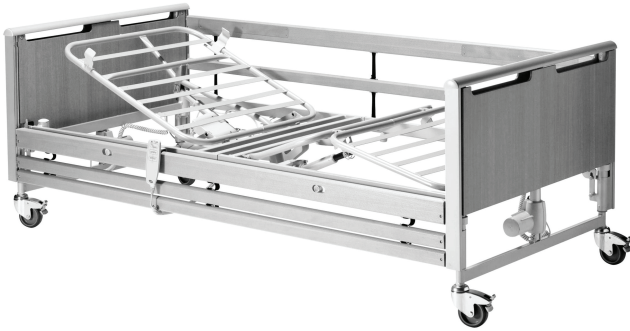


# Invacare® Etude Plus

Etude Plus, Etude Plus Low



en Bed  
User Manual

**taylor**dolman

This manual MUST be given to the user of the product.  
BEFORE using this product, this manual MUST be read and saved  
for future reference.



**Yes, you can.®**



# Contents

|                                                        |           |                                                                                 |           |
|--------------------------------------------------------|-----------|---------------------------------------------------------------------------------|-----------|
| <b>1 General</b>                                       | <b>4</b>  | <b>8 Troubleshooting</b>                                                        | <b>22</b> |
| 1.1 Introduction                                       | 4         | 8.1 Troubleshooting electrical system                                           | 22        |
| 1.1.1 Symbols in this Document                         | 4         | <b>9 Technical Data</b>                                                         | <b>23</b> |
| 1.2 Intended Use                                       | 4         | 9.1 Materials                                                                   | 23        |
| 1.2.1 Intended Operator                                | 4         | 9.2 Dimensions                                                                  | 23        |
| 1.3 Service Life                                       | 5         | 9.3 Weights                                                                     | 23        |
| 1.4 Compliance                                         | 5         | 9.4 Mattress sizes                                                              | 23        |
| 1.4.1 Product-specific standards                       | 5         | 9.5 Environmental conditions                                                    | 24        |
| 1.5 Warranty Information                               | 5         | 9.6 Electrical system                                                           | 24        |
| 1.6 Limitation of Liability                            | 5         | <b>10 Electromagnetic compatibility (EMC)</b>                                   | <b>25</b> |
| <b>2 Safety</b>                                        | <b>6</b>  | 10.1 General EMC information                                                    | 25        |
| 2.1 General safety information                         | 6         | 10.2 Electromagnetic emission                                                   | 25        |
| 2.2 Mattresses                                         | 7         | 10.3 Electromagnetic Immunity                                                   | 25        |
| 2.3 Safety information on electromagnetic interference | 7         | 10.3.1 Test specifications for immunity to RF wireless communications equipment | 26        |
| 2.4 Labels and symbols on the product                  | 8         |                                                                                 |           |
| 2.4.1 Identification label                             | 8         |                                                                                 |           |
| 2.4.2 Other Labels                                     | 8         |                                                                                 |           |
| <b>3 Setup</b>                                         | <b>10</b> |                                                                                 |           |
| 3.1 General Safety Information                         | 10        |                                                                                 |           |
| 3.2 Receiving the bed                                  | 10        |                                                                                 |           |
| 3.3 Other Items                                        | 10        |                                                                                 |           |
| 3.4 Assembly of the bed                                | 10        |                                                                                 |           |
| 3.4.1 Attaching Labels                                 | 11        |                                                                                 |           |
| 3.5 Control Box                                        | 11        |                                                                                 |           |
| 3.6 Wiring                                             | 11        |                                                                                 |           |
| 3.7 Installing side rails                              | 12        |                                                                                 |           |
| 3.7.1 Scala 2 side rail                                | 12        |                                                                                 |           |
| 3.7.2 Britt V and Line side rail                       | 12        |                                                                                 |           |
| 3.8 Dismantle the bed                                  | 13        |                                                                                 |           |
| <b>4 Operating the bed</b>                             | <b>14</b> |                                                                                 |           |
| 4.1 General Safety Information                         | 14        |                                                                                 |           |
| 4.1.1 Low Heights                                      | 14        |                                                                                 |           |
| 4.1.2 Mattress retainers                               | 14        |                                                                                 |           |
| 4.2 Hand control                                       | 14        |                                                                                 |           |
| 4.2.1 Locking function                                 | 14        |                                                                                 |           |
| 4.3 Castors and brakes                                 | 15        |                                                                                 |           |
| 4.3.1 Castor brake                                     | 15        |                                                                                 |           |
| 4.4 Operating side rails                               | 15        |                                                                                 |           |
| 4.4.1 Operating Scala 2 side rail                      | 15        |                                                                                 |           |
| 4.4.2 Britt V and Line side rails                      | 16        |                                                                                 |           |
| 4.5 Lifting pole                                       | 16        |                                                                                 |           |
| 4.5.1 Place the lifting pole                           | 16        |                                                                                 |           |
| 4.5.2 Adjusting the handle height                      | 16        |                                                                                 |           |
| 4.6 Adjusting the leg section                          | 16        |                                                                                 |           |
| 4.7 Emergency positions                                | 17        |                                                                                 |           |
| 4.7.1 Emergency release of a mattress support section  | 17        |                                                                                 |           |
| 4.8 Mattress support extension                         | 17        |                                                                                 |           |
| 4.9 Transportation and Storage                         | 17        |                                                                                 |           |
| <b>5 Options</b>                                       | <b>18</b> |                                                                                 |           |
| 5.1 List of available options                          | 18        |                                                                                 |           |
| 5.2 Transport brackets                                 | 18        |                                                                                 |           |
| <b>6 Maintenance</b>                                   | <b>19</b> |                                                                                 |           |
| 6.1 General maintenance information                    | 19        |                                                                                 |           |
| 6.2 Daily inspections                                  | 19        |                                                                                 |           |
| 6.3 General servicing information                      | 19        |                                                                                 |           |
| 6.3.1 Checklist maintenance                            | 19        |                                                                                 |           |
| 6.4 Inspection after relocation - Prepare for new user | 19        |                                                                                 |           |
| 6.4.1 Checklist - After relocation                     | 19        |                                                                                 |           |
| 6.5 Cleaning and Disinfection                          | 20        |                                                                                 |           |
| 6.5.1 General Safety Information                       | 20        |                                                                                 |           |
| 6.5.2 Cleaning Intervals                               | 20        |                                                                                 |           |
| 6.5.3 Cleaning by Hand                                 | 20        |                                                                                 |           |
| 6.5.4 Disinfection Instructions                        | 20        |                                                                                 |           |
| 6.6 Lubrication                                        | 20        |                                                                                 |           |
| <b>7 After Use</b>                                     | <b>21</b> |                                                                                 |           |
| 7.1 Disposal                                           | 21        |                                                                                 |           |
| 7.2 Reconditioning                                     | 21        |                                                                                 |           |

# 1 General

## 1.1 Introduction

This user manual contains important information about the handling of the product. To ensure safety when using the product, read the user manual carefully and follow the safety instructions.

Only use this product if you have read and understood this manual. Seek additional advice from a healthcare professional who is familiar with your medical condition and clarify any questions regarding the correct use and necessary adjustment with the healthcare professional.

Note that there may be sections in this document, which are not relevant to your product, since this document applies to all available models (on the date of printing). If not otherwise stated, each section in this document refers to all models of the product.

The models and configurations available in your country can be found in the country-specific sales documents.

Invacare reserves the right to alter product specifications without further notice.

Before reading this document, make sure you have the latest version. You find the latest version as a PDF on the Invacare website.

If you find that the font size in the printed document is difficult to read, you can download the PDF version from the website. The PDF can then be scaled on screen to a font size that is more comfortable for you.

For more information about the product, for example product safety notices and product recalls, contact your Invacare distributor. See addresses at the end of this document.

In case of a serious incident with the product, you should inform the manufacturer and the competent authority in your country.

### 1.1.1 Symbols in this Document

Symbols and signal words are used in this document and apply to hazards or unsafe practices which could result in personal injury or property damage. See the information below for definitions of the signal words.



#### WARNING

Indicates a hazardous situation that could result in serious injury or death if it is not avoided.



#### CAUTION

Indicates a hazardous situation that could result in minor or slight injury if it is not avoided.



#### NOTICE

Indicates a hazardous situation that could result in damage to property if it is not avoided.



#### Tips and Recommendations

Gives useful tips, recommendations and information for efficient, trouble-free use.

## Other Symbols

(Not applicable for all manuals)



#### UK Responsible Person

Indicates if a product is not manufactured in the UK.



#### Triman

Indicates recycling and sorting rules (only relevant for France).

## 1.2 Intended Use

The medical bed is electrically operated, adjustable in height and features a profiling support surface intended to be used in combination with a mattress. Medical beds are designed for support of the patient and used for the mitigation, relief, and recovery from certain medical conditions. The medical bed also supports and eases the caregivers' working environment.

The Medical bed is intended to be used on:

- *Application environment 3*; Long-term care in a medical area where medical supervision is required and monitoring is provided if necessary and medical electrical equipment used in medical procedures may be provided to help maintain or improve the condition of the patient.
- *Application environment 4*; Care provided in a domestic area where medical electrical equipment is used to alleviate or compensate for an injury, disability or disease.

### Intended Users

A person with a medical condition that needs to be cared for in bed.

### Indications

The bed is intended for adult users, having a physical size equal to or more than 146 cm, a weight equal to or more than 40 kg and a body mass index (BMI) equal to or more than 17.

The bed is intended for indoor use only.

Maximum user weight is 165 kg and safe working load is 200 kg.

### Contra-indications

The bed is not intended for transportation of users. It is mobile within a room with a user in it. Castors are lockable.

The bed is not intended for persons with a psychosocial disability.



#### WARNING!

Any other or incorrect use could lead to hazardous situations.

