PHILIPS

*Mobile**Diagnost** wDR*

Mobile digital radiography

Access all areas with
the **premium DR room to go**

Philips MobileDiagnost wDR Release 2 specifications

1 Introduction

Philips MobileDiagnost wDR offers you the superb quality and full efficiency of Philips' premium digital radiography rooms all packed into a flexible mobile X-ray system. The system has an outstanding workflow with rapid availability for critical situations. The Philips SkyPlate wireless portable detector along with UNIQUE 2 image processing and Skyflow Plus scatter correction offer premium digital images. With the option of a sliding column, the MobileDiagnost wDR is easy to maneuver; and you'll reach every area of the hospital — with new levels of imaging flexibility.

Contents

Ambient Conditions

Temperature range	
Operation	+10°C to +35°C
Storage	–10°C to +40°C
Relative humidity	
Operation	30% to 75%
Storage	20% to 90%
Air pressure	
Operation	700 mbar to 1060 mbar
Storage	700 mbar to 1060 mbar
Class A device according to EN 60601-1-2	

Key advantages

- **Access to all hospital and anatomical areas**
  Make use of a flexible system with sliding column for tight spaces and acute care areas such as ER

- **Access to excellent efficiency and workflow**
  Perform exams seamlessly with intuitive system handling

- **Access to rapid, high-quality images**
  Get outstanding grid-less images fast to support confident diagnoses

2 System overview

Digital wireless mobility means having your DR room wherever you need it. That's especially advantageous for critical, acute areas where rapid decisions are essential. Gain time through easy positioning and rapid image processing. Take the equipment to the patient – because fast diagnoses can make all the difference.
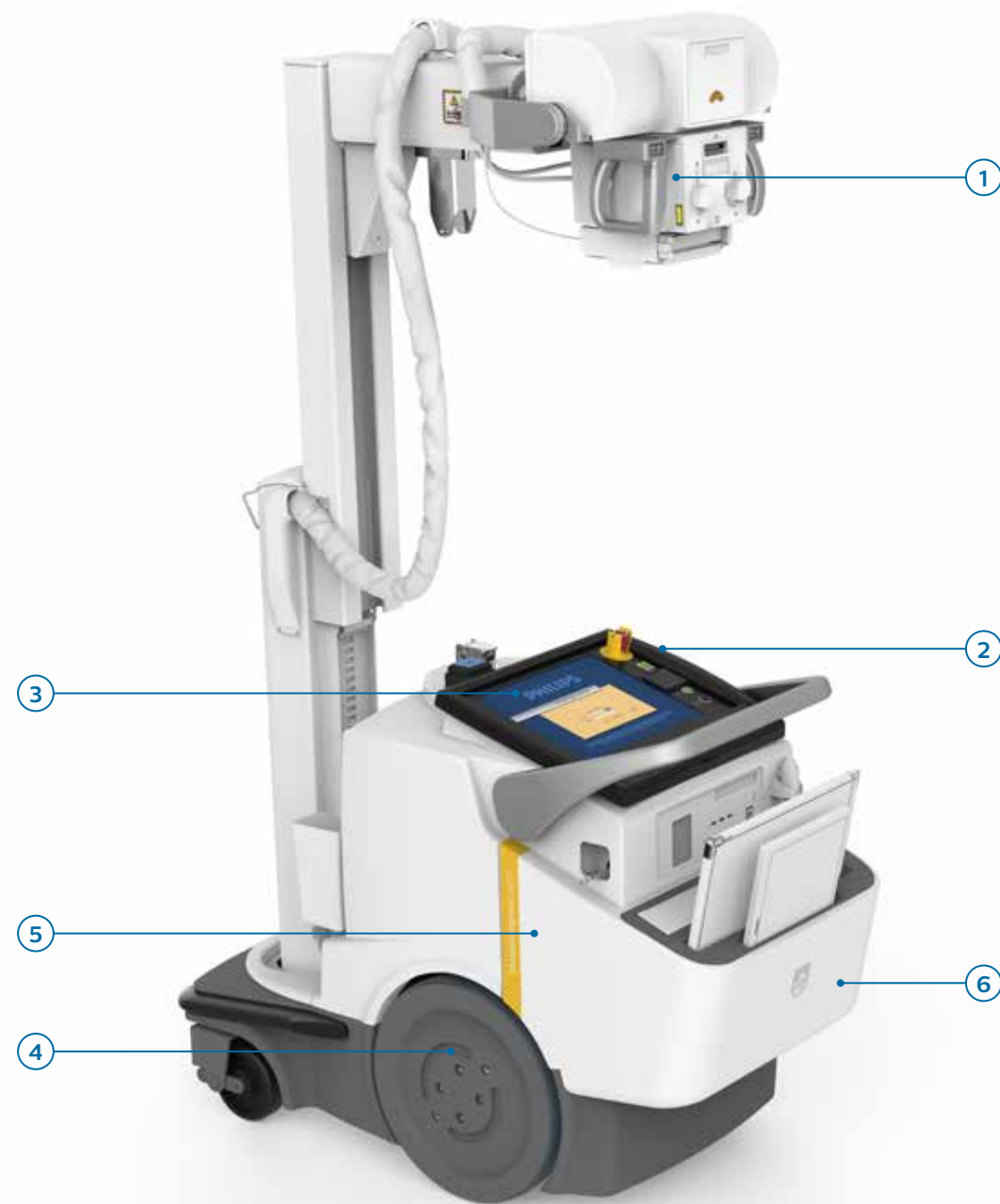
① Advanced tube head
- Fine positioning capabilities allow moving the system in all directions from the tube head
- High speed tube with dual focal spots allow for easy imaging of small and large anatomical structures
- Compact tube head design for high visibility while driving from room to room
- Free movement with single brake release in handle

