DRF 4343TS

Acquisition and processing system with dynamic Flat Panel detector
for fluoroscopy and radiography

Product Data

General features

Power supply	Single-phase voltage	230 ± 10%, 50/60 Hz
Power consumption	24" monitor system	1000 VA
Working environmental conditions	Temperature	15 – 35 °C
	Humidity	20 – 75 %
	Atmospheric pressure	700 – 1060 hPa
Typical working dose	In Radiography	2.5 µGy/img
	In Continuous Fluoroscopy	35 µR/s = 306 nGy/s ~ 10 nGy/i (43 x 43 cm) 50 µR/s = 437 nGy/s ~ 14 nGy/i (30 x 30 cm) 50 µR/s = 437 nGy/s ~ 14 nGy/i (20 x 20 cm) 50 µR/s = 437 nGy/s ~ 22 nGy/i (15 x 15 cm)
	In Pulsed Fluoroscopy	4 µR/i = 35 nGy/i (43 x 43 cm) **6** µR/i = 52.4 nGy/i (30 x 30 cm) **6** µR/i = 52.4 nGy/i (20 x 20 cm) **12** µR/i = 104.8 nGy/i (15 x 15 cm)

Image acquisition modality

	Field size	Output matrix (pixel)	Frame rate (frame/s)	Binning
Continuous Fluoro	43x43 cm (17"x17") 30x30 cm (12"x12") 20x20 cm (8"x8") 15x15 cm (6"x6")	946x958 1024x1024 672x672 1024x1024	30 29 30 20	3x3 2x2 2x2 1x1
	Field size	Output matrix (pixel)	Frame rate (frame/s)	Binning
Pulsed Fluoroscopy	43x43 cm (17"x17") 30x30 cm (12"x12")* 30x30 cm (12"x12")* 20x20 cm (8"x8") 20x20 cm (8"x8") 15x15 cm (6"x6")	946x958 1024x1024 682x682 672x672 462x562 1024x1024	1, 2, 4, 8, 15 1, 2, 4, 8, 15 1, 2, 4, 8, 15, 30 1, 2, 4, 8, 15 1, 2, 4, 8, 15, 30 1, 2, 4, 8, 15	3x3 2x2 3x3 2x2 3x3 1x1
Note*: with 30X30 Field size one Output Matrix is available and it is set at the installation				

Radiography	Field size	Output matrix (pixel)	Frame rate (frame/s)	Binning
High resolution	43x43 cm (17"x17")	2840x2874	0.5, 1, 3, 6	1x1
Medium resolution	43x43 cm (17"x17")	1420x1436	0.5, 1, 2, 4, 8, 16	2x2
Tomography	43x43 cm (17"x17")	2840x2874	2.3 o 4.3	1x1

Dynamic flat panel detector

Model	Thales – Pixium RF 4343 FL4-P	
Power supply	Voltage	+24 V ± 0.5 V
	Power consumption	4 A (max)
Technology	Dynamic Flat Panel Detector Amorphous Silicon photodiodes array with high absorption and high resolution CsI scintillator screen with 6 µm needle structure	
Acquisition modality	– Radiography – Tomography – Pulsed fluoroscopy – Continuous fluoroscopy	
Max spatial resolution	3.5 lp/mm (Nyquist frequency)	
Frame rate	From 1 to 30 img/s	
MTF at RQA5 (typ.)	66% @ 1.0 lp/mm 35% @ 2.0 lp/mm 19% @ 3.0 lp/mm 15% @ Nyquist	
DQE at RQA5 (a ≈ 2 µGy)	74% @ 0 lp/mm 64% @ 0.5 lp/mm 54% @ 1.0 lp/mm 49% @ 1.5 lp/mm 44% @ 2.0 lp/mm 37 % @ 2.5 lp/mm 29% @ 3.0 lp/mm 20% @ Nyquist	
Exposure Dose Range	0.1 – 10 µGy	
Maximum linear response dose	50 µGy	
Saturation dose	85 µGy	
Max field size	43 x 43 cm (17 x 17")	
Max output matrix	2840 x 2874 pixels	
Pixel dimension	148 µm	
A/D conversion	16 bit (65.536 gray levels)	
Cooling	Air	

