

LOGOS
IMAGING



T210 CR Imaging System

Operator's Manual

Introducing the T210 System

Congratulations on your purchase of the T210, the leading desktop Computed Radiography system on the market today. With the T210, you will be able to capture, process, store, send, and print high quality digital radiographic images. Your system includes a reader, a set of imaging plates, and software for controlling the reader, evaluating and managing images.

This user guide will help you start using your T210 system for basic operations quickly and safely. It also provides a description of more advanced features, system calibration, and maintenance.

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Regulatory Compliance and Safety

The T210 Computed Radiography System is a Class II medical device as defined by the United States Food and Drug Administration (FDA) regulations and Class I as defined by the European Union Medical Device Directive. The T210 system includes additional accessories that are CE marked by their manufacturer. The device has been designed and tested in accordance with recognized safety standards.

For human medical applications, Federal law restricts the sale of this device to physicians and other healthcare professionals. Use of this device in procedures other than those described in this manual may result in injury or damage to the system.

The T210 is indicated for use in generating radiographic images of human anatomy. It is intended to replace radiographic film/screen systems in all general-purpose diagnostic radiography procedures. It is not cleared for use for mammography in the United States.

ALERT! The reader is a Class 1 laser device when its covers are in place. When the covers are removed, laser light from the embedded Class 3b laser may be present. Direct eye contact with the output beam from the laser may cause serious injury and possibly blindness. Do not remove the protective covers of the reader.

CAUTION! Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Safety Standards This device complies with the safety standards described in Table 1.

TABLE 1: T210 Safety Standards

Standard	Description
21 CFR 1010	US FDA CDRH Performance Standards for Electronic Products
21 CFR 1040	US FDA CDRH Performance Standards for Light-Emitting Products
IEC 60601-1:2005	<ul style="list-style-type: none"> Standard for Safety: Medical Electrical Equipment, Part 1: General Requirements For Safety CAN/CSA-C22.2 No. 601.1- M90 / UL 60601-1:2003: North American deviations
IEC 60825-1:2007	Safety of laser products - Part 1: Equipment classification, requirements and user's guide
IEC and EN 60601-1-2:2007 Group 1 Class A	General requirements for safety – Collateral standard: Electromagnetic compatibility – Requirements and tests. International standard and European deviation

Safe Installation

Follow these instructions when installing the reader, moving it, or reconnecting it to its power supply or to the workstation.

WARNING!

This equipment may cause radio interference or may disrupt the operation of nearby equipment. It may be necessary to take mitigation measures, such as reorienting or relocating the equipment, or shielding the location.

WARNING!

The T210 Reader should not be used adjacent to, or stacked with other equipment. If adjacent or stacked use is necessary, the device should be observed to verify normal operation in the configuration in which it will be used.

- Do not connect unspecified electrical devices to the reader.
- Use only grounded electrical connections — Connect the reader to a grounded electrical outlet between 100-240 V. Connecting to a power source that is not equipped with a protective earth contact creates a shock hazard for the operator. Likewise, interrupting the protective conductor inside or outside the device or disconnecting the protective earth terminal creates a shock hazard for the operator. To achieve the enhanced grounding reliability of the hospital grade plug provided with T210, use an outlet marked “hospital only” or “hospital grade.” This is intended to protect other equipment that may be on the same circuit.
- Allow for proper ventilation and air circulation around the reader. Keep it at least two inches from any other equipment.
- Do not install the reader next to a radiator or water source — excessive heat, dampness, or water leaks may cause damage to the reader’s electrical components, imaging plates, and cassettes.
- Do not install or operate the reader near flammable or explosive materials.
- For installations in North America, the reader should only be used on 120V~ or split-phase 240V supply.
- Only fuses with the required current rating and of the specified type should be used for replacement. The fuse specifications are described on the label just above the power switch on the back of the reader.
- When the T210 Reader must be moved, use a sturdy cart. Two people may be required to lift the reader. Ensure good footing and a clear path for moving the system. Use good lifting techniques.
- If the T210 Reader is to be moved to another facility, or a long distance, it is highly recommended that you place it into its original shipping container. Contact your service representative for help with moving the reader any significant distance.

