Enabled	10.1.34.134	255.255.255.0	10.1.34.253
eth1	LAN1	00:30:d8:09:95:ca	Disabled	192.168.11.110	255.255.255.0	192.168.11.1
eth1.nat1to1.0	ALIAS			192.168.11.150		
wlan0	WIFI	24:7d:4d:6f:78:55	Disabled	172.27.72.1	255.255.255.0	

**Wireless Networking**

Regulatory Domain: IT

Interface Name: wlan0

Enabled: Yes

Safety WiFi Network: Yes

Channel: 38 (5190 MHz) - INDOOR ONLY

State: COMPLETED ✓

Connected Stations: 1

5	<p>Settings/Services Define a NAT rule to prepare direct access to X5 Wireless handheld Open Router/NAT/Port forwarding</p> <div><p>Router / NAT / Port forwarding</p><p>Enabled <input checked="" type="checkbox"/></p><p>Port Forwarding Rules None</p><p>1:1 NAT Rules</p><table border="1"><thead><tr><th>Enabled</th><th>Name</th><th>Source Interface</th><th>Source IP</th><th>Device IP</th><th>Port or Range (empty or P1 or P1-Pn)</th></tr></thead><tbody><tr><td><input checked="" type="checkbox"/></td><td>X5 wireless</td><td>eth1</td><td>192.168.11.150</td><td>172.27.72.2</td><td></td></tr></tbody></table></div> <p>Device IP (that is the address of the X5 Wireless handheld within the Wi-Fi network) is fixed and should not be changed. The Source IP refers to the address allocated to the Base Station (BS) within its network context. This configuration entails the allocation of a static IP address to the X5 wireless handheld device.</p> <p><b>Warning:</b> ensure that the value entered for 'Source IP' does not match the actual IP address assigned to the physical Ethernet port specified as the 'Source Interface'. Failure to adhere to this caution may result in malfunction.</p>	Enabled	Name	Source Interface	Source IP	Device IP	Port or Range (empty or P1 or P1-Pn)	<input checked="" type="checkbox"/>	X5 wireless	eth1	192.168.11.150	172.27.72.2	
Enabled	Name	Source Interface	Source IP	Device IP	Port or Range (empty or P1 or P1-Pn)								
<input checked="" type="checkbox"/>	X5 wireless	eth1	192.168.11.150	172.27.72.2									
6	<p>Settings/Services Enable VNC Server with autostart</p>												
7	<p>Create a simple project file using JMobile Studio. This sample project should include:</p> <ul style="list-style-type: none"><li>- System Variables protocol configured for Xbase device.</li><li>- Modbus TCP Server protocol configured in UDP mode ("use UDP/IP").</li><li>- Tag definition as needed.</li></ul> <p>For demonstration purpose we suggest you avoid activating user management in project. Load this project file to BS using JMobile Studio.</p>												
8	<p>Connect a VNC client to BS to check operation of JMobile runtime with the project file you have just loaded.</p>												

### 4.3 Configuring X5 Wireless Handheld



#### INFORMATION

Complete the Base Station (BS) configuration as outlined in the previous chapter before proceeding with the handheld configuration.

1	<p>Power on X5 Wireless handheld. Wait for boot phase to complete. At first power-up you may be asked "Country Code must be set to unlock the system". Selecting the country of operation is required to comply with regulatory requirements for radio transmission. When asked to start the pairing procedure press "Exit" button and return to startup menu.</p>
2	<p>Using JM Studio prepare a JMobile update package containing "JMobile Client" and save it to a USB flash drive. Install this package to the handheld using the USB flash drive. Add the JMobile Client software to the device start-up list.</p>
3	<p>If not already present in the list, install "Device Publisher" software application using a USB flash drive. Add the software to the device start-up list.</p>
4	<p>Start System Settings. Use touchscreen for operation. System is security protected by default. If you are using a device for the first time you will be asked to change default passwords. Read chapter <a href="#">Security Features</a> in this manual for further information.</p>
4	<p>Settings/Localization Make sure Country Code has been entered correctly for compliance with radio communications regulatory requirements. Country Code = Italy (or the country where you are)</p>
5	<p>Settings/Network: Enable Safety Wi-Fi</p>
6	<p>Settings/Device Publisher Enable Device Publisher. Accept default properties.</p>
7	<p>Settings/Services Enable SSH Server with autostart Enable VNC Server with autostart</p>
8	<p>Open the Pairing application pressing keys K1 and K4.</p>
	<p>The first time you open the Pairing application, the list of devices will appear empty. Create a new entry in the list with the UID of a new device pressing the button "+" to start the process. Use the <b>UID number</b> printed on the BS module to identify the BS you are connecting.</p>