Working environmental conditions	Temperature	10 – 35 °C working range in compliance with specifications 10 – 40 °C working range out of specification
	Humidity	20 – 75 %
	Atmospheric pressure	700 – 1060 hPa
Environmental conditions for transport and storage	Temperature	-25 – 55 °C
	Humidity	5 – 95 %
	Atmospheric pressure	500 – 1060 hPa

Wireless static detector (option)

Model	Thales – Pixium 3543EZ-C
Dimensions	383 x 460 x 16 mm
Weight	2.8 kg (with battery)
Receiver type	Amorphous silicon (a-Si)
Conversion screen	Cesium (CsI)
DQE @ 0.05 lp/mm	66%
Acquisition time (typ.)	12 s
Working dose	0.5 – 5 µGy/img
Pixel size	148 µm
Active area size	355 x 426 mm (2330 x 2846 pixel)
Matrix	2400 x 2880 pixel
Sensitivity (typ.)	550 LSB/µGy
Resolution (max)	3.6 lp/mm
A/D conversion	16 bit

Video processor (hardware specs)

Video processor	Model	HIRIS TS PACO / VP
	CPU	Intel core i7 9700k – 3.66 GHz
	Operating system	Windows 10 LTSC 2019
	GPU	PCI-e 16x, Model RTX 3060
	Ethernet interface	INTEL Server Adapter I210-T1
	RAM	32 GB
	Acquisition	Digital 16-bit, serial, GigE 16 bit/s
Mass storage	System HD	SSD, 500 GByte
	Archive HD	SSD, standard 1 TByte
	Image storage capacity	– Pulsed Fluoro: 512 images/GB (512 000 images with standard Archive HD) – Radiography high resolution: 60 images/GB (60 000 images with standard archive HD) – Radiography medium resolution: 240 images/GB (240 000 images with standard archive HD)

	Number of images per run	Unlimited: based on archive HD capacity
	Number of exams	Unlimited: based on archive HD capacity
Interface	Ethernet TCP/IP	Standard DICOM 3
	For external burning device	USB 2.0 / USB 3.0

Control and image processing unit (software specs)

The control and image processing unit is based on a powerful Graphic Processor Unit with high computational performance which provides real-time image acquisition and processing with increased contrast, resolution and dynamics. It also provides the complete management of the integrated workflow including: HIS-RIS and PACS data flow management, exam procedure management, exposure factors and techniques setting management and detector management.	
Main Control unit	
Features	– System diagnostics – Examination table management workflow – Generator management workflow – Image acquisition, processing and post processing workflow management – Patients camera view management – HIS-RIS and PACS DICOM workflow management – Supervision and management of radiation protection safety warnings
Graphic Unit Interface	
Languages	Italian, English, Spanish, French, German, Dutch, Russian, Romanian
Backup hard-disk	The system is equipped with a backup hard disk for complete storage of the contents of the main hard disk. This feature allows the user to restore full machine functionality in the event of a primary hard disk failure

Main Monitor 24"

Screen technology	LCD color, Touch Screen
Active screen size (diagonal)	609.6 mm (24")
Active screen size	518.4 x 324.0 mm (20.4 x 12.8")
Aspect ratio	16:10
Resolution	1920 x 1200 pixels, 2 MP
Pixel pitch	0,270 mm
Bit depth	30 bit
Viewing angle	178°
Ambient light presets	Yes, reading room selection
Front sensor	Yes, Front Consistency Sensor

Max luminance	600 cd/m^2
DICOM calibrated luminance	350 cd/m^2
Contrast ratio	1000:1
Response time (typical)	7 ms
Video input signals	1x DisplayPort 1x DVI-I
USB ports	1x USB upstream (endpoint) 2x USB 2.0 downstream
Power requirements	120-240 Vac, 50/60 Hz, 1.6 - 0.7 A
Power consumption	25 W, < 0.5 (hibernate), < 0.5 (standby)
Installation	On desk, trolley
Dimensions with stand (W x H x D)	Portrait: 383.0 x 577.1~629.1 x 201.3 mm Landscape: 568.0 x 420.6~530.6 x 201.3 mm
Dimensions without stand (W x H x D)	Portrait: 383.0 x 568.0 x 67.3 mm Landscape: 568.0 x 383.0 x 67.3 mm
Net weight with stand	7.8 kg
Net weight without stand	5.6 kg
Tilt	-5° to +22°
Pivot	0° to 90°
Height adjustment range	110 mm
Housing color	Black (RAL 9004)
Mounting Standard	VESA (100 mm)
Screen protection	PCAP touchscreen
QA software	MediCal QAWeb
Operating environmental conditions	Temperature:	0°C to 40 °C (32°F to 104 °F) 15°C to 35 °C (59°F to 95 °F) within specs
	Humidity:	8% to 80% (non-condensing)
	Pressure:	700 hPa min
Environmental conditions for storage and transport	Temperature:	-20°C to 60 °C (-4°F to 140°F)
	Humidity:	5% to 90% (non-condensing)
	Pressure:	500 hPa to 1060 hPa

Secondary Monitor 21" (optional)

Screen technology	LCD color
Active screen size (diagonal)	541.0 mm (21.3")
Active screen size	432.0 x 324.0 mm (17.0 x 12.8")
Aspect ratio	4:3
Resolution	1600 x 1200 pixels, 2 MP
Pixel pitch	0.270 mm

Bit depth	30 bit
Viewing angle	178°
Ambient light preset	Yes, reading room selection
Front sensor	Yes, Front Consistency Sensor
Maximum luminance	1000 cd/m²
DICOM calibrated luminance	400 cd/m²
Response time (typ)	8 ms
Video input signals	1x DisplayPort 1x DVI-I
USB ports	1x USB 2.0 upstream (endpoint) 2x USB 2.0 downstream
Power requirements	120–240 Vac, 50/60 Hz, 0.9–0.5 A
Power Consumption	25 W, < 0.5 (hibernate), < 0.5 (standby)
Installation	On desk, trolley
Dimensions with stand (W x H x D)	Portrait: 374.5 x 506.6~583.3 x 201.3 mm Landscape: 477.0 x 411.5~529.6 x 201.3 mm
Dimensions without stand (W x H x D)	Portrait: 477.0 x 374.5 x 70.4 mm Landscape: 374.5 x 477.0 x 70.4 mm
Net weight with stand	5.8 kg
Net weight without stand	3.6 kg
Tilt	–5° to +22°
Pivot	0° to 90°
Height adjustment range	110 mm
Housing color	Black (RAL 9004)
Mounting standard	VESA (100 mm)
QA software	MediCal QAWeb
Environmental operating conditions	Temperature:	0°C to 40 °C (32°F to 104 °F) 15°C to 35 °C (59°F to 95 °F) within specs
	Humidity:	8% to 80% (non-condensing)
	Pressure:	700 hPa min
Environmental storage and transport conditions	Temperature:	–20°C to 60 °C (–4°F to 140°F)
	Humidity:	5% to 90% (non-condensing)
	Pressure:	500 hPa to 1060 hPa

Connectivity

Standard DICOM classes	– Print (SCU) – Store (SCU) – Worklist (SCU) – Storage Commitment (SCU) – MPPS (SCU) – Radiation Dose Structured Report (SCU)
Optional DICOM classes	– Query/Retrieve (SCU) – Dicom Media Export, CDROM burning device included – Dicom Media Export, USB (BMP format)
Data transmission rate	Ethernet 10/100/1000 Mbps
Multiple destinations	Multiple DICOM destinations (Store SCU) are available
Auto-Store	Images can be automatically sent to DICOM destinations upon closing the study
Remote access	Remote access service support (optional)
Note	*All features previously described are subject to verification of hardware and software compatibility of the devices to be connected.*

Tomosynthesis (optional)

Tomosynthesis function	Through a scan performed at a fixed angular range of 40° (±20°), the systems acquires a series of projection at different angles which are reconstructed by software in a sequence of slices parallel to the exam plane
Acquisition speed	6 frame/s
Acquisition time	7.5 s
Image matrix	1440 x 1441 pixel
Number of acquired images	60
Layer height (geometric position of central slice of reconstructed volume respect to table)	0 ÷ 350 mm, step 1 mm
Distance between two adjacent slices	Selectable at 1 mm steps
Image display functions	Cine-loop with selectable speed, frame-by-frame image view
Reconstructed tomosynthesis images	The software allows to define the first and final slice of the reconstructed sequence of tomosynthesis images, as well as the distance between adjacent slices. Different elaborations can be obtained and stored by using the same tomosynthesis acquisition
Reconstruction profiles	Selection among three suggested reconstruction profiles to get the best presentation of the images. Other profiles can be created during the installation phase according to the user's needs

