HELIODENT PLUS

Installation Requirements
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1 Structure of the document

1.1 Identification of the danger levels

To prevent personal injury and material damage, please observe the warning and safety information provided in these operating instructions. Such information is highlighted as follows:

⚠️ DANGER
An imminent danger that could result in serious bodily injury or death.

⚠️ WARNING
A possibly dangerous situation that could result in serious bodily injury or death.

⚠️ CAUTION
A possibly dangerous situation that could result in slight bodily injury.

NOTICE
A possibly harmful situation which could lead to damage of the product or an object in its environment.

IMPORTANT
Application instructions and other important information.

Tip: Information on making work easier.

1.2 Formats and symbols used

The formats and symbols used in this document have the following meaning:

- ✓ Prerequisite
  1. First action step
  2. Second action step
  or
  ➢ Alternative action
  ➢ Result
  ➢ Individual action step

- Prompts you to do something.

- See "Formats and symbols used [→ 4]"
  Identifies a reference to another text passage and specifies its page number.

- • List
  Designates a list.

- "Command / menu item"
  Indicates commands, menu items or quotations.
2 Safety instructions

2.1 Shielding of room

When using the HELIODENT Plus X-ray tube assembly, proper shielding of the room and operator position is essential.

It is the installer's responsibility to ensure that all local radiation regulations and safety measures are met.

2.2 Electromagnetic compatibility

The unit should not be operated in the immediate vicinity of other devices. If this proves to be unavoidable, the unit should be monitored to ensure that it is operating properly.

2.3 Modifications and extensions of the system

Modifications to this unit which might affect the safety of the system owner, patients or other persons are prohibited by law.

For reasons of product safety, this product may be operated only with original Sirona accessories or third-party accessories expressly approved by Sirona. The user assumes the risk of using non-approved accessories.
3 Prior to installation

3.1 Installation options

Designations for release buttons and door contact

- Manual release S3
  - Coiled cable
- Release key on the control membrane S4
  - Directly connected to control board DX4
- Remote control release key S9
  - Integrated in remote control housing
- Door contact (safety circuit) S7

Installation option 1
Release in the treatment room **without** remote control
- Release
  - Manual release S3

Installation option 2
Release in the treatment room **with** remote control
- Release
  - Manual release S3
    or
  - Remote control release key S9

Installation option 3
Release in the treatment room **with** Remote Timer
- Release
  - Manual release S3
    or
  - Release key on the control membrane S4

**NOTICE**
Length of cable supplied for Remote Timer approx. 10 meters (393") (must not be extended).
Conduit int. dia. at least 12 mm (1/2").
Installation option 4
Release outside of the X-ray room with remote control
- Release
  - Manual release S3
  - Remote control release key S9

NOTICE
Installation prerequisites
Use of the remote control is permissible only if the yellow X-Ray LED is visible to the operating personnel during radiation release.

Installation option 5
Release outside of the X-ray room with Remote Timer
- Release
  - Manual release S3
  - Release key on the control membrane S4

NOTICE
Length of cable supplied for Remote Timer approx. 10 meters (393") (must not be extended).
Conduit int. dia. at least 12 mm (1/2").

Installation option 6
Release outside of the X-ray room with remote control, door contact safety circuit
- Door contact
  - Door contact S7 wired to the wall adapter
- Release
  - Manual release S3
  - Remote control release key S9

NOTICE
Installation requirement
Use of the remote control is permissible only if the yellow X-Ray LED is visible to the operating personnel during radiation release.
3 Prior to installation
3.1 Installation options

Installation option 6.1
Release outside of the X-ray room with remote control, door contact safety circuit
- Door contact
  - Door contact S7 wired to the remote control housing
- Release
  - Manual release S3
  or
  - Remote control release key S9

**NOTICE**

Installation requirement
Use of the remote control is permissible only if the yellow X-Ray LED is visible to the operating personnel during radiation release.