	The UID (Unique Identification) number can also be found in the System/Info page of System Settings in Base Station.
9	Select from the UID list the device you want to pair with. Press button "Connect" to start. Wait for Wi-Fi connection to complete.
10	Start the pairing procedure and follow the sequence described in X5 Installation Guide. To carry out this process you must have a lamp connected to the pairing lamp output of the BS (connector X5, pin 3). At the successful completion of the pairing procedure, the Emergency Stop button will turn red. Now the safety channel is active. If you press the Enabling button or the Emergency Stop button you will hear relays clicking in Base Station to replicate the status of safety devices in the handheld.
11	Use a computer running a browser to connect to X5 Wireless device System Settings. The IP address is the one you have previously defined with the NAT rule in BS settings <a href="https://ipaddress/machine_config">https://ipaddress/machine_config</a> (see previous chapter) Remind that access to System Settings is security protected by default. If you are using a device for the first time you will be asked to change default passwords. Read chapter <a href="#">Security Features</a> in this manual for further information.
12	Complete the setup of JMobile Client entering the settings: Server Address: <a href="http://172.27.72.1">http://172.27.72.1</a> (this is the pre-defined address of BS in Wi-Fi network) Auto connect at startup: checked. Fit to screen size: checked.
13	Now on X5 Wireless handheld screen you will see the project file that is running in Base Station. Normal interactivity with the HMI application is possible.
14	Connect a VNC client to the address of the handheld as defined in previous chapter. That will allow you to have simple monitoring/diagnostic access to the content of the screen in X5 Wireless handheld.



## 5 Device Publisher

Device Publisher is a software application designed to provide fast transfer of certain device data from handheld to the PLC/controller connected to the Base Station.

This is an important requirement for applications where X5 is used for direct interaction with machines.

Device Publisher uses Modbus TCP protocol in UDP mode and operates as client.

Data transfer uses Modbus Function Code 16, Write multiple registers.

Modbus addressing and register allocation are fixed.

Device Publisher cyclically sends data packets with a cycle time of about 10 ms.

Register assignment:

Holding Register	Name	Data Type	Range	Description / Notes
400001	version	unsignedShort	1	The version number of this register schema
400002	counter	unsignedShort	-	Current packet count (diagnostic information)
400003	elapsed	uint64	-	Number of elapsed milliseconds since service was started (Linux epoch timestamp)
400007	keys map	uint64	-	Binary map of keypad state
400011	wheel	unsignedShort	0..32767	Wheel counter
400012	pot 0	unsignedShort	0..255	Potentiometer
400013	pot 1	unsignedShort	0..255	Potentiometer
400014.0	battery	unsignedByte	0..100	Battery charge level
400014.1	wifi signal	unsignedByte	0..100	Wi-Fi signal level

Byte order is big endian. Bit assignment for "keys map" 400007:

