XIOS\textsuperscript{Plus} Sensors

Operating Instructions

This product is covered by one or more of the following US patents:

- US 5,912,942
- US 5,434,418
- US 6,811,312
- US 6,069,935
- US 6,134,298
- US 5,841,126
- US 6,549,235
- US 6,570,617
- US 5,513,252
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1 Dear Customer,

Thank you for purchasing the XIOS Plus X-ray sensor. In combination with a XIOS Plus wall module or a XIOS Plus USB module, the XIOS Plus X-ray sensor facilitates the digital acquisition of intraoral X-ray images.

Your XIOS Team

1.1 Contents of this document

Table of contents

This operator manual describes the handling of the sensor.

1.2 General conventions

You should familiarize yourself with the unit by reading through the operating instructions before taking patient exposures. Please always observe the valid radiation protection directives and the safety information in these instructions.

These operating instructions are based on the assumption that you are familiar with the SIDEXIS XG software.

In case you get stuck despite having thoroughly studied the operating instructions, please contact your dental depot.

To prevent any personal injury or material damage, pay special attention to any notes printed in bold type or highlighted with signal words such as NOTICE, CAUTION or WARNING:

1.3 Structure of the document

1.3.1 Identification of danger levels

To prevent personal injury and material damage, please observe the warning and safety information provided in this document. 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.
Dear Customer,

Operating Instructions XIOS\textsuperscript{Plus} Sensors

1.3.2 Formats and symbols used

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

- ✔ Prerequisite
  1. First action step
  2. Second action step
     or
     ➢ Alternative action
  % Result

- See “Formats and symbols used [→ 5]”

- List

- “Command/menu item”

1.4 Other valid documents

For the operation of XIOS\textsuperscript{Plus} sensors the following documents are required:

- Operating instructions:
  - XIOS\textsuperscript{Plus} wall module
  - XIOS\textsuperscript{Plus} USB module
- SIDEXIS XG Installation Instructions (included in delivery SIDEXIS XG)
- SIDEXIS XG Operator’s Manual (for working with SIDEXIS XG software, included in delivery SIDEXIS XG).

Keep these documents handy at all times (file them in the X-ray System Logbook in Germany).

The system integrator must complete the enclosed declaration of conformity.

To safeguard your warranty claims, please complete the attached "Installation Report / Warranty Passport" together with the service engineer immediately after the installation of your unit.
2 Warning and safety information

Symbols used

Observe accompanying documents (on rating plate)

Intended use

This product has been designed for the digital acquisition of intraoral X-ray images.
This product must not be used in areas subject to explosion hazards.

Indications in the areas:

- Conservative dentistry
- Caries diagnosis, especially of proximal lesions
- Endodontics
- Periodontology
- Prosthodontics
- Functional diagnosis and therapy of craniomandibular dysfunctions
- Surgical dentistry
- Implantology
- Oral and maxillofacial surgery
- Orthodontics

Contraindications:

- Display of cartilage structures
- Display of soft tissue

USA only: Caution!

According to US Federal Law, this product may be sold only to or by instruction of physicians, dentists, or licensed professionals.

Maintenance and service recommendations

Inspection and maintenance must be performed at scheduled intervals to ensure the operational and functional reliability of your product and to protect the safety and health of patients, users and other persons. In accordance with IEC 60601-1.

The system owner must ensure that all inspections and maintenance events take place.

If the system owner fails to fulfill the obligation to have inspections and maintenance work performed or ignores error messages, Sirona Dental Systems GmbH and its authorized dealers cannot assume any liability for resulting damage.

As manufacturers of medical electrical equipment, we can assume responsibility for the safety properties of the system only if maintenance and repair work on the system is performed by ourselves or by agencies expressly authorized by us, and if components affecting safe operation of the system are replaced by original spare parts in case of failure.
We suggest that you request a certificate showing the nature and extent of the work performed from those who carry out such work; it must contain any changes in rated parameters or working ranges (if applicable), as well as the date, the name of the company and a signature.

**Modifications to the unit**

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.

**CAUTION!** PC extensions can lead to impairment of the system's functional reliability (e.g. patient safety and electromagnetic compatibility). The guarantee of the system's functional reliability will automatically be transferred to anyone who implements a system extension which has not been expressly approved by Sirona.

Use the XIOSPlus sensor only as described in these Operating Instructions.

**Combination with other equipment**

Permissible combinations are specified in the Declaration of Conformity by the system integrator.
Patient environment

Within the patient environment (A), direct contact is only permissible with devices or system parts that are approved for use in the patient environment (A).

This applies to all possible patient positions (B) during the examination or treatment.

X-raying of patients

X-rays of patients must be taken only when the system works without errors.

The system may only be operated by skilled or properly trained personnel.

Do not leave the patient at the unit unattended.

