



# Understanding you

Mobile C-arm systems BV Pulsera, Functional description

**PHILIPS**

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# Understanding you

The BV Pulsera is a powerful mobile fluoroscopy system for the most challenging surgical and interventional procedures.

The powerful pulsed technology allows you to go the distance in longer studies, capture moving anatomy and see through your largest patient.

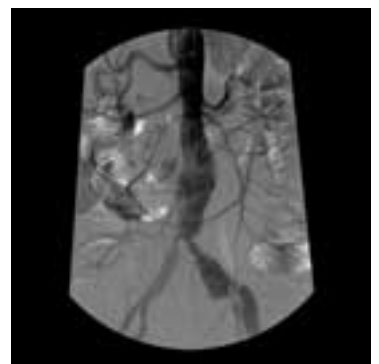
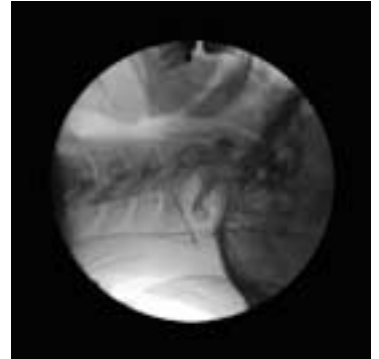
SmartVision, a highly advanced, full digital 1 Kx1K imaging chain in combination with unique state-of-the-art image processing algorithms (including BodySmart and Automatic Shutter Positioning) provides you with high quality images at the lowest possible dose.

The ultra compact Mobile View Station perfectly fits in the surgical workflow. The unique intelligent viewing concept of the Mobile View Station provides the user with easy transportation, easy and intuitive system set-up and optimal viewing capabilities.

The interventional powerhouse comes with a 9" or 12" image intensifier, and can handle the most advanced interventions as well as all routine and special procedures:

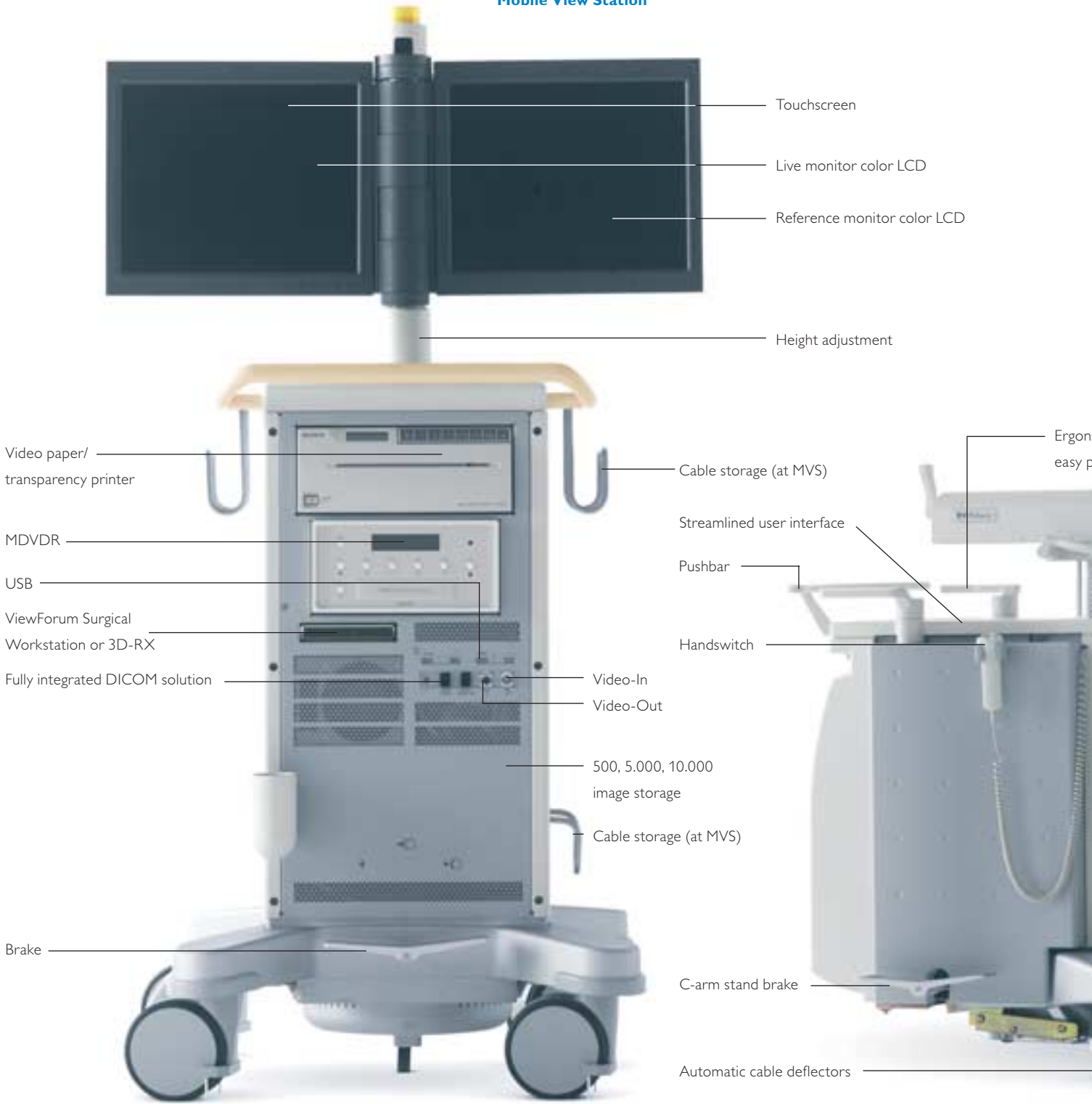
- Cardiovascular procedures (peripheral/abdominal/cerebral, interventions)
- Orthopedic surgery (fractures, fixation)
- Abdominal surgery (cholangiography, urological exams)
- Neurosurgical procedures (pain management, vertebroplasty)
- Thoracic surgery
- Three dimensional imaging with 3D-RX (Trauma surgery, Hand/wrist surgery, Maxillofacial constructions, Cochlear implants, Orbital surgery, Cervical spine)

