### 6.16 Room Display (NIRD)

The NIRD Room Display (NIRD) combines Ascom interactive messaging (IM) functionality, with a teleCARE door side module and an RFID card reader in a wall mounted module which is suitable for use in residents rooms and staff rooms. It has an EBA polyester film membrane which covers the display and incorporates the buttons, keys and the LEDs.

**Important:** At least one NIRD serving the property must be permanently installed in a fixed location.



*Figure 138. Room Display*

The NIRD includes three teleCARE function buttons (red, yellow and green). Each of these buttons has an LED which illuminates to indicate the activated condition. Three function keys and a scroll button are included for controlling the display and speech.

The LCD screen measures 2.5in (63mm) x 1.3in (35mm). It displays large, easy to read characters showing calls and the locations of staffs. Above the LCD screen is a three-color LED which illuminates to emphasize the type or category of calls received.

The NIRD also includes a buzzer speaker which signals the configured beep codes for the received messages.

The integrated card reader is an RFID device operating in the 13.56 MHz frequency range. It is used in combination with contactless smart cards.

The NIRD is an active module and must be connected to the teleCARE IP room bus. It uses two fixed room bus addresses 6 and 7.

The NIRD has a 5-pole connector for the teleCARE IP speech module and a 4-pin connector for supporting a passive peripheral bus.

**Note:** *The 4-pole connector terminal required for the room bus and the 8-pole connector terminal which is required to connect the room bus and a passive peripheral bus are not supplied with the NIRD. They are available as accessories and must be ordered separately.*

There are two dedicated backplates available for the NIRD: a short backplate for mounting the NIRD as a single module and a long backplate for combining the NIRD with the NISP speech module. These backplates must be ordered separately.

*Note:* *The NIRD is not compatible with the standard teleCARE switch module backplates and it is not compatible with the teleCARE surface mounting spacer.*

### 6.16.1 Room Bus Electrical Connections

The NIRD is an active teleCARE IP peripheral which must be connected to teleCARE IP room bus by a 4-pole connector, as shown below.
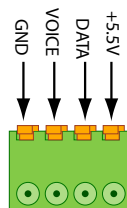


*Figure 139. 4-pole connector terminal for the room bus*

### 6.16.2 Room Bus with Passive Peripheral Bus Electrical Connections

When a passive peripheral bus is required the room bus and the passive peripheral bus must be combined in an 8-pole connector, as shown below.
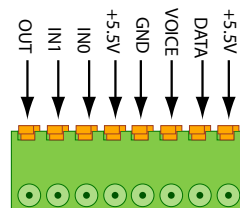


*Figure 140. 8-pole connector terminal for the room bus and passive peripheral bus*

### 6.16.3 Connector locations

The locations of the room bus connector, the passive peripheral bus connector and the NISP speech module connector are shown below:
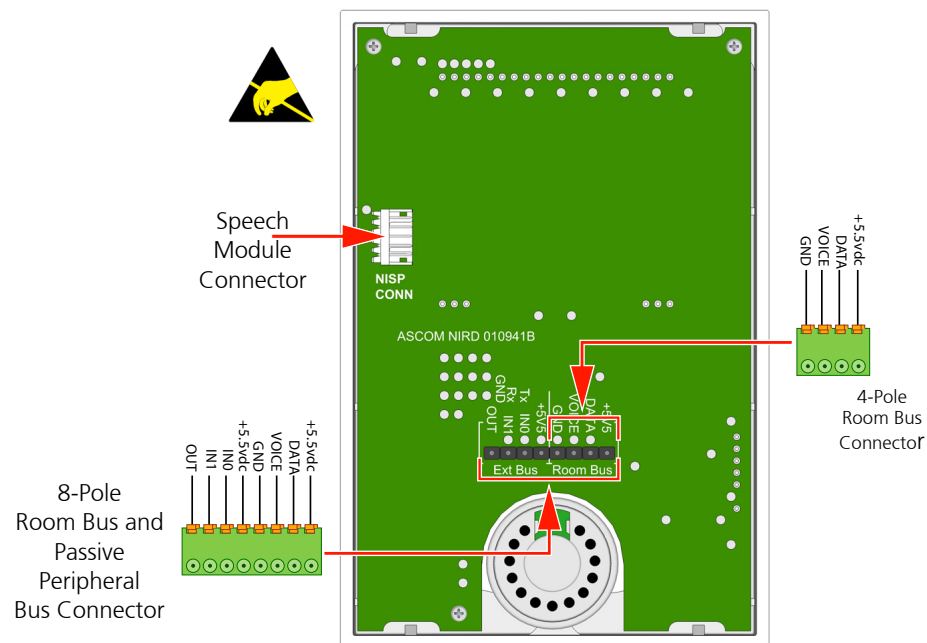
*Figure 141. Room display electrical connections*

### 6.16.4  Room Display Backplate (Short)

To mount the NIRD as a single module the short backplate must be used: Figure 141 indicates the location of a hole which needs to be drilled for mounting purposes.
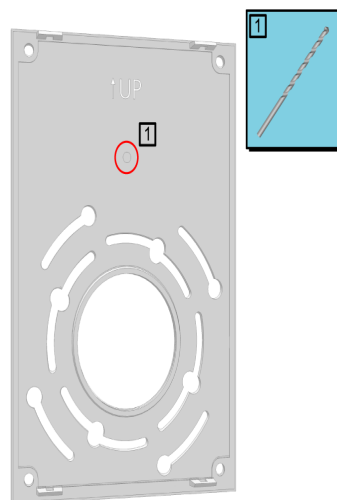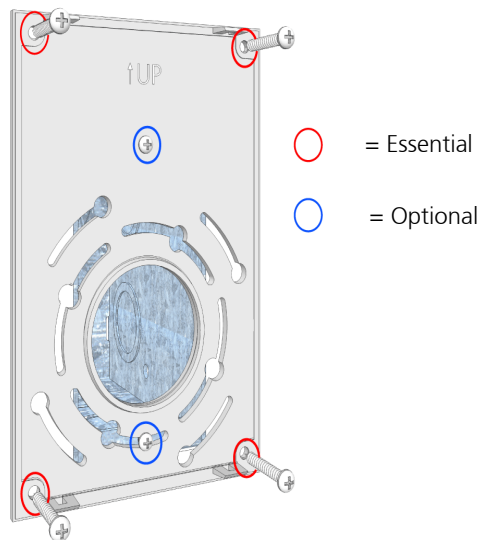


*Figure 142. Room display backplate (short)*

The backplate must be fixed to the wall using the four corner holes (indicated in the drawing below by red circles).



○ = Essential

○ = Optional

***CAUTION!***
*DO NOT MOUNT THE ROOM DISPLAY CLOSE TO OR OVER METAL OBJECTS.*

*There must be a minimum distance of 1 in (30mm) in all directions between the room display and any metal objects to avoid the degradation of the card reader antenna performance.*

*Figure 143. Mounting the room display backplate*

The backplate has an arrangement of fixing holes (indicated in the drawing above by blue circles) which make it suitable for mounting on various international back boxes.

**Caution:** *Even when the backplate is mounted on a back box it must also be fixed to the wall with the corner holes.*

### 6.16.5 Room Display Combined with the Speech Module

The NIRD can be combined with the NISP Speech Module in teleCARE IP systems with speech. The NIRD is used to select calls, control voice communication and cancel calls. The NISP facilitates two-way voice communication via a press-to-talk function on the NIRD.
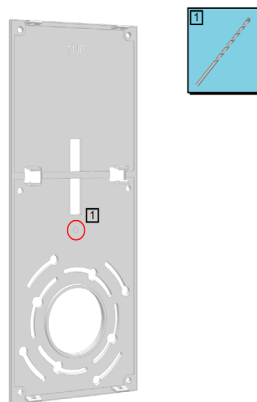
*Figure 144. Room display combined with the speech module*

### 6.16.6  Room Display Backplate (Long)

The long backplate must be used to mount the NIRD combined with the NISP. Figure 144 indicates the location of a hole which needs to be drilled for mounting purposes.



*Figure 145. Room display backplate (long)*

**Mounting the Backplate and Installing the NIRD and NISP**

It is important to insert the NIRD to NISP connection cable through the backplate before the backplate is screwed to the wall, as shown in the following illustration:
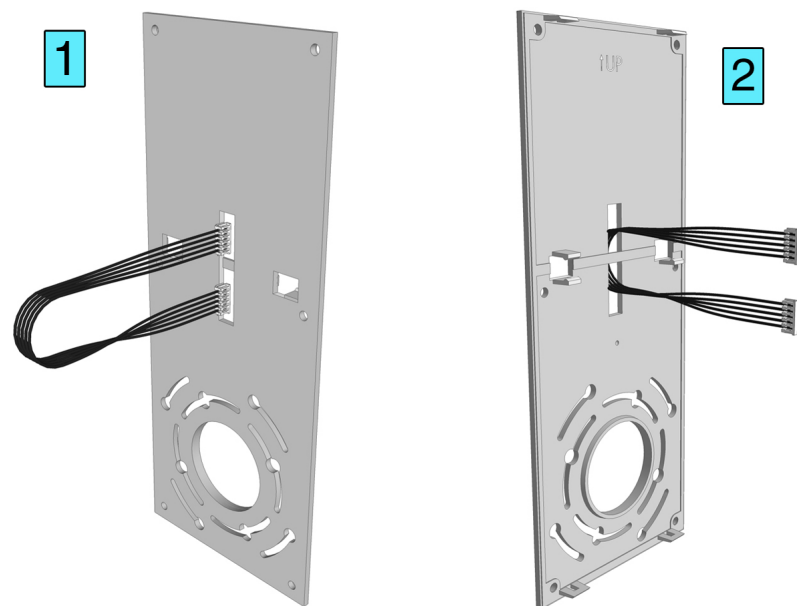
*Figure 146. Inserting the connection cable through the backplate*