Use the XIOS\textsuperscript{Plus} sensor only as described in these Operating Instructions.
### Electromagnetic compatibility (EMC)

The XIOS\textsuperscript{Plus} sensor complies with the requirements of IEC 60601-1-2. Medical electrical devices are subject to special precautionary measures regarding EMC. It must be installed and operated as specified in the document “Installation Requirements”.

Portable and mobile RF communications equipment may interfere with medical electrical equipment. Therefore, the use of mobile wireless phones in medical office or hospital environments must be prohibited.

### Allocation of acquisition system to patient

Within the scope of practice operations, unambiguous allocation of the acquisition system to the examinee must be ensured to guarantee reliable allocation of X-ray exposures to the patient data saved by SIDEXIS!

### Hygiene information

The XIOS\textsuperscript{Plus} protective sleeves and the XIOS\textsuperscript{Plus} sensor holder tabs are single use devices and must be renewed for each patient. The sterilizable exposure accessories should be resterilized for each new patient to prevent any possible transmission of infective agents which might under certain circumstances cause serious illnesses.

Suitable hygienic measures must be taken to prevent cross contamination between patients, users and other persons.

The sensors and the cable must be wiped disinfected before each patient!

### Disturbance of electronic devices worn on the patient’s body

To prevent the malfunctioning of electronic devices and data memories, e.g. radio-controlled watches, telephone cards etc., these objects must be removed prior to the X-ray exposure.

Your product is marked with the adjacent symbol. Within the European Economic Area, this product is subject to Directive 2002/96/EC as well as the corresponding national laws. This directive requires environmentally sound recycling/disposal of the product. The product must not be disposed of as domestic refuse!

Please observe the disposal regulations applicable in your country.

### 2.1 ESD protective measures

ESD stands for ElectroStatic Discharge.

ESD protective measures include:

- Procedures for preventing electrostatic charge build-up (e.g. air conditioning, air moistening, conductive floor coverings and non-synthetic clothing)
- Discharging the electrostatic charges of your own body on the frame of the UNIT, the protective ground wire or large metallic objects
- Connecting yourself to ground using a wrist band.

We therefore recommend that all persons working with this system be instructed on the significance of this warning label. Furthermore, they also should receive training in the physics of electrostatic discharges which can occur in the practice and the destruction of electronic components which may result if such components are touched by electrostatically charged USERS.
About the physics of electrostatic charges

What is an electrostatic charge?

An electrostatic charge is a voltage field on and in an object (e.g. a human body) which is protected against conductance to ground potential by a nonconductive layer (e.g. a shoe sole).

Formation of an electrostatic charge

Electrostatic charges generally build up whenever two bodies are rubbed against each other, e.g. when walking (shoe soles against the floor) or driving a vehicle (tires against the street pavement).

Amount of charge

The amount of charge depends on several factors:

Thus the charge is higher in an environment with low air humidity than in one with high air humidity; it is also higher with synthetic materials than with natural materials (clothing, floor coverings).

NOTICE

Electrostatic discharge must be preceded by electrostatic charging.

Background

Integrated circuits (logical circuits and microprocessors) are used to implement a wide variety of functions in dental/X-ray/CAD/CAM systems.

The circuits must be miniaturized to a very high degree in order to include as many functions as possible on these chips. This leads to structure thicknesses as low as a few ten thousandths of a millimeter.

It is obvious that integrated circuits which are connected to plugs leading outside of the unit via cables are sensitive to electrostatic discharge.

Even voltages which are imperceptible to the user can cause breakdown of the structures, thus leading to a discharge current which melts the chip in the affected areas. Damage to individual integrated circuits may cause malfunction or failure of the system.
To prevent this from happening, the ESD warning label next to the plug warns of this hazard. ESD stands for ElectroStatic Discharge.
3 Technical description

3.1 General data

The XIOS\textsuperscript{Plus} sensors, type D3495, were tested in combination with the XIOS\textsuperscript{Plus} wall module or the XIOS\textsuperscript{Plus} USB module in accordance with IEC 60 601–1. They comply with the requirements of these regulations.

Original language of the present document: German

Patents
- US 5,912,942
- US 5,434,418
- US 6,811,312
- US 6,069,935
- US 6,134,298
- US 5,841,126;
- US 6,549,235;
- US 6,570,617
- US 5,513,252

Additional patents pending.