Invacare accepts no liability for any use, change or assembly of the product, other than stated in this user manual.

### 1.2.1 Intended Operator

A healthcare professional or private person who has received proper training is the intended operator of this product.

The hand control can also be operated by the occupant of the bed.

### 1.3 Service Life

The expected service life of this product is seven years when used daily and in accordance with the safety instructions, maintenance intervals and correct use, stated in this manual. The effective service life can vary according to frequency and intensity of use.

### 1.4 Compliance

Quality is fundamental to the company's operation, working within the disciplines of ISO 13485.

This product features the CE mark, in compliance with the Medical Device Regulation 2017/745 Class I.

This product features the UKCA mark, in compliance with Part II UK MDR 2002 (as amended) Class I.

We are continuously working towards ensuring that the company's impact on the environment, locally and globally, is reduced to a minimum.

We only use REACH compliant materials and components.

We comply with the current environmental legislations WEEE and RoHS.

#### 1.4.1 Product-specific standards

The product has been tested and conforms to IEC 60601-2-52 (Particular requirements for the basic safety and essential performance of medical beds) and all related standards.

For further information about local standards and regulations, contact your local Invacare representative. See addresses at the end of this document.

### 1.5 Warranty Information

We provide a manufacturer's warranty for the product in accordance with our General Terms and Conditions of Business in the respective countries.

Warranty claims can only be made through the provider from whom the product was obtained.

### 1.6 Limitation of Liability

Invacare accepts no liability for damage arising from:

- Non-compliance with the user manual
- Incorrect use
- Natural wear and tear
- Incorrect assembly or set-up by the purchaser or a third party
- Technical modifications
- Unauthorised modifications and/or use of unsuitable spare parts

## 2 Safety

### 2.1 General safety information

This section of the manual contains general safety information about your product. For specific safety information, refer to the appropriate section of the manual and procedures within that section.



#### **WARNING!**

##### **Risk of injury or damage**

- Do not use this product or any available optional equipment without first completely reading and understanding these instructions and any additional instructional material such as user manuals or instruction sheets supplied with this product or optional equipment. If you are unable to understand the warnings, cautions or instructions, contact a healthcare professional, Invacare provider or qualified technician before attempting to use this product.
- Do not make any unauthorized alterations or modifications to the product.



#### **WARNING!**

##### **Risk of entrapment / suffocation**

There's a risk of entrapment / suffocation between mattress support, side rail and bed end or between moving parts and objects placed nearby the bed.

- The bed must not be used by persons under 12 years of age, or by persons with a body size equivalent to an average 12 years old or smaller.
- The bed, in combination with side rails must not be used by persons having a physical size less than 146 cm, a weight less than 40 kg or a body mass index (BMI) less than 17.
- Due to mattress compression, an increased risk may occur over time. Periodically monitor gaps between the bed, mattress and/or side rail. Replace mattress if the gaps may lead to entrapment.



#### **WARNING!**

##### **Risk of slipping through the openings**

The bed fulfils all requirements regarding maximum distances. However, it is possible that persons with small body dimensions slip through the openings between the side rails or through the opening between the side rail and the mattress support.

- Pay special attention, if the bed is used for the care of persons with small body dimensions.



#### **WARNING!**

##### **Risk of injury or damage**

Inappropriate handling of cables, incorrect connections and use of unauthorized equipment can cause electrical shock and product failure.

- Do not kink, shear or otherwise damage the cables of the product.
- Make sure that no cables are jammed or damaged, when the product is used.
- Disconnect the plug from the mains before moving the bed.
- Make sure the wiring is correct and connections are proper.
- Do not use unauthorized equipment.



#### **WARNING!**

##### **Risk of tripping, entanglement or strangulation**

Improper routing of cables may cause tripping, entanglement or strangulation hazard.

- Ensure all cables are routed and secured properly.
- Ensure there are no loops of excess cable extending away from the product.



#### **WARNING!**

##### **Risk of injury or damage**

Ignition sources can cause burns or fire.

- Bed must be placed with a safety space from possible ignition sources (heater, fireplace, etc.)
- The patient and assistants must not smoke while using or operating the bed.



#### **WARNING!**

##### **Risk of injury or damage**

To avoid injury or damage when operating the product:

- Close supervision is necessary when the product is used near children or pets.
- Do not let children play with the product.



#### **CAUTION!**

- For a person entering or exiting the bed, always lower the bed to an appropriate height. For entering or exiting the bed, the backrest section of the mattress support can be used as an assistance. Make sure the patient is laid down at the centre of the backrest section. When the backrest section is being raised the allowed maximum weight for the backrest section is 45% of maximum safe working load.
- Always lower the bed to the lowest position before leaving a person in the bed unattended.
- Make sure that there is nothing under, over, or near the bed that can obstruct the height adjustment, like for example furniture, lifts or window frames.

**CAUTION!**

Non-original or wrong accessories may affect the function and safety of the product.

- Only use original accessories for the product in use.
- Due to regional differences, refer to your local Invacare catalog or website for available accessories or contact your local Invacare representative. See addresses at the end of this document.

**CAUTION!****Risk of injury or damage**

The product can get hot when exposed to sunlight or other heat sources.

- Do not expose the product to direct sunlight for prolonged periods.
- Keep the product away from heat sources.

**CAUTION!**

There is a risk of entrapment of fingers in the bed moving parts.

- Pay attention to your fingers.

**NOTICE!**

The bed has no isolator (main switch). If the bed needs to be electrically disconnected, it has to be unplugged from the mains socket.

- Always place the bed in a way so the mains socket is easily accessible to unplug the bed.

**NOTICE!**

Accumulation of lint, dust and other dirt can impair the product.

- Keep the product clean.

## 2.2 Mattresses

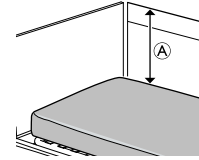
**WARNING!****Safety aspects regarding combination of side rails and mattresses:**

To get the highest possible safety level, when using side rails on the bed, the minimum and maximum measures for mattresses, must be respected.

- For correct mattress measures see mattress table in chapter 9 *Technical Data*, page 23.

**WARNING!****Risk of entrapment and/or suffocation**

- The user could get trapped and/or suffocate, if the horizontal space, between the mattress side and the inside of the side rail, is too big. Follow the minimum width (and length) of mattresses in combination with a side rail, as stated in the mattress table in chapter 9 *Technical Data*, page 23.
- Be aware that using very thick or soft mattresses (low density), or a combination of these, increases the risk.

**WARNING!****Risk of falling**

The user can fall over the edge and get seriously injured, if the vertical distance (A) between the top of the mattress and the edge of the side rail/bed end, is too short. See image above.

- Always keep a minimum distance (A) of 22 cm.
- Follow the maximum mattress height in combination with the side rail as stated in the mattress table in chapter 9 *Technical Data*, page 23.

## 2.3 Safety information on electromagnetic interference

**WARNING!****Risk of malfunction due to electromagnetic interference**

Electromagnetic interference between this product and other electrical equipment can occur and disturb the electrical adjustment functions of this product. To prevent, reduce or eliminate such electromagnetic interference:

- Only use original cables, accessories and spare parts, to not increase electromagnetic emission or reduce electromagnetic immunity of this product.
- Do not use portable radio frequency (RF) communications equipment closer than 30 cm to any part of this product (including cables).
- Do not use this product near active high-frequency surgical equipment and the RF shielded room of a system for magnetic resonance imaging, where the intensity of electromagnetic disturbances is high.
- If disturbances occur, increase the distance between this product and the other equipment or switch it off.
- Refer to the detailed information and follow the guidance in chapter 10 *Electromagnetic compatibility (EMC)*, page 25.

**WARNING!****Risk of malfunction due to electromagnetic interference**

Do not use this bed adjacent to or stacked with other electrical equipment, than specified in the following, as it could result in improper operation. If such use is necessary, the bed and the other equipment must be closely observed to verify that they are operating normally.

This bed can be used together with Invacare approved accessories and medical electrical equipment connected to the heart (intracardially) or blood vessels (intravascularly) provided that following points are respected:

- Medical electrical equipment should not be fixed on the bed's metallic accessories such as side rails, lifting pole, drip rod, bed ends, etc.
- The medical electrical equipment power supply cord should be kept clear of the accessories or any other moving parts of the bed.

|                                                                                   |                        |
|-----------------------------------------------------------------------------------|------------------------|
|  | Type B applied part    |
|  | WEEE conform           |
|  | European Conformity    |
|  | UK Conformity Assessed |

Abbreviations for technical data:

- I<sub>in</sub> = Incoming Current
- U<sub>in</sub> = Incoming Voltage
- Int. = Intermittence
- AC = Alternating Current
- Max = maximum
- min = minutes

For more information about technical data, refer to 9 *Technical Data*, page 23.

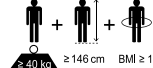
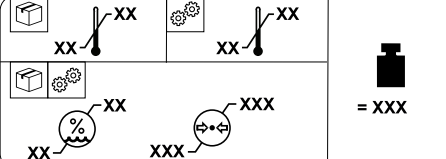
## 2.4 Labels and symbols on the product

### 2.4.1 Identification label

The identification label is placed on the frame of the bed and contains the main product information, including technical data.

|                                                                                     |                        |
|-------------------------------------------------------------------------------------|------------------------|
|  |                        |
|   | Serial number          |
|   | Reference number       |
|   | Manufacturer           |
|   | Date of manufacture    |
|   | Medical device         |
|   | Max. user weight       |
|   | Max. safe working load |
|   | CLASS II equipment     |

### 2.4.2 Other Labels

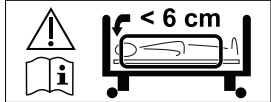
|                                                                                                |                                                                                                               |
|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
|             |                                                                                                               |
| Read the user manual before using this product and follow all instructions for safety and use. |                                                                                                               |
|            |                                                                                                               |
|             | Definition of min. weight, min. height and min. body mass index of an adult user.<br><i>See Intended Use.</i> |
|             | Refer to user documentation for the correct mattress measures.<br><i>See 9 Technical Data</i> , page 23.      |
|            |                                                                                                               |
|             | Total weight of the product with the maximum safe working load applied                                        |
|             | Temperature limit                                                                                             |
|             | Humidity limitation                                                                                           |
|             | Atmospheric pressure limitation                                                                               |

|                                                                                   |                                  |
|-----------------------------------------------------------------------------------|----------------------------------|
|  | Transport and storage conditions |
|  | Operation conditions             |

|                                                                                                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                         |
| <p>Indicates areas with increased risk of squeezing feet on the lower sides of the bed ends near the castors.</p> <p>See 4.1.1 <i>Low Heights</i>, page 14</p> <p>(Only present on the low versions of this product)</p> |

|                                                                                                                |
|----------------------------------------------------------------------------------------------------------------|
|                             |
| <p>Indicates detachable parts with a mass of more than 20 kg.</p> <p>See 9 <i>Technical Data</i>, page 23.</p> |

### Label on 3/4 length side rails

|                                                                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                             |
| <p>Indicates the maximum space between side rail and the head bed end.</p> <p>See the mounting instruction in this manual or the instruction delivered with the side rail.</p> |

## 3 Setup

### 3.1 General Safety Information


**WARNING!**
**Risk of injury or damage**

Damaged parts may affect the safety of the product.

- Check all parts for shipping damage before use.
- In case of damage, do not use the product and contact your Invacare provider for further instructions.


**WARNING!**
**Risk of injury or damage to property**

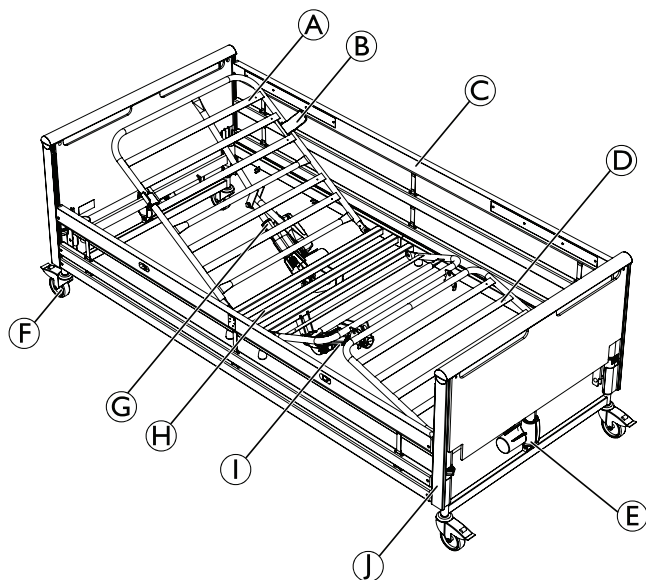
The assembly of the bed and installation of accessories must only be performed by a qualified technician or a person who has received proper training.

- Follow instructions carefully. If you have any question regarding the assembly, contact your Invacare provider.
- The electrical equipment of the bed must not be dismantled or combined with other electrical equipment.
- After each assembly, check that all fittings are properly tightened and that all parts have the correct function.


**NOTICE!**

- To prevent condensation, the bed should not be used until it has reached operating temperature. See 9 Technical Data, page 23

### 3.2 Receiving the bed


**Scope of delivery:**

- Ⓐ Mattress support, head end
- Ⓑ Mattress retainers, 4 pcs
- Ⓒ Side rails (wood or steel), 2 pcs
- Ⓓ Mattress support, foot end
- Ⓔ Motor for bed end

- Ⓕ Castors, 4 pcs
- Ⓖ Motor for head end
- Ⓘ Motor for leg end
- Ⓙ Bed ends, 2 pcs
- Hand control (not shown)

**Optional**

- ⓓ Mattress support extension (10 or 20 cm)
- Lifting pole
- Transport fitting



Side rails might not be part of the configuration. For more information about side rails and other options, contact your Invacare representative.

### 3.3 Other Items

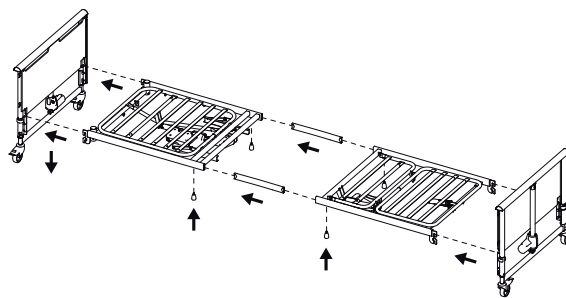
The following items are also provided within the scope of delivery:

| Part             | Quantity |
|------------------|----------|
| User manual      | 1        |
| Entrapment label | 4        |

### 3.4 Assembly of the bed

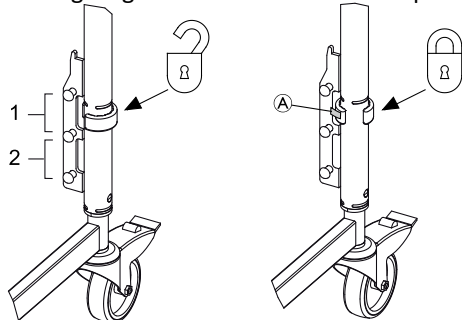

**WARNING!**

- After each assembly, check that all fittings are tightened correctly and that the function of all parts is given.

**Mattress support**


1. Place the two inserts in the upper half of the mattress support. The inserts must be mounted in such a way that one extends further out of the side tube than the other.
2. Loosely screw in the two thumb screws.
3. Push the lower half of the mattress support onto the two inserts.
4. Tighten with two thumb screws.
5. Retighten the two thumb screws at the head end of the top frame.
6. Turn up the four mattress support brackets.
7. Turn the handle of the leg section up.

8. Press the bracket **A** on the locking ring\* and turn the locking ring on the bed ends to the position "open".

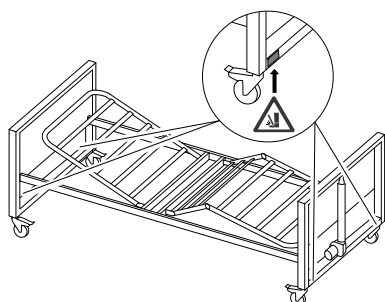


9. Latch the mattress support to the bed ends and press firmly into position.  
 10. Make sure that the bed ends are in the same level. It is possible to level the bed in high position (1) and low position (2).  
 11. Turn the locking ring to the position "lock".

\* The locking rings ensure that the mattress support is not accidentally lift clear off the bed ends.

### 3.4.1 Attaching Labels

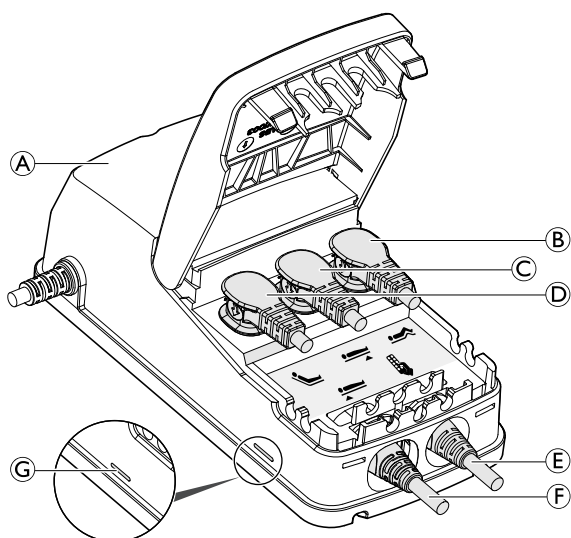
(Low version only)



1. Place the four foot squeezing warning labels (delivered separately) on the lower sides of the bed ends near the castors.

## 3.5 Control Box

The control box is latched to the backrest motor.



The control box **A** is provided with a label with symbols showing where to connect the motor plugs:

- Thigh section's motor **B**.
- Bed end motor, foot end **C**.
- Backrest motor **D**.
- Hand control **E**.
- Bed end motor, head end **F**.



The control box is equipped with a **green LED G** which indicates it is connected to mains power. When it is connected to mains power the **green LED G** is on.

## 3.6 Wiring

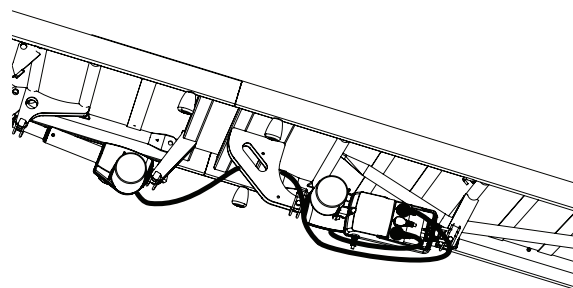


### NOTICE!

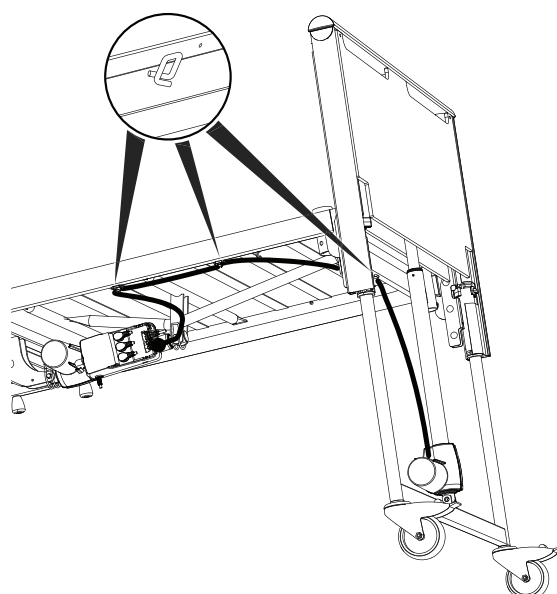
- The cables must be mounted in such a way that they are kept clear off the floor and do not block the castors.

