








X-ray RF System

# SONIALVISION G4

## Specifications

# About the Symbols Appearing in this Specifications

Throughout the text in this manual, warnings and other information essential when using this unit, such as cautionary or prohibited items, appear classified as per the following:

Mark	Description
 <b>DANGER</b>	Indicates an imminently hazardous situation which, if not avoided, will result in serious injury or death.
 <b>WARNING</b>	Indicates a potentially hazardous situation which, if not avoided, could result in serious injury or possibly death.
 <b>CAUTION</b>	Indicates a potentially hazardous situation which, if not avoided, may result in minor to moderate injury or equipment damage.
 <b>NOTE</b>	Emphasizes additional information that is provided to ensure the proper use of this product.
 Instructions	Indicates an action that must be performed.
 Prohibitions	Indicates an action that must not be performed.
 <b>Reference</b>	Indicates the location of related reference information.

## Revision History

Revision	Date	Changes
First edition	Mar. 2013	First edition released

# Contents

## Chapter1 Overview

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1.1 Applications .....	1-2
1.2 Features .....	1-2
1.3 Principle .....	1-3
1.4 Configuration .....	1-4
1.4.1 Standard Components .....	1-4
1.4.2 Optional Components .....	1-5
1.5 Environmental Conditions .....	1-7
1.5.1 Operation Environment .....	1-7
1.5.2 Transportation and Storage Environment .....	1-8
1.5.3 Power Supply .....	1-9
1.6 Classification of Equipment .....	1-11

## Chapter2 Specifications

---

2.1 Environmental Conditions of EMC (Electromagnetic Compatibility) .....	2-2
2.2 Statement of Compliance [For Europe] .....	2-11
2.2.1 Regulatory Information .....	2-11
2.2.2 Company's Quality System .....	2-11
2.2.3 International Standards .....	2-12
2.3 Statement of Compliance with Standards .....	2-12
2.4 Manufacturer Information .....	2-13
2.5 Specifications .....	2-14
2.5.1 X-Ray Diagnostic Table .....	2-14
2.5.2 High-Voltage Generator .....	2-16
2.5.3 Collimator .....	2-22
2.5.4 Digital Radiography (DR) Unit .....	2-23

## Chapter3 Appendix

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3.1 Reference Axis of Equipment .....	3-2
3.2 Dimensions .....	3-3

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# Chapter *1*

## Overview

This chapter describes the applications and features of SONIALVISION G4.

### ■ Contents

1.1	Applications .....	1-2
1.2	Features .....	1-2
1.3	Principle .....	1-3
1.4	Configuration .....	1-4
1.5	Environmental Conditions .....	1-7
1.6	Classification of Equipment.....	1-11

## 1.1 Applications

SONIALVISION G4 is a multi-purpose X-ray RF system that can meet a wide range of requirements for individual clinics.

The main applications are as follows:

- Fluoroscopy diagnosis
- Gastrointestinal series
- Angiography
- Vascular/Non-vascular IVR
- General radiography

Do NOT use this system in angiography or IVR intended for cerebrovascular and cardiovascular applications.

## 1.2 Features

- A large-field 17-inch FPD and digital image processing enable you to acquire high quality diagnostic images.
- The equipment employs a high-frequency inverter system with maximum frequency of 50 kHz for high-voltage generation and ensures high efficiency by low-ripple output.
- The X-ray diagnostic table holds a wide examination area and allows radiography from head to foot without the need to move the patient.
- The tabletop can be raised or lowered in the height range from 47 cm to 110 cm to help the patient get on or off and allow the operator to take an unforced pose according to required examinations.
- The operator can assist the patient while operating the X-ray diagnostic table on its front control panel.
- The control panel is equipped with a 10.4-inch LCD touch panel, where the operator can view the patient information or change the fluoroscopy or radiography condition. The screen layout or display options can be switched as appropriate according to the purpose of examination. Customizable hard switches help you access to the frequently used functions with a single touch of a button.
- Low-dose exposure and high image quality are achieved at the same time by incorporating automatic selection of BH-filter (X-ray filter), wave-tail cut-off mechanism for pulsed fluoroscopy, detachable anti-scatter grid, virtual collimation, and single-mask collimator (option).
- A series of radiography conditions for examination can be registered in a program to repeat the same series of radiography.
- Image data can be stored for a prolonged period by saving it on DVD-R or CD-R disks in DICOM format.
- The equipment supports DICOM3.0 and allows smooth connection to a hospital network. DICOM Print, Media Storage, DICOM Storage, and MWM/MPPS (option) are also supported.

## 1.3 Principle

1

This equipment detects the X-rays, which are radiated from the X-ray tube unit and passed through the patient's body, using a flat-panel detector (FPD), converts them into digital image data, and takes it into the image processing unit. The image processing unit displays digitally processed images on the monitor, records the images, and transfers them to network.

It is also possible to perform general radiography in combination with the second tube (option) and cassettes.

# 1.4 Configuration

## 1.4.1 Standard Components

SONIALVISION G4 comprises the following parts.

Unit	Name	Component
X-ray diagnostic table	Remote controlled X-ray diagnostic table ZS-200	X-ray diagnostic table body <sup>*1</sup> Control cabinet (for X-ray diagnostic table) Remote control panel Anti-scatter grid <sup>*1</sup> Tabletop mat <sup>*1, *2</sup> Foot rest <sup>*1, *2</sup> , Hand grips <sup>*1, *2</sup> , Upper hand grip <sup>*1, *2</sup> , Shoulder rests <sup>*1, *2</sup>
Digital radiography unit	Digital Radiography System DR-300	Control cabinet (for digital radiography unit) Operation cabinet FPD <sup>*1, *3</sup> Acquisition monitor, Reference monitor Touch panel <sup>*1, *4</sup> Keyboard, Mouse
High-voltage generator	Diagnostic X-ray High-Voltage Generator D150BC-40S (D150VC-40S)	Control cabinet (for high-voltage generator) Hand switch Phototimer receiver <sup>*1, *3</sup>
X-ray tube unit	Medical X-Ray Tube Unit 0.7/1.2JG326D-265 (0.4/0.7JG326D-265)	X-ray tube <sup>*1, *3</sup>
Collimator	Collimator R-300	Collimator <sup>*1, *3</sup>

<sup>\*1</sup>: Equipment suitable for use in patient environment

<sup>\*2</sup>: The patient's body comes into contact with these parts (applied parts).