Key	Key ID	Bit Mask	HEX
F1	KEY_F1	00000000000000000000000000000001	00000001
F2	KEY_F2	00000000000000000000000000000010	00000002
F3	KEY_F3	00000000000000000000000000000100	00000004
F4	KEY_F4	000000000000000000000000000001000	00000008
F5	KEY_F5	0000000000000000000000000000010000	00000010
F6	KEY_F6	00000000000000000000000000000100000	00000020
K1	KEY_F7	000000000000000000000000000001000000	00000040
K2	KEY_F8	0000000000000000000000000000010000000	00000080
K3	KEY_F9	00000000000000000000000000000100000000	00000100
K4	KEY_F10	000000000000000000000000000001000000000	00000200
K5	KEY_F11	0000000000000000000000000000010000000000	00000400
K6	KEY_F12	00000000000000000000000000000100000000000	00000800
dot1	KEY_F13	000000000000000000000000000001000000000000	00001000
dot2	KEY_F14	0000000000000000000000000000010000000000000	00002000
dot3	KEY_F15	00000000000000000000000000000100000000000000	00004000
dot4	KEY_F16	000000000000000000000000000001000000000000000	00008000
dot5	KEY_F17	0000000000000000000000000000010000000000000000	00010000
dot6	KEY_F18	00000000000000000000000000000100000000000000000	00020000
dot7	KEY_F19	000000000000000000000000000001000000000000000000	00040000

### 5.1 Forwarding Device Publisher Information to PLC/Controller

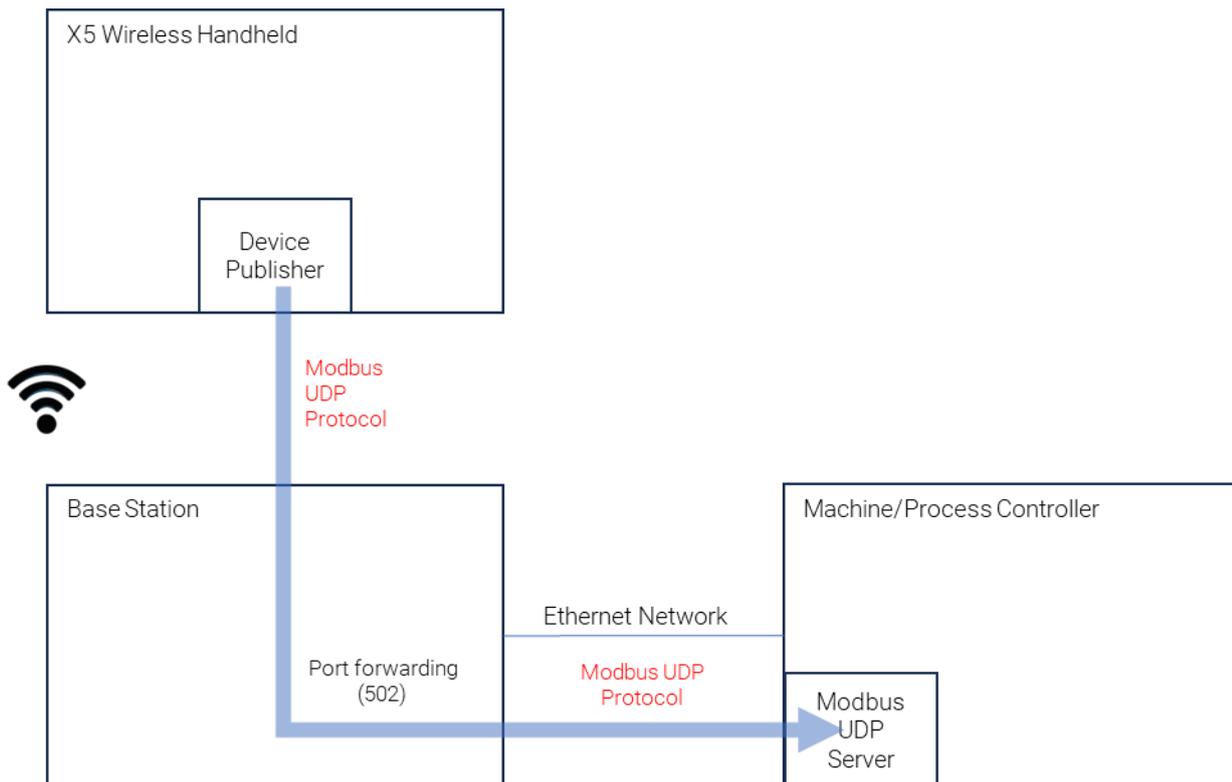
You can automatically redirect the information produced by Device Publisher to the Controller/PLC connected to the Base Station.

This will ensure the most efficient transfer of time-critical information directly from the handheld to the Controller/PLC.

Please note that to do so the Controller/PLC must have a Modbus TCP server configured for operating in UDP mode.

Addressing of Device Publisher information is given above.

Figure shows the diagram of the system you will be setting.



- 1 Connect to Base Station using a browser and open System Settings. Remind that you will be asked to enter credentials.

---

- 2 Settings/Services  
 Open Router/NAT/Port forwarding  
 Define a Port forwarding rule associated the port used by the Modbus protocol of the Device Publisher  

Port Forwarding Rules					
Enabled	Name	Source Interface	Source Port	Device IP	Device Port
<input checked="" type="checkbox"/>	Dev-Pub	wlan0	502	10.1.34.131	502

Note that the "Device IP" address will have to be replaced with the actual IP address of the controller you have connected to the Base Station

---

- 3 Note that Modbus in UDP mode is only sending out datagrams and does not expect response from the server. The protocol in Device Publisher does not establish communication sessions and does not provide error information, even in case the server is not present.



## 5.2 How to Receive Data from Device Publisher

Device Publisher uses Modbus TCP protocol in UDP mode to send X5 device information. Port number 502, standard assignment to Modbus TCP and UDP, is used as default. The software application uses only one data packet to send information using Modbus Function Code 16, Write Multiple Registers. Dimensions of the Modbus packet are fixed. Data section is 28 bytes.

Modbus in UDP mode does not expect a response from the server receiving the data. The format of the UDP packet in Device Publisher is shown in figure (produced with WireShark).

```

> Frame 29979: 83 bytes on wire (664 bits), 83 bytes captured (664 bits) on
▼ Ethernet II, Src: Netgear_68:b3:df (8c:3b:ad:68:b3:df), Dst: Dell_b1:54:8
  ▼ Destination: Dell_b1:54:8c (c8:f7:50:b1:54:8c)
    Address: Dell_b1:54:8c (c8:f7:50:b1:54:8c)
    .... ..0. .... .. = LG bit: Globally unique address (fa
    .... ..0. .... .. = IG bit: Individual address (unicast
  > Source: Netgear_68:b3:df (8c:3b:ad:68:b3:df)
    Type: IPv4 (0x0800)
> Internet Protocol Version 4, Src: 10.1.34.28, Dst: 10.1.32.153
> User Datagram Protocol, Src Port: 39892, Dst Port: 502
> Modbus/UDP
▼ Modbus
  .001 0000 = Function Code: Write Multiple Registers (16)
  Reference Number: 0
  Word Count: 14
  Byte Count: 28
  > Register 0 (UINT16): 1
  > Register 1 (UINT16): 36089
  > Register 2 (UINT16): 2298
  > Register 3 (UINT16): 6547
  > Register 4 (UINT16): 374
  > Register 5 (UINT16): 0
  > Register 6 (UINT16): 0
  > Register 7 (UINT16): 0
  > Register 8 (UINT16): 0
  > Register 9 (UINT16): 0
  > Register 10 (UINT16): 32767
  > Register 11 (UINT16): 0
  > Register 12 (UINT16): 32
  ▼ Register 13 (UINT16): 23140

```

```

0000 c8 f7 50 b1 54 8c 8c 3b ad 68 b3 df 08 00 45 00  .P.T.; .h....E.
0010 00 45 47 f7 40 00 3e 11 9d fa 0a 01 22 1c 0a 01  .EG.@.> .....
0020 20 99 9b d4 01 f6 00 31 6d 3e 00 00 00 00 23  .....1 m>....#
0030 00 10 00 00 00 0e 1c 00 01 8c f9 08 fa 19 93 01  .....
0040 76 00 00 00 00 00 00 00 00 00 00 7f ff 00 00 00  v.....
0050 20 5a 64                                           Zd

```

The payload of Device Publisher starts at byte offset 49; see it highlighted in yellow in figure.