Whatever your situation, the BV Pulsera shows everything you need to see during surgical- and interventional procedures.

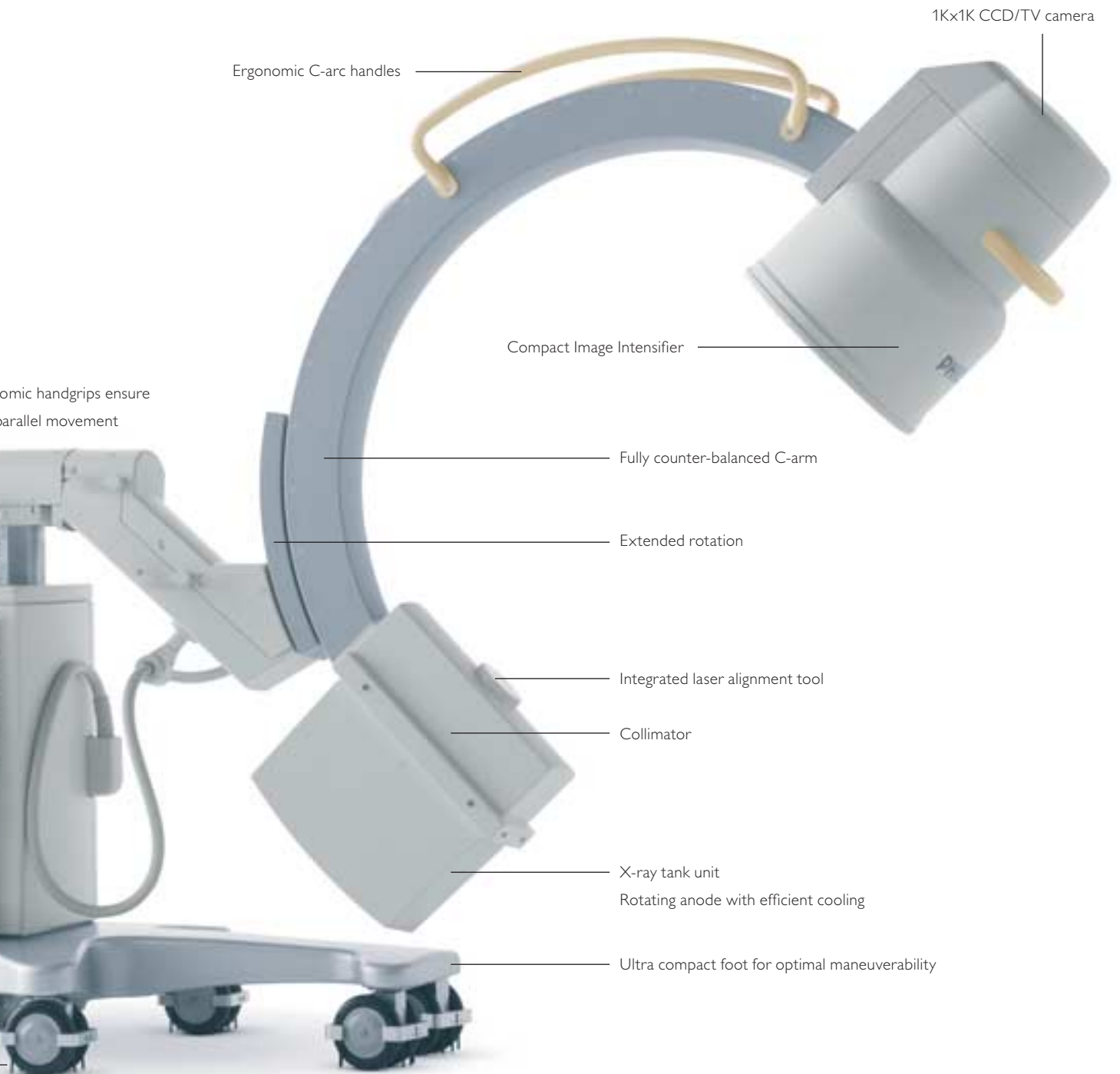


# System overview

## Mobile View Station



## C-arm stand



# Advanced functionality

## Everything you want to do

The BV Pulsera consists of a mobile C-arm stand and a Mobile View Station. It offers a choice of X-ray and imaging functionality, as well as a variety of options and accessories. The functionality of the complete system is described in the following pages and the text that is important for you depends on the system configuration chosen.

## Mobile C-arm stand

- Ultra compact foot including pushbar and handles for easy maneuverability and positioning of the stand.
- Compact, counterbalanced C-arm provides all required projections.
- Extended rotation: C-arm rotates a full 135°
- C-arm has a very low lateral position of 81 cm.
- Rear wheel steering concept for easy maneuverability and positioning of the stand
- Dedicated parallel movement with ergonomically designed handgrips for easy positioning alongside operating table.
- Source to Image Distance (SID) is 98 cm.
- Streamlined user interface for easy control during procedures.
- Cable deflectors brush aside any floor cables.
- System includes footswitch, handswitch, radiation indicator.
- Remote control.
- Laser alignment tool.
- Ergonomically designed C-arm handles: guarantee easy C-arm positioning.

## X-ray generation

- Rotating anode X-ray tube with excellent cooling rate for the most demanding interventional procedures.
- Pulsed Acquisition Mode
- Pulsed Fluoroscopy Mode
- Because of the integrated pre-filter, the compact converter X-ray generator ensures a homogeneous X-ray spectrum with the lowest possible skin radiation.
- BodySmart will find the region of interest, define the optimal measuring field and follow the region of interest, ensuring optimal kV/mA settings and resulting in the best possible image quality.