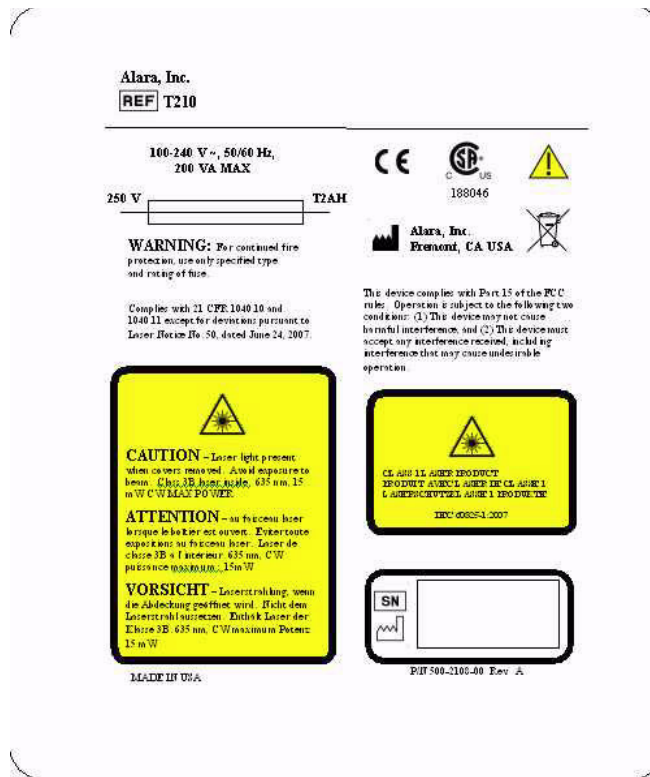
Safe Operation

Every effort has been made to ensure the highest levels of safety. However, this system may be dangerous to the operator unless safe operating instructions are observed.

Safe operating instructions are included here, and throughout this user guide.

- Use only supplied or specified accessories — Use of other accessories could adversely affect compliance with electrical safety standards, result in increased electromagnetic emissions and/or decreased immunity to electromagnetic interference, and/or affect product performance. Imaging plates must include attachment ears. Imaging plates other than those supplied by Logos will not work with the reader.
- A system interlock prevents user access to the interior of the reader during operation. If the interlock is open, the reader stops working. Do not modify the interlocks to allow operation with the cover open.
- Do not allow liquids to spill onto or into the reader or workstation. Electric shock and/or equipment damage may result.
- Do not place anything on top of the reader.
- Do not eat or drink beverages near the reader.
- Do not remove the protective covers of the reader. Parts behind the protective covers of the reader are not user-serviceable. Repairs requiring the removal of protective covers must be performed by factory certified technicians. For assistance, contact your service representative.
- Do not use the T210 if the protective covers are removed or broken. There is a potential for electric shock and access to class 3b laser light when the covers are removed. When reading, one Class 3b laser (IEC 60825-1:2001; laser specifications: 635 nm, 15 mW CW max power) is in operation. The eraser assembly is Class 1. If the covers are damaged or broken, contact your service representative.
- Follow the instructions on the safety labels located on the back panel of the reader as shown below in Figure 1 on page 7. Review the label information prior to operating the reader.

FIGURE 1: Safety and Certification Labels on the Reader



Reliability

To ensure that surges or drops in electrical power do not damage the reader or compromise the integrity of image data acquisition, Logos recommends that you use an uninterruptible power supply (UPS) for the T210 Reader and Workstation.

Anti-Scatter Grids

Logos recommends that you use reciprocating anti-scatter grids, or high frequency (>178 per inch or 70 lines per cm) stationary grids. Moiré' patterns in patient images can result when low-frequency (<140 lines per inch or 55 lines per cm) stationary grids are used.

Starting and Stopping the System

This section describes how to turn the system on and off, and how to launch the Logos Imaging software application. Additional information about working with the reader can be found in subsequent sections.

Turning the Reader On and Off

Before starting the reader, make sure it is plugged into its power source and that the workstation is on. The Logos Imaging software doesn't need to be running when you turn on the reader.

To turn the reader on

1. Push the power switch located on the back of the reader to the "I" position.
2. The green power LED on the front panel will illuminate.



To turn the reader off

1. Push the power switch located on the back of the reader to the "O" position.



Indicator Lights

Indicator lights on the front panel of the T210 provide information on the status of the system. Please see "Working with the T210 Reader" on page 9 for additional information about the indicator lights.

Turning the Workstation On and Off

Refer to the user documentation supplied with the Workstation to turn it on and off and to gain access to the computer desktop.

It is not necessary to leave the Workstation on.

Starting Logos Software from the Desktop

1. Find the **Logos.exe** shortcut on the desktop.
2. Double click the shortcut to start the application.
3. The application starts and displays the workspace.

To Exit Logos Software

In the File Menu, select **Exit**, or click the Close box in the upper right corner of the application window.




Working with the T210 Reader

This chapter provides the information you need in order to operate the reader, insert and remove imaging plates, and recover from the unlikely condition of the imaging plate detaching from the drum during scanning.

The Reader Indicator Lights

During imaging plate scanning, the lights on the front of the T210 Reader indicate the current status of the system. Table 2 describes these lights.

TABLE 2:

Symbol	Name	Location	Status
	Power On	Right front panel. Top.	Off when reader power is off. Steadily illuminated when T210 reader is on and ready for use.
	System Active	Right front panel. Middle.	Off when system is idle. Blinks when system is busy. Steadily illuminated amber while the imaging plate is being read.
	Error Condition	Right front panel. Bottom.	Steadily illuminated red to indicate a reader error condition. Off otherwise.

Loading the Imaging Plate

X-ray images are acquired with the phosphor side of the imaging plate toward the x-ray source. The imaging plate is attached to the drum in the T210 reader with the phosphor side of the imaging plate facing up. Figure 2 illustrates the procedure.

FIGURE 2: Attaching the Image Plate



Engage imaging plate slots on white latches.



Engage imaging plate slots on black latches by pulling levers.



Imaging plate attached to the drum.

Place the slots in the imaging ears over the fixed white latches. Rotate the drum until the blue, spring-loaded latches are aligned with the slots in the ears on the other end of the imaging plate. Pull the latch levers with your forefingers or middle fingers while pulling the imaging plate flush to the drum surface with your thumbs. Release the latch levers ensuring that the latches engage all of the slots. When you have ensured that the plate is properly attached to the drum, close the reader cover. The imaging plate is ready to be read.

Removing the Imaging Plate

After the imaging plate has been read and erased, the System Active light (see Table 2) will be extinguished. Open the T210 reader door by lifting up on the handle. Remove the imaging plate by pulling the latch levers and letting the imaging plate come free of the spring loaded latches. Hold the free end of the imaging plate and allow the drum to rotate until the white fixed latches are on the side of the drum facing you. Carefully disengage the imaging plate from the fixed latches.

Recovering From Detached Imaging Plate

Should the imaging plate become detached from the drum during scanning, when the drum has stopped spinning, open the door and carefully remove the plate. Reattach it to the drum and perform an Erase Operation. The x-ray will then need to be retaken and the steps outlined above in Loading the Imaging Plate should be repeated.

Working With Cassettes and Imaging Plates

This section describes how to handle, operate, and care for the cassettes and imaging plates. Careful handling and maintenance of the cassettes and imaging plates helps to maximize their useful lifetime.

Guidelines for Imaging Plate Care

Handle the imaging plates carefully. Damage to the white phosphor layer is likely to result in image artifacts. Here are some guidelines for handling the imaging plates:

- Avoid picking up the plates in a way that crimps them. Pick them up with the pads of your fingers and be careful to not exert pressure on the white surface of the imaging plates with your fingernails.
- Always place the phosphor side up when placing the plate on a table or bench, or in the cassette.
- Make sure that table or bench surfaces are clean.
- Keep the imaging plate away from abrasive surfaces or sharp objects.
- Follow recommended cleaning procedures when cleaning the plates. See “Cleaning the Imaging Plates” on page 12.
- If imaging plates have not been used for 24 hours, they should be erased before being used for clinical images. Instructions for erasing imaging plates are provided in “Erasing Imaging Plates” on page 13.
- Make sure that the plates are properly installed in cassettes. Avoid crimping the edges of the plates when the cassette is closed.

Loading an Imaging Plate into a Cassette

To load an imaging plate into a cassette, simply:

1. Open the cassette.
2. Place the imaging plate in the cassette with the phosphor side toward the front (x-ray tube side) of the cassette.
3. Close the cassette.

CAUTION!

Be sure to place imaging plate edges within the fabric lining. If the plate's edges are outside of this area, the plate could be damaged when the cassette is closed.

Inspecting and Cleaning Imaging Plates and Cassettes

Store imaging plates in cassettes or appropriate envelopes to protect them from dirt and damage.

Do not store imaging plates and cassettes near a radiator or water source. Water or moisture can be absorbed into the plate's phosphor layer, damaging the plate and degrading image quality.

Damage or dirt can result in streaks or artifacts appearing in the diagnostic image. If artifacts are observed in diagnostic images, the plate should be inspected and cleaned. See page 15 for guidelines for identifying and reducing image artifacts.

Cleaning the Imaging Plates

When cleaning the imaging plates:

- Avoid contact with water.
- The overcoat on storage phosphor imaging plates is more delicate than that of conventional intensifying screens. Vigorous scrubbing may damage the imaging plate.
- Use recommended cleaning materials.

For best results, Logos recommends:

1. Wiping the plate gently with a dry, lint-free soft cloth or wipe. Dirt or debris on the imaging plate can cause image artifacts
2. If soil remains after Step 1, moisten a lint-free soft cloth or wipe with Agfa Screen Cleaner and gently wipe the soiled area of the plate. Gently wipe the moistened area with a dry lint-free soft cloth to remove residual moisture. A residue may remain if the moisture is allowed to dry by evaporation.
3. If Step 2 is not effective, repeat using isopropyl alcohol.

ALERT!

Do not forcefully clean the imaging plates. Vigorous scrubbing may damage the plate.

Reading Imaging Plates

The x-ray image stored on the imaging plate degrades over time. Whenever possible, it is important to read the cassette soon after the x-ray exposure. Two hours after the x-ray exposure, approximately 20 percent of the original image signal is lost from the plate.

NOTE:

Ambient light can degrade the signal stored on the imaging plate, so the imaging plate should be loaded onto the drum in subdued light.

The basic process for acquiring an image from the T210 Reader is:

1. Launch the Logos Imaging Software Application.
2. Attach an exposed imaging plate to the T210 drum.
3. Close the T210 cover.
4. Click **Logos Image**.
5. Click **Scan**.
6. When the process completes, a thumbnail of the image is displayed in the Incident Manager panel.
7. You can acquire another image(s) by removing the processed imaging plate from the drum and attaching another exposed imaging plate, or close the scan dialog and begin to review the image(s).

The reader automatically erases the imaging plate on each use. When you recover the imaging plate, you can reuse it immediately.

Image Quality Control

Once the image is acquired and you have verified that the appropriate component was captured and that the basic image quality is adequate, you may use Logos Imaging Application tools to orient the image, optimize window and level settings, apply image filtering, and annotate the image.

About Resolution

The T210 has two resolution modes, 6 pixels/mm and 12 pixels/mm. These are nominal values. Exact values are summarized in Table 3.

TABLE 3: Properties of Standard and High Resolution Modes

Resolution Mode	Actual Pixel Pitch	Pixel Size
6 pixels per mm	5.9 pixels per mm	169 micrometers
9 pixels per mm	11.8 pixels per mm	85 micrometers

TABLE 4: Resolution Settings, Image Matrix Sizes, and Read Times

Image Plate Size (inches)	Override Setting	Matrix Size (pixels)	Time to Image Display (seconds)
14 x 17	6 pixels/mm	2400 x 2084	87
14 x 17	12 pixels/mm	4800 x 4170	164

Erasing Imaging Plates

The T210 automatically erases imaging plates After reading them. However, imaging plates store energy from background radiation and this can affect the appearance of diagnostic images. If imaging plates have not been in use for 24 hours, they should be erased before being used for clinical images or calibration procedures.

To erase an imaging plate

1. Load an image plate onto the drum.
2. Close the lid.
3. Click **Logos Image**.
4. Click **Erase Only**.

Exposure Indicator Value

Unlike film, which produces an image with good contrast for only a narrow range of x-ray exposure, the imaging plates used in CR systems, such as the T210, have a broad dynamic range. Combined with digital image processing, CR can produce images of diagnostic quality for a very wide range of x-ray exposure levels.

For CR (unlike film, where over-exposure results in film blackening) there is no image quality penalty for over-exposure. Without feedback to operators, exposure levels can rise over time. To help prevent “exposure creep,” the concept of an exposure indicator has emerged. The exposure indicator lets the operator know whether the exposure was too high or too low. By monitoring the exposure indicator, exposure trends can be identified, and, if necessary, technique adjustments can be made to ensure that image quality and potential exposure are optimized.