② Convenient driving capabilities
- Robust base unit with comfortable driving speed
- Easy handling and convenient driving
- Small turning radius supports smooth navigation

③ Next generation Multi-resolution UNIQUE 2 image processing
- State-of-the-art image processing that provides all relevant information in one image
- Harmonizes contrast, enhances small details and attains detail in all areas
- Achieves consistently high image quality

④ Outstanding maneuverability
- Large wheels for managing uneven floors and small hurdles
- Spring-loaded frontwheels for shock vibration absorption
- Anti-collision sensors to stop system automatically

⑤ Powerful interior
- Powerful high performance version boosts power for bariatric patients and demanding exposures with peak performance up to 500 mAs
- Favorable performance version is especially suited for standard radiography applications

⑥ Smart battery management
- Dual battery system provides dedicated power for exposures and motor drive

2 System overview

1 Versatile collimator
- Built-in spectral filters and optional DAP meter for X-ray dose management and reporting
- Bright, long-lasting LED light clearly indicates exposure area
- SID laser indicator supports convenient positioning

2 Easy to position
- Sliding column option offers excellent visibility making the system easy to drive and easy to park
- Tube arm with long telescopic range easily reaches over patient beds
- Allows flexible positioning with 317° rotation

3 Intuitive Eleva user interface
- Harmonized and intuitive user interface across X-ray modalities for easy operation
- All parameters are refined for different types of patients, exams, views, and acquisition
- Immediate image viewing capability on the 17" touch-screen display provides for swift procedures throughout the hospital
- Integrated generator control

4 Fast connection
- Rapid transfer of images to hospital network via Wi-Fi or LAN connection
- Based on wireless standard technology and additionally equipped with a LAN cable
- Now available on more secure and updated Windows 10 platform

5 A grid-less workflow with SkyFlow
- Improves image contrast
- Saved an average of 34 seconds per chest exam vs. grid workflow[1]
- Provides economic value
- Allows for fewer retakes caused by grid misalignment
- Supports X-ray dose management
- Is fully automatic, patient adaptive, and works without special attention

6 Sturdy SkyPlate wireless portable detector
- Comfortable handling with cable-free design
- Two detector sizes to carry-out even the most difficult projections, small, 24 cm x 30 cm (10" x 12" approx.) large, 35 cm x 43 cm (14" x 17")
- Lightweight with maximum weight (incl. battery): Small detector: 1.6 kg (3.5 lbs) Large detector: 2.8 kg (6.2 lbs)
- Resolution of 148 µm allows for high-quality imaging
- Excellent X-ray dose management with digital Csl detector
- Convenient on-board battery charging and grid storage

1 For more details refer to white paper "Grid-less imaging with SkyFlow: Time savings and work ow improvements" 4522 991 11471 * Jun 2015

