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Introducing the *DRX-Plus* Wireless, Portable DR Panel

Nov 2016

Topics

1. Introduction
2. Overview
3. Features
4. DRX-Plus Setup
5. Practical Information
6. Standard and Optional Warranty
7. Service Model
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10. Questions

Product Description

DRX-Plus is a compact, wireless, portable DR system suitable for use in NDT applications. It is a lightweight system complete with imaging software designed to maximize throughput in high production inspection environments. The *DRX-Plus* will be a viable substitute for film and CR around the world.

DRX-Plus for NDT leverages legacy imaging technology from the DRX-1 / DRX-Plus used in Medical & Veterinary.

DRX-Plus compact design makes it extremely easy to move and its ability to run on a variety of power sources including battery allow customers the ultimate work flexibility.

DRX-Plus uses Carestream NDT's proven Industrex software at its core with a simplified user interface designed for easy configuration and high throughput. It can be expanded to existing Industrex systems allowing customers to gain additional productivity.

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Key Messages

DRX-Plus is a lightweight, compact, portable DR system suitable for use in NDT environments.

DRX-Plus can be substituted into existing film or CR labs on may applications. It allows users to effectively remove film, chemicals or CR and replace them with a direct capture device.

DRX-Plus can improve throughput by eliminating steps in the image acquisition process.

DRX-Plus will help standardize image viewing with the use of pre-defined image filters.

DRX-Plus has multiple power options so customers can work in any environment.

DRX-Plus uses Industrex imaging software that can improve workflow and accuracy.

Value Proposition

Carestream NDT's new *DRX-Plus* portable DR system will deliver quality radiographic imaging in a portable wireless format targeted at NDT labs, mobile inspection crews and production environments. It will be priced competitively against competitors DR systems. DRX-Plus is lighter, has an IP57 enclosure rating, provides excellent image quality with 139 micron pixel pitch and will be available with INDUSTREX v4.2 Sp2 software with a simple user interface for easier DR panel setup, calibration and use.

Inspectors

- No more chemicals
- Greater image analysis
- Lightweight
- Wireless
- Portability
- High image quality

Business Owner

- Consumable savings
- Downsizing of vehicles
- Digital Records
- Improved Reporting
- Option to sell storage
- Price

Customers

- Better image quality
- Ability to analyze images
- Easy storage
- Data management
- Faster
- Cost effective

Market Situation

Why do customers want to move to DR?	Why hasn't the move been quicker?	Why DRX-Plus?
• Eliminates Consumables. • Eliminates chemical disposal ($1K / 100 gal). • CR plate life issues. • Wireless mobility big plus for mobile inspection. • Software allows users to do more analysis than film. • Customers are requesting digital format images.	• Capital investment. • Industry standards slow to address new technology. • DR panels are 'fragile' • Inspectors average age 58, no desire to switch.	• No consumables • Lightest panel on the market. • IP57 weatherproof rating. • Long battery life, better than competitors. • Excellent image quality 139 micron pixel pitch. • "Close to edge" imaging.

Feature / Advantage / Benefit

Feature	Advantage	Benefit
System Footprint	Compact size & thickness allows use in tight inspection locations.	No need to switch modalities to make the shot.
System Weight	Lightest DR system available in the industry	Easy to move around during mobile inspection.
Battery Power	Ability to run on main or battery power gives users optimum flexibility.	Maximum flexibility to work on a jobsite or in a lab environment.
Battery Life	300+ images/charge best in class.	Longer use before new battery needed.
High Throughput	No need to load film / CR plate then develop / scan media.	Allows customers to run at high image rates due to mininal hands-on.
Weatherproof	IP57 enclosure rating provides improved protection against water / dust.	No other DR system is capable of this.
Automated Reporting	Improves throughput and accuracy	Inspectors can work longer making more shots rather than spending time transferring data to a reporting software
Digital Files	Improves throughput, sharing and storage of information	Improved transfer of data to customer, allows faster billing and can share
Standardized Filters	Allows all the inspectors to look images in a common fashion.	Reduces risk
Simple UI software	Simplified UI designed for easy set up and use.	Allows inspection crew to set up faster without complex steps.

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Product Overview / Technical Features

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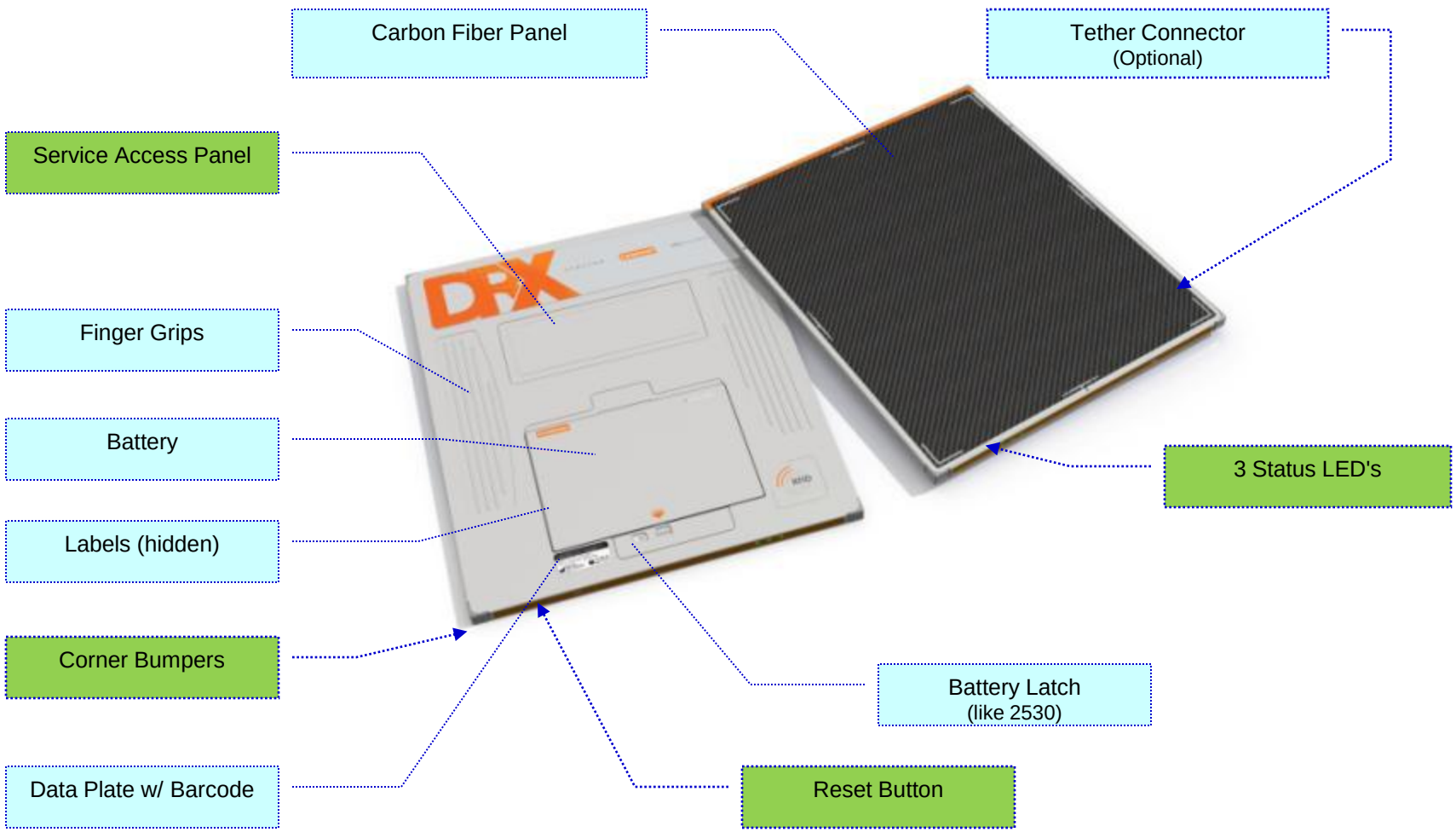
Meet the DRX-Plus!

