# Falco MD11 User Manual

**Contact us**



| | |
|---|---|
| International (M) | 26 Zarhin St., Raanana, 4366250, Israel |
| **EC\|REP** | CEpartner4U Esdoornlaan 13, 3951 DB Maarn, The Netherlands<br>+31.6.516.536.26 |
| Website | Medical.teradek.com |
| TEL: | +972.9.962.9200 |

# Table of Contents

## 1.1 Glossary of Symbols

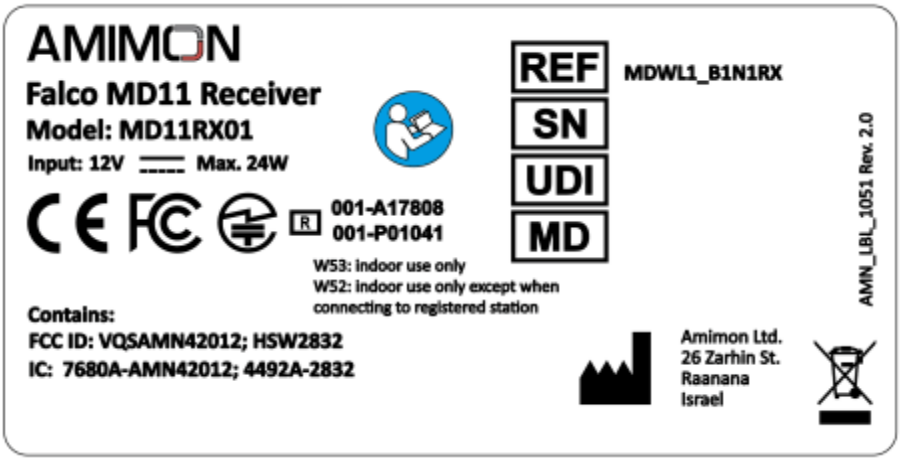
The following are symbols that you will find throughout this operating manual and their meanings

| | |
|---|---|
|  | WARNING: The information stated where you will see this symbol is extremely important and must be noted! |
|  | General Information |
|  | "Conformité Européene" Symbol (CE Marking) |
|  | Waste of Electrical and Electronic Equipment (WEEE) Marking |
|  | Manufacturer |
|  | Authorized Representative in the European Community |
|  | Manufacturer (accompanied by the name and address of the manufacturer) |
|  | Date of Manufacture |
|  | Medical Device |
|  | Country of Manufacturer |
|  | Fragile |
|  | This Way Up |
|  | Keep Dry |
|  | Catalog Number |

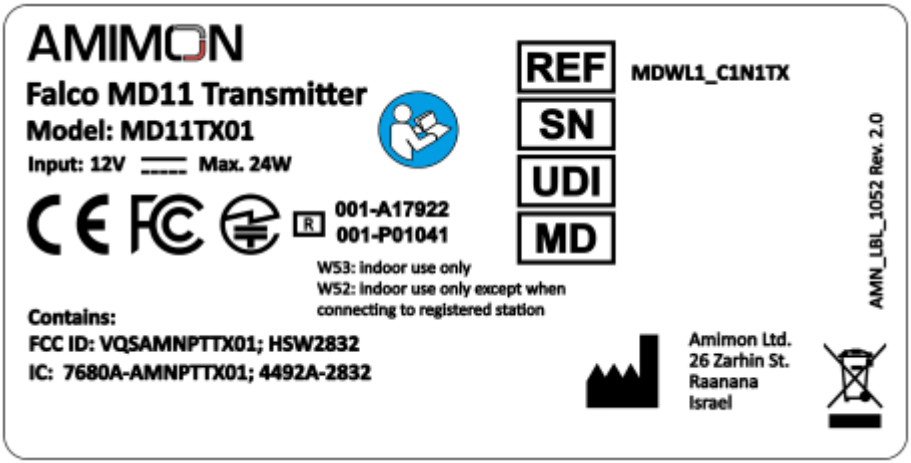
| | |
|---|---|
|  | Serial Number |
|  | Wireless Transmission |
|  | Storage and Transport Humidity Range |
|  | DC Power Control |
|  | Storage and Transport Temperature Range |
|  | Refer to Instruction Manual/Booklet |
|  | Direct Current |
|  | Unique Device Identifier |
|  | RF ID tag |
|  | Batch Code |
|  | Model Number |
|  | Translation |
|  | Non-Sterile |
|  | Compliance with Federal Communication Commission |