<sup>\*3</sup>: Incorporated in the X-ray diagnostic table

<sup>\*4</sup>: Incorporated in the remote control panel



## 1.4.2 Optional Components

1

Name	Description
Remote control desk	Desk incorporating a remote control panel and an operation cabinet for digital radiography unit.
Remote control panel box	Required when a remote control panel is placed on a desktop.
Remote control panel cart	Cart for mounting a remote control panel.
Remote control panel installation kit	Required when the remote control panel is installed in a desk other than the remote control desk.
Local console <sup>*1</sup>	Local console for operations in the examination room.
Local console with touch panel <sup>*1</sup>	Local console for operations in the examination room, which is equipped with the same touch panel as the remote control panel.
Monitor cart <sup>*1</sup>	Cart that holds the monitor inside the examination room.
Monitor cart with control panel <sup>*1</sup>	Cart that holds the monitor inside the examination room, which is equipped with a proximity control panel.
Acquisition monitor for the examination room <sup>*1</sup>	Acquisition monitor to use inside the examination room.
Reference monitor for the examination room <sup>*1</sup>	Reference monitor to use inside the examination room.
Microphone <sup>*1</sup> and speaker for intercom	For communications between the examination room and control room.
Upper GI examination unit <sup>*1, *2</sup>	Compression unit and barium cup holder used for upper GI examinations.
Compression band <sup>*1, *2</sup>	Used to hold the patient when observing while compressing the region of interest.
Leg support <sup>*1, *2</sup>	Used for urological examination in a horizontal position.
Endoscope support <sup>*1</sup>	Used to secure the endoscope fiber.
Drain bag <sup>*1, *2</sup>	Plastic disposal bag for urological examination.
Elbow support <sup>*1</sup>	Used to hold the operator's elbow for urological examination.
Voiding Cystographic Chair <sup>*1, *2</sup>	Used for urological examination in a sitting position.
Rotary foot rest <sup>*1, *2</sup>	Foot rest used to turn the standing patient on his or her body axis.
Foot rest for myelography <sup>*1, *2</sup>	Used for myelography examination.
Foot switch for examination room <sup>*1</sup>	Foot switch used for fluoroscopy or radiography at a remote place from the control console in the examination room.
Foot controller <sup>*1</sup>	Foot controller used to operate the X-ray diagnostic table in the examination room.
Withstand load 500 lb option	Withstand load increased from standard 450 lb (204 kg) to 500 lb (227 kg).
Hand grip (D) <sup>*1, *2</sup>	Large-sized hand grip.
Drip hanger <sup>*1</sup>	Drip hanger to fit on the tabletop of the X-ray diagnostic table.

Name	Description
Auxiliary tabletop <sup>*1, *2</sup>	Used to extend the X-ray diagnostic table by 600 mm.
Auto transformer ZAT-1	Built in the control cabinet (for X-ray diagnostic table) if the power voltage for high-voltage generator and X-ray diagnostic table is other than 200 V.
DSA radiography option	Optional software for DSA radiography.
DICOM Storage option	Optional software that transfers radiographic images to a server.
DICOM MWM option	Optional software that acquires study information from the server.
DICOM MPPS option	Optional software that transfers the study status and records to a server.
Barcode reader	Used to input patient information from a barcode.
UPS	Allows the digital radiography unit to be safely shut down when a power failure occurs during the equipment operation.
High-voltage generator control panel GSC-2002L	Console used exclusively for displaying and altering X-ray conditions.
Auto transformer XAT-2H	Built in the control cabinet (for high-voltage generator) if the power voltage for high-voltage generator and X-ray diagnostic table is 200, 220 or 240 V.
Exposure reduction option <sup>*1</sup>	Includes a C-leaf collimator and independent mask collimation to reduce X-ray exposure.
Line marker <sup>*1</sup>	Used to check the center of the irradiation field in the longitudinal direction.
Area dosimeter adapter <sup>*1</sup> (For VACUTEC)	Adapter for fitting an area dosimeter manufactured by VACUTEC to the collimator.
Lateral cassette holder <sup>*1, *2</sup>	Used to hold a cassette for lateral radiography on the X-ray diagnostic table.

\*1: Equipment suitable for use in patient environment

\*2: The patient's body comes into contact with these parts (applied parts).

## WARNING

**Do NOT connect equipment other than the designated equipment to the system.**

Prohibitions

# 1.5 Environmental Conditions

1

To obtain proper performance, be sure to use the equipment under the specified environmental conditions.

## 1.5.1 Operation Environment


The installation of a dedicated air-conditioner is recommended if the building air-conditioner cannot maintain the necessary environmental conditions 24 hours a day. The heat emitted from the equipment is not significant enough to affect the environment in which the equipment is used.


### Examination Room

Item	Condition
Atmosphere	No explosive or corrosive gases
Ambient temperature	10 to 30 °C
Relative humidity	15 to 75 % (No condensation)
Atmospheric pressure	800 to 1060 hPa

### Operation Room

Item	Condition
Atmosphere	No explosive or corrosive gases
Ambient temperature	10 to 30 °C
Relative humidity	20 to 70 % (No condensation) * It is recommended to use a dehumidifier for humidity control.
Atmospheric pressure	800 to 1060 hPa
Environmental illuminance	150 to 500 lx
Ambient noise level	70 dB max.

 **WARNING**



**Do NOT use the equipment in an oxygen-rich environment.**

Using the equipment in an oxygen-rich environment may cause fire, which may lead to fatal or serious injuries to the patient or damage to the equipment.

Prohibitions

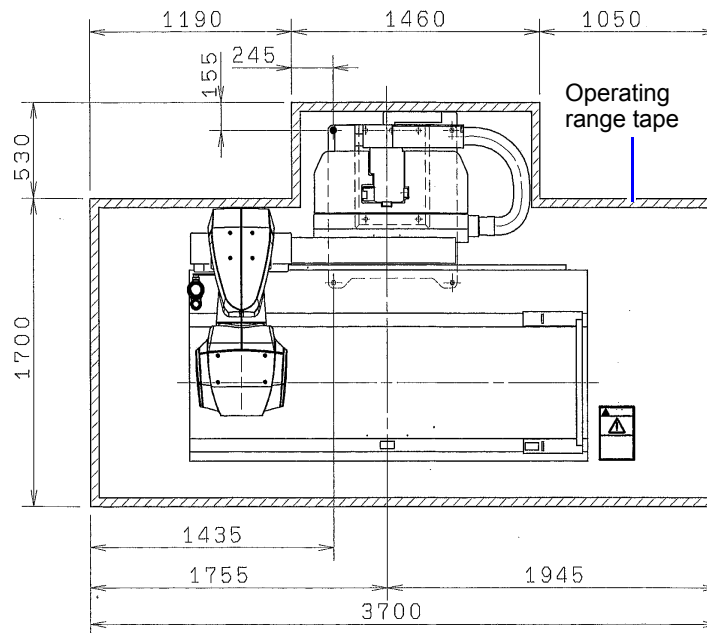
## CAUTION

Prohibitions

**Even under the prescribed conditions, do NOT change the temperature or humidity rapidly.**

Condensation may occur and cause failure. Also, rust or corrosion may occur inside the equipment.

### Operating Range



## 1.5.2 Transportation and Storage Environment

Item	Condition
Ambient temperature	-10 to 60 °C
Relative humidity	10 to 95 % (No condensation)
Atmospheric pressure	700 to 1060 hPa

## CAUTION

Instructions

**Condensation inside the equipment may cause rust formation or corrosion.**

Under low ambient temperature, freezing could occur and damage the internal circuit.

Exercise care when storing the equipment in a place with sharp changes in temperature and humidity, such as a warehouse.

### 1.5.3 Power Supply

1

**DANGER**

Instructions

**Be sure to use the power supply specified in the operation manual.**

Using a power supply other than the one specified may cause equipment malfunction or serious accidents such as fire, smoke emission, or explosions.

#### ■ Power Supply 1 (for Digital Radiography Unit)

- Nominal voltage: 200/220/230/240 VAC, single phase
- Frequency: 50/60 Hz
- Allowable voltage range (at no load): Nominal voltage  $\pm 10\%$
- Electric capacity: 7.0 kVA
- Grounding resistance: 100  $\Omega$  max.