The byte sequence of the payload is:

Modbus Function Code	10
Start/End Address	00 00 00 0e
Byte Length	1c
Version	00 01
Counter	8c f9
Elapsed	08 fa 19 93 01 76 00 00
Key map	00 00 00 00 00 00 00 00
Wheel	7f ff
Pot 0	00 00
Pot 1	00 20
Wi-Fi level	5a
Battery charge level	64

X5 data area is highlighted in yellow. Values shown are examples.



## 6 Introducing Pairing App Version 2

The X5 Wireless handheld and Base Station now support Pairing app Version 2. This updated app boasts a refreshed graphical user interface (GUI) with flat-style button widgets, akin to those in JMobile 4.5 Widget Gallery. Moreover, Pairing app Version 2 introduces a streamlined pairing procedure, detailed in the X5 Wireless User Manual and X5 Wireless Installation Guide for your reference. For easy identification, the System Variable "Safety Version" indicates the current Pairing app version. As you use this manual, you will encounter sample screens provided for your guidance.



### INFORMATION

Content of this chapter refers to X5 BSP version 1.3.880 or later which includes the new Pairing app version 2. Changes are considered with reference to BSP version 1.3.822.

Pairing app version 2 include these new features:

1	Refreshed GUI with a button style consistent with the Widget Gallery design of JMobile 4.5.
2	Simplified Pairing Process: the revised procedure involves responding with the number of flashes, followed by pressing and releasing the Emergency Stop button. During the wait for the pressure/release of the Emergency Stop button, the pairing lamp flashes rapidly. Operators no longer need to check the lamp ON/OFF status and respond accordingly. This modification guarantees a more expedited completion of the pairing process.
3	Enhanced Accessibility of critical information: the Base Station UID and Description are now consistently displayed on all pages of the Pairing app, ensuring users have constant reference information.
4	Clear Instructions: operator help text has undergone a revamp. Screens in the enhanced Pairing app now present precise and easily understandable descriptions in the English language, guiding users through expected operations.
5	Changed operation of property "Connect automatically".

This software revision maintains the original information while enhancing the flow and readability of the description.

The X5 Base Station and X5 Wireless handheld may have different BSP versions, resulting in the use of different Pairing app versions.

All combinations are viable and supported to ensure proper operation.

The table below outlines the pairing procedure type based on the BSP content of both devices.

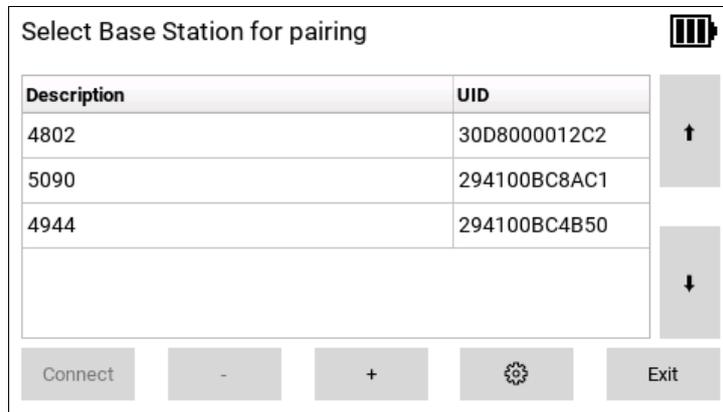
X5 Base Station	Pairing V1	Pairing V2
X5 Wireless handheld		
Pairing V1	Pairing V1	Pairing V1
Pairing V2	Pairing V2	Pairing V2

In practical terms, when using an X5 Wireless handheld with a BSP that includes Pairing app version 2, the user will always experience the operation of Pairing app version 2, regardless of the version of the X5 Base Station.