## 1.2 S/N Label

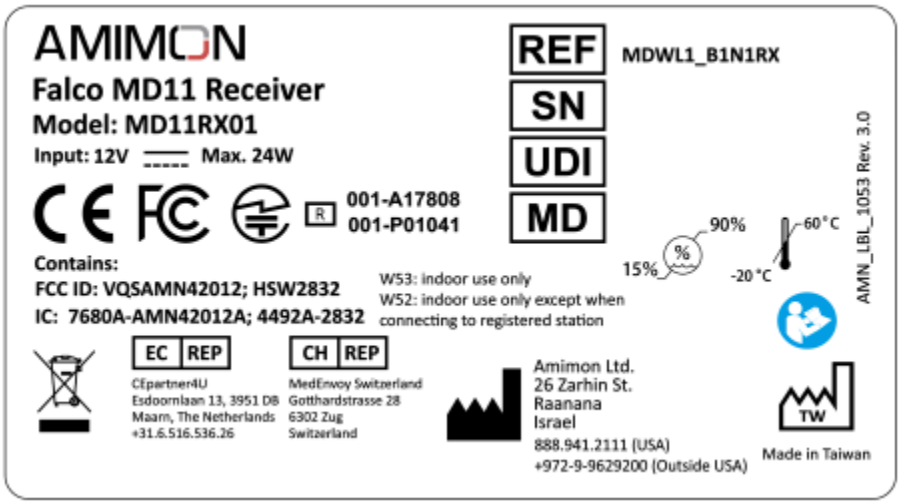
### MD11 Receiver Label on the Device



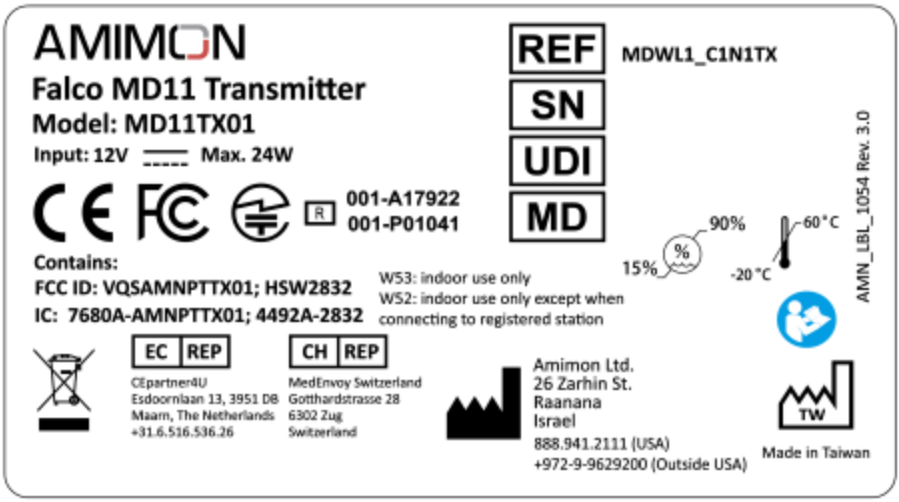

### MD11 Transmitter Label on the Device



## MD11 Receiver Label on the Individual Device Package




## MD11 Transmitter Label on the Individual Device Package



## 1.3 Warning

> ⚠ **The MD11 is designed for professional use only. Any unauthorized change or modification to the MD11 devices is prohibited and can result in hazard or injury. The manufacturer cannot be held responsible for damage or injury caused by improper use or uses other than those for which this device is intended.**

Read the User Manual instructions carefully to become familiar with all safety requirements and operating procedures before using the Falco MD11 devices, thereby preventing accidents and injury and reducing the risk of damaging the machine.

## 2.1 System Description

### Models

Transmitter: **MD11TX01**
Receiver: **MD11RX01**

### Description

The Falco MD11 Wireless Video transmitter and receiver devices allow for the seamless connection of live video to secondary monitors, eliminating the need for cables and enhancing mobility and flexibility during surgical procedures. The MD11 transmits 4K 30fps video with high fidelity over a reliable, secure, and robust link, all while maintaining a latency below 1 mSec. This makes it ideal for use with C-arms, Surgical Cameras, Endoscopy Systems, Robotic Surgery, and other medical equipment requiring video applications. With a single transmitter, you can simultaneously broadcast the same video to four separate receiver destinations. The installation process is quick and straightforward, saving both time and costs while maximizing operating room availability.

### Intended Use and Environment

Falco MD11 is designed for use by healthcare professionals only within a professional healthcare facility environment, specifically outside of the sterile field.

Falco MD11 wireless devices are intended for use in professional healthcare facility environments, such as physician offices, dental offices, clinics, limited care facilities, freestanding surgical centers, freestanding birthing centers, multiple treatment facilities, hospitals, emergency rooms, patient rooms, intensive care, surgery rooms (except near HF SURGICAL EQUIPMENT), outside the RF shielded space of a system for magnetic resonance imaging.

The Falco MD11 is designed to provide wireless video output for a secondary monitor, facilitating training, education, and recording endeavors.

### Limitations of Use

The MD11 is a non-sterile, reusable device not intended for use within a sterile environment.
The MD11 shall not be used to replace the video connectivity of the primary monitor.

## 3.1 Introduction

⚠ **This chapter describes safety issues regarding the use and maintenance of the MD11 wireless system, with particular emphasis on electrical safety. Carefully read this chapter and be familiar with its safety requirements and operating procedures before operating the system.**

The system is designed for a safe and reliable usage when used by proper operating and maintenance procedures as outlined in this operating manual. Only healthcare professionals can use the system. The operator and all other personnel operating or

maintaining the system should be familiar with all the safety information provided in this manual.

The primary objective should always be maximizing the safety of both, patient and operator.

**WARNING: Use of this equipment adjacent to or stacked with other equipment should be avoided because it could result in improper operation. If such use is necessary, this equipment and the other equipment should be observed to verify they are operating normally.**

**WARNING: Use of accessories, transducers, and cables other than those specified or provided by the manufacturer of this equipment could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation.**

**WARNING: The video transmitter system, model MD11 needs special precautions regarding EMC and needs to be installed and put into service according to the specific instructions for maintaining basic safety and essential performance with regard to electromagnetic disturbances for the expected service life provided in the regulatory warning section in this chapter.**

## 3.2 Operator

**WARNING:**

- **All operators MUST be familiar with the system controls and know how to shut down the system in case of trouble.**
- **Always be aware of the possible dangers of using the System and take proper precautions as described in this manual.**
- **Do not touch the inner parts of the System. The System repairs must be performed by qualified personnel only. Failure to do so will void all service agreements.**
- **Do not touch the surface of the System for a period longer than 10 seconds to avoid excessive exposure to temperature.**

## 3.3 Regulatory Warnings and Information

### Modifications

Any changes or modifications could void the user's authority to operate the equipment and invalidate the regulatory approval.

### Antenna Requirements

The product is provided with approved antennas. Use only antennas supplied by Amimon. Any changes or modifications to the antenna may void the regulatory approvals obtained for the product.

**FCC STATEMENT**

The following antennae were approved with the modules listed in the **Antenna Information** table.

**INDUSTRY CANADA (IC) STATEMENT**

The radio transmitters 7680A-AMNPTTX01, 7680A-AMN42012, and 4492A-2832 have been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain shown for that type, are strictly prohibited for use with this device.

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 chosen so that the equivalent isotropically radiated power (e.i.r.p.) is not more than necessary for successful communication.

Les présent émetteur radios 7680A-AMNPTTX01, 7680A-AMN42012 et 4492A-2832 ont 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.

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.

| Antenna Information | | | | | |
|---|---|---|---|---|---|
| **Medical Device** | **Module Model** | **FCC ID** | **IC** | **Model** | **Gain** |
| MD11 TX01 | AMNPTTX01 | VQSAMNPTTX01 | 7680A-AMNPTTX01 | 2x: AMN_ANT_1012-0 | 0dBi |
| MD11 TX01 | Bluetooth Module: MBN52832 | HSW2832 | 4492A-2832 | AMN_ANT_1022 | 3dBi |
| MD11 RX01 | AMN42012 | VQSAMN42012 | 7680A-AMN42012 | 5x: AMN_ANT_1012-1 | 2dBi |
| MD11 RX01 | Bluetooth Module: MBN5283 | HSW2832 | 4492A-2832 | AMN_ANT_1022 | 3dBi |

## RF Exposure

**EU and INTERNATIONAL STATMENT**

The product complies with internationally recognized standards covering human exposure to electromagnetic fields from radio devices. To satisfy local RF exposure regulation requirements, the transmitting product must operate with a minimum separation distance of 20cm or more from a person's body.

