HELIODENT DS

Installation Instructions
**ATTENTION**

Interference with electromedical devices by radio telephones:
To guarantee the operational safety of electromedical devices, the operation of mobile radio telephones in the medical practice or hospital area is prohibited.

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**ATTENTION**

When opening the equipment:
Please observe the safety measures for handling PC boards.
Touch a ground point to remove any personal electrostatic charge before touching the components.

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**New since:** 10.2008

Modification compared with last edition: 11.2007

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<thead>
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<th>Chapter or paragraph</th>
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1. HELIODENT® DS without remote control in treatment room.
2. HELIODENT DS with remote control in treatment room. Length of screened off and supplied remote cable about 10m (400”).
3. HELIODENT DS with remote control outside of X-ray room, removable manual release.
4. HELIODENT DS with remote control outside of X-ray room and door contact, removable manual release.
5. HELIODENT DS with remote control outside of X-ray room, manual release not removable.
6. HELIODENT DS with remote control outside of X-ray room and door contact, manual release not removable.
7. HELIODENT DS with remote control outside of X-ray room and security button, removable or not removable manual release.
8. Heliodent DS with remote timer outside of X-ray room.
2. Required Installation hardware

1. For the installation, the service engineer is responsible for assessing the condition of the wall and the type of wall attachment needed for the unit.

   Suitable wood screws for wooden beams are included in delivery.

   For all other types of wall construction, the appropriate wall plugs must be obtained from a specialized dealer. The wall plugs and screws should be identical for each point of attachment.

   As an alternative, an anchor plate can be used as a counter surface. In this case, M8 threaded rods of the appropriate length (Thickness of wall + 2 x thickness of Installation plate + mounting hardware) for the wall are required.

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**ATTENTION**

Support arm till 700 mm: A minimum extraction force of 3600 N is required for the upper wall plugs and screws or for the threaded rod and nuts.

Support arm 950 mm: A minimum extraction force of 4200 N is required for the upper wall plugs and screws or for the threaded rod and nuts.
3 Installing the Wall Adapter

1. Switch OFF power from the main switch for the electrical installation.

2. For a recessed installation, cut away the cable duct using the Drilling Template. Align the Drilling template and tape it into place.

3. Mark the center points for the four points of attachment and drill them.
   - If using the countersupport plate drill through the wall with an $8\text{mm}$ ($5/16\text{"}$) drill tip.
   - When mounting with wall plugs, drill holes according to the plugs used (max. $10\text{mm}$ / $3/8\text{"}$) and then insert the plugs.
   - For a wooden wall drill the holes with a $6\text{mm}$ ($1/4\text{"}$) wood drill tip at least $80\text{mm}$ deep. Remove the drilling template.

4. For recessed installations only with remote control:
   - Draw the end of the remote control cable with a cable tie into the remote control device. Draw the other end through opening B.

5. Draw the power cable through opening A. (For Ceiling Version: also draw in the cable of the overhead support, see Mounting Instructions for Ceiling Version.)

6. For surface-wiring installations only:
   - Attach self-sticking cover to the rear side.

7. Align the wall adapter with the spirit level and secure it with four screws and washers.

8. For surface-wiring installations only:
   - Run the power cable from below into the installation plate and relieve strain with a cap clamp.
4 Installing the Support Arm

ATTENTION
Do not remove the securing belt.

1. Place the disk B onto the bearing.
   Feed in the arm cable and set the support arm into the bearing.

2. After inserting the support arm, secure it against removal with a retaining ring.

3. Check the support arm with the spirit level.
   If necessary, loosen the bearing attachment and insert compensating angle A beneath.

NOTE for USA/Canada only
When using a HELIODENT DS for two X-ray chambers both stop pins C can be removed to swing the support arm around (not for travel stand!).
5 Electrical Connection

1. Unscrew the 2 bolts "D" from the wall adapter.
   - Fix cable lug C.
   - Insert generator board DX1 on the spacer.
   - With travel stand, cut off wire as short as possible.