Stitching (optional)

Stitching function	The stitching function allows the acquisition of a series of images of a wide anatomic part, which are then joined together in a single image in a completely automatic process. This function is typically used for spine and extremity exams
Manual correction	Is possible to manually correct the overlapping zone between two images both vertically and horizontally.
Memorization	The full stitched image and the original segmented images are stored in a single patient record.

Digital Subtraction Angiography (optional)

Multiple phase angio procedures	Each Angio procedure can be made of up 6 phases with different frame. It is possible to define the start of the injection and the start of the subtraction.
Maximum opacification function (MaxOp)	To track the flow of contrast media in subtraction mode. It's possible to activate the MaxOp function on exams acquired without it
Lock-In	This function can be selected to lock the dose level between the different steps of the angio procedure
Injector control	With automatic synchronization of the mask image acquisition
Road mapping	Continuous fluoroscopy with image subtraction for tracking the progress of the catheter insertion
Reference image	For image comparison, the live image is shown on one monitor while a stored image can be displayed on the reference monitor
Cine loop	Possibility to select the speed of the playback and to define the start and stop of the sequence to be played
Sub-on, Sub-off	It is possible to review images with and without the image subtraction
Remasking	Manual choice of the mask image
Pixel shift	Mask image repositioning with sub-pixel increments
Landmarking	It's possible to modify the weight of the mask image. It allows to adjust the level of the background anatomy display
Image sum	Images can be summed to enhance the visibility of the contrast media

Study workflow management

Patient demographics	Patient data can be entered with the following modalities: – DICOM Worklist – Local database query – Manual insertion via keyboard – "Emergency" mode
Exam settings	User selection of anatomic examination procedures from a pre-defined library (customizable), with automatic setting of: – Exposure technique (3 points, 2 points, AEC)

	– 7 patient sizes – Focal Spot – Exposure factors – Look-Up Table for grey scale optimization – Region Of Interest for automatic parameters optimization – Image processing algorithm – Zoom factor – Windowing Possibility of manual override for modification of the preset parameters
Exam table pre-setting	According to the predefined examination procedure, the table automatically sets: – Table Tilt – Column tilt – Longitudinal detector position – Transversal tabletop position – Source-Detector distance – Collimated area – Grid type – Additional filtration (if present)
Last Image Hold (LIH)	After X-ray emission, the last image will be held on the monitor
Virtual collimation	The function allows to adjust the collimator opening area without X-ray emission adjusting a digital rectangle on the last image (LIH)
Virtual scan	The function displays the displacement of the collimator on the last image hold (LIH) during the table movements (longitudinal scan and transversal tabletop movement), allowing the centering of the region of interest without X-ray emission
Integrated camera	Patient visualization on the main monitor through a camera integrated in the system
RIS mapping	If the PACS supports this function, when a patient record is downloaded from the Worklist, the system automatically recognizes the requested anatomic procedure and sets itself according to it
Patient demographics	Patient data can be entered with the following modalities: – DICOM Worklist – Local database query – Manual insertion via keyboard – "Emergency" mode

Post Processing

Patient database query	Possibility to query with different filters: performed exams, completed exams, documented exams (print, store, etc.)
Image review	Single image review. Playback of dynamic sequences at acquisition or arbitrary speed. Forward and backward manual image browse.