In the Logos Imaging Application, the Exposure Indicator Value (EIV) is displayed numerically in Image Details Pane. The target value is 2000. Changes of 300 counts represent equivalent factors of 2 in exposure. For example, an EIV of 2300 represents an exposure to the imaging plate that is twice as high as for an EIV of 2000. An EIV of 2600 is four times as high as an EIV of 2000; an EIV of 1700 indicates an exposure that is one-half of that corresponding to the target value of 2000.

Note that it is not necessary that the EIV be exactly 2000. Some variation around this number is expected and still indicates an acceptable exposure level. If EIV's are consistently above 2200 or below 1800, work with your system administrator or service representative to resolve any x-ray technique questions or to calibrate the T210 Reader.

Table 5 summarizes the meaning of selected Exposure Indicator Values.

TABLE 5: Selected Exposure Indicator Values

EIV	Definition
1400	¼ Target Exposure
1700	½ Target Exposure
2000	Target Exposure
2300	2x Target Exposure
2600	4x Target Exposure

Solving Problems

The T210 System is designed to be highly reliable if properly used and maintained. Should problems occur during operation, the information in this section helps you address them.

The following resources are available to help you solve problems you might experience with the system:

- This User Guide. Some problems you will encounter can be resolved by reviewing this manual and ensuring that you understand proper use and operation of the system.
- The built-in Help File. This file is accessed from the Logos Imaging Help Menu.
- Training provided by your service representative.
- Instructions provided by error messages during system operation.
- Telephone and on-site support by your service representative.

Solving Problems Yourself

Beyond ensuring that you are properly using and maintaining the system, there are some types of problems that you might encounter.

- Image quality degradation
- Reader power

Image Artifacts

All computed radiography systems will occasionally exhibit image artifacts. Should you see objectionable artifacts in the image, the following strategy and instructions will help you to resolve them.

If you see moiré patterns in the image, make sure that you are not using a low frequency (< 140 lines per inch or 55 lines per cm), stationary grid. Logos recommends that only reciprocating grids or high-frequency (> 178 lines per inch or 70 lines per cm) stationary grids be used. For recommendations on purchasing a high-frequency stationary grid, contact your service representative.

If the artifacts appear as white smudges or vertical streaks in the image that do NOT extend the full length of the image, you may have a dirty or damaged imaging plate. An example is shown in Figure 3.

FIGURE 3: **Example of dirty and damaged image plate.** Vertical smudges on left side of image are due to soiled image plate. Thin vertical streak on right side of image is due to a scratch on the image plate.



If you see this type of artifact:

1. Open the cassette, and with good lighting, inspect the imaging plate. If you see dark spots or smudges, clean the plate according to the technique described in “Inspecting and Cleaning Imaging Plates and Cassettes” on page 11.
2. If, after cleaning, you see scratches or damage, and the image artifacts are unacceptable, dispose of the imaging plate (Appendix B), and replace it with a new one. Be sure to perform an Erase Only on the new imaging plate before using it.

If the artifacts appear as horizontal bands (Figure 4) that are still present after cleaning or replacing the imaging plate, please contact your service representative.

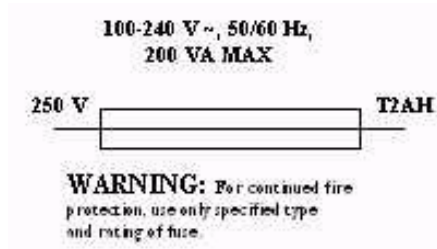
FIGURE 4: Example of horizontal band image artifact.



Reader Power

If the reader doesn't power on, or loses power, you may need to replace the fuse.

Only fuses with the required current rating and of the specified type should be used for replacement. The fuse specifications are described on the label just above the power switch on the back of the reader.



The use of incorrect or makeshift fuses or the short-circuiting of fuse holders creates a shock hazard for the operator and invalidates any warranty that may be in place.

To replace the fuses

1. Power the reader off and remove the power cord from the socket.
2. Open the fuse box located above the socket (Figure 5).

Figure 5:



3. Remove the red fuse casing from the fuse box (Figure 6).

Figure 6:



4. The fuse casing holds two fuses, one on each side. Remove the old fuses and replace them with new ones.
5. Return the fuse casing to the fuse box and close the latch.
6. Plug in the power cord and power on the reader.

Maintaining the System

The T210 system is designed for a long, reliable life with proper use and maintenance.

NOTE: Logos recommends that the results of tests and maintenance activities be documented.