#### ■ Power Supply 2 (for High-Voltage Generator, X-ray Diagnostic Table)

- Nominal voltage: 200/220/240/380/400/415/440/480 VAC, 3-phase
- Frequency: 50/60 Hz
- Allowable voltage range (at no load): Nominal voltage  $\pm 10\%$

#### Electric capacity and recommended transformer capacity:

Item	Capacity
Electric capacity	133 kVA
Recommended transformer capacity	75 kVA

#### Auto transformers to be combined:

Voltage	Auto Transformer
200 V	XAT-2H
220/240 V	XAT-2H, ZAT-1
380/400/415/440/480 V	ZAT-1

#### Power supply impedance:

Voltage	Power Supply Impedance
200/220/240 V	0.054 $\Omega$ max.
380 V	0.10 $\Omega$ max.
400 V	0.11 $\Omega$ max.
415 V	0.12 $\Omega$ max.
440 V	0.13 $\Omega$ max.
480 V	0.16 $\Omega$ max.

**Nominal cross-sectional area of incoming line:**

Transformer capacity: 75 kVA, conduit wiring

Voltage	Incoming Line Length (Single)									
	Up to 10 m	Up to 20 m	Up to 30 m	Up to 40 m	Up to 50 m	Up to 60 m	Up to 70 m	Up to 80 m	Up to 90 m	Up to 100 m
200 V	14	22	38	38	60	60	60	100	100	100
415 V	5.5	8	14	22	22	22	38	38	38	38

(Units: mm<sup>2</sup>)**Safety devices**

Voltage	Type	Fuse or Breaker Rated Current
200 V line	Breaker	100 A
	Knife switch and fuse	
400 V line	Breaker	75 A



When installing an earth leakage breaker with any power voltage, be sure to use an inverter-type earth leakage breaker to prevent malfunctions in the high-frequency circuits.

**Grounding conditions**

Voltage	Grounding Resistance
200 V line	100 Ω max.
400 V line	10 Ω max.

**WARNING**

Instructions

**Be sure to connect the equipment only to a (commercial) power outlet with a ground terminal.**

If the outlet does not have a ground terminal, electric shock may occur.



Open the wiring circuit breaker or knife switch of the switchboard that the equipment is connected to before removing the equipment from the power supply.

# 1.6 Classification of Equipment

This equipment is classified as follows, based on safety standards for electrical medical equipment.

**Protection Method Against Electric Shock**

Class I equipment

**Classification of Applied Parts**

Equipment including Type B Applied Parts


**Operation Mode**


Continuous operation

**Degree of Protection Against Liquid Ingress**

- Ordinary equipment
  - Foot switch: IPX1  
Foot controller: IPX4  
Otherwise: Regular
- \*: The IPX Waterproof Specification, specified by the International Electrotechnical Commission, indicates waterproof/drip-proof performance on instruments and equipment.

**Use in an Oxygen-Rich Environment**

**WARNING**





Prohibitions

**Do NOT use the equipment in an oxygen-rich environment.**

Using the equipment in an oxygen-rich environment may cause fire, which may lead to fatal or serious injuries to the patient or damage to the equipment.

**Use in Flammable Atmosphere**

**DANGER**



Prohibitions

**Do NOT use the equipment or system in the presence of flammable anesthetic gas.**

Doing so may cause an explosion.

**Classification of Installation Type**

Permanent installation type equipment

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# Chapter 2

## Specifications

This chapter describes the specifications of SONIALVISION G4.



### ■ Contents

2.1	Environmental Conditions of EMC (Electromagnetic Compatibility) .....	2-2
2.2	Statement of Compliance [For Europe].....	2-11
2.3	Statement of Compliance with Standards.....	2-12
2.4	Manufacturer Information.....	2-13
2.5	Specifications.....	2-14

## 2.1 Environmental Conditions of EMC (Electromagnetic Compatibility)

The equipment satisfies the EMC (Electromagnetic Compatibility) standard below:

IEC 60601-1-2:2007



 <b>CAUTION</b>	
	<p><b>Pay attention to the electromagnetic circumstances at the installation site.</b></p>
<p>Instructions</p>	<p>The equipment may be affected by the electromagnetic environment at the installation site.</p> <p>Also, the installation of the equipment may affect other existing equipment.</p>

### ■ Classification of EMI in Accordance with EN/IEC 60601-1-2:2001+A1:2004

Group 1, Class A

The system uses radio-frequency energy only for its internal function and is not intended to deliver energy to the patient. However, even a small amount of radio frequency energy leakage does harm to highsensitive equipment.

The system main power line in the clinical site should be connected to the domestic power sources which are separated from the public main network.

 <b>CAUTION</b>	
	<p><b>For replacement parts of internal components, make sure to apply the cables supplied by Shimadzu.</b></p>
<p>Instructions</p>	<p>The use of non-cable devices, accessories, or cables other than those sold by Shimadzu as replacement parts for the internal components may result in increased emissions or decreased immunity of the equipment.</p>

### ■ Performance to Be EMC Immunity Tested (Essential Performance)

Essential performances of this equipment are as followings:

- Securing the patient
- Positioning of X-ray irradiation field
- Settings of X-ray conditions
- X-ray exposure
- Patient information registration
- Image acquisition
- Image display

## List of Cables

S: Shielded  
U: Unshielded

No.	Cable Name	Cable Length (m)	Shield	Manufacturer
1	Power Cable 3 Phase	16	S	Shimadzu
2	Earth Cable	16	U	Shimadzu
3	ZS POWER CABLE	20	S	Shimadzu
4	Cable, UD-ZS	20	S	Shimadzu
5	Cable, HV	30	S	Shimadzu
6	Cable, HV 04-TYPE	30	S	Shimadzu
7	Cable, SPTX4	35	S	Shimadzu
8	ZS SERVO LV CABLE	20	S	Shimadzu
9	ZS SIGNAL CABLE	20	S	Shimadzu
10	ZS POW INV CABLE	20	S	Shimadzu
11	Earth Cable	40	U	Shimadzu
12	Cable, ZS-Remote	30	S	Shimadzu
13	Cable, ZS-Mini Local	20	S	Shimadzu
14	Earth Cable	32	U	Shimadzu
15	Power Cable	30	S	Shimadzu
16	Earth Cable	30	U	Shimadzu
17	Cable, UD-DR	20	S	Shimadzu
18	Cable, CAT6A SFTP	30	S	Shimadzu
19	Cable, DR-Remote	30	S	Shimadzu
20	Cable, CAT6A SFTP	30	S	Shimadzu
21	Cable, CAT6A SFTP	30	S	Shimadzu
22	Cable, CAT6A SFTP	30	S	Shimadzu
23	DVI PS Cable	30	S	Shimadzu
24	Cable, CAT6A	30	U	Shimadzu
25	Cable, CAT6A	30	U	Shimadzu
26	Power Cable	20	U	Shimadzu
27	Power Cable	30	U	Shimadzu
28	FAN Cable	20	S	Shimadzu
29	Power Cable	40	S	Shimadzu
30	Optical Cable	40	U	Shimadzu