- Anatomically Programmed Fluoroscopy (APF) sets fluoroscopy parameters automatically, providing consistent image quality for every examination type.
- Automatic High Penetration for optimal image quality in heavy objects even in the steepest projections e.g., lateral hip.



The ultra compact foot ensures easy maneuverability and positioning of stand.



C-arm steering with parallel movement for positioning alongside operating table



### **X-ray collimation**

- Full lead shutters can be rotated and moved together or independently to provide real protection against direct radiation and thus reduce scatter radiation.
- An additional beam filter (of 0.1 mm Cu) reduces patient and clinical staff skin dose by 40% over conventional filters.
- Shutters and Iris can be set on Last Image Hold.
- The Iris collimator limits the X-ray beam to the actual field of the image intensifier.
- Automatic Shutter Positioning for functionality that will position the shutters according to the region of interest with one touch of a button.

### **Imaging System**

- Choice of two triple-mode, image intensifier configurations:
  - 23/17/14 cm (9/7/5").
  - 31/23/17 cm (12/9/7").
- Compact CCD/TV camera.
- Image rotation digital, live and on Last Image Hold
- Carbon fiber X-ray grid.
- Digital rotation and mirroring up/down and left/right
- 1 K2 imaging throughout whole imaging chain

### **X-ray modes**

- Low Dose Fluoroscopy with Last Image Hold.
- High Definition Fluoroscopy with Last Image Hold.
- Real pulsed fluoroscopy (12.5 pulses/second) providing low dose motion blur-free fluoroscopic images.
- Half- and quarter dose pulsed fluoro modes reduce dose up to 75%.
- SharpShot digital exposure mode for diagnostic quality images and archiving purposes.
- Radiographic mode for cassette exposures.
- Image grab; grabbing single images.