DRX-*Plus* DR Panel



Detector Specifications

- Active Area: 14x17”
- Pixel Pitch: 139µ
- Pixels: 2544 x 3056
- A/D Conver: 16 bits
- Wireless: 802.11
- Tethered: Ethernet
- Protection: IP57
- Max Kv: 150

DRX –Plus GOS DR Panel CAT#: 8602617

Detector Specifications

Mechanical	
Size (cm)	35 x 43 Cassette (ISO 4090) 38.35 x 45.95 x 1.47 cm
Weight	3.06 kg (6.75 lb.)
Housing Material	Aluminum
Sensor Protection Material	Carbon Fiber and Aluminum Plate
Load Limit	Applied to a single 4 cm (1.6 in.) point: 114 kg (250 lb.) Distributed evenly over the detector area: 170 kg (375 lb.)

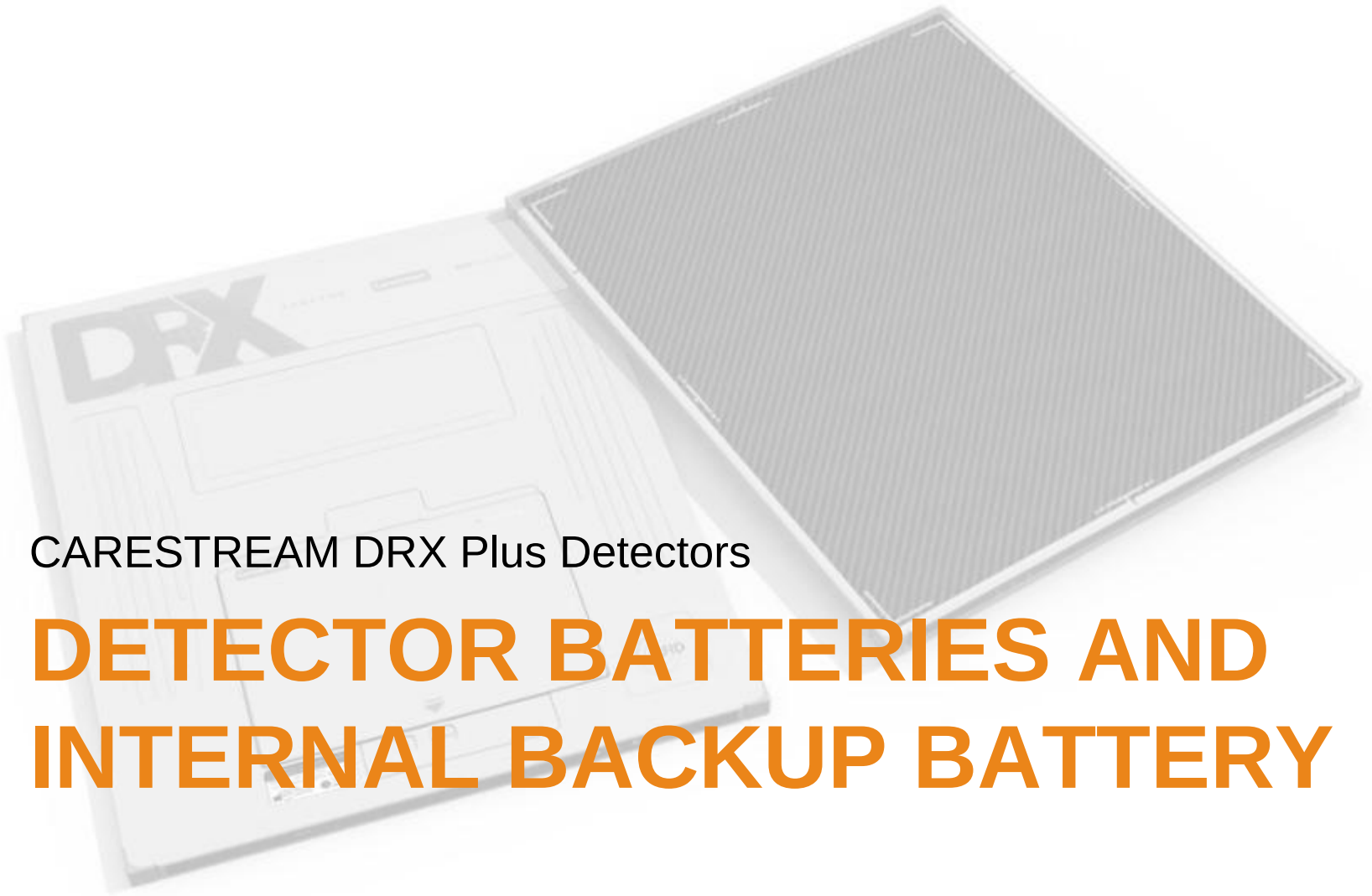
DETECTOR BATTERY	
Technology	• Lithium-polymer Technology • "Smart" battery technology prevents overcharge
Size	21 x 15 x 0.67 cm
Weight	0.4 kg (12.4 oz.)
Voltage / Energy	14.8V DC, 2.1Ah (nominal) capacity
Battery "Hot Swap" Capability	Yes
Charge Capability	340 maximum images per charge in "Direct Connect Mode" 14 days per charge in undisturbed "Sleep Mode"
Expected Life	500 charge / discharge cycles results in ~80% full charge energy
Medical Safety	IEC 60601–1:1988 + Amendment 1:1991 + Amendment 2:1995—Medical Electrical Equipment IEC 62133:2002—Safety requirements for secondary cells and batteries containing alkaline or other non-acid electrolytes
Electromagnetic Compatibility	IEC 60601–1–2 Ed. 2.1, 2004—Medical Electrical Equipment Electromagnetic Compatibility Requirements and tests, including CISPR 11:1999 + A2:02 emissions Group 1, Class A)

Detector Specifications

WIRELESS SYSTEM	
Technical Specifications	
Network Protocol	TCP/IP, IPv4/IPv6
Network Type	Isolated Private Wireless LAN (WLAN) Enterprise Wireless
Wireless Protocol	802.11 A -or- N -or- G
Antenna	
Frequency Band	5 and 2.4 GHz
Available Channels (fixed at installation)	1, 5, 9, 13, 36, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, 149, 153, 157, 161, 165
Maximum Power of Detector Radio	50 mW
Number of Antennas on Detector	2
IP Addressing	Static Private IP addresses for detectors and AP
Agency approvals	FCC Part 15
Typical Data Size	One 15 MB file per image
Dual Homed PC (two NIC cards)	Hospital network connection, Private network connection

Security	
WPA2-PSK AES	Factory loaded and user loaded keys
SSID	Broadcast
Private Patient Identification Data	No patient ID data exchanged with detector
Username and Password	Non-default username and password

Enterprise Wireless	
IP Addressing	Static or DHCP
Authentication	The detector supports authentication with most radius servers using the following protocols: EAP-TLS, EAP-PEAP-MSCHAPV2, EAP-FAST, EAP-PEAP-TLS, EAP-TTLS, EAP-TTLS-MSCHAPV2
Encryption methods	AES-CCMP, WPA2-AES
Certificates supported	.pem, .crt, .cer, .der, .p7b, .pfx, .p12 extensions
Keys	Private keys with .key extensions
QOS	Control signals and data path can be separately configured.



