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Digital Angiography System

DAR-9500f

Operation Manual

Read the instruction manual thