

**SIEMENS**



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Data Sheet

# Cios Fusion

Fuse surgical versatility with Full View FD

[siemens.com/cios-fusion](https://www.siemens.com/cios-fusion)

# Cios Fusion

## Fuse surgical versatility with Full View FD

**Increase the competitiveness and surgical versatility of your institution by introducing innovative imaging technologies into your OR.**

To stay competitive, clinical institutions have to keep pace with the prevailing trends across a vast range of surgical disciplines. Most clinical institutions, however, do not fully tap the potential of their OR because they lack the proper equipment. This can have severe consequences, including incorrect image interpretations and therapy decisions as a result of low image quality.

Increase the competitiveness and surgical versatility of your institution by introducing innovative imaging technologies into your OR – with Cios Fusion. Equipped with our Full View FD technology and unique Retina Imaging Chain with IDEAL (Intelligent Dose Efficiency Algorithm) dose reduction, the mobile C-arm provides large, crystal-clear, distortion-free images at the right dose. Showing even the smallest anatomical details in sharp quality, Cios Fusion can increase confidence in image interpretation and thus help you increase the quality of care.

Cios Fusion's compact and lightweight design enables your staff to easily move the system wherever they need it. They can even control it directly via a remote user interface from within the sterile field, resulting in increased precision and time savings. In addition, by providing cutting-edge technologies for advanced surgical care, your institution can increase its attractiveness to both patients and staff.

**Designed to support you in your work, Cios Fusion is your true partner in performance.**

### **Fuse surgical versatility with Full View FD**

- 160 % more to see<sup>1)</sup> – with Full View FD
- Save time – with advanced table-side control\*
- Drive surgical revenue – with innovative technology



\* Option

<sup>1)</sup> Compared to today's conventional 23 cm / 9 inch image intensifiers



# Cios Fusion

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## C-arm

C-arm with mechanical brakes

Orbital movement	150 ° (– 40 ° to + 110 °)
Angulation	± 225 °
Horizontal movement	20 cm (7.9")
Immersion depth	73 cm (28.7")
Swivel range	± 12 °
Vertical travel	43 cm (16.9"), motorized
Source to image-receptor distance	102 cm (40.2")
Free space	82 cm (32.2"), with attached grid

## Collimator system

Rectangular diaphragm (lead)	For concentric, radiation-free collimation
Slot diaphragm (lead)	For symmetric and asymmetric, radiation-free collimation, with unlimited rotation

## PC Hardware

Image acquisition system	Intel-compatible dual-core microprocessor with PCI bus architecture, Windows 7, 64 bit, 4 GB RAM, S-ATA drive, USB 2.0, high-performance professional level graphics card and interface cards for the detector/X-ray system
Acquisition memory on hard disk	Storage and postprocessing of all acquired images in a common patient folder 150,000 images on hard disk irrespective of matrix size
Hard-disk capacity	2 TB
Power supply	Integrated, uninterruptible power supply helps ensure that image and patient data are secure in the event of a power outage

# Cios Fusion

## X-ray generator / tube

### 2.3 kW high-frequency generator

Nominal peak output power	2.3 kW
Inverter control frequency	15 kHz to 30 kHz
kV range	40 kV to 110 kV
Single Image (incl. DR sum)	0.2 mA to 25 mA
Continuous fluoroscopy	0.2 mA to 15 mA
Pulsed fluoroscopy	3 mA to 25 mA
	Pulse width: 7 ms to 40 ms
	Pulse rate: Variable frame rate 0.5 to 15 f/s 30 f/s in continuous fluoro mode
Power and dose management	Easy selection of suitable power and dose levels for each clinical application

### Single tank with single-focus anode tube

Focal spot nominal value	0.6
Nominal voltage	110 kV
Anode heat dissipation	27,600 J/min 37,300 HU/min
Anode heat storage capacity (IEC 613)	45,200 J 61,100 HU
Optical anode angle	9°
Inherent filtration (IEC 601)	3 mm Al with 75 kVp / 0.1 mm Cu
Single-tank heat dissipation	4500 J/min 6075 HU/min
Single-tank heat storage capacity (physical)	888,000 J 1,200,000 HU
Continuous heat dissipation	80 W
Max. uninterrupted fluoro time	20 min at 600 W 60 min at 170 W

# Cios Fusion

## Flat detector 30 cm x 30 cm (12" x 12")\*

Amorphous silicon flat detector based on indirect conversion technology

High-performance fiber-optic connection to digital imaging system

Input fields (active field)	Mag 0 (full format) 30 cm x 30 cm (12" x 12")	Mag 1 20 cm x 20 cm (8" x 8")	Mag 2 15 cm x 15 cm (6" x 6")
Material	aSi with CsI scintillator		
Pixel size	194 $\mu\text{m}$		
Matrix	1536 x 1536 pixels		
Digitization depth	16 bits		
Detective quantum efficiency (DQE) (typical)	76 % at 0.05 lp/mm		
Vertical DQE at 80 nGy, RQA5, 1x1 (Zoomed Fluoro) and 400 nGy, RQA5, 1x1 (Single Image)	55 % at 1 lp/mm 30 % at 2 lp/mm 14 % at 2.6 lp/mm (Nyquist frequency)		
Detective quantum efficiency (DQE) (typical)	76 % at 0.05 lp/mm		
Vertical DQE at 40 nGy, RQA5, 2x2 (Full Field-of-View Fluoro)	43 % at 1 lp/mm 25 % at 1.3 lp/mm (Nyquist frequency)		
Modulation Transfer Function (MTF) (typical)	55 % at 1 lp/mm		
Vertical MTF	25 % at 2 lp/mm 16 % at 2.6 lp/mm (Nyquist frequency)		
Resolution on monitor with 30 x 30 FD (measured in accordance with DIN 6868-150)	Overview (Mag 0) – acquisition (without zoom)	2.5 lp/mm	
	Overview (Mag 0) – acquisition (with zoom)	3.1 lp/mm	
	Overview (Mag 0) – fluoroscopy	1.4 lp/mm	
	Format switchover (Mag 1) – acquisition	3.1 lp/mm	
	Format switchover (Mag 1) – fluoroscopy	2.8 lp/mm	
	Format switchover (Mag 2) – acquisition	3.1 lp/mm	
	Format switchover (Mag 2) – fluoroscopy	2.8 lp/mm	
Anti-scatter grid (detachable)	Pb 17:1, 70 lines/cm, $f_0 = 100 \text{ cm}$		

# Cios Fusion

## Flat detector 20 cm x 20 cm (8" x 8")

Amorphous silicon flat detector based on indirect conversion technology

High-performance fiber-optic connection to digital imaging system

Input fields (active field)	Mag 0 (full format) 20 cm x 20 cm (8" x 8")	Mag 1 15 cm x 15 cm (6" x 6")	Mag 2 10 cm x 10 cm (4" x 4")
Material	aSi with CsI scintillator		
Pixel size	194 $\mu\text{m}$		
Matrix	1024 x 1024 pixels		
Digitization depth	16 bits		
Detective quantum efficiency (DQE) (typical)	76 % at 0.05 lp/mm		
Vertical DQE at 80 nGy, RQA5, 1x1 (Fluoro)	55 % at 1 lp/mm		
and 400 nGy, RQA5, 1x1 (Single Image)	30 % at 2 lp/mm		
	14 % at 2.6 lp/mm (Nyquist frequency)		
Modulation Transfer Function (MTF), typical	55 % at 1 lp/mm		
Vertical MTF	25 % at 2 lp/mm		
	16 % at 2.6 lp/mm (Nyquist frequency)		
Resolution on monitor with 20 x 20 FD	Overview (Mag 0) – acquisition	3.1 lp/mm	
(measured in accordance with DIN 6868-150)	Overview (Mag 0) – fluoroscopy	2.8 lp/mm	
	Format switchover (Mag 1) – acquisition	3.1 lp/mm	
	Format switchover (Mag 1) – fluoroscopy	2.8 lp/mm	
	Format switchover (Mag 2) – acquisition	3.1 lp/mm	
	Format switchover (Mag 2) – fluoroscopy	2.8 lp/mm	
Anti-scatter grid (detachable)	Pb 17:1, 70 lines/cm, $f_0 = 100 \text{ cm}$		

# Cios Fusion

## Monitor cart

### Displays

#### 19" TFT Premium high-brightness color display\*

Anti-reflexion coated glass screen	One single glass panel for high-contrast image quality and ease of cleaning
Brightness Uniformity Auto Adjustment	Brightness uniformity is automatically adjusted for a more balanced and uniform image impression
Automatic Brightness Adjustment	Brightness is automatically adjusted based on ambient light
Automatic DICOM Correction <sup>2)</sup>	DICOM curves are automatically corrected based on ambient light
Protective collision cover	
Full b/w emulation mode	
Screen diagonal	19" (48 cm)
Image display	1280 x 1024 (pixels)
Brightness (DICOM calibrated), typical	500 cd/m <sup>2</sup>
Maximum brightness, typical	1000 cd/m <sup>2</sup>
Horizontal / vertical viewing angle	170° / 170°
Contrast ratio, typical	1000 : 1
Response time, typical	25 ms
Backlight White LED technology	