CARESTREAM DRX Plus Detectors

DETECTOR BATTERIES AND INTERNAL BACKUP BATTERY

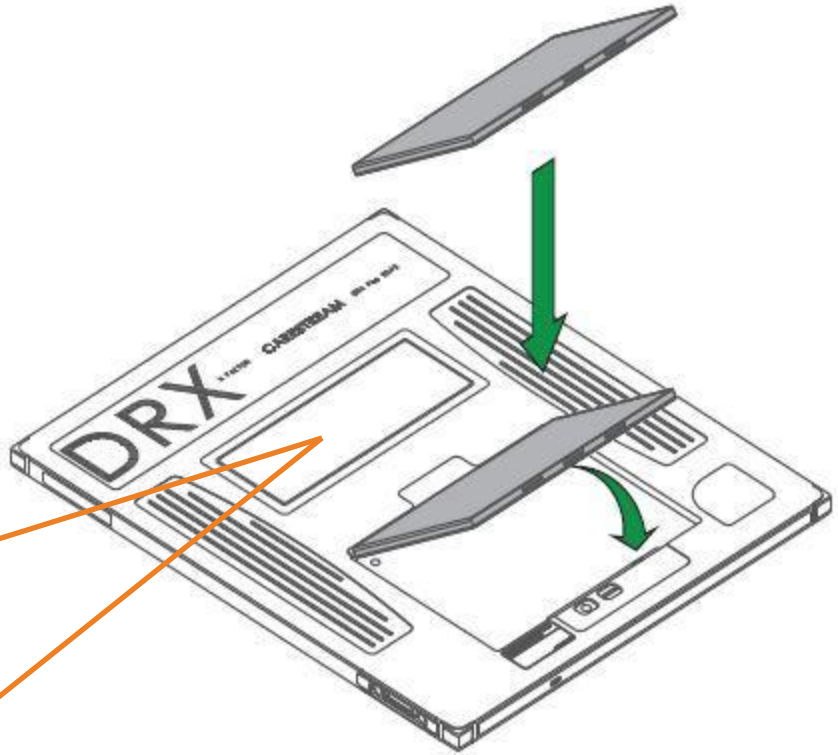
Detector Battery Life

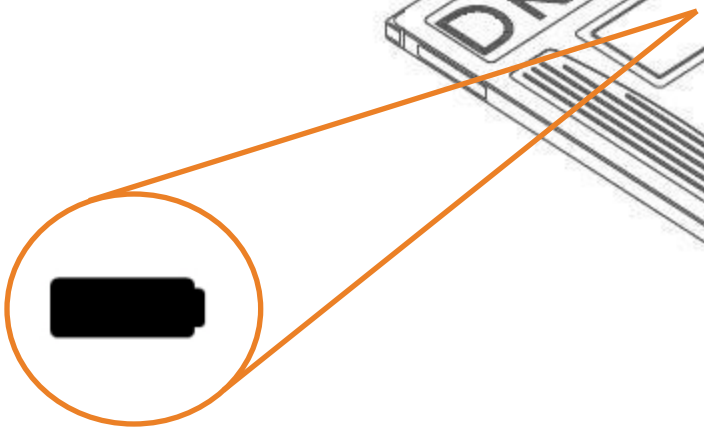
- The DRX-Plus uses a 14.8v Lithium Ion Battery
- Batteries do not have the same ingress protection rating as the panel.

DRX-BATTERY CAT#: 8024853

Detector Battery Backup/Hot Swap

Communication is maintained





Internal back up battery

To replace detector battery without rebooting

The detector battery can now be replaced without requiring a Reboot…. If done within 15 seconds

Battery Charger

- A Battery Charger is available (Optional Equipment).
- It can quick charge (3) LiON batteries simultaneously.

Note: When the panel is connected to mains power the battery will trickle charge.

DRX CHARGER CAT#: 1528439

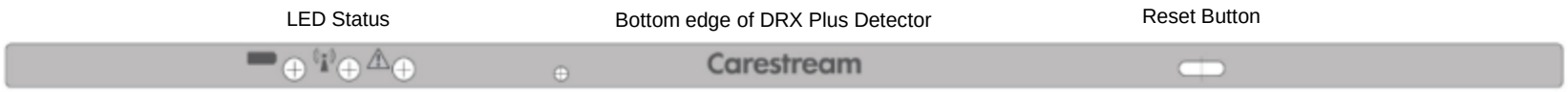
CARESTREAM DRX Plus Detectors

RESET BUTTON & LED INDICATORS

Reset Button

The DRX Plus Detectors have a reset button built into the frame.

The reset button will allow a radiographer to reboot the detector without having to remove and replace the battery

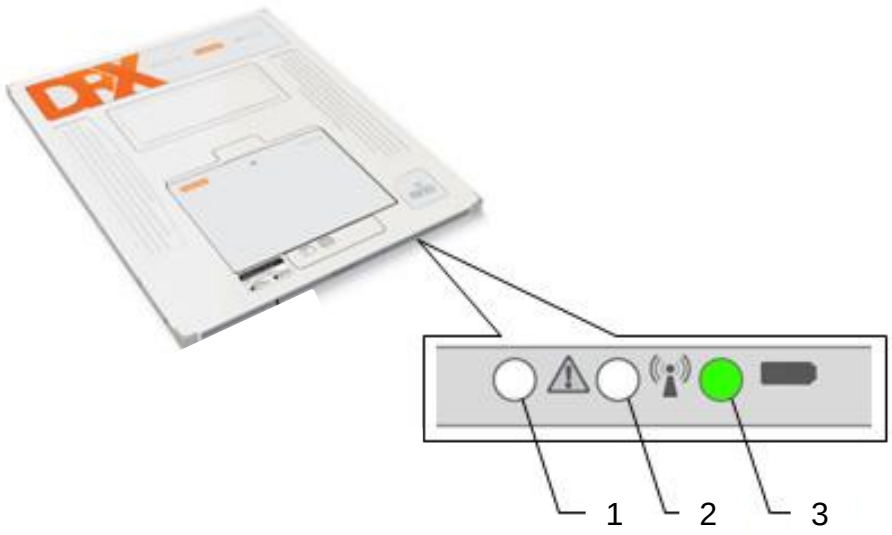


Press and release; the reset button will allow the detector to perform a soft reboot

Press and Hold (5 seconds); the reset button disrupts the detector and will force a hard shutdown. This should only be done when directed by Service.

Reminder: Removing the battery will still perform a soft reboot, but only after 15 seconds due to the back up battery in the detector.

LED Indicators



The DRX Plus Detectors provide individual LED indicators for:

1. Error
2. Communication
3. Power

CARESTREAM DRX Plus Detectors

INGRESS PROTECTION

Improved Liquid Protection

The DRX Plus Detectors conform to the IP Code for IEC standard 60529, sometimes interpreted as Ingress Protection. This code classifies and rates the degree of protection provided against intrusion (dust, water,fluids, etc.). The standard aims to provide users more detailed information rather than vague terms such as “waterproof”.

The IP code for the DRX Plus Detectors is **IP57** where as the first numeral references the level of protection against particulates and the second numeral references the level of protection against fluids.

- A level 5 particulate rating means it is dust protected
- A level 7 liquid rating means it is protected up to 1 meter immersion under defined conditions.

Note: Batteries do NOT have the same IP57 rating.

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Utility Cover

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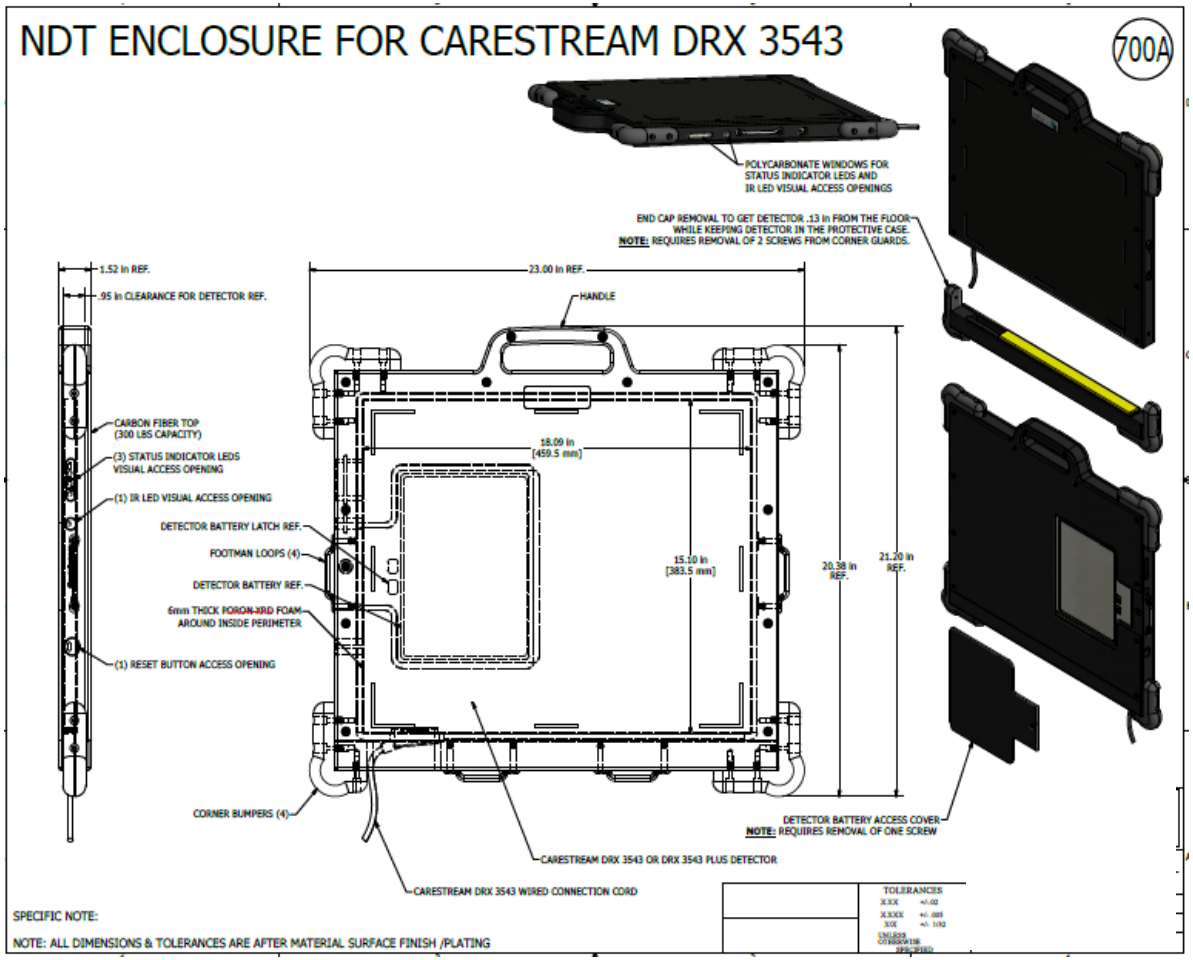
Utility Case

- The DRX Plus will have an optional utility case.
- This utility case adds the ability for customers to strap the panel to an object for imaging.
- This utility case is simply that – to help move and attach the panel to objects. It does not guarantee additional protection if the panel is handled poorly.



Utility Case CAT#: 8603276

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DRX-Plus Setup

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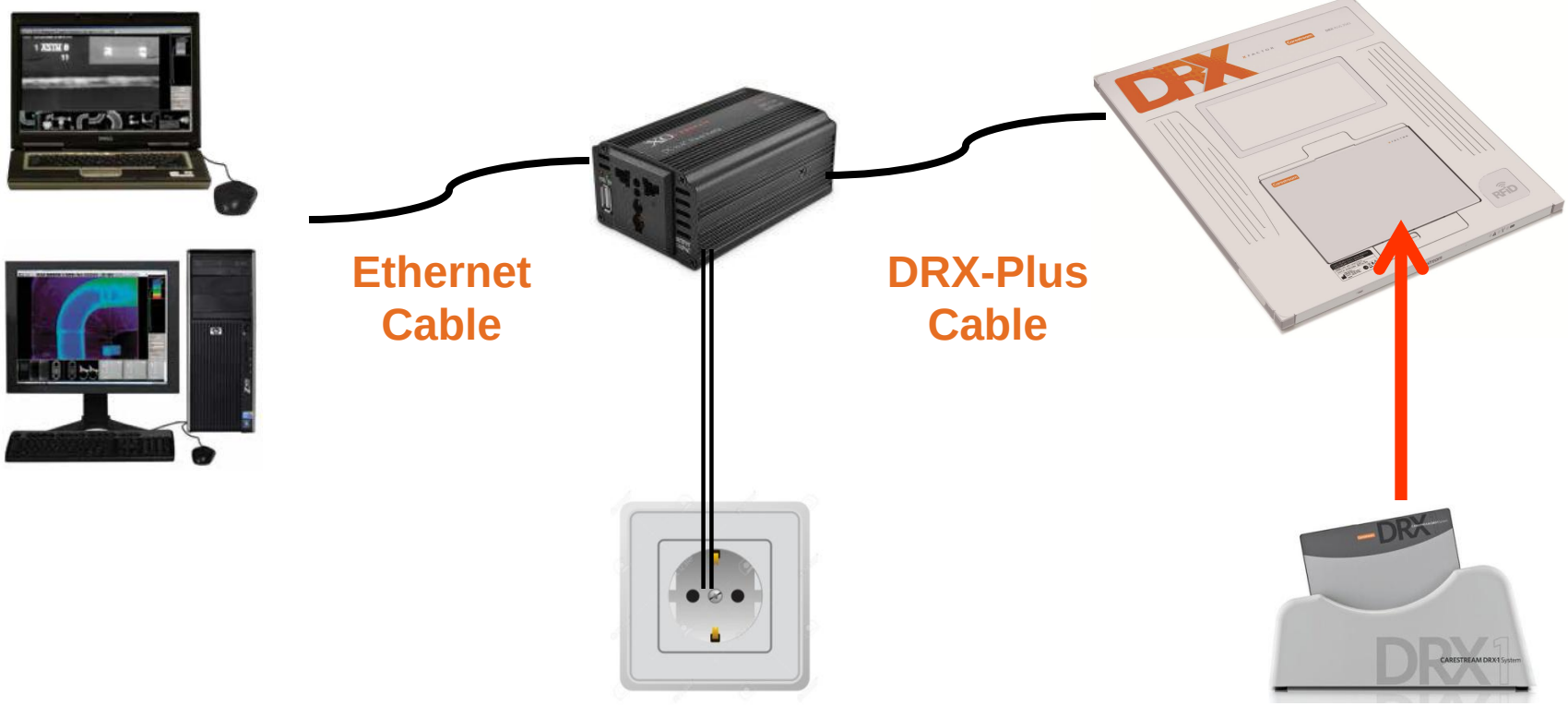
Components

Wired Setup

Computer with Industrex v4.2 Sp 2

Integrated Power Supply & Communication Module

DRX-Plus DR Panel w/Battery



Sample Setup

Wired

- One option is to put the power supply / communication module inside the examination area near the panel.
- This is most practical given the length of the DRX-Plus connecting cable.

