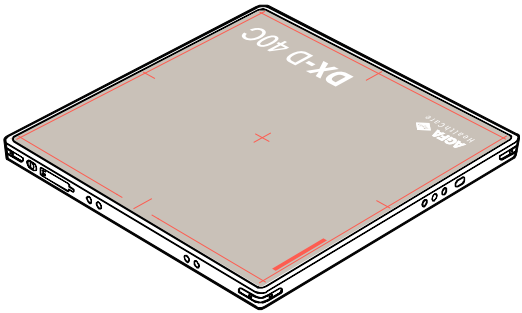
DX-D 40C, DX-D 40G

6007/100

6007/200

User Manual



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AGFA

Contents

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Agfa NV, Septestraat 27, B-2640 Mortsel - Belgium

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Published by Agfa NV

B-2640 Mortsel - Belgium.

Introduction to this Manual

Topics:

Scope

This manual contains information for the safe and effective operation of the DX-D 40C and DX-D 40G wireless DR Detectors and peripheral equipment, further referred to as the DR Detector.

About the safety notices in this document

The following samples show how warnings, cautions, instructions and notes appear in this document. The text explains their intended use.

DANGER:
A danger safety notice indicates a hazardous situation of direct, immediate danger for a potential serious injury to a user, engineer, patient or any other person.

WARNING:
A warning safety notice indicates a hazardous situation which can lead to a potential serious injury to a user, engineer, patient or any other person.

CAUTION:
A caution safety notice indicates a hazardous situation which can lead to a potential minor injury to a user, engineer, patient or any other person.

An instruction is a direction which, if it is not followed, can cause damage to the equipment described in this manual or any other equipment or goods and can cause environmental pollution.

A prohibition is a direction which, if it is not followed, can cause damage to the equipment described in this manual or any other equipment or goods and can cause environmental pollution.

Note: *Notes provide advice and highlight unusual points. A note is not intended as an instruction.*

Disclaimer

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Every care has been taken to ensure the accuracy of the information in this document. However, Agfa assumes no responsibility or liability for errors, inaccuracies or omissions that may appear in this document. To improve reliability, function or design Agfa reserves the right to change the product without further notice. This manual is provided without warranty of any kind, implied or expressed, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

Note: *In the United States, Federal law restricts this device to sale by or on the order of a physician.*

Introduction to the DR Detector

Topics:

Intended Use

The DR Detector is a wired and wireless radiographic digital X-ray imaging device commonly referred to as flat panel detector. It is designed for all general radiography applications. The DR Detector will be used in a radiological environment by qualified staff to capture the X-ray images and send these images to the imaging processing software.

The DR Detector is not intended for mammography applications.

Indications for Use

The DR Retrofit solution is indicated for use in general projection radiographic applications to capture for display diagnostic quality radiographic images of human anatomy. The DR Retrofit solution may be used wherever conventional screen-film systems may be used.

The DR Retrofit solution is not indicated for use in mammography.

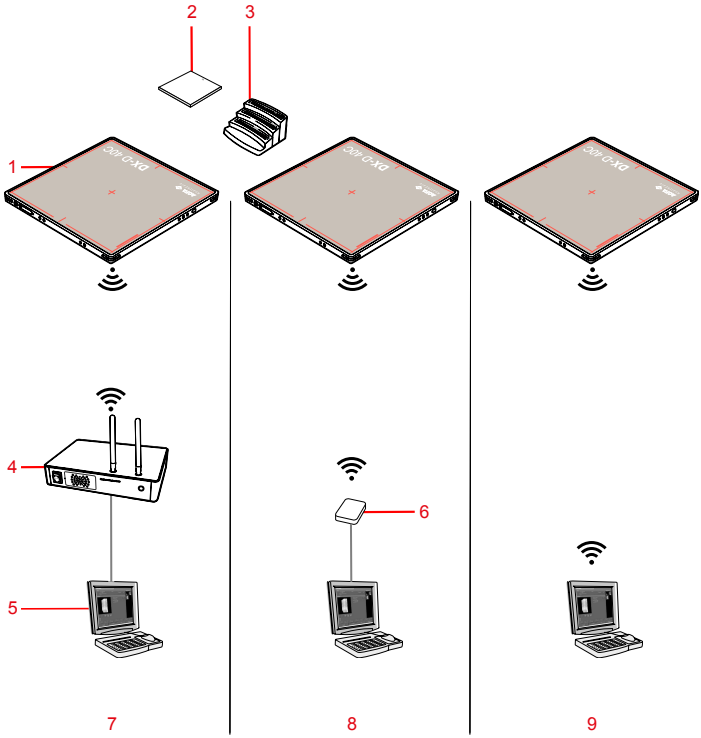
Intended User

This manual is written for trained users of Agfa products. Users are considered as the persons who actually handle the equipment as well as the persons having authority over the equipment. Before attempting to work with this equipment, the user must read, understand, note and strictly observe all warnings, cautions and safety markings on the equipment.

Only a physician or a legally certified operator should use this product.

Configuration

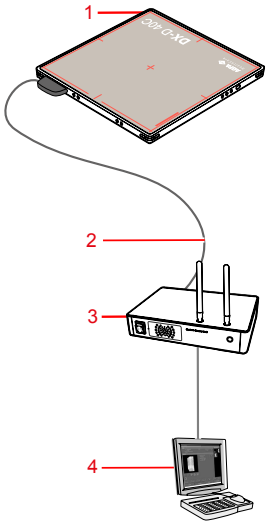
The DR Detector is a component that can be integrated in an X-ray system and that communicates to a workstation. Multiple DR Detectors can communicate to a single workstation. A DR Detector can be shared between multiple workstations.



1. DR Detector
2. DR Detector battery
3. DR Detector battery charger
4. System Control Unit (including a wireless access point)
5. Workstation
6. Wireless access point
7. Communication via System Control Unit
8. Communication via wireless access point
9. Communication via internal wireless adapter

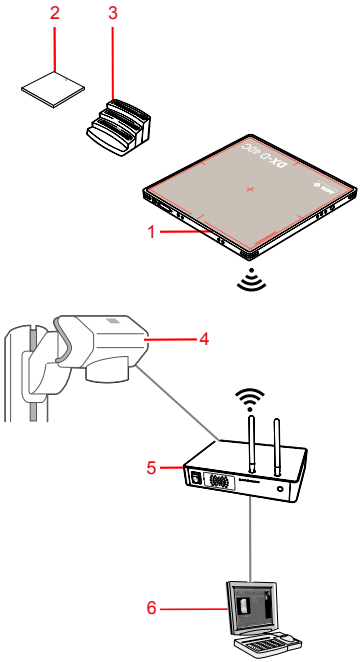
Figure 1: DR Detector configuration (wireless)

A DR Detector cannot be configured to communicate to more than one workstation via the internal wireless adapter of the workstation.



1. DR Detector
2. DR Detector connector cable (wired configuration)
3. System Control Unit
4. Workstation

Figure 2: DR Detector configuration (wired)



1. DR Detector
2. DR Detector battery
3. DR Detector battery charger
4. X-ray generator
5. System Control Unit (including a wireless access point)
6. Workstation

Figure 3: DR Detector configuration with X-ray generator synchronization

Related Links

Automatic exposure detection on page 86

Registering the DR Detector on another NX Workstation on page 92

Using the Windows wifi settings to switch between the wireless DR detector and the wireless hospital network on page 94

Equipment Classification

Per EN/IEC60601-1, Medical Electrical Equipment, General Requirements for Safety, the DR Detector, including the battery pack, is classified as following.

Type of protection agains electrical shock	Internally powered (wireless configuration) Class I equipment (wired configuration)
Type B equipment	A Type B piece of equipment is one that provides a particular degree of protection against electric shock particularly regarding allowable leakage current and reliability of the protective earth protection.
Water ingress	IPX3 This device is protected against spraying water.
Flammable anesthetics	This device is not suitable for use in the presence of a flammable anesthetic mixture with air, or in presence of a flammable anesthetic mixture with oxygen or nitrous oxide.
Operation	Continuous operation.
Applied Parts	The DR Detector tube side is an applied part.
Expected service life	Up to seven (7) years (if regularly serviced and maintained according to Agfa instructions)

Non-medical equipment

Following components are classified as non-medical equipment:

- DR Detector battery charger
- System Control Unit
- Workstation

Options and Accessories

- DR Detector battery
- DR Detector battery charger
- Handle with screws
- Click-on grid

The delivery contains a set of labels. When using multiple DR Detector, on the labels a nickname is written to identify the DR Detector. An identical label is attached to the bucky of the X-ray system to identify the dedicated workspace of each DR Detector.

Topics:

Anti-scatter grids

Anti-scatter grids are used to reduce scattered radiation and improve image quality. Grids are available as an option.

Refer to the Agfa website for specifications on the anti-scatter grids that have been found compatible with the system and the DR Detectors.

http://www.agfahealthcare.com/global/en/library/overview.jsp?ID=54332498

DR Detector cable

The DR Detector cable connects the DR Detector to the System Control Unit.

The DR Detector cable can be used for two different functions. Which of two functions is enabled, is selected at installation. Both functions cannot be enabled on the same detector.

1. The DR Detector is configured for wireless operation. The cable is used for registering a shared DR Detector on another NX workstation.
2. The DR Detector is configured for wired operation. The cable is used to power the DR Detector and to transmit image data.

