



It's all about you

Philips BV Endura functional description

**PHILIPS**



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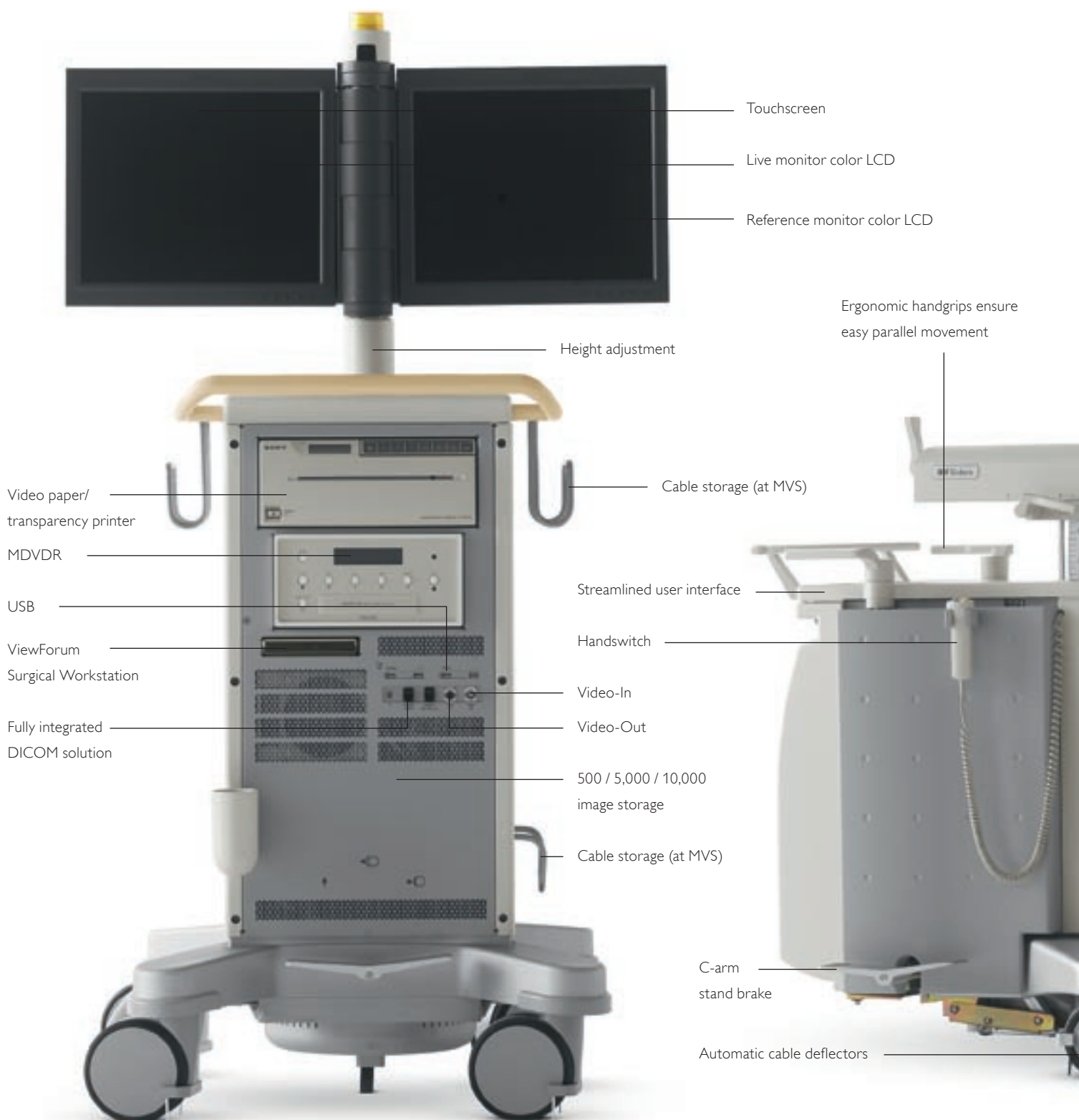