3 Geometry

The MobileDiagnost wDR has a strong, robust design making it highly suited to the aggressive demands of busy medical facilities. It may quickly become your hospital hero. No matter what the critical area, the MobileDiagnost wDR zooms to where it's needed, aptly does the job, then quickly departs to the next task. It gets into tight spaces and navigates crowded areas with ease, so you can give your patients the care they need and streamline your procedures.
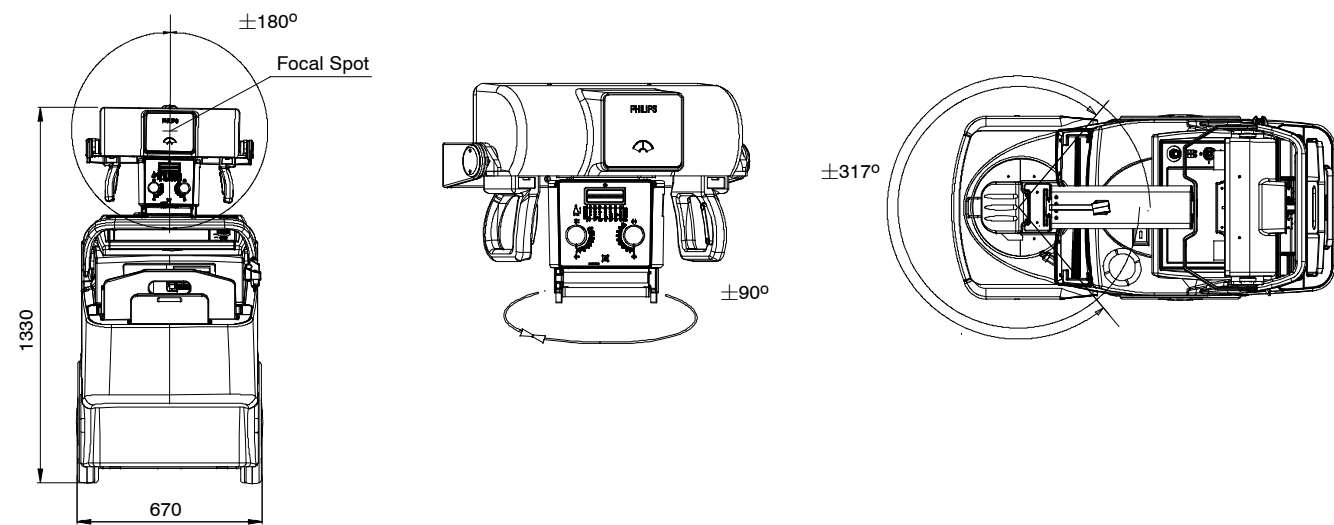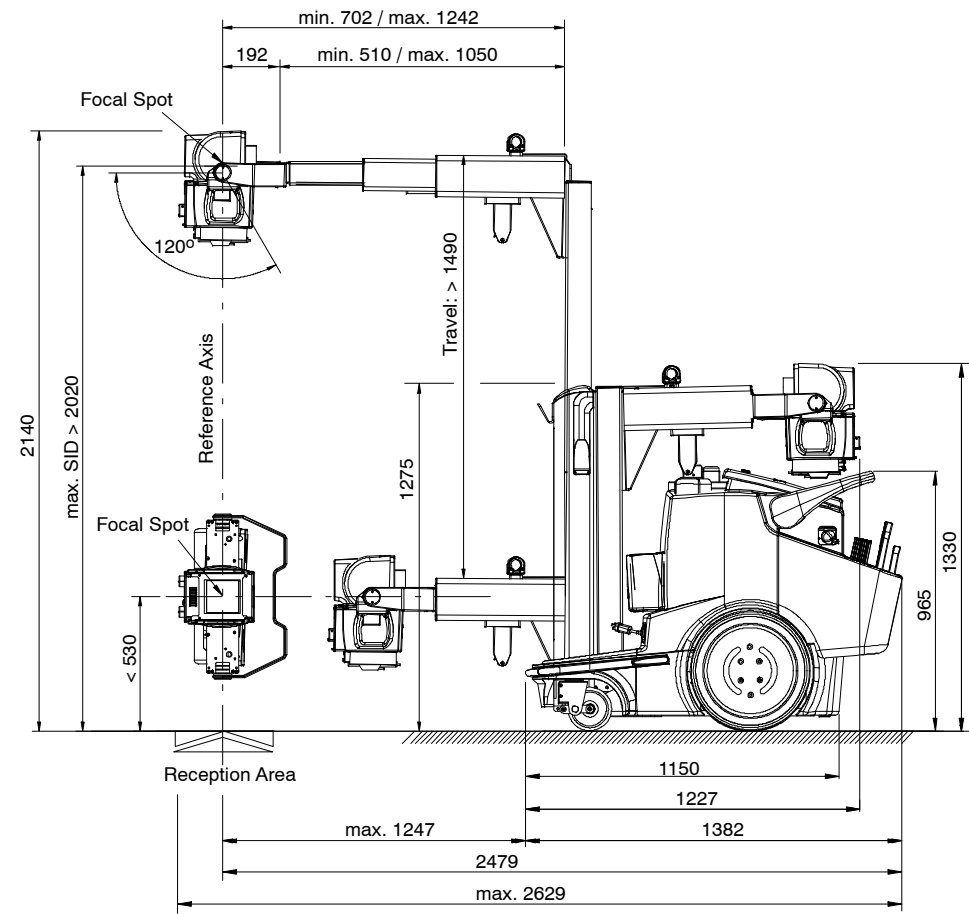
Base Unit

Type	Mobile X-ray unit with sliding column X-ray tube arm and wireless portable detector
Dimensions (l x w x h) in parking position	1382 mm x 670 mm x 1330 mm (54.4" x 26.4" x 52.4")
Weight	580 kg (1278 lbs)
Wheel base length	600 mm (23.6")
Back wheel size	430 mm (17")
Motorization	5 km/h (3.1 mph) tube in parking position 1.6 km/h (1 mph) tube not in parking position 2.5 km/h (1.6 mph) backwards
Focal point distance from floor	53 to 202 cm (20.9" to 79.5")
Focal point distance to column	Max: 1242 mm (49") Min: 702 mm (27.6")
Tube column rotation	± 317°
Handswitch with exposure release button and collimator light button	Yes
Fine positioning from tube head	Yes
Anti-collision sensor and brake	Yes
Hook for lead apron	Yes
Grid storage for 2 click-on grids	Yes
Storage trays for bottles, hygienic bags, papers and others	Yes
Exposure on mains	Yes (available at minimum battery charge level)
Keyless system access	Yes

Batteries

Batteries	Separate batteries for drive and generator control
Type of batteries	Lead Crystal (Generator) Lead Acid (Motor)
Low battery indication	Yes
Power for charging single phase	100/110/220/230 VAC; ± 10%
Generator battery capacity	14 Ah
Time to charge generator battery (from empty to fully charged)	9 hours
Motor battery capacity	9 Ah
Typical usage	4 hours of continuous movement (approx. 20 km/12.4 mi)
Time to charge motor battery (from empty to fully charged)	6 hours

Convenient storage trays allow you to carry additional equipment with the system.

min. 702 / max. 1242

192   min. 510 / max. 1050

Focal Spot

120°

Travel: > 1490

Reference Axis

max. SID > 2020

2140

Focal Spot

1275

1330

965

< 530

Reception Area

1150

1227

1382

max. 1247

2479

max. 2629

±180°

Focal Spot

1330

±90°

±317°

670

Dimensions in mm.
Tolerance in Dimensions ±1%

4 SkyPlates

Philips SkyPlate, wireless portable detector, is made of amorphous silicon and cesium iodide scintillator for excellent image quality. These versatile devices are easy to carry and position.