**Note:** *Make sure that the cable lies in the recess under the strip in the middle of the backplate to avoid trapping the cable under the backplate when it is screwed to the wall.*

The backplate must be fixed to the wall using the four corner holes and the two holes in the middle of the backplate (indicated in the drawing below by red circles).
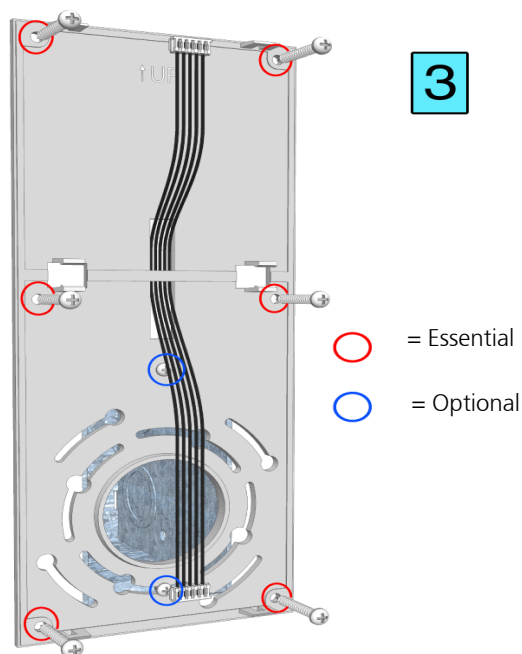


⭕ = Essential

⭕ = Optional

**CAUTION!**
*DO NOT MOUNT THE ROOM DISPLAY CLOSE TO OR OVER METAL OBJECTS.*

*There must be a minimum distance of 1 inch (30mm) in all directions between the room display and any metal objects to avoid the degradation of the card reader antenna performance.*

*Figure 147. Mounting the room display long backplate*

The backplate has an arrangement of fixing holes (indicated in the drawing above by blue circles) which make it suitable for mounting on various international back boxes.

*Caution: Even when the backplate is mounted on a back box it must also be fixed to the wall with the corner holes and the middle holes.*

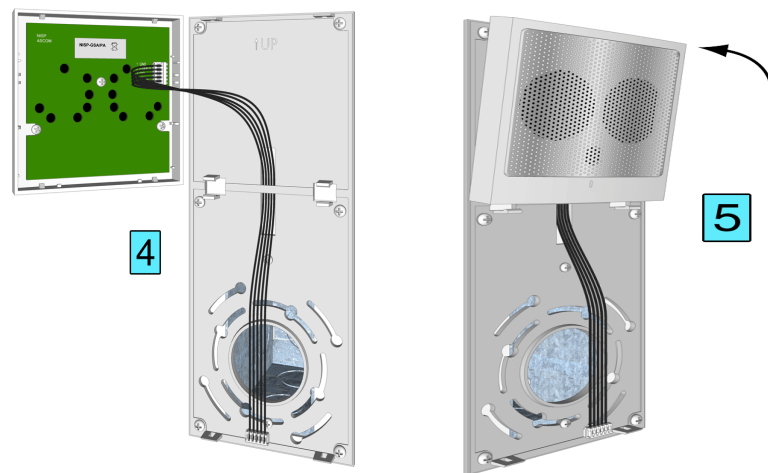When the backplate is screwed to the wall connect the NISP and snap fit it to the backplate.



*Figure 148. Connecting the NISP and mounting it on the backplate*

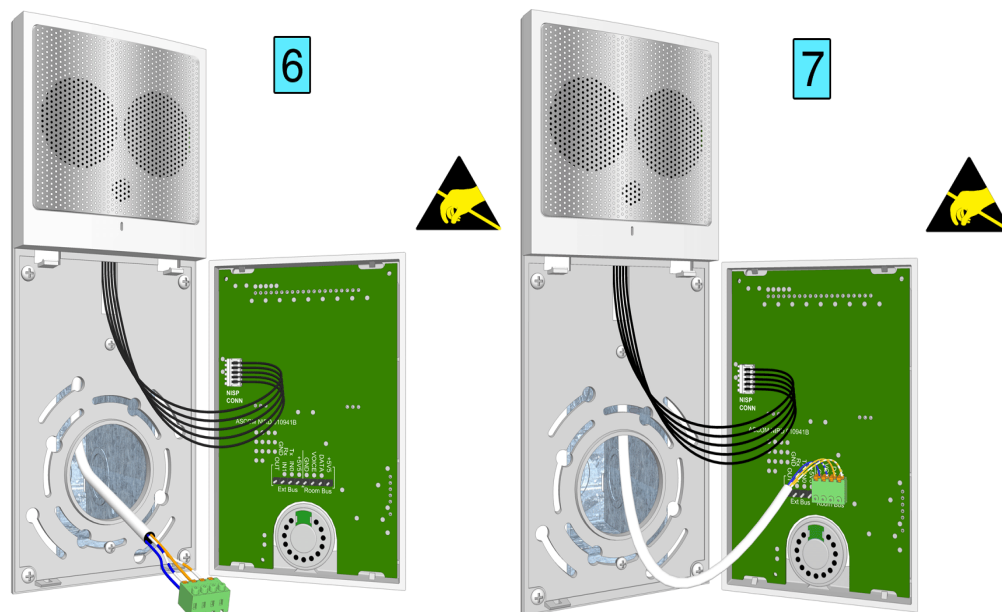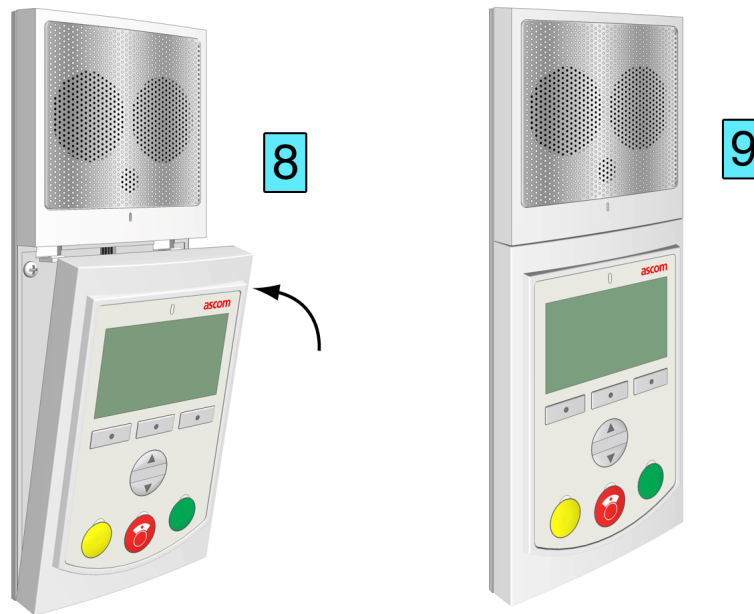Next connect the NIRD room display to the NISP and plug in the room bus connector.



*Figure 149. Connecting the NIRD to the NISP and connecting the room bus*

Refer to 6.16.1, Room Bus Electrical Connections on page 107 for full details.

Next, snap fit the room display to the backplate.



*Figure 150. Mounting the NIRD on the backplate*

## 6.17  Television Interface Module

The television interface module is the interface between the television stereo audio output and the teleCARE IP system. It provides the necessary galvanic separation between the television and the teleCARE peripherals. In the teleCARE IP application the television interface module is a passive device requiring no power supply.
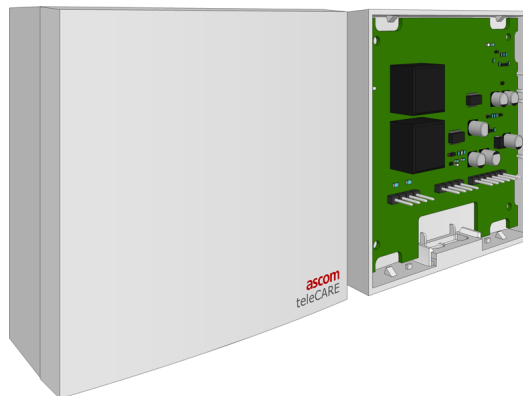


*Figure 151. Television interface module: front and back view*

The television interface module mounted on the supplied surface mounting spacer. See 6.3.2, Surface Mounting Spacer on page 63 for details.

The stereo audio input to the television interface module is taken from the headphone jack socket of the television and connected to the television interface module at J1. The output from J2 of the

television interface module is connected to the "Audio" connector of the NIBM2 bedside module.
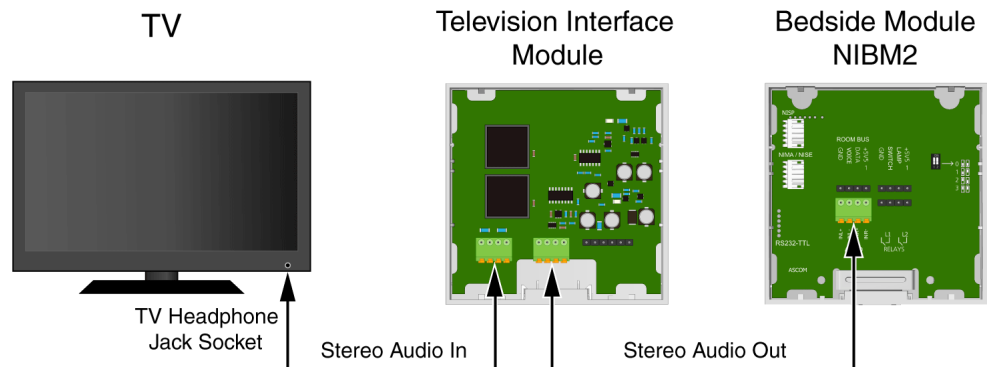


*Figure 152. Television audio connections*

**WARNING:** The equipment that is connected to this interface is not considered to be part of the teleCARE IP system UL listing.