### **Image processing**

SmartVision, a highly advanced, full digital 1Kx1K imaging chain in combination with unique state-of-the art image processing functions ( like BodySmart, Automatic Shutter Positioning, advanced noise reduction algorithms) includes:

- Dedicated 12-bit image pipeline processor.
- Adaptive temporal recursive filtering for noise integration
- Vignette correction
- Dynamic movement detection to reduce motion blur.
- Real-time 2D edge enhancement, contrast, and brightness control.
- Automatic contrast and brightness.
- Annotation.
- Video invert.

### **Extended image post-processing**

- Zoom and roam: 200% real-time magnification on any section of an image.
- Measurement function for precisely quantifying lengths and angles in an image.
- Electronic shutters to block out over-exposed image areas.

Image post-processing functionality availability on the left monitor of the MVS . This functionality provides easy access to the different menus, performing patient administration or post-processing on acquired images, with a tip of your finger.

The Vascular Package, which includes subtraction, can easily be combined with Extended Processing functions such as Zoom and Measure



### Vascular imaging functionality

- Subtracted fluoroscopy mode displays images in subtracted mode.
- Trace-subtract shows maximum opacification of vasculature using CO<sub>2</sub> or iodine contrast.
- ViewTrace creating a trace image, post processed
- Roadmap images support catheter guidance.
- SmartMask reduces dose and contrast medium usage by re-using previously acquired mask images for roadmapping.
- Remask lets you reselect the best image in your run as a mask image for contrast runs.
- Landmarking highlights background anatomy for reference.
- Real-time pixel shift compensates for movement artifacts.
- Subtraction on/off simplifies the orientation for subtracted images or during roadmap procedures.

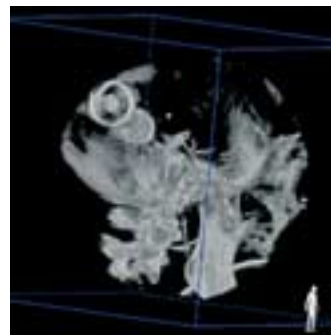


### Cardiac imaging functionality

- With dedicated Anatomical Programmed Fluoroscopy parameters for electrophysiology procedures and advanced pacemaker placements.
- Always sharp images, even with fast moving objects in the field of interest, with frame speeds up to 30 fr/s.
- Includes an additional 20 degrees rotation of the C-arm for maximum projection flexibility.
- Three dedicated APF sets for Cardiac procedures, Advanced pacemaker placements, and electrophysiology
- Frame speeds up to 30fr/s, with maximum of 60mA,
- Storage of 10.000 1k x1k images on hard disk at maximum 30 frames per second
- +90 to -45 degrees of rotation (standard: +90 to -25 degrees)

### BV Pulsera with 3D-RX

- unique combination of conventional 2D flexibility and top-quality 3D imaging in a single compact system, with no compromises.
- 3D visualization and information on complex anatomy in the OR.
- Intra-operative imaging reducing the need for pre-and postoperative CT/MR, thus improving workflow efficiency.
- Decreased procedure risk with improved visualization of anatomy.



3D image

Choose either a 9" or 12" triple-mode image intensifier, to match your applicational requirements



### Mobile View Station with unique intelligent viewing concept

The ultra compact Mobile View Station perfectly fits in the surgical workflow. The unique intelligent viewing concept of the Mobile View Station provides you with easy transportation, easy system set-up, flexible monitor positions and extended viewing . When the Mobile View Station is in the OR, patient demographics can easily be entered manually or retrieved via the hospital network. After entering these data, the monitors can be rotated and the clean side of the MVS can be positioned as close as possible to the operating table and operating staff. Depending on the way you work – standing or seated- excellent viewing is guaranteed by the height adjustment possibilities of the monitors. After the procedure is finished, you simply turn the monitors 180 degrees and you can post-process the images and send them to the PACS.

Height of the LCD monitors can be increased/decreased with 25 cm (10"). This stepless height adjustment can be done manually and will bring ergonomical operation, easy transportation and easy storage.

Designed to accommodate paper/transparency printer, Medical DVD Recorder, ViewForum Surgical Workstation and a fully integrated DICOM connectivity solution.

On top of the standard 500 images, the following memory extensions are available:

- 5,000 images on hard disk (8 frames/second).
- 10,000 images on hard disk (30 frames/second).

### System controls

A variety of intuitive system controls provide the utmost flexibility in controlling procedures.



Two different types of LCD monitors can be provided:

- 18" standard color LCD monitors providing optimal image quality
- 18" high brightness color LCD monitors providing superb image quality.