Installation option 7
Release outside of the X-ray room with Remote Timer, door contact safety circuit
- Door contact
  - Door contact S7
- Release
  - Release key on the control membrane S4

Installation option 8
Release outside of the X-ray room with Remote Timer, door contact safety circuit
- Door contact
  - Door contact S7 wired to Remote Timer
- Release
  - Manual release S3
3.2 On-site installation

**CAUTION**

Observe wall properties

In installation situations, the technician is responsible for the assessment of wall properties and selecting the method of attaching the unit to the wall.

- The permissible tensile force of the selected attachment must at least equal the tensile force listed above.
- Matching wood screws for wooden beams are included in delivery.
- For all other wall structures, special wall anchors must be purchased from a selected dealer. The wall anchors and screws should be identical for every attachment point.
- Alternatively, an anchor plate can be used as a counter bearing. In this case, M8 threaded rods of the appropriate length for the wall (thickness of the wall + 2 x mounting plate thickness + attachment material) are required.
3 Prior to installation
3.2 On-site installation

Re-use installation sites of old units

It is possible to conceal the installation site of an old unit when installing a HELIODENTPLUS®.

- For the replacement of vertically mounted old units (e.g. HELIODENT DS, HELIODENT MD, Planmeca Intra) an adapter plate is available for this purpose, REF 62 42 254.
- The drill holes of some vertically mounted units (e.g. Progeny Previa, Gendex 765DC) coincide with the dimensions of the drill holes of the Heliodent PLUS®. No adapter plate is required.

NOTICE

Regardless of their prior use, the existing drill holes and wall plugs must comply with the installation regulations and must be checked by the person performing installation.

NOTICE

The different connection areas of the old units make it necessary to relocate the existing electrical connections (e.g. concealed installation) on-site.

⚠️ CAUTION

The on-site electrical installation must be performed according to the valid regulations for medical electrical equipment (DIN VDE 0100-710).

- Cable for remote control or Remote Timer: Conduit int. min. 12mm (1/2"), requires an excess length of at least 0.25 m (10") at both ends.
- Power cable 3x1.5 mm² (AWG 16); required excess length for concealed installation: 0.25m (10").

⚠️ CAUTION

Do not install the cables for Remote Timer and power cables in the same conduit.

NOTICE

The HeliodentPlus® wall model is suitable for fixed installation only.

⚠️ DANGER

Perilous shock hazard!

Fixed connection!

Installing a mains plug instead of the specified fixed connection infringes international medical regulatory actions and is prohibited. In case of error, this puts patients, users, and other parties seriously at risk.

1. The product names mentioned may be copyrighted by their respective owners.
CAUTION

Observe the permissible nominal voltage range!
The unit can be connected to 120 V (1-phase connection) or to 200 - 240 V (1- or 2-phase connection), for all other voltages a pre-transformer is required. As a ceiling model or device model, the HELIODENT<sup>PLUS</sup> must only be connected to 200 - 240 V (1 or 2-phase connection).

For the USA only

Power supply:
A separate three wire grounded circuit connected directly to the central distribution panel with an over-current protection rated for 20 amperes should be used.
4 Dimensions, technical data

4.1 Dimensions with round support arm

4.1.1 Dimensions of front view with all options

| A | Recommended installation height for the wall module |
| B | Cable bushing for network cable                   |
| C | Unit height                                        |
| D | Ceiling height                                     |
| E | Wooden beam                                        |
| F | Wall module cover                                  |
| G | Cable bushing for remote control or Remote Timer  |
### 4.1.2 Dimensions for 950 mm (37 3/8") support arm

**Side view**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Recommended installation height: 1110 mm (43 3/4&quot;)</td>
</tr>
<tr>
<td>T</td>
<td>X-ray tube assembly with standard tube, 200 mm (8&quot;) SSD</td>
</tr>
</tbody>
</table>