2. Pull the arm cable through the ferrite cores as shown twice.
   - For Japan: Use Ferrite cores conversion set 61 39 906.
   - Unscrew the ground wire of the arm cable directly at the grounding point of the mounting plate by loosening the two nuts, the serrated washers and clamp A. Screw the ground wire down as shown.

3. Connect the arm cable:
   - orange to X3.1
   - gray to X3.2
   - blue to X3.3
   - red to X3.4
   - brown to X3.V * see NOTE 1
   - black to X3.W *

4. Attach the arm cable with cable ties at the gummed base B.

5. Power cable:
   - **NOTE**
     - The Heliodent DS wall model is suited for fixed connection only.
     - Connect L (brown) to X1.2
     - N (blue) to X1.3.
     - Place the protective ground wire under terminal clamp A and tighten the nut.

6. **ATTENTION**
   - **CAUTION!** line voltage:
     - 200 – 230V version
       - The jumper must be in the X2.1/2 position.
     - 127V version
       - The jumper must be in the X2.2/3 position.
     - **NOTE 1**
       - For exhibition mode: (no radiation)
         - Do not connect brown to X3.V and black to X3.W.
         - Isolate terminals to prevent contacts with live components.
         - Set switch S300 to position 2 (no radiation).
         - LED V335 lights up in exhibition mode.
7. Without remote control:
Attach the shielding for the spiral cable with a cable clamp, screw and serrated washer to the shielding plate.

8. Attach the shielding plate with the Allen screw to the installation plate.
Connect the two wires to X5.3 and X5.4.

**NOTE**
Only **ONE** exposure button may be connected.

9. With remote control:
With surface-wiring installations it is necessary to tie a knot in the remote control cable for strain relief.

10. Attach the shielding for the remote control cable with a cable clamp, screw and serrated washer to the shielding plate.

11. With remote control:
Attach the shielding plate with the Allen screw to the installation plate.
Connect the wires:
- white to X5.3
- brown to X5.4
- yellow to X5.1.3
- green to X5.1.4

12. For recessed installations:
Fasten the remote control cable with adhesive base and cable ties.

13. It is possible to install a door contact or security switch at X5.1 and 2 (remove the jumper).
6 Installing the X-ray Tube Unit

1. Firmly hold the X-ray tube unit. Fit plug K1 together. Insert the cylindrical pin A in the hole of the holder and support bracket up to the stop. Attach the X-ray tube unit with the two Allen screws and serrated washers to the support arm. Remove the cylindrical pin again (no longer required).

**ATTENTION**
Using an ohmmeter, check the connection between the tube assembly support bracket and the grounding point in the wall adapter. The value should be below 2 ohms. This measurement is **not a substitute** for the protective ground wire test described in the service manual!

2. Remove the adhesive tape. Push the sliding ring (in the covering tube) downwards. Push the silicone stop downwards until the joint is covered. The covering tube must be flush with the bellows.

3. Options:
   - **12” cone**
     Turn the radiation limiter and remove it. Insert the 12” cone (press easy the detent stud into place) and turn until it engages.
   - **12” square cone**
     Turn the radiation limiter and remove it. Insert the 12” square cone (press easy the detent stud into place) and turn until it engages.

4. Loosen the securing belt and remove it.
5. Installing the Remote Control (if present).

**NOTE**
With remote stations with or without a remote timer, there are separate "Installation Instructions for Remote Controls."
7 Starting-Up, Measurements and Controls
(for USA/Canada only)

Required Measuring Instruments

1. Digital multimeter Fluke 8000 A, Philips PM 2816 rms or equivalent.

2. Electromechanical pulse counter KESSLER ELLIS, KT 203±1 pulse, or equivalent.

Radiation Protection

Observe the radiation protection guidelines as outlined in the Operating Instructions manual.

X-radiation is emitted as long as the exposure button is depressed.

The X-ray indicator must light up during radiation. An acoustic signal must also be heard.

Line Voltage

Be sure the jumper on generator board DX1 is plugged according to nominal line voltage as outlined on page 7:

- X2.1: 100 – 125 VAC
- X2.2: 208 – 230 VAC

Power Supply Adequacy

To assure that the HELIODENT system performance is in accordance with Sirona specifications, an adequate power supply is essential.


Duty Cycle

Between exposures maintain a cool-off time (automatic exposure blockage, see Operating Instructions manual).

Operating Instructions

During measurements and controls it is necessary to energize or de-energize the unit. For all operating steps please refer to the Operating Instructions manual.
ATTENTION
CAUTION with PC-Boards!

All PC-boards are fitted with electronic components sensitive to electrostatic discharge (ESD). In an environment of moving people electrostatic charges are unavoidable due to friction of clothing, carpeting etc.

To prevent damage of electronic chips do not touch same.
Always handle circuit boards by the edge of same.

ATTENTION
Electrical Shock Hazard!

Always turn unit OFF before connecting and disconnecting the test leads to the test points.
7.1 Line voltage

Set the multimeter to AC voltage, range depending on the local nominal line voltage.
Turn ON power supply at the central distribution panel.
Measure the voltage to terminal strip X1, N and L1.

- When connected for 127 VAC the measured line voltage must be at least 115 VAC and may not exceed 139VAC.
- When connected for 200 – 230 VAC the measured line voltage must be at least 180VAC and may not exceed 243VAC.
7.2 Power supply adequacy – voltage drop

Attach object selector switch temporarily to the rotary switch shaft on DX4. Switch ON unit (see Operating Instructions).

Select the conventional radiography technique and set the exposure time on the control panel to 3.2s, using the object selector switch (see Operating Instructions, chapter “Preparing the Exposure, Select the radiography technique and Adapting the base value”).

**ATTENTION**

Mind radiation protection guidelines!

Make an exposure by holding depressed the exposure button, X-ray lights up, an audible beep sounds at the wall adapter. Record the voltage reading.

No load voltage: _____VAC
Minus voltage under load: _____VAC
Voltage drop: _____VAC

The maximum permissible voltage drop must not exceed 5.0VAC in the exposure range given.

If power is insufficient advise to the customer that an adequate power supply must be installed according to Power supply given in the instructions Pre-Installation, Mounting Template.
7.3 Measure voltage at X3

- Adjust the voltmeter in the 2V measuring range.
- The DX1 is automatically aligned to the tube assembly.
  Check the voltage on X3.1 – and 2+ as a connection check:
  Nominal value 540mVDC ±200mVDC
- Value for out of tolerance (Volt range):
  Check leads to X3 for proper connection (see section “Electrical Connection”, page 7).
7.4 Tube Current Verification

- Turn unit OFF.
- Remove jumper from test points DX1, X6/X7.
- Connect multimeter to X6+ / X7 –, range 10mA DC.
- Turn unit ON.
- Set the exposure time on the control panel to 3.2s, using the object selector switch (conventional radiography technique).

**ATTENTION**

Make an exposure.

- The reading should be 7mA DC ± 0.5mA.
- If specified value is obtained turn unit OFF (WARNING: Electrical shock hazard!).
- Remove meter leads and replace jumper!
- If specified value cannot be obtained, see Service Manual, chapter "Tube Current Verification".
7.5 Exposure Time Verification (conventional radiography technique)

- For testing the exposure times a mechanical pulse counter is needed.
- Switch unit OFF (WARNING: Electrical shock hazard!) and connect the test leads to test points MP311/MP312 on PCB DX1.
- Switch unit ON.
- Make an exposure with each of the exposure times given: CAUTION RADIATION!
- Observe the cooling time between exposures. The Ready LED flashes until the automatic cooling down time of the tube assembly has expired.
- Set exposure times using the object selector switch (see Operating Instructions).