In order to prevent the cables from being damaged when activating the motors, follow the instructions below.

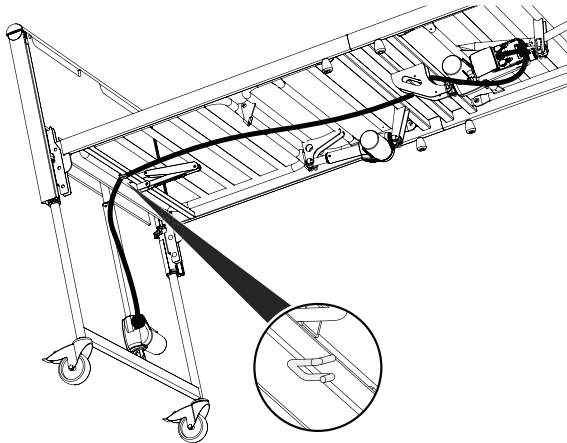
1. Check the labels on the Hi/Lo motor cables (the coiled ones) and plug the cables on the corresponding bed end motor (head or foot).
2. Close the locking clips of the motors and ensure the cables are secure.
3. Connect the mains cable to the power outlet.
4. Raise the bed to its highest position.
5. Disconnect the mains cable from the power outlet.
6. Guide the thigh motor cable through the opening of the support for the backrest motor and then connect it to the motor.



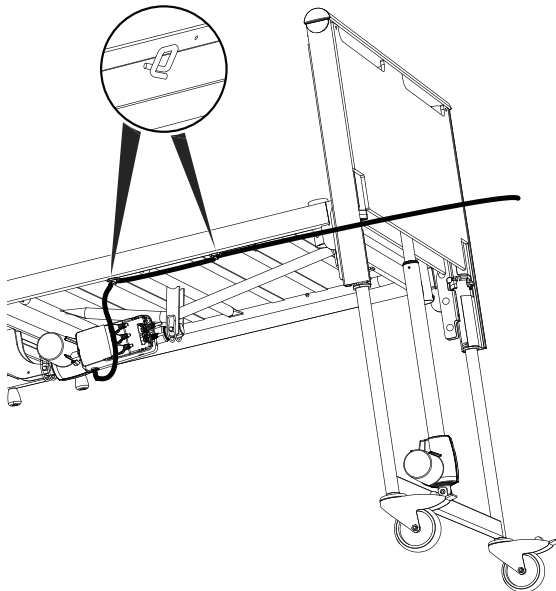
7. Guide the head Hi/Lo motor cable through the frame hooks on the side of the bed and the end of the coiled part on the bed end hook.



8. Disconnect the foot Hi/Lo motor cable from the control box, guide it through the opening of the support for the backrest motor and reconnect it.
9. Place the middle of the foot Hi/Lo motor cable coiled part on the hook at the bed end.



10. Guide the mains cable through the frame hooks on the side of the bed to the power outlet and connect it.



11. Before taking the bed into use, check that all parts run smoothly and that no motor cables are hanging on the floor or being squeezed while moving bed sections.

### 3.7 Installing side rails



#### **WARNING!**

##### **Risk of personal damage**

There is a risk of entrapment or squeezing, while assembling or disassembling the side rail.

- Pay attention to your fingers.
- Follow instructions carefully.
- After each assembly, check that all fittings are properly tightened and that the side rail has the correct function.

#### Removable 3/4 length side rails



#### **WARNING!**

##### **Risk of entrapment**

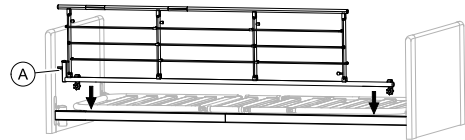
There's a risk of entrapment or suffocation between mattress support, side rail and bed end.

- When using removable side rails, always make sure that the distance between the bed end and the side rail's handle upper edge is less than 6 cm in the head end and more than 32 cm in the foot end of the bed.

### 3.7.1 Scala 2 side rail

#### Mounting side rail

1.

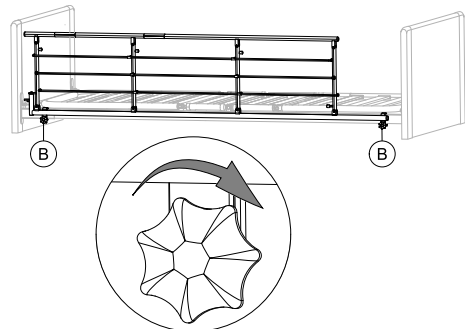


Place the side rail over the top frame with the release system A at the head end of the bed.



The fork links on the side rail must be mounted according to the instruction on the side rail.

2.



Tighten the finger screws B to attach the side rail on the top frame. Make sure it is steady and fastened.

#### Dismounting side rail

1. Loosen the two finger screws B and remove the side rail.

### 3.7.2 Britt V and Line side rail

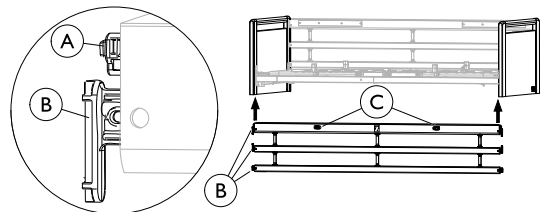


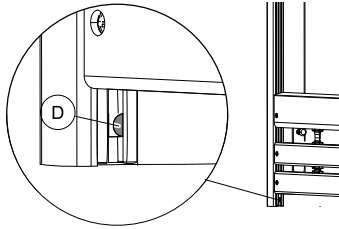
#### **WARNING!**

##### **Risk of entrapment / suffocation**

The user can get trapped or fall out of the bed if the side rail is not correctly mounted or damaged.

- Make sure that all gliding shoes are correctly guided into the bed end guideways.
- Make sure that all side rail bars are above the locking pin and properly locked.
- Make sure that the straps between the bars are not damaged or loose.





## Mounting

1. Lift the upper bar in one end of the side rail. The release buttons © must face up/outwards.
2. Press in the locking pin Ⓐ in the end of the side rail.
3. Guide the three gliding shoes Ⓑ (in the end of the side rail bars) up into the bed end guideways, until they have all passed the locking pin Ⓓ.
4. Repeat steps 2 and 3 to mount the other side of the side rail.

## Dismounting

1. Lower the side rail.
2. Lift the lower bar, in one end, to make the locking pin Ⓓ visible and press it in with a screwdriver.
3. Lower all three bars, until they are out of the guideways.
4. Repeat steps 2 to 3 to dismount the other end of the side rail.

## 3.8 Dismantle the bed

1. Remove the side rails and the lifting pole.
2. Bring the bed to its lowest position and adjust all mattress support sections to horizontal position.
3. Disconnect the bed from the mains.
4. Disconnect the cables from the bed end motors and remove it from the frame hook.
5. Disconnect the cable from the thigh motor.
6. Separate the mattress support from the bed ends.
7. Divide the head and foot end of the mattress support.

## 4 Operating the bed

### 4.1 General Safety Information



#### WARNING!

##### Risk of personal injury and damage to property.

- The bed must be placed so that the height adjustment is not obstructed by, for example, lifts or furniture.
- Take care that no body parts are being squeezed between fixed parts (such as side rails, bed ends etc) and moving parts.
- The hand control must not be used by children.



#### WARNING!

##### Risk of injury

If the bed is used by confused or restless users or users with spasms:

- either, when the bed is equipped with a lockable hand control, lock the hand control functions,
- or make sure that the hand control is out of reach for the user.

#### 4.1.1 Low Heights



#### CAUTION!

##### Risk of entrapment or squeezing

Depending on the configuration, the free space between moving and fixed parts of the bed can become very small when the bed is lowered.

- Ensure your feet are not near or under moving parts when lowering the bed.
- Ensure cables are routed properly and can not get squeezed when lowering the bed.



#### CAUTION!

##### Risk of injury

Depending on the configuration, the minimum working height of the bed is very low.

Using an improper/incorrect posture while working at low working heights can lead to injuries for the carer.

- Be aware of your body posture when attending to the user.

#### 4.1.2 Mattress retainers



#### WARNING!

##### Risk of injury

Without properly installed mattress retainers, the mattress can slip sideways and cause the user to fall out of the bed.

- Never use the bed without mattress retainers.
- Always make sure the mattress retainers are properly installed and facing upwards.
- Only use the original mattress retainers.

## 4.2 Hand control

The hand control can be equipped with either three or four buttons to operate the electrical functions of the bed. The hand control can also be equipped with a locking function.

### Backrest section



1. Up: press left side of the button (▲).
2. Down: press right side of the button (▼).

### Height adjustment



1. Up: press left side of the button (▲).
2. Down: press right side of the button (▼).

### Thigh section



1. Up: press left side of the button (▲).
2. Down: press right side of the button (▼).

### Tilt function



#### CAUTION!

##### Risk of fatal injury

Tilting with head end down can have fatal effect on users who are sensitive for increased blood pressure in the upper part of the body.

- Only medically trained persons must operate the tilt function.
- Always perform a medical evaluation, before tilting the bed with the user's lower extremities positioned higher than the heart.
- The tilt function is NOT a Trendelenburger function and must not be used for medical treatment.