![Diagram of 950 mm support arm dimensions]
**Top view**

- 2280 89 3/4" (width)
- 1150 45 1/4" (height)
- 1352 54" (side length)
- 268 10 1/2" (height)
- 1850 72 7/8" (length)
- 180° (rotation)
- 540° (rotation)

Dimensions, technical data Sirona Dental Systems GmbH

4.1 Dimensions with round support arm

Installation Requirements HELIODENTPLUS
Minimum dimensions for X-ray rooms with 950 mm (37 3/8") support arm

- min. 1350 (53"")
- min. 1150 (45 1/4"")
- min. 2350 (92 1/2"")
- min. 800 (31 1/2"")
- min. 1500 (59"")

Dimensions with round support arm
### 4.1.3 Dimensions for 700 mm (27 1/2") support arm

**Side view**

<table>
<thead>
<tr>
<th><strong>A</strong></th>
<th><strong>T</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommended installation height: 1110 mm (43 3/4&quot;)</strong></td>
<td><strong>X-ray tube assembly with standard tube, 200 mm (8&quot;) SSD</strong></td>
</tr>
</tbody>
</table>

![Diagram of dimensions for 700 mm support arm](image-url)
Minimum dimensions for X-ray rooms
with 700 mm (27 1/2") support arm

<table>
<thead>
<tr>
<th>Minimum Dimension</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-ray room width</td>
<td>min. 1100</td>
</tr>
<tr>
<td></td>
<td>43 1/4&quot;</td>
</tr>
<tr>
<td>X-ray room height</td>
<td>min. 1150</td>
</tr>
<tr>
<td></td>
<td>45 1/4&quot;</td>
</tr>
<tr>
<td>X-ray table height</td>
<td>min. 2080</td>
</tr>
<tr>
<td></td>
<td>81 7/8&quot;</td>
</tr>
<tr>
<td>X-ray table width</td>
<td>600</td>
</tr>
<tr>
<td></td>
<td>23 5/8&quot;</td>
</tr>
<tr>
<td>X-ray table height</td>
<td>220</td>
</tr>
<tr>
<td></td>
<td>8 5/8&quot;</td>
</tr>
<tr>
<td>X-ray table width</td>
<td>800</td>
</tr>
<tr>
<td></td>
<td>31 1/2&quot;</td>
</tr>
<tr>
<td>X-ray support arm height</td>
<td>min. 1200</td>
</tr>
<tr>
<td></td>
<td>47 1/4&quot;</td>
</tr>
</tbody>
</table>
### 4.1.4 Dimensions for 410 mm (16 1/8") support arm

**Side view**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>Recommended installation height: 1110 mm (43 3/4&quot;)</td>
</tr>
<tr>
<td>T</td>
<td>X-ray tube assembly with standard tube, 200 mm (8&quot;) SSD</td>
</tr>
</tbody>
</table>

![Diagram of dimension for 410 mm support arm]
4 Dimensions, technical data

4.1 Dimensions with round support arm

Top view

- 1740
  - 68 1/2"
- 180°
- 610
  - 24"
- 1352
  - 54"
- 268
  - 10 1/2"
- 1300
  - 51 1/8"
- 540°
Minimum dimensions for X-ray rooms with 410 mm (16 1/8") support arm

Minimum dimensions:
- 620 mm (24 3/8")
- 700 mm (27 1/2")
- 220 mm (8 5/8")
- 300 mm (11 3/4")
- min. 1100 mm (43 1/4")
- min. 1600 mm (63")
- 250 mm (9 7/8")
- 220 mm (8 5/8")
- 1000 mm (39 3/8")
- min. 1400 mm (55 1/8")
- min. 1200 mm (47 1/4")
4.1.5 Dimensions mobile stand

Front view
Top view

Dimensions with round support arm:

- 1001 (39 3/8"
- 973 (38 3/8"
- 782 (30 3/4"
- 550 (21 5/8"
- 610 (24"
- 180°
- 1740 (68 1/2"
- 1330 (52 3/8"
4.2 Dimensions with angular support arm