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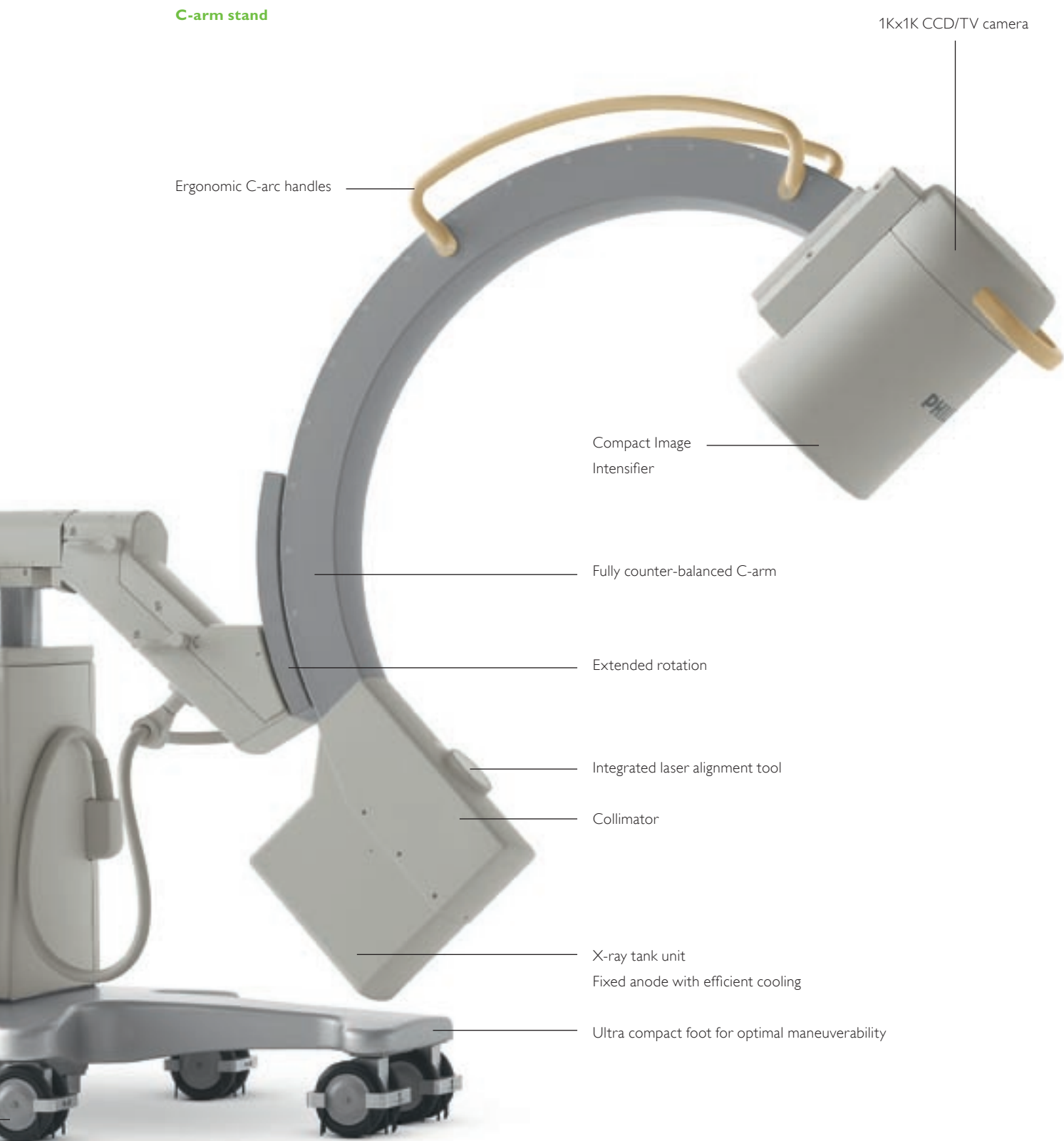
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# System overview BV Endura