3.2 Sensors

Technology: CMOS-APS (Active Pixel Sensor)
Physical pixel size: 15 µm
Active surface: Size 1 - sensor = 20 x 30 mm
Size 2 - sensor = 25.6 x 36 mm
The active surface of the sensor is identified by dots and labeling.
External dimensions: Size 1 - sensor = 24.8 x 38.5 x 6.7 mm
Size 2 - sensor = 31.3 x 44.5 x 6.7 mm
Cable length: 2.85 m
Degree of protection against electrical shock: Type BF

3.3 Ambient conditions

Ambient temperature: 10° (50°F) – 40°C (104°F)
Storage temperature: -40°C (-40°F) – 70°C (158°F)
Relative humidity (storage and transport) 10% – 95%
3.4 Requirements for intraoral X-ray tube assemblies

- Relative humidity in operation: 10% – 75%
- Air pressure (storage and transport): 500 – 1060 hPa
- Air pressure (operation): 700 – 1060 hPa
- Operating altitude: ≤ 3000 m

NOTICE

The intraoral X-ray tube assembly must be installed in accordance with the manufacturer’s instructions and requirements. Please refer to the manuals supplied with your intraoral X-ray unit for more information.

NOTICE

For optimal image quality we recommend using a multipulse unit as well as a 12” cone.

Multipulse units (DC), mAs product: 0.14 – 1.4 mAs, at 60 – 70 kV and 8” cone

This information must be modified accordingly for single-pulse units or other cone lengths.
4 Accessories and spare parts

NOTICE

Not all of the accessories listed here are included in the scope of supply.

NOTICE

Sensor holder tabs and hygienic protective sleeves are single use devices!

They can, however, be used repeatedly on the same patient. The adhesive on the sensor holder tabs is suitable for gluing and detaching them from the protective sleeve repeatedly.

Identification of single use devices

Single use devices are identified with the symbol shown at left.

4.1 Accessories

XIOS Plus sensor holder starter kit, size 2

Order No.: 61 73 624

Contents:

- 15x sensor holder tab, anterior (blue), including localizer ring and guide rod
- 15x sensor holder tab, posterior (yellow), including localizer ring and guide rod
- 15x sensor holder tab, bite wing (red), including localizer ring and guide rod
- 15x sensor holder tab, endo (gray), including localizer ring and guide rod
- 15x sensor holder tab, universal (green)
- 50x hygienic protective sleeves, size 2

XIOS Plus sensor holder starter kit, size 1

Order No.: 61 73 632

Contents:

- 15x sensor holder tab, anterior (blue), including localizer ring and guide rod
- 15x sensor holder tab, posterior (yellow), including localizer ring and guide rod
- 15x sensor holder tab, bite wing (red), including localizer ring and guide rod
- 15x sensor holder tab, endo (gray), including localizer ring and guide rod
- 15x sensor holder tab, universal (green)
- 50x hygienic protective sleeves, size 1

**XIOSPlus** Hygienic protective sleeves, size 1 (single use device, 300 pcs)
- Size 1: Order No.: 61 48 998
- Size 2: Order No.: 61 49 004

Wall holder for XIOS X-ray sensors
Order No.: 61 74 879

**Phantom XIOSPlus** sensor sizes 1 and 2 for constancy test (only for Germany)
Order No.: 62 09 634

**XIOS sensor holder tab, anterior, blue** (single use device, 100 pcs)
Order No.: 61 76 510

**XIOS sensor holder tab, posterior, yellow** (single use device, 100 pcs)
Order No.: 61 76 528

**XIOS sensor holder tab, bite wing, red** (single use device, 100 pcs)
Order No.: 61 76 536
4 Accessories and spare parts
4.1 Accessories

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XIOS sensor holder tab, endo, gray (single use device, 50 pcs)
Order No.: 61 76 551

XIOS sensor holder tab, universal, green (single use device, 100 pcs)
Order No.: 61 76 544

Radiation field limiter 3x4 for HELIODENT DS, replacement
Order No.: 46 81 974

Radiation field limiter 2x3 for HELIODENT DS, replacement
Order No.: 60 00 579
5 Use of the X-ray Sensor

General information

The X-ray sensor should be placed according to the well-known parallel or half-angle technique.

⚠️ CAUTION

Illustrations without hygienic sleeves
For the sake of clarity, no hygienic sleeves are shown in some of the illustrations. However, a hygienic sleeve always must be slipped over the sensor before using it on a patient.

NOTICE

Risk of damage
- Handle the sensor carefully.
- Do not drop the sensor!
- Do not swirl the sensor about by its cable.
- Do not bend the sensor cables or run over them (e.g. with a chair)!
- Avoid laying sensor cables on the floor if possible.
- Make sure that the patient does not bite on the sensor or the sensor cable.

NOTICE

Operational reliability
- The sensor must be checked to ensure that it is plugged in correctly before releasing an exposure!
- The user must check exposure readiness prior to radiation release. See Operating Instructions for the XIOSPlus wall module or the XIOSPlus USB module.
- Never place two sensors in the beam path at the same time!

5.1 Preparation

Checklist

NOTICE

Check the sensor cable and sensor for damage, e.g. cracks or splinters, prior to each exposure. In case of visible damage to the sensor, please contact your dealer.
5.2 Hygienic protection

5.2.1 General information

Hygienic protection

Please use Sirona hygienic protective sleeves for hygienic protection.