1. Head end up: press left side of the button (▲).
2. Foot end up: press right side of the button (▼).

If the bed is equipped with anti-tilt function only, tilting with the foot end up is not possible:

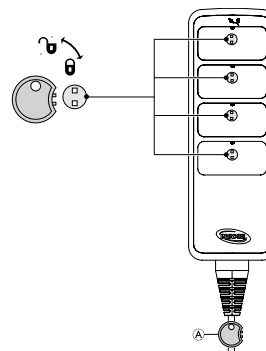


1. Head end up: press left side of the button (▲).
2. Horizontal position: bring the bed all the way down (▼).

Alternatively, this can be achieved by pressing the height adjustment button to bring it all the way up.

#### 4.2.1 Locking function

The locking function prevents usage of certain function buttons. Regardless of how many buttons your hand control has, they can all be locked individually.



1. Insert key ① in the keyhole located just above the desired function.
2. To lock, turn the key clockwise.
3. To unlock, turn the key anti-clockwise.

### 4.3 Castors and brakes


**CAUTION!**
**Risk of trapping/squeezing**

All brakes are foot-operated.  
– Do not release the brake with the fingers.


**CAUTION!**
**Risk of injury**

User can fall, while entering or exiting the bed, if brakes are not locked.

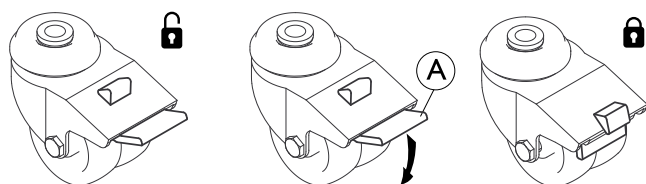
– Always lock the brakes before the user is moving in or out of bed or when attending to the user.



Castors might make marks on different types of absorbing floor surfaces - such as untreated or badly treated floors. To prevent marks, *Invacare*® recommends to place a suitable kind of protection between the castors and the floor.

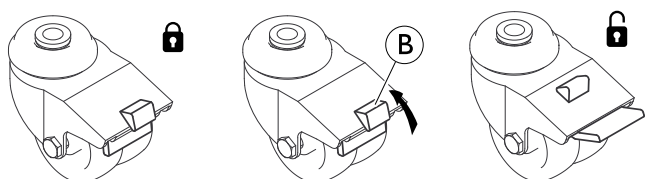
#### 4.3.1 Castor brake

##### Locking the brake



Step on the outer pedal ①.

##### Unlocking the brake



Push up the release button ②.

### 4.4 Operating side rails


**WARNING!**
**Risk of entrapment or suffocation**

There's a risk of entrapment or suffocation between mattress support, side rail and bed end.  
– Always ensure correct fitting and tightening of the side rails.


**WARNING!**
**Risk of falling**

If it has been decided that the user needs side rails:

- Never leave the user unattended in the bed with the side rail down.
- Make sure the side rail is in its highest position and properly locked while leaving the user unattended.


**CAUTION!**
**Risk of Injury**

If the side rail is not locked properly it can fall down.

- Pull/push the top bar of the side rail to ensure that the locking system is properly engaged.


**CAUTION!**
**Risk of Injury**

There is a risk of entrapment or squeezing while operating the side rail.

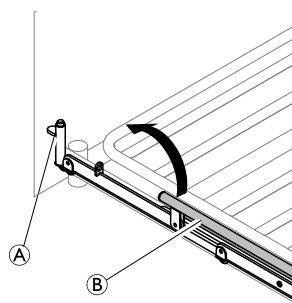
- Pay attention to your fingers and body parts of the patient.
- Never force or drop the side rail while handling it.

#### 4.4.1 Operating Scala 2 side rail

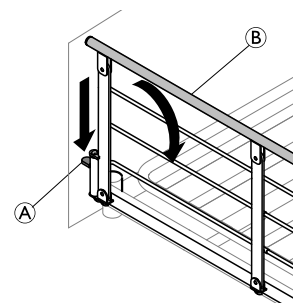

**NOTICE!**

- When manoeuvring the side rail, place your hands only in the areas marked with the grip label.

1.

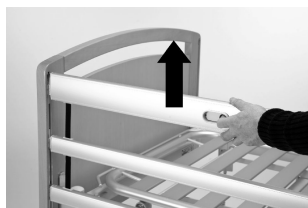


2.



1. **Up:** Lift and pull the top bar ② of the side rail towards the end with the locking mechanism (release button) ①. Ensure, it is locked in place.
2. **Down:** Press the release button ① and push the top bar ② of the side rail away from the locking mechanism.

#### 4.4.2 Britt V and Line side rails



##### Lock / Upper position

Pull up the top wooden side rail bar, until the locking pin locks with an audible click



##### Release

Lift the top wooden side rail bar and press the two locking rings together.



##### Down / Lower position

Lower the side rail.

#### Using a side rail height extender

Line and Britt V side rails can be supplemented by a height extender. A side rail height extender increases the allowed mattress thickness by 15 cm.



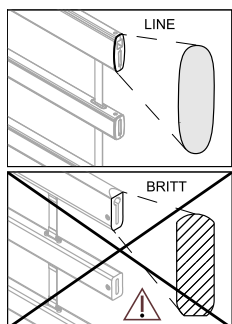
##### WARNING!

##### Risk of injury or death

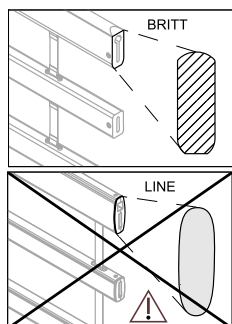
A misapplied side rail height extender could fall off. There's an increased risk for the user to fall out of the bed.

- Make sure that the side rail height extender is properly attached to the side rail. Refer to the user manual of the side rail height extender.
- Make sure to use the correct height extender for your side rail (the shape must match to the shape of the side rail. A label on the height extender determines to which side rail it belongs. See image below.

Height extender for LINE side rail:



Height extender for BRITT V side rail:



#### 4.5 Lifting pole



##### WARNING!

##### Risk of injury

The bed can tip if the handle is used, while the lifting pole is turned away from the bed.

- The lifting pole always has to be positioned with the handle hanging over the bed area.
- Do not exceed the maximum load of the lifting pole; 80 kg.

##### 4.5.1 Place the lifting pole

The lifting pole can be placed either on the left or the right side of the head end of the bed.

1. Insert the lifting pole into the lifting pole tube and fix it with the finger screw.

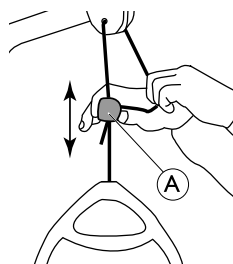


It's not required to tighten the finger screw, in case you want the lifting pole to swing away to the side of the bed.

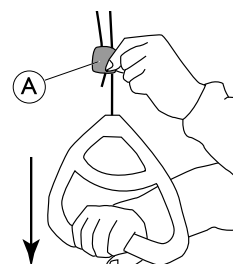
##### 4.5.2 Adjusting the handle height

The handle height should always be adjusted to the user's need.

1.



2.



1. Hold the cord out while sliding the plastic cord lock (A) upwards or downwards until the handle reaches the preferred height.
2. Lock the handle by pressing back the cord in the lock (A) and pull the handle downwards.



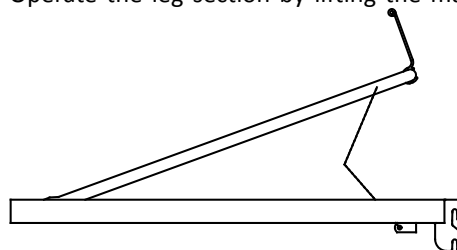
##### NOTICE!

After adjusting the handle height:

- Check that the two cords above the cord lock are parallel and inside the cord lock.
- Make sure the cord is properly locked by pulling the handle hard.

#### 4.6 Adjusting the leg section

Operate the leg section by lifting the mattress handle:



1. **Up:** Lift the mattress handle on the leg section.
2. **Down:** Lift the mattress handle on the leg section right up and then lower the leg section.

## 4.7 Emergency positions

In case of a medical emergency, it might be required to bring all or certain mattress support sections into a flattened position - e.g. a flattened back section for cardiopulmonary resuscitation (CPR).

To bring a mattress support section into a flattened position,

- use the corresponding function on the hand control

OR

- in case of power failure or urgent need for action, use the manual emergency release and lower the mattress support section.

Refer to 4.7.1 *Emergency release of a mattress support section*, page 17.

### 4.7.1 Emergency release of a mattress support section

In case of a power- or motor failure, an emergency release of the back, thigh or leg section could be necessary. An emergency release of the height adjustment is NOT possible.



#### **CAUTION!** **Risk of injury**

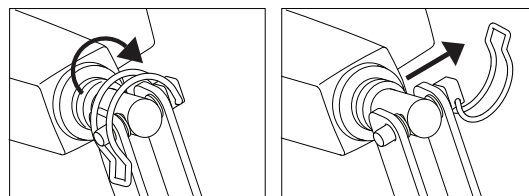
- A minimum of two persons is required for an emergency release of a mattress support section.
- When releasing a mattress support section, it might lower fast. Do not reach under the mattress support while lowering it.



#### **NOTICE!**

- Before an emergency release of the mattress support, remove the plug from the mains socket.

1. Both persons hold the mattress section.
2. One of them locates the motor in question and pulls out the safety pin.



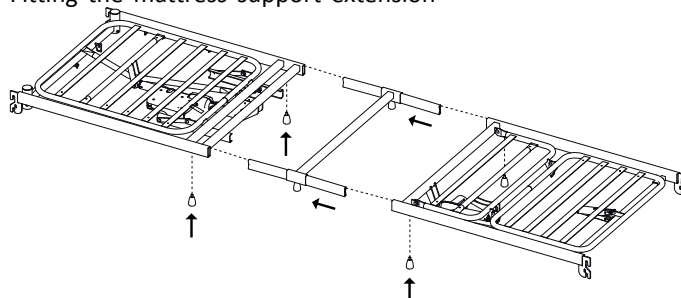
3. Both persons slowly lower the mattress section until it is completely down.