**FCC RF EXPOSURE STATEMENT**

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

**IC RADIATION EXPOSURE STATEMENT**

**Important Note: Radiation Exposure Statement**

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and your body.

**Note Importante: Déclaration d'exposition aux radiations**

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

## Unintentional Radio Interference

If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the system
- Increase the separation between the equipment and the system

## Radio Transmitters

**General**

- Operation of these devices in the 5.925-6.425 GHz band is prohibited on oil platforms, cars, trains, boats, and aircraft, except that operation of this device is permitted in large aircraft while flying above 10,000 feet.
- Operation of these devices in the 5.925-6.425 GHz band is prohibited for control of or communications with unmanned aircraft systems.
- Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
- In the 5.925-6.425 GHz band, MD11 receiver devices containing AMN42012 (a client device) must operate under the control of an MD11 transmitter device containing the AMNPTTX01, an indoor access point. Access points may connect to other access

points. Client devices are prohibited from connecting directly to another client device. In all cases, an exception exists for transmitting brief messages to an access point when attempting to join its network after detecting a signal that confirms that an access point is operating on a particular channel.

**FCC STATEMENT: Radio Transmitters (Part 15) –** Class B Digital Devices
This device complies with Part 15 of the FCC Rules. 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.

FCC regulations restrict the operation of these devices in the 5.925-6.425 GHz band to indoor use only.

**IC STATEMENT**
This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science, and Economic Development Canada's license-exempt RSS(s). 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 present appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisee aux deux conditions suivantes:
1. l'appareil ne doit pas produire de brouillage.
2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

**Caution:**
1. The device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.
2. Users should also be advised that high-power radars are allocated as primary users (i.e.

priority users) of the bands 5250-5350 MHz and 5650-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.
3. The maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall be such that the equipment still complies with the e.i.r.p. limit.
4. The maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits specified for point-to-point and non-point-to-point operation as appropriate.
5. Operation is limited to indoor use only in the band 5925-6425 MHz;
6. Operation on oil platforms, cars, trains, boats, and aircraft shall be prohibited except for on large aircraft flying above 10,000 ft.

**Avertissement:**
1. Les dispositifs fonctionnant dans la bande 5 150-5 250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux;
2. De plus, les utilisateurs devraient aussi être avisés que les utilisateurs de radars de haute puissance sont désignés utilisateurs principaux (c.-à-d., qu'ils ont la priorité) pour les bandes 5 250-5 350 MHz et 5 650-5 850 MHz et que ces radars pourraient causer du brouillage et/ou des dommages aux dispositifs LAN-EL.
3. Le gain d'antenne maximum autorisé pour les appareils fonctionnant sous les bandes de fréquences 5250-5350 MHz et 5470-5725 MHz doit être tel que l'équipement est toujours conforme à la limite PIRE;
4. Le gain d'antenne maximum autorisé pour les appareils fonctionnant sous les bandes de fréquences 5725-5850 MHz doit être tel que l'équipement est toujours conforme à la limite PIRE spécifiée pour un fonctionnement point à point et non point à point, le cas échéant.
5. Utilisation limitée à l'intérieur seulement dans la bande 5 925 – 6 425 MHz;
6. Utilisation interdite à bord de plateformes de forage pétrolier, de voitures, de trains, de bateaux et d'aéronefs, sauf à bord d'un gros aéronef volant à plus de 10,000 pieds d'altitude

**EU COMPLIANCE STATEMENT**

AMIMON Ltd. hereby declares that this Radio Transmitter complies with the essential requirements and other relevant provisions of Directives 2014/53/EU, 2011/65/EU, and (EU) 2015/863. The full text of the EU DoC is located at: **https://www.medical.teradek.com/falco-md11**.

## 3.4 Electrical and Mechanical Safety, and Fire Hazards

Damage due to inappropriate handling is not covered under warranty.

Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the Video transmitter system, model MD11, including cables specified by the manufacturer. Otherwise, it could result in degradation of the performance of this equipment.

## Fire Hazards

⚠ **Do not use the system in the presence of explosive or flammable materials.**
**Do not use the system in an oxygen-rich environment.**

## Equipment List

When you receive the system, ensure that it includes the following pieces of equipment:

- MD11TX – Transmitter & AC adapter
- MD11RX – Receiver & AC adapter

## Electrical Requirements

⚠ **The system shall only be powered with the AC adaptor supplied with GlobTek WR9QE3000CCPNNAR6B.**
**The AC adaptor characteristic:**

- **Input parameters - 100-240 Volts; AC, 50-60Hz, 1.0A**
- **Output parameters - 12 Volts DC; 3.0A**

**The AC adaptor must be replaced immediately in case the adaptor or power cord is damaged.**

## Environmental Requirements

- Corrosive materials can damage electronic parts. Ensure that the environment is free from corrosive material.
- For optimal operation, the System should be placed in a room with temperatures between 0º- 40ºC (32º-104ºF) and relative humidity between 25-75%.
- For optimal storage, the system should be stored at a temperature between -20º- 60ºC (-4º-140ºF) with a relative humidity between 15-90%.
- For Optimal transportation system should be transported under the temperature range between -20º- 60ºC (-4º-140ºF) with a relative humidity of less than 80%.

## 4.1 System Installation

## Installation

MD11 transmitter and receiver can be installed horizontally, using the plastic bumpers on the bottom of the devices.