## 2 Specifications

No.	Cable Name	Cable Length (m)	Shield	Manufacturer
31	Logger Cable	16	U	Shimadzu
32	Cable, CAT6A SFTP	30	S	Shimadzu
33	Cable, CAT6A SFTP	30	S	Shimadzu
34	Power Cable	20	U	Shimadzu
35	Power Cable	20	U	Shimadzu
36	Rolling Step Cable	20	S	Shimadzu
37	Speaker Cable	20	U	Shimadzu
38	Speaker Cable	20	U	Shimadzu
39	Microphone Cable	30	S	Shimadzu
40	Microphone Cable	30	S	Shimadzu
41	Cable, CAT6A SFTP	30	S	Shimadzu
42	Earth Cable	30	U	Shimadzu
43	DVI Cable	5	S	Shimadzu
44	Earth Cable	20	U	Shimadzu
45	Earth Cable	2.5	U	Shimadzu
46	HDMI-DVI Cable	2	S	Shimadzu
47	Cable, IBS	20	S	Shimadzu
48	Power Cable	2.5	U	Shimadzu
49	DVI Cable	2.5	S	Shimadzu
50	Power Cable	2.5	U	Shimadzu
51	DVI Cable	2.5	S	Shimadzu
52	Keyboard Cable	2	S	Shimadzu
53	Mouse Cable	2	S	Shimadzu
54	Card Reader Cable	2	S	Shimadzu
55	Barcode Reader Cable	2	S	Shimadzu
56	Keyboard Cable	2	S	Shimadzu
57	Mouse Cable	2	S	Shimadzu
58	Hand Switch Cable	4.5	U	Shimadzu
59	Foot Switch Cable	2	S	Shimadzu
60	Earth Cable	8	U	Shimadzu
61	ZS Foot Switch Cable	10	U	Shimadzu
62	ZS Foot Controller Cable	5	S	Shimadzu
63	Power Cable	16	S	Shimadzu

## 2.1 Environmental Conditions of EMC (Electromagnetic Compatibility)

2

No.	Cable Name	Cable Length (m)	Shield	Manufacturer
64	Earth Cable	16	U	Shimadzu
65	Signal Cable	20	S	Shimadzu
66	Power Cable	10	S	Shimadzu
67	Arcnet Cable	10	S	Shimadzu
68	Signal Cable	32	S	Shimadzu
69	Earth Cable	32	U	Shimadzu
70	Signal Cable	20	S	Shimadzu
71	Power Cable	20	S	Shimadzu
72	Earth Cable	20	U	Shimadzu
73	LV Cable	32	S	Shimadzu
74	Cable, HV	32	S	Shimadzu
75	Cable, HV	32	S	Shimadzu
76	Signal Cable	20	S	Shimadzu
77	Earth Cable	20	U	Shimadzu
78	Cable, SPTX4	35	S	Shimadzu
79	Power Cable	10	S	Shimadzu
80	Hand Switch Cable	4.5	U	Shimadzu
81	Com Cable	20	S	Shimadzu



**NOTE**

The cables listed above are the parts specified to be compliant with the standards. These parts are not attached to the equipment.

### List of Accessories

No.	Accessory Name	Manufacturer
1	Mini Local Console	Shimadzu
2	Large Local Console	Shimadzu
3	Remote Console Box	Shimadzu
4	ZS Foot Switch	Shimadzu
5	ZS Foot Controller	Shimadzu
6	Rolling Step	Shimadzu
7	Mat Sensor A	Shimadzu
8	Mat Sensor B	Shimadzu
9	Auto Transformer ZAT-1	Shimadzu
10	Monitor Cart	Shimadzu
11	In Room Monitor	Shimadzu
12	Barcode Reader	Shimadzu
13	Card Reader	Shimadzu
14	Side Station	Shimadzu
15	Side Station Monitor	Shimadzu
16	Uninterruptible Power Supply	Shimadzu
17	GSC-2002L	Shimadzu
18	Auto Transformer XAT-2H	Shimadzu
19	Area Dosimeter (VACUDAP)	Shimadzu
20	Collimator C-leaf	Shimadzu
21	Collimator Single-mask	Shimadzu
22	Collimator Auto-filter	Shimadzu
23	Line Marker	Shimadzu
24	Microphone (Remote)	Shimadzu
25	Microphone (Patient)	Shimadzu
26	Microphone (Aux)	Shimadzu
27	Speaker (Remote)	Shimadzu
28	Speaker (Exam. Room)	Shimadzu
29	CH-200	Shimadzu
30	BK-120M	Shimadzu
31	Phototimer	Shimadzu



The accessories listed above are the parts specified to be compliant with the standards. These parts are not attached to the equipment.

## Guidance and Manufacturer's Declaration - Electromagnetic Emissions

Guidance and manufacturer's declaration - electromagnetic emissions		
The SONIALVISION G4 is intended for use in the electromagnetic environment specified below. The customer or the user of the SONIALVISION G4 should assure that it is used in such an environment.		
Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions EN 55011/ CISPR 11	Group 1	The SONIALVISION G4 uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions EN 55011/ CISPR 11	Class A	The SONIALVISION G4 is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions EN 61000-3-2/ IEC 61000-3-2	Not applicable	
Voltage fluctuations/ flicker emissions EN 61000-3-3/ IEC 61000-3-3	Not applicable	

2


## ■ Guidance and Manufacturer's Declaration - Electromagnetic Immunity

Guidance and manufacturer's declaration - electromagnetic immunity			
The SONIALVISION G4 is intended for use in the electromagnetic environment specified below. The customer or the user of the SONIALVISION G4 should assure that it is used in such an environment.			
Immunity test	EN/IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) EN 61000-4-2/ IEC 61000-4-2	$\pm 6$ kV contact $\pm 8$ kV air	$\pm 6$ kV contact $\pm 8$ kV air	Floors should be wood, concrete or ceramic tile. If the floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient / burst EN 61000-4-4/ IEC 61000-4-4	$\pm 2$ kV for power supply lines $\pm 1$ kV for input/output lines	$\pm 2$ kV for power supply lines $\pm 1$ kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge EN 61000-4-5/ IEC 61000-4-5	$\pm 1$ kV line(s) to line(s) $\pm 2$ kV line(s) to earth	$\pm 1$ kV line(s) to line(s) $\pm 2$ kV line(s) to earth	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines EN 61000-4-11/ IEC 61000-4-11	$<5\%U_T$ ( $>95\%$ dip in $U_T$ ) for 0.5 cycle  $40\%U_T$ ( $60\%$ dip in $U_T$ ) for 5 cycles  $70\%U_T$ ( $30\%$ dip in $U_T$ ) for 25 cycles  $<5\%U_T$ ( $>95\%$ dip in $U_T$ ) for 5 sec	Not applicable          $<5\%U_T$ ( $>95\%$ dip in $U_T$ ) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the SONIALVISION G4 requires continued operation during power mains interruptions, it is recommended that the SONIALVISION G4 be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field EN 61000-4-8/ IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE $U_T$ is the a.c. mains voltage prior to application of the test level.			




## Guidance and Manufacturer's Declaration - Electromagnetic Immunity


2

Guidance and manufacturer's declaration - electromagnetic immunity			
The SONIALVISION G4 is intended for use in the electromagnetic environment specified below. The customer or the user of the SONIALVISION G4 should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Conducted RF EN 61000-4-6/ IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms 150 kHz to 230 MHz	<p>Portable and mobile RF communications equipment should be used no closer to any part of the SONIALVISION G4, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.</p> <p>Recommended separation distance</p> $d = 1.2 \sqrt{P}$
Radiated RF EN 61000-4-3/ IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m 351.2 MHz 800 MHz 1980 MHz 2412 MHz	<p><math>d = 1.2 \sqrt{P}</math> 80 MHz to 800 MHz</p> <p><math>d = 2.3 \sqrt{P}</math> 800 MHz to 2.5 GHz</p> <p>where <math>P</math> is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and <math>d</math> is the recommended separation distance in meters (m).</p> <p>Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey<sup>*1</sup>, should be less than the compliance level in each frequency range<sup>*2</sup>.</p> <p>Interference may occur in the vicinity of equipment marked with the following symbol:</p> 
<p>NOTE</p> <ul style="list-style-type: none"> <li>At 80 MHz and 800 MHz, the higher frequency range applies.</li> <li>These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.</li> </ul>			
<p>*1: Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the SONIALVISION G4 is used exceeds the applicable RF compliance level above, the SONIALVISION G4 should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the SONIALVISION G4.</p> <p>*2: Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.</p>			