### User Interface on C-arm Stand

- Streamlined user interface for easy control during procedures. Includes pre-set Anatomically Programmed Fluoroscopy parameters (APF).
- Workflow oriented flat panel shows functional separation of keys and can be easily cleaned.
- Choice of language is incorporated into the system (English/French/Spanish/Swedish/German/Italian and Dutch)



#### User Interface on Mobile View Station

- Vequion competent user interface consisting of on-screen display and alphanumeric keyboard with touchpad.
- Touchscreen option for the left monitor. Easy access to the different menus, performing patient administration or post-processing on acquired images, with a tip of your finger. Touchscreen is compatible with the High Brightness and Standard color LCD monitors.
- Multi-patient database provides fast access to clinical images and patient data.
- Image handling can be controlled via remote control, C-arm stand, or Mobile Viewing Station.
- Choice of language is incorporated into the system. (English/French/Spanish/Swedish/German/Dutch/Danish)
- DICOM functionality can be operated at the Mobile View Station.

#### Safer treatment environment

With every new system Philips Medical Systems look at how we can incorporate better shielding and improve our X-ray exposure to further reduce dose. A number of Philips unique features help drastically lower dose during procedures:

- Unique beam filters reduce patient skin dose by 40% over conventional filters.
- Pulsed fluoro modes (1/2 dose and 1/4 dose mode) reduce dose up to 75%.
- Independently movable lead shutters provide better radiation protection than semi-transparent shutters.
- SmartMask saves dose and contrast medium by letting you re-use previously acquired subtracted and non-subtracted images as masks for roadmapping.
- The system lets you adjust the collimator, shutters, and image orientation during Last Image Hold without applying radiation.
- Automatic Shutter Positioning will position the shutters according to the region of interest, with one touch of a button.



### Handheld Remote Control

The remote control unit is a handheld infrared keypad used to control the main image handling functions. For sterile operation, it can be used in a transparent sterile plastic cover. The functions include:

- Run loop
- Overview run/exam
- Retrieve previous image/run
- Retrieve next image/run
- Park image on reference monitor
- Protect image/release image
- SmartMask
- Fluoroscopy mode selection
- II-format selection
- Subtraction on/off
- Image grab

### Customer support

Philips' ongoing commitments to develop future-safe technology means that your BV Pulsera system can be kept up-to-date throughout its lifecycle, embracing emerging applicational demands, and keeping up with advances in networking and PACS

Through service excellence, flexible solutions and effective relationships, Philips CUSTOMerCARE service programs give all the support needed to ensure that the BV Pulsera system always operates at peak performance - today and in the future.



Remote control provides full control over X-ray modes and image handling

# Options

## More efficiency

### ViewForum Surgical Workstation

A workflow enhancer bringing extra efficiency to the OR procedures providing :

- An intuitive multi-purpose platform for handling multi-modality images
- A stand-alone or integrated solution
- DICOM Query and Retrieve/USB storage

The ViewForum Surgical Workstation can be extended with the following options:

- MIP/MPR
- Procedure Reporting Package
- DVD DICOM store

### Fully integrated DICOM solution

All BV family systems can be equipped with Philips Integrated DICOM solution which transfers images from the BV family onto the hospital network in a DICOM Secondary or a DICOM XA format. The Standard DICOM package supports the DICOM Print and DICOM Store.

The Advanced DICOM package includes Modality Worklist Management, Modality Performed Procedure Step (including dose parameters) and Storage Commit

### Touchscreen

Speeding up workflow with touchscreen added to the (left) monitor. The Vequion competent graphical user

interface allows easy patient administration (through different menus) or post processing of the acquired images, with the tip of your finger.

Touchscreen is compatible with the standard and high brightness color LCD monitors.

### LCD height adjustment

This height adjustment can be done manually.

The adjustment is stopless, meaning that the monitors can be positioned at any desired height between the lowest and highest position (height adjustment of the LCD monitors is possible with 25 cm).

### Color LCD Monitors

High contrast images can be obtained via the standard or high brightness 18" color LCD monitors.

### Medical DVD Recorder

Medical DVD Recorder for automatic recording clinical images on a DVD (up to 2 hours). Both static and dynamic images can be recorded. Review of images on BV family system or a standard PC.

### Laser alignment tool

The Laser Alignment Tool is an optional positioning device integrated into the X-ray tank unit. It projects an image of a cross on the patient indicating the center of the X-ray beam, which allows the C-arm to be precisely positioned using the least possible radiation (e.g., for locking nail procedures).

### Laser Aiming Device

The Laser Aiming Device is an optional positioning device for use at the Image Intensifier side.