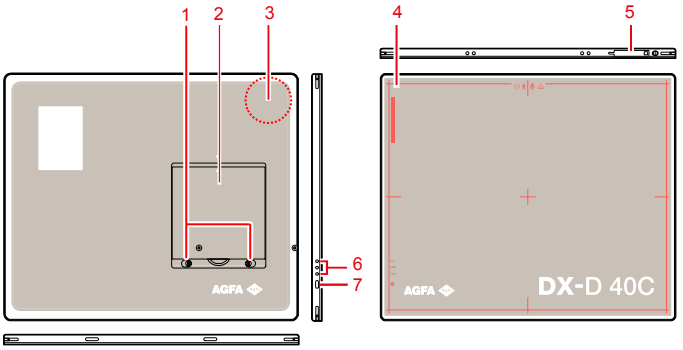
Related Links

Registering the DR Detector on another NX Workstation on page 92
Charging the battery using the DR detector cable on page 91

Operation Controls

Topics:

DX-D 40C, DX-D 40G



1. DR Detector battery lock lever

   Unlock the battery.
2. DR Detector battery

   Supplies power to the detector during wireless communication.
3. Antenna of the wireless network adapter

   Operation in wireless configuration.
4. Effective imaging area border and center position indication
5. DR Detector connector

   Operation in wired configuration.
6. Status indicators

   - Blue indicator shows data communication status.
   - Orange indicator shows if the detector is ready.
   - Green indicator shows power on/off status of the detector.
7. On/off switch

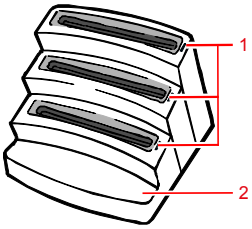
Figure 4: DR Detector operation controls

Related Links

Detector Status Indicators on page 90
DX-D 40C, DX-D 40G on page 104

DR Detector Battery Charger

The battery charger has three slots to insert a battery.



1. Battery status indicator light
   - Orange to indicate that the battery is charging.
   - Green to indicate that the battery is fully charged.
2. Power status indicator light

Figure 5: DR Detector Battery Charger

WARNING:
Do not use the battery charger within the patient's vicinity.

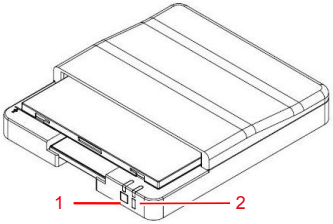
Related Links

Charging a battery on page 91
DX-D 40C, DX-D 40G Battery Charger on page 107
DX-D 40C, DX-D 40G Battery on page 106
Safety directions for the power supply on page 68

DR Detector Dual Battery Charger

The dus battery charger is available depending on the configuration of the system.

The battery charger has two slots to insert two different battery models.



1. Battery status indicator light of FXRB-01A battery
2. Battery status indicator light of FXRB-03A battery

- Orange to indicate that the battery is charging.
- Green to indicate that the battery is fully charged.

Figure 6: DR Detector Battery Charger

WARNING:
Do not use the battery charger within the patient's vicinity.

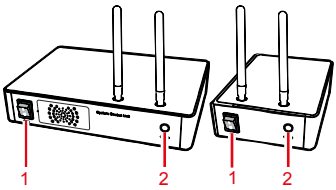
System Control Unit

The System Control Unit is connected to the DR Detector via wireless network or via the DR Detector cable.

The System Control Unit is connected to the X-ray generator to synchronize the exposure, in a configuration with X-ray generator synchronization.

The System Control Unit is connected to the workstation via wired network.

Depending on the configuration, the System Control Unit may not be part of the system.



1. Power switch
2. Status indicator
   - Blinking green: starting up
   - Green: ready
   - Blue: communicating to the detector

Figure 7: System Control Unit (SCU) and Mini System Control Unit (Mini SCU)

WARNING:
Do not use the System Control Unit within the patient's vicinity.

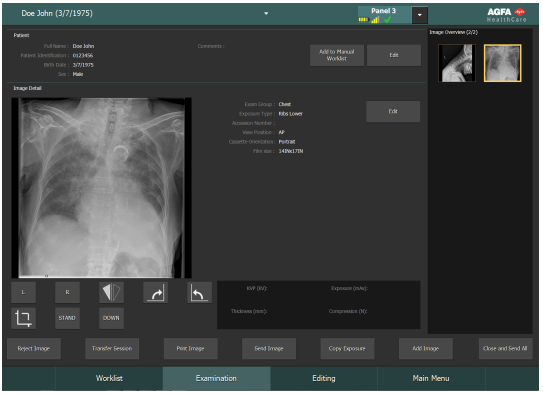
Related Links

System Control Unit on page 109
Mini System Control Unit on page 110
Safety directions for the power supply on page 68

DR Detector Switch on the NX Workstation

The DR Detector Switch is available in the title bar of the NX application. The DR Detector Switch shows which DR Detector is active and shows its status. The DR Detector Switch can be used to activate another DR Detector.

It is positioned in the title bar of the NX application.



Battery status icon					(empty)
Meaning	Full	Medium	Low	Empty	Wired DR Detector Wireless DR Detector is off or disconnected

Connection status icon (wi-fi/wired)					(empty)
Meaning	Good	Low	Bad	Wired DR Detector	DR Detector is off or disconnected

DR Detector status icon		 (blinking)		(empty)

Meaning	DR Detector is ready for exposure	DR Detector is initializing for exposure	DR Detector is off or disconnected or in error	DR Detector is inactive (no thumbnail selected)

DR Detector exposure synchronization

Automatic exposure detection icon	**A**	(empty)
Meaning	The active DR Detector is using automatic exposure detection	The active DR Detector is using X-ray generator synchronization

Note: Depending on the installed software version, the icon may not be displayed.

System Documentation

The documentation consists of a User manual (this document) and related documentation:

- NX User Manual (4420).
- NX Key User Manual (4421).
- NX Getting Started Sheets (4424).
- NX Problem Solving Sheets (4425).
- DX-D DR Detector Calibration Key User Manual (0134).
- DX-D System User Documentation (if applicable).

The documentation shall be kept with the system for easy reference.

The most extensive configuration is described within this manual, including the maximum number of options and accessories. Not every function, option or accessory described may have been purchased or licensed on a particular piece of equipment.

Technical documentation is available in the product service documentation which is available from your local support organization.

The most recent version of this document is available on *http://www.agfahealthcare.com/global/en/library/index.jsp*

Wireless access point

The wireless access point is delivered with its own user documentation.

Training

The user must have received adequate training on the safe and effective use of the system before attempting to work with it. Training requirements may vary from country to country. The user must make sure that training is received in accordance with local laws or regulations that have the force of law. Your local Agfa or dealer representative can provide further information on training.

The user must note the following information in the system documentation:

- Intended Use.
- Intended User.
- Safety Directions.

Product Complaints

Any health care professional (for example a customer or a user) who has any complaints or has experienced any dissatisfaction with the quality, durability, reliability, safety, effectiveness, or performance of this product must notify Agfa.

If the device malfunctions and may have caused or contributed to a serious injury, Agfa must be notified immediately by telephone, fax or written correspondence to the following address:

Agfa Service Support - local support addresses and phone numbers are listed on www.agfa.com

Agfa - Septestraat 27, 2640 Mortsel, Belgium

Agfa - Fax +32 3 444 7094

Compatibility

The system must only be used in combination with other equipment or components if these are expressly recognized by Agfa as compatible. A list of such equipment and components is available from Agfa service on request.

Changes or additions to the equipment must only be carried out by persons authorized to do so by Agfa. Such changes must comply with best engineering practice and all applicable laws and regulations that have the force of law within the jurisdiction of the hospital.

Compliance

Topics:

General

- The product has been designed in accordance with the MEDDEV Guidelines relating to the application of Medical Devices and have been tested as part of the conformity assessment procedures required by 93/42/EEC Medical Device Directive (European Council Directive 93/42/EEC on Medical Devices).
- ISO 13485
- ISO 14971

Safety

- EN 60601-1
- IEC 60601-1
- UL 60601-1
- CAN.CSA-C22.2 No. 601.1

Electromagnetic Compatibility

- IEC 60601-1-2

Radio Frequency

Declaration of conformity

U.S.A.	FCC Part 15.107(b) / Part 15.109(b) FCC Part 15 Subpart E 15.407 FCC Part 15 Subpart C 15.247
European Union (and EEA)	ETSI EN 301 489-1 V1.8.1 (EMC) ETSI EN 301 489-17 V2.1.1 (EMC) EN 300 328 V1.7.1 EN 301 893 V1.6.1 (RF) EN 62311:2008 (RF Exposure) ETSI EN 300 328 V1.7.1 EN 301 893 V1.5.1 (Radio Spectrum)
South Korea	Clause 3, Article 58-2 of Radio Waves Act Clause 2, Article 58-2 of Radio Waves Act
Japan	Article 2-1-19, 2-1-19-3, 2-1-19-3-2 of the Radio law (MIC)

Related Links

Remarks for HF-emission and immunity on page 111

Topics:

Local regulations

This product complies with local radio frequency regulations in the country or region where you purchased the product. Note that it cannot be used in any areas other than the country or region of its purchase.

The radio frequency channel (5 GHz) configured for indoor use may not be usable in outdoor areas, depending on local radio frequency regulations.

If you would like to add other equipment to the environment where this product is installed, or to use this product in other environments, please consult your sales representative or local dealer for details.

Restrictions on outdoor use

There are restrictions on the outdoor use of the U-NII Low (5150-5250 MHz) and U-NII Mid (5250-5350 MHz) bandwidths of the WLAN module

incorporated in the device in the following Member States: Belgium (BE), Bulgaria (BG), Czech Republic (CZ), Denmark (DK), Germany (DE), Estonia (EE), Ireland (IE), Greece (EL), Spain (ES), France (FR), Croatia (HR), Italy (IT), Cyprus (CY), Latvia (LV), Lithuania (LT), Luxembourg (LU), Hungary (HU), Malta (MT), Netherlands (NL), Austria (AT), Poland (PL), Portugal (PT), Romania (RO), Slovenia (SI), Slovakia (SK), Finland (FI), Sweden (SE) and United Kingdom (UK).

Specific absorption rate (SAR)

WARNING:
The SAR limit set by FCC is 2W/kg (for EU and Japan) and 1.6W/kg (for USA and Korea). This equipment complies with FCC&CE SAR regulation. The front side of a detector should be used for image acquisition.

- OET Bulletin 65, Supplement C (edition 01-01)
- EN 62311:2008
- EN 62209-1:2006
- EN 62209-2:2010

Connectivity

Topics:

Wireless Communication

Wireless communication is established between the internal wireless module of the DR Detector and the NX workstation via the wireless access point. The DR Detector is compliant with IEEE 802.11n (2.4 GHz/5 GHz). The available frequency band varies depending on local radio laws and system requirements. The frequency band (channel) of the DR Detector is selected at installation.

Note: *Use of multiple pieces of equipment that use the same frequency band (channel) may interfere with each wireless communication and cause a decline in transmission speed.*

Note: *Before introducing other wireless equipment to the same environment where the DR Detector is set up, consult the system engineer or qualified personnel at the medical site.*

Note: *Do not place obstacles in the way of the wireless access point or of the antenna of the internal wireless module of the DR Detector. Otherwise, the properties of wireless communication, such as the throughput and operable distance, may decrease.*

Note: *Transmitting the image data to the NX workstation takes a number of seconds. After making an exposure, stay with the detector in the direct neighbourhood of the wireless access point until the image is available on the NX workstation.*

Wireless communication in the bucky

In a configuration using communication via the internal wireless adapter of the workstation, the properties of wireless communication, such as the throughput and operable distance, may decrease if the DR Detector is in the bucky.

For applications using the bucky, it is strongly recommended to install an external access point.

Wired communication

The use of accessories and cables other than those specified or sold by the manufacturer as replacement parts, may result in increased radiation emissions or decreased stability of the equipment.

Accessory equipment connected to the analog and digital interfaces must be certified according to the respective IEC standards. All combinations of equipment must be in compliance with IEC 60601-1-1 system requirements.

Any person who connects additional equipment to the signal input or signal output ports, configures a medical system and is therefore responsible for ensuring that the system complies with the requirements of the system standard IEC 60601-1.

Installation

Installation and configuration is performed by an Agfa trained and authorized service engineer. Contact your local support organization for more information.

On a configuration with multiple DR Detectors of the same type, it is required to apply labeling to the DR Detector containing a unique nickname for each DR Detector. The nicknames must be configured on the NX Workstation. The DR Detector Switch shows which DR Detector is active and shows its status, by means of the nickname of the DR Detector.

An identical label is attached to the bucky of the X-ray system to identify the dedicated workspace of each DR Detector.

Environment of Use

The equipment is mainly for use in X-ray exposure rooms, hospital wards and mobile medical examination vehicles. To use it in other places, consult your sales representative or local Agfa dealer.

WARNING:
Do not install or store the equipment in any of the locations listed below. Doing so may result in failure or malfunction, equipment falling, or fire or injury:

- **Close to facilities where water is used**
- **Where it will be exposed to direct sunlight**
- **Close to the air outlet of an air-conditioner or ventilation equipment**
- **Close to a heat source such as a heater**
- **In a dusty environment**
- **In a saline or sulfurous environment**
- **Where temperature or humidity is high**
- **Where there is freezing or condensation**
- **In areas prone to vibration**
- **On an incline or in an unstable area**

Note: *Do not use the detector near devices generating a strong magnetic field. Doing so may produce image noise or artifacts.*

Note: *Do not use this equipment in combination with peripherals such as defibrillators or large electric motors as these may cause power-supply noise or power supply voltage variations. Doing so may prevent normal operation of this equipment and peripherals.*

Note: *This product may malfunction due to electromagnetic waves caused by portable personal telephones, transceivers, radio-controlled toys, etc. Be sure to avoid having objects such as these, which affect this product, brought near the product.*

CAUTION:
Sudden heating of the room in cold areas will cause condensation to form on the equipment. In this case, wait until the condensation evaporates before use. If the equipment is used while condensation is formed on it, problems may occur. When an air-conditioner is used, be sure to raise/lower the temperature gradually so that a difference in temperature in the room and in the equipment does not occur, to prevent condensation.

WARNING:
Do not use non-medical equipment in the patient's vicinity.

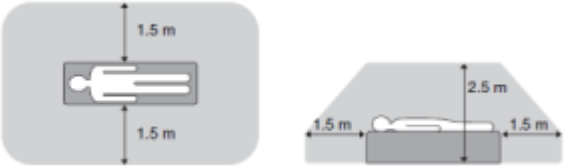


Figure 8: Patient's vicinity

Related Links

DR Detector Battery Charger on page 21
System Control Unit on page 23
DR Detector Switch on the NX Workstation on page 24

Messages

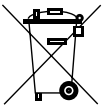
Under certain conditions the DR Detector shows a dialog box containing a message in the middle of the screen of the NX workstation. This message informs the user that either a problem has occurred or that a requested action cannot be performed. The user must read these messages carefully. They will provide information on what to do from then on. This will be either performing an action to resolve the problem or to contact the local service organization. Details on the contents of messages can be found in the service documentation which is available to local service personnel.

Related Links

Problem solving on page 96
Detector Status Indicators on page 90

Labels

Symbol	Explanation
	On (power: connection to the mains)
	On (power: connection to the mains) for part of the equipment
	Off (power: disconnection from the mains)
	Off (power: disconnection from the mains) for part of the equipment
	Tube side
	Direct current
	Alternating current
	Protective earth (ground)
	Equipotential connector: Provides a connection between the equipment and the potential bus bar of the electrical system as found in medical environments. It is recommended to use the equipotential connection as additional safety measure.
	This mark indicates that this is a Type B Equipment
	Handle with care
	Maximum patient weight over the whole area of the detector surface
	Device contains a transmitter module that generates non-ionizing radiation.

Symbol	Explanation
	Manufacturer
	Date of manufacture
	Serial number
	This mark shows compliance of the equipment with Directive 93/42/EEC (for European Union).
	This mark shows compliance with both Canadian and U.S. safety requirements. With respect to electric shock, fire, and mechanical hazards only.
	This symbol on the products, and/or accompanying documents means that used electrical and electronic products should not be treated as, or mixed with general household waste.
	This wheeled bin symbol on the products, and/or accompanying documents means that the used batteries should not be treated as, or mixed with general household waste.
	Medicine that can only be given by a prescription from a doctor or a doctor's recommendation to use a certain medicine. (for U.S.A. only)
	Read and understand all instructions and warning labels in the product documentation before using the equipment. Keep manual for future reference.
	Safety warning, indicating that the manuals should be consulted.
	General warning, caution, risk of danger.

Symbol	Explanation
	Dangerous voltage
	General Mandatory action.

Topics:

- *Additional Labeling of the DR Detector*
- *Additional Labeling of the DR Detector battery*
- *Additional Labeling of the DR Detector battery charger*
- *Additional Labeling of the System Control Unit*
- *Additional Labeling of the Mini System Control Unit*
- *Consulting the About box*

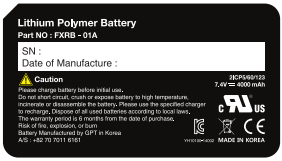
Additional Labeling of the DR Detector

	Type label on the back side of the DR Detector.

DR Detector identification label

Label	Meaning
	Writable label to identify and dedicate a DR Detector to an X-ray system bucky.

Additional Labeling of the DR Detector battery

	Type label on the back side of the battery.

Additional Labeling of the DR Detector battery charger

Type label on the bottom side of the battery charger.

Additional Labeling of the System Control Unit

Type label on the bottom side of the System Control Unit.

Additional Labeling of the Mini System Control Unit

Type label on the bottom side of the Mini System Control Unit.

Consulting the About box

1. Click **About the solution** in the Tools section of the Main Menu window on the NX workstation.

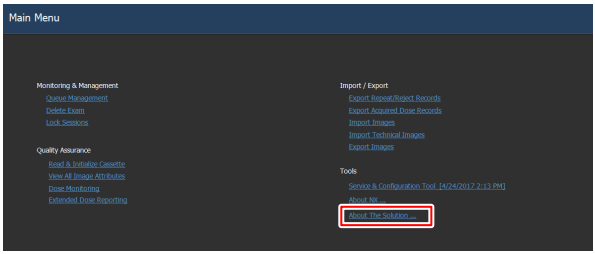


Figure 9: Main Menu window.

This will open the About box showing the current release and version details of the DR Retrofit solution and the XRDI software.

Figure 10: DR Retrofit About box (Displayed data may be different).

Note: *Always quote these details when you discuss any issues with Agfa service personnel.*

2. Click on the dialog to close it.

Cleaning and Disinfecting

All appropriate policies and procedures should be followed to avoid contamination of the staff, patients and equipment. All existing universal precautions should be extended to avoid potential contaminations and to avoid patients coming into (close) contact with the device. The user is responsible for selecting a disinfection procedure.

Topics:

Cleaning

To clean the exterior of the equipment:

1. Stop the system

WARNING:
When the equipment is going to be cleaned, be sure to turn OFF the power of each device, and to unplug the power cord from the AC outlet. Never use anhydrous or high solvency alcohols, benzine, thinner or any other flammable cleaning agent. Otherwise, it may result in fire or electric shock.

2. Wipe the exterior of the system with a cloth slightly moistened with a neutral detergent. Some approved disinfectants can be used for cleaning as well.

CAUTION:
Make sure no liquid gets in the device.

CAUTION:
Clean the equipment with only a little moisture. Do not spray disinfectants or detergents directly on the equipment. Do not pour liquid directly on the equipment.

CAUTION:
Liquids ingressing the DR Detector or the battery may cause malfunction and contamination. Take special care near the battery bay and near the cable connector on the side of the DR Detector.

CAUTION:
Do not use abrasive brush and scraper to clean the product.

Note: Do not open the equipment for cleaning. No components inside the device require cleaning by the user.

3. Start up the system.

Related Links

Approved disinfectants on page 52

Use of protective plastic bag

WARNING:
Liquids ingressing the DR Detector may cause malfunction and contamination.

If there is a chance that the detector comes in contact with liquids (bodily fluids, disinfectants,...), the DR Detector must be wrapped in a protective plastic bag while performing the examination.

It is considered good clinical practice to use a single-use protective bag in all cases where contact of the device or contaminants is expected, to avoid contamination of others.

Make sure that the plastic bag is not wrinkled to avoid the creases showing in the image.

Disinfecting

To disinfect the device, use only disinfectants and disinfection methods that are approved by Agfa and that correspond to the national regulation and guidelines as well as explosion protection. If you plan to use other disinfectants, approval of Agfa is needed before use, as most disinfectants can damage the device. UV disinfection is also not allowed.

Perform the procedure following the instructions for use, the disposal instructions and the safety instructions of the selected disinfectants and tools and of the hospital.

Approved disinfectants

Refer to the Agfa website for specifications on the disinfectants that have been found compatible with the cover material of the device and can be used on the outer surface of the device.

http://www.agfahealthcare.com/global/en/library/overview.jsp?ID=41651138

Safety directions for disinfection

WARNING:
When the equipment is going to be cleaned, be sure to turn OFF the power of each device, and to unplug the power cord from the AC outlet. Otherwise, it may result in fire or electric shock.

WARNING:
Do not pour liquid directly on the equipment. Always use a clean, low-linting cloth dampened (not dripping) with the solution.

WARNING:
Use in well-ventilated areas.

WARNING:
Do follow the instructions of use as provided with the cleaning or disinfection product.

WARNING:
Consult the manufacturer's Material Safety Data Sheets (MSDS) and recommendations on the product label for additional information prior to use.

CAUTION:
Clean the equipment with only a little moisture. Do not spray disinfectants or detergents directly on the equipment. Do not pour liquid directly on the equipment.

CAUTION:
Be sure that all surfaces are thoroughly dry before returning the equipment to use.

CAUTION:
Make sure that the equipment is properly decontaminated and disinfected before shipment or servicing.

Maintenance

Always consult the Agfa Service documentation and an Agfa trained and authorized service engineer for complete maintenance schedules.

In order to ensure that the equipment is used safely and normally, be sure to inspect the equipment before use. If any problem is found during the inspection and cannot be corrected, please contact your sales representative or local dealer.

Topics:

Daily inspection

WARNING:
For safety reasons, be sure to turn OFF the power to each piece of equipment before performing the following. Otherwise, an electric shock may result.

Detector

1. Ensure that cables are not damaged and cable jackets are not torn.
2. Ensure that the power cord plugs are securely connected to both the equipment AC inlet and the AC outlet.

Cable

3. Ensure that there are no loose screws or breaks.
4. Ensure that there is no dust or foreign matter on the battery bay connector.
5. Ensure that there are no breaks or short-circuits in the battery bay connector.

Turn on the power. Start the NX workstation and perform a test exposure.

Half-yearly inspection

To indicate when the half-yearly calibration is due, a message is displayed on the NX workstation.

Perform calibration half-yearly or when exposure conditions have changed significantly. For details, refer to the DX-D DR Detector Calibration Key User Manual (0134).

Regular Inspection and Maintenance

In order to ensure the safety of patients, operating personnel and third parties, and to maintain the performance and reliability of the equipment, be sure to perform regular inspection at least once a year. Clean up the equipment, make adjustments, or replace consumables. There may be cases where overhaul is recommended depending on the conditions. Contact your sales representative or local dealer for regular inspections or maintenance.

CAUTION:
Clean the plug of the power cord periodically by unplugging it from the AC outlet and removing dust or dirt from the plug, its periphery and AC outlet with a dry cloth. If the cord is kept plugged in for a long time in a dusty, humid or sooty place, dust around the plug will attract moisture. This could cause insulation failure resulting in a fire.

CAUTION:
Do not perform maintenance and inspection while the equipment is used for a patient.

Replacement Parts Support

Parts required to maintain the functioning of the product will be stocked for seven years after discontinuance of production, to allow for repair.

Repair

The product can only be repaired in the factory.

Patient data security

The user must ensure that the patients' legal requirements are met and that the security of the patient data is guarded.

The user must define who can access patient data in which situations.

The user must have a strategy available on what to do with patient data in case of a disaster.

Environmental Protection

Disposal of this product in an unlawful manner may have a negative impact on health and on the environment. Therefore, when disposing of this product, be absolutely sure to follow the procedure which is in conformity with the laws and regulations applicable in your area.

Figure 11: WEEE end user information

The directive on Waste Electrical and Electronic Equipment (WEEE Directive 2012/19/EU) aims to prevent the generation of electric and electronic waste and to promote the reuse, recycling and other forms of recovery. It therefore requires the collection of WEEE, recovery and reuse or recycling.

Due to the implementation into national law, specific requirements can be different within the European Member States.

This symbol on the products, and/or accompanying documents means that used electrical and electronic products should not be treated as, or mixed with general household waste

For more detailed information about take-back and recycling of this product please contact your local Agfa service organization and/or Agfa dealer. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. The recycling of materials will help to conserve natural resources.

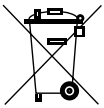


Figure 12: Battery Notice

This wheeled bin symbol on the products, and/or accompanying documents means that the used batteries should not be treated as, or mixed with general household waste.

This wheeled bin symbol on batteries or its packaging may be used in combination with a chemical symbol. In cases where a chemical symbol is available it indicates the presence of respective chemical substances. If your equipment or replaced spare parts contain batteries or accumulators please dispose of them separately according to local regulations.

For battery replacements please contact your local sales organization.

Safety Directions

WARNING:
Safety is only guaranteed when an Agfa certified field service engineer has installed the product.

WARNING:
Improper changes, additions, maintenance or repair of the system can lead to personal injury, electrical shock and damage to the equipment. Safety is only guaranteed when changes, additions, maintenance or repairs are carried out by an Agfa certified field service engineer. A non certified engineer performing a modification or service intervention on a medical device, acts on his own responsibility and makes the warranty void.

WARNING:
Do not use or store the equipment near flammable chemicals such as alcohol, thinner, benzine, etc. If chemicals are spilled or evaporate, it may result in fire or electric shock through contact with electric parts inside the equipment. Also, some disinfectants are flammable. Take care when using them.

WARNING:
Do not connect the equipment with anything other than specified. Doing so may result in fire or electric shock.

WARNING:
Never disassemble or modify the equipment. Doing so may result in fire or electric shock. Also, since the equipment incorporates parts that may cause electric shock as well as other hazardous parts, touching them may cause death or serious injury.

WARNING:
Never modify the cables. Doing so may damage them and result in fire or electric shock.

WARNING:
Never remove or modify files on the workstation that are associated to the equipment software. Only use the tools provided with the product.

WARNING:
Do not place anything on top of the equipment. The object may fall and cause an injury. Also, if metal objects such as needles,

staples or clips fall into the equipment, or if liquid is spilled, it may result in fire or electric shock.

WARNING:
Do not hit or drop the equipment. The equipment may be damaged if it receives a strong jolt, which may result in fire or electric shock if the equipment is used without being repaired.

WARNING:
If an X-ray image is taken while the patient is moving, the quality of the image may be affected. Make sure that the patient maintains a fixed posture as much as possible.

WARNING:
To avoid electric shocks and burns caused by use of the wrong type of fire extinguisher, make sure that the fire extinguisher at the site has been approved for use on electrical fires.

CAUTION:
Strictly observe all warnings, cautions, notes and safety markings within this document and on the product.

CAUTION:
All Agfa medical products must be used by trained and qualified personnel.

CAUTION:
This device is not intended to supply heat to a patient. However, during normal use, surfaces will become heated due to power dissipation. Patient contact surfaces will not exceed 48 °C under normal useconditions. The operator should monitor and evaluate how much of the patient's body area is in contact with these surfaces and for how long.

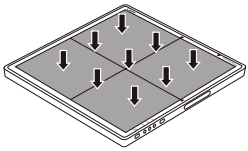
CAUTION:
Excessive ambient temperature may impact performance of DR Detectors and cause permanent damage to the equipment. If ambient temperature and humidity is outside the range of 10 - 35 °C and 30 - 85% RH, do not operate the system or use air conditioning. Warranty will be void if it is obvious that operating conditions are not met.

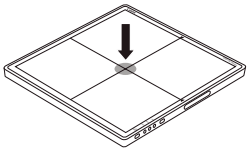
CAUTION:
Turn OFF the power to each piece of equipment for safety when not being used.

CAUTION:
Handle the equipment carefully. Do not submerge the equipment in water. The internal image sensor may be damaged if something hits against it, or if it is dropped, or receives a strong jolt.

CAUTION:

Do not place excessive weight on the detector. Avoid the whole weight of the patient body to rest on the detector. Otherwise, the internal image sensor may be damaged. Load limit - Uniform load: 150 kg over the whole area of the detector surface. Load limit - Local load: 100 kg on an area 40 mm in diameter.





CAUTION:
Be sure to use the detector on a flat and rigid surface so it will not bend. Otherwise, the internal image sensor may be damaged. Be sure to securely hold the detector while using it in upright positions. Otherwise, the detector may fall over, resulting in injury to the user or patient, or may flip over, resulting in damage to the inner device.

CAUTION:

If a malfunction occurs, do not use this device until qualified personnel correct the problem.

Should any of the following occur, immediately turn OFF the power to each piece of equipment, unplug the power cord from the AC outlet, and contact your sales representative or local dealer:

- When there is smoke, an odd smell or abnormal sound
- When liquid has been spilled into the equipment or a metal object has entered through an opening
- When the equipment has been dropped and is damaged

CAUTION:
Observe great care when handling the DR Detector. The detector is shock sensitive and drops should be avoided. Warranty will be void if it is obvious that operating conditions are not met.

If the DR Detector has been dropped:

1. *Visually check the DR Detector for deformations.*

2. *Perform a calibration of the DR Detector. For instructions, refer to the DX-D DR Detector Calibration Key User Manual (document 0134).*
3. *Perform a flat field exposure and check the image for visible artifacts. Typical flat field exposure settings are 75 kV, 10 µGy, large focus and using 1.5 mm Cu filter without grid.*

CAUTION:
Damaged grid. Reduced image quality. Please handle the grids with special care.

Topics:

DR Detector Battery

Safety Directions

WARNING:

Do not use any charger other than that specifically provided for use with the equipment.

The battery is used with the DR Detector. Do not use them in other combinations.

Use only a power adapter complying with IEC 60601-1 or IEC 60950-1.