- Run the Ethernet cable out of the examination area to the PC located in a safe area.

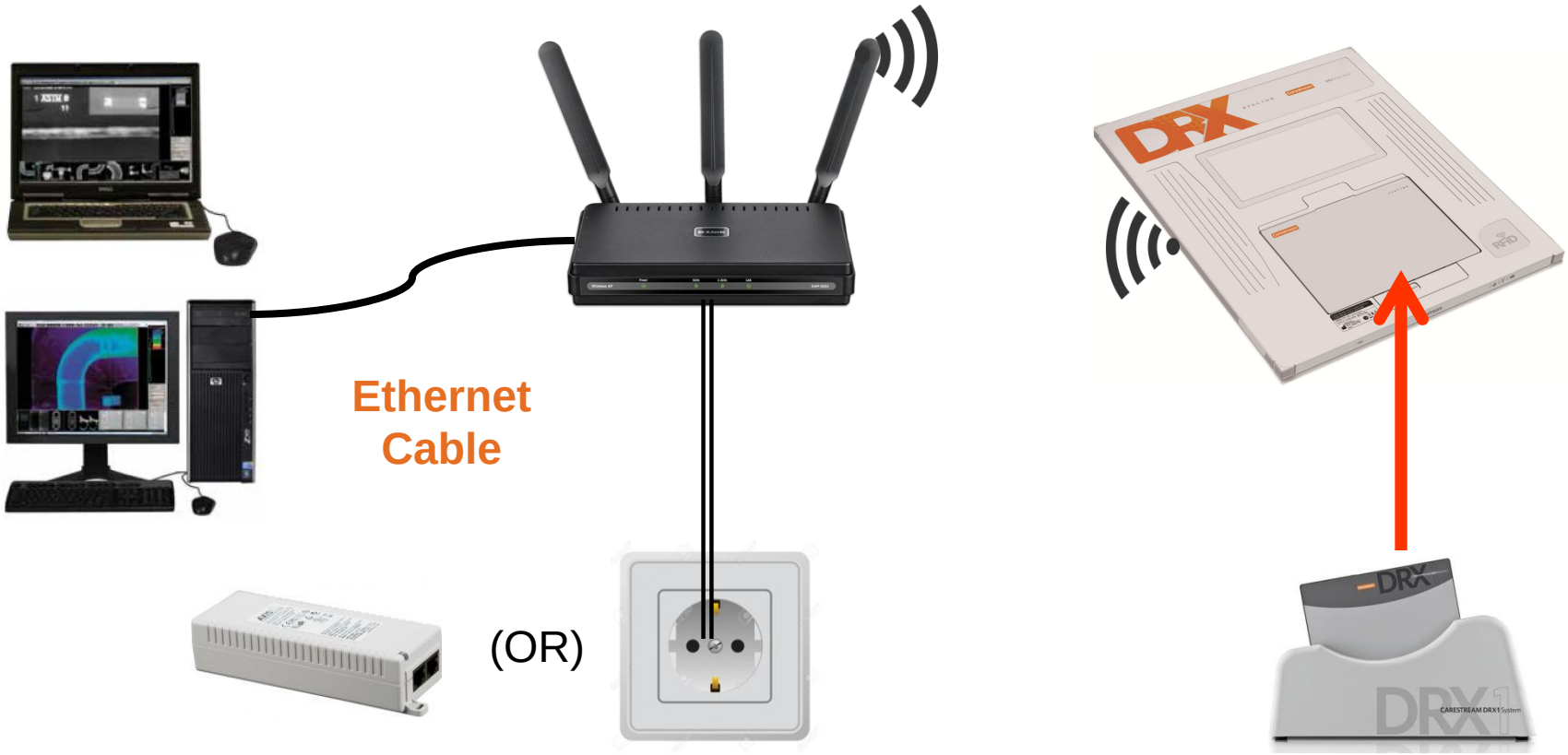
Components

Wireless Setup

Computer with Industrex v4.2 Sp 2

Wireless Access Point

DRX-Plus DR Panel w/Battery



Sample Setup

Wireless

- Its easier to put the wireless access point inside the examination area near the panel.

- Run the Ethernet cable from the access point to a safe area zone outside the examination area.

- For a multi-bay exam area it may be more practical to place the wireless access point on top of the examination area walls. This usually allows the wireless signal to travel into more bays so the panel can move around freely.

What to know about wireless

- Wireless doesn't always work out. At locations with significant interference it may not work at all. Customers will always receive the wired components so they can switch over in these situations.
- A general rule of thumb in home networking says that 802.11b/g WAPs and routers support a range of up to **150 feet** (**46 m**) indoors and **300 feet** (**92 m**) outdoors.

Physical Obstructions

Distance between Devices

Wireless Network Interference

Signal Sharing

Network Usage & Load

Local Environment Characteristics

Poorly Deployed Antennas

Spectrum Channel Limitations

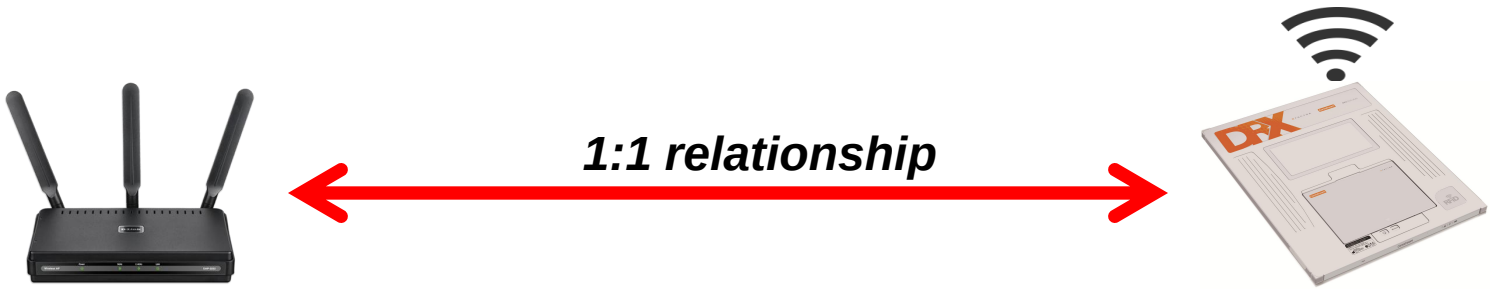
Signal Reflection

Wireless Signal Restriction

Signal Reflection

What to know about wireless

- The DRX-Plus Access Point will come fully configured.
- You can use the DRX-Plus wired or wireless *without changing the IP address*.
- When you turn the panel on and activate the Access Point they will automatically connect. You will see lights on the AP & panel showing the connection.
- Customers *CANNOT* provide their own Access Point.
- An Access point can only connect to (1) DRX-Plus.
- If you have more than (1) system running in the same wireless area you will need to configure one system differently so they don't overlap. Service will provide instructions on how to do that.