### List of the transmitters or equipment used as RF test sources and the frequency and modulation characteristics of each source

kind of equipment	type	manufacturer	Spot check frequencies	Modulation
Digital Transceiver	IC-DPR5	ICOM	351.2 MHz	FSK (frequency shift keying)
Cellular Telephone	P251S	Panasonic	800 MHz	PM (Phase modulation)
Cellular Telephone	812SH	Sharp	1980 MHz	PM (Phase modulation)
Wireless LAN Station	WHR-HP-G	BUFFALO	2412 MHz	OFDM (Orthogonal Frequency-Division Multiplexing)

 **WARNING**



**When using the devices at frequencies other than the tested frequencies, be sure to check the electromagnetic influence.**

The equipment is tested for radiated RF immunity only at particular frequencies. Note that the test is not necessarily performed over the entire frequency range from 80 MHz to 2.5 GHz.

Instructions

### Recommended Separation Distances Between Portable and Mobile RF Communications Equipment and SONIALVISION G4

Recommended separation distances between portable and mobile RF communications equipment and the SONIALVISION G4			
<p>The SONIALVISION G4 is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled.</p> <p>The customer or the user of the SONIALVISION G4 can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the SONIALVISION G4 as recommended below, according to the maximum output power of the communications equipment.</p>			
Rated maximum output power of transmitter (W)	Separation distance according to frequency of transmitter (m)		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	80 MHz to 800 MHz $d = 1.2\sqrt{P}$	800 MHz to 2.5 GHz $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23
<p><b>NOTE</b></p> <p>For transmitters rated at a maximum output power not listed above, the recommended separation distance <math>d</math> in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where <math>P</math> is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.</p> <ul style="list-style-type: none"> <li>At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.</li> <li>These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.</li> </ul>			

## 2.2 Statement of Compliance [For Europe]

2

### 2.2.1 Regulatory Information

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For Europe (with CE-MDD mark only)

The product complies with the requirements of the Medical Device Directive 93/42EEC.

Product Name: X-RAY TELEVISION SYSTEM

Model Name: SONIALVISION G4

Parts Number: 503-78000 / 566-10000

Manufacturer: SHIMADZU CORPORATION  
Medical Systems Division

Address: 1, NISHINOKYO-KUWABARACHO,  
NAKAGYO-KU, KYOTO, 604-8511, JAPAN

Authorized  
Representative in EU: SHIMADZU EUROPA GmbH

Address: Albert-Hahn-Strasse 6-10, 47269 Duisburg, F.R. Germany

### 2.2.2 Company's Quality System

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The company's Quality System is satisfied with Annex II, Article 3 for 93/42/EEC as amended by 2007/47/EC, which is certified by TUV Rheinland LGA Products GmbH; Tillystrasse 2, D-90431 Nurnberg, Germany (Notified under No. 0197) as Registration No.: HD 60029841 0001

### 2.2.3 International Standards

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SONIALVISION G4 conforms to the following international standards.

- IEC 60601-1:2005 / EN 60601-1:2006
- IEC 60601-1-2:2007 / EN 60601-1-2:2007
- IEC 60601-1-3:2008 / EN 60601-1-3:2008
- IEC 60601-1-6:2010 / EN 60601-1-6:2010
- IEC 60601-2-54:2009 / EN 60601-2-54:2009
  
- ANSI /AAMI ES 60601-1:2005
- CAN / CSA-C22.2 No.60601-1:08
- CAN / CSA-C22.2 No.60601-1-3:09
- CAN / CSA-C22.2 No.60601-2-54:11
  
- IEC 62304:2006 / EN 62304:2006
- IEC 62366:2007 / EN 62366:2008
- ISO 10993-1:2009 / EN ISO 10993-1:2009
- ISO 14971:2007, Corrected version / EN ISO 14971:2012
- EN 980:2008
- EN 1041:2008

## 2.3 Statement of Compliance with Standards

X-RAY EQUIPMENT for RADIOGRAPHY and/or RADIOSCOPY SONIALVISION G4  
IEC 60601-2-54:2009

## 2.4 Manufacturer Information

Manufacturer: SHIMADZU CORPORATION  
Medical Systems Division

Address: 1, NISHINOKYO-KUWABARACHO,  
NAKAGYO-KU, KYOTO, 604-8511, JAPAN

## 2.5 Specifications

The specifications of SONIALVISION G4 are given below.



The specification may be subject to change without notice responding to technological advances.

The given values are standard values. Actual values may vary.

### 2.5.1 X-Ray Diagnostic Table

Item			Description
Configuration of X-ray diagnostic table			Over table/tube system island type
Tabletop section	Tabletop		76.5×235 cm, flat
	Attenuation equivalent		0.8 mm Al eq.
	Allowable load weight		All motions: 204 kg (450 lb) * <sup>1</sup>
	Lateral	Range	25 cm
		Speed	Max. 5.0 cm/sec
	Tilting	Range	Trendelenburg position 90° to vertical position 90°
		Speed	15 sec/90° (continuously variable) * <sup>2</sup> Soft start/soft stop
	Vertical	Range	Height with the tabletop in the horizontal position 47 to 110 cm
		Speed	Max. 3.6 cm/sec
Imaging unit	Longitudinal	Range	160.5 cm
		Speed	Max. 15 cm/sec Soft start/soft stop
	Distance from X-ray focus to FPD surface (SID)		110, 120, 150 cm
	Distance between irradiation field center and floor		Vertical: 59.5 to 220 cm Trendelenburg: 46.5 to 207 cm
	Angle	Range	Patient head side 40° to patient foot side 40°
		Speed	3°/sec
	X-ray tube rotation angle		Vertical: Counter-clockwise 90° Trendelenburg: Clockwise 90°
	Irradiation field adjusting means		Collimator
	Anti-scatter grid		Detachable

Item			Description
Component	Tabletop mat	Attenuation equivalent	0.3 mm Al eq.*3
	Foot rest	Allowable load weight	227 kg
	Shoulder rests		227 kg
	Rotary foot rest (option)		227 kg
	Auxiliary tabletop (option)		30 kg
Compression unit	Compression force		Max. 80 N (approx. 8 kgf)
	Compression cone shape		Either flat or extruded
	Distance between compression cone head and tabletop surface		10 to 50 cm
Installation	Space needed for installation		Recommended: W370×D350 cm or larger (Minimum: W350×D350 cm or larger)
	Ceiling height for installation		Recommended: 290 cm or larger (Minimum: 260 cm or larger)
	Control cabinet dimensions		W70×H190×D50 cm
	Control cabinet mass		Approx. 230 kg
	X-ray diagnostic table dimensions		See " <a href="#">3.2 Dimensions</a> " P.3-3
	X-ray diagnostic table operation/maintenance mass		Approx. 1560 kg

\*1: When the withstand load 500 lb option is combined: 227 kg (500 lb) for all motions; 318 kg (700 lb) in the tabletop horizontal / stop position

\*2: When the withstand load 500 lb option is combined: 17 sec/90°

\*3: If a tabletop mat other than the SHIMADZU certified parts is used, the attenuation equivalent may be affected.