The handset NIPH-AES is required to listen to the TV audio. The audio can be broadcasted through the speaker of the handset or listened to through stereo headphones plugged into the jack socket in the cable of the handset.

**General Considerations**

- The maximum audio input voltage is 2Vp-p.

- The maximum audio input impedance is 2k ohms.

**6.17.1 Television Interface Module Electrical Connections**
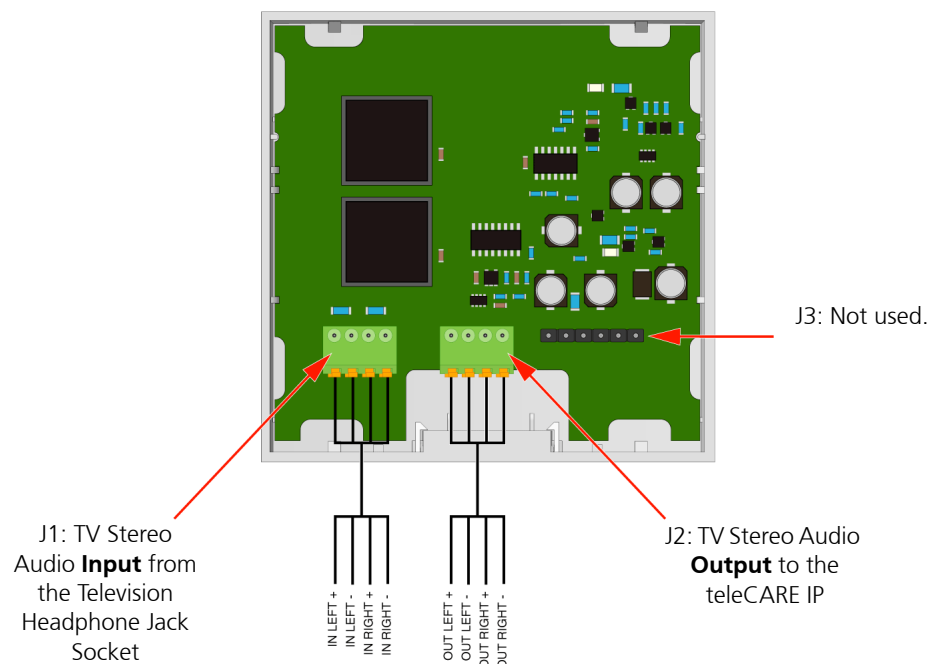


*Figure 153. Television interface module electrical connections*

**Note:**

- The equipment that is connected to this interface is not considered to be part pf the system configuration unless the equipment complies with ANSI/UL 2560 standard for Emergency Call Systems for Assisted Living and Independent Living Facilities.

- The Television Interface Module provides electrical isolation between the Television and the teleCARE IP Emergency Call System.

- Television audio in teleCARE IP requires the bedside module NIBM2. For details of the NIBM2 refer to .

- The 4 pole connector terminals must be ordered separately.

## 6.18 Sunblind Control Module
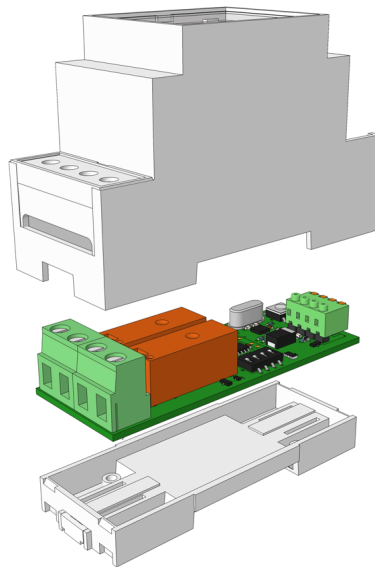


*Figure 154. Sunblind Control Module*

The Sunblind Control Module is a passive device on the teleCARE IP room bus. It has two heavy duty relays with normally open contacts to control the sunblind motor.

The sunblind control module is compatible with the bedside module NIBM2 and the medical rail socket NIMS2. It is used in combination with the NIPH3-A7A and NIPH3-AES handsets to control the up and down motors of sunblinds.
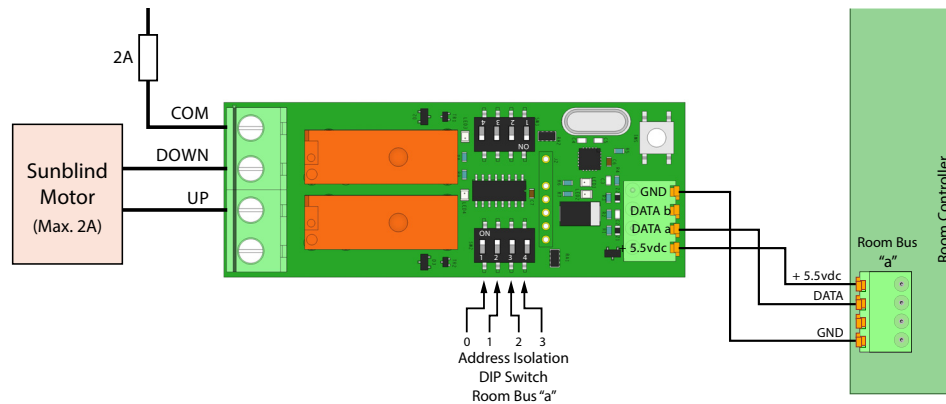
### 6.18.1 Sunblind Motor Controller



*Figure 155. Sunblind control module electrical connections*

The sunblind control module can be connected to one room bus and will only respond to room bus addresses 0 to 3 of the connected room bus.  The Room Bus "a" DIP switches are used to prevent the sunblind control module from responding to specific room bus addresses. Setting a DIP switch to the ON position selects that particular address, 0 to 3 to control the module.

**WARNING:** Up to 230Vac power to the sunblind motor control relay must be fused at 2 Amps. Appropriate cable for the voltage and current must be used for the sunblind motor control.

**WARNING:** The equipment that is connected to this interface is not considered to be part of the teleCARE IP system.

# 7    Corridor Equipment

## 7.1    Corridor Display (NICD)

The NICD is a supplemental IP based corridor display suitable for use in teleCARE IP, and contains a LAN interface for connection to the teleCARE IP LAN network.

The NICD has a large character, 3-color (Red/Green/Amber) message display and a signaling buzzer. It is available as a single or double sided unit with a 6-character or a 12-character display.



*Figure 159. 6 and 12 character Corridor Display (NICD)*

**WARNING:**    The NICD equipment described in this section is for supplementary purposes only, is not evaluated to UL 2560 and is not part of the teleCARE IP system UL listing.

From the built-in web interface the basic configuration of the NICD can be adjusted, for example the IP address, host name and communication port.

General text display settings can be set in the NISM2. Up to 50 NICDs can be added to a single NISM2.

The NISM2 is used to define such things as message display time, number of stored messages, the color of the displayed message depending on message priority and buzzer options. The NICD display mode can be constant or scrolling.

The display mode can be set to constant (with short blank period in between) or to scrolling (from bottom to top) when there are two or more active calls to be displayed. The NICD can display up to 30 different messages. If the maximum number of messages is reached, the oldest message with the lowest priority will be cleared first. When the display is not showing any messages (idle), it can be configured to show the time/date or any other type of welcome message.

### 7.1.1  Corridor Display Network Requirements

- Ethernet 10 BaseT
- half duplex
- no auto-crossing
- no auto-negotiation
- no auto-polarity

**Note:** *The display will not work on non-standard (reversed polarity) switches using a normal straight cable. Reversed polarity switches require a special Reverse Polarity Cable.*

### 7.1.2 Preparing Single-Sided Displays Prior to Mounting

Before a single-sided display can be mounted, the LAN cable must be connected to the rear of the display first. The first step is to remove the metal strain reliever plate from the back of the display by unscrewing the 2 screws.
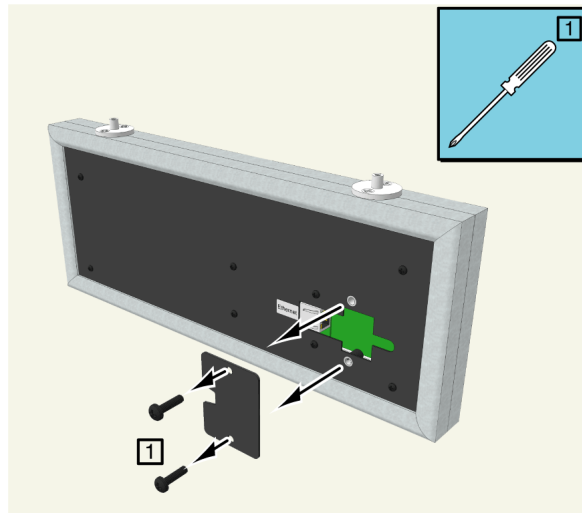


*Figure 160. Remove the strain reliever plate*

Plug the RJ-45 connector of the network cable into the ethernet socket of the display and place the strain reliever plate back in place.
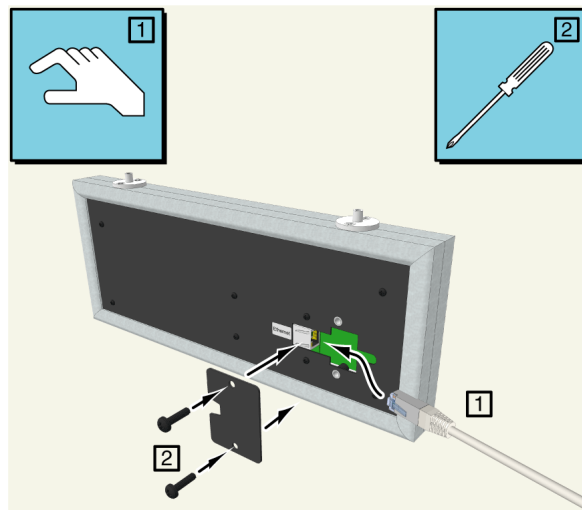


*Figure 161. Plug in the RJ-45 connector*

### 7.1.3  Mounting the Corridor Display

The NICD is prepared for wall mounting using a special wall mounting bracket which is available as an accessory.