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Practical Information

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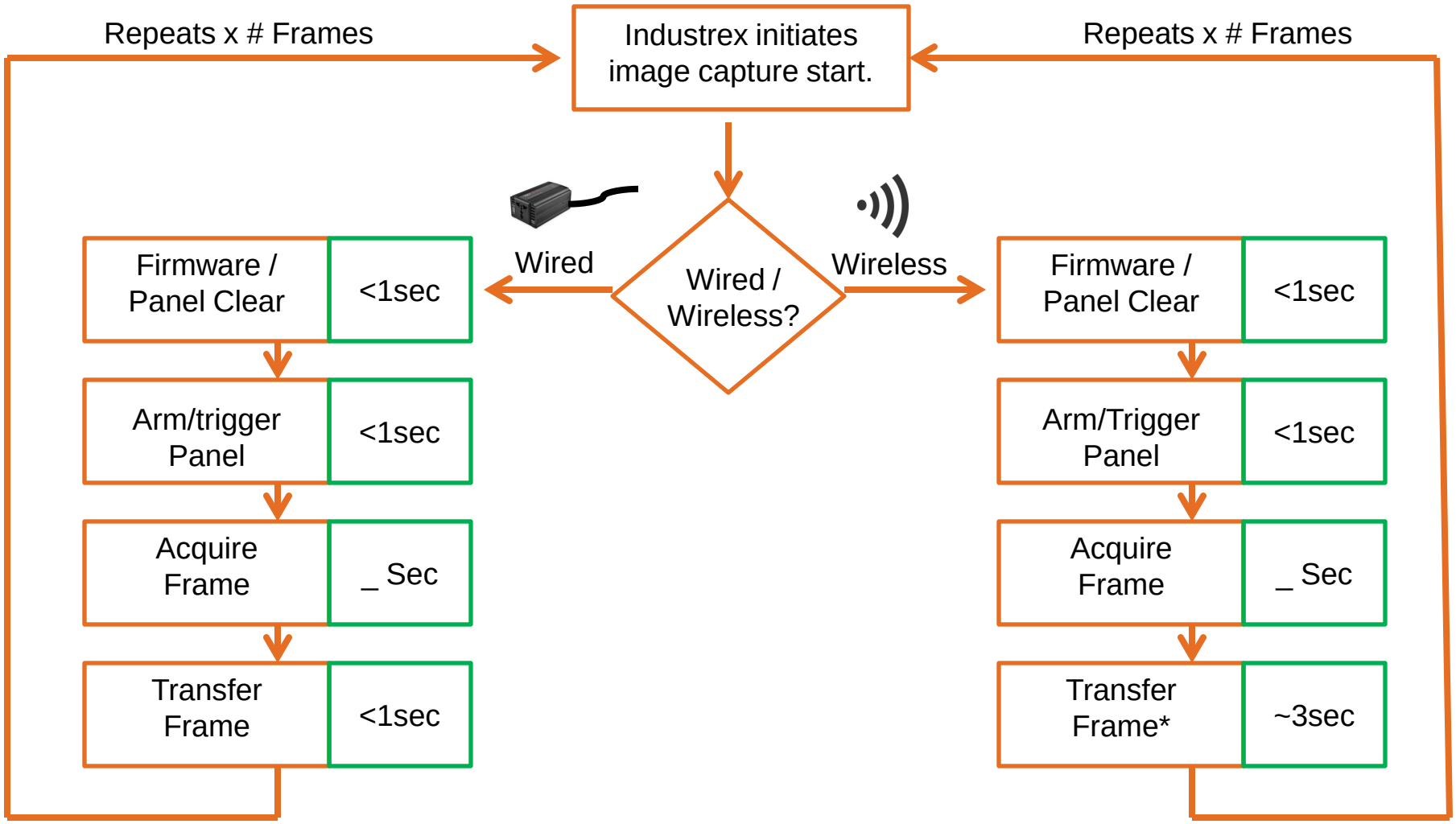
DR Shot Time



*Depends on network capacity

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Standard and Optional Warranty

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Standard Panel Warranty

Basic 1 yr Warranty (No Charge)

Items Covered

- Covers defects from manufacturing, parts and/or labor.
- (Includes incidents caused by drops under 200g as recorded in the detector shock log.)

Items Not Covered

- Drops greater than 200g
- Glass Breakage
- Liquid Damage
- Failure due to excessive dose outside the specifications of the product

Accident Protection Insurance

Accident Protection Insurance

Items Covered

- 1 year coverage (one critical event only)
- Must be purchased at time of original panel purchase
- Covers (1) incident ONLY during the 12 month warranty period
- Includes coverage for
  - Drops greater than 200g
  - Glass Breakage
  - Liquid Damage

Not Covered

- Failure due to excessive dose outside the specifications of the product

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Service Model

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Service / Warranty Case 1

Detector Repair Under Warranty and/or Accident Protection Insurance (API)

1. After troubleshooting the detector failure with the CoE & Service Desk it is determined that the detector is in need of repair.
2. The Service Desk will place an order to have detector packing material sent to the customer.
3. Customer sends detector to Rochester service depot for evaluation.
4. Service Depot evaluates detector within 2-5 days after receiving the detector.
   - If failure is covered under warranty or API customer will be asked if they can accept a replacement detector.
     - If they can accept a replacement, a detector will be sent to the customer at no charge.
     - If they need their original SN back, detector will be repaired (assuming possible).
   - If failure is not covered under warranty or API, the Depot will provide a quote for detector repair/replacement.
     - If customer agrees to the repair and provides a PO, a replacement detector will be sent to the customer.
     - If the customer does not agree to the repair, then their non repaired detector will be sent back to them.

Service / Warranty Case 2

Detector repair "Class D" (No Warranty or API)

1. After troubleshooting the detector failure with the CoE & Service Desk it is determined that the detector is in need of repair.
2. The Service desk requests a non-refundable $3K PO from customer for detector evaluation (will be credited against the repair if customer chooses to repair).
3. Upon receipt of the customer PO the Service Desk will order detector packing material to be sent to the customer.
4. Customer sends detector to Rochester service depot for evaluation.
5. Depot quotes detector repair cost within 2-5 days after receiving the detector.
   - Customer agrees to the repair costs and provides the necessary PO.
   - Customer will be asked if they can accept a replacement detector or if they need their original detector back (if the detector can be repaired).
     - If they need their original SN back, detector will be repaired (assuming possible)and returned. .
     - If they can accept a replacement, a detector will be sent to the customer and they will be billed the repair cost of the defective detector they sent back.

Service / Warranty Case 3

Detector repair "Class D" (No Warranty or API) Customer needs replacement unit immediately and provides PO up-front

1. After troubleshooting the detector failure with the CoE & Service Desk it is determined that the detector is in need of repair.
2. Customer would like a replacement detector prior to sending back their detector for evaluation, and is willing to provide PO for up to full cost of the Detector
3. Upon receipt of the customer PO the Service Desk will order a replacement detector be sent to customer.
4. Upon receiving the replacement detector the customer will pack and send the failed detector to the service depot.
5. The service Depot provides the repair quote that will be charged against the customer PO customer will be asked if they can accept a replacement detector or if they need their original detector back (if possible).
   - If they need their original SN back, detector will be repaired (assuming possible) and returned.
   - If they can accept a replacement, a detector will be sent to the customer and the invoice will be billed full amount for a replacement detector.

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DRX-Plus Service Model

Important Things to Note:

1) Warranty does not cover excess exposure or customer incurred damage.
2) We will have (2) regional service locations that stock swap-out panels:
    I. Rochester, NY — Covers US/C, LAR and APR
    II. Stuttgart, Germany — Covers EAMER

    We will add additional panel(s) to China & Brazil once sales occur.
3) In the case a panel is swapped-out, customer WILL NOT get back their original serial number. This needs to be discussed ahead of time.
4) Customer warranty does not change with a swapped out panel. If they had 5 months left at time of swap, the replacement panel carries 5 months.