## 2.5.2 High-Voltage Generator

### ■ D150BC-40S Specifications

Item			Description
Radiography technique			General radiography, Bucky radiography, Auto-changer radiography, Diagnostic fluoroscopy, Digital radiography
Number of connectable X-ray tubes			2 tubes
Setting range *1 *2 *3 *4 *5	Radiography	Tube voltage	40 to 150 kV
		Tube current	10 to 1000 mA
			Any 12 of the following positions permitted by the X-ray tube can be used for each focus. 1000, 900, 800, 710, 630, 560, 500, 450, 400, 360, 320, 280, 250, 220, 200, 180, 160, 140, 125, 110, 100, 90, 80, 71, 63, 56, 50, 45, 40, 36, 32, 28, 25, 22, 20, 18, 16, 14, 12, 11, 10 mA
			mAs
		Set from the following 65 positions. 500 mAs is the upper limit for AEC radiography. 0.50, 0.56, 0.63, 0.71, 0.80, 0.90, 1.0, 1.1, 1.25, 1.4, 1.6, 1.8, 2.0, 2.2, 2.5, 2.8, 3.2, 3.6, 4.0, 4.5, 5.0, 5.6, 6.3, 7.1, 8.0, 9.0, 10, 11, 12.5, 14, 16, 18, 20, 22, 25, 28, 32, 36, 40, 45, 50, 56, 63, 71, 80, 90, 100, 110, 125, 140, 160, 180, 200, 220, 250, 280, 320, 360, 400, 450, 500, 560, 630, 710, 800 mAs	
		Time	0.001 to 10 sec
			Set from the following 81 positions. A value below 0.5 or above 800 mAs cannot be set. 500 mAs is the upper limit for AEC radiography. 1.0, 1.1, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.5, 2.8, 3.2, 3.6, 4.0, 4.5, 5.0, 5.6, 6.3, 7.1, 8.0, 9.0, 10, 11, 12, 14, 16, 18, 20, 22, 25, 28, 32, 36, 40, 45, 50, 56, 63, 71, 80, 90, 100, 110, 125, 140, 160, 180, 200, 220, 250, 280, 320, 360, 400, 450, 500, 560, 630, 710, 800, 900 ms, 1.0, 1.1, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.5, 2.8, 3.2, 3.6, 4.0, 4.5, 5.0, 5.6, 6.3, 7.1, 8.0, 9.0, 10 sec
	Fluoroscopy	Tube voltage	50 to 125 kV
		Tube current	0.3 to 20 mA
		Time	Total time display: 99 min 59 sec., continuous fluoroscopy time: 10 min
Nominal supply voltage (50/60 Hz)		400 V line	3-phase AC: 380/400/415/440/480 V
		200 V line	3-phase AC: 200/220/240 V
Recommended switchboard transformer capacity			75 kVA



Item		Description
Nominal Electric Power		80 kW (100 kV, 800 mA, 0.1 sec)
Short-time rating*2		150 kV 500 mA, 125 kV 630 mA, 100 kV 800 mA, 80 kV 1000 mA
Nominal X-ray tube voltage and max. tube current that can flow at nominal X-ray tube voltage*2		Short-time rating: 150 kV 500 mA Long-time rating: 125 kV 12 mA
Max. tube current and max. tube voltage to achieve max. tube current*2		Short-time rating: 80 kV 1000 mA Long-time rating: 75 kV 20 mA
Tube voltage and tube current combination for max. electrical output*2		Short-time rating: 80 kV 1000 mA, 100 kV 800 mA Long-time rating: 75 kV 20 mA, 125 kV 12 mA
Min. tube current time product		0.5 mAs
Long-time rating*2		75 kV 20 mA, 125 kV 12 mA
Nominal min. exposure time (AEC radiography)		3 ms
Dimensions	Control cabinet	W700×H1900×D500 mm
	Control panel (option)	W308×H345×D82 mm
Mass	Control cabinet	Approx. 300 kg
	Control panel (option)	2.5 kg
Standard model		IRF-1000-150

\*1: The setting range differs according to the type of X-ray tube unit.

\*2: Restrictions apply depending on the type of X-ray tube unit.

\*3: Accuracy of each condition is given below (confirm to IEC standards).

Tube voltage (within ±10 %), tube current (within ±20 %)

mAs: within ±(10 %+0.2 mAs), time: within ±(10 %+1 ms)

\*4: X-ray output stability is given below.

Variation coefficient: 0.005 or less

\*5: The X-ray output stability with neighboring setting values satisfies the following formula.

$$\left| \frac{\bar{K}_1}{I_1 t_1} - \frac{\bar{K}_2}{I_2 t_2} \right| \leq 0.2 \frac{\frac{\bar{K}_1}{I_1 t_1} + \frac{\bar{K}_2}{I_2 t_2}}{2}$$

Where

$\bar{K}_1, \bar{K}_2$  : Mean value of measured X-ray output values obtained using neighboring setting values

$I_1, I_2$  : Neighboring tube current setting values

$t_1, t_2$  : Neighboring radiography time setting values

### Load condition when combined with the X-ray tube unit

Item	X-ray Tube Unit		
	0.7/1.2JG326D -265	0.4/0.7JG326D -265	0.6/1.2P324DK -125
Nominal X-ray tube voltage and max. tube current that can flow at nominal X-ray tube voltage	125 kV, 7.6 mA	125 kV, 7.6 mA	125 kV, 2.4 mA
	150 kV, 500 mA	150 kV, 360 mA	150 kV, 500 mA
Max. tube current and max. tube voltage to achieve max. tube current	80 kV, 11.8 mA	80 kV, 11.8 mA	125 kV, 2.4 mA
	100 kV, 800 mA	112 kV, 500 mA	100 kV, 800 mA
Tube voltage and tube current combination for max. electrical output	125 kV, 7.6 mA	125 kV, 7.6 mA	125 kV, 2.4 mA
	100 kV, 800 mA	112 kV, 500 mA 140 kV, 400 mA	100 kV, 800 mA
Nominal electric power	80 kW (100 kV, 800 mA, 0.1 sec)	50 kW (100 kV, 500 mA, 0.1 sec)	80 kW (100 kV, 800 mA, 0.1 sec)