## 6.1 Base Station Selection

Base Station Selection is the main screen in the Pairing app. From this screen you can choose the BS you want to connect and then pair.



	Update the content of the list based on Wi-Fi Strength. This button only appears when you have selected the option Wi-Fi Strength for list sorting.
+	Add new BS to the list.
-	Remove selected BS from the list.
	Open Settings.
Connect	Connect to selected BS. If connection is not successful the error message "Time out, unable to connect to [UID]" will appear.
Exit	Return to X5 application.

Touch an item in the list to select. Selected item will be highlighted.  
Double click an item in the list to edit settings.  
Use arrow buttons to scroll through the list. Swipe list items for faster scrolling.



### 6.1.1 Base Station Settings

Enter Base Station properties in Settings page.

**Add new Base Station**

Base Station UID:

Base Station description:

NFC Code:

Password:

Base Station UID	Unique Identifier for the BS. UID is printed on product labels and can be displayed in System Settings.
Base Station description	User-defined description text for the BS.
NFC Code	See below.
Password	

### 6.2 Pairing App Settings

Use Pairing app settings to specify operation properties.

**Settings**

Connect automatically

Enable NFC

**List Handling**

**List Sorting**

Wi-Fi strength
  Alphabetical
  Default



### 6.2.1 Connect Automatically

This property relates to operation of the Wi-Fi network.

<input type="checkbox"/> Unchecked	<ul style="list-style-type: none"> <li>- upon power-up, the X5 Wireless device will <b>not</b> automatically attempt to reconnect to the previously connected BS upon power-up,</li> <li>- following a successful Unpair command, the X5 Wireless device will automatically disconnect from the BS.</li> </ul>
<input checked="" type="checkbox"/> Checked	Upon power-up, the X5 Wireless device will automatically attempt to reconnect to the previously connected BS.



#### INFORMATION

After successfully establishing an automatic connection with the BS, the X5 Wireless device will not proceed with the pairing process. Instead, it will remain ready awaiting operator input to finalize the pairing procedure.

### 6.2.2 List Sorting

The X5 Pairing app streamlines the management process of X5 BS by presenting a list of these devices, each associated with its unique UID number. In situations where the number of devices becomes substantial, manual navigation of the list using the handheld can become a challenging effort with an increased susceptibility to errors.

The List Sorting option is designed to enhance the device selection process by offering users three distinct sorting methods, thereby improving efficiency of navigation.

Wi-Fi strength	Sorting of list entries is determined by the strength of their respective Wi-Fi signals. This approach is particularly advantageous when dealing with numerous devices distributed across various locations, as is typical within large working areas. Devices with stronger Wi-Fi signals will be given priority placement at the top of the list. This strategy takes into consideration that devices near the user are more likely to exhibit higher radio signal strength. The X5 handheld device conducts a comprehensive scan of all available Wi-Fi channels, evaluating the radio signal strength of each X5 BS device listed. The content of the list is automatically updated whenever the Pairing app is launched, with a brief 5-second interval typically required for stabilization. Users also have the option to manually initiate an update by pressing the dedicated update button located on the right side of the list. Notably, the update button only becomes visible if the "Wi-Fi strength" sorting method has been selected.
Alphabetical	Sorting of list entries is based on the content of their respective "Description." This "Description" is a user-defined string, offering a distinct and easily recognizable reference to each specific device. By employing this approach, devices can be conveniently sorted and located alphabetically, streamlining the selection processes.
Default	This method presents UID entries in the order established by the user. It is important to note that any new entries added using the "Add" function will be appended to the end of the list.



### 6.2.3 Enable NFC

X5 can take advantage of NFC tags to accelerate the Pairing process.

Check "Enable NFC" in the Settings page to activate the function.