	Cine loop with editing functions.
Multi-Image overview	User selection of the number of images among 4 / 9 / 16 / 1+5 (1 large image + 5 small images) / 1+7 (1 large image + 7 small images)
Zoom	1:1 / 2:1 / 3:1 /Magnifying glass
Image deletion	From multi-image display or standard image review
Real-time processing	− Dynamic Range Compression (DRC)* − Automatic W/L − DSA (MaxOp, Road Mapping, image subtraction, automatic remasking)
Processing functions	− Dedicated LUT for each exam and size − Grey scale inversion − Brightness (Level) and contrast (window) correction − Image enlargement (zoom) − Spatial filters − DRC (Dynamic Range Compression)* − Image flip V / H − Image rotation by 90° − Electronic shutters − Multiple images overview − Image labeling − Analysis of statistics − Stitching functions (automatic reconstruction, stitching points definition, manual reconstruction) − Graphic functions for DSA (shifting mask, pixel shift, vascular tracing, land marking, QA analysis)
Graphic functions	− Grid display − Linear measurements − Angular measurements − Overlay of text and markers on image − Virtual shutters − Cobb angle and orthopedic measurements (option)
ATH (Anatomical Tissue Harmonization)	ATH is an advanced image processing function that automatically improves the image quality by: − Applying dedicated processing algorithms and parameters for every anatomic district under examination − Recovering the image visualization in under- or over-exposed areas − Increasing the image latitude without loss of contrast − Automatically optimizing the grey scale and reducing the need for manual windowing − Improving the visibility of details without adding noise or artifacts − Balancing the visibility of high and low density structures in the same image

Fluoro real-time processing	FTH is an advanced image processing function for fluoroscopy images in real time, able to optimize the image presentation, independently of the radiographic features of examined organs and tissues. FTH produces an high enhancement of the latitude of dynamic image, without loss of contrast and definition
Hardcopy	Interactive print layout editor. True-Size print capability. Predefined layouts according to anatomic procedures from RIS
Patient database query	Possibility to query with different filters: performed exams, completed exams, documented exams (print, store, etc)
Image review	Single image review. Playback of dynamic sequences at acquisition or arbitrary speed. Forward and backward manual image browse. Cine loop with editing functions.

*Note: *Dynamic Range Compression is a digital process in which the image is presented to the user with increased contrast, resolution and dynamics. In addition, a recursive quantum noise reduction filter is applied. All these processes are set and saved on the HD of the video processor and identified by a version and a date.*

Automatic Exposure Control device (AEC)

Model	Claymount SSMC 601 / preamplifier 1001 Three measuring chambers	
Technology	Solid state	
Dimensions	Global	472 x 460 x 3.3 mm
	Useful area	430 x 430 mm
	Weight	1 kg ± 100 g
Power supply	Voltage	± 15 V DC (±2 V)
	Consumption	40 mA
Technical data	Sensitivity	0.8 V/μGy
	Attenuation coefficient (80 kV, 25 mm Al, FFD 100 cm)	< 1.05
	Measuring areas	Left, Right, Center (any combination)
	Working range	40 ÷ 150 kV

DAP (Dose Area Product)

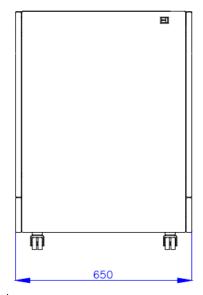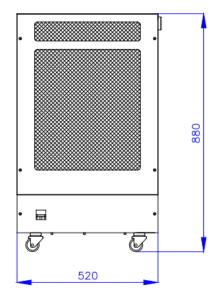| Model	*KermaX-plus* 120-131 OEM-HS	
Power supply	Voltage	da 9 a 29 V DC
	Consumption	65 mA (max)
Dimensions	Global	156 x 180 x 18 mm
	Active area	146 x 146 mm
Technical data	Sensitivity	0.1 mGy * cm^2
Reproducibility	< 1 % at constant atmospheric temperature and pression	
Dependence on energy	Better than ±8 % at 100 kV	

Standards and regulations

Certifications	The equipment complies with European Directive 93/42/EEC and subsequent amendments, in particular 2007/47/EEC.
	The following harmonized standards apply to the EM equipment:
	– EN 60 601-1:2006 + A1:2013
	– EN 60 601-1-2: fourth edition
	– EN 60601-1-6:2010 + A1:2013
	– EN 62366-1:2015
	– EN 62304:2006 + A1:2015
	– EN 62563-1: 2010
	– EN ISO 14971:2012
	– EN ISO 15223-1:2016
	– EN 1041:2008

Cabinet Mechanical Dimensions (in millimeters)

Weight: 103 kg

Note: Products are continuously under review in the light of technical advancement. The actual specification may therefore be subject to improvement or modification without notice.