**CAUTION**

Use only the XIOS\textsuperscript{Plus} hygienic protective sleeves offered by Sirona, especially in connection with the XIOS\textsuperscript{Plus} sensor holders.

**CAUTION**

Hygienic protective sleeves and sensor holder tabs are single use devices. Do not use hygienic protective sleeves more than once!

- Prior to each application on a new patient, the sensor must be covered with a new hygienic protective sleeve.
- Do not bend the sensor cable when slipping the hygienic protective sleeve over it!
- Please use the hygienic protective sleeve which correctly matches the sensor.

**Hygienic protective sleeves**

- XIOS\textsuperscript{Plus} hygienic protective sleeve for sensor size 1
  300 pcs, Order-No: 62 01 839
- XIOS\textsuperscript{Plus} hygienic protective sleeve for sensor size 2
  300 pcs, Order-No: 62 01 847

**NOTICE**

Make sure that the cable connecting the sensor is run out of the patient’s mouth in such a way that the patient cannot bite it.
5.2.2 Sliding the hygienic protective sleeve over the sensor

Handling

1. Please select a hygienic protective sleeve with a size that matches the sensor.
2. Slide the sensor into the hygienic protective sleeve.

**NOTICE**

Size of the hygienic protective sleeve
The hygienic protective sleeve is slightly undersized, so that it surrounds the sensor tightly and prevents the sensor from slipping out of place.

3. Position the sensor holder tab on the hygienic protective sleeve.

**NOTICE**

The exact position depends on the sensor holder tab used and the X-ray exposure area. The following sections contain specific information on how to position different sensor holder tabs.

Handling information for the parallel technique
If the supplied XIOS sensor holder tab set is used, the hygienic protection sleeve must be placed between the sensor and the holder. The sensor holder tab must not be glued onto the unprotected sensor.

**NOTICE**

Never slide the hygienic protective sleeve over the sensor with glued on sensor holder!

5.2.3 Removing the hygienic protective sleeve from the sensor

**NOTICE**

Leave the sensor holder tab attached to the sensor and slide the sensor out of the hygienic protective sleeve using your thumb.

**NOTICE**

Please do not pull on the sensor cable while pushing the sensor out of the hygienic protective sleeve!

**NOTICE**

Always handle the cable with care when removing the hygienic protective sleeve.
1. Grasp the guide rod in one hand so that you can touch the side of the sensor facing away from the sensor cable with your thumb.

2. Carefully push the sensor out of the part of the hygienic protective sleeve that is glued to the sensor holder tab with your thumb.

3. Slide the sensor further out of the hygienic protective sleeve with your thumb.
4. Hold the sensor cable firmly to prevent the sensor from falling out of the hygienic protective sleeve.

5.3 Parallel technique with radiation limiter!

For enhanced dose reduction, we recommend using the radiation limiter and the XIOS holder system for the parallel technique.

5.3.1 Anterior tooth exposure

Explanation

A special "anterior" sensor holder tab is available for anterior tooth exposures.

- This sensor holder tab and the matching localizer ring are color-coded blue.
- The (triple-offset) guide rod and the blue localizer ring for anterior tooth exposures must be used.
- The following illustrations show how to attach the sensor holder tab to the hygienic protective sleeve with sensor.

Preparation

1. Plug together the triple-offset guide rod (C) and the blue localizer ring (B) of the XIOS holder system for anterior tooth exposures.
2. Select the blue sensor holder tab for periapical exposures (A) and plug it onto the guide rod (C).
3. Slide the sensor into the hygienic protective sleeve. When doing so, follow the instructions for sensors. [→ 19]
4. Adhere the sensor holder tab in the middle of the active area of the sensor to the hygienic protective sleeve as shown in the illustration. The active area of the sensor is identified by dots on the sensor.

1. Position the sensor in the patient's mouth.
2. Place the X-ray tube assembly in the correct position. Change the position of the sensor holder if necessary.
4. Discard the sensor holder tab and the hygienic protective sleeve following the patient examination.
5. The guide rod and localizer ring must be cleaned and sterilized.

5.3.2 Posterior tooth exposures

Explanation

The "posterior" type sensor holder tab is available for periapical posterior tooth exposures.

- This sensor holder tab and the matching localizer ring are color-coded yellow.
- The (double-offset) guide rod and the yellow localizer ring for posterior tooth exposures must be used.
- The following illustrations show how to attach the sensor holder tab to the hygienic protective sleeve with sensor.