The following procedures and their scheduling are provided as recommendations from the manufacturer. If operational problems occur during the performance of these QC procedures, please refer to page 15 for recommendations on how to resolve them.

The checklist in Table 6 summarizes the maintenance procedures and their frequency.

TABLE 6: Maintenance Checklist

Procedure	Frequency
Quick system inspection	Daily
Quick image test	After power on. Refer to Note on 8.
Inspect and clean imaging plates	Inspect daily. Clean as needed as described in “Cleaning the Imaging Plates” on page 12.
Erase imaging plates	If plates have not been used for more than 24 hours. Please refer to “Erasing Imaging Plates” on page 13.
Inspect and clean system	Weekly.

Calibration

Each T210 system is calibrated at the factory. Field calibration is generally not necessary, but if it is required it should be performed only by trained service personnel.

Quick System Inspection

1. Turn on power to T210 reader and the QC Workstation. Confirm that indicator lights, reader fans (see “Cleaning the Fan Filters” on page 20), and computer and monitor are functioning.
2. Inspect display monitor for smudges, fingerprints, etc. and clean as necessary following procedures in the manual provided by the monitor manufacturer. Adjust monitor contrast and brightness settings as necessary.

Quick Image Test

1. Using your facility's x-ray equipment, image a small test object (e.g., scissors, pencil, test phantom, etc.) on a 14 x 17 cassette containing an imaging plate.
2. Launch the Logos Imaging application program.
3. In the Logos Imaging application, open or create an incident.
4. Attach the exposed imaging plate to the drum and click *Logos Image* and then click *Scan*.
5. Confirm that an image of the test object is displayed.
6. Confirm the absence of obvious image artifacts.

Cleaning the Reader Exterior

Inspect the front, top, side and back covers for damage and debris.

1. Wipe any dust from the reader surfaces and from the surface on which the reader is installed.
2. Remove any dust and dirt using a soft cloth. Clean the exterior of the Reader by moistening a piece of clean gauze with isopropyl alcohol and gently wipe the exterior surface. DO NOT spray any liquid directly onto the machine

Cleaning the Reader Interior

Interior cleaning of the reader should only be performed by trained service personnel.

Cleaning the Fan Filters

There is one intake filter on the back of the reader (Figure 7).

Figure 7:



Air intake filter

Inspect the filters by looking for dust and dirt embedded in them. The fan filters should be cleaned as needed.

The reader can remain on, but should not be operated, while you are cleaning the filters.

To clean the filters:

1. Grip the edges of the fan filter cover and gently squeeze and pull towards you until it comes loose.
2. Remove the filter and wash it in warm water with a mild soap, rinsing until the water runs clear.
3. Remove excess water by placing the filter flat between paper towels and pressing out the water.

General Maintenance

4. Replace the filter.
5. Replace the cover by snapping it back onto their fittings.
 - Check power cords — Periodically check the condition of the reader and computer power cords. If either power cord is damaged, replace it immediately. Electric shock and/or equipment damage may result from damaged power cords.
 - Use only supplied or specified accessories — Use of other accessories could adversely affect compliance with electrical safety standards, result in increased electromagnetic emissions and/or decreased immunity to electromagnetic interference, and/or affect product performance.
 - Beyond the maintenance procedures described here, do not attempt to service the reader yourself. Contact your service representative for assistance.

Moving the Reader

- When the T210 Reader must be moved, use a sturdy cart. Two people are recommended for lifting the reader. Ensure good footing and a clear path for moving the system. Use good lifting techniques.
- If the T210 Reader is to be moved to another facility, or a long distance, it is highly recommended that you place it into its original shipping container. Logos recommends that you contact your service representative for help with moving the reader any significant distance.

Technical Specifications

This appendix lists the technical specifications for the T210. Methods of measurement and test measurement results are on file at Alara, and are available upon request. All specifications are subject to change without notice.