4.2.1 Dimensions of front view with all options

<table>
<thead>
<tr>
<th>Letter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Recommended installation height for the wall module</td>
</tr>
<tr>
<td>B</td>
<td>Cable bushing for network cable</td>
</tr>
<tr>
<td>C</td>
<td>Unit height</td>
</tr>
<tr>
<td>D</td>
<td>Ceiling height</td>
</tr>
<tr>
<td>E</td>
<td>Wooden beam</td>
</tr>
<tr>
<td>F</td>
<td>Wall module cover</td>
</tr>
<tr>
<td>G</td>
<td>Cable bushing for remote control or Remote Timer</td>
</tr>
<tr>
<td>H</td>
<td>Recommended installation height of remote control or Remote Timer</td>
</tr>
</tbody>
</table>

![Diagram of Dimensions with Angular Support Arm]

Dimensions in inches:
- **A**: 235 9 1/4" (Recommended installation height for the wall module)
- **B**: 374 14 3/4" (Cable bushing for network cable)
- **C**: 150 5 7/8" (Unit height)
- **D**: 335 11 1/2" (Ceiling height)
- **E**: 2325 91 1/2" (Wooden beam)
- **F**: 350 13 3/4" (Wall module cover)
- **G**: 350 13 3/4" (Cable bushing for remote control or Remote Timer)
- **H**: 213 8 3/8" (Recommended installation height of remote control or Remote Timer)
### Dimensions for 910 mm (35 7/8") support arm

#### Side view

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Recommended installation height: 1110 mm (43 3/4&quot;)</td>
</tr>
<tr>
<td>T</td>
<td>X-ray tube assembly with standard tube, 200 mm (8&quot;) SSD</td>
</tr>
</tbody>
</table>

![Diagram of dimensions](image)
Top view

- 2280 mm (89 3/4"
- 1150 mm (45 1/4"
- 180°
- 540°
- 1352 mm (54"
- 1850 mm (72 7/8"
- 268 mm (10 1/2"

4 Dimensions, technical data
Sirona Dental Systems GmbH
4.2 Dimensions with angular support arm
Installation Requirements HELIODENT® PLUS
Minimum dimensions for X-ray rooms with 910 mm (35 7/8") support arm

- min. 1150 (45 1/4")
- min. 1300 (51 1/8")
- min. 2350 (92 1/2")
- 220 (8 5/8")
- 220 (8 5/8")
- 250 (9 7/8")
- 800 (31 1/2")
- 1500 (59")
4.2.3 Dimensions for 660 mm (26") support arm

Side view

| A  | Recommended installation height: 1110 mm (43 3/4") |
| T  | X-ray tube assembly with standard tube, 200 mm (8") SSD |

---

Diagram showing the dimensions for the 660 mm support arm, including recommended installation height, X-ray tube assembly details, and other measurements.
Minimum dimensions for X-ray rooms with 660 mm (26") support arm

- min. 1150 45 1/4"
- 600 23 5/8"
- 220 8 5/8"
- min. 1100 43 1/4"
- min. 2080 81 7/8"
- 250 9 7/8"
- 220 8 5/8"
- 800 31 1/2"
- min. 1200 47 1/4"
- min. 1200 47 1/4"
4.2.4 Dimensions for 370 mm (14 1/2") support arm

Side view

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td>Recommended installation height: 1110 mm (43 3/4&quot;)</td>
</tr>
<tr>
<td><strong>T</strong></td>
<td>X-ray tube assembly with standard tube, 200 mm (8&quot;) SSD</td>
</tr>
</tbody>
</table>

![Diagram showing dimensions and installation requirements for a 370 mm support arm]
Top view

Dimensions with angular support arm

- **Top view**

- **Lengths:**
  - 1740 mm (68 1/2")
  - 1352 mm (54")
  - 1300 mm (51 1/8")
  - 610 mm (24")
  - 268 mm (10 1/2")