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Selling Points

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Portability

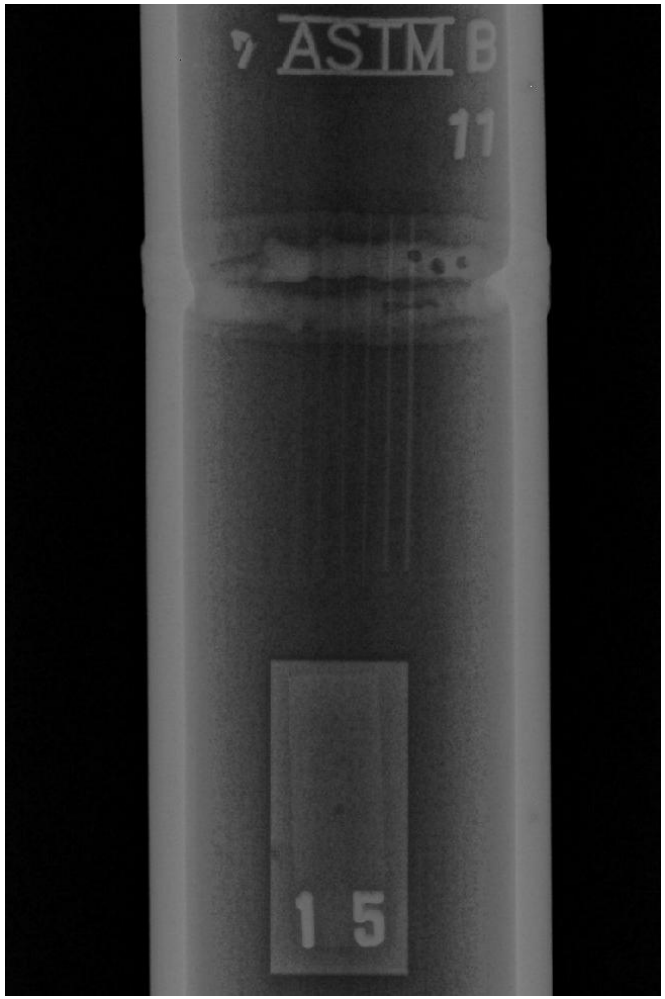
The DRX-Plus is one of the most portable DR panels available in the industry today. Its lightweight making it ideal for inspection work inside a lab or in a mobile environment. DRX-Plus benefits:

1. Can be used in many applications due to compact size and weight.
   i. Very portable (6.75 lbs / 3.0 Kg).
   ii. Very Thin (0.6 inches / 1.5 cm)
2. Wireless Connection for ease of use.

Image Quality

Image quality testing proved excellent image quality

- The DRX-Plus can achieve the sensitivity required for many NDT applications.
- Sample below 2” Sch 80 pipe, pulled the #6 wire on an ASTM B gauge and 2T (arguably 1T) with gamma source.
- Easily met ASME code requirements in the limited testing done to date.



Runs in Mode 1 or Mode 2

- The DRX-Plus can be run in Mode 1 or mode 2.

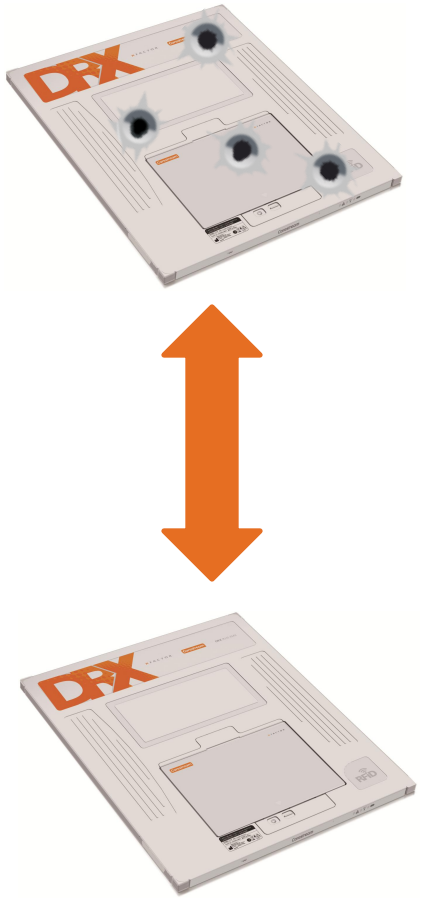
Rapid Image Viewing

- You will be surprised at customers reactions to its overall design when they see the DRX-Plus.
- Make to highlight all the points:

1. Weight 6.75 Lbs (3 Kg)
2. Long battery life (300+ shots/charge).
3. Weatherproof IP57 rating.
4. “Close to Edge” Imaging
5. Reduce image processing time
6. Reduce the approval cycle time.
7. Improve overall productivity.

Rapid Image Viewing

- The DRX-Plus is the only panel in the industry that offers a Swap-Out repair.
  - Applicable to panels under warranty
  - If the CoE cannot fix the problem remotely they will initiate shipment of a swap out panel to the customer.
  - Customer gets the new panel (to keep) and returns their defective detector to Carestream in the same box.



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Catalogue Numbers

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Preliminary Cat #’s

Catalogue #	Description
8602617	INDX DRX-Plus 3543 GOS Panel
1750090	Tether Kit
8602799	Power over IP with/Global AC Power Cables
1528439	Battery Charger
8024853	Battery (qty 1)
8603276	INDX DRX-Plus 3542 Detector Utility Case
8603268	INDX DRX-Plus 3543 Transport Case
8604332	INDX DRX-Plus 3543 Accident Protection Insurance

Preliminary Cat #’s

Catalogue #	Description
1006303	Network Access Point for US
1006311	Network Access Point for Great Britain
1006329	Network Access Point for Latin America
1006345	Network Access Point for Australia/New Zealand
1006352	Network Access Point for Brazil
1006360	Network Access Point for Canada
1006378	Network Access Point for China
1006428	Network Access Point for Egypt
1006436	Network Access Point for Israel
1006451	Network Access Point for Japan
1006469	Network Access Point for Korea
1006477	Network Access Point for Russia
1006758	Network Access Point for Singapore
1006774	Network Access Point for Taiwan

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Appendix

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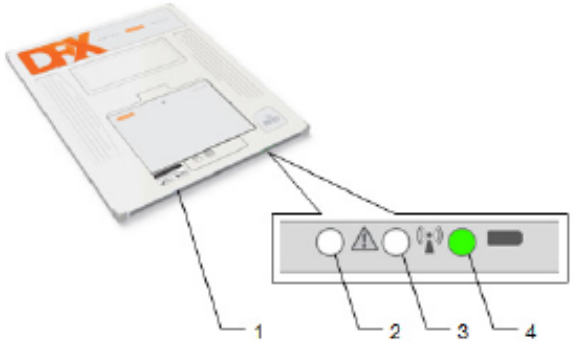
LED Indicator Faults



The drawing above locates the Reset button (1), and the LEDs that Indicate Error (2), Communication (3), and Power (4).

LED Indicator	Condition	Meaning
		
Off		No power, or the detector is asleep, or no error. You can make an exposure if the Power LED is green or yellow.
G	Blinking	The detector is booting.
M	Blinking	There is a detector fault condition preventing the detector from going into the Ready state.

LED Indicator Faults

The drawing above locates the Reset button (1), and the LEDs that indicate Error (2), Communication (3), and Power (4).

LED Indicator	Condition	Meaning
O	Blinking	Shock is recorded and calibration has failed.
O	On	Shock is recorded and calibration is recommended.