	SkyPlate Small		SkyPlate Large	
Type	Digital CsI (Cesium Iodide) flat detector (ISO 4090)			
Housing material	Carbon fiber			
Sensor protection material	Carbon fiber			
Detector size	24 cm x 30 cm (approx. 10" x 12")		35 cm x 43 cm(14" x 17")	
Active area	22.2 cm x 28.4 cm (approx. 8.7" x 11.2")		34.48 cm x 42.12 cm (approx. 13.6" x 16.6")	
Dimensions according to ISO 4090 Target Target tolerance Thickness Thickness tolerance	267.5 mm x 327.5 mm (10.5" x 12.9") +1 mm/ –1 mm (+0.04"/ –0.04") 15 mm (0.59") +1 mm/ –2 mm (+0.04"/ –0.08")		383.5 mm x 459.5 mm (15.1" x 18.1") +1 mm/ –1 mm (+0.04"/ –0.04") 15 mm (0.59") +1 mm/ –2 mm (+0.04"/ –0.08")	
Image matrix size	1500 x 1920 pixels		2330 x 2846 pixels	
Detector pixels	2.9 Megapixels		6.6 Megapixels	
Pixel size	148 µm		148 µm	
Image resolution	Up to 3.38 Lp/mm		Up to 3.38 Lp/mm	
DQE and MTF values at 2 µGy	DQE (%)	MTF (%)	DQE (%)	MTF (%)
0.05 Lp/mm	70	NA	70	NA
1.0 Lp/mm	51	61	51	61
2.0 Lp/mm	42	30	42	30
3.0 Lp/mm	29	14	29	14
Energy range (kVp)	40 – 150		40 – 150	
A/D Conversion (bits)	16		16	
Weight (incl. battery)	1.6 kg (3.5 lbs)		2.8 kg (6.2 lbs)	
Max. patient weight	100 kg (220 lbs) on 4 cm disk for weight bearing examinations 300 kg (662 lbs) for distributed load, e.g. chest examinations in bed (upto 150 kg on the detector)			
WLAN network standard	WiFi standard IEEE 802.11 a, b, g or n (configurable)			
Encryption	Default WPA2 encryption according to IEE 802.11			

Ambient conditions for operation

Temperature range	+10°C to +35°C
Altitude	max 3012 m (9,882')
Relative humidity range	20% to 80%
Ambient pressure range	700 mbar to 1100 mbar
Oxygen saturation	max 100%

Battery	SkyPlate
Technology	Exchangeable lithium ion battery
Size of batteries	248 mm x 74 mm x 7.1 mm (9.8" x 2.9" x 0.28")
Battery charging time	4 hours max. for 100% charge
Bar charge status color indication per battery	0–25%; 25–50%; 50–75%, 75–100%
Autonomy operation mode	Large: typically 6.5 hours/ 1050 images Small: typically 5.5 hours/ 950 images
Autonomy listen mode	Large typically 11.7 hours without image acquisition Small typically 10 hours without image acquisition
Charging slots	1
User–replaceable battery	yes
Ingress Protection	IP43

Convenient handling with the SkyPlate's lightweight and cable-free design.

Optional

Accessories for SkyPlate

Detector holder
With Philips well designed detector accessories, like SkyPlate wireless detector holders, procedures may become easier, faster and more patient- friendly as they help the technologist to work around the patient. Reach every patient body area and lessen your physical involvement with a moveable holder or bed holder.

Moveable detector holder	Suited for the SkyPlate wireless portable detector, CR or film cassettes
Dimensions (l x w x h) Vertical height adjustment Horizontal position Swivel around the vertical axis	830 mm x 670 mm x 1500 mm (32.7" x 26.4" x 59.1") from 680 mm to 1280 mm (11" to 50.4") can be pivoted to any angle from 0° to 90° and swiveled around the lateral axis ±45°
Formats	Supports both landscape and portrait formats
Detector holder patient bed	Suited for the wireless portable detector, CR or film cassettes
Dimensions (w x h)	220 mm x 630 mm (8.7" x 25")
Formats	Supports both landscape and portrait formats

Grids
You are able to order click-on grids in portrait or landscape orientation for the SkyPlate detector and transport it directly on the mobile unit. The grids are especially useful for abdomen, chest, axial hip and pelvis applications. Philips advanced gridline-correction algorithm removes the gridlines from the images for excellent image quality.

Type	Click on, fixed grid with fiber interspaces and carbon fiber cover plate
Grid SkyPlate large portrait (including handle)	44 lines/cm (112 lines/inch), ratio 8, focus 130 cm (51"), for source-image distance from 96 to 203 cm (38" to 80"), 2.0 kg (4.4 lbs)
Grid SkyPlate large landscape (including handle)	40 lines/cm (100 lines/inch), ratio 8, focus 130 cm (51"), for source-image distance from 100 to 185 cm (39" to 73"), 2.0 kg (4.4 lbs)
Grid SkyPlate small portrait	40 lines/cm (100 lines/inch), ratio 8, focus 130 cm (51"), for source-image distance from 84 to 291 cm (33" to 115"), 1.0 kg (2.2 lbs)
Automatic gridline-correction algorithm	yes

Handle frame for Large SkyPlate

Dimensions	46.8 cm x 47.6 cm x 2.5 cm (18.4" x 18.8" x 1")
Weight	1 kg (2.2 lbs)

To enhance workflow and ease patient positioning, the moveable detector holder is designed to make exceptional use of the wireless portable detector.