## Mobile View Station





C-arm stand

1Kx1K CCD/TV camera

Ergonomic C-arc handles

Compact Image  
Intensifier

Fully counter-balanced C-arm

Extended rotation

Integrated laser alignment tool

Collimator

X-ray tank unit  
Fixed anode with efficient cooling

Ultra compact foot for optimal maneuverability



# It's all about you

The BV Endura is a versatile mobile fluoroscopy system for routine surgical and vascular interventions. The BV Endura incorporates a unique concept - SmartVision. 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.

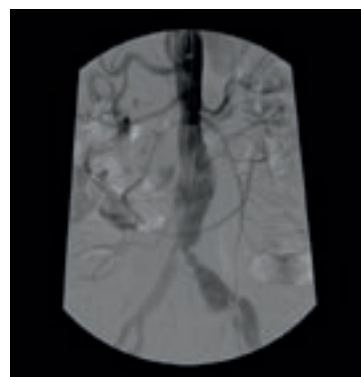
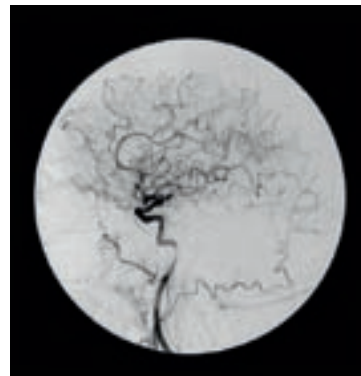
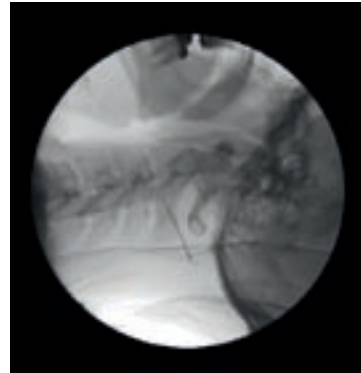
The ultra compact Mobile View Station perfectly fits in the surgical workflow. The unique intelligent viewing concept of the Mobile View Station provides the user with easy transportation, easy and intuitive system set-up and optimal viewing capabilities.

The BV Endura pairs dedicated interventional features and best-of-class image quality to support minimally-invasive procedures. Its single-user control and streamlined design also helps you to perform a high volume of different surgical procedures, smoothly and efficiently.

This versatile system comes with a 9" or 12" image intensifier and goes anywhere you need it – surgery, intensive care, and emergency. And can handle all your routine and interventional procedures:

- Orthopedic surgery (fractures, fixation)
- Abdominal surgery (cholangiography, urological exams)
- Neurosurgical procedures (pain management, vertebroplasty)
- Thoracic surgery
- Vascular procedures (peripheral/abdominal/cerebral, interventions)

Whatever your situation, the BV Endura shows everything you need to see in surgery.



# Everything you want to do

The BV Endura 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
- Rear wheel steering concept
- Dedicated parallel movement with ergonomically designed handgrips for easy positioning alongside operating table
- Source to Image Distance (SID) is 100 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

- Fixed anode X-ray tube with excellent cooling rate for the most demanding interventional procedures
- 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 automatically 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
- Carbon fiber X-ray grid
- Digital rotation and mirroring up/down and left/right
- 1 K<sup>2</sup> imaging throughout whole imaging chain

### X-ray modes

- Low Dose Fluoroscopy with Last Image Hold
- High Definition Fluoroscopy with Last Image Hold
- Pulsed fluoro modes (1/2 dose and 1/4 dose modes) reduce dose with 50% or 75%
- Radiographic mode for cassette exposures
- Image grab

### 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
- Patient database including 16 images RAM memory
- Adaptive temporal recursive filtering for noise integration
- Vignette correction
- Dynamic movement detection to reduce motion blurring
- Real-time 2D edge enhancement, contrast, and brightness control
- Automatic contrast and brightness (on the Mobile View Station)
- 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 is also available 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.