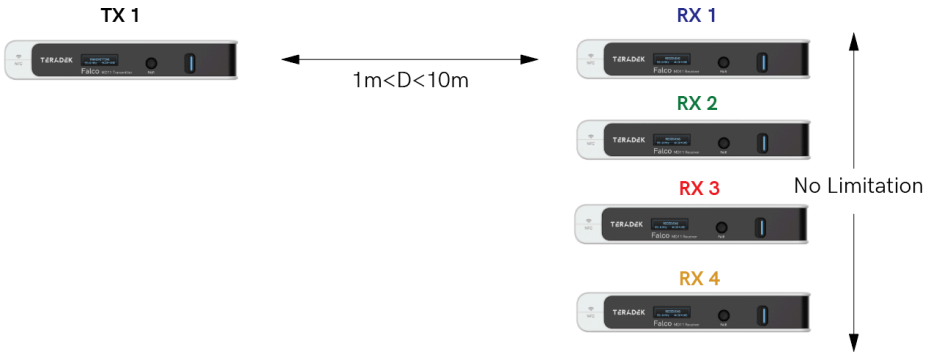
**Note:**

- The transmitter and receiver shall be positioned on a flat surface to avoid accidental falls and damage.
- **When using VESA plate mounting accessories (AMN_VESA_KIT01, AMN_VESA_KIT02), the MD11 transmitter and receiver can be mounted on the back of a monitor.**

## Distance Between Falco Devices

This section describes the required distance and limitations between installed Falco devices (such as Falco MD11).

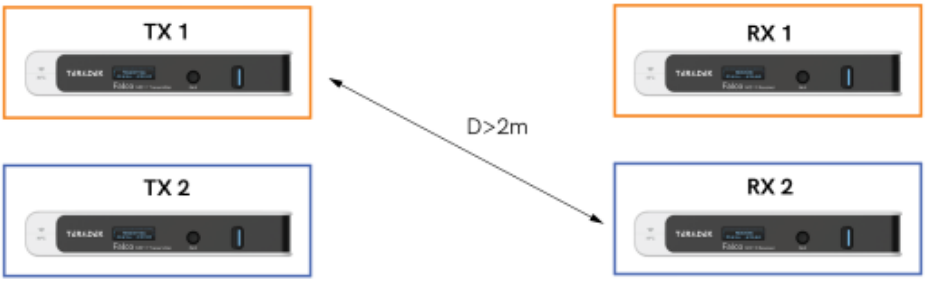
- The distance between a paired transmitter and receiver shall be between 1m and 10m.
- There is no distance limitation between receivers paired with the same transmitter.




## D = Distance

- The distance between neighboring transmitters shall be no less than 1m


- The distance between any transmitter and any receiver (not part of the link) shall be no less than 2m.



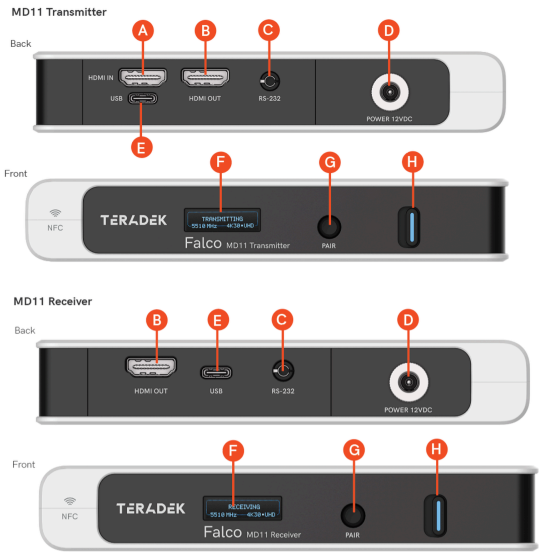

- The distance between receivers (linked to different transmitters) shall be no less than 80 cm.


- The maximum number of Falco devices to be operated in a single room is six transmitters and six receivers.
- The room may also contain other RF-emitting devices, such as 2.4GHz or 5GHz Wi-Fi and 2.4GHz Bluetooth.

**WARNING**

- Do not connect the device to power using a multiple socket outlet or an extension cord.
- Not intended for use near patients or medical staff (minimum distance of 20cm between the radiator and your body).
- Do not install near sources of intense heat, such as boilers or radiators.
- Install this system in an environment that complies with all applicable IEC, CEC, and NEC requirements for the safety of electrical devices. Any installation or connection with other devices shall be evaluated for electrical safety according to the IEC 60601-1.

## 4.2 View of the System




**A**. HDMI input

**B.** HDMI output

**C.** RS-232 input

**D.** 12V DC power input

**E.** USB-C port

**F**. OLED display

**G.** Pairing button

**H.** On/Off Switch

## 5.1 Power and Connectivity

1. Connect power to the transmitter and receiver using the included AC adapter.
2. Connect the output from your video source to the HDMI input **(A)** on the MD11 transmitter.

3. Connect the HDMI output **(B)** from the MD11 receiver to the video input on your monitor.
4. Move the power switches on both the transmitter and receiver **(H)** to the ON position. Follow the Pairing process described hereunder and the receiver will connect to the transmitter and start delivering video.
5. To turn off the device, slide the power switch **(H)**, and make sure the blue light turns off. **NOTE: USB-C (E) available for future SW update**

**When there is no video input to the transmitter:**

1. The receiver will turn off the HDMI 5V output, to enable the video sink device to enter sleep mode.
2. After 10 minutes, the transmitter will turn off the RF transmission until the video signal is detected.

## 5.2 Pairing

To associate the MD11 transmitter with the MD11 receiver, the devices need to be paired using the device's front panel navigation button (**G**).

1. Press the Navigation Button on the MD11 **transmitter** (**G**) for 5 seconds to start the **Pairing** process. The OLED display will indicate pairing has started. **NOTE: Pressing the navigation button for 5 seconds will start the Pairing process without unlocking the menu.**
2. Press the Navigation Button on the MD11 **receiver** (**G**) for 5 seconds to start the **Pairing** process. The OLED display will indicate pairing has started. **NOTE: Pressing the navigation button for 5 seconds will start the Pairing process without unlocking the menu.**
3. When pairing two to four receivers with one transmitter, repeat steps 1 and 2 for each receiver to be paired. Once a receiver is paired, turning it off before pairing the next receiver device is recommended.

4. When a fifth receiver is paired with a transmitter, the first paired receiver is deleted automatically from the transmitter's list of paired receivers. This receiver will stop showing video.
5. Falco MD11 devices can also pair with Falco MD62 devices. To pair the MD11 device with a Falco MD62 device, follow the pairing instructions for the MD62 device and the MD11 device.

**NOTE:**

1. Turning off unused devices in the area while performing the pairing procedure is recommended.
2. Once the transmitter and receiver are paired, they will automatically connect upon powering up.
3. When the transmitter or receiver performs the un-pairing procedure, the transmitter and receiver will not reconnect.
4. When connecting a MD62 transmitter with an MD11 receiver, the MD11 receiver will not be able to support resolutions over 4K30 fps and 3D resolutions, which are part of MD62 feature set.