X5 handhelds include an NFC device compatible with ISO/IEC 14443A.

You can easily associate a unique NFC code to each entry in the UID list when adding a new Base Station or editing properties of an existing Base Station.

"NFC Code" is the unique identifier (UID) of the NFC tag used in the identification process.

You can enter the NFC Code manually or, in alternative, you can scan the NFC tag while the Base Station property window is open. If the scan is successful, the NFC Code property will be filled with the tag unique identifier.

NFC can be used to achieve immediate selection of a Base Station for pairing. When the Pairing app is showing the Base Station list, just scan an NFC tag and, if the identifier of the tag is matching one of those programmed in the properties of one of the Base Stations in the list, then the app will propose to proceed immediately to the connection step.

After connection has been completed, pairing procedure will proceed in the usual way.

### 6.2.4 List Handling

Base Station List import/export function has the purpose of:

- simplify the creation of long BS lists for use with the Pairing app.
- backing-up or archiving the content of BS lists.
- copying BS lists from one X5 wireless handheld to another.

Managing BS lists require a USB Flash drive attached to one of the USB ports in the X5 Wireless handheld.

Import and Export command buttons are available in the Pairing app settings page.

#### 6.2.4.1 Exporting Base Station List

1	Insert one USB Flash drive into any of the USB ports of the X5 handheld device.
2	Go to Pairing app settings and press the button "Export".
3	The contents of the Base Station list will be duplicated into the file 'Export_List.txt' within the root folder of the USB flash drive. If the file does not exist, it will be created. If a file with the same name already exists in the root folder, it will be overwritten, resulting in the loss of previous content.

Exported file is a comma-separated text file. There is one line for each Base Station present in the list.

Lines follow the format given below:

"Base Station UID","Description","Encrypted password","NFC UID","Encrypted"

Length of Base Station UID is fixed at 12 characters.

Maximum length of Description and NFC UID is 33 characters.

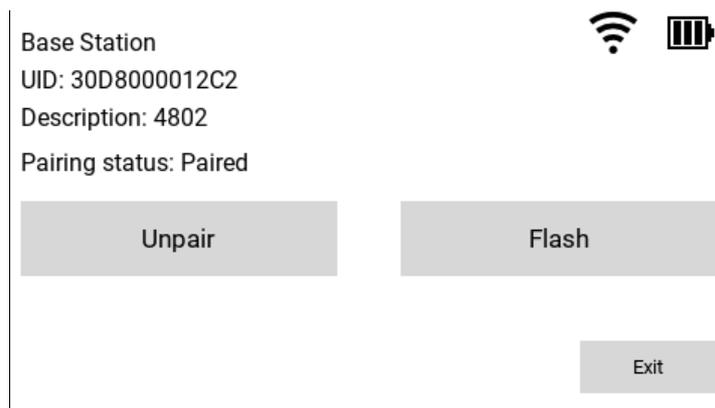
The format of the exported file is ready for use with the import procedure.

### 6.2.4.2 Importing Base Station List

1	Generate a file named 'Import_List.txt' following the format outlined above and populate it with the necessary information.
2	Copy the file 'Import_List.txt' to the root folder of a USB Flash drive.
3	Insert the USB flash drive into any of the USB ports on the X5 handheld device.
4	Go to Pairing app settings and press the button "Import".
5	The content of the file will be copied to the Base Station list. If the file is not found, an error message will be displayed. Content of previous BS list will be overwritten and lost.

If you need to replicate the Base Station List from one device to another, simply export the file from the source device and import it onto the target device, adjusting the filename as needed.

## 6.3 Unpairing



### 6.3.1 Unpair

Press Unpair to interrupt the safety link between X5 Wireless handheld and Base Station. Unpairing will terminate the Wi-Fi connection between the two devices if "Connect automatically" has not been checked; if checked the two devices will stay connected.