### Video paper/transparency printer

Thermal multi-media printer for printing images (multi-format) from live monitor onto paper or blue transparency.

### Video paper printer

Thermal printer for printing images from live monitor on paper. Hard copies of clinical images can be made during or after examinations.



# Accessories

## Making work easier

### C-arm spring bow for sterilizable covers

The spring bow holds the sterilizable covers of the C-arm in position while allowing free movement of the C-arm.

### Sterilizable covers

To help maintain optimal levels of hygiene and sterility in the surgical environment, sterilizable drapes are provided for shielding the X-ray tank unit, image intensifier, and C-arm. Both sterile transparent covers and green fabric covers are available. The green covers are made of lint-free fabric (35% Trevira, 65% cotton) and are resistant to boiling.

### Cassette holder

The cassette holder is suitable for a standard cassette or a grid-cassette. The holder accommodates two cassette sizes: 24 x 24 cm and 24 x 30 cm. The cassette holder can be rotated a full 360° around the image intensifier field.



The cassette holder can be rotated a full 360° around the image intensifier field



# Technical Specifications

<b>X-ray tube / tank unit</b>	
• Tube type	Rotating anode
• Nominal focal spot values	(IEC 336) 0.3 IEC and 0.6 IEC
• Nominal X-ray tube voltage	120 kV
• Maximum anode heat content	222 kJ = 300 kHU
• Anode cooling capacity	52 kJ/min. = 70 kHU/min.
• Maximum housing heat content	1350 kJ = 1900 kHU
• Inherent filtration	1.0 Al eq.
• Additional filtration	3 mm Al + 0.1 mm Cu
<b>Collimator unit</b>	
<b>Iris collimator</b>	
• Type	Circular opening, lead iris leaves
• Indication	During LIH (and also on image)
<b>Shutters</b>	
• Type	2 independently movable real lead shutters with steel wedge tip
• Rotation	360°
• Indication	During LIH (and also on image)
• Automatic Shutter Positioning	positioning of shutters (manually or automatically) excluding direct radiated areas.
<b>X-ray generator</b>	
• Generator type	80 KHz High Frequency converter, Constant Potential (CP) generator, micro-processor controlled
• Max. generator output	15 kW (7.5 KW depending on local regulations)
• Max. X-ray tube voltage	120 kV
• Max. X-ray tube current	125 mA
<b>Continuous fluoroscopy</b>	
• kV range	40 to 120 kV
• mA range for Low Dose Fluoroscopy mode	0.10 to 8.3 mA (up to 10 mA during Auto High Penetration)
• mA range for High Definition Fluoroscopy mode	0.24 to 20.0 mA
<b>Pulsed Fluoroscopy</b>	
• kV range	40 to 120 kV
• mA peak range	0.4 - 12 mA
• Pulse widths	24, 40 ms
• Pulse rate	12.5 pps
<b>Half Dose Fluoroscopy</b>	
• kV range	40-120 kV
• mA peak range	0.4 - 12 mA
• Pulse rate	12.5 pps
<b>Quarter Dose Fluoroscopy</b>	
• kV range	40-120 kV
• mA peak range	0.4 - 12 mA
• Pulse rate	6.25 pps

<b>Pulsed Exposure</b>	
• kV range	40 - 110 kV
• mA peak range	2.0 to 60.0 mA
• Pulse width	8.0, 9.5 and 11.1 ms
• Pulse rates	3- 30 pulses per second
<b>Sharpshot</b>	
• kV range	40 - 110 kV
• mA range	0.90 to 75.0 mA
• Time range	120 ms to 460 ms
<b>Radiography</b>	
• kV range	40 - 110 kV
• mA range	60 mA fixed
• mAs range (R'10 series from ISO 497)	3.2 to 125 mAs
<b>Detection</b>	
• Image intensifier type	Triple mode 9" HRC / Triple mode 12"
• Nominal II formats	32, 22, and 17 cm (12", 9", and 7") 23, 17, and 14 cm (9", 7", and 5")
• Entrance screen = Input screen	Cesium Iodine
• Detection Quantum Efficiency (DQE) typical [%] according to IEC 1262-5	9": 58 12": 65
• Grid type	Circular, carbon fiber; 60 lines/cm Ratio = 1:10 at FFD = 100 cm
• TV camera type	1024 x 1024 Interline transfer CCD; high resolution
• Image rotation	Digital, Live and on LIH
• Image reversal	Yes Digital up/down and left/right, Live and on LIH
• Automatic anatomical measuring field	Yes with 'BodySmart'
<b>TV monitor</b>	
• Type: Standard Color LCD monitors	18" screen size, TFT technology, resolution 1280x1024 (hxv), 250cd/m <sup>2</sup>
• High Brightness Color LCD monitors	18" screen size, TFT technology, resolution 1280x1024 (hxv), 500cd/m <sup>2</sup>
<b>Image storage and processing</b>	
• Digital image processor type	Dedicated 12 bit video pipeline processor
• Display image matrix size	1024 x 1280 x 8
• Image storage capacity and max. storage rate	10,000 images max. 30 frames/second 5,000 images max. 8 frames/second 500 images max. 5 frames/second (standard)
• Patient data handling	Multipatient database
• Image processing	2D Edge enhancement (real-time and post processing), Windowing (real-time and post processing), Adaptive Temporal Recursive noise reduction, Movement detection, Mosaic, Replay, Annotation
• Processing options	Subtraction, Roadmapping, Remasking, Trace (max. opacification), ViewTrace, Trace white (CO <sub>2</sub> imaging), Memory roadmapping (SmartMask)