## 5.3 Receiver Menu

**Main Status Screen** - This screen displays the connection status of the receiver and the transmitter, along with the current video resolution and link quality (when connected).

**Menu Operation** - Press left on the Navigation Button **(G)** for 5 seconds to unlock the menu, then press right on the Navigation Button to navigate the menu.

- **Pair** - Pair your receiver with a transmitter. Once Pairing is activated on the receiver, activate Pairing on the transmitter.
- **Unpair**
  - **Unpair specific device** - Unpair one transmitter.
  - **Unpair all** – Unpair all paired transmitters.
- **Info**

- **Working Frequency -** When paired, displays the frequency being used.
- **Firmware Versions** – Displays controller, radio, and BLE firmware.
- **Model** – Displays the device's serial number and name.
- **Device Info** – Display the receiver's input voltage level and temperature.
- **Transmitter Info** – Displays the transmitter's name, serial number, input voltage level, and temperature (when a receiver is connected to a transmitter).

- **Display Settings -** Use the Display Settings to control the Navigation screen (OLED) display operation.
  - **Invert every 30min** – Inverts the OLED display every 30 minutes.
  - **Dim after 10 min** – Dims the OLED after 10 minutes.
  - **Dim after 10 sec** - Dims the OLED after 10 seconds.
  - **Off after 10 min** – Turns off the OLED after 10 minutes (default configuration).
  - **Off after 10 sec** – turns off the OLED after 10 seconds.
  - **Always on** – OLED stays On.

- **Switch TX -** Select a different transmitter (paired transmitters only). MD11 receivers can pair with up to four transmitters at a time. **Switch TX** allows you to quickly switch from one paired transmitter to another paired transmitter without the need to pair the units again.
- **Advanced Settings**
  - **Keypad Lock** - Locks the Navigation menu to prevent it from being used (keypad is locked by default).
  - **Bluetooth Settings** - Controls the Bluetooth device used for wireless link control. The Bluetooth configuration does not affect the video link itself, which is done over a proprietary protocol, not over the Bluetooth connection. **Note: Bluetooth wireless link control requires a dedicated mobile application or control device.**
    - **Enable Bluetooth** – Enables/disables Bluetooth connectivity. The default configuration is **On.**
    - **Use Bluetooth PIN** – Enables/ Disables Bluetooth PIN code for a secured Bluetooth connection. The default configuration is **Off**.
    - **Change PIN** – Change the Bluetooth PIN code.

- **No Link Video Out**– define the video output when there is no active link.
  - **No Video** – Turn Off TMDS lines when there is no active video link (default configuration).
  - **Synthetic Video** – Output synthetic video when there is no active video link.
- **Reset All Settings** – Reset all configurable options to their factory defaults. **Note: Pairing is not deleted when the settings are reset.**

## Receiver Navigation Screen (OLED) Messages

| # | STATE | MESSAGE |
|---|---|---|
| 1 | Unit is powering up | GETTING READY |
| 2 | No paired devices | NOT PAIRED |
| 3 | Network is connecting | CONNECTING |
| 4 | Network connected and video is delivered | CONNECTED TO TX NAME |
| 5 | Network connected but no video is delivered | NO VIDEO |
| 6* | Pairing before a transmitter was found | PAIRING SEARCHING FOR TX |
| 7* | Pairing in progress | PAIRING... |
| 8 | Pairing completed successfully | PAIRING COMPLETED SUCCESSFULLY |
| 9 | Pairing failed | PAIRING FAILED |
| 10 | Unpairing | UNPAIRING... PLEASE WAIT... |

| # | STATE | MESSAGE |
|---|---|---|
| 11 | Firmware update | UPGRADING FIRMWARE PLEASE WAIT… |
| 12 | Restoring default settings | RESTORING DEFAULT SETTINGS |
| 13 | Device not in link | NO LINK |
| 14 | Network connected & unsupported resolution | Unsupported resolution |

* For status 6-7, the message will display an option to cancel and abort the operation.

## 5.4 Transmitter Menu

**Main Status Screen** - This screen displays the status of the wireless transmitter, along with the current video resolution and frequency.

**Menu Operation** - Press left on the Navigation button **(G)** for 5 seconds to enable and then navigate the menu.

- **Pair -** Pair the transmitter with a receiver. Once **Pairing** is activated on the transmitter, activate Pairing on the receiver.
- **Unpair:**
  - **Unpair specific device**
  - **Unpair all** – unpair all paired devices.
- **Info**
  - **Working Frequency -** When paired, displays the frequency being used.
  - **Firmware Versions –** Displays the controller, video, and radio firmware versions.
  - **Model** – Displays the device model type and serial number.
  - **Device Info** – Displays the device's input voltage level and temperature.
- **Display Settings -** Use the Display Settings to control the Navigation screen (OLED) display operation.

- **Invert every 30min** – Inverts the OLED display every 30 minutes.
- **Dim after 10 min** – Dims the OLED after 10 minutes.
- **Dim after 10 sec** - Dims the OLED after 10 seconds.
- **Off after 10 min** – Turns off the OLED after 10 minutes (default configuration).
- **Off after 10 sec** – Turns off the OLED after 10 seconds.
- **Always on** – OLED stays On.

- **Advanced Settings**
  - **Keypad Lock** - Locks the Navigation button to prevent it from being used.
  - **Bandwidth -** Controls the bandwidth of the wireless video link.
    - **20MHz** - Allows video support up to 1080p60
    - **40MHz** - Enables the highest video quality and resolution up to 4K30fps. (default configuration)
  - **Bluetooth**- Controls the Bluetooth device used for wireless link control. The Bluetooth configuration does not affect the video link itself, which is done over a proprietary protocol, not over the Bluetooth connection.
    - **Enable Bluetooth** – Enables/disables Bluetooth connectivity. The default configuration is **On.**
    - **Use Bluetooth PIN** – Enables/ Disables Bluetooth PIN code for a secured Bluetooth connection. The default configuration is **Off**.
    - **Change PIN** – Change the Bluetooth PIN code.
  - **Reset All Settings -** Reset all configurable options to their factory defaults. **Note:** Pairing is not deleted when the settings are reset.