## 4.8 Mattress support extension



For users, taller than two meters it is recommended to use a mattress support extension.

Fitting the mattress support extension



1. Disassemble the bed and remove the inserts.
2. Mount the mattress support extension between both parts of the mattress support and reassemble the bed.

## 4.9 Transportation and Storage

The bed can be transported or stored in assembled or disassembled state.

See 3.8 *Dismantle the bed*, page 13 for detailed instructions on how to disassemble the bed.

To transport or store the bed in its assembled state:

1. Disconnect the power cable from the mains socket.
2. Coil up the power cable and ensure that it is clear of the floor during transport, or storage, so it is not damaged.

## 5 Options

### 5.1 List of available options



Due to regional differences, refer to your local Invacare website or catalog for details about available accessories or contact your Invacare provider.

- Side rails
  - Scala Basic 2  
3/4 length collapsible steel side rail (168 cm x 40 cm), mounted on the side tube. Release button in the head section
  - Scala Basic Plus 2  
3/4 length collapsible steel side rail (168 cm x 40 cm), mounted on the side tube. Release button in the head section
  - Scala Medium 2  
3/4 length collapsible steel side rail (165 cm x 46 cm), mounted on the side tube. Release button in the head section
  - Scala Decubi 2  
3/4 length collapsible steel side rail (168 cm x 54 cm), mounted on the side tube. Release button in the head section
  - Britt V  
Full length collapsible wood side rail (205 cm x 40 cm), mounted on the bed end guideways. Release buttons in the middle
  - Line standard  
Full length collapsible aluminum side rail (206 cm x 40 cm), mounted on the bed end guideways. Release buttons in the middle
  - Line extendable  
Full length collapsible aluminum side rail with telescopic extension (206-226 cm x 40 cm), mounted on the bed end guideways. Release buttons in the middle
  - Height Extenders for Britt V and Line side rails
  - Covers for side rails – textile covers for the different side rails (net or padded)
- Mattress support extension (center) – 10 cm or 20 cm
- Mattress support extension (foot end) – 10 cm
- Lifting pole
- Fixed support handles – 25 cm x 30 cm, 25 cm x 80 cm, 40 cm x 30 cm, 40 cm x 50 cm or 40 cm x 80 cm
- Swiveling support handles
- Sit-Up support
- Stand-Up Support
- Hand controls
  - with back, thigh and height adjustment
  - with back, thigh and height adjustment, tilt and anti-tilt functions
  - with back, thigh and height adjustment, and anti-tilt function
- Soft Tilt – Patient repositioning system mounted on the mattress platform.

- Transport fitting

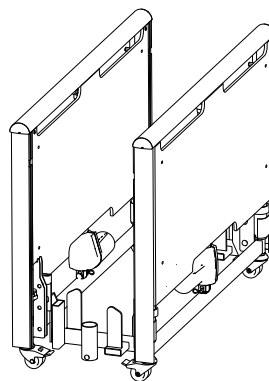


#### NOTICE!

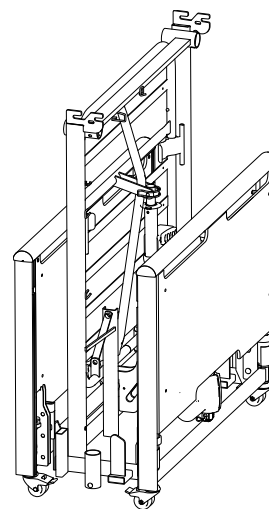
- Use only original options and spare parts. Spare parts lists and extra user manuals can be ordered from Invacare.

### 5.2 Transport brackets

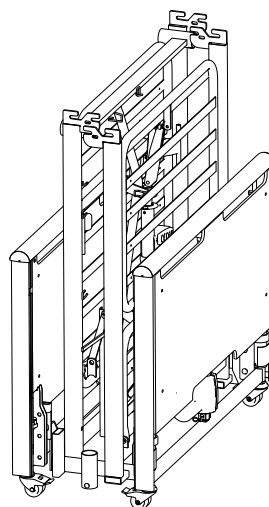
1.



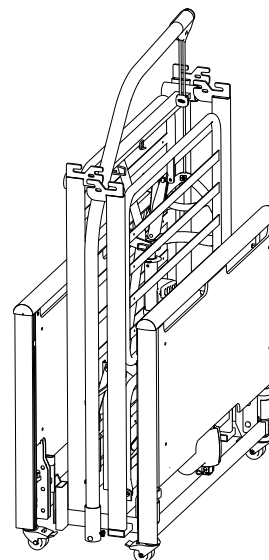
2.



3.



4.



1. Attach both bed ends on the brackets.
2. Attach the mattress support head section.
3. Attach the mattress support leg section.
4. Place the lifting pole on the bracket.

## 6 Maintenance

### 6.1 General maintenance information


**CAUTION!**
**Risk of injury or damage**

- Do not perform any maintenance or service procedures while the product is in use.

Follow the maintenance procedures described in this manual to keep your product in continuous operation.

### 6.2 Daily inspections


**WARNING!**
**Risk of injury or damage**

- Damaged or worn parts can affect the safety of the product.
- The product should be checked each time it is used.
  - Do not use the product if damage is found or you question the safety of any part of the product. Contact your Invacare provider immediately and ensure the product is not used until repairs are made.

#### Daily Inspection Checklist

- ☐ Visually inspect the bed. Check all parts for external damage or wear.
- ☐ Check all hardware, attachment points, stressed parts and any pivot points for signs of wear, cracking, fraying, deformation or deterioration.
- ☐ Check the hand control and all actuators for smooth operation.

### 6.3 General servicing information


**NOTICE!**

- The mattress support must be supported during service inspections, to prevent accidental lowering.
- Only personnel who have received the necessary instructions or training may perform service and maintenance of the bed.
- After reconditioning the bed, or if bed functions change, service must be carried out according to the check list.

A service contract can be made in the countries, where Invacare has its own sales company. In certain countries Invacare offers courses in service and maintenance of the bed. Spare parts lists and additional user manuals are available from Invacare.

#### Before Use

- Ensure that all manual and electrical parts functions correctly and are in a secure state.

#### After three months

- Ensure that all manual and electrical parts are functioning, and tighten bolts, screws, nuts, etc.

#### Every year

- We recommend a safety test comprising the actuators' performance and mechanical state.

#### Every second year

- We strongly recommend a service according to the below checklist after two years of normal use and then every second year.



Actuators, hand control and control unit are serviced by exchanging the faulty part.

### 6.3.1 Checklist maintenance

#### Checkpoints

- ☐ Visual inspection of all parts of the bed (no deformations)
- ☐ Circlips, cotter pins and plastic fixing ring - properly locked and intact.
- ☐ Screws - tightened.
- ☐ Weldings - intact (no wear and tear)
- ☐ Castors (rolling smoothly)
- ☐ Castor fittings - tightened.
- ☐ Castor brakes - locking properly.
- ☐ All motors - running properly (with regular speed and at low noise).
- ☐ Wires - correctly wired and undamaged.
- ☐ Electric plugs - undamaged.
- ☐ Side rail locking and moving system - properly locking and running smoothly.
- ☐ Accessories - correctly assembled and correct function.
- ☐ Damaged coating - repaired.
- ☐ Leakage of grease - check for grease.


**CAUTION!**
**Risk of injury or damage to property**

- Grease leaks can lead to accidental falls or fire.
- Contact service provider if leaks of grease or other residue is detected.

### 6.4 Inspection after relocation - Prepare for new user


**NOTICE!**

- When the bed has been relocated; before given to a new user it has to be thoroughly inspected.
- Inspection must be done by a trained professional.
  - For regular maintenance see maintenance chart.

#### 6.4.1 Checklist - After relocation

#### Checkpoints

- ☐ Check that the inserts connecting the two mattress support halves are fully inserted and locked.
- ☐ Check that the mattress support is correctly mounted to the bed ends and that the locking ring is engaged.
- ☐ Check the locking of the motors (pipe pins correctly mounted).
- ☐ Check the electronic wiring for the motors (wires not squeezed).
- ☐ Check that the enclosing of the motors are intact (no cracks that enables fluids to pierce).
- ☐ Check that the locking cam is properly mounted over the contacts in the control box.
- ☐ Check the sections of the mattress support by using the hand control to activate all functions of the moving parts.

- ☐ Check the function of the brakes.
- ☐ Check the locking function(s) of the side rails.
- ☐ Check that all bed slats are intact and not loose.

## 6.5 Cleaning and Disinfection

### 6.5.1 General Safety Information



#### CAUTION!

##### Risk of Contamination

- Take precautions for yourself and use appropriate protective equipment.



#### CAUTION!

##### Risk of Electric Shock and Product Damage

- Switch off the device and disconnect from mains, if applicable.
- When cleaning electronic components consider their protection class regarding water ingress.
- Make sure that no water splashes to the plug or the wall outlet.
- Do not touch the power socket with wet hands.



#### NOTICE!

Wrong fluids or methods can harm or damage the product.

- All cleaning agents and disinfectants used must be effective, compatible with one another and must protect the materials they are used to clean.
- Never use corrosive fluids (alkalines, acid etc.) or abrasive cleaning agents. We recommend an ordinary household cleaning agent such as dishwashing liquid, if not specified otherwise in the cleaning instructions.
- Never use a solvent (cellulose thinner, acetone etc.) that changes the structure of the plastic or dissolves the attached labels.
- Always make sure that the product is completely dried before taking into use again.



For cleaning and disinfection in clinical or long-term care environments, follow your in-house procedures.