- **Angles:**
  - 180°
  - 540°
Minimum dimensions for X-ray rooms with 370 mm (14 1/2") support arm

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>min. 1600</td>
<td>63&quot;</td>
</tr>
<tr>
<td>min. 1100</td>
<td>43 1/4&quot;</td>
</tr>
<tr>
<td>250</td>
<td>9 7/8&quot;</td>
</tr>
<tr>
<td>220</td>
<td>8 5/8&quot;</td>
</tr>
<tr>
<td>1000</td>
<td>39 3/8&quot;</td>
</tr>
<tr>
<td>min. 1200</td>
<td>47 1/4&quot;</td>
</tr>
<tr>
<td>700</td>
<td>27 1/2&quot;</td>
</tr>
<tr>
<td>300</td>
<td>11 3/4&quot;</td>
</tr>
<tr>
<td>620</td>
<td>24 3/8&quot;</td>
</tr>
<tr>
<td>220</td>
<td>8 5/8&quot;</td>
</tr>
</tbody>
</table>
4.2.5 Dimensions mobile stand

Front view

Dimensions:
- 1229 48 3/8" (height)
- 350 13 3/4" (width)
- 685 27" (depth)
- 2125 83 6/8" (overall height)
- 400 15 3/4" (arm length)
Top view
4.3 Technical data

<table>
<thead>
<tr>
<th>Dimensions of the packaging</th>
<th>HELIODENTPLUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round support arm system</td>
<td>87 cm x 91 cm x 29 cm</td>
</tr>
<tr>
<td></td>
<td>34 1/4&quot; x 35 7/8&quot; x 11 1/2&quot;</td>
</tr>
<tr>
<td>Angular support arm system</td>
<td>99 cm x 94 cm x 29 cm</td>
</tr>
<tr>
<td></td>
<td>39&quot; x 37&quot; x 11 1/2&quot;</td>
</tr>
<tr>
<td>Mobile stand</td>
<td>120 cm x 80 cm x 40 cm</td>
</tr>
<tr>
<td></td>
<td>47 1/4&quot; x 31 1/2&quot; x 15 3/4&quot;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weight</th>
<th>incl. / without packaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>HELIODENTPLUS</td>
<td></td>
</tr>
<tr>
<td>Round support arm system</td>
<td>31 kg / 24 kg</td>
</tr>
<tr>
<td>Angular support arm system</td>
<td>37 kg / 30 kg</td>
</tr>
<tr>
<td>Mobile stand</td>
<td>128 kg / 105 kg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power supply connection</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Line voltage</td>
<td></td>
</tr>
<tr>
<td>wall model</td>
<td>120 V, 200 V - 240 V, 50 / 60 Hz</td>
</tr>
<tr>
<td>ceiling model, unit model</td>
<td>200 V - 240 V, 50 / 60 Hz</td>
</tr>
<tr>
<td>Line voltage variation</td>
<td>± 10%</td>
</tr>
<tr>
<td>Internal line resistance</td>
<td>At 120 V: 0.3 Ω</td>
</tr>
<tr>
<td></td>
<td>for 200 V - 240 V: 0.8 Ω</td>
</tr>
<tr>
<td>Nominal current</td>
<td>At 120 V: 10 A</td>
</tr>
<tr>
<td></td>
<td>for 200 V - 240 V: 6 A - 5 A</td>
</tr>
<tr>
<td>Fuse</td>
<td>16 A slow blow</td>
</tr>
<tr>
<td>Power consumption</td>
<td>≤ 1.2 kW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transport and operating conditions:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport and storage temperature:</td>
<td>-40°C – +70°C (-40°F – 158°F)</td>
</tr>
<tr>
<td>Air humidity:</td>
<td>10% – 95%</td>
</tr>
<tr>
<td>Operating conditions as specified in IEC 60601-1:</td>
<td>Ambient temperature +10 °C – +40 °C (50 °F – 104 °F)</td>
</tr>
<tr>
<td>Relative humidity:</td>
<td>30% – 75%</td>
</tr>
<tr>
<td>Recommended operating temperature:</td>
<td>18°C - 35°C (64°F - 95°F)</td>
</tr>
<tr>
<td>With room temperatures &gt; 35°C (&gt; 95°F)</td>
<td>Sirona recommends the use of an air conditioning system.</td>
</tr>
<tr>
<td>Operating altitude:</td>
<td>≤ 3000 m</td>
</tr>
</tbody>
</table>
Electromagnetic compatibility