## Transmitter Navigation Screen (OLED) Messages

| # | STATE | MESSAGE |
|---|---|---|
| 1 | Unit is powering up | GETTING READY |
| 2 | No paired devices | NOT PAIRED |
| 3 | Searching for free frequency **NOTE: It typically takes up to 60 seconds to set up a link during this state.** | SEARCHING FREQ |
| 4 | Network connecting | CONNECTING |
| 5 | Network is connected and video is delivered | SENDING VIDEO |
| 6 | Network is connected but no video is delivered | NO VIDEO |
| 7* | Pairing before a receiver was found | PAIRING SEARCHING FOR RX |
| 8* | Pairing in progress | PAIRING... |
| 9 | Pairing completed successfully | PAIRING COMPLETED SUCCESSFULLY |
| 10 | Pairing failed | PAIRING FAILED |
| 11 | Unpairing | UNPAIRING... PLEASE WAIT... |
| 12 | Firmware update | UPGRADING FIRMWARE PLEASE WAIT… |
| 13 | Restore default settings | RESTORING DEFAULT SETTINGS |

| | | |
|---|---|---|
| 14 | Network connecting | NO LINK |
| 15 | Pairing timeout | PAIRING TIMEOUT |

* For status 7-8, the message will display an option to cancel and abort the operation.

## 6.1 Maintenance

No maintenance is required.

⚠ **Cleaning and Maintenance Warning**:

- Prior to cleaning, power the device off and unplug all external power sources (i.e., power cables) and video/data cables (i.e., HDMI, USB).
- Cover HDMI, and USB connections when cleaning the device so the chemical does not penetrate inside the device.
- If you're not using sanitizing wipes, use a lint-free cloth, such as a screen wipe or a cloth made from microfiber.
- Avoid excessive wiping and submerging of products in disinfectant solutions. This could lead to damage. Wring wet wipes before use if they are excessively wet.
- Avoid bleach or abrasive cleaners. Using bleach on plastic parts or OLEDs might cause white stains and malfunction.
- Do not spray liquid disinfectants directly on devices. Instead, spray a lint-free cleaning cloth with it first and gently wipe. Using liquids directly on devices could cause an electric short if it comes into contact with internal electronics.
- Use isopropyl alcohol-based disinfectant solutions containing at least 70% alcohol since they will evaporate faster.
- When using a cleaner for the first time, test it in a small hidden area before cleaning the whole device.

## 6.2 Waste Electrical and Electronic Equipment (WEEE)

Waste electrical and electronic equipment should not be disposed of with household waste. Please recycle where facilities exist. Check with your local authority or retailer for recycling advice.

## 7.1 Troubleshooting

**The MD11 unit does not power on.**

1. Verify the power adaptor is connected and that the power switch is in the **ON** position.
2. Power cycle the unit by switching the power button to **OFF** and then back to **ON**.

**The MD11 unit shows a "NOT PAIRED" message on the OLED.**
Make sure the transmitter and receiver units are paired with each other. If not, refer to **page 25, section 5.2** (**Pairing** section) for steps on how to pair your devices.

**The MD11 receiver shows a "NO LINK" message on the OLED.**

1. Verify that the "paired" MD11 transmitter is turned **ON**.
2. If the paired transmitter is in "Network Connecting" mode for over a minute, power cycle (turn **OFF** then **ON**) both the MD11 transmitter and receiver.
3. If the paired transmitter is in "Searching for Frequency" mode, wait at least two minutes.
4. Keep at least a 1-meter distance between the MD11 transmitter and receiver.
5. Re-pair the units.

**The MD11 transmitter shows a "SEARCH FREQ" message on the OLED.**
This indicates that the unit is still searching for a clean RF channel.

1. Verify that the transmitter is placed at least 1m away from other Falco devices.
2. Allow five minutes for the system to find a vacant channel before power cycling the unit by turning the MD11 transmitter **OFF** and **ON**.

3. Turn off other wireless systems (e.g. Wi-Fi, or other Falco devices operating in the vicinity) to clear frequencies or extend the distance between the transmitter and other wireless devices.

**I can't see any video signal on the monitor.**

1. Verify that the transmitter's OLED shows a **"SENDING VIDEO"** message. If not, ensure that:
   a. The video source resolution is supported by the MD11 (up to 1080p60 at 20MHz channel bandwidth, and up to 4K 30Hz at 40MHz channel bandwidth)
   b. The HDMI cable which is connected to the transmitter supports 4K video resolution.
   c. When the video source is connected directly to the monitor with a cable, video is displayed on the monitor.
2. Verify that the HDMI cable connected to the receiver supports 4K video resolution.
3. Verify that the receiver's OLED shows a **"Connected to xxx"** message.
4. Verify that the receiver is connected to the correct transmitter.

**The video is displayed with artifacts.**

1. Verify the transmitter and receiver are positioned in the same room, with a distance of up to 10m.
2. Verify that there are no major obstacles (walls, metal plate, etc.) between the two units.
3. Verify the instructions described on page 20, section 4.1 (**Distance Between Falco Devices**) are met.
4. Verify that there are no other wireless units (non-Falco) located in close proximity to the MD11 receiver.
5. Power cycle the units.

**It takes over five minutes to get a video link on all the devices in the room**

In case of multiple links in the same room (over two transmitters), it's recommended to power up the transmitters one-by-one, for a faster room setup.

## 8.1 Technical Specifications

| | FALCO MD11 TRANSMITTER | FALCO MD11 RECEIVER |
|---|---|---|
| **VIDEO** | | |
| Video Inputs | **1x** HDMI 1.4 Type-A | N/A |
| Video Outputs | **1x** HDMI 1.4 Type-A | **1x** HDMI 1.4 Type-A |
| Color Sampling | **RGB**: 8/10-bit<br>**YCbCr**: 4:4:4; 8/10-bit<br>**YCbCr**: 4:4:2 | **RGB**: 8/10-bit<br>**YCbCr**: 4:4:4; 8/10-bit<br>**YCbCr**: 4:4:2 |
| Delay (TX to RX) | <0.001sec | <0.001sec |
| Supported Resolutions | 4Kp30/29.97/25/24/23.98<br>1080p60/59.94/50/30/29.97/25/24/23.98<br>1080i60/59.94/50<br>720p60/59.94/50<br>**NOTE: Resolutions higher than 1080p60Hz are supported in 40MHz bandwidth only.** | |
| **AUDIO** | | |
| Audio Compression | 48kHz 24-bit PCM | 48kHz 24-bit PCM |
| Audio Input | Embedded HDMI Audio Input (2 Channel) | N/A |