### 6.5.2 Cleaning Intervals



#### NOTICE!

Regular cleaning and disinfection enhance smooth operation, increases the service life and prevents contamination.

Clean and disinfect the product:

- regularly while in use,
- before and after any service procedure,
- when it has been in contact with any body fluids,
- before using it for a new user.

### 6.5.3 Cleaning by Hand

All components (excluding removable textiles)

- Cleaning agent: We recommend using a mild detergent with neutral or near neutral pH (5-9).



Commercially available consumer products like hand dishwashing liquid or all-purpose cleaners can be used. Read the instructions on the label of your cleaning agent and use it at the indicated concentration.

- Max. water temperature: 40 °C

1. Wipe surfaces thoroughly with a soft cloth slightly moistened with detergent solution until all visible soil is removed.
2. Remove all detergent residue with a clean damp cloth.
3. Wipe dry using a clean soft cloth.

**Removable textiles** (including upholstery and mattresses)

- See attached label on each product.

### 6.5.4 Disinfection Instructions

#### In Domestic Care

- Disinfectant: We recommend using an alcohol-based surface disinfectant (with 70-90% alcohol).



Read the instructions on the label of your disinfectant. It provides information on the activity spectrum (bacteria, fungi and/or viruses), material compatibility and the correct exposure time.

1. Ensure the surfaces are cleaned before disinfection.
2. Moisten a soft cloth and wipe-disinfect all accessible surfaces and keep them moistened for the exposure time stated on the label of the disinfectant.
3. Allow the product to air-dry.

#### In Institutional Care

Follow your in-house disinfection procedures and only use the disinfectants and methods specified therein.

## 6.6 Lubrication

We recommend lubricating the bed according to the following instruction after service and cleaning or whenever it is necessary to reduce friction.

| Part of bed                                 | Lubrication method    |
|---------------------------------------------|-----------------------|
| Points of rotation in mattress support      | Oil (medically clean) |
| Motor attachment points on mattress support | Oil (medically clean) |
| Motor bearings and tension rods             | Oil (medically clean) |



The wooden side rails gliding system must not be lubricated with oil - otherwise the wooden bars will move sluggishly.

For ordering of correct oil, contact your Invacare provider.

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## 7 After Use

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### 7.1 Disposal

Be environmentally responsible and recycle this product through your recycling facility at its end of life.

Disassemble the product and its components, so the different materials can be separated and recycled individually.

The disposal and recycling of used products and packaging must comply with the laws and regulations for waste handling in each country. Contact your local waste management company for information.

### 7.2 Reconditioning

This product is suitable for reuse. To recondition the product for a new user, carry out the following actions:

- Inspection
- Cleaning and disinfection

For detailed information, see *6 Maintenance, page 19*.

Make sure that the user manual is handed over with the product.

If any damage or malfunction is detected, do not reuse the product.

## 8 Troubleshooting

### 8.1 Troubleshooting electrical system

| Symptom                                                                                                                                                                                                                                                                                                          | Possible cause                                          | Remedy                                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|------------------------------------------------------|
| Mains indicator does not light up                                                                                                                                                                                                                                                                                | Mains are not connected                                 | Connect mains                                        |
|                                                                                                                                                                                                                                                                                                                  | Fuse in the control unit is blown                       | * Replace the control unit                           |
|                                                                                                                                                                                                                                                                                                                  | Control unit is defective                               | * Replace the control unit                           |
| Mains indicator lights up, but the motor is not running. The relay in the control unit makes a clicking noise.                                                                                                                                                                                                   | Motor plug is not fully inserted into the control unit. | Insert the motor plug properly into the control unit |
|                                                                                                                                                                                                                                                                                                                  | The motor is defective.                                 | * Replace the motor                                  |
|                                                                                                                                                                                                                                                                                                                  | Motor cable is damaged.                                 | * Replace the cable                                  |
|                                                                                                                                                                                                                                                                                                                  | Control unit is defective                               | * Replace the control unit                           |
| Mains indicator lights up, but the motor is not running. No relay sound is heard from the control unit.                                                                                                                                                                                                          | Control unit is defective                               | * Replace the control unit                           |
|                                                                                                                                                                                                                                                                                                                  | Hand control is defective                               | * Replace the hand control                           |
| Control unit is in order except for one direction on one channel.                                                                                                                                                                                                                                                | Control unit is defective                               | * Replace the control unit                           |
|                                                                                                                                                                                                                                                                                                                  | Hand control is defective                               | * Replace the hand control                           |
| Motor is running, but the piston rod does not move.                                                                                                                                                                                                                                                              | Motor is damaged                                        | * Replace the motor                                  |
| The motor cannot lift full load.                                                                                                                                                                                                                                                                                 |                                                         |                                                      |
| Motor noise, but no movement of piston rod.                                                                                                                                                                                                                                                                      |                                                         |                                                      |
| Piston rod operates inwards and not outwards.                                                                                                                                                                                                                                                                    |                                                         |                                                      |
| * Service and maintenance of the bed must only be performed by personnel who have received the necessary instruction or training.                                                                                                                                                                                |                                                         |                                                      |
| <div><div></div><div><p><b>WARNING!</b><br/><b>Risk of personal injury and damage to the product.</b><br/>– The bed must be unplugged from the main power source before opening or repairing electrical parts.</p></div></div> |                                                         |                                                      |

## 9 Technical Data

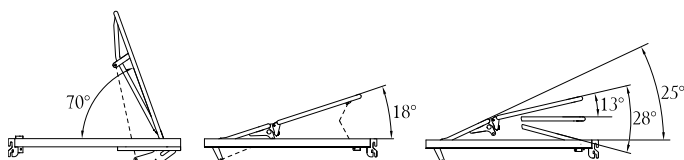
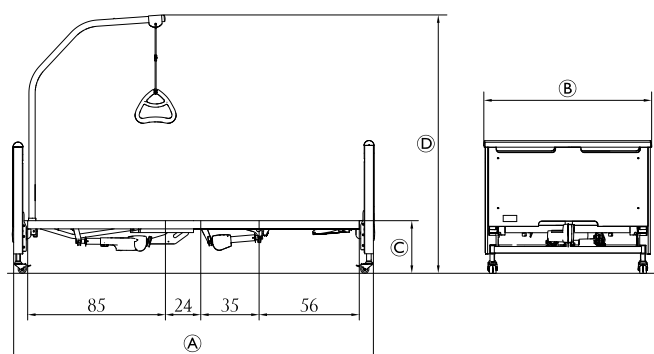
### 9.1 Materials

|                                                                                      |                                                 |
|--------------------------------------------------------------------------------------|-------------------------------------------------|
| <b>Mattress Platform</b>                                                             | Steel (powder-coated)                           |
| <b>Bed Ends</b>                                                                      | Steel (powder-coated) and MDF                   |
| <b>Side Rails</b>                                                                    | Steel (powder-coated), Wood or Aluminum         |
| <b>Lifting Pole</b>                                                                  | Steel (powder-coated), PP and POM               |
| <b>Actuators housing, Hand control, Control box, Castors and other Plastic parts</b> | Material according to marking (PA, PP, PE, ABS) |
| <b>Bolts and nuts</b>                                                                | Steel (Zinc-plated)                             |

### 9.2 Dimensions

All measurements are stated in cm. All angles are stated in degrees. All measurements and angles are stated without tolerances.

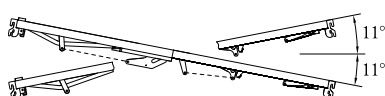
Invacare® reserves the right to change the stated measurements and angles.



|     | Etude Plus low |         | Etude Plus |         |
|-----|----------------|---------|------------|---------|
|     | Low            | High    | Low        | High    |
| (A) | 219            | 219     | 219        | 219     |
| (B) | 102            | 102     | 102        | 102     |
| (C) | 20-60          | 27-67   | 33-73      | 40-80   |
| (D) | 138-178        | 145-185 | 158-198    | 165-205 |

The angle between the lower leg section and horizontal is adjustable from 0° to 15°.

### Bed with tilt function



### 9.3 Weights

|  |                                                                                                        |        |
|--|--------------------------------------------------------------------------------------------------------|--------|
|  | Max. patient weight (provided that the weight of the mattress and the accessories do not exceed 35 kg) | 165 kg |
|  | Max. safe working load (patient + accessories)                                                         | 200 kg |

|                                                                                   |          |
|-----------------------------------------------------------------------------------|----------|
| Etude Plus standard bed, complete, excluding accessories                          | 76.5 kg  |
| Etude Plus auto-regression, complete, excluding accessories                       | 84.35 kg |
| Etude Plus bed end with extra plate – 1 piece                                     | 19.0 kg  |
| Etude Plus bed end without extra plate – 1 piece                                  | 17.0 kg  |
| Mattress support, standard head end                                               | 22.5 kg  |
| Mattress support with auto-regression, head end                                   | 26.0 kg  |
| Mattress support with auto-regression, head end, without actuator and control box | 21.5 kg  |
| Mattress support, foot end                                                        | 17.0 kg  |
| Mattress support, foot end, electrical upper leg section                          | 21.35 kg |
| Mattress support extension (10 cm)                                                | 3.5 kg   |
| Mattress support extension (20 cm)                                                | 5.5 kg   |
| Scala Basic 2 side rail – 1 piece                                                 | 7.4 kg   |
| Scala Basic Plus 2 side rail – 1 piece                                            | 7.4 kg   |
| Scala Medium 2 side rail – 1 piece                                                | 8.9 kg   |
| Scala Decubi 2 side rail – 1 piece                                                | 10.3 kg  |
| Britt V side rail – 1 side                                                        | 7.7 kg   |
| Line side rail – 1 side                                                           | 4.5 kg   |
| Line extendable side rail – 1 side                                                | 6.5 kg   |
| Lifting pole                                                                      | 6.0 kg   |

### 9.4 Mattress sizes

|                                                     | Mattress measures (in cm): |             |            |             |
|-----------------------------------------------------|----------------------------|-------------|------------|-------------|
|                                                     | Min. height                | Max. height | Min. width | Min. length |
| Side rail:                                          |                            |             |            |             |
| Scala Basic 2                                       | 10                         | 17          | 85 – 90    | 200         |
| Scala Basic Plus 2                                  | 10                         | 17          | 85 – 90    | 200         |
| Scala Medium 2                                      | 10                         | 22          | 85 – 90    | 200         |
| Scala Decubi 2                                      | 23                         | 31          | 85 – 90    | 200         |
| Line*, mattress support platform in low position    | 11                         | 22          | 88 – 90    | 200         |
| Line*, mattress support platform in high position   | 5                          | 15          | 88 – 90    | 200         |
| Britt V, mattress support platform in low position  | 11                         | 22          | 85 – 90    | 200         |
| Britt V, mattress support platform in high position | 5                          | 15          | 85 – 90    | 200         |

\* both Line side rails standard and extendable.