### 6.3.2 Flash Pairing Lamp

In configurations including multiple systems controlled by X5, it may be useful for operators to easily have an indication of what BS station is currently paired with a certain handheld. This is the purpose of the "Flash" function available on the screen of the Pairing app. Pressing the Flash button results in the pairing lamp flashing with a cycle of about 3 Hz for a duration of 4 seconds.



## 7 Using X5 Wireless - Application Notes

### 7.1 Auxiliary Unpairing Input

The 'Auxiliary Unpairing Input' (connector X5, pin 1-2) on the Base Station (BS) is utilized in specific scenarios.

This input triggers a recovery procedure to reset the safety state of BS to IDLE when the device itself is either in SAFE or SAFE-P state (refer to X5 User Manual for details). The Auxiliary Unpairing Input is only active during these conditions. The Auxiliary Unpairing Input is edge sensitive. To activate the input, change the value from OFF to ON. Keeping the input constantly at the ON state will have no effect.

The need to transition the safety state of BS to IDLE with a direct action at the BS itself arises when the X5 Wireless handheld is unavailable. Reasons for unavailability include battery discharge, Wi-Fi out of range, device switched off or device failure.

When the BS is in the safety state IDLE, the Emergency Stop outputs (connector X6, pins 1-4) are closed. This indicates that X5 is not requesting an Emergency Stop for the machine under control. The IDLE state is non-volatile and will persist even when power cycling the BS.

### 7.2 Using VNC Client for Easier Access to BS and Handheld

To enhance your testing experience with the X5, we recommend utilizing a VNC client on your computer. By employing VNC, you can conveniently access screen information both on the BS and the X5 Wireless handheld.

To get started with VNC, enable the VNC service in System Settings/Services. Remember to activate the VNC service on both the BS and the handheld. For accessing information on the handheld, ensure that you have configured the necessary NAT rule on the BS.

### 7.3 Pressing Multiple Keys in X5 Wireless Handheld

Keypad handler in X5 Wireless handheld supports a maximum of 2 keys pressed at the same time. If you press more than 2 keys at the same time, the handler will return a no-key-pressed status.

### 7.4 Haptic Response

X5 Wireless handheld includes a haptic response device.

It can be highly effective in giving information to users holding the device without disturbing his flow of activity.

The haptic response is in the form of a vibration transferred from the device to the hands of the user. Haptic response can be programmed using dedicated System Variables:

Vibration

Vibration Timeout.



## Appendix A. Differences between Pairing App V1 and V2

This appendix illustrates shows differences between the functions and procedures in Pairing app version 2 (UN75 BSP version 1.3.880 or later) and previous versions (UN75 BSP version up to 1.3.822).

Feature	Version 1	Version 2
Base Station Selection		
Start Pairing		
Enter Number of Lamp Flashes		
Check Lamp ON		Removed
Check Lamp OFF		Removed



Feature	Version 1	Version 2
Press and Release Emergency Stop Button	 <p>Press and release the Emergency Stop button</p> <p></p> <p>Abort</p>	 <p>Base Station UID: 30D8000012C2 Description: 4802</p> <p> Press and release the Emergency Stop button</p> <p>Enabling button must be released Pairing activated at the release of Emergency Stop button</p> <p>Pairing V2</p> <p>Abort</p>
Unpair or Flash	 <p>Pairing status: Paired  </p> <p>Paired with: UID 30D8000012C2 Description Device 4802</p> <p>Unpair Flash</p> <p>Exit</p>	 <p>Base Station  </p> <p>UID: 30D8000012C2 Description: 4802 Pairing status: Paired</p> <p>Unpair Flash</p> <p>Exit</p>
Connect automatically	If 'Connect automatically' is not checked, Wi-Fi connection is preserved after Unpair command.	If 'Connect automatically' is not checked, Wi-Fi connection is terminated after Unpair command.
List Sorting Wi-Fi Strength	List content is always updated automatically.	The list content is updated automatically when the page is shown, and additional updates can be requested manually.