*Figure 162. Wall mounted NICD*

**NICD Wall Mounting Bracket**

The NICD wall mounting bracket is available in two sizes, for the 6-character display and for the 12-character display.
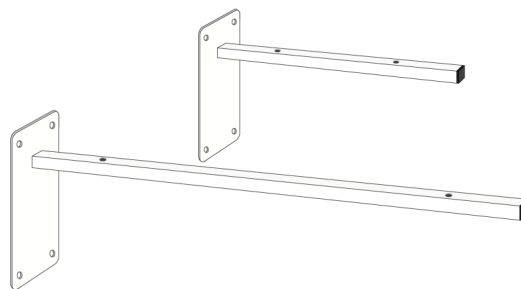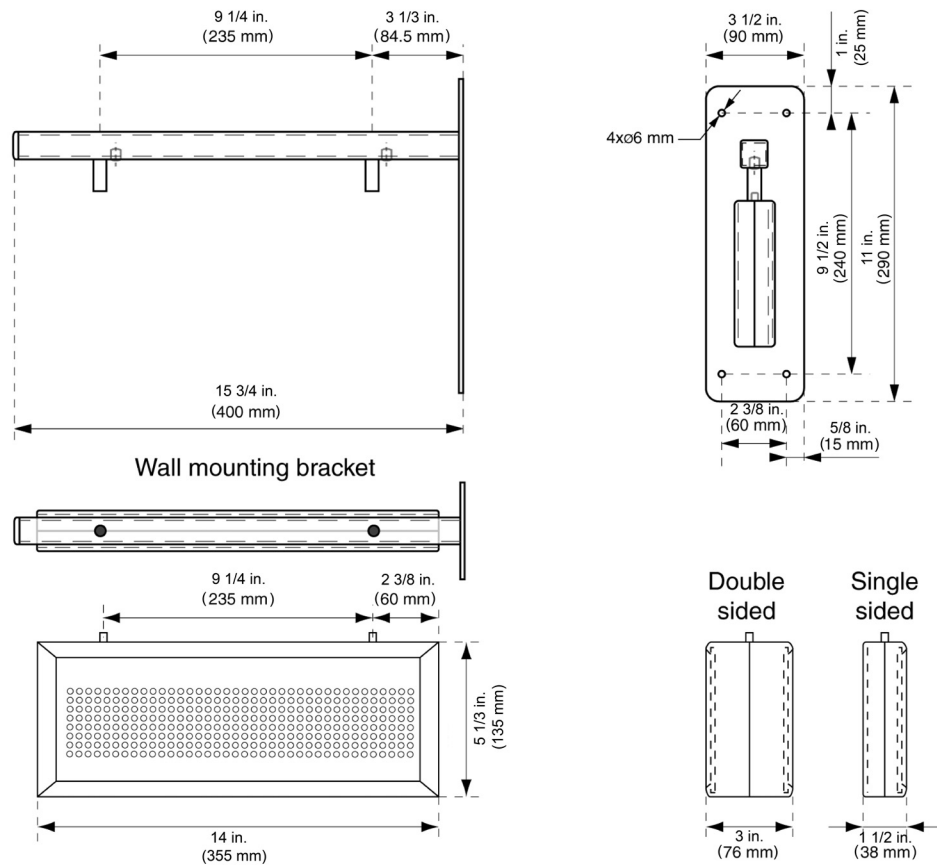


*Figure 163. 6 and 12 character mounting brackets*

**Dimensions & Weights**

The method used to fix the mounting bracket to the wall must be capable of safely supporting the combined weight of the NICD and the mounting bracket.

**6 Character NICD**

- Weight of the 6 character single-sided display = 3.7 pounds/1.7 kg

- Weight of the 6 character double-sided display = 4.4 pounds/2 kg

- Weight of the 6 character mounting bracket     = 3.3 pounds/1.5 kg

9 1/4 in.
(235 mm)

3 1/3 in.
(84.5 mm)

3 1/2 in.
(90 mm)

1 in.
(25 mm)

4x⌀6 mm

9 1/2 in.
(240 mm)

11 in.
(290 mm)

15 3/4 in.
(400 mm)

2 3/8 in.
(60 mm)

5/8 in.
(15 mm)

**Wall mounting bracket**

9 1/4 in.
(235 mm)

2 3/8 in.
(60 mm)

5 1/3 in.
(135 mm)

14 in.
(355 mm)

Double
sided

Single
sided

3 in.
(76 mm)

1 1/2 in.
(38 mm)

### 12 Character NICD

- Weight of the 12 character single-sided display = 6.2 pounds/2.8 kg

- Weight of the 12 character double-sided display = 7.3 pounds/3.3 kg

- Weight of the 12 character mounting bracket    = 4.4 pounds/2 kg
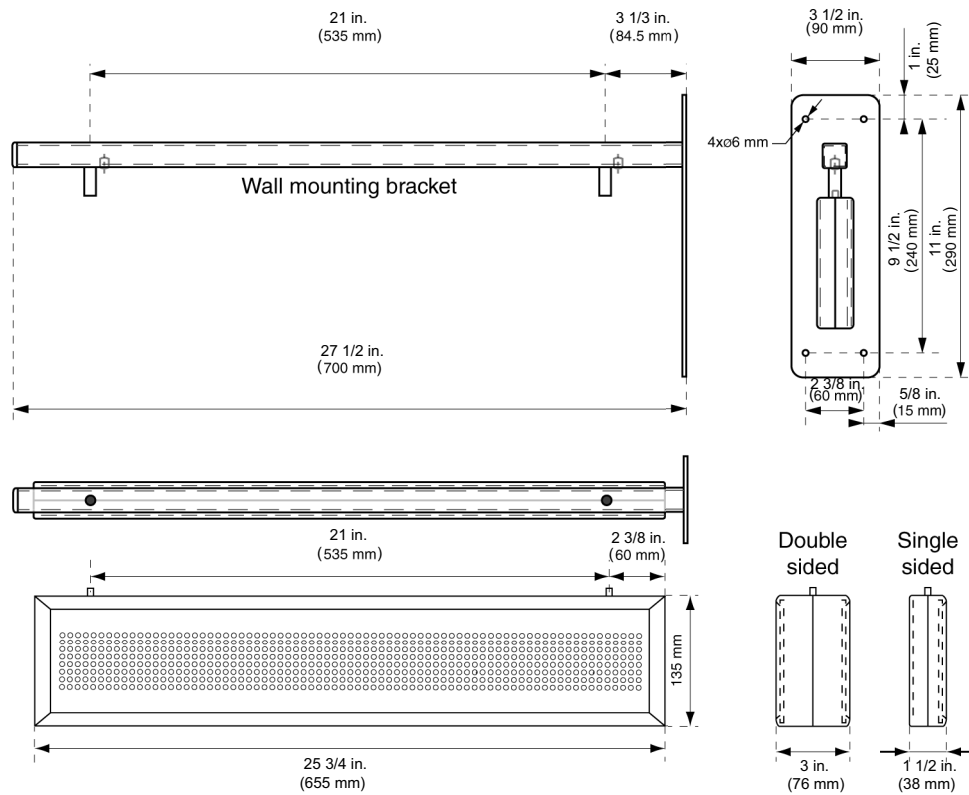
When placing the wall mounting bracket on the wall, consider the minimum height at which the display should be mounted. The minimum installation height depends on things like opening a door in the vicinity of a display or an object transported through the corridor. Make sure that in none of these circumstances the object will hit the display.
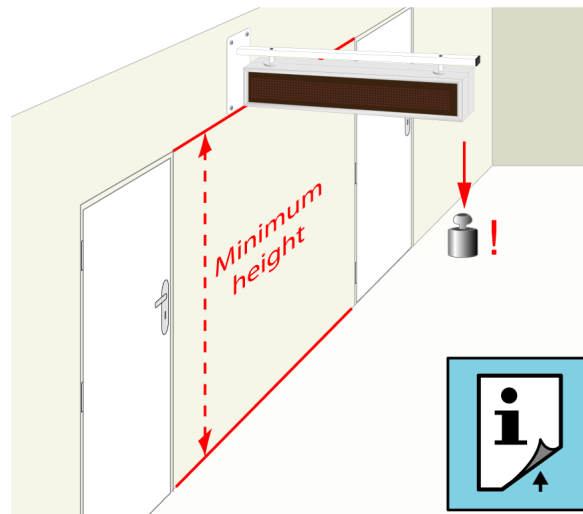


*Figure 164. Minimum installation height*

To mount the bracket on the wall, drill four holes according to the dimensions of the 6 or 12 character mounting bracket.
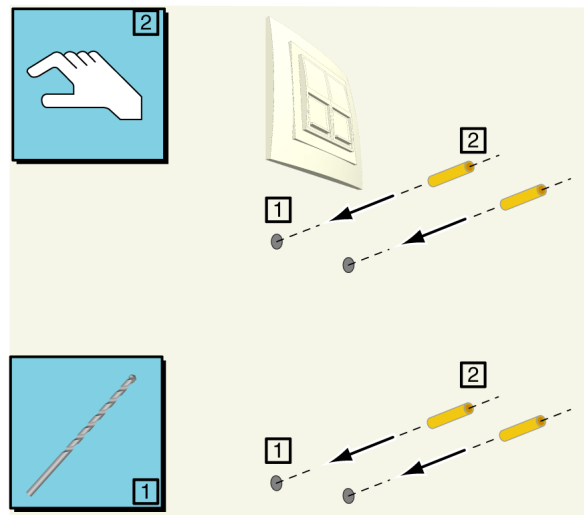
*Figure 165. Drilling four holes for mounting the bracket*