Make sure to turn off the detector before detaching a battery pack.

When the detector is not to be used for some time, remove the battery pack. Otherwise, over discharge may occur resulting in the shortened battery life.

Securely plug the power cord of the charger into the AC outlet. If contact failure occurs, or if dust/metal objects come into contact with the exposed metal prongs of the plug, fire or electric shock may result.

Stop charging the battery when the battery charger indicator lights keep indicating that the battery is charging, beyond the specified charging time. Not doing so may result in the battery overheating or smoking or in an explosion or fire.

Always check the remaining amount of the battery pack during use of the detector. If performance of the battery pack has some problems, consult your local Agfa representative.

The battery charger is designed for the dedicated battery pack. Do not use the battery charger other than the dedicated one. Otherwise, a battery explosion or a battery leak may occur, resulting in fire or electrical shock.

Do not operate the battery charger using any type of power supply other than the one indicated on the rating label.

Do not handle the product with wet hands.

Do not attempt to disassemble, alter, or apply heat to the product.

Avoid dropping or subjecting the product to severe impacts. To avoid the risk of injury, do not touch the internal parts of the battery if it has been cracked or otherwise damaged.

Stop using the battery pack immediately if it emits smoke, a strange smell, or otherwise behaves abnormally.

Do not let the battery pack and battery charger come into contact with water or other liquids and do not allow them to get wet.

Do not clean with substances containing organic solvents such as alcohol, benzene, thinner, or other chemicals. Otherwise, fire or electrical shock may result.

Do not allow dirt or metal objects (such as hair pins, clips, staples or keys) to contact the terminals. Otherwise, battery explosion or leakage of electrolyte may occur, resulting in fire, injury or pollution of surrounding area. If the battery leaks and the electrolytes come into contact with your eyes, mouth, skin or clothing, immediately wash it away with running water and seek medical attention.

Do not leave, store, or place the product in a location near heat sources, or in a place subject to direct sunlight, high temperature, high humidity, excessive dust, or mechanical shock. Otherwise, battery leakage, overheating or damage to the product may occur, resulting in electrical shock, burns, injury or fire.

If the battery pack becomes heated or swollen, immediately replace the battery with a new one before using it. Otherwise, overheat, smoke, explosion, or fire may occur.

The Lithium ion/polymer battery is recyclable.

Battery slowly discharges even if not in use. The battery pack may have expired if it discharges immediately after being fully charged. You can purchase an optional battery pack to replace an exhausted one. The battery pack is a consumable item. If a fully charged battery is consumed quickly, use a new and fully charged battery pack.

Be sure to charge the battery periodically (once a year) if it is not used for an extended period of time. The battery pack cannot be charged if it has been over discharged.

Before discarding the battery pack, cover the terminals with adhesive tape or other insulators. Contact with other metal materials may cause fire or explosion.

Safety directions for the power supply

WARNING:
Do not operate the equipment using any type of power supply other than the one indicated on the rating label. Otherwise, it may result in fire or electric shock.

WARNING:
Do not use any power cords other than the one provided with this equipment. Otherwise, it may result in fire or electric shock.

WARNING:
Do not handle the equipment with wet hands. You may experience an electric shock that could result in death or serious injury.

WARNING:
Do not place heavy objects such as medical equipment on cables and cords, or do not pull, bend, bundle or step on them to prevent their sheath from being damaged, and do not alter them neither. Doing so may result in fire or electric shock.

WARNING:
Do not supply power to more than one piece of equipment using the same AC outlet. Doing so may result in fire or electric shock.

WARNING:
Do not connect a multiple portable socket-outlet or extension cord to the system. Doing so may result in a fire or electric shock.

WARNING:
Securely plug the power cord into the AC outlet. If contact failure occurs, or if dust or metal objects come into contact with the exposed metal prongs of the plug, fire or electric shock may result.

WARNING:
Be sure to turn off the power to each piece of equipment before connecting or disconnecting the cords. Otherwise, you may get an electric shock that could result in death or serious injury.

WARNING:
Do not connect the AC or DC power cable to the product with the power applied. Failure to do so may result in damage to the product.

WARNING:
Be sure to hold the plug or connector to unplug the power cord. If you pull the power cord, the core wire may be damaged, resulting in fire or electric shock.

WARNING:
When using the power supply, care must be taken to ensure that there is either a mains plug or an all-cable disconnecting device in the internal installation fitted near the device and that it is easily accessible in case of emergency.

Safety directions for the System Control Unit

WARNING:
Do not block the ventilation ports to prevent overheating. Overheating can cause system malfunction and damages.

WARNING:
Ensure continuous power supply to the system, with voltage and current according to the product specifications. If power failures are frequent, an uninterrupted power supply (UPS) should be installed to avoid loss of data.

CAUTION:
The System Control Unit and the X-ray generator must be grounded to a common protective earth. Always connect the three-core power cord plug to a grounded AC power outlet.

Getting started

Topics:

Starting the DR Detector

CAUTION:
Do not use the battery pack as a power source for equipment other than DX-D 40C or DX-D 40G detectors. Be sure to use only the dedicated battery pack for the DX-D 40C or DX-D 40G detector.

To start the DR Detector:

1. If the DR Detector is connected to the System Control Unit via the DR Detector cable, check if the power cable of the System Control Unit is connected to the mains power.

   The battery is not required to operate the DR Detector. Skip to step 4.
2. Fully charge the battery.

   Charge the battery on the day of examination or on the previous day.

   Note: *The battery slowly discharges even if not in use. The battery pack may have expired if it discharges immediately after being fully charged. You can purchase an optional battery pack to replace an exhausted one.*
3. Attach the battery.

   Note: *Make sure that the lock lever is placed to the (unlock) side.*

   Align the claw on the battery pack and the groove on the battery bay (1). Insert the battery pack fully (2). Push down the battery pack (3). Slide the lock lever toward (lock) side (4) and lock it.

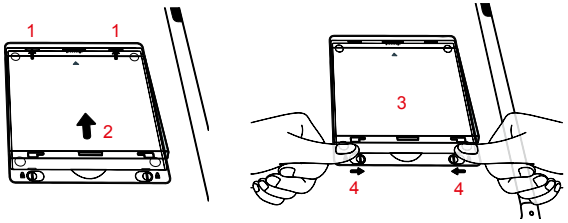


Figure 13: Attach the battery

Note: *Make sure that the battery is securely attached.*

4. Turn on the detector.

   Note: Before operating the detector, start up the NX workstation.

   Press and hold the power button for 1 second.

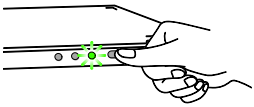


Figure 14: Power button

   After startup the green status indicator is lit, indicating the power status.

5. Turn on the System Control Unit using the power switch.

   The status indicator is green.

   Depending on the configuration, the System Control Unit may not be part of the system.

6. Check the DR Detector Status icon on the DR Detector Switch.

   If the displayed status is error, register the DR Detector to the NX workstation.

   If the DR Detector communicates via the internal wireless adapter of the workstation, switch the NX Workstation to the wireless network of the DR Detector.

The green and orange status indicators on the DR Detector are lit. The DR Detector is ready.

Before exposure make sure to check the equipment daily and confirm that it works properly.

Related Links

Detector Status Indicators on page 90
Registering the DR Detector on another NX Workstation on page 92
Using the Windows wifi settings to switch between the wireless DR detector and the wireless hospital network on page 94
DR detector not ready for exposure on page 98

Basic Workflow DR Detector

Topics:

Step 1: retrieve the patient info

At the NX workstation:

1. When a new patient comes in, define the patient info for the exam.
2. Start the exam.

Step 2: select the exposure

1. At the NX workstation, select the thumbnail for the exposure in the Image Overview pane of the Examination window.

   The selected DR Detector is activated.

   The DR Detector Switch shows the active DR Detector and shows its status.

   - Red (flashing): starting up
   - Green (constant): ready for exposure
2. At the X-ray generator console, select the exposure settings suitable for the exposure.

Step 3: prepare the exposure

In the examination room:

1. Position the DR Detector.

   When using the bucky, check that the identification labels on the DR Detector and on the bucky match. Do not use a DR Detector that is dedicated to another bucky.
2. Position the patient.

   Apply radiation protective measures for the patient if needed.
3. Check if the X-Ray system position is suitable for the exposure.
4. Position the X-Ray tube with respect to the DR Detector and the patient.
5. Set the correct distance between DR Detector and X-Ray tube.
6. Switch on the light on the collimator. Adapt collimation if required.

   Take care that the collimated area is not larger than the detector.

WARNING:
Monitor the patient position (hands, feet, fingers, etc.) with special care to avoid injury to the patient caused by unit movements. Patient hands must be kept away from mobile components of the unit. Intravenous tubing, catheters and other patient connected lines should be routed away from moving equipment.

Step 4: check the exposure settings

On the DR Detector Switch:

1. Check if the DR Detector Switch displays the name of the DR Detector that's being used
2. If a wrong DR Detector is displayed, select the right DR Detector by clicking the drop down arrow on the DR Detector Switch.
3. Check the DR Detector Status icon.

On the X-ray system:

1. Check if the exposure settings displayed on the console are suitable for the exposure.
2. Check if no error messages are displayed on the X-ray system.

Exposure synchronization

Depending on the configuration, the DR Detector synchronizes to the exposure using one of these methods:

- X-ray generator synchronization
- Automatic exposure detection

WARNING:
In a configuration using automatic exposure detection, the X-ray system allows executing an exposure, even if the DR Detector is not ready. Avoid unnecessary dose by checking the status of the DR Detector before exposure. The DR Detector Switch displays the DR Detector status icon.

Related Links

Automatic exposure detection on page 86
DR Detector Switch on the NX Workstation on page 24

Step 5: execute the exposure

Press the exposure button to execute the exposure.

Make sure the generator is ready for exposure before you press the exposure button.

WARNING:
The radiation indicator on the control console lights up during exposure release.

WARNING:
Do not select another thumbnail until the preview image is visible in the active thumbnail.