**NOTICE**

HELIODENTPlus complies with the requirements for electromagnetic compatibility (EMC) according to IEC 60601-1-2.

HELIODENTPlus is referred to in the following as "UNIT". Observance of the following information is necessary to ensure safe operation regarding EMC aspects.

5.1 Accessories

<table>
<thead>
<tr>
<th>Designation of the interface cables</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIYCY 2x0.25mm² (AWG 24) remote cable L9 for remote release, 10m</td>
<td>62 42 064</td>
</tr>
<tr>
<td>LIYYC 8x0.22mm² (AWG 24) remote cable L6 for Remote Timer, 10m</td>
<td>62 42 056</td>
</tr>
<tr>
<td>3x1.5mm² NYM</td>
<td>Commercially available</td>
</tr>
</tbody>
</table>

- The UNIT may be operated only with accessories and spare parts approved by Sirona. Unapproved accessories and spare parts may lead to an increased emission or to a reduced immunity to interference.
- The UNIT should not be operated immediately adjacent to other devices. If this proves to be unavoidable, the UNIT should be monitored to ensure that it is operating properly.

5.2 Electromagnetic emission

The UNIT is intended for operation in the electromagnetic environment specified below.

The customer or user of the UNIT should make sure that it is used in such an environment.

<table>
<thead>
<tr>
<th>Emission measurement</th>
<th>Conformity</th>
<th>Electromagnetic environment - guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF emissions according to CISPR 11</td>
<td>Group 1</td>
<td>The UNIT 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.</td>
</tr>
<tr>
<td>RF emissions according to CISPR 11</td>
<td>Class B</td>
<td>The UNIT is intended for use in all facilities, including residential areas and in any facilities connected directly to a public power supply providing electricity to buildings used for residential purposes.</td>
</tr>
<tr>
<td>Harmonics according to IEC 61000-3-2</td>
<td>Class A</td>
<td></td>
</tr>
<tr>
<td>Voltage fluctuations / flicker according to IEC 61000-3-3</td>
<td>coincides</td>
<td></td>
</tr>
</tbody>
</table>
### 5.3 Immunity to interference

The UNIT is intended for operation in the electromagnetic environment specified below.

The customer or user of the UNIT should make sure that it is used in such an environment.