Min. density: 38kg/m<sup>3</sup>

## 9.5 Environmental conditions

|                      | Storage and Transportation  | Operation     |
|----------------------|-----------------------------|---------------|
| Temperature          | -10°C to +50°C              | +5°C to +40°C |
| Relative humidity    | 20% to 80% - not condensing |               |
| Atmospheric pressure | 700 hPa to 1060 hPa         |               |



Allow the product to reach operation temperature before usage:

- Warming up from minimum storage temperature might take up to 24 hours.
- Cooling down from maximum storage temperature might take up to 24 hours.

## 9.6 Electrical system

|                                                   |                                                         |
|---------------------------------------------------|---------------------------------------------------------|
| <b>Voltage supply</b>                             | Uin = 230 Volt, AC, 50/60 Hz (AC = Alternating current) |
| <b>Maximum current input</b>                      | Iin max. = 1.5 A                                        |
| <b>Intermittent</b><br>(periodic motor operation) | Iint = 10%, max. 2 min / 18 min                         |

|                             |                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Degree of protection</b> | IPX6 or IPX4 (depending on configuration)<br><br>When the bed is equipped with electrical leg rest it is protected according to IPX4.<br><br><b>IPX6</b> – The electrical system is protected against water projected in powerful jets from any direction.<br><br><b>IPX4</b> – The electrical system is protected against water splashed against the components from any direction. |
| <b>Insulation class</b>     | Class II equipment                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Type B Applied Part</b>  | Applied Part complying with the specified requirements for protection against electrical shock according to IEC60601-1.                                                                                                                                                                                                                                                              |
| <b>Sound level</b>          | 45 to 50 dB (A)                                                                                                                                                                                                                                                                                                                                                                      |



The bed has no isolator (main switch). If the bed needs to be electrically disconnected, it has to be unplugged from the mains socket.

## 10 Electromagnetic compatibility (EMC)

### 10.1 General EMC information

Medical Electrical Equipment needs to be installed and used according to the EMC information in this manual.

This product has been tested and found to comply with EMC limits specified by IEC/EN 60601-1-2 for Class B equipment.

Portable and mobile RF communications equipment can affect the operation of this product.

Other devices may experience interference from even the low levels of electromagnetic emissions permitted by the above standard. To determine if the emission from this product is causing the interference, run and stop running this product. If the interference with the other device operation stops, then this product is causing the interference. In such rare cases, interference may be reduced or corrected by the following:

- Reposition, relocate, or increase the separation between the devices.

### 10.2 Electromagnetic emission

#### Guidance and manufacturer's declaration

This product is intended for use in the electromagnetic environment specified below. The customer or the user of this product should assure that it is used in such an environment.

| Emissions test                                              | Compliance | Electromagnetic environment - guidance                                                                                                                                                                                   |
|-------------------------------------------------------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RF emissions<br>CISPR 11                                    | Group I    | This product uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.                                        |
| RF emissions<br>CISPR 11                                    | Class B    | This product is suitable for use in all establishments including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes. |
| Harmonic emissions<br>IEC 61000-3-2                         | Class A    |                                                                                                                                                                                                                          |
| Voltage fluctuations<br>/flicker emissions<br>IEC 61000-3-3 | Complies   |                                                                                                                                                                                                                          |

### 10.3 Electromagnetic Immunity

#### Guidance and manufacturer's declaration

This product is intended for use in the electromagnetic environment specified below. The customer or the user of this product should assure that it is used in such an environment.

| Immunity test                                    | Test / Compliance level                                                                                                      | Electromagnetic environment – guidance                                                                                                         |
|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Electrostatic discharge (ESD)<br>IEC 61000-4-2   | ± 8 kV contact<br>± 2 kV, ± 4 kV, ± 8 kV, ± 15 kV air                                                                        | Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %. |
| Electrostatic transient / burst<br>IEC 61000-4-4 | ± 2 kV for power supply lines; 100 kHz repetition frequency<br>± 1 kV for input / output lines; 100 kHz repetition frequency | Mains power quality should be that of a typical commercial or hospital environment.                                                            |
| Surge<br>IEC 61000-4-5                           | ± 1 kV line to line<br>± 2 kV line to earth                                                                                  | Mains power quality should be that of a typical commercial or hospital environment.                                                            |

| Immunity test                                                                                          | Test / Compliance level                                                                                                           | Electromagnetic environment – guidance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Voltage dips, short interruptions and voltage variations on power supply input lines<br>IEC 61000-4-11 | < 0% $U_T$ for 0,5 cycle at 45° steps<br>0% $U_T$ for 1 cycles<br>70% $U_T$ for 25 / 30 cycles<br>< 5% $U_T$ for 250 / 300 cycles | Mains power quality should be that of a typical commercial or hospital environment. If the user of this product requires continued operation during power mains interruptions, it is recommended that the product is powered from an un-interruptible power supply or a battery.<br><br>$U_T$ is the a. c. mains voltage prior to application of the test level.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Power frequency (50/60 Hz) magnetic field<br>IEC 61000-4-8                                             | 30 A/m                                                                                                                            | Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Conducted RF<br>IEC 61000-4-6                                                                          | 3 V<br>150 kHz to 80 Mhz                                                                                                          | Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which this product is used exceeds the applicable RF compliance level above, this product should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating this product.<br><br>Interference may occur in the vicinity of equipment marked with the following symbol:  |
|                                                                                                        | 6 V<br>in ISM & amateur radio bands                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Radiated RF<br>IEC 61000-4-3                                                                           | 10 V/m<br>80 Mhz to 2,7 GHz                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                                                                                        | 385 MHz - 5785 MHz test specifications for immunity to RF wireless communication equipment refer to table 9 of IEC 60601-1-2:2014 | Portable and mobile RF communications equipment should be used no closer than 30 cm to any part of this product including cables.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |



These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

### 10.3.1 Test specifications for immunity to RF wireless communications equipment

IEC 60601-1-2:2014 — Table 9

| Test Frequency (MHz) | Band <sup>a)</sup> (MHz) | Service <sup>a)</sup>                                              | Modulation <sup>b)</sup>                            | Maximum power (W) | Distance (m) | Immunity test level (V/m) |
|----------------------|--------------------------|--------------------------------------------------------------------|-----------------------------------------------------|-------------------|--------------|---------------------------|
| 385                  | 380 - 390                | TETRA 400                                                          | Pulse modulation <sup>b)</sup><br>18 Hz             | 1.8               | 0.3          | 27                        |
| 450                  | 430 - 470                | GMRS 460,<br>FRS 460                                               | FM <sup>c)</sup><br>± 5 kHz deviation<br>1 kHz sine | 2                 | 0.3          | 28                        |
| 710<br>745<br>788    | 704 - 787                | LTE Band 13, 17                                                    | Pulse modulation <sup>b)</sup><br>217 Hz            | 0.2               | 0.3          | 9                         |
| 810<br>870<br>930    | 800 - 960                | GSM 800/900,<br>TETRA 800,<br>iDEN 820,<br>CDMA 850, LTE<br>Band 5 | Pulse modulation <sup>b)</sup><br>18 Hz             | 2                 | 0.3          | 28                        |

| Test Frequency (MHz) | Band <sup>a)</sup> (MHz) | Service <sup>a)</sup>                                                       | Modulation <sup>b)</sup>                 | Maximum power (W) | Distance (m) | Immunity test level (V/m) |
|----------------------|--------------------------|-----------------------------------------------------------------------------|------------------------------------------|-------------------|--------------|---------------------------|
| 1720<br>1845<br>1970 | 1700 - 1990              | GSM 1800;<br>CDMA 1900;<br>GSM 1900;<br>DECT; LTE Band 1, 3, 4, 25;<br>UMTS | Pulse modulation <sup>b)</sup><br>217 Hz | 2                 | 0.3          | 28                        |
| 2450                 | 2400 - 2570              | Bluetooth,<br>WLAN, 802.11 b/g/n, RFID 2450, LTE Band 7                     | Pulse modulation <sup>b)</sup><br>217 Hz | 2                 | 0.3          | 28                        |
| 5240<br>5500<br>5785 | 5100 - 5800              | WLAN 802.11 a/n                                                             | Pulse modulation <sup>b)</sup><br>217 Hz | 0.2               | 0.3          | 9                         |

 If necessary to achieve the immunity test level, the distance between the transmitting antenna and the Medical Electrical Equipment or System may be reduced to 1 m. The 1 m test distance is permitted by IEC 61000-4-3.

<sup>a)</sup> For some services, only the uplink frequencies are included.

<sup>b)</sup> The carrier shall be modulated using a 50 % duty cycle square wave signal.

<sup>c)</sup> As an alternative to FM modulation, 50 % pulse modulation at 18 Hz may be used because while it does not represent actual modulation, it would be worst case.



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