Upper: Long-time rating

Lower: Short-time rating

## D150VC-40S Specifications

2

Item			Description
Radiography technique			General radiography, Bucky radiography, Auto-changer radiography, Diagnostic fluoroscopy, Digital radiography
Number of connectable X-ray tubes			2 tubes
Setting range *1 *2 *3 *4 *5	Radiography	Tube voltage	40 to 150 kV
		Tube current	10 to 800 mA
			Any 12 of the following positions permitted by the X-ray tube can be used for each focus: 800,710,630, 560, 500, 450, 400, 360, 320, 280, 250, 220, 200, 180, 160, 140, 125, 110, 100, 90, 80, 71, 63, 56, 50, 45, 40, 36, 32, 28, 25, 22, 20, 18, 16, 14, 12, 11, 10 mA
		mAs	0.5 to 800 mAs
			Set from the following 65 positions. (500 mAs upper limit for AEC radiography.) 0.50, 0.56, 0.63, 0.71, 0.80, 0.90, 1.0, 1.1, 1.25, 1.4, 1.6, 1.8, 2.0, 2.2, 2.5, 2.8, 3.2, 3.6, 4.0, 4.5, 5.0, 5.6, 6.3, 7.1, 8.0, 9.0, 10, 11, 12.5, 14, 16, 18, 20, 22, 25, 28, 32, 36, 40, 45, 50, 56, 63, 71, 80, 90, 100, 110, 125, 140, 160, 180, 200, 220, 250, 280, 320, 360, 400, 450, 500, 560, 630, 710, 800 mAs
		Time	0.001 to 10 sec
	Set from the following 81 positions. (Cannot be set with an mAs value below 0.5 or above 800 mAs. 500 mAs upper limit for AEC radiography.) 1.0, 1.1, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.5, 2.8, 3.2, 3.6, 4.0, 4.5, 5.0, 5.6, 6.3, 7.1, 8.0, 9.0, 10, 11, 12, 14, 16, 18, 20, 22, 25, 28, 32, 36, 40, 45, 50, 56, 63, 71, 80, 90, 100, 110, 120, 140, 160, 180, 200, 220, 250, 280, 320, 360, 400, 450, 500, 560, 630, 710, 800, 900 ms, 1.0, 1.1, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.5, 2.8, 3.2, 3.6, 4.0, 4.5, 5.0, 5.6, 6.3, 7.1, 8.0, 9.0, 10 sec		
	Fluoroscopy	Tube voltage	50 to 125 kV
		Tube current	0.3 to 20 mA
		Time	Total Time Display 99 min 59 sec, continuous fluoroscopy time 10 min.
Nominal supply voltage (50/60 Hz)			200/220/240/380/400/415/440/480 VAC, 3-phase
			200/220/240 VAC, single-phase
Recommended switchboard transformer capacity			75 kVA
Nominal Electric Power			65 kW (103 kV, 630 mA, 0.1 sec)
Short-time rating*2			150 kV 400 mA, 125 kV 500 mA, 100 kV 630 mA, 80 kV 800 mA

## 2 Specifications

Item		Description
Nominal max. tube voltage and max. tube current that can flow at nominal max. tube voltage*2		Short-time rating: 150 kV 400 mA Long-time rating: 125 kV 12 mA
Max. tube current and max. tube voltage to achieve max. tube current*2		Short-time rating: 81 kV 800 mA Long-time rating: 75 kV 20 mA
Tube voltage and tube current combination for max. electrical output*2		Short-time rating: 130 kV 500 mA Long-time rating: 75 kV 20 mA, 125 kV 12 mA
Min. tube current time product		0.5 mAs
Nominal min. exposure time (AEC radiography)		3 ms
Long-time rating*2		75 kV 20 mA, 125 kV 12 mA
Dimensions	Control cabinet	W700×H1805×D400 mm
	Control panel (option)	W308×H345×D82 mm
Mass	Control cabinet	Approx. 300 kg
	Control panel (option)	2.5 kg

\*1: The setting range differs according to the type of X-ray tube unit.

\*2: Restrictions apply depending on the type of X-ray tube unit.

\*3: Accuracy of each condition is given below (confirm to IEC standards).

Tube voltage (within ±10 %), tube current (within ±20 %)  
mAs: within ±(10 %+0.2 mAs), time: within ±(10 %+1 ms)

\*4: X-ray output stability is given below.

Variation coefficient: 0.005 or less

\*5: The X-ray output stability with neighboring setting values satisfies the following formula.

$$\left| \frac{\bar{K}_1}{I_1 t_1} - \frac{\bar{K}_2}{I_2 t_2} \right| \leq 0.2 \frac{\frac{\bar{K}_1}{I_1 t_1} + \frac{\bar{K}_2}{I_2 t_2}}{2}$$

Where

$\bar{K}_1, \bar{K}_2$  : Mean value of measured X-ray output values obtained using neighboring setting values

$I_1, I_2$  : Neighboring tube current setting values

$t_1, t_2$  : Neighboring radiography time setting values

**Load condition when combined with the X-ray tube unit**

Item	X-ray Tube Unit		
	0.7/1.2JG326D -265	0.4/0.7JG326D -265	0.6/1.2P324DK -125
Nominal X-ray tube voltage and max. tube current that can flow at nominal X-ray tube voltage	125 kV, 7.6 mA	125 kV, 7.6 mA	125 kV, 2.4 mA
	150 kV, 400 mA	150 kV, 360 mA	150 kV, 400 mA
Max. tube current and max. tube voltage to achieve max. tube current	80 kV, 11.8 mA	80 kV, 11.8 mA	125 kV, 2.4 mA
	81 kV, 800 mA	112 kV, 500 mA	81 kV, 800 mA
Tube voltage and tube current combination for max. electrical output	125 kV, 7.6 mA	125 kV, 7.6 mA	125 kV, 2.4 mA
	130 kV, 500 mA	112 kV, 500 mA 140 kV, 400 mA	130 kV, 500 mA
Nominal electric power	65 kW (103 kV, 630 mA, 0.1 sec)	45 kW (100 kV, 450 mA, 0.1 sec)	65 kW (103 kV, 630 mA, 0.1 sec)

Upper: Long-time rating

Lower: Short-time rating

### 2.5.3 Collimator

Item			Description
Max. voltage used for applicable X-ray tube			150 kV
Irradiation field (SID 110 cm)	Without C-leaves and independent H mask (option)		Max. rectangular irradiation field: 523×523 mm Min. rectangular irradiation field: 0×0 mm
	With C-leaves and independent H mask (option)		Max. rectangular irradiation field: 495×495 mm Min. rectangular irradiation field: 0×0 mm (Independent H mask can block a half of irradiation field, either on the right or on the left of the horizontal center of X-ray irradiation.) Min. polygonal irradiation field: φ118 mm (Diameter of circle inscribed in C-leaves)
Lighting field	Average illumination		160 lx or more (when SID is 100 cm)
	Illumination duration		Continuously for 30 seconds (automatically turns off)
	Lamp model		JM 12V 106W 5H
	Adjustment mechanism		Provided
	Discrepancy between lighting field and actual irradiation field		Within 2 % of the SID (adjusted on shipment from the factory)
Filtration	Inherent filtration		1.1 mm Al (70 kV HVL 2.5 mm Al). <sup>*1</sup>
	Rotary type BH filter	Filter #1	-
		Filter #2	Cu 0.1 mm
		Filter #3	Cu 0.2 mm
		Filter #4	Cu 0.3 mm
Pb equivalency of shielding leaves	H-leaves and V-leaves		3 mm Pb (middle leaf: 2 mm Pb)
	Independent H mask (option)		3 mm Pb
	C-leaves (option)		2 mm Pb
Leaf driving method			Stepping motor drive
Distance between the focus and fitting face			60 mm
External dimensions			W231×H259×D317 mm
Mass			Approx. 10 kg
Power supply (supplied from high-voltage generator)			24 VDC, 240 VA

\*1: Total filtration when combined with the X-ray tube unit is 2.6 mm Al eq.

### 2.5.4 Digital Radiography (DR) Unit

Item		Description
Hardware	CPU	Operating frequency of 3.0 GHz or more (or equivalent)
	Memory	2 GB or more
	OS	Microsoft Windows 7 or later
	Operation	Mouse and keyboard
	Hard disk drive capacity	500 GB or more
	Number of storable images	10000 (at 1024×1024)
Image input	Flat panel sensor	17×17 inch
	Matrix	Up to 3032×3032 pixel
	Pixel size	139 μm
	Density resolution	16 bits/65536 graduation
Image output	Display monitor	LCD monitor
	Display matrix	1024×1024 (image area)
	Display graduation	256
External output	Video output	NTSC/PAL
Fluoroscopy	Pulsed fluoroscopy	Rate: 30/15/7.5/3.75 fps
	Store fluoroscopy	Direct record: Records an image being provided through current fluoroscopy directly on hard disk drive. L.I.H. record: records one frame of the last fluoroscopic image-hold images. Loop record: Records in memory the last 1000 fluoroscopic frame images (also storable in hard disk drive).
	Virtual collimation	Enables to configure irradiation field by displaying the collimator position onto fluoroscopic L.I.H. image.