<table>
<thead>
<tr>
<th>Exposure Time 0.4s:</th>
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<tbody>
<tr>
<td>at 60Hz: 24 pulses</td>
<td>Tolerance: 1 pulse,</td>
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<tr>
<td>at 50Hz: 20 pulses</td>
<td>Tolerance: 1 pulse</td>
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<table>
<thead>
<tr>
<th>Exposure Time 3.2s:</th>
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<tr>
<td>at 60Hz: 192 pulses</td>
<td>Tolerance: 9 pulses,</td>
</tr>
<tr>
<td>at 50Hz: 160 pulses</td>
<td>Tolerance: 8 pulses</td>
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- If the measured pulse count is not within specified tolerance, see Service Manual, chapter “Exposure Time Verification”.
- Switch unit OFF (WARNING: Electrical shock hazard!) and disconnect the test leads to test points MP311/MP312.
- Remove the object selector switch knob from the rotary switch shaft.
8 Startup

ATTENTION
Check the V and W connections at terminal X3 on board DX1. The connections must not be reversed (see page 6)! Otherwise a malfunction will occur.

1. Switch ON power supply (installation on site).
2. Switch ON the unit, an acoustical signal sounds briefly. Preparing the Exposure (see the HELIODENT DS Operating Instructions).
3. Adjust the voltmeter in the 2V measuring range.

ATTENTION
Observe the following with cable extension (e.g. due to ceiling installation, Centro column or Split Concept):

- Check the voltage behind the cable extension. Measure on terminal X10 for ceiling installations and on terminal K2 for the Centro column and the Split Concept. The voltage measured (on terminal X10 or K2) will be lower than the value measured on DX1, however, still must lie within the tolerance of 540mV ± 200mV.
- Value for out of tolerance (Volt range): Check leads to X3 for proper connection (see Section "Electrical Connection", page 7).
For the following tests, observe the radiation protection guidelines in the Operating Instructions.

4. Check X-radiation
   Place a luminous film.
   Select 1.0s exposure time.
   Darken the room.
   Press the exposure button.
   **CAUTION RADIATION**
   - The radiation must be visible on the luminescent film.
   - Incandescent lamp A on board DX1 and the radiation indicator must remain lit for the duration of the exposure.
   - An acoustic signal in the wall adapter must also accompany the entire exposure.
   - With remote control operation, the LED on the remote control module must also light up.

5. Interrupt the exposure.
   Select 3.2s exposure time (see HELIODENT DS Operating Instructions, Adapting the Base Value).
   Press the exposure button until the radiation indicator lights up and then let go; the exposure must stop immediately.
   The elapsed exposure time up to the time of interruption flashes.
   Following the automatic cool-down period, the unit is again ready.

6. Switch OFF the unit.

7. For exhibition only, with no radiation!
   Disconnect the wires from X3.V and X3.W and isolate them.
   Set switch S300 to position 2.
   LED V335 lights up in operation.
9 Concluding Work

1. Insert the cable bush (for remote control: cable with knot) in the slot C.

2. – Run the protective ground wire to the cover.
   – Set on the cover.
   – Option Ceiling Version / Centro Column / Split Concept: place cap A into the cover.
   – Insert lid B and attach the cover with the four Allen screws.

Without remote timer:

3. Glue the cover supplied into the recess of the hood.

4. Attach the rotary knob to the rotary switch shaft. It must be easy to turn.

5. Place the manual release into the holder (if not installed with the remote control).
9.1 Light Indicators at the Display, Audible Sound at the Wall Adapter (for USA/Canada only)

- Switch unit ON with master power switch.
- The stored exposure data must light up on the display, see Operating Instructions under “Preparing the exposure”.
- Make an exposure:
  - Set the exposure time to 1.00 s for conventional radiography technique (button D must not light up).
  - CAUTION RADIATION: Depress the exposure button and hold until the exposure terminates automatically.
    - The radiation indication X-ray must light up during the exposure period.
    - Simultaneously an audible beep must sound at the wall adapter.
    - In operation with remote control, the LED on the remote station must light up as well.
    - The Ready LED flashes until the automatic cooling down time of the tube assembly has expired.
- Interrupt an exposure – deadman feature:
  - Set the exposure time to 3.2 s.
- CAUTION RADIATION: Press the exposure button until X-ray lights up and subsequently release – the exposure must terminate immediately.
  - The selected exposure time blinks until the automatic cooling down time of the tube assembly has expired.
- Switch unit OFF.
6. Switch ON the unit (see the HELIODENT DS Operating Instructions, Preparing the Exposure).

7. Check perfect operation of the changeover button D. The displays of the exposure time, Digital and LED, must be easily visible.

8. Hand securing belt over to the customer.

Installation Report / Warranty passport

9. Enter the serial numbers in the unit passport. Fill out the remaining lines together with the customer.

   - FOR THE CUSTOMER remains in possession of customer.
   - FOR THE DEALER remains in customer file of Technical Service.

NOTE

The technical documentation supplied is a part of the unit. You must therefore give this to the customer.

The unit is now ready to operate.

(for USA/Canada only: – see page 24 and 25)
With digital acquisition it is possible to switch over between the Intraoral Sensor types “Intraoral II 0.0.2 (Full Size / Universal)” and “Intraoral I 0.0.1”.

1. Set the big patient symbol to the last current object stage.
2. Turn the object selector switch 3 steps anticlockwise.
3. Press the digital key until 0.0.1 or 0.0.2 appears in the display.
4. Turn the object selector switch until the required sensor (0.0.1 or 0.0.2) appears.
5. Press the digital key briefly.
11 Install travel stand

1. Attach the two rods A to base B using two screws and spring washers.
2. Insert the rods in the rectangular tube and attach them to base C by means of two screws and spring washers.
3. Remove the protective sheeting from the adhesive strips D on the cover. Stick the cover to the two flats E.
4. Remove nut F and the screw with washer and fan washer (does not apply).
5. Run the mains cable through the large hole of the wall adapter.
6. Attach four screws (M8×50) with washers and spring washers through the wall adapter to the two handles. Attach one screw (M8×40) with washer and spring washer to the flat. Adjust wall adapter with water level and firmly tighten five screws.
7. Insert the pin in the hole and drive in up to the stop.
8. Perform further installation steps commencing at page 6.
Proper shielding of room and operator position is essential. Since these requirements vary from state to state it is the assembler's / installer's responsibility that all local radiation safety requirements are met.

Form FD 2579:
It is the responsibility of the Dealers, Distributors, Assemblers, Installers of Certified Diagnostic X-Ray Equipment to fill out and distribute the Federal Form FD 2579, upon completion of an installation. It is also your obligation to inform the end user "purchaser" of the use, care and recommended yearly maintenance. Forms may be acquired from:
FDA
2098 Gaither Rd.
Rockville, MD 20850
(301) 594–4520
Sample of a filled out form see next page.

The Model - Nos of the certified components are printed and the Serial - Nos have been recorded by you, the installer, on the Warranty Passport.

Familiarize the user with the proper operation of the unit.

Advise the user / customer of the manufacturer's recommended Yearly Maintenance.

Hand over the adjustment tools and special wrenches for future yearly maintenance.

All manuals are part of the unit and are the customer's property.

Additional copies of the manual can be purchased for service use and / or customer use at our cost price, a P.O. via dealer must be sent to the address indicated on the rear of this manual.

This unit is now ready for use!
13 Sample of a Filled out Form (for USA/Canada only)

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1. EQUIPMENT LOCATION
   - Name of Hospital: Smith
   - Address: 135 Main St., NC
   - Phone: 28757
   - Fax: 177 321 7890

2. ASSEMBLER INFORMATION
   - Name of Assembler: Smith
   - Address: 20710 Long Rd., NC
   - Phone: 28753
   - Fax: 177 333 8555

3. GENERAL INFORMATION
   - Documentation: Assembler's name and location
   - Regulatory Information: FDA Approval Number

4. COMPONENT INFORMATION (Additional space is needed for this section, use another form if space is limited)
   - Component Number: 0302
   - Certifying Person: Jones
   - Date: 10/12/2008

5. ASSEMBLER CERTIFICATION
   - Certification: Smith
   - Date: 10/12/2008

6. COMMENTS

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Sirona Dental Systems GmbH

13 Sample of a Filled out Form (for USA/Canada only)
We reserve the right to make any alterations which may be required due to technical improvements.