At the NX workstation:

- The image is acquired from the DR detector and displayed in the thumbnail.
- If collimation is applied, the image is automatically cropped at the collimation borders.

Step 6: perform a quality control

At the NX workstation:

1. Select the image on which quality control is to be performed.
2. Prepare the image for diagnosis by using e.g. L/R markers or annotations.
3. If the image is OK, send the image to a hardcopy printer and/or PACS (Picture Archiving and Communication System).

Connecting the NX workstation to the hospital network

If the DR Detector communicates via the internal wireless adapter of the workstation, switch the NX Workstation to the hospital network to send images to the printer or to the PACS archive.

Related Links

Using the Windows wifi settings to switch between the wireless DR detector and the wireless hospital network on page 94

Positioning the DR Detector

WARNING:
Because the equipment cable is long, take care that cables do not become tangled during use. Also, be careful not to get your feet caught in the cable. It may cause a malfunction of the equipment or injury to the user from tripping over the cable.

When performing an exposure, keep in mind the following detector orientation aids:

- tube side
- patient orientation marker

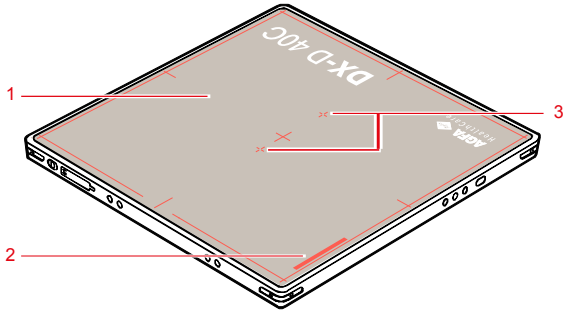


Figure 15: Detector orientation aids

1. Tube side of the detector
2. Location red patient orientation marker
3. Position of the sensors for automatic exposure detection

The detector orientation and the patient orientation are exposure settings on the NX workstation. The detector orientation is displayed on the NX workstation as cassette orientation.

The user is responsible for the correct and clear marking on the left or right side of the image to eliminate possible errors.

Below some examples to illustrate the importance of the detector orientation marker.

Table 1: Skull AP portrait

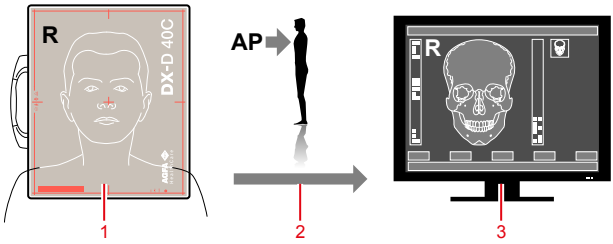


Figure 16: Skull AP portrait

1. Detector orientation (Portrait)
2. Patient orientation (AP)
3. Result on monitor

Table 2: Chest PA Landscape

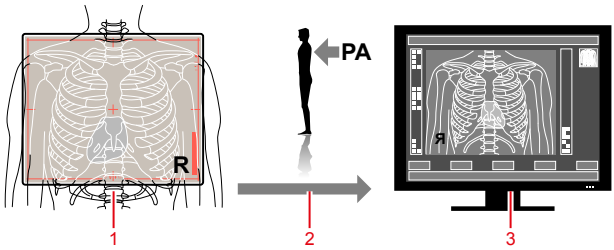


Figure 17: Chest PA landscape

1. Detector orientation (Landscape)
2. Patient orientation (PA)
3. Result on monitor

Table 3: Table with bucky

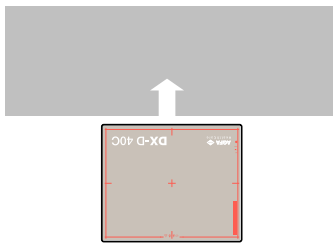
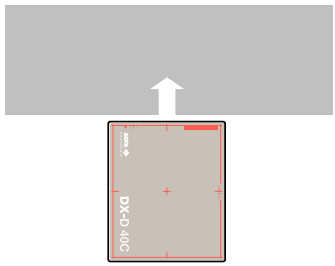
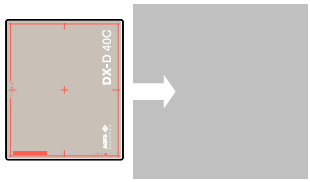
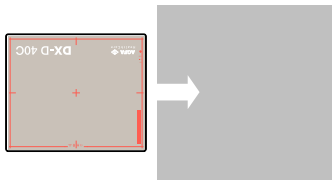
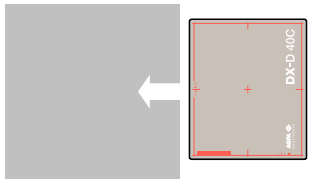
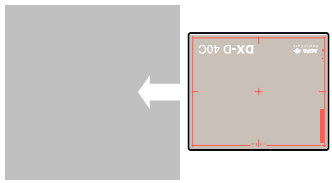
Table with bucky, portrait	

Table with bucky, landscape	

Note: NX is configured for a specific patient orientation, either head left (default) or head right.

Table 4: Wallstand bucky

Wallstand with left loading bucky, portrait	
Wallstand with left loading bucky, landscape	
Wallstand with right loading bucky, portrait	
Wallstand with right loading bucky, landscape	

Guidelines for Pediatric Applications

CAUTION:
Children are more radiosensitive than adults. Adopting the Image Gently campaign guidelines and reducing dose for radiographic procedures while maintaining acceptable clinical image quality will benefit patients.

Please review the following link and reduce pediatric technique factors accordingly: http://www.imagegently.org

As a general rule, next recommendations shall be observed in pediatrics:

- X-Ray Generator must have short exposures times.
- AEC must be used carefully, preferably use manual technique setting, applying lower doses.
- If possible, use high kVp techniques.

Positioning the pediatric patient: Pediatric patients are not as likely as adults to understand the need to remain still during the procedure. Therefore it makes sense to provide aids to maintaining stable positioning. It is strongly recommended the use of immobilizing devices such as bean bags and restraint systems (foam wedges, adhesive tapes, etc.) to avoid the need of repeating exposures due to the movement of the pediatric patients. Whenever possible use techniques based on the lowest exposure times.

Shielding: We recommend you provide extra shielding of radiosensitive organs or tissues such as eyes, gonads and thyroid glands. Applying a correct collimation will help to protect the patient against excessive radiation as well. Please review the following scientific literature regarding pediatric radiosensitivity: GROSSMAN, Herman. “Radiation Protection in Diagnostic Radiography of Children”. Pediatric Radiology, Vol. 51, (No. 1): 141--144, January, 1973:

http://pediatrics.aappublications.org/cgi/reprint/51/1/141.

Technique factors: You should take steps to reduce technique factors to the lowest possible levels consistent with good image acquisition.

For example if your adult abdomen settings are: 70--85 kVp, 200--400 mA, 15--80 mAs, consider starting at 65--75 kVp, 100--160 mA, 2.5--10 mAs for a pediatric patient. Whenever possible use high kVp techniques and large SID (Source Image Distance).

Summary:

- Image only when there is a clear medical benefit.
- Image only the indicated area.
- Use the lowest amount of radiation for adequate imaging based on size of the child (reducing tube output -- kVp and mAs).
- Try to use always short exposure times, large SID values and immobilizing devices.

- Avoid multiple scans and use alternative diagnostic studies (such as ultrasound or MRI) when possible.

Stopping the DR Detector

To stop the DR Detector:

1. Turn off the detector.

   Press and hold the power button (approx. 3 seconds).

   All the status indicator lights are off.
2. While holding down the battery pack, slide the lock levers toward (unlock) (1), put your fingers on the battery edge that lifts up, and then pull the edge to remove the battery pack (2).

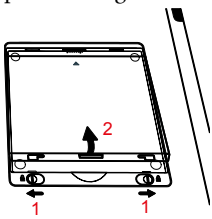


Figure 18: Remove the battery

Note: *When the detector will not be used for some time, remove the battery. Otherwise, overdischarge may occur, leading to a shorter battery life.*

Note: *When not in use, keep the detector, handle unit with grid in a designated location or in a location where they are safe and cannot fall down.*

Automatic exposure detection

The DR detector detects X-ray exposure to automatically perform the image acquisition.

Before performing the exposure, the DR detector must be ready. Check the status of the DR detector in the DR Detector Switch.

WARNING:
The sensor for automatic exposure detection must be in the exposed area. Positioning the sensor for automatic exposure detection outside the exposed area can cause failure to trigger the image acquisition.

WARNING:
Do not hit or drop the equipment. If it receives a strong jolt, image acquisition can be triggered without X-ray exposure.

WARNING:
Very short exposure time can cause failure to trigger the image acquisition. Use an exposure time of at least 3 ms.

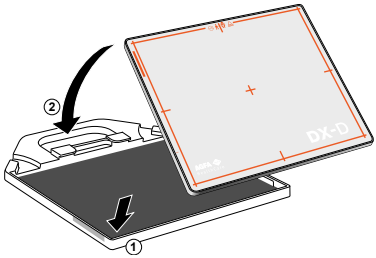
WARNING:
Specific exposure conditions (use of grid, thickness of the exposed object) can cause failure to trigger the image acquisition or horizontal artifacts in the acquired image.

CAUTION:
Excessive ambient temperature may impact performance of DR Detectors and cause permanent damage to the equipment. If ambient temperature and humidity is outside the range of 10 - 35 °C and 30 - 85% RH, do not operate the system or use air conditioning. Warranty will be void if it is obvious that operating conditions are not met.

Related Links

Positioning the DR Detector on page 80

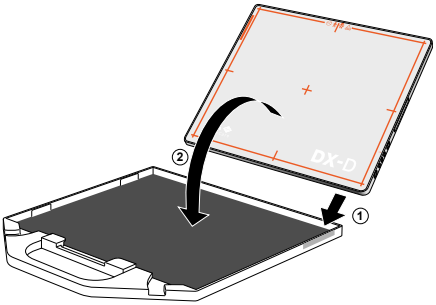
Attaching the Handle Unit without Grid



To attach the handle unit for making exposures without using the grid

1. Lay down the handle unit on a flat surface.
2. Lay the DR Detector in the handle unit, bottom edge first, with the tube side facing up (1).
3. Attach the handle unit to the DR Detector (2).