Preparation

1. Plug together the double-offset guide rod (C) and the yellow localizer ring (B) of the XIOS holder system for posterior tooth exposures.
2. Select the yellow sensor holder tab for periapical posterior tooth exposures (A) and plug it onto the guide rod (C).
3. Slide the sensor into the hygienic protective sleeve, When doing so, follow the instructions for sensors. [→ 19]
**4. For the left upper jaw and right lower jaw:** Position the sensor holder tab in the middle of the active area of the sensor as shown in the illustration. The active area of the sensor is identified by dots on the sensor. The edge of the sensor holder tab must be flush with the edge of the sensor.

**5. For the right upper jaw and left lower jaw:** Position the sensor holder tab in the middle of the active area of the sensor as shown in the illustration. The active area of the sensor is identified by dots on the sensor. The edge of the sensor holder tab must be flush with the edge of the sensor.

1. Position the sensor in the patient's mouth.
2. Place the X-ray tube assembly in the correct position. Change the position of the sensor holder if necessary.
4. Discard the sensor holder tab and the hygienic protective sleeve following the patient examination.
5. The guide rod and localizer ring must be sterilized.

**5.3.3 Bite wing exposures**

**Explanation**

The "bite tab" type sensor holder tab is available for bite wing exposures.

- This sensor holder tab and the matching localizer ring are color-coded red.
- The straight guide rod and red localizer ring for bite wing exposures must be used.
- The following illustrations show how to attach the sensor holder tab to the hygienic protective sleeve with sensor.
5 Use of the X-ray Sensor
5.3 Parallel technique with radiation limiter

Operating Instructions XIOSPlus Sensors

Preparation

1. Plug together the straight guide rod (C) and the red localizer ring (B) of the XIOS holder system for bite wing exposures.
2. Select the (bite tab type) red sensor holder tab (A) for bite wing exposures and plug it onto the guide rod (C).
3. Slide the sensor into the hygienic protective sleeve. When doing so, follow the instructions for sensors. [→ 19]

4. For vertical bite wing exposures: Position the sensor holder tab vertically on the hygienic protective sleeve in the middle of the active area of the sensor as shown in the illustration. The active area of the sensor is identified by dots on the sensor.

5. For horizontal bite wing exposures: Position the sensor holder tab horizontally on the hygienic protective sleeve in the middle of the active area of the sensor as shown in the illustration. The active area of the sensor is identified by dots on the sensor.

X-ray image

1. Position the sensor in the patient's mouth.
2. Place the X-ray tube assembly in the correct position. Change the position of the sensor holder if necessary.
4. Discard the sensor holder tab and the hygienic protective sleeve following the patient examination.
5. The guide rod and localizer ring must be sterilized.

5.3.4 Endodontics

Explanation

The "endo" type sensor holder tab is available for endodontics.

- This sensor holder tab, the matching guide rod and the matching localizer ring are color-coded gray.
Preparation

1. Plug together the gray guide rod made of plastic (C) and the gray localizer ring (B) of the XIOS holder system for endodontic exposures.
2. Select the gray sensor holder tab (A) for endodontic exposures and plug it onto the guide rod (C).
3. Slide the sensor into the hygienic protective sleeve. When doing so, follow the instructions for sensors. [→ 19]
4. Adhere the sensor holder tab in the middle of the active area of the sensor to the hygienic protective sleeve as shown in the illustration. The active area of the sensor is identified by dots on the sensor.

X-ray image

NOTICE

The endodontic needles and files can remain in the root canal for the measurement exposure.

1. Position the sensor in the patient’s mouth.
2. Place the X-ray tube assembly in the correct position. Change the position of the sensor holder if necessary.
4. Discard the sensor holder tab and the hygienic protective sleeve after completing the root treatment.
5. The guide rod and localizer ring must be disinfected.

5.4 Half-angle technique without radiation limiter

Depending on the size of the tooth or position of the area to be exposed, place the X-ray sensor in the patient’s mouth vertically or horizontally.

The patient may be asked to immobilize the sensor by holding it himself.

5.4.1 Endodontic Exposures

A special universal sensor holder tab is available for exposures with the half-angle technique.

- This universal sensor holder tab is color-coded green.
- The following illustrations show how to attach the sensor holder tab to the hygienic protective sleeve with sensor.

Preparation

1. Slide the sensor into the hygienic protective sleeve, following the instructions for sensors. [→ 19]
2. Select the green universal sensor holder tab and remove the protective foil from the adhesive surface.

3. **Anterior tooth exposures**: To take anterior tooth exposures, position the sensor holder tab on the edge of the sensor near the cable.

4. **Posterior tooth exposures**: To take posterior tooth exposures, position the sensor holder tab in the middle of the active area of the sensor. The active area of the sensor is identified by dots on the sensor.

1. Position the sensor in the patient’s mouth.
2. Place the X-ray tube assembly in the correct position. Change the position of the sensor holder if necessary.
4. Discard the universal sensor holder tab and the hygienic protective sleeve following the patient examination.
Exposure times

The dose to be set for X-ray exposure depends primarily on the following:

- Type of X-ray tube assembly (manufacturer, AC/DC, etc.),
- Distance between beam focus and sensor,
- Morphology of patient,
- Object (i.e. tooth), which is to be X-rayed.