| | | |
|---|---|---|
| Audio Output | Embedded HDMI Audio in Loopback (2 channels) | Embedded SDI/HDMI Audio Output (2 Channel) |
| **PHYSICAL ATTRIBUTES** | | |
| Dimensions | 6” x 3.1” x 1” (151.4 x 79 x 25mm) | 6” x 3.1” x 1” (151.4 x 79 x 25mm) |
| Weight | 10.4oz (296g) | 11.2oz (317g) |
| Construction | chassis - Milled aluminum, enclosure PC\ABS | |
| **INTERFACES** | | |
| Navigation Button | Control and Configuration | Control and Configuration |
| OLED | Status and Configuration Display | Status and Configuration Display |
| BLE and NFC | Control and Configuration | Control and Configuration |
| Switches | On/Off Switch | On/Off Switch |
| USB Interface | Update via USB-C | Update via USB-C |
| Device Control | RS-232 (for future use) | RS-232 (for future use) |
| **WIRELESS VIDEO NETWORK** | | |
| Wireless Video Bands | **DFS Frequencies:** 5.250 - 5.350 GHz, 5.470 - 5.725 GHz | **DFS Frequencies:** 5.250 - 5.350 GHz, 5.470 - 5.725 GHz |

| | | |
|---|---|---|
| | **Non-DFS Frequencies**: 5.150 - 5.250 GHz, 5.725 - 5.850 GHz | **Non-DFS Frequencies**: 5.150 - 5.250 GHz, 5.725 - 5.850 GHz |
| | **NOTE: Frequencies and channels are dependent on regional approvals.** | |
| Bandwidth | 20MHz/40MHz | 20MHz/40MHz |
| Modulations | OFDM | OFDM |
| RF Power | 15dBm EIRP | 14dBm EIRP |
| Antennas | **2x** Internal 0dBi antennas | **5x** Internal 2dBi antennas |
| Encryption | AES-256, RSA-1024 key exchange | AES-256, RSA-1024 key exchange |
| Range | Up to 100 ft (30m) | Up to 100 ft (30m) |
| Multicast | Transmitter can stream simultaneously to up to 4 receivers | Receiver can switch between 4 transmitters |
| Noise Rejection | Can coexist with WiFi and other devices working on the 5GHz band. Up to 6 sets at the same location. | Can coexist with WiFi and other devices working on the 5GHz band. Up to 6 sets at the same location. |
| **BLUETOOTH** | | |
| BT Frequency Band | 2402-2480MHz | 2402-2480MHz |
| Bandwidth | 1MHz | 1MHz |

| | | |
|---|---|---|
| RF Power | 7dBm EIRP | 7dBm EIRP |
| **NFC** | | |
| Frequency | 13.56MHz | 13.56MHz |
| Antenna inductance | 2.1uH | 2.1uH |
| **POWER** | | |
| Power Input | 2.1 mm barrel connector 12 VDC | 2.1 mm barrel connector 12 VDC |
| Nominal Power Consumption | 6 Watts | 7 Watts |
| Operating Temperature | 0-40°C (32-104°F), Relative humidity range: 25-75% | 0-40°C (32-104°F), Relative humidity range: 25-75% |
| **GENERAL** | | |
| Mountability | Can be mounted on a VESA Plate and be placed in any position. | Can be mounted on a VESA Plate and be placed in any position. |
| RF Compliance | FCC, EU, ISED, KC, MIC | FCC, EU, ISED, KC, MIC |
| **CERTIFICATION AND APPROVALS** | | |
| General | ISO 13485:2016<br>MDR 2017/745 Class I | |

| | |
|---|---|
| | FDA Manufacturer Registration 3014730563<br>FDA Listing Class I, 510K exempt.<br>CFR 21 Parts 801, 807, 820, 880<br>UK MDR 2002 |
| Medical Electrical Equipment | IEC 60601-1:2005 + A1:2012 + A2:2020, EN 60601-1:2006 + A1:2013 + A2:2021, ANSI/AAMI ES60601-1:2005+ A1:2012 + A2:2021, CAN/CSA-C22.2 No. 60601-1:14 + A2:2022<br>IEC 60601-1-6:2010+A2:2021, EN 60601-1-6:2010 + A1:2015 + A2:2021<br>IEC 60601-1-2:2014 + A1:2020, EN 60601-1-2:2015 + A1(21) Edition 4.1, CISPR 11:2015 + A1(16) + A2(19) group 1 class B limits |
| Materials | Regulation (EC) No 1907/2006,<br>Directive 2011/65/EU & (EU) 2015/863 |
| Radio | FCC CFR 47 Part 15, FCC CFR 47 Part 2<br>RE-Directive 2014/53/EU: EN 301 893 V2.1.1, EN 300 328 V2.2.2, EN 50665:2017<br>Electromagnetic Compatibility - EN 301 489-1 V2.2.3, EN 301 489-17 V3.2.4, Class B |

## Electromagnetic Compatibility

- This equipment is for use in a professional healthcare environment. It is not for use in the RF-shielded room of a medical electrical system for magnetic resonance imaging, where the intensity of EM disturbances is high.
- This equipment is not likely susceptible to interference from HF surgical instruments in the Special Environment of being near an active HF surgical instrument. In the case that HF surgical interference is observed, adjust the separation distance of the equipment.

## Guidance and Manufacturer's Declaration - ELECTROMAGNETIC IMMUNITY

The MD11 Wireless Transmitter and Receiver are intended for use in the electromagnetic environment specified below. The customer or the user of the MD11 Wireless Transmitter and Receiver should ensure that they are used in such an environment.