#### 19" TFT high-brightness color display

Screen diagonal	19" (48 cm)
Image display	1280 x 1024 (pixels)
Brightness (DICOM calibrated), typical	400 cd/m <sup>2</sup>
Maximum brightness, typical	650 cd/m <sup>2</sup>
Horizontal / vertical viewing angle	178° / 178°
Contrast ratio, typical	900 : 1
Backlight LED technology	

\* Option

<sup>2)</sup> This feature greatly speeds up verification of conformity to DIN 6868-157 in affected countries

# Cios Fusion

## Monitor cart

### Column

#### **Display column Flex**

Allows for vertical display positioning independently of monitor cart position with a rotation angle of 240° (- 30° to + 210°)

Defined lock-in positions at 0° and 180°

#### **Motorized display column Flex Plus\***

Allows for vertical display positioning independently of monitor cart position with a rotation angle of 240° (- 30° to + 210°)

Defined lock-in positions at 0°, 90° and 180°

Motorized height adjustment

Foldable displays for protection and easier transport

### Sound system\*

Integrated EMotion sound system with interface for connecting external (MP3) audio equipment via aux-in jack (aux input) incl. amplifier with digital sound processor (DSP) and 2-way stereo speaker system for high-fidelity sound

# Cios Fusion

## Monitor cart

### Interface description

Injector interface*	Unidirectional trigger output for a contrast agent injector Trigger signal (with radiation on) 24 V DC (e.g. to hook up Bluetooth connectors)
Video splitter*	2 single-link DVI-D; female connectors; up to 1920 x 1200 @ 60 Hz or 1080 p
SmartView-HD VideoManager*	Outputs: 2 x CAT (RJ 45); DVI-D via active CAT/DVI adapter; 1280 x 1024 @ 60 Hz Inputs : DVI-I (analog or digital) (2x), RGB, YPrPb, Y, S-Video (2x), Composite, SD/HD-SDI (2x), VGA; offers 150 preprogrammed timings up to 1080 p (1920 x 1080, 50/60 Hz, interlaced/progressive) including PAL and NTSC
USB	Data interface USB 2.0 Charging interface USB 2.0
EMotion audio interface (Aux In)	3.5 mm plug
LAN	Gigabit
WLAN / WiFi	150 Mbit/s IEEE 802.11 a, b, e, g, h, i, n
Power cable	5.5 m
Monitor cart connection cable	7 m

# Cios Fusion

Patient data administration	
Patient registration	<ul style="list-style-type: none"> <li>Retrieval of patient list and examination data from the hospital/radiology information system (HIS/RIS)</li> <li>Emergency patient registration</li> <li>Study and image data administration</li> <li>Configurable patient registration</li> </ul>
Exam preparation	
Applications Manager	<ul style="list-style-type: none"> <li>Dedicated, application-related user programs</li> <li>Administration and selection of applications and application groups</li> </ul>
Image acquisition	
Operating modes	<ul style="list-style-type: none"> <li>Selection of application-specific fluoroscopy and radiography curves for the individual operating modes</li> </ul>
Fluoroscopy	<ul style="list-style-type: none"> <li>Image acquisition 0.5 f/s to 15 f/s; 30 f/s with continuous fluoro mode</li> <li>Image storage: all images, every nth image</li> <li>Digital filtration</li> <li>Moving weighted averaging for low-noise image display with minimum dose</li> <li>Optimized gray-scale visualization based on image analysis</li> </ul>
Single Image	<ul style="list-style-type: none"> <li>Digital filtration</li> <li>Optimized gray-scale visualization based on image analysis</li> </ul>
Subtraction*/Roadmap*	<ul style="list-style-type: none"> <li>Image acquisition 0.5 f/s to 30 f/s</li> <li>Image storage: all images, every nth image</li> <li>Subtraction angiography with Pixelshift, Remask, Peak Opacification for iodine contrast (MaxOp) and CO<sub>2</sub> contrast (MinOp)</li> <li>Anatomical landmarking from 0 % to 100 %</li> <li>Automatic and manual Pixelshift function to correct Subtraction runs</li> <li>Filtering of mask and fill images for contrast enhancement</li> <li>Simultaneous dual-channel output for image acquisition and postprocessing, simultaneous storage of fill image</li> <li>Roadmap technique, to position a catheter precisely in a blood vessel under fluoroscopy</li> <li>Roadmap on corrected subtraction Peak Opacification images to avoid additional contrast medium in angiography procedures</li> </ul>