Attaching the Handle Unit with Grid



To attach the handle unit for making exposures using the grid

1. Lay down the grid on a flat surface.
2. Lay the DR Detector in the grid, bottom edge first, with the tube side facing down (1).
3. Attach the grid to the DR Detector (2).

WARNING:
Use only the grid that is supplied as option to the DR Detector.

Advanced Operating

Topics:

Detector Status Indicators

Table 5: Detector status

Status	Power indicator	Status indicator	Data indicator
Power on		OFF	OFF
Detector ready			
Data communication ongoing			
Wireless data communication setup ongoing			OFF
Power off	OFF	OFF	OFF

Note: When two or more status indicator lights are flashing, an error has occurred.

Related Links

Problem solving on page 96

Charging a battery

To charge a battery using the battery charger:

1. Connect the power supply to the mains power and to the power socket of the battery charger.
2. Insert the battery in an empty slot of the battery charger.

   The battery charger automatically detects the battery and starts charging the battery.

   The battery status can be read from the indicator lights.

   The charge level of the battery is monitored and it is kept at maximum level until the battery is removed from the battery charger.
3. Remove the charged battery from the battery charger.

Related Links

Safety Directions on page 66

DR Detector Battery Charger on page 21

Charging the battery using the DR detector cable

Connect the DR Detector cable to charge the battery that is attached to the DR Detector. The battery status can be read from the DR Detector Switch on the NX Workstation.

While charging, the DR Detector can still be used. If the DR Detector is used with the DR Detector cable connected, make sure that a battery is always attached.

Related Links

DR Detector Switch on the NX Workstation on page 24

DR Detector cable on page 18

Registering the DR Detector on another NX Workstation

The DR Detector can be used for examinations on different NX workstations. The DR Detector is set up to communicate to a specific NX workstation. The procedure of registering the DR Detector to another NX workstation switches the availability of the DR Detector between NX workstations.

In a configuration with multiple NX workstations sharing a DR Detector, each NX workstation is connected to a System Control Unit. One or more of the System Control Units is equipped with a DR Detector Cable.

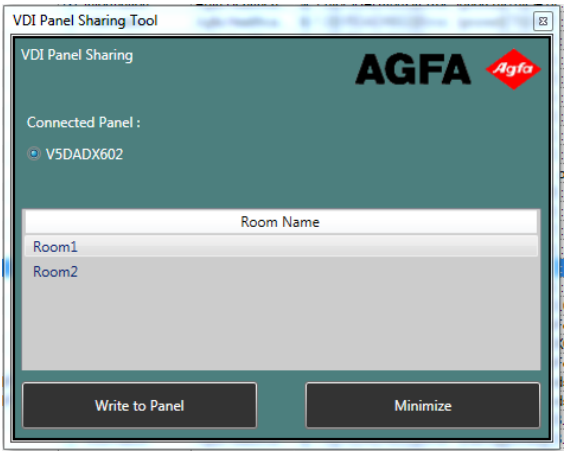
In a configuration with mobile X-ray units sharing a DR Detector, a dedicated PC is connected to a System Control Unit that is equipped with a DR Detector Cable.

Note: On a PC without NX software, the VDI Panel Sharing Tool may not be set up to start automatically. To start it manually, in the Start menu, select All programs > Agfa > Start VDI Panel Sharing Tool.

To register the DR Detector and make a connection to another X-ray room:

1. Connect the DR Detector to any of the NX workstations with the DR Detector Cable.

   A dialog is displayed on the NX workstation listing the configured X-ray rooms.



   It may take up to 30 seconds for the dialog to pop up.

2. Select the X-ray room where the DR Detector will be used.
   A dialog is displayed on the NX workstation to confirm the registration.

The DR Detector is set up to make connection to the selected NX workstation.

Related Links

DR Detector cable on page 18
Configuration on page 12

Using the Windows wifi settings to switch between the wireless DR detector and the wireless hospital network

The NX Workstation can be configured to connect to a wireless DR Detector as well as to a wireless hospital network.

In a configuration without System Control Unit or without a wireless access point that is connected to the workstation, the DR Detector communicates via the internal wireless adapter of the workstation and only one connection can be active at a time. The user must manually switch between the wireless connection to the hospital network and the wireless connection to the DR Detector.

To switch between wireless networks:

1. Swipe in from the right side of the screen.

   The Windows **action center** is displayed.

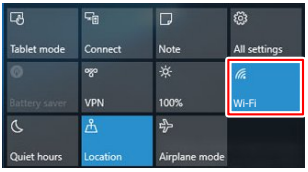


Figure 19: Windows action center with Wifi button highlighted

2. Touch the **Wifi** button
   The available wireless networks are displayed.
3. Select the wireless network.

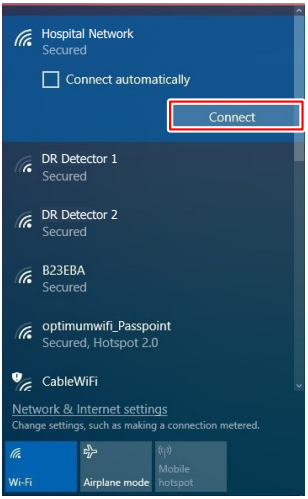


Figure 20: Available wireless networks

- To connect to the hospital network, select name of the hospital network.

  Do **not** enable the option to connect automatically to the hospital network.

  The NX Workstation is connected to the hospital network to retrieve data from the RIS or to print or archive images.

  No communication to the DR Detector is possible, no exposures can be performed.
- To connect to the wireless DR Detector, select the name of the detector.

  The option to connect automatically to the DR Detector can be enabled.

  The NX Workstation is connected to the DR Detector to make exposures.

  No communication to the hospital network is possible, e.g. to RIS or PACS.

4. Touch the **Connect** button.
   The network connection is switched to the selected wireless network.

Related Links

Configuration on page 12

Password requested when connecting to the DR Detector via the wireless network on page 99

Problem solving

Topics:

Artifact in DR Detector images

Details	An artifact is visible in the images produced by a DR Detector.
Cause	Exposure conditions have changed significantly since latest calibration.
Brief Solution	Perform calibration of the DR Detector. For details, refer to the DX-D DR Detector Calibration Key User Manual (0134).

DR detector not ready for exposure

Details	The DR detector is turned on. The DR Detector Status icon on the DR Detector Switch is not green.
Cause	(only if the DR Detector is shared between multiple NX workstations) The DR Detector is not registered on the NX Workstation.
Cause	(only on DX-D 45C, DX-D 45G) The S-button has been pushed accidentally.
Cause	(only if the DR Detector communicates via the internal wireless adapter of the workstation) The NX Workstation may not be connected to the DR Detector via the wireless network.
Brief Solution	**1.** (only if the DR Detector is shared between multiple NX workstations) Register the DR Detector on the NX Workstation. **2.** (on DX-D 45C, DX-D 45G) Check the indicator next to the S-button. The indicator must be green or orange when the DR Detector communicates via a System Control Unit or a wireless access point that is connected to the workstation. The indicator must be blue when the DR Detector communicates via the internal wireless adapter of the workstation. If the indicator does not match the way it communicates to the workstation, press and hold the S-button for 5 seconds. The indicator color switches to the correct mode. **3.** (if the DR Detector communicates via the internal wireless adapter of the workstation) Switch the NX Workstation to the wireless network of the DR Detector.

Related Links

Registering the DR Detector on another NX Workstation on page 92
Using the Windows wifi settings to switch between the wireless DR detector and the wireless hospital network on page 94

Password requested when connecting to the DR Detector via the wireless network

Details	When connecting to the DR Detector by selecting it from the list of available wireless networks, a password is requested.
Cause	The password was removed from the wireless network settings stored by the operation system.
Cause	The DR Detector is already configured on another NX Workstation, to communicate via the internal wireless adapter of the workstation.
Brief Solution	Contact your local service representative to reset the password or to investigate alternatives for sharing the DR Detector between multiple NX Workstations.

Images are not sent to the printer or to the PACS archive

Details	The exam is closed, but the images are not sent to the printer or to the PACS archive.
Cause	(only if the DR Detector communicates via the internal wireless adapter of the workstation) The NX workstation has not been connected to the hospital network.
Brief Solution	Switch the NX workstation to the hospital network. The images will be sent automatically as soon as a connection to the hospital network is active.

Related Links

Using the Windows wifi settings to switch between the wireless DR detector and the wireless hospital network on page 94

Identifying problems

Please refer to the details of following symptoms or error messages. If the problem persists, turn off the detector and consult your sales representative or local dealer.

WARNING:
Improper changes, additions, maintenance or repair of the system can lead to personal injury, electrical shock and damage to the equipment. Safety is only guaranteed when changes, additions, maintenance or repairs are carried out by an Agfa certified field service engineer. A non certified engineer performing a modification or service intervention on a medical device, acts on his own responsibility and makes the warranty void.

Symptom	Cause	Remedy
The detector will not turn on.	The battery is not attached.	Attach the battery.
	The battery pack is not charged.	Fully charge the battery pack.
	The battery pack is broken.	Replace the battery pack.
The status indicator of the System Control Unit does not light up.	The power cord is unplugged from the AC outlet.	Connect the plug to the AC outlet firmly. If it still does not work, replace the System Control Unit.
The status indicator of the System Control Unit does not light up in green.	A hardware error has occurred.	Turn off the System Control Unit and turn it on again. If it still does not work, replace the System Control Unit.
The green status indicator lights up and the orange and blue status indicators are flashing.	An error has occurred during registration of the DR Detector.	Check the network connection on the System Control Unit. Check the network configuration of the workstation.
	An error has occurred during data communication.	Check if the System Control Unit is turned on.

Symptom	Cause	Remedy
		Check if the wireless network communication is stable.
All status indicators are flashing.	A hardware error has occurred.	Turn off the DR Detector and turn it on again.
Two status indicators are flashing and the third is flashing slowly.		
A fully charged battery is consumed quickly.	The battery capacity decreases.	The DR Detector battery can deteriorate because of its characteristics and structure. For purchase of consumables, contact your sales representative or local dealer.
	The battery was charged or used in low temperatures.	In low temperatures the battery capacity decreases. Use a battery charged in normal temperatures.
The battery bay is unusually hot.	The battery is malfunctioning.	Stop using the battery and consult your sales representative or local dealer.

Technical Data

Topics:

DX-D 40C, DX-D 40G

Commercial name	DX-D 40C, DX-D 40G
Electrical connection DR Detector	
Rated power supply (powered by battery pack)	DC +24 V, Max. 0.5 A
Power consumption	max. 12 W
Wireless connection	IEEE 802.11a/b/g/n (2.4 GHz/5 GHz)
Wireless signal range (in an open space)	maximum 8 m
Environmental conditions (during normal operation)	
Room temperature	between +10 °C and +35 °C
Humidity (non condensing)	between 30% and 85% RH (non-condensing)
Atmospheric pressure	between 700 hPa and 1060 hPa
Environmental conditions (during storage and transport)	
Temperature (ambient)	between -15 °C and +55 °C
Humidity (non condensing)	between 10% and 90% (non-condensing)
Atmospheric pressure	between 500 and 1060 hPa
Warming-up time	
30 minutes	
Dimensions	
Dimensions width x length x height	approx. 384 x 460 x 15.5 mm
Weight (incl. battery)	< 3.4 kg
Maximum load	100 kg on an area of 40 mm in diameter
Maximum total load	150 kg over the whole detector surface

Vibration tolerance	2 G during normal operation 5G during storage and transport
Shock tolerance	20 G during normal operation 30 G during storage and transport
Drop limit	700 mm (once)
Image acquisition time	6.5 s

	DR 40C	DR 40G
Conversion screen	CsI:TI	Gadox:Tb
Pixel size	140 μm	
Active pixel matrix	2560 x 3072	
Effective pixel matrix	2536 x 3048	2548 x 3060
Detector type	amorphous silicium	
Active area size	358 mm x 430 mm	
Effective area size	356 mm x 428 mm	358 mm x 430 mm

DX-D 40C, DX-D 40G Battery

Type of product	Rechargeable lithium ion battery pack
Part number	FXRB-01A
Dimensions	
Dimensions (length x width x height)	144.4 mm x 143.4 mm x 7.0 mm
Weight	220 g
Battery output	
Output voltage	DC +7.4 V
Capacity	4000 mAh
Lifecycle	
Preventive maintenance frequency.	No preventive maintenance required.
Estimated product life	Estimated product life: 500 charge cycles

DX-D 40C, DX-D 40G Battery Charger

Type of product	Lithium ion battery pack charger
Part number	FXRC-01A
Charging time	2 hours
Simultaneous charging	3 batteries
Dimensions	
Dimensions (width x height x depth)	192.0 mm x 167.5 mm x 223.4 mm
Weight	1200 g
Electrical connection	
Rated Power Supply	DC +24V, 2.7 A Max
Lifecycle	
Preventive maintenance frequency.	No preventive maintenance required.

DR Detector Dual Battery Charger

Type of product	Lithium ion battery pack charger
Part number	FXRC-03A
Charging time	3 hours
Simultaneous charging	2 batteries
Dimensions	
Dimensions (width x height x depth)	190.0 mm x 163.6 mm x 34.0 mm
Weight	0.5 kg
Electrical connection	
Rated Power Supply	DC +24V, 2 A Max
Lifecycle	
Preventive maintenance frequency.	No preventive maintenance required.

System Control Unit

System Control Unit	
Type	6007/300
Rated power supply (input)	AC100 to 240V, 50/60 Hz, Max. 2.0-0.8A
Rated power supply (output)	DC +24V 3.25A, 78W
Wireless connection	IEEE 802.11n (2.4 GHz/5 GHz)
Dimensions (width x height x depth)	300 mm x 236 mm x 58 mm (140 mm antenna height)
Weight	2.8 kg

Mini System Control Unit

Mini System Control Unit	
Type	6007/301
Rated power supply (input)	DC +24V 2A max
Wireless connection	IEEE 802.11n (2.4 GHz/5 GHz)
Dimensions (width x height x depth)	210 mm x 170 mm x 45 mm (140 mm antenna height)
Weight	1.2 kg

Remarks for HF-emission and immunity

Topics:

EMC (Electromagnetic Compatibility) Statements

WARNING:
This device has been tested for EMI/EMC compliance, but interference can still occur in an electromagnetically noisy location. Attempt to maintain a suitable distance between electrical devices to prevent malfunction.

WARNING:
Obtaining diagnostic images and transferring them to a PC (workstation) are the essential performance of the DR detector. If the required performance is degraded or lost due to electromagnetic interference, images that are not suitable for diagnosis may be obtained or the image may be lost.

Electromagnetic emissions

This device has been tested for a normal hospital environment as described below.

The user of the device should ensure that it is used in such an environment.

Nevertheless the HF-emission and immunity can be influenced by connected data cables depending on length and the manner of installation.

Emissions test	Compliance	Electromagnetic Environment Guidelines
RF emissions in accordance with CISPR 11	Group 1	This device 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 in accordance with CISPR 11	Class A	The device is directly connected to a low voltage power supply network, and can be used in all facilities except the ones that supply voltage to home facilities or buildings. The emissions characteristics of this equipment make it suitable for use in industrial areas and hospitals (CISPR 11 class A). If it is used in a residential environment (for which CISPR 11 class B is normally required) this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.
Harmonic emissions in accordance with IEC 61000-3-2	Class A	
Voltage fluctuations / flicker emissions in accordance with IEC 61000-3-3	Complies (*)	

(*) Applies to regions where the rated voltage is 220 V or higher. Not applicable to regions where the rated voltage is less than 220 V.

Electromagnetic immunity

This DR Detector is intended for operation in the electromagnetic environment given below. The user of the DR Detector should ensure that it is used in such an environment.

Resistance to Jamming Test	**IEC 60601 Test Level**	**Level of Agreement**	**Electromagnetic Environment Guidelines**
Discharge of static electricity in accordance with IEC 61000-4-2	± 8 kV contact discharge ± 15 kV air discharge	± 8 contact discharge ± 15 kV air discharge	Floors should consist of wood, concrete or ceramic tiles. The relative humidity must be at least 30%, if the floor is made of synthetic material.
Fast transient electrical disturbance variables / bursts in accordance with IEC 61000-4-4	± 2 kV for network leads ± 1 kV for entry and outlet leads	± 2 kV for network leads ± 1 kV for entry and outlet leads	The quality of the voltage supplied should correspond to a typical commercial or clinical environment.
Impulse voltages (surges) in accordance with IEC 61000-4-5	± 1 kV push-pull voltage ± 2 kV common mode voltage	± 1 kV push-pull voltage ± 2 kV common mode voltage	The quality of the voltage supplied should correspond to that of a typical commercial or clinical environment.
Voltage breakthroughs, short term interruptions and variations in the voltage supplied in accordance with IEC 61000-4-11	100% reduction for 0.5 cycle at 0, 45, 90, 135, 180, 225, 270 and 315 degrees 100% reduction for 1 cycle 30% reduction for 25/30 cycles at 0 degree 100% reduction for 250/300 cycles (5 sec.)	100% reduction for 0.5 cycle at 0, 45, 90, 135, 180, 225, 270 and 315 degrees 100% reduction for 1 cycle 30% reduction for 25/30 cycles at 0 degree 100% reduction for 250/300 cycles (5 sec.)	The quality of the voltage supply should correspond to that of a typical commercial or clinical environment. If the user wants the DR Detector to work continuously, even when the energy supply is interrupted, it is recommended to use an energy supply free of interruptions or a battery.

Magnetic field at the supply frequency (50/60 Hz) in accordance with IEC 61000-4-8	30 A/m	30 A/m	Magnetic field at the network frequency should correspond to the typical values as they are in a commercial and clinical environment.

Tests of Resistance to Disruption	IEC 60601 Test Level	Level of Agreement	Electromagnetic Environment
Conducted high frequency disturbance variables in accordance with IEC 61000-4-6	3 V_{eff} 150 kHz to 80 MHz 6 V_{eff} in the ISM bands 150 KHz to 80 MHz	3 V_{eff} 150 kHz to 80 MHz 6 V_{eff} in the ISM bands 150 KHz to 80 MHz	The electromagnetic field strength of a stationary RF transmitter determined by an electromagnetic test survey must be less than the compliance level of each frequency range.
Radiated high frequency disturbance variables in accordance with IEC 61000-4-3	3 V/m 80 MHz to 2.7 GHz	3 V/m 80 MHz to 2.7 GHz	
			Interference may occur in the vicinity of equipment marked with the symbol: 

Note: *The higher value will apply at 80 MHz and 800 MHz.*

Note: *These Guidelines may not apply to all situations. The dispersion of electromagnetic waves is influenced by absorption and reflections from buildings, objects and people.*

WARNING:
The field strength of stationary transmitters, such as base stations of radio telephones, mobile broadcasts for rural areas, amateur stations, and AM and FM radio transmitters, cannot be precisely predetermined theoretically. An investigation of the location is recommended, to ascertain the electromagnetic environment as a result of stationary high frequency transmitters. If the field strength of the device exceeds the level of agreement given above, the device must be observed with regard to its normal operation at each place of use. In case of unusual performance characteristics, it can be necessary to take additional measures, such as the re-orientation of the device, for example.

WARNING:
The field strength will be lower than 3 V/m above the frequency range from 150 kHz to 80 MHz.

WARNING:
Portable RF communications equipment (including peripherals such as antenna cables and external antenns) should be used no closer than 30cm (12 inches) to any part of the DR detector, including cables specified for use with the equipment. Otherwise, degradation of the performance of this equipment could result.

For U.S.A.

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measure.

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from where the receiver is connected.
- Consult the distributor or an experienced radio/TV technician for help.

FCC WARNING:

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.