Fix the mounting bracket on the wall by using four well-fitted screws capable of carrying the weight of both the display and the mounting bracket.
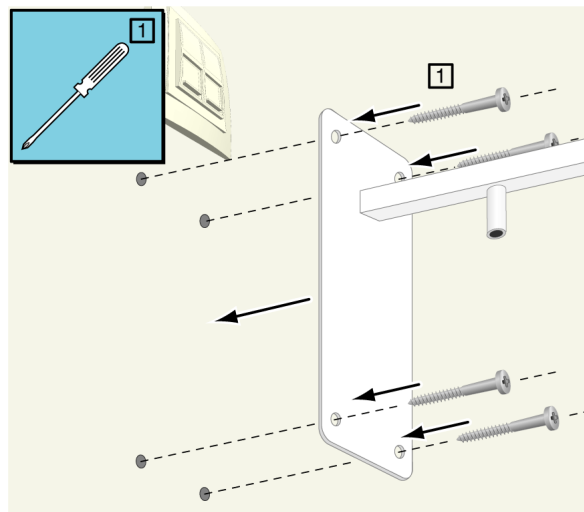


*Figure 166. Fixing the wall mounting bracket*

The next step is to mount the display on the wall mounting bracket. First start by removing the two hex screws at the top of the display using an allen key (Hex key wrench).
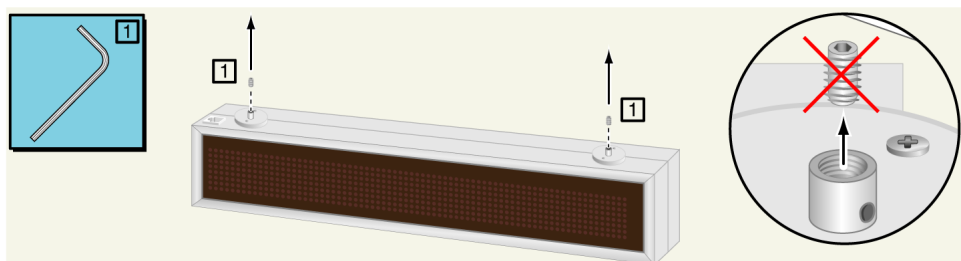


*Figure 167. Use the included accessories to mount the display on the bracket.*
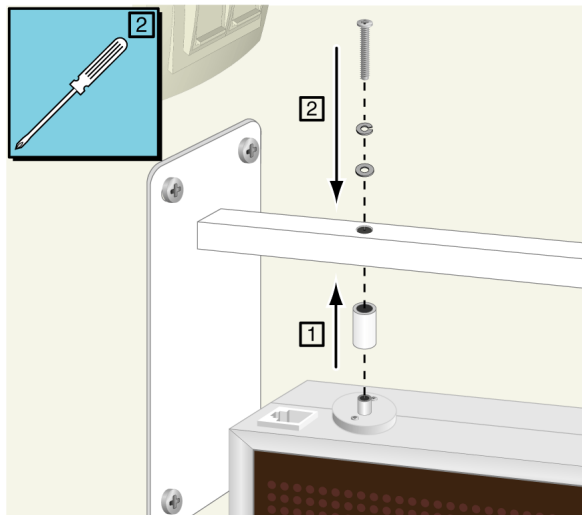
*Figure 168. Mount the display on the bracket*

Finally connect the ethernet cable from the outlet to the corridor display.
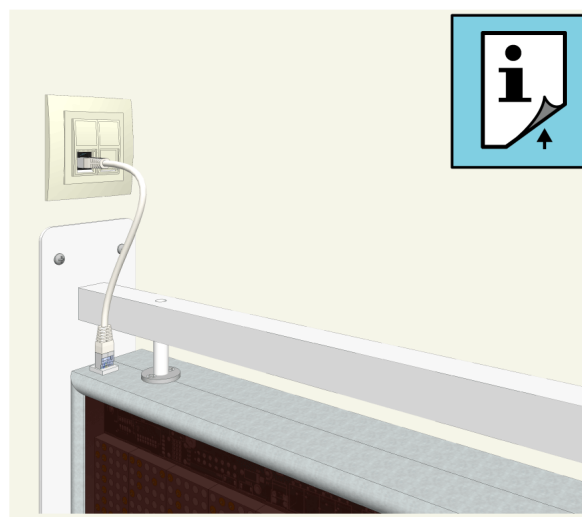


*Figure 169. Connecting the displays ethernet cable*

**Direct Wall Mount**

With the direct wall mount holder, single sided displays can be mounted directly onto the wall by sliding the displays holding slots onto the wall mount holder that is fixed to the wall.

Direct Wall Mount



*Figure 170. Close the loop and tighten the suspension wire*

### 7.1.4 Corridor Display Electrical Connections

The NICD can be powered using Power over Ethernet (PoE) through a PoE switch or through an external 24Vdc power supply using a shielded PoE injector with the 24V negative lead "-" connected to the shield.
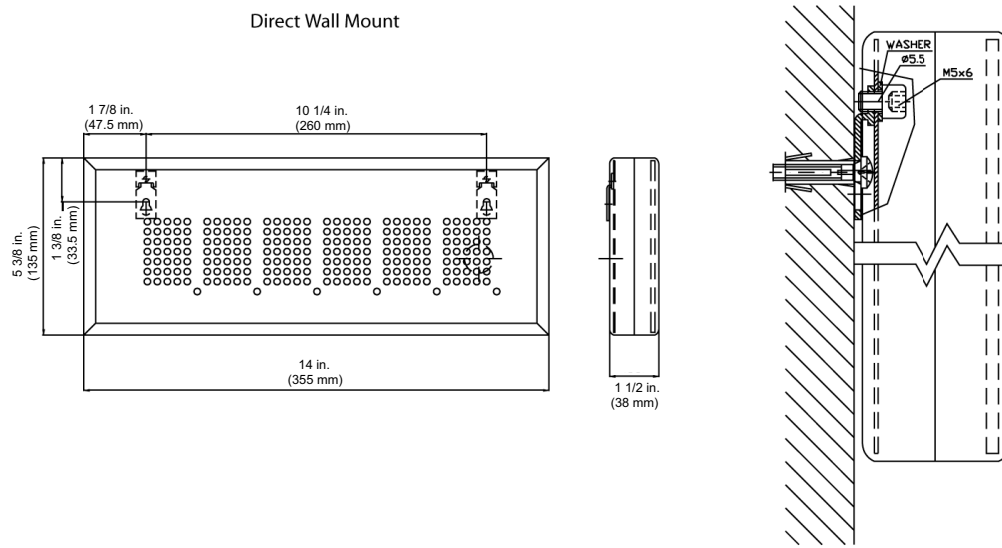
A standard T-568B straight-through shielded ethernet cable is used to connect the NICD to the LAN network.



T-568B                                      T-568B
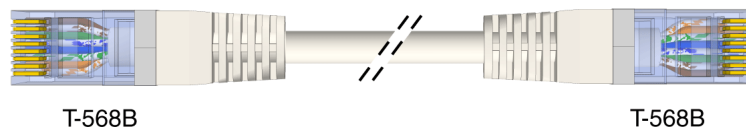
*Figure 171. T-568B straight-through shielded ethernet cable*

| RJ-45 | color (T-568B) | Name | Ext. Power Supply |
|:---:|:---:|:---:|:---:|
| 1 | white / orange | TX+ | |
| 2 | orange | TX- | |
| 3 | white / green | RX+ | |
| 4 | blue | SP1 | 24 Vdc |
| 5 | white / blue | SP1 | either polarity |
| 6 | green | RX- | |
| 7 | white / brown | SP2 | 24 Vdc |
| 8 | brown | SP2 | polarity opposite to SP1 |

*Table 9. T-568B cable specification*

*Caution:* The display will not work on supplementary non-standard (reversed polarity) ethernet switches using a normal straight cable. A "Reverse Polarity Cable" is required when connecting to a reversed polarity switch.



*Figure 172. Single and double sided display network connection*

**Corridor Display Power Requirements**

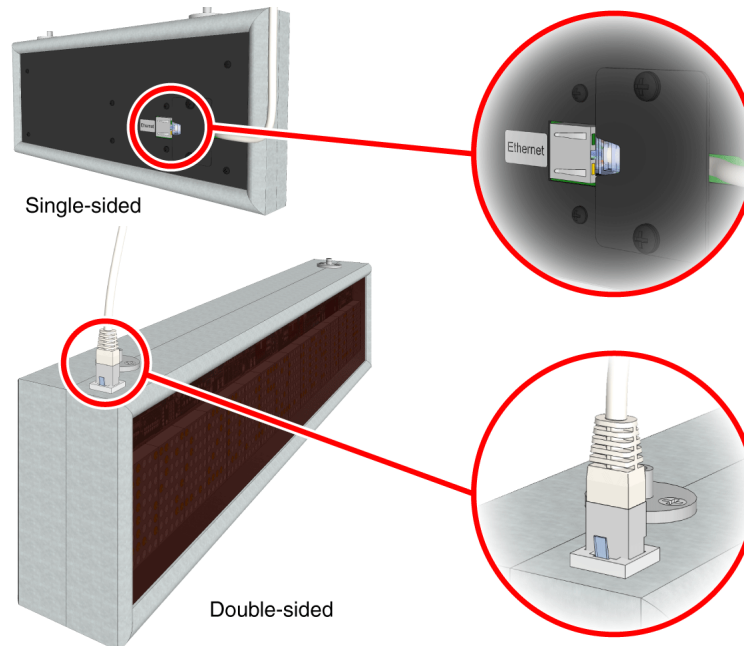The following table shows the power requirements for the various corridor displays.

| Display Type | PoE type | PoE Class | Power Consumption | | |
| --- | --- | --- | --- | --- | --- |
| | | | Ext. Supply | PoE Supply | |
| | | | 24 Vdc | 42 Vdc | 57 Vdc |
| 6 character Single Sided | PoE (802.3af) | Class 2 < 6.49 W | 7.6 W 0.31 A | 7.5 W 0.17 A | 7.9 W 0.14 A |
| 6 character Double Sided | PoE (802.3af) | Class 0 < 12.94 W | 15 W 0.62 A | 13.8 W 0.32 A | 14.0 W 0.24 A |
| 12 character Single Sided | PoE (802.3af) | Class 0 < 12.94 W | 11.3 W 0.47 A | 10.8 W 0.25 A | 11.0 W 0.19 A |
| 12 character Double Sided | PoE+ (802.3at) | Class 4 < 25.50 W | 22.7 W 0.94 A | 21.2 W 0.50 A | 21.4 W 0.37 A |

*Table 10. Corridor display power requirements*

When using an external power supply to power the display, a shielded PoE injector is required with the 24Vdc negative lead "-" connected to the shield. The 24Vdc from the external supply will be injected on the spare wires of the network cable (SP1 and SP2 pairs).