CR Reader Type	<ul style="list-style-type: none">▪ Desktop, Single Image Plate▪ Manual Image Plate Loading▪ Subdued Ambient Light Operation▪ Integrated Read/Erase
Imaging Plates	Customized Agfa MD Series (High Absorption Efficiency) or Equivalent with attachment ears
Imaging Plate Specifications	<ul style="list-style-type: none">▪ 35 cm x 43 cm (14" x 17")▪ Operating Temperature 15 - 34°C (59 - 93°F)▪ Relative Humidity 30% - 80%, non-condensing
Throughput	<ul style="list-style-type: none">▪ Standard resolution — 30 plates/hour (includes 30-second erase time / image plate)▪ High resolution — 20 plates/hour (includes 30-second erase time / image plate)
Image Preview Display Time	<ul style="list-style-type: none">▪ Standard Resolution — 87 seconds▪ High Resolution — 164 seconds
Spatial Resolution	<ul style="list-style-type: none">▪ Standard resolution — 6 pixels/mm▪ High Resolution — 12 pixels/mm
Grayscale Resolution	<ul style="list-style-type: none">▪ Data Acquisition — 16 bits/pixel▪ Output — 12 bits/pixel
Pixel Matrix Sizes	<ul style="list-style-type: none">▪ Standard Resolution<ul style="list-style-type: none">○ 14 x 17 – 2400 x 2084▪ High Resolution<ul style="list-style-type: none">○ 14 x 17 – 4800 x 4170

T210 Reader

The following are the technical specifications for the reader.

- Power requirements
 - Voltage: 100 – 240 VAC, 50-60 Hz, auto-sensing.
 - Power consumption 110 W max, 200 VA max
- Operating Conditions
 - 5% - 95% relative humidity, non-condensing
 - 0° to 40°C (32° to 104°F)
- Storage Conditions — -40° to 50°C (-40° to 122°F)
- Laser Classification — Class I per IEC 60825-1:2007
- Laser Specification — Internal laser diode class 3B per IEC 60825-1:2007. 635 nm, 15 mW CW Max Power
- Electrical Classification — Class I (grounded), suitable for continuous operation
- Protection Against Ingress of Water — Unprotected (IPX0)

Options and Accessories

Options and accessories include imaging plates in the following dimensions:

- 35 x 43 cm (14 x 17 in)

Space Requirements

The dimensions and weight of the components of the T210 system are listed below.

Component	Dimensions (W x H x D)	Weight
T210 Reader	72 cm x 32 cm x 42 cm (28.4" x 13.5" x 16.4")	22 kg (48 lbs)

The T210 Reader requires approximately 15 cm (6 in) clearance on its right side and back for ventilation and to facilitate turning the unit on and off.

The T210 requires a computer workstation and display monitor to operate. Installation space planning should take into account these items as well.

Components are not suitable for use in the presence of flammable anaesthetic mixtures.

Disposing of Parts and Materials

Disposal of Waste Materials and Inoperative Parts

At the end of its life, we recommend that you return the T210 and accessories to Logos Imaging for proper disposal. If you choose instead to dispose of the device yourself, please dispose of materials responsibly. Disposal regulations vary by location. Therefore, it is difficult to give specific instructions on the disposal of material and inoperative parts from the T210. In general, we believe the following guidelines to be applicable:

Table 7: Disposal of Waste Materials

Material	Items	Recycle?	Comments
Plastic	Enclosure, Gears	Yes	Remove all non- plastic items before recycling
Metals	Upper and Lower Half	Yes	Remove all non-metal parts before recycling
Storage Phosphor	Imaging Plates	No	Contains barium, which may be regulated. Contact your local agency for more information and instructions on disposal of imaging plates.
Other Materials	All Others	No	All other materials may be land filled.
Computer System	Monitor and CPU Enclosure	Maybe	Contact your local agency for more information and instructions on disposal of computer equipment.

Guidance and Manufacturer’s Declaration - EMC

The T210 is intended for use in the electromagnetic environment specified below. With the help of your service representative, you should ensure that your T210 is installed and used in such an environment.

NOTE: **Essential Performance:** for the purpose of EMC compliance, no device functions are considered essential to the safety of the patient

Emissions Test Emissions test declarations are specified in Table 8.

TABLE 8: Emissions Test

Emissions Test	Compliance	Electromagnetic Environment Guidance
RF emissions CISPR 11	Group 1	The T210 uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	The T210 is suitable for use in all establishments, with the following exceptions: <ul style="list-style-type: none"> ▪ Domestic, ▪ Establishments directly connected to a public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/flicker emissions IEC 61000-3-3	Complies	