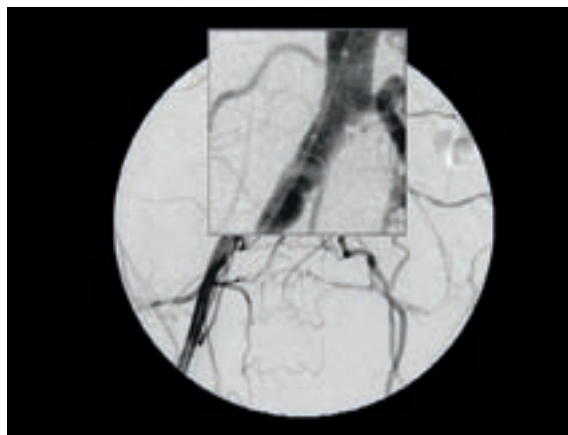


### Vascular imaging functionality

- 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
- 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
- SmartMask reduces dose and contrast medium usage by re-using previously acquired mask images for roadmapping
- Subtraction on/off simplifies the orientation for subtracted images or during roadmap procedures (Remote control, MVS)

### Vascular image

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



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



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 capabilities. 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. 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.

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
- Optionally a height adjustment for the monitors is available

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

- Designed to accommodate paper/transparency print. 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 (25 frames/second)

### System controls

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

### 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)





### 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)
- DICOM functionality can be operated at the Mobile View Station

### Safer treatment environment DoseWise story

- Unique beam filters reduce patient skin dose by 40% over conventional filters
- Pulsed fluoro modes (1/2 dose and 1/4 dose modes) reduce dose with 50% or 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 Endura system can be kept up-to-date throughout its lifecycle, embracing emerging applicational demands, and keeping up with advances in networking and PACS.

The Philips CUSTOMerCARE service programs offer a wide and flexible choice of equipment maintenance services, clinical education, financing, remote support, product upgrading and beyond give the power of choice to keep you BV Endura at peak performance.



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

# Handy extras



## 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.

## Medical DVD Recorder

Medical DVD Recorder for 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.

## 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.

## 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 supports Modality Worklist Management, Modality Performed Procedure Step and Storage Commit.

## Color LCD Monitors

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

## 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 with just one hand. 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).



# 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

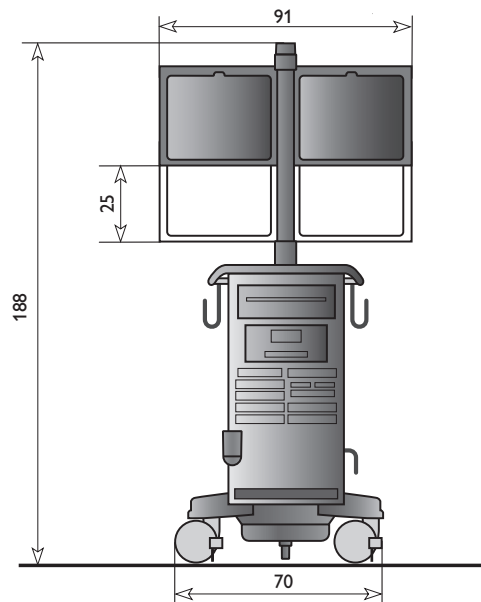
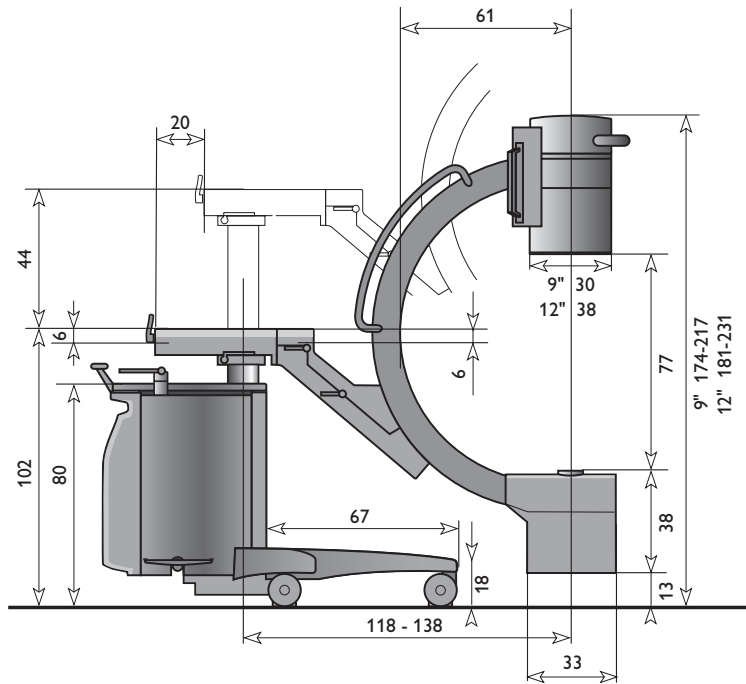
<b>X-ray tube / tank unit</b>	
Tube type	Fixed anode
Nominal focal spot values (IEC 336)	0.6 IEC and 1.4 IEC
Nominal X-ray tube voltage	110 kV
Maximum anode heat content	35.5 kJ = 50 kHU
Anode cooling capacity	21.6 kJ/min. = 30.6 kHU/min.
Maximum housing heat content	840 kJ = 1200 kHU
Inherent filtration	3.0 Al eq.
Additional filtration	1 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	Option
<b>X-ray generator</b>	
Generator type	DC converter, Constant Potential (CP) generator, micro-processor controlled
Max. generator output	3.15 kW
Max. X-ray tube voltage	110 kV
Max. X-ray tube current	20 mA (30 mA for France)
<b>Continuous fluoroscopy</b>	
kV range	40 to 110 kV
mA range for Low Dose Fluoroscopy mode	0.10 to 3.0 mA (up to 7.20 mA during Auto High Penetration)
mA range for High Definition Fluoroscopy mode	0.24 to 7.20 mA
<b>Half Dose Fluoroscopy</b>	
kV range	40 to 110 kV
mA range	0.1 to 3.0 mA (up to 7.2 during Auto High Penetration)
Pulse widths	40 ms
Pulse rate	12.5 pulses/second
<b>Quarter Dose Fluoroscopy</b>	
kV range	40 - 110 kV
mA range	0.1 to 3.0 mA (up to 7.2 during Auto High Penetration)
Pulse width	40 ms
Pulse rate	6.25 pulses/second
<b>Radiography</b>	
kV range	40-105 kV
mA range	During LIH (and also on image)
mAs range (R'10 series from ISO 497)	1024x1024 Interline transfer CCD; high resolution