# 8    Wireless Functionality

## 8.1    General

teleCARE IP with wireless functionality is intended for use in nursing homes and in assisted living facilities.

teleCARE IP is able to support wireless functionality through the NICR3 teleCARE IP room controller combined with the NIRX transceiver, which is piggy-back mounted on the circuit board of the NIRC3.
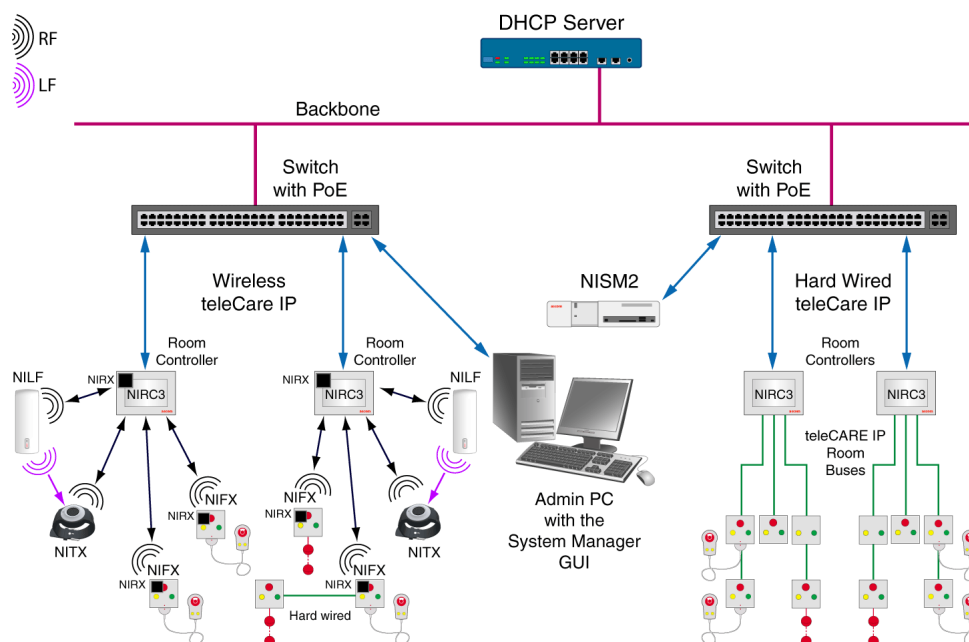


*Figure 173. Wireless teleCARE IP and hard-wired teleCARE IP*

The wireless call peripherals consist of the NIFX fixed transceiver, the NITX mobile transceiver and an optional low frequency beacon NILF.

The NIFX fixed wireless transceiver is a three-button wall mounted switch module. It comes as a socket version used for the connection of a patient handset or equipped with a pull-cord. Both variants of the NIFX include a 125 kHz LF receiver and an NIRX 916 to 921 MHz Class 1 transceiver which is piggy-back mounted on the circuit board of the NIFX. The fixed wireless transceiver switch modules can be powered by two AA disposable alkaline batteries, or connected to an external 12 - 24Vdc power supply.

The NITX mobile call transceiver can be attached to a wrist strap, or to a neck pendant. It can also be used as a mobile alarm transmitter connected to third party equipment. The NITX is powered by an internal three volt replaceable lithium battery. It includes a 916 to 921 MHz transceiver and a 125 kHz LF receiver for receiving the location update information from LF beacons.

The NILF low frequency beacon includes a 125 kHz transmitter and can be extended with the piggy-back mounted NIRX 916 to 921 MHz transceiver. The LF Beacon NILF is contained in a white plastic enclosure with a slim design that is suitable for surface mounting on walls or at a door post. The NILF can be powered by three C size disposable alkaline batteries, or connected to an external 24Vdc power supply.

## 8.2    Principle of the teleCARE IP with Wireless Functionality

The system is configured using the teleCARE IP System Manager - NISM2. The wireless server is a Unite application on the NISM2 serving as the central controller for all wireless devices in the teleCARE IP system with wireless functionality.

The wireless server has similar functions to those found in the teleCARE IP room controller, such as event handling, assignment handling and linking, with additional functions such as signal strength comparison. The main difference between the wireless server and the teleCARE IP room controller is that the wireless server controls all wireless devices in the system, whereas each room controller is responsible for only the devices which are hard-wired to it.

The NIRC3 room controller requires the piggy-back mounted NIRX transceiver module to give it wireless compatibility. When combined with the NIRX the room controller also serves as a base station and portal for the wireless devices.

The NIFX fixed transceiver has a piggy-back mounted NIRX transceiver, whereas the NITX mobile transceiver has its' own internal transceiver.
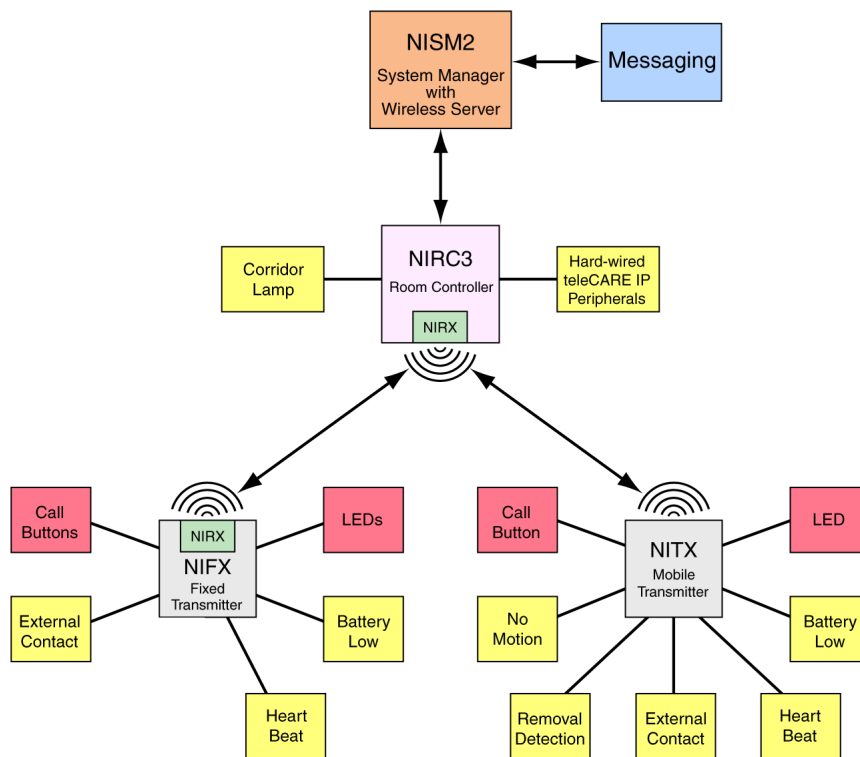
*Figure 174. Principle diagram of teleCARE IP wireless functionality*

### 8.2.1 Location Based Wireless Nurse Call Using LF Beacons

The addition of the NILF low frequency beacons gives location based wireless functionality available including access control. The NILF will send out its ID, including location information, at regular intervals using a low frequency 125 kHz signal that will be picked up by the wireless transceiver modules that pass by the NILF.
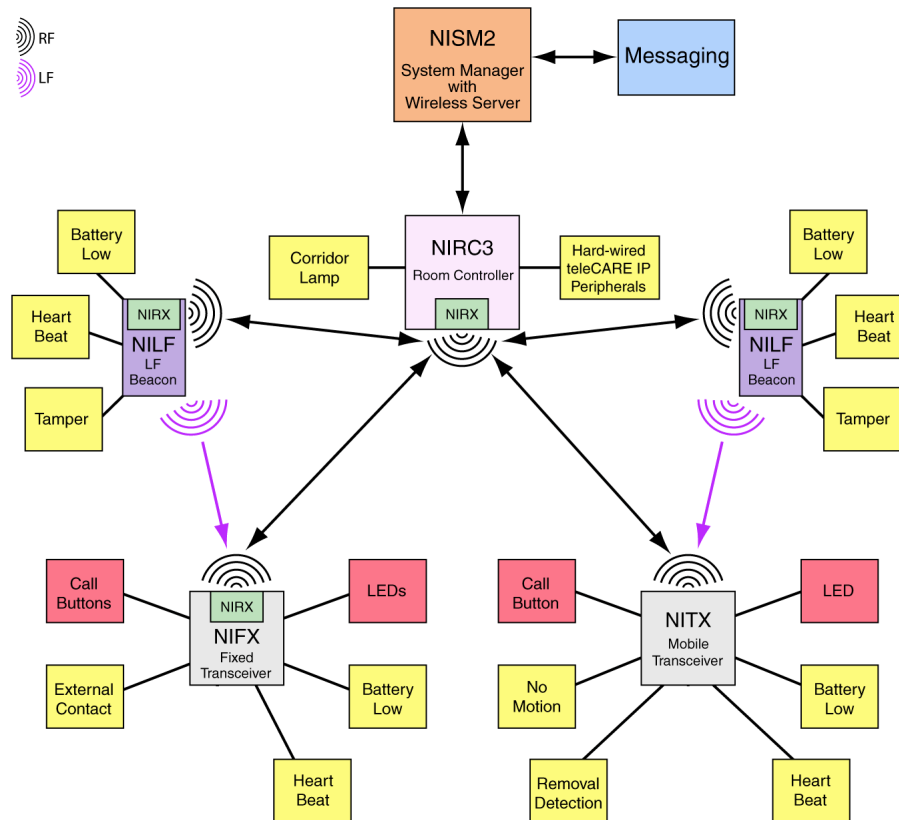


*Figure 175. Location based wireless functionality*

The range of an LF beacon is adjustable and can be up to approximately 6.5 feet (2 meters) with battery power and approximately 10 feet (3 meters) with external power.