Immunity Test

TABLE 9: Immunity Test

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment Guidance
Electrostatic discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Power quality should be that of a typical commercial or hospital environment
Surge IEC 61000-4-5	±1 kV line(s) to line(s) ±2 kV line(s) to earth	±1 kV line(s) to line(s) ±2 kV line(s) to earth	Power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% <i>UT</i> (>95% dip in <i>UT</i>) for 0.5 cycle 40% <i>UT</i> (60% dip in <i>UT</i>) for 5 cycles 70% <i>UT</i> (30% dip in <i>UT</i>) for 25 cycles <5% <i>UT</i> (>95% dip in <i>UT</i>) for 5 sec.	<5% <i>UT</i> (>95% dip in <i>UT</i>) for 0.5 cycle 40% <i>UT</i> (60% dip in <i>UT</i>) for 5 cycles 70% <i>UT</i> (30% dip in <i>UT</i>) for 25 cycles <5% <i>UT</i> (>95% dip in <i>UT</i>) for 5 sec.	Power quality should be that of a typical commercial or hospital environment. If the user of the T210 requires continued operation during power mains interruptions, it is recommended that the T210 be powered from an uninterruptable power supply or battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	N/A	Power frequency magnetic fields should be at levels characteristic of a typical commercial or hospital environment.

Note: *UT* is the a.c. mains voltage prior to application of the test level.

TABLE 9: Immunity Test (Continued)

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment Guidance
Conducted RF IEC 61000-4-6	3 V rms 150 kHz to 80 MHz	3 V rms	<p>Portable and mobile RF communications equipment should be used no closer to any part of the T210, including cables, than the recommended separation distance calculated from the -equation applicable to the frequency of the transmitter.</p> <p>Recommended separation distance</p> $d = 1.2 \sqrt{P} \text{ 80 MHz to 800 MHz}$ $d = 2.3 \sqrt{P} \text{ 800 MHz to 2.5 GHz}$ <p>where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m).</p> <p>Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, should be less than the compliance level in each frequency range.</p> <p>Interference may occur in the vicinity of equipment marked with the following symbol:</p>
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	
			<p>Note:</p> <ul style="list-style-type: none"> ▪ At 80 MHz and 800 MHz, the higher frequency range applies ▪ Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m

Recommended Separation Distances

Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the T210 is used exceeds the applicable RF compliance level above, the performance of the T210 should be observed to verify normal operation. If abnormal performance is observed, corrective measures may be necessary, such as re-orienting or relocating the T210.

With the help of your service representative, you can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the T210 as recommended in Table 10, according to the maximum output power of the communications equipment.

TABLE 10: Recommended Separation Distances: Separation distance (in meters) according to frequency of transmitter.

Rated Maximum Output Power of Transmitter (in watts)	150 kHz to 80 MHz outside ISM bands $d = 1.2 \sqrt{P}$	150 kHz to 80 MHz in ISM bands $d = 1.2 \sqrt{P}$	80 MHz to 800 MHz $d = 1.2 \sqrt{P}$	800 MHz to 2.5 GHz $d = 2.3 \sqrt{P}$
0.01	0.35	0.12	0.12	0.23
0.1	1.1	0.38	0.38	0.73
1	3.5	1.2	1.2	2.3
10	11	3.8	3.8	7.3
100	35	12	12	23

At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

The ISM (industrial, scientific and medical) bands between 150 kHz and 80 MHz are 6.765 MHz to 6.795 MHz; 13.553 MHz to 13.567 MHz; 26.957 MHz to 27.283 MHz; AND 40.66 MHz to 40.70 MHz.

NOTE:









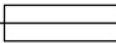

An additional factor of 10/3 has been incorporated into the formulae used in calculating the recommended separation distance for transmitters in the ISM frequency bands between 150 kHz and 80 MHz and in the frequency range 80 MHz to 2.5 GHz to decrease the likelihood that mobile/portable communication equipment could cause interference if it is inadvertently brought into patient areas.

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

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

Safety Symbols

TABLE 11: Safety Symbols

Symbol	Location	Description
	Back panel	Caution. Indicates that the user should refer to the instruction manual for additional caution and warning statements.
	Right front panel	System error status. A red light below the symbol indicates an error condition.
	Interior	Indicates presence of dangerous voltages within the device.
	Right front panel.	Off when reader power is off. Steadily illuminated when T210 reader is on and ready for use.
	Right front panel.	Off when system is idle. Steadily illuminated amber while the imaging plate is being read or erased. Blinking amber when the system is otherwise busy.
	Back Panel Lower Left	ON position for AC power.
	Back Panel Lower Left	OFF position for AC power.
	Interior	Indicates protective earth ground terminal.
	Back Panel	Indicates fuse.
	Back Panel	Indicates alternating current (AC).