| Guidance and Manufacturer's Declaration: ELECTROMAGNETIC EMISSIONS | | |
|---|---|---|
| The MD11 Wireless Receiver and MD11 Wireless Transmitter are intended for use in the electromagnetic environment specified below.<br><br>The customer or the user of the MD11 Wireless Receiver and MD11 Wireless Transmitter should ensure they are used in such an environment. | | |
| **Emissions Test** | **Compliance** | **Electromagnetic Environment - Guidance** |
| RF emissions CISPR 11 | Group 1 | The MD11 Wireless Receiver and MD11 Wireless Transmitter use RF energy only for their internal function; therefore, their RF emissions are very low and are not likely to cause any interference in nearby electronic equipment. |
| RF emissions CISPR 11 | Class B | The MD11 Wireless Receiver and MD11 Wireless Transmitter are suitable for use in all establishments other than domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes, provided the following warning is heeded:<br><br>WARNING: This system is intended for use by healthcare professionals only. This system may cause radio interference or disrupt nearby equipment's operation. It may be necessary to take mitigation measures, such as reorienting or relocating the system or shielding the location |
| Harmonic emissions IEC 61000-3-2 | Class A | |
| Voltage Fluctuations/ flicker emissions IEC 61000-3-3 | Complies | |

| Guidance and Manufacturer's Declaration - ELECTROMAGNETIC IMMUNITY | | | |
|---|---|---|---|
| **Immunity Test** | **IEC 60601 Test level** | **Compliance Level** | **Electromagnetic Environment - Guidance** |
| Electrostatic Discharge (ESD) IEC 61000-4-2 | ±8kV contact,<br><br>±15kV air | ±8kV contact,<br><br>±15kV air | Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, there should at least be 30% relative humidity. |
| Electrical fast transient/burst IEC 61000-4-4 | ±2kV for power supply lines,<br><br>±1 kV for SIP/ SOP lines (if applicable) | ±2kV line to ground, | Mains power quality should be that of a typical commercial or hospital environment. |
| Surge IEC 61000-4-5 | ±1kV differential mode<br><br>±2kV common mode | ±1kV differential mode<br><br>Class II equipment | Mains power quality should be that of a typical commercial or hospital environment. |
| Voltage dips, short interruptions, and voltage variations on power supply input lines IEC 61000-4-11 | 0% UT for 0.5 cycle<br><br>0% UT for 1 cycle<br><br>70% UT for 25/30 cycles<br><br>0% UT for 250/300 cycles | 0% UT for 0.5 cycle<br><br>0% UT for 1 cycle<br><br>70% UT for 25/30 cycles<br><br>0% UT for 250/300 cycles | Mains power quality should be that of a typical commercial or hospital environment. If the user of the transmitter requires continued operation during power mains interruptions, it is recommended that the Wireless Transmitter be powered by an uninterruptible power supply or a battery. |
| Power frequency (50/60Hz) magnetic field<br><br>IEC 61000-4-8 | 30 A/m | 30 A/m | Power-frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment. |
| **NOTE:** UT is the AC mains voltage prior to application of the test level | | | |

| Guidance and Manufacturer's Declaration – ELECTROMAGNETIC IMMUNITY FOR PROFESSIONAL HEALTHCARE FACILITY ENVIRONMENT, IEC 60601-1-2 Ed.4.1 | | | |
|---|---|---|---|
| **Immunity Test** | **IEC 60601 Test level** | **Compliance Level** | **Electromagnetic Environment - Guidance** |
| Conducted RF<br><br>IEC 61000-4-6 | 6 Vrms in ISM bands between 150 kHz to 80 MHz<br><br>3 Vrms 150 kHz to 80 MHz | 6 Vrms in ISM bands between 150 kHz to 80 MHz<br><br>3 Vrms 150 kHz to 80 MHz | Portable and mobile RF communications equipment should be used no closer to any part of the MD11 Wireless Receiver and MD11 Wireless Transmitter system, including its cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.<br><br>**Recommended Separation Distance**<br><br>$d = 2\sqrt{P}$ 80 MHz to 2.7 GHz<br><br>where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey (a), should be less than the compliance level in each frequency range (b).<br><br>Interference may occur in the vicinity of equipment marked with the following symbol:<br><br>  |
| Radiated RF<br><br>IEC 61000-4-3 | 3V/m 80MHz to 2.7GHz | 3V/m 80MHz to 2.7GHz | |

**(a)** Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcasts, and TV broadcasts, cannot be predicted theoretically with accuracy. An electromagnetic site survey should be considered to assess the electromagnetic environment due to fixed RF transmitters. If the measured field strength in the location in which the MD11 Wireless Receiver and MD11 Wireless Transmitter are used exceeds the applicable RF compliance level above, the display and transmitter should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the MD11 Wireless Receiver and MD11 Wireless Transmitter

**(b)** Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m

| Tested Specifications for Immunity to RF Wireless Communications Equipment | | | | | |
|---|---|---|---|---|---|
| | **Test Frequency (MHz)** | **Band A (MHz)** | **Service** | **Modulation** | **Immunity Test Level** |
| Proximity fields from RF wireless communications equipment | 385 | 380-390 | TETRA 400 | Pulse modulation b) 18Hz | 27 V/m |
| | 450 | 430-470 | GMRS 460, FRS 460 | FM c) ±5kHz deviation 1 kHz | 28 V/m |
| | 710 | 704-787 | LTE Band 13, 17 | Pulse modulation b) 217 Hz | 9 V/m |
| | 745 | | | | |
| | 780 | | | | |
| | 810 | 800-960 | GSM 800/900 TETRA 800 iDEN 820 CDMA 850 LTE Band 5 | Pulse modulation b) 18 Hz | 28 V/m |
| | 870 | | | | |
| | 930 | | | | |
| | 1720 | 1700-1990 | GSM 1800 CDMA1900 GSM 1900 DECT LTE Band 1,3, 4,25; UMTS | Pulse modulation b) 217 Hz | 28 V/m |
| | 1845 | | | | |
| | 1970 | | | | |
| | 2450 | 2400-2570 | Bluetooth, WLAM, 802.11 b/g/n, RFID 2450, LTE Band 7 | Pulse modulation b) 217 Hz | 28 V/m |
| | 5240 | 5100-5800 | WLAN 802.11 a/n | Pulse modulation b) 217 Hz | 9 V/m |
| | 5500 | | | | |
| | 5785 | | | | |
| IEC 61000-4-39<br><br>Immunity to magnetic fields in close proximity | 65 A/m<br>134.2 kHz<br>7.5 A/m<br>13.56 MHz | NFC | NFC | | 65 A/m<br>134.2 kHz<br>7.5 A/m<br>13.56 MHz |

**Note:** Portable RF Communication equipment should be used no closer than 30cm to the MD11 Wireless Receiver and MD11 Wireless Transmitter System. Otherwise, degradation of the performance of this equipment could result.

**(a)** For some services, only the uplink frequencies are included.
**(b)** The carrier shall be modulated using a 50 % duty cycle square wave signal.
**(c)** As an alternative to FM modulation, the carrier may be pulse modulated using a 50 % duty cycle square wave signal at 18 Hz. While it does not represent actual modulation, it would be worst case.

URM-000003
Version 1.0