<b>Detection</b>	<b>360°</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": 62 12"0: 65
Grid type	Circular, carbon fiber; 60 lines/cm Ratio = 1:10 at FFD = 100 cm
TV camera type	Interline transfer CCD; high resolution
Image rotation	Digital, live and on LIH
Rotation position indication	Pre-indication on image, during LIH
Image reversal	Yes
Mirror up/down	Digital, live and on LIH
Mirror left/down	Digital, live and on LIH
Automatic anatomical measuring field	Yes with 'BodySmart'
<b>TV monitor</b>	
Flat screen LCD monitors	Extra high resolution, high contrast , extra high brightness, 18" screen size, TFT technology, resolution 1280x1024 (hxv)
<b>Image storage and processing</b>	
Digital image processor type	Dedicated 12 bit video pipeline processor
Display image matrix size	resolution 1280x1024 (hxv)
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
Patient data handling	Multipatient database
Image processing	Edge enhancement (real-time and post processing), Windowing (real-time and post processing), Recursive noise reduction, Movement detection, Mosaic, Replay, Annotation
Processing options	Subtraction, Roadmapping, Remasking, Trace (max. opacification), Trace white (CO <sub>2</sub> imaging), Memory roadmapping (SmartMask), Landmarking, Pixel shift, Zoom, Measurement, Electronic shuttering

Geometry	
Longitudinal movement	20 cm (7.9")
Swivel range	± 10°
Vertical movement	50 cm (+44 cm/-6 cm)(+ 17.3"/-2.3") Motorized
Rotation	± 180°, with safety stop at ±135°
Angulation (orbital movement)	+90°, -25°
Angulation (orbital movement) option	+90°, -45°
Source to image distance (SID)	99.5 cm (39.2")
Free space within C-arc	78 cm (30.7")
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": 280 kg (617 lb) – 12": 295 kg (650 lb)
C-arm stand length	9": 184 cm (72.4") – 12" 187 cm (73.6")
C-arm stand width	81 cm (31.9")
C-arm stand height	9": 168 cm; (66.1") – 12": 181 cm (71.3")
Mobile view station depth	70 cm (27.6")
Mobile view station width	91 cm (35.8")
Mobile view station height	188 cm (74")
Power supply	
Input voltage	110-240V +/- 10%
Frequency	50/60 Hz
Options	
Laser alignment tool	Yes
Laser aiming device	Yes (9"only)
Video paper/transparency printer	Yes
Medical DVD Recorder	Yes
Standard DICOM package	Yes (supports DICOM print, DICOM store)
Advanced DICOM package	Yes (incl. MWL, MPPS, SC)
Sterile covers	Yes
Detachable cassette holder	Yes
Flat screen LCD monitors	Yes
Touchscreen	Yes
LCD Height adjustment	Yes (25 cm /10")
ViewForum Surgical Workstation	Yes (supports Multi Modality Image Query/Retrieve)