When a wireless device comes within range of a passive NILF location beacon it will receive the beacon ID with the location information. It then stores the location as the last known location. The stored last known location will be added to the next event that is transmitted from the wireless device, like a button press, battery low alarm, etc.

When a wireless device comes within range of an active NILF location beacon, it sends a location update message to the wireless server. In addition, based on the received location information, the wireless server can check to see if the person carrying the wireless device is allowed to access that location. Doors can be opened or stay closed depending on the access rights. Automatic alarms can be generated when a person leaves or enters a certain location.

Whenever a call is made from a wireless module the location will be transmitted to the wireless server, when the wireless module is not in range of an LF beacon the last two known locations will be transmitted.

### 8.2.2  Wireless Nurse Call with Speech

Wireless transceivers can be used to generate calls to notify the staff that help is needed. These devices don't support speech themselves. To be able to set up a speech session with a person that initiated a wireless nurse call, the wired teleCARE IP speech modules are required.

To be able to support speech for wireless call, a phone number will be included in the message towards the messaging devices, including speech options. When selecting the IM option "speech" on the messaging device, a speech session will be started with the wired peripheral that is configured with that phone number.

For wireless speech, hard-wired speech modules are required at all the locations that contain wireless transceivers that are configured to use static locations. In static location mode, calls from the wireless transceiver are always linked to the location that is selected in the configuration of the wireless transceiver.

When the wireless device is configured to use dynamic locations, speech modules are also required at, or close to the locations that are covered by location beacons NILF. When in range of a location beacon the wireless device will store the location information which will be used the next time a call is made.
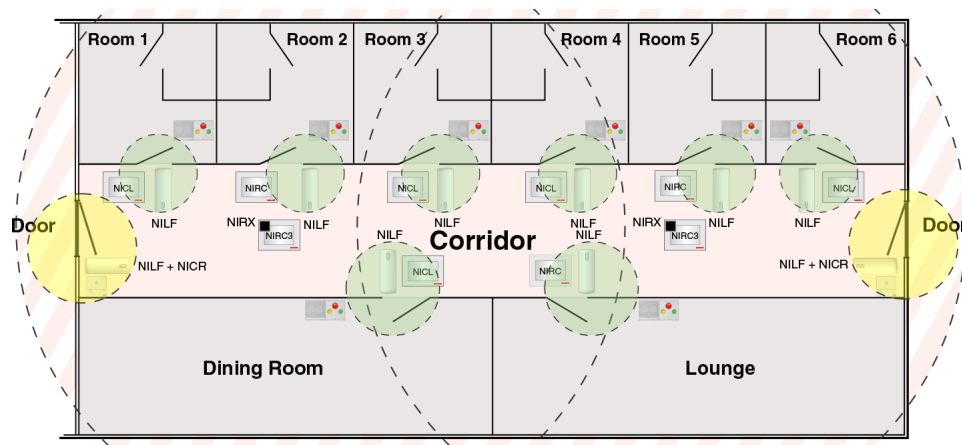


*Figure 176. Wireless nurse call example with speech*

This example consists of two room controllers (NIRC3) with transceiver module (NIRX) mounted for the wireless communication and three room controllers (NIRC) with five corridor lamps from an existing teleCARE IP configuration with speech. Each location has a doorside module with speech unit and a passive location beacon. The two main entry doors to the corridor are controlled by an active location beacon with access control unit.

Wireless speech will be based on the location of the wireless transceiver.
For wireless transceivers that are configured to use a static location, the phone number of the hard-wired teleCARE IP speech module at the location that is assigned to the wireless transceiver will always be used in the IM "speech" option.

For wireless transceivers that are configured to use dynamic locations, the phone number for the IM "speech" option will be automatically updated when the wireless transceiver moves between locations that are covered by active location beacons NILF.

When using passive location beacons, the IM options will not be updated when moving between passive locations, and the speech location will be the location where the wireless call was first made.

The table below shows the speech handling for wireless transceivers based on their static or dynamic location mode setting in combination with passive or active location beacons.

| Transceiver Location mode | Location Beacon (NILF) | Location at the start of a New call | IM "Speech" location change update | | |
|---|---|---|---|---|---|
| | | | Before speech | During speech | After speech |
| Static | NA | Fixed default location | No | No | No |
| Dynamic | Passive | Last known | No | No | No |
| | Active | Last known | Yes | No | No |

## 8.3    teleCARE IP Wireless Components

### 8.3.1  NIRX teleCARE IP Transceiver

The NIRX transceiver is a printed circuit module which is piggy back mounted on the NIRC3 room controller and the NIFX fixed transceiver. Mounting the NIRX will add wireless nurse call functionality to the NIRC3 room controller and the fixed transceiver. Optionally the NIRX can also be mounted on the NILF location beacon for actively monitoring the state of the NILF, such as tamper and low battery alarm conditions.
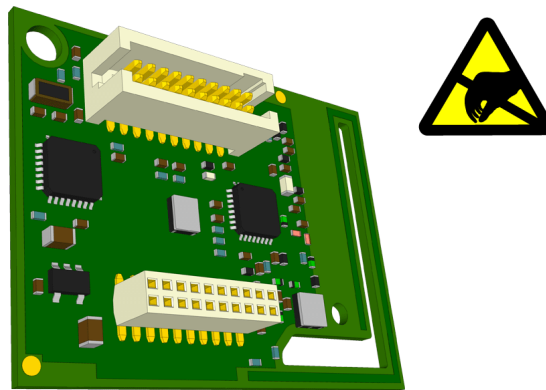


*Figure 177. Transceiver piggyback module (NIRX)*

**Connecting the Transceiver Module**

The NIRX is piggyback mounted on the NIRC3 room controller, on the NIFX fixed transceiver and on the NILF low frequency beacon printed circuit boards:
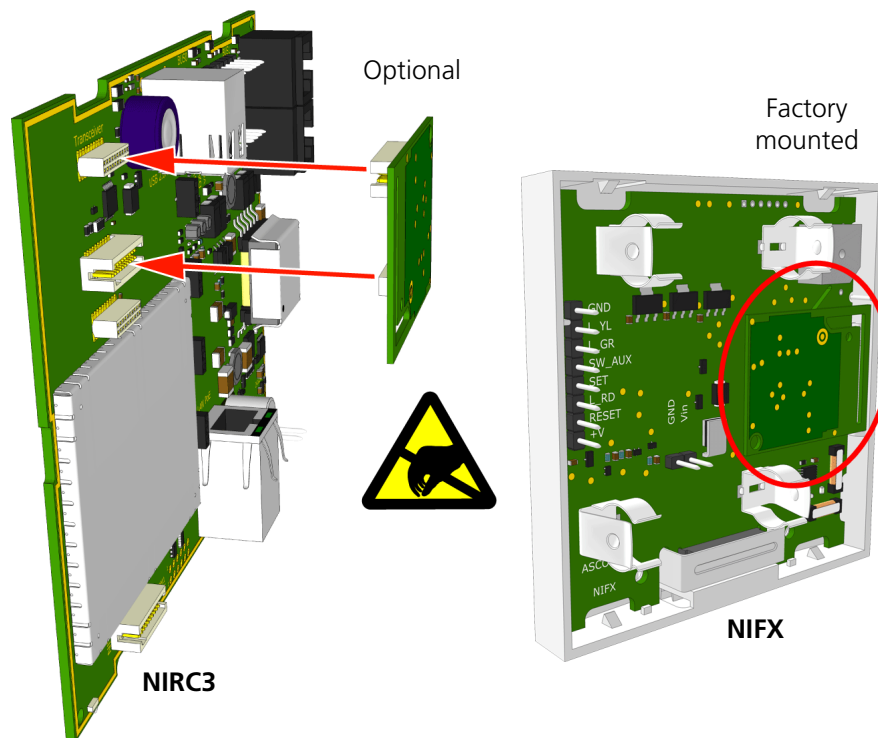


*Figure 178. Piggyback mounting of the transceiver module on the NIRC3 and NIFX*

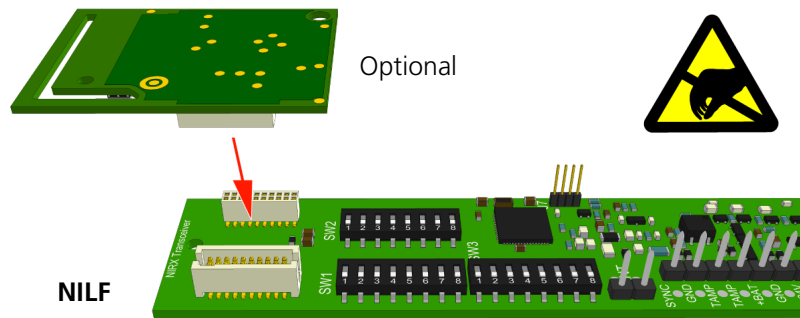**Note:** *The NIFX is delivered with an NIRX mounted from the factory.*