With the detector holder for patient beds projections can easily be performed without moving the patient.

Grids for the SkyPlate detector can always be carried in the MobileDiagnost wDR grid holder.

5 Detector sharing

Philips detector sharing enables hospitals to share the Philips SkyPlate detectors between Philips digital radiography systems. There are plenty of options available that help to increase system and detector utilization. The SkyPlate detector can be used for free exams or inserted in a wireless tray in tables or vertical stands in several rooms providing more cost efficiency and flexibility at the same time.

Optional detector sharing

Main benefits at a glance
- Low initial investment while providing a high level of flexibility
- Back-up solution to provide continuous uptime
- Smart starting point for upgrades, i.e. adding additional detectors in the future

Cost efficiency as the driver
- In today's medical world facilities have to be mindful of the budget while maintaining their power to compete
- SkyPlate sharing is a convincing answer to financial constraints
- With a fixed expenditure the room utilization can be raised to an even higher degree

Possible scenarios for detector sharing
- If there are times during the day when one SkyPlate detector would be enough to cover the workload
- If the hospital is equipped with several digital radiography rooms in close proximity which only occasionally need a SkyPlate detector
- If the medical facility only needs mobile radiography units at certain times during the day

Increased detector utilization with detector sharing.

6 X-ray generation

The MobileDiagnost wDR is available as a performance or high performance solution comprising different generator options. With its robust high performance package, the MobileDiagnost wDR delivers fast exposure times for challenging examinations and critical patients. The generator also boosts power for bariatric patients.

Generator	MobileDiagnost wDR Performance	MobileDiagnost wDR High Performance
Type	High frequency	High frequency
Power	20 kW	40 kW
kV range	40 – 125 kV in steps of 1 kV	40 – 150 kV in steps of 1 kV
mA range	10 to 320 mA	10 to 500 mA
mAs range (dependent on the kV range)	0.1 – 500 mAs	0.1 – 500 mAs
Exposure times	0.001 - 1.25 s with SkyPlate 0.001 - 4 s with free cassette	0.001 - 1.25 s with SkyPlate 0.001 - 4 s with free cassette
Frequency	50/60 Hz	50/60 Hz

Tube		
Focal spot	0.3 / 1.0	0.7 / 1.3
Anode angle	12°	16°
Anode heat storage capability	100 kJ (140 kHU)	220 kJ (300 kHU)
Speed	2700 min-1 at 50 Hz 3200 min-1 at 60 Hz	2700 min-1 at 50 Hz 3200 min-1 at 60 Hz
Horizontal angulation of tube head	120°	120°
Active tube head brakes	Yes	Yes
Tube overload protection	Yes	Yes

Collimator		
Type	Manual, with LED light field indicator	
Rotation	±120°	
Filters	Built in filter disk for manual filter selection No filter 1 mm Al + 0.1 mm Cu 1 mm Al + 0.2 mm Cu 2 mm Al	
Light indication when filter is selected	Yes	
SID laser light alignment	SID distance configurable at installation	
Manual SID indication	Yes	

SID laser indicator allows convenient positioning.
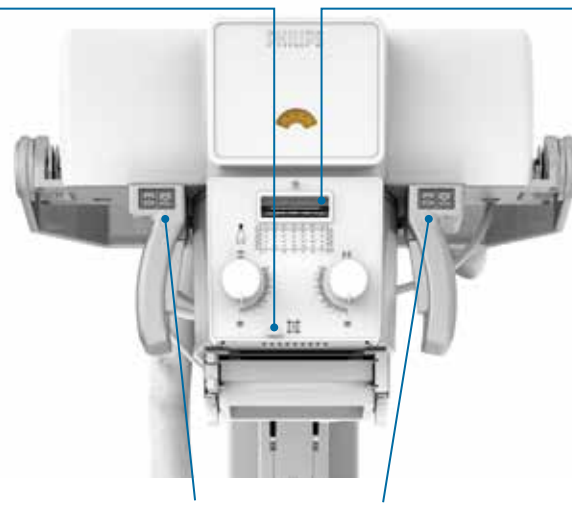
Built-in spectral filters for superb X-ray dose management.

Fine positioning capabilities allow moving the system in all directions from the tube head.

Dose Area Product meter

The Dose Area Product meter measures the X-ray dose output at the collimator and reports the measured Dose Area Product (μGy*m^2) to the DICOM header of the image. With this optional DAP meter, technologists can easily check the X-ray dose and perform dose reporting.

Dimensions (l x w x h)	170 mm x 170 mm x 18 mm (6.7" x 6.7" x 0.7")
Active area	147 mm x 147 mm (5.8" x 5.8")
Light transparency	> 70 %

The optional Dose Area Product meter allows users to benefit from integrated dose reporting to PACS.

Optional

Wireless remote control for preparation/exposure

The wireless remote control for MobileDiagnost wDR uses infrared technology and allows technologists to keep a larger distance from the X–ray source for excellent radiation protection.