The dose is adjusted through tube voltage and tube current (specified by kV/mA) as well as exposure time.

The X-ray dose influences the image quality that can be achieved by an X-ray system. Based on fundamental laws of physics, with digital X-ray sensors - as with film - an insufficient dose generally means higher image noise, which usually leads to poorer detail discrimination.

On the other hand, a too-high dose can cause the sensor to be overexposed. This is noticeable by a decreasing detail discrimination, specifically in darker areas.

Brightness and contrast can always be optimally adjusted through the XIOSPlus image preprocessing function, independent of dose.

XIOSPlus sensors have a very wide effective dose area, so that, depending on the object and diagnostic question at hand, the selection of an optimal parameter adjustment is always possible.

**NOTICE**

Since the exposure time depends on the diagnostic problem as well as the respective clinical situation, the selection of an optimal adjustment is the responsibility of the treating physician.

**NOTICE**

Image degradations resulting from an insufficient dose

Image degradations resulting from an insufficient dose can be partially compensated through image postprocessing.

**CAUTION**

Image degradations caused by overexposure of the sensor cannot be compensated!

Exposure times for size 1 and size 2 XIOSPlus X-ray sensors

Short exposure times are adequate for the highly sensitive size 1 and size 2 XIOSPlus X-ray sensors.

The exposure parameters specified for X-ray sensors in the documentation for the various Sirona intraoral X-ray systems therefore do not apply to size 1 and size 2 XIOSPlus X-ray sensors.

**Recommended** exposure times for Sirona devices are described below. Exposure times of 0.06 - 0.12 s correspond to dose values between approx. 300 and 600 µGy at the sensor when measured without an object.
and with a focus-sensor-distance of 23 cm. Corresponding values apply to devices from other manufacturers and to AC tube units. However, for optimal image quality DC tube units should be used.

**NOTICE**

Please observe the corresponding specifications of the X-ray device manufacturer.

**NOTICE**

**Better image quality**

Since the positioning of the sensors in the beam path of the cone strongly influences the image quality, using the parallel technique (with XIOS sensor holders) is recommended for optimal positioning of the sensors.

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### 6.1 HELIODENT DS

**General**

HELIODENT DS has its own exposure times for operation with digital X-ray sensors.

The preset exposure times are not valid for XIOSPlus sensors.

To switch from conventional to digital acquisition, briefly press the **D** button.

- The word "DIGITAL" lights up on the membrane keyboard to indicate the switch-over.
- The reduced exposure time is indicated.

➢ In this case please use the radiation limiter for digital acquisition.

For a detailed description please refer to the Operating Instructions of the HELIODENT DS.

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### 6.1.1 HELIODENT DS Serial Nos. 15864 and higher (wall model) and 4416 and higher (ceiling model)

**NOTICE**

Prior to an exposure, check the following:

- Is digital exposure selected (illuminated display "DIGITAL")?
- Is the correct exposure time for the exposure region displayed?

---

**Possible exposure times**

<table>
<thead>
<tr>
<th>0.01</th>
<th>0.02</th>
<th>0.03</th>
<th>0.04</th>
<th>0.05</th>
<th>0.06</th>
<th>0.08</th>
<th>0.10</th>
<th>0.12</th>
<th>0.16</th>
<th>0.20</th>
<th>0.25</th>
<th>0.32</th>
<th>0.40</th>
<th>0.50</th>
<th>0.64</th>
<th>0.80</th>
<th>1.00</th>
<th>1.25</th>
<th>1.60</th>
<th>2.00</th>
<th>2.50</th>
<th>3.20</th>
</tr>
</thead>
</table>

**Recommended exposure times – with 8” SSD cone and XIOS size 1 / size 2 X-ray sensors**

An excellent image quality is achieved with XIOS sensors when using a radiation time of 0.08 to 0.10 s (at 60 kV, 7 mA).
The positioning of the sensors using the parallel technique (with XIOS sensor holders) ensures an optimal positioning of the sensors in the beam path of the cone.

It is the responsibility of each individual dentist to determine the required dose for each patient in order to achieve image quality suitable to make a diagnosis. Sirona can only make recommendations.

When the desired patient symbol is set to the tooth symbol, the recommended exposure times are assigned automatically.

Each tooth symbol is subdivided into three different exposure times.

For digital X-ray exposures, make sure to set the longest exposure time setting within a tooth symbol for X-rays of adults, and the shortest exposure time setting for X-rays of children.

Only then does the corresponding value appear on the digital display.

Adjacent example: Maxillary molar

Valid for software version 17 and higher (number appears briefly after the unit is switched on).