*Figure 179. Piggyback mounting the transceiver module on the NILF*

### 8.3.2  NIFX Fixed Transceiver

The NIFX series fixed transceiver is a wireless teleCARE IP switch module which is available as socket module or pull cord module. It has 3 function buttons, a white plastic body and includes a spacer for surface mounting. The pull cord version includes the cord with two red balls but no socket.
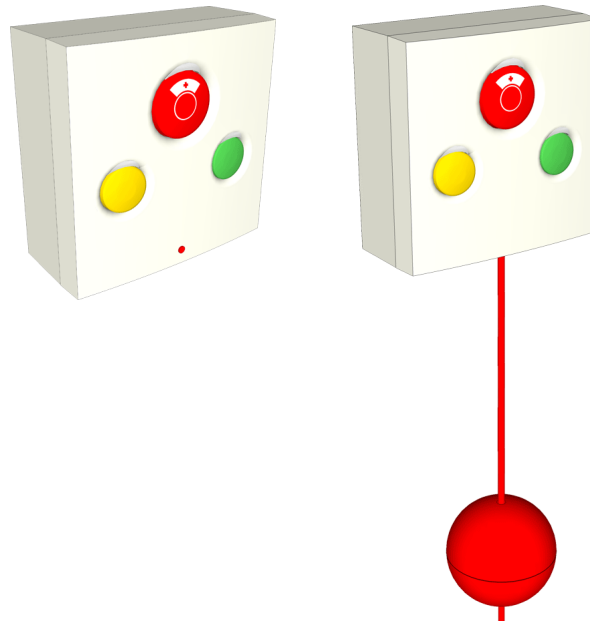


*Figure 180. NIFX wireless switch module and pull-cord module*

The NIFX socket variant supports the connection of a passive patient handset, see "Handset Connection" on page 134.

**Replacing the Batteries**

The fixed transceiver requires 2 x 1.5V AA disposable alkaline batteries. The battery voltage is continually monitored and if low voltage is detected a "low battery" alarm is transmitted and the low battery status is included in every heartbeat transmission of the unit. Under normal circumstances the battery life is 1 to 1½ year.
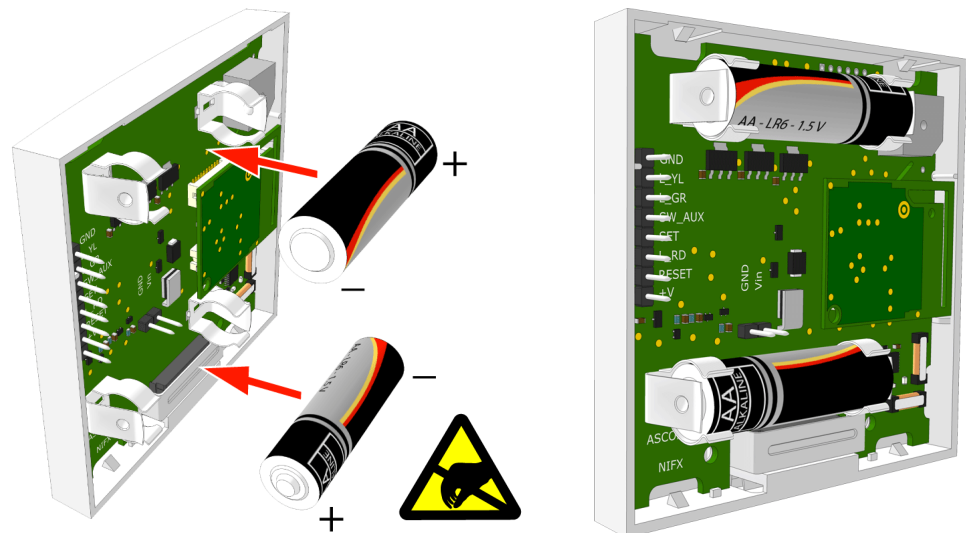


*Figure 181. Replacing the batteries*

When battery powered the fixed transceiver LEDs stay active for a period of 30 seconds after a call has been made.

**Connecting a DC Power Adapter**

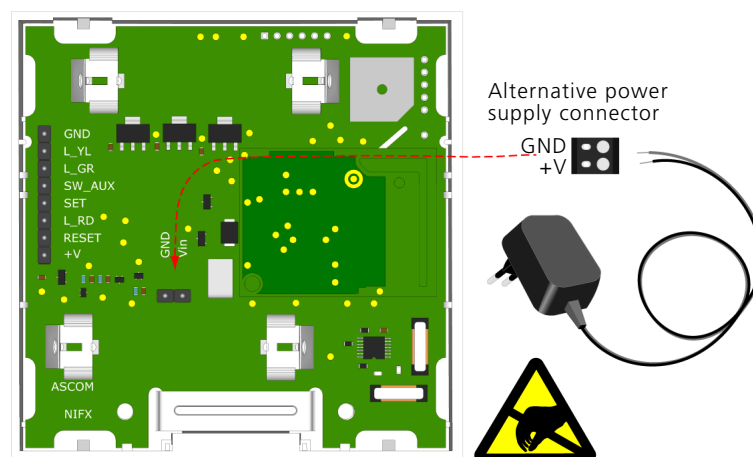Alternatively, an external CE certified 12-24Vdc power adapter can be used.



*Figure 182. Connecting an external 12-24Vdc power adapter*

When externally powered the red, yellow and green LEDs will permanently emit a low intensity light for locating and identification in the dark.

**Handset Connection**

The socket module version of the fixed transceiver includes a teleCARE Safe Release socket for connecting the NIPH2-A1A handset with handset disconnect alarm functionality. Speech/Entertainment handsets are not supported.
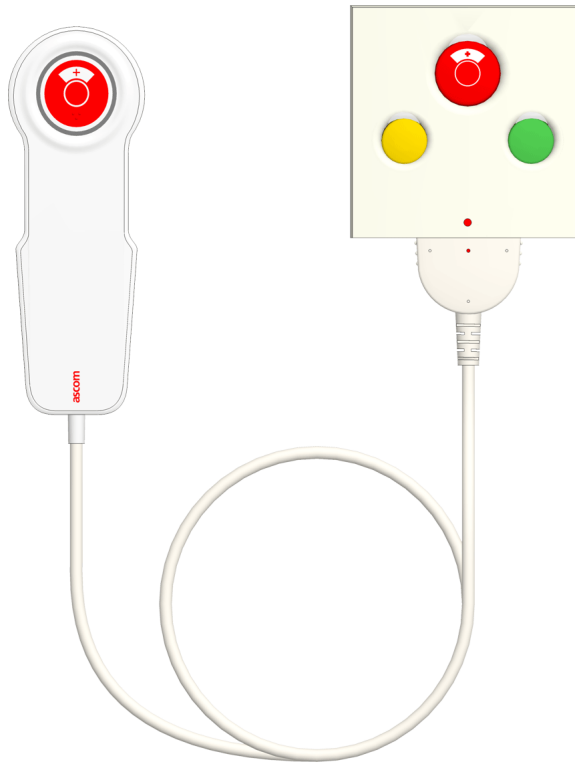


*Figure 183. NIPH2-A1A handset connected to the NIFX*

### 8.3.3 NITX Mobile Transceiver

The NITX mobile transceiver is a wireless call unit for residents. It is robust and water resistant (IP 65).

The NITX (AAA and BAA) contains a 916 to 921 MHz RF transceiver, a call button and a reassurance LED. The NITX-BAA also includes a 125 kHz LF receiver used for call cancellation using a cancel pendant and for location determination using LF beacons. Each mobile transceiver has a unique identity (ID) which is transmitted with every event from the mobile transceiver.



*Figure 184. teleCARE IP mobile transceiver*

The mobile transceiver can be fitted with a wrist strap so that it can be worn like a wrist watch. Alternatively, it can be attached to a lanyard so that it can be worn around the neck. The wrist strap and lanyard must be ordered separately.

**Removing the Rear Cover**

Removing the rear cover of the NITX is necessary when replacing the battery or when connecting an external alarm contact to the NITX circuit board.

Remove the four torx screws at the back of the NITX using A special screwdriver (T3) or bit (IP-3). When the screws are removed, gently pull off the rear cover.
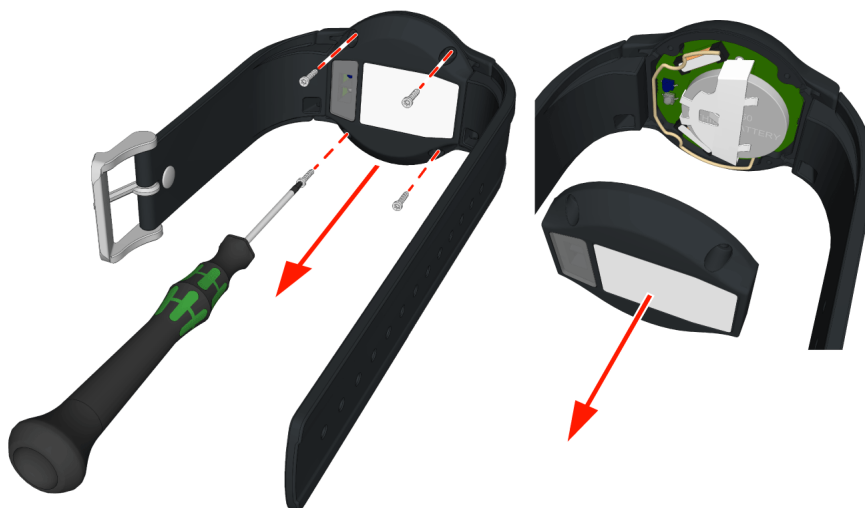


*Figure 185. Removing the rear cover*

**Note:** *Removing the rear cover will wear out the screw holes of the NITX front cover, therefore the NITX can be opened and closed approximately three times.*