Type	
Type	Infrared; with battery status display
Range	10 m (32.8 ft)
Acoustic signal when remote control is not inserted back into the cradle	Yes
Collimator light button on remote control	Yes

To support a low radiation dose for staff, exposure can be released with optional wireless remote control.

Barcode Reader

Achieve a fast and smooth workflow with a barcode reader, that can translate any barcode to text on the selected text field. Some examples–
Patient ID
Tech ID
User ID and Password on Login screen

Advantages:

Comfortable, Ergonomic design
Excellent handheld scanning
Reduced typographical errors during examinations
Quicker login

7 Digital workflow

Your filmless workflow will be convenient and fast. The SkyPlate detectors and the renowned Eleva user interface provide all tools and controls on an intuitive touchscreen display to allow for seamless procedures. Exams can be prepared, performed and completed in just three steps, combining highly efficient operation with rapid results. Pre-programmed automatic exposure parameter settings for different patient types and radiography views may speed up procedures more.

Intuitive workflow with Eleva user interface that provides all tools and controls on an intuitive touch-screen display.

Eleva workspot

Hard disk	1 TB
Image storage	Typically 4,000 images
RAM storage capacity	16 GB
Interfaces	Wi-Fi USB & infrared Detector interface LAN cable (Ethernet)
Start up time	Approx. 2 minutes
Monitor	17"-LCD color touch-screen monitor 1280 x 1024 at 60 Hz
Generator control	Integrated into Eleva software More than 600 pre-programmable APRs
Typical time to preview image	5 seconds
Additional time to full image	7 seconds
Typical cycle time	12 seconds
UNIQUE 2 multi-resolution image processing	Yes

Image data

Data volume	Small SkyPlate: 5.8 MB/image Large SkyPlate: 13.2 MB/image
Matrix depth	16 bit/pixel

Wireless connection from SkyPlate to MobileDiagnost wDR

Network type	Isolated private wireless LAN (Wi-Fi)
Based on IEEE 802.11 N	Configurable (2.4Ghz or 5Ghz)
Back-up cable	LAN, 2 m (approx. 6.6 ft)
Data encryption	WPA2
Wi-Fi access point	Link in Base Unit
Available channels	Selectable at installation/depending on country allowance (can be configured according to hospital preferences)
IP addressing	Static IP-addresses will be set during installation

Wireless connection MobileDiagnost wDR to hospital network

Network type	Standard wireless connection (according to the hospital infrastructure)
WLAN network standard	IEEE 802.11 a/b/g/n/ac
System protection	Application Control (White Listing technology) and firewall
Backup cable	LAN, 3 m (9.8")
Encryption	Configurable up to CCMP/AES according to WPA2 (IEEE 802.11 a/b/g/n) FIPS 140 compliant
Authentication	PSK or IEEE802.1X (PEAP, EAP-FAST, EAP-TLS supported)
IP addressing	Dynamic Host Configuration Protocol (DHCP) /Static (Both)

DICOM

MobileDiagnost wDR is DICOM compatible. This means that you can benefit from all relevant DICOM services offered via this common medical data transfer standard. Storing, retrieving, printing, and other features will improve your workflow.
DICOM SR Dose Reporting
The complete DICOM Communication Package Plus includes:
   DICOM Media on CD/DVD
   DICOM WLM (Work List Management)
   DICOM MPPS (Modality Performed Procedure Step)
   DICOM Print
   DICOM Image Export incl. Storage Commit
   DICOM Query and Retrieve

8 SkyFlow Plus

We're committed to providing you with technology to support excellent patient care. Enter Philips SkyFlow Plus. It's an intelligent software that produces images with grid-like contrast by managing the effect of scattered radiation for non-grid exams for all anatomies. You can decide whether or not to use a grid. When working without a grid, SkyFlow Plus can streamline your workflows, deliver high-quality images, and enable you to keep patients at the center of what you do.

A grid-less workflow with SkyFlow Plus

· Improves image contrast

· Saved an average of 34 seconds per chest exam vs. grid workflow[1]

· Allows for fewer retakes caused by grid misalignment

· Supports X-ray dose management

· Is fully automatic, patient adaptive, and works without special attention

Free up workflows
SkyFlow Plus is designed for efficiency – and fully automatic operation is just the start. Without an anti-scatter grid, you'll be able to work quickly, avoiding the time and effort associated with having to attach and detach a grid, not to mention carry, position and align one. You would also eliminate potential retakes due to grid cut-off or misalignment – because there is no grid.

Enjoy superb image quality
Support clinical excellence with images of excellent quality. You can review enhanced images and make decisions on the spot since SkyFlow Plus identifies and manage scatter from the image immediately. It also delivers the correct contrast for each individual patient type by automatically adjusting the contrast enhancement based on the amount of scatter. As a result, you can examine a wide range of patients, including bariatric cases, while maintaining high standards for your images.