## 2 Specifications

Item		Description
Radiography	SPOT radiography	Single shot (HighReso/Normal mode) 17" field : 3032×3032 / 1512×1512 15" field : 2700×2700 / 1350×1350 12" field : 2052×2052 / 1026×1026 9" field : 1620×1620 / 810×810 6" field : 1080×1080 / 540×540
	Subdivisional Acquisition (SDA)	2 × 1/1 × 2/2 × 2 By-block radiography (serial shots possible)
	SERIAL radiography	Up to 6 frames/sec SERIAL radiography (HighReso/Normal mode) 17" field : 3032×3032 / 1512×1512 15" field : 2700×2700 / 1350×1350 12" field : 2052×2052 / 1026×1026 9" field : 1620×1620 / 810×810 6" field : 1080×1080 / 540×540
	DSA radiography (optional)	Up to 6 frames/sec SERIAL radiography and real-time subtraction processing
Image processing	SUREngine-Advance	Contrast and graininess are improved with a special image processing engine.
	Graduation processing	Density/contrast adjustment, black/white reversal, auto optimization processing (AWC)
	Gamma processing	Selection from up to 10 types of graduation conversion curve
	Reversal processing	Horizontal or Vertical reversal
	Noise filter processing	Recursive processing
	Edge processing	Template filter processing
	Magnification processing	Fourfold magnification
	Multi-display	2×2 or 4×4 multi-display
	Annotation	Overlays text and pointer on images
	Re-masking processing (with DSA radiography option)	Performs subtraction processing for specified mask image
	Re-registration processing (with DSA radiography option)	Performs subtraction processing for mask image with overlay position shifted.
Measurement processing	Distant measurement	Measures distance on image.
	Angle measurement	Measures angle on image.



Item		Description
DICOM communication	LI output	DICOM Print support
	Network transmission (optional)	DICOM Storage support Modality: RF/XA
	Media output	CD-R, DVD-R (DICOM format)
	MWM (optional)	Receives examination information from server.
	MPPS (optional)	Transmits examination information to server.
	Bar code reader (optional)	Inputs patient information from bar code reader and performs search with MWM (option)
Maintenance	Remote maintenance	Provides remote system maintenance work (communication link equipment is required separately).
Dimension	Control cabinet	W700×H1900×D500 mm
	Operation cabinet	W160×H575×D470 mm
Mass	Control cabinet	320 kg
	Operation cabinet	35 kg
Rated power supply voltage		Single phase 200/220/230/240 V, 50/60 Hz, 7.0 kVA

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# Chapter 3

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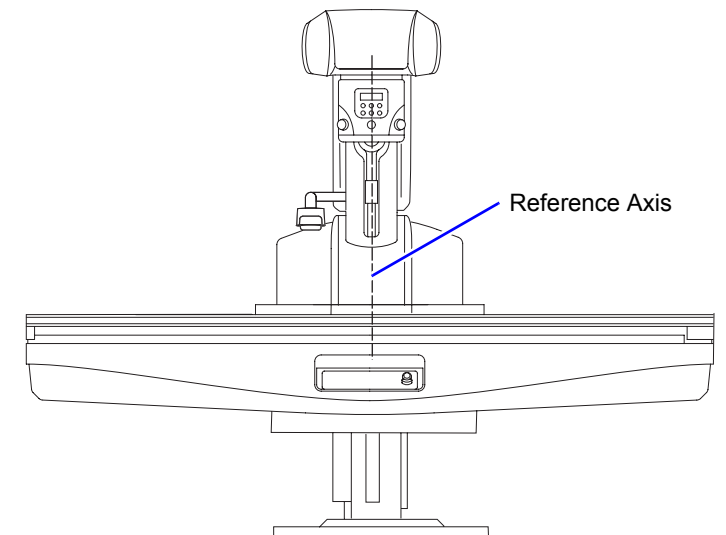
## Appendix

### ■ Contents

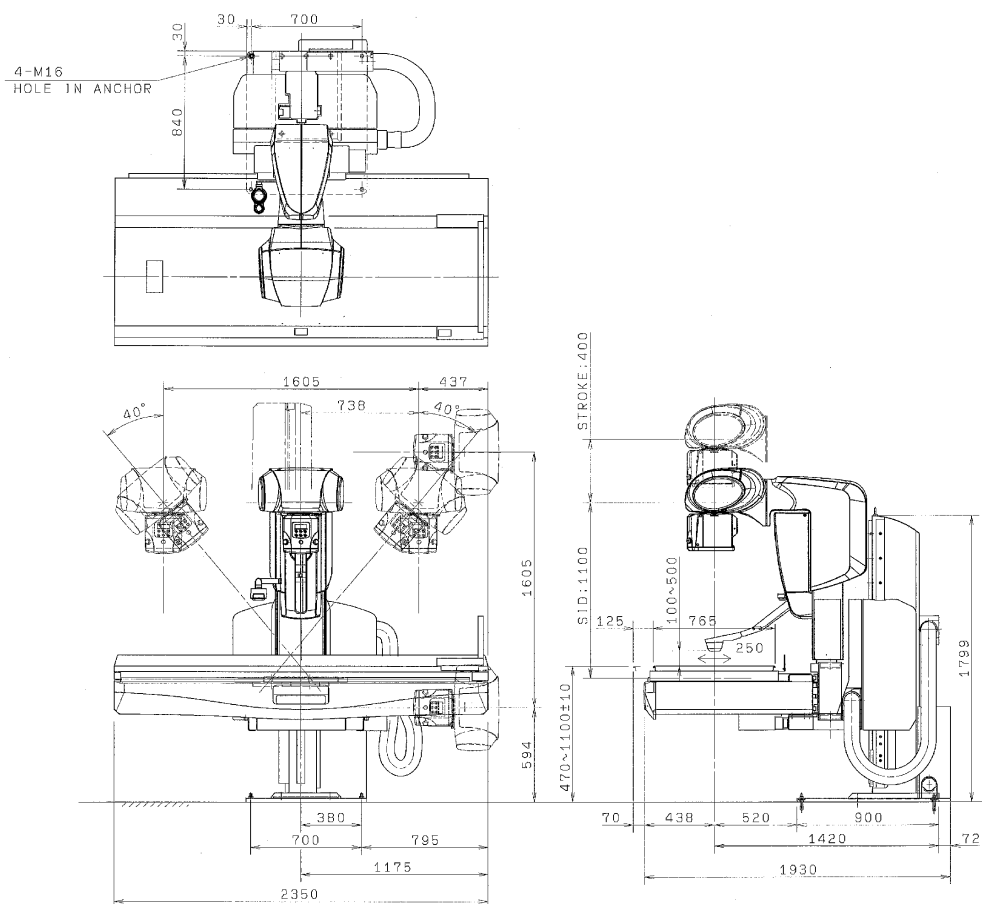
3.1	Reference Axis of Equipment .....	3-2
3.2	Dimensions .....	3-3

## 3.1 Reference Axis of Equipment

The reference axis which employed in normal operation of equipment means the incident X-ray axis from X-ray tube unit to FPD vertically as shown below.



# 3.2 Dimensions



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# 文書承認履歴

文書の承認履歴を以下に記述します。

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