LED Indicator Faults

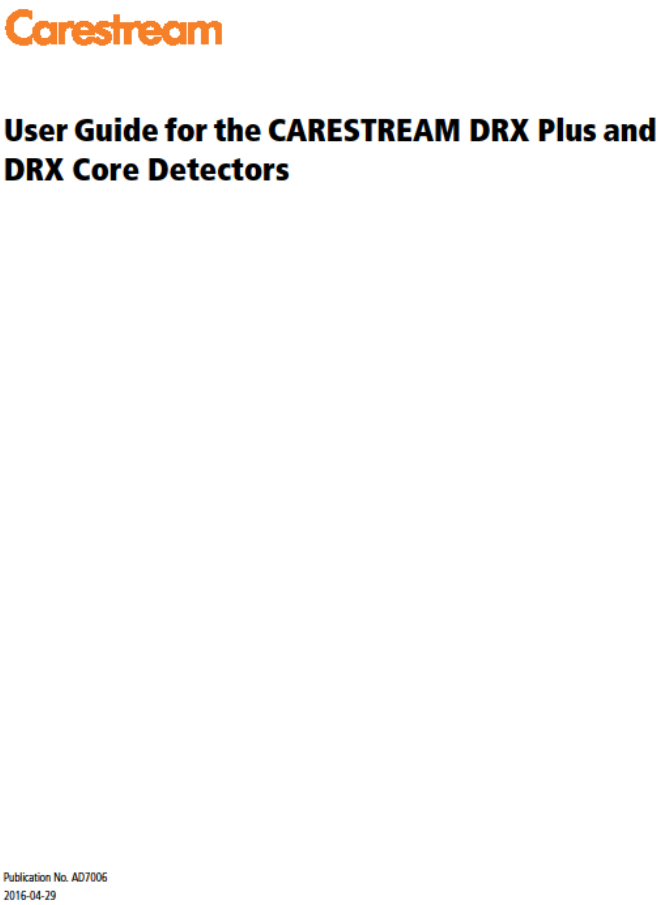
Off		No power, or the detector is asleep. You may make an exposure if the Power LED is green or yellow.
G	Blinking	The detector is booting.
M	Blinking	Wireless associating/authenticating.
M	On	Authenticated.
B	On	The detector is connected to the Console/client but not ready to expose.

LED Indicator Faults

Off		No power, or the detector is asleep.
G	Blinking	The detector is booting.
G	On	The detector is Ready, and the battery is good.
Y	On	The detector is Ready, and the battery is low. Limited exposures are remaining.
M	On	The power is on, and the battery is below imaging level.

Key	
G	Green
M	Magenta
Y	Yellow
B	Blue
O	Orange

DRX-Plus Files (click on each for more information)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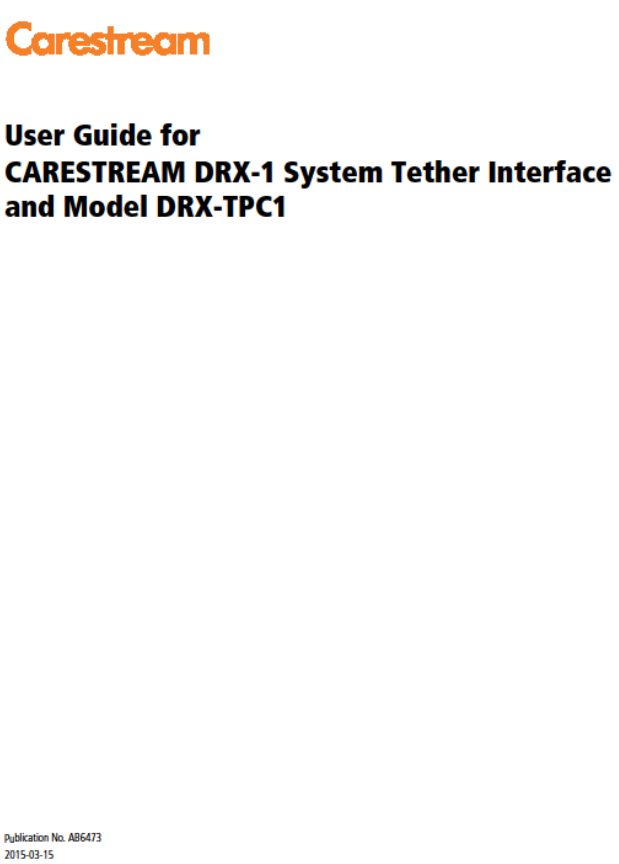
User Guide for the CARESTREAM DRX Plus and DRX Core Detectors

Publication No. AD7006
2016-04-29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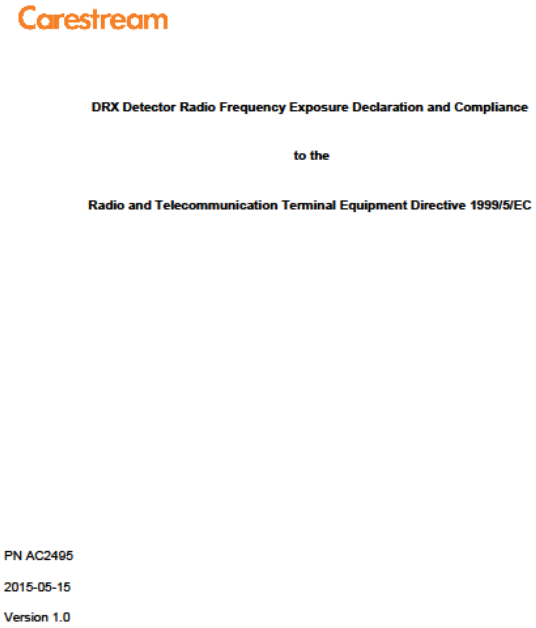
User Guide for
CARESTREAM DRX-1 System Tether Interface and Model DRX-TPC1

Publication No. AB6473
2015-03-15

DRX-Plus Files (click on each for more information)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DRX Detector Radio Frequency Exposure Declaration and Compliance

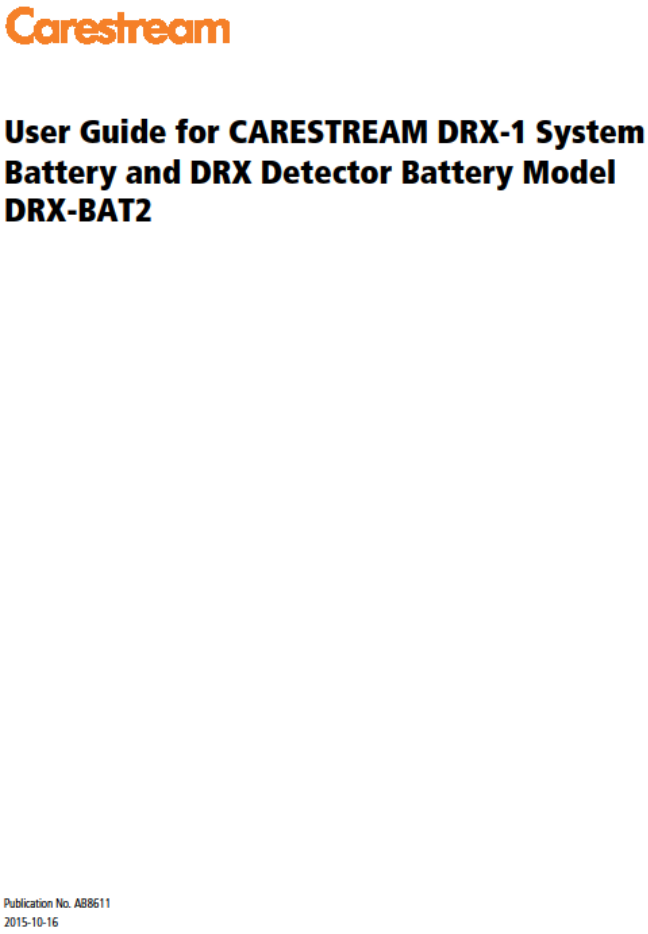
to the

Radio and Telecommunication Terminal Equipment Directive 1999/5/EC

PN AC2495

2015-05-15

Version 1.0


Carestream

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