Classification of recommended exposure times by tooth region:

<table>
<thead>
<tr>
<th>Tooth Region</th>
<th>Adult Exposure Times</th>
<th>Child Exposure Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Adults</td>
<td>0.08 s – 0.10 s</td>
<td>0.08 – 0.12 s</td>
</tr>
<tr>
<td>B = Children</td>
<td>0.06 s – 0.08 s</td>
<td>0.06 – 0.08 s</td>
</tr>
</tbody>
</table>

A = adults
B = children
C = Mandibular anterior tooth
D = Mandibular canine tooth
E = Maxillary anterior tooth
F = Maxillary molars
G = Maxillary canine tooth / Mandibular molars
H = occlusal exposure

If a 12" SSD cone is used together with a size 1 / size 2 XIOS X-ray sensor, the above exposure times are doubled!
6.1.2 HELIODENT DS up to Serial No. 15863 (wall model) and 4415 (ceiling model)

**NOTICE**

Prior to an exposure, check the following:
- Is digital exposure selected (illuminated display "DIGITAL")?
- Is the correct exposure time for the exposure region displayed?

Possible exposure times

| 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 0.06 | 0.08 | 0.10 | 0.12 | 0.16 | 0.20 | 0.25 | 0.30 | 0.32 | 0.40 | 0.50 | 0.60 | 0.80 | 1.00 | 1.25 | 1.60 | 2.00 | 2.50 | 3.00 | 3.20 |

Recommended exposure times – with 8” SSD cone and XIOS\textsuperscript{Plus} size 1 / size 2 X-ray sensors

An excellent image quality is achieved with XIOS\textsuperscript{Plus} sensors when using a radiation time of 0.08 to 0.10 s (at 60 kV, 7 mA).

- The positioning of the sensors using the parallel technique (with XIOS\textsuperscript{Plus} sensor holders) ensures an optimal positioning of the sensors in the beam path of the cone.
- It is the responsibility of each individual dentist to determine the required dose for each patient in order to achieve image quality suitable to make a diagnosis. Sirona can only make recommendations.

**WARNING**

The preset exposure times on the Heldiodent DS do not apply to XIOS\textsuperscript{Plus} sensors.

Classification of recommended exposure times by tooth region:

<table>
<thead>
<tr>
<th>Tooth Region</th>
<th>Exposure Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (adults)</td>
<td>0.08 s – 0.10 s</td>
</tr>
<tr>
<td>B (children)</td>
<td>0.06 s – 0.08 s</td>
</tr>
</tbody>
</table>

- A = adults
- B = children
- C = Mandibular anterior tooth
- D = Mandibular canine tooth
- E = Maxillary anterior tooth
- F = Maxillary molars
- **G** = Maxillary canine tooth / Mandibular molars
- **H** = occlusal exposure

If a 12" SSD cone is used together with a size 1 / size 2 XIOS X-ray sensor, the above exposure times are doubled!
7 Care of outer surface

7.1 Care and cleaning agents

NOTICE
Approved care and cleaning agents
Use only care and cleaning agents which have been approved by Sirona!

A continuously updated list of approved agents can be downloaded from the Internet at the address "www.sirona.com". In the navigation bar, go to the menu items "SERVICE" / "Care and cleaning" and then open the document "Care and cleaning agents".

If you do not have any access to the Internet, please contact your dental depot to order the list.

REF 59 70 905

Care and cleaning agents, supplement for USA

The outside areas may be disinfected with a suitable chemical disinfectant. Only use disinfectants that meet the requirements of the national authorities and have been tested and certified for the necessary bactericidal, fungicidal and virucidal properties.

Examples of approved disinfectants are:
- MinutenSpray classic, by ALPRO®
- MinutenWipes, by ALPRO®

In the USA and Canada:
- CaviCide® or
- CaviWipes™.

7.2 Disinfecting

Overview
The following components can only be disinfected by wiping them off:
- Size 1 and size 2 XIOSPlus X-ray sensors

NOTICE
Risk of sensor destruction
The sensor plug contains sensitive electronics.
No fluids may penetrate the sensor plug during preliminary cleaning and wipe disinfection!
The following should be observed regarding XIOS sensors and their connecting leads:

- Sensors must **not** be thermally disinfected!
- Sensors must **not** be immersed in disinfectant solutions!
- The sensors must **not** be disinfected or sterilized with radiation!

### Preliminary Cleaning

**Visible contamination**

✔ Sensor or cable visibly contaminated (e.g. with blood or saliva).

1. Clean the sensor and cable with a cloth or a paper towel moistened in soapsuds.
2. Then dry the sensor and cable with a fiber-free cloth or paper towel.

**Disinfection**

1. Wipe the sensor and cable completely and thoroughly at least **twice** with one of the disinfectants recommended in the section "Care and cleaning agents."