# Cios Fusion

## Image acquisition

IDEAL (Intelligent Dose Efficiency Algorithm)	The Intelligent Dose Efficiency Algorithm (IDEAL) is a smart dose management system specially designed for the Cios C-arm family It continuously analyzes each and every one of the detector's pixels and constantly ensures optimum dose management The result is an always optimized balance of image quality and dose as well as automatic contrast and brightness regulation
Footswitch	Standard footswitch for radiation release (5 m cable) Multifunctional footswitch* with advanced functionality (5 m cable)
Remote control unit*	Touch-based remote control unit for controlling the C-arm functions from the sterile area (6 m cable)

## CARE program (Combined Applications to Reduce Exposure)

CARE is a Siemens Healthcare initiative to reduce radiation dose Cios Fusion is equipped with state-of-the-art features to reduce radiation dose to the patient and operator This includes IDEAL, the automatic dose, contrast, and brightness control system, as well as a dedicated low-dose examination setting and the optional measuring chamber integrated into the single tank to enable the measurement and recording of the dose area product and the standardized surface dose to the patient	
CAREMAX*	Integrated dose measuring chamber with automatic transfer of the accumulated dose into a radiation report
CAREVISION	Pulsed fluoroscopy with a pulse rate of up to 15 p/s Easy selection of dose levels and operating modes including dedicated low-dose programs
CAREPROFILE	Radiation-free positioning of primary collimators through graphical display in the LIH image on the image monitor
Dose optimization	Integrated dose measuring chamber* with automatic transfer of the accumulated dose into a radiation report Selection of dose levels Additional copper filter for further reduction of the patient dose System-integrated FD laser aimer* System-integrated tube-side laser targeting device* Detachable grid, e.g. for pediatric applications

# Cios Fusion

Image display/processing	
Image display	Aspect ratio 5:4, corresponding to 1280 x 1024 matrix, 1k x 1k image content Split screen (1, 16 on 1) Digital zoom, fixed zoom, roaming Magnification (detector zoom) Digital image rotation Movie function for playback of scenes and auto replay function Digital shutters Horizontal and vertical image reversal Positive/negative image inversion LSH (Last Scene Hold)
Image processing	Application-specific lookup tables (LUTs) for optimum contrast and brightness Spatial frequency filtration for edge-enhanced image display Edge enhancement Noise reduction Motion detection with active noise reduction Metal correction With Subtraction option: Manual and automatic Pixelshift, Remask, Landmark, recalculate Peak OP
Digital Density Optimization (DDO)	Digital Density Optimization reduces the dynamic range of an image, allowing the contrast of structures to be emphasized without loss of information in bright and dark image areas
Text/graphic functions	Text: annotation, image comments, R/L marking Graphics: quantification with distance and angle measurements
Stenosis quantification*	Quantification program for geometric and densitometric values
Live Graphical Overlay*	Digital drawing tool for enhanced visualization in all radiation modes (e.g. for marking vessels in AAA procedures)

# Cios Fusion

## Data transfer and documentation

### DICOM network interfaces

DICOM Send/Storage Commitment*	DICOM interface for image data communication in a clinical network (PACS) based on the DICOM 3 standard Sending, receiving and storing of images Archiving confirmation from the image archive
DICOM Print*	For printing within the network, on a DICOM-compatible camera or DICOM-compatible printer
DICOM Query/Retrieve*	Retrieval of studies from a digital archive, a workstation, or other imaging systems; e.g., MR, CT Multimodality viewing
DICOM Worklist/MPPS*	Get Worklist function for importing patient data from a data management system (RIS/HIS). XA, CR and DX worklist entries supported, configurable Modality Performed Procedure Step (MPPS) function for sending examination statistics and dose information to a data management system
DICOM Dose Structured Report	Sending of dose values for each study to an archiving system
DICOM Advanced*	DICOM Advanced contains all the functions of DICOM Dose Structured Report, plus: DICOM Send/Storage Commitment DICOM Print DICOM Query/Retrieve DICOM Worklist/MPPS