<table>
<thead>
<tr>
<th>Interference immunity tests</th>
<th>IEC 60601-1-2 test level</th>
<th>Compliance level</th>
<th>Electromagnetic environment - guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrostatic discharge (ESD) according to IEC 61000-4-2</td>
<td>± 8 kV contact discharge; ± 15 kV air discharge</td>
<td>± 8 kV contact discharge; ± 15 kV air discharge</td>
<td>Floors should be made of wood or concrete or finished with ceramic tiling. If the floor is covered with synthetic material, the relative humidity should be at least 30%.</td>
</tr>
<tr>
<td>Electrical fast transient/burst according to IEC 61000-4-4</td>
<td>± 1 kV for input and output lines; ± 2 kV for power supply lines</td>
<td>± 1 kV for input and output lines; ± 2 kV for power supply lines</td>
<td>The quality of the line power supply should be that of a typical commercial or hospital environment.</td>
</tr>
<tr>
<td>Surge voltages according to IEC 61000-4-5</td>
<td>± 1 kV differential mode voltage; ± 2 kV common mode voltage</td>
<td>± 1 kV differential mode voltage; ± 2 kV common mode voltage</td>
<td>The quality of the line power supply should be that of a typical commercial or hospital environment.</td>
</tr>
<tr>
<td>Voltage dips, short interruptions and variations of the power supply according to IEC 61000-4-11</td>
<td>Voltage dips: 0% UT with 1/2 period at 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315°; 0% UT with 1 period and 70% UT with 25 periods at 50 Hz and 30 periods at 60 Hz each at 0°; Short interruptions: 0% UT with 250 periods at 50 Hz and 300 periods at 60 Hz</td>
<td>The quality of the line power supply should be that of a typical commercial or hospital environment. If the user of the UNIT requires it to continue functioning following interruptions of the power supply, it is recommended to have the UNIT powered by an uninterruptible power supply or a battery.</td>
<td></td>
</tr>
<tr>
<td>Magnetic field of power frequencies (50/60 Hz) according to IEC 61000-4-8</td>
<td>30 A/m</td>
<td>30 A/m</td>
<td>Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.</td>
</tr>
</tbody>
</table>

Note: UT is the AC supply voltage prior to application of the test level.
### Interference immunity tests

<table>
<thead>
<tr>
<th>Conducted RF interference IEC 61000-4-6</th>
<th>IEC 60601-1-2 test level</th>
<th>Compliance level</th>
<th>Electromagnetic environment - guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3 V_{eff}</strong></td>
<td>150 kHz to 80 MHz $^1$</td>
<td><strong>3 V_{eff}</strong></td>
<td>$d = \left\lceil 1.2 \sqrt{P} \right\rceil$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Radiated RF interference IEC 61000-4-3</th>
<th>IEC 60601-1-2 test level</th>
<th>Compliance level</th>
<th>Electromagnetic environment - guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3 V/m</strong></td>
<td>80 MHz to 800 MHz $^1$</td>
<td><strong>3 V_{eff}</strong></td>
<td>$d = \left\lceil 1.2 \sqrt{P} \right\rceil$ at 80 MHz to 800 MHz</td>
</tr>
<tr>
<td><strong>3 V/m</strong></td>
<td>800 MHz to 2.7 GHz $^1$</td>
<td><strong>3 V_{eff}</strong></td>
<td>$d = \left\lceil 2.3 \sqrt{P} \right\rceil$ at 800 MHz to 2.7 GHz</td>
</tr>
</tbody>
</table>

with $P$ as the power rating of the transmitter in watts (W) according to the transmitter manufacturer's specifications and $d$ as recommended safety distance in meters (m).

Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey $^2$ should be less than the compliance level $^3$ in each frequency range.

Interference is possible in the vicinity of equipment bearing the following graphic symbol.

---

1. The higher frequency range applies at 80 MHz and 800 MHz.

2. The field strengths of fixed transmitters, such as base stations of radiotelephones and mobile agricultural radio broadcast services, amateur radio stations, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. A site survey is recommended to assess the electromagnetic environment due to fixed RF transmitters. If the measured field strength in the location in which the UNIT is used exceeds the applicable RF compliance level above, the UNIT should be observed to verify normal operation. If unusual performance characteristics are observed, it may be necessary to take additional measures such as reorientation or repositioning of the UNIT.

3. Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.
### Electromagnetic compatibility

#### 5.3 Immunity to interference

<table>
<thead>
<tr>
<th>Test frequency (MHz)</th>
<th>Frequency band(a) (MHz)</th>
<th>Radio service (a)</th>
<th>Modulation (b)</th>
<th>Power max. (W)</th>
<th>Distance (m)</th>
<th>Immunity test level (V/m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>385</td>
<td>380 - 390</td>
<td>TETRA 400</td>
<td>Pulse modulation (b) 18 Hz</td>
<td>1.8</td>
<td>0.3</td>
<td>27</td>
</tr>
<tr>
<td>450</td>
<td>430 – 470</td>
<td>GMRS 460, FRS 460</td>
<td>FM(c) ± 5 kHz stroke 1 kHz sinus</td>
<td>2</td>
<td>0.3</td>
<td>28</td>
</tr>
<tr>
<td>710, 745, 780</td>
<td>704 - 787</td>
<td>LTE band 13, 17</td>
<td>Pulse modulation (b) 217 Hz</td>
<td>0.2</td>
<td>0.3</td>
<td>9</td>
</tr>
<tr>
<td>810, 870, 930</td>
<td>800 - 960</td>
<td>GSM 800/900, TETRA 800, iDEN 820, CDMA 850, LTE band 5</td>
<td>Pulse modulation (b) 18 Hz</td>
<td>2</td>
<td>0.3</td>
<td>28</td>
</tr>
<tr>
<td>1720, 1845, 1970</td>
<td>1700 - 1990</td>
<td>GSM 1800; CDMA 1900; GSM 1900; DECT; LTE band 1, 3, 4, 25; UMTS</td>
<td>Pulse modulation (b) 217 Hz</td>
<td>2</td>
<td>0.3</td>
<td>28</td>
</tr>
<tr>
<td>2450</td>
<td>2400 - 2570</td>
<td>Bluetooth, WLAN, 802.11 b/g/n, RFID 2450, LTE band 7</td>
<td>Pulse modulation (b) 217 Hz</td>
<td>2</td>
<td>0.3</td>
<td>28</td>
</tr>
<tr>
<td>5240, 5500, 5785</td>
<td>5100 - 5800</td>
<td>WLAN 802.11 a/n</td>
<td>Pulse modulation (b) 217 Hz</td>
<td>0.2</td>
<td>0.3</td>
<td>9</td>
</tr>
</tbody>
</table>

**Note:**

If necessary, the distance between the transmitting antenna and the ME unit or ME system can be reduced to 1 m in order to achieve the immunity test level. The 1 m test distance conforms to IEC 61000-4-3.

(a) For some radio services, only the frequencies for the radio link between the mobile communication device and the base station (uplink) have been recorded in the table.

(b) The carrier must be modulated with a square-wave signal with 50% duty cycle.

(c) Alternatively to the frequency modulation (FM), a pulse modulation with 50% duty cycle at 18 Hz can be used, as this, if not the actual modulation, would represent the worst case.
5.4 Working clearances

The UNIT is intended for operation in an electromagnetic environment, where radiated RF interference is checked. The customer or the user of the UNIT can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the UNIT - depending on the maximum output power of the communication device, as shown below.

<table>
<thead>
<tr>
<th>Power rating of the transmitter [W]</th>
<th>Working clearance according to transmission frequency [m]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>150 kHz - 80 MHz</td>
</tr>
<tr>
<td></td>
<td>( d = [1, 2] \ \sqrt{P} )</td>
</tr>
<tr>
<td>0.01</td>
<td>0.12</td>
</tr>
<tr>
<td>0.1</td>
<td>0.38</td>
</tr>
<tr>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>10</td>
<td>3.8</td>
</tr>
<tr>
<td>100</td>
<td>12</td>
</tr>
</tbody>
</table>

The recommended safety distance \( d \) in meters (m) can be determined for transmitters, whose maximum power rating is not specified in the above table, using the equation that belongs to the corresponding column, wherein \( P \) is the maximum power rating of the transmitter in watts (W) according to the transmitter manufacturer.

**Note 1**

The higher frequency range applies at 80 MHz and 800 MHz.

**Note 2**

These guidelines may not apply in all cases. The propagation of electromagnetic waves is influenced by their absorption and reflection by buildings, objects and persons.
We reserve the right to make any alterations which may be required due to technical improvements.