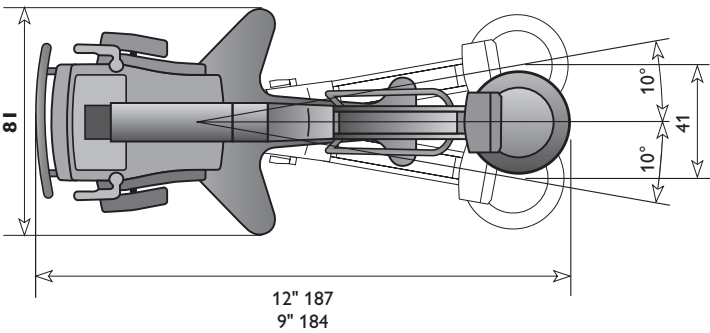
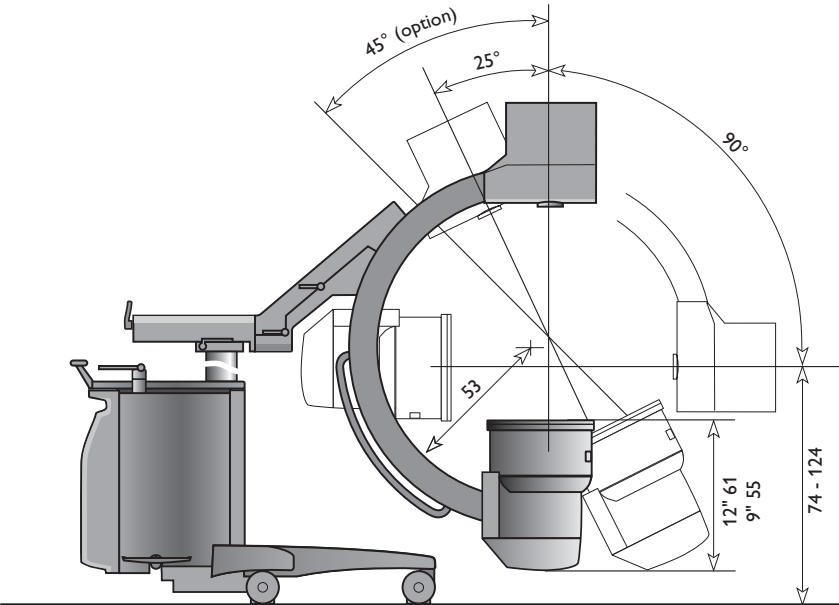
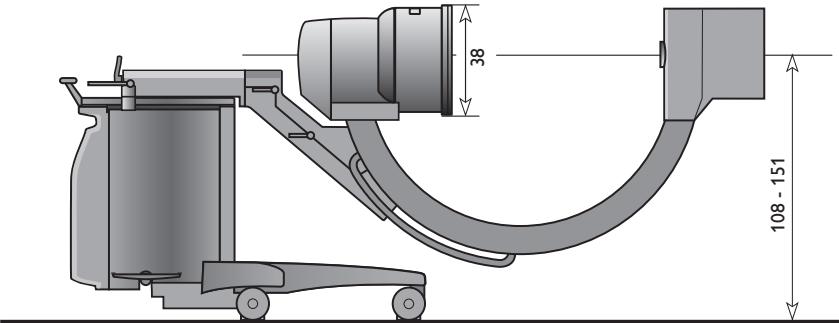
### 9" system

Dimensions in cm.



12" system

Dimensions in cm.



**Philips Healthcare is part of  
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