Enhance the patient experience
Focus on the individual, not the equipment. SkyFlow Plus features fully automatic operation in all functions, so you can devote more attention to patients. Since you may not need to prepare the detector with a grid, you would be able to help patients, helping to shorten their exam times and position them comfortably during exams.
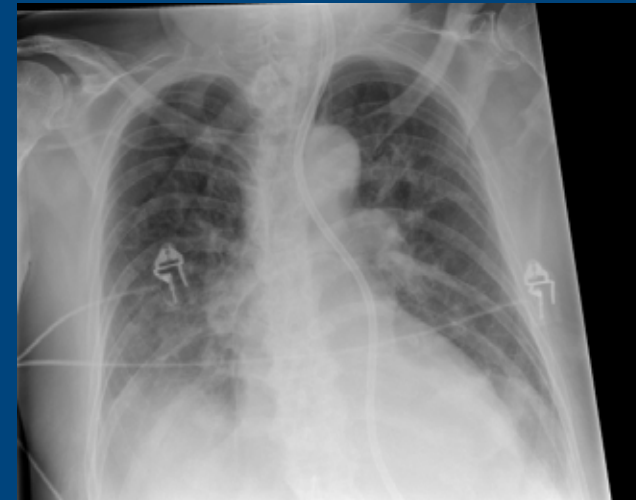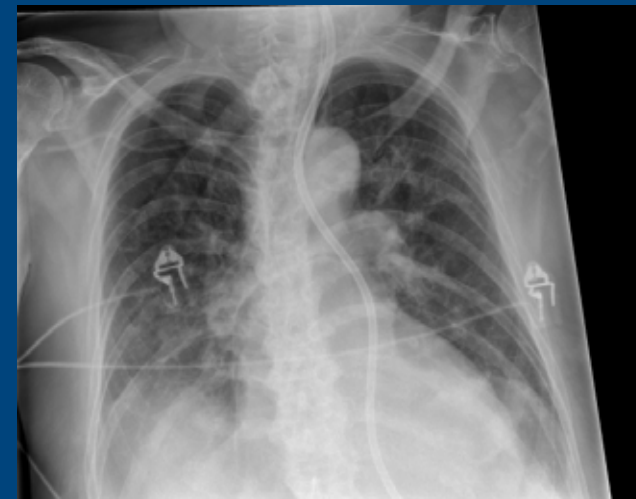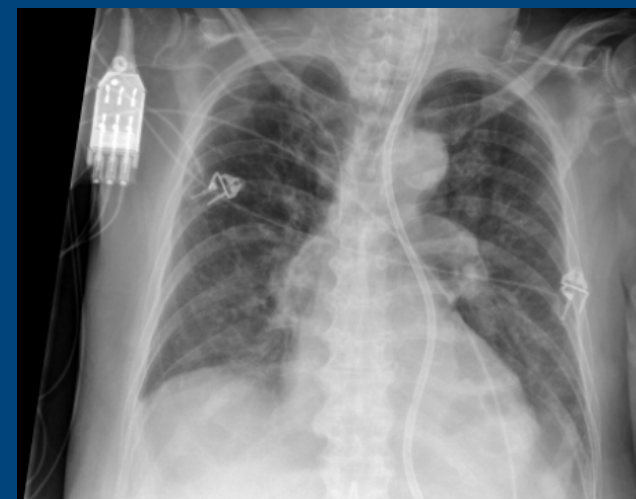
1 Whitepaper "Grid-less imaging with SkyFlow: Time savings and workflow improvements" 4522 991 11471 * Jun 2015

Image taken without Grid

Image taken without Grid but with SkyFlow Plus

Image taken with Grid

9 Image quality

Philips pioneered the use of multi-resolution image processing in digital radiography with the creation of UNIQUE (UNified Image QUality Enhancement). With UNIQUE 2 (**UN**ified **I**mage **QU**ality **E**nhancement) Philips introduces the second generation of this image post processing software. By increasing the image contrast and reducing noise and artifacts on digital radiographs, Philips addresses today's radiologists' needs. UNIQUE 2 processed images result in improved visibility of details while the overall impression remains natural.

Outstanding images for all anatomical areas
Irrespective of data origin, UNIQUE 2 multi-resolution software automatically delivers excellent images for both viewing and printing. It detects the appropriate region of interest and automatically sets brightness, contrast and detail enhancement, enhanced for each anatomical area and view.

The difference is in the details
UNIQUE 2 is especially suited to those applications where high-definition detail is absolutely essential. Designed for flat detector use and for more efficient workflow, images can be viewed after the exposure in a matter of seconds, fully processed. UNIQUE 2's design is based on customers' experience. With UNIQUE 2, images can be customized to the individual preference of the radiologist. Whether sharper or smoother images are preferred, UNIQUE 2 adapts to the way the user wants to see them displayed.

UNIQUE 2 main benefits at a glance

· Reduced noise and artifacts

· Second generation of image processing

· Consistent image impression

· Harmonized contrast

· Enhanced details

Chest AP

Hip AP

Skull lateral

Shoulder AP

Knee lateral standard processing

Knee lateral adapted processing for soft tissues

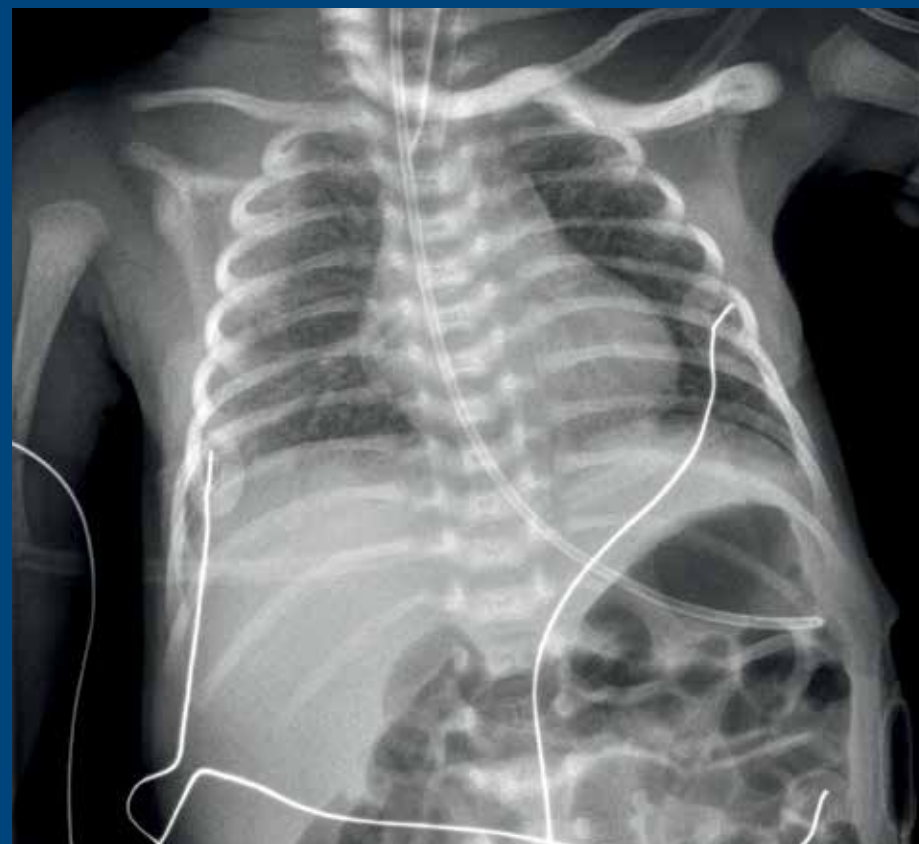**Pediatric chest**

10 Clinical QC

The powerful image statistic tool provides the advanced user with functionality to analyze operator rejected images and reasons for rejection. It also serves to monitor and analyze general parameters. Therefore Clinical QC supports the quality standards of the department and teaching situations.

Dose documentation per image and examination
Presets of image rejecting reasons
Time period statistics
Data filtering on rejected and confirmed examinations
Data filtering on body area, operators and dates
Statistic presentation as bar or pie chart at Eleva workspot
Export results in universal csv-format for use with external spreadsheet software
Data storage locally on the system that can be accessed with ftp from any computer connected to the hospital network. This connection is password protected.
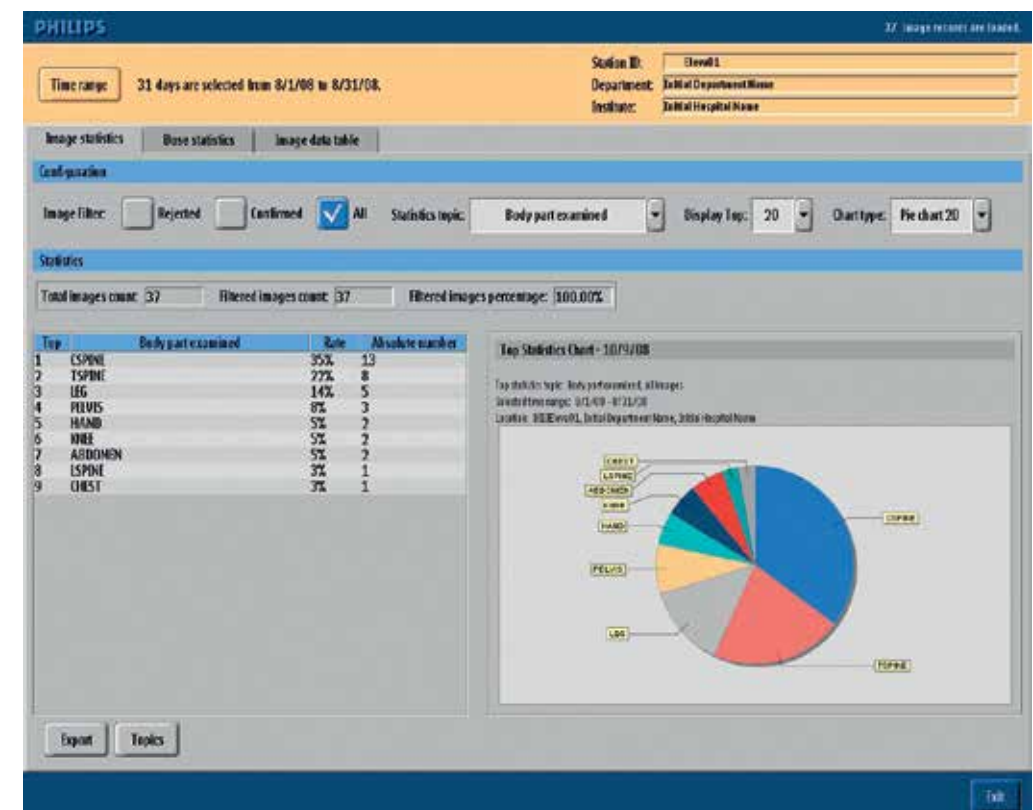
Convenient image statistics with Clinical QC.

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