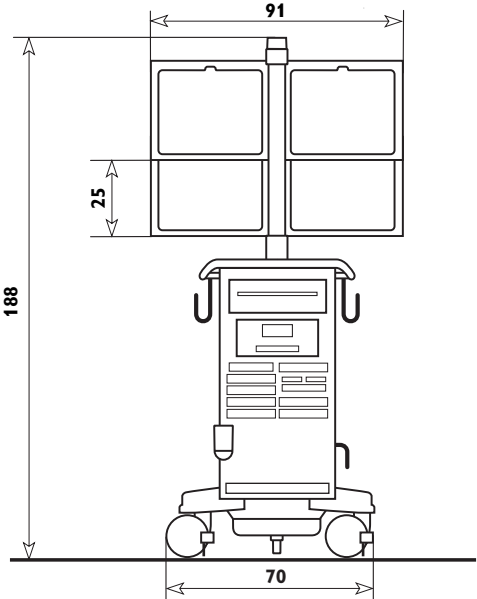
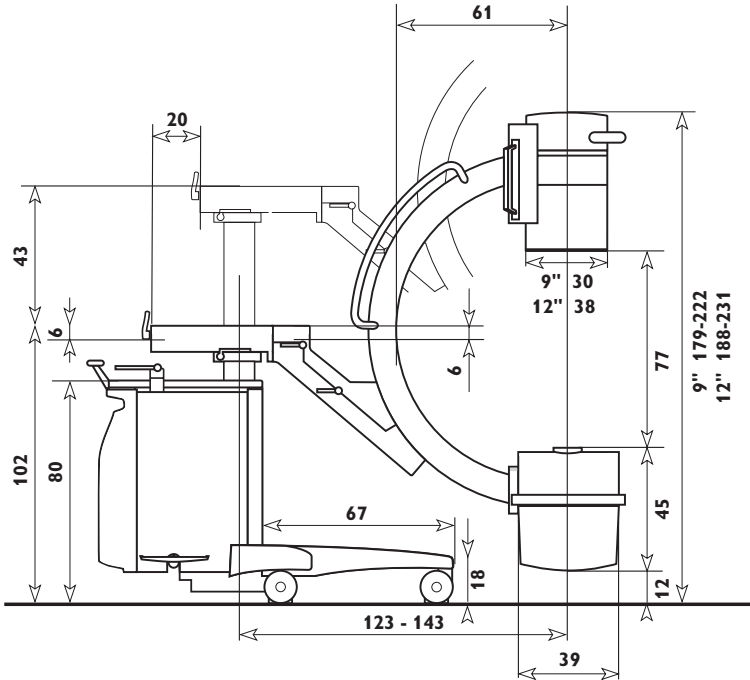
<b>Geometry</b>	
• Longitudinal movement	20 cm (7.9") (with 3D-RX: 17 cm or 6.6")
• Swivel range	± 10°
• Vertical movement	Motorized 49 cm (+43 cm, -6 cm) (19.3", +16.9", -2.4")
• Rotation	± 180°, with safety stop at ± 135°
• Angulation	+90°, -25°, (option -45°)
• Source to image distance (SID)	98.2 cm (38.7")
• Free space within C-arc	77 cm (30.3")
• C-arc depth	61 cm ( 24.0")
• Brakes for all movements	Yes, manual
• Steering	rear wheel
• Parallel movement	Via rear wheel control
• Cable deflectors	Yes
• C-arm stand weight	9": 305 kg (672 lb) , 12": 310 kg (683 lb)
• C-arm stand length	9": 196 cm, 12": 196 cm (77.2")
• C-arm stand width	81.5 cm (32")
• C-arm stand height	9": 179 cm (69.8"), 12": 188 cm (74")
• Mobile view station depth	70 cm (27.6")
• Mobile view station width	91 cm ( 35.8"), 70 cm with monitors folded
• Mobile view station height	188 cm ( 74.0")
<b>Power supply</b>	
• Input voltage	110-240 V +/- 10%
• Frequency	50/60 Hz
<b>Options</b>	
• 3D-RX	Yes
• ViewForum Surgical Workstation	Yes (supports Multi Modality Image Query/Retrieve)
• Standard DICOM package	Yes (supports DICOM print, DICOM store)
• Advanced DICOM package	Yes (incl. MWL, MPPS, SC)
• Touchscreen	Yes
• LCD Height adjustment	(25 cm / 10")
• Flat screen LCD monitors	Yes
• Medical DVD Recorder	Yes
• Laser alignment tool	Yes
• Laser aiming device	Yes (9"only)
• Video paper/transparency printer	Yes
• Sterile covers	Yes
• Detachable cassette holder	Yes