### Sterilizing

**General**

**NOTICE**

Risk of destruction of the XIOS\(^{\text{Plus}}\) sensors

The XIOS\(^{\text{Plus}}\) sensors are **not** sterilizable!
The following components can be sterilized:

- Rods and rings of the XIOSPlus holder system

The manufacturer's instructions have to be observed for other systems.

NOTICE

Risk of damage

Please follow the instructions given below carefully. Otherwise, your components, the autoclaves or any other objects you have placed in the autoclaves may be damaged.

NOTICE

Durability of plastic parts

Plastic parts have a limited durability and therefore should be replaced regularly. The durability of plastic parts is shortened by every sterilizing procedure.

NOTICE

Risk of melting and distortion of plastic parts

- During sterilization plastic parts must be in a sterilization pouch which is separate from metal parts!
- During sterilization the temperature in the autoclave must not exceed 132°C (270°F)!

Interval

Used rods and rings must be cleaned and sterilized after every patient treatment.

Preparation

1. Separate the rods and rings.
2. Remove any residues with hot soapy water or mild dishwashing liquid.
3. Put the components, metal parts separated from plastic parts, into individual sterilization pouches.
4. Put the sterilization pouches into the middle tray of the autoclave, ensuring sufficient distance to the walls of the autoclave and the heating element.

Sterilization

NOTICE

- Do not use glutaraldehyde with a phenol base!
- Do not use cleaners specialized for specific applications or ultrasonic cleaners!
- Do not use chemical sterilizers or hot air sterilizers!
- Do not perform cold sterilization!

Operate the autoclave according to the manufacturer’s instructions. (the conditions for sterilization are specified below).
Conditions for sterilization

**Sterilized contents packed loosely**
Sterilizer temperature/pressure, length of cycle:
- Steam sterilizer 121°C/103.4 kPa (250°F/15 psi) 20 minutes.
  or
- Steam sterilizer 132 °C /206.8 kPa (270°F/30 psi) 8 minutes.

**Sterilized contents packed tightly**
Sterilizer temperature/pressure, length of cycle:
- Steam sterilizer 121°C/103.4 kPa (250°F/15 psi) 20 minutes.
  or
- Steam sterilizer 132°C/206.8 kPa (270°F/30 psi) 10 minutes.
8 Configuration

Explanation

It is possible to automatically optimize the image quality of an X-ray image after capture with the XIOS Plus sensor using a configuration dialog.

Call

➢ Follow the path "start"/"programs"/"SIDEXIS"/"SIDEXIS Manager" and start the application "XIOS Configuration".

The application "XIOS Configuration" opens.

Configuration

● "Automatic Image Optimization" check box

The "Automatic Image Optimization" check box activates the "Contrast" area.

● "Contrast" area

The modifications made in this area will be executed for each X-ray image when the "Automatic Image Optimization" check box is activated.

Selection fields "Filter 1", "Filter 2", "Filter 3". Filter operations can be selected here, which will be processed in the following order: "Filter 1", then "Filter 2", then "Filter 3".

Selection field "Brightness". The brightness can be corrected here.

Selection field "Contrast". The contrast can be corrected here.

● "Binning" area

The modifications made in this area will be processed for each X-ray exposure.

Binning is the technique of combining neighboring pixels to one single pixel.

The more pixels that are combined, the lower the image noise. In contrast, the resolution of the system decreases.

In the case of Software Binning the binning is done with the image processing software.

In the case of Hardware Binning the binning is done directly on the sensor.

In the latter case the image transfer time and the amount of saved data is less.

The binning factor specifies how many pixels are combined into one pixel:

("1x1") means that binning is not activated.

("2x2") means that the pixels from two neighboring rows and columns are combined into one pixel.

("3x3") means that the pixels from three neighboring rows and columns are combined into one pixel.

IMPORTANT

"Software" binning is only possible if "Hardware" binning is not activated ("Hardware" binning = "1x1").

● "16 bit" check box

When the "16 bit" check box is activated, the standard gray scale
reduction is deactivated (8 bit gray levels).
The "16 bit" setting prevents a loss of information caused by a reduction of the gray levels. In this case, the amount of data doubles.

**IMPORTANT**
The compression of X-ray images with a value range of more than 8 bits is not currently supported.

- "Orientation marker" check box
  Activation of the "Orientation marker" check box causes the position of the XIOSPlus sensor to be retained during the exposure; this is achieved with the displayed sensor size.
  Marking of sensor sizes: 1 = sensor size 1, 2 = sensor size 2
  The sensor size is displayed on the XIOSPlus sensor, on which the name SIRONA is located.
  For example, a mirror-inverted 1 or 2 shows that the image was mirror-inverted.

**Example screen**
We reserve the right to make any alterations which may be required due to technical improvements.