# Cios Fusion

## Data transfer and documentation

### Documentation

WLAN*	<p>WLAN client module for wireless transmission of DICOM image data, e.g. to a PACS</p> <p>Compatible with 802.11 a/b/e/g/h/i/n WLAN standards</p> <p>Operation within the 2.4 / 5 GHz frequency bands</p> <p>802.11 i, 802.1 x, WPA/WPA2</p> <p>WPA2 Enterprise supplicants EAP-TLS, EAP-TTLS, (MSCHAPv2), EAPP-EAP (MSCHAPv2) as security/authentication features</p> <p>Supports TKIP and AES for data encryption</p> <p>Supports DHCP client</p>
DVD recorder for fluoro recording*	<p>Direct output of fluoroscopy and radiography acquisition series on DVD recorder in MPEG4 format</p> <p>Recordings are triggered via radiation release</p>
CD/DVD	DVD drive for digital image storage on CD-R, DVD+R or DVD-R for offline data exchange in DICOM 3, TIFF and AVI formats
Printer interface*	Digital printers for printing on paper or paper/film
USB export	For digital image storage to a USB device in DICOM, TIFF and AVI formats
External DVI interface*	<p>Live monitor (A):</p> <p>Video splitter output for connecting an external live monitor</p> <p>Reference monitor (B):</p> <p>Video splitter output for connecting an external reference monitor</p> <p>DVI interface (splitter), without galvanic isolation</p>
SmartView-HD VideoManager*	<p>Display of sources such as endoscopy, ultrasound or image review workstations on the reference monitor (B). Supports HD (high-definition) endoscopy</p> <p>Images from connected video sources can be stored as a freeze frame in DICOM format and transferred to a PACS in the same patient folder as the other images acquired</p> <p>Additional output for transmitting X-ray live/reference images or external video sources (e.g. endoscopy or ultrasound) connected via VideoManager to, e.g., an external monitor</p>

# Cios Fusion

Options	
Image acquisition	Subtraction/Roadmap
C-arm	Flat detector 30 cm x 30 cm
	Touch-based remote control unit
	Multifunctional footswitch
	Position memory
	System-integrated laser aimer on the flat detector <sup>2)</sup>
	System-integrated laser targeting device on tube side <sup>2)</sup>
Image display/processing	Integrated dose measuring chamber
	Measuring of angles and distances
	Stenosis quantification
	Live Graphical Overlay
Data transfer and documentation	DICOM Send/Storage Commitment
	DICOM Print
	DICOM Query/Retrieve
	DICOM Worklist/MPPS
	DICOM Advanced
	External DVI monitor connections
	SmartView-HD VideoManager
	DVD recorder for fluoro recording
	WLAN
	Printer
	HIPAA
	X-ray passcode
	Monitor cart
Sound system EMotion	
19" TFT Premium high-brightness color display	
Service	Remote Desktop (Netviewer Assistance)
Accessories	Sterile covers for C-arm, X-ray tube and flat detector
	Additional holder for adapting the remote control unit to the standard rail of the OR table

# Cios Fusion

## Operating data

Power requirements	100 V, 110 V, 120 V, 127 V, 200 V, 230 V, 240 V, ( $\pm 10\%$ ), 50/60 Hz ( $\pm 1$ Hz)
Unit fuse protection (internal)	100 V to 127 V 20 A slow-blow fuse 200 V to 240 V 15 A slow-blow fuse
Maximum power consumption	2.6 kW
Standby power consumption (for 230 V)	475 W
Voltage / Current values	Continuous 16 A (100 V) / 7 A (230 V) Short-time (max.30 s 1000 W Fluoro) 25 A (100 V) / 12 A (230 V) Short-time (max. ~ 50 ms DR single shot) 29 A (100 V) / 14 A (230 V)
Internal line impedance	Ri max. 0.3 ohms for 100 V to 127 V Ri max. 0.8 ohms for 200 V to 240 V

# Cios Fusion

## Environmental conditions (operation)

Temperature range	+ 15°C to + 35°C
Relative humidity	15% to 75%, non-condensing
Barometric pressure	700 hPa to 1060 hPa

## Dimensions and weight

Chassis (l x w x h)	195.5 cm x 80.5 cm x 162 cm (77.0" x 31.6" x 63.8")
Monitor cart (l x w x h)	70 cm x 74 cm x 182 cm (27.6" x 29.1" x 71.7"), motor-driven 16 cm (6.3")
Weight of C-arm chassis without options	
Cios Fusion	272 kg (600 lbs)
Monitor cart	230 kg (506 lbs) (including 2 monitors, UPS)

# Cios Fusion

## Dimensions in cm (inches)