# Dimensions

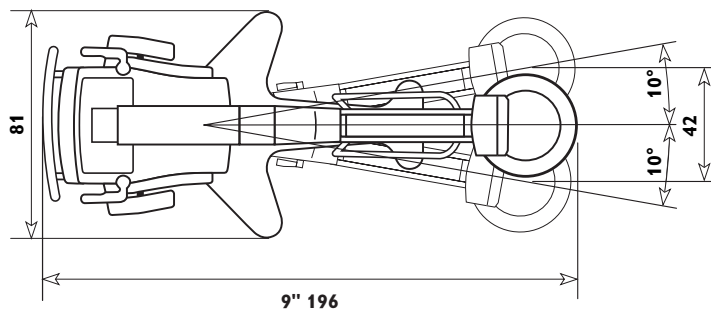
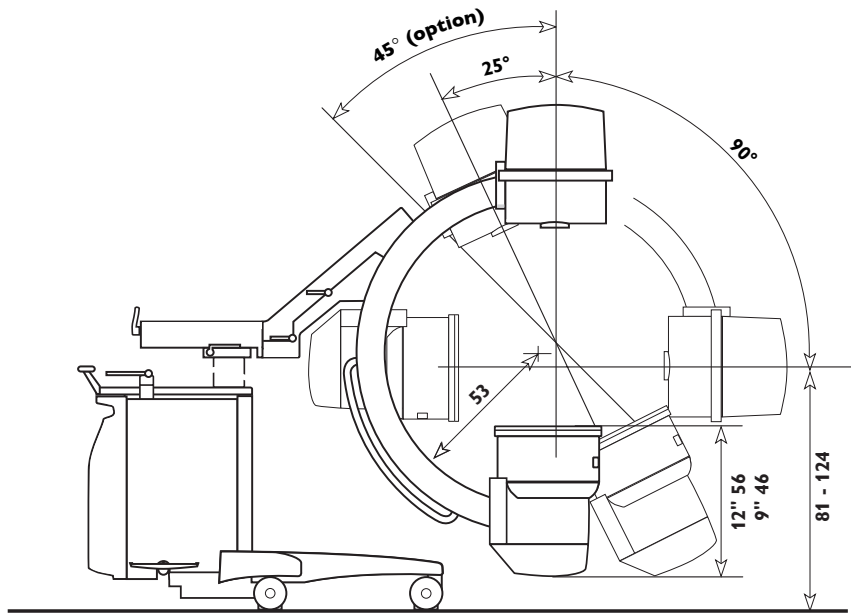
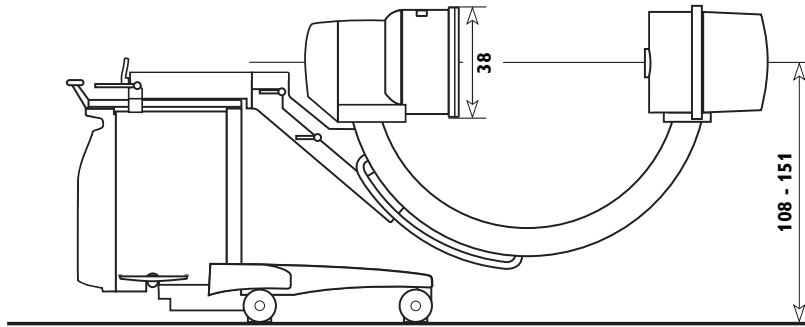
All dimensions in cm

9" system



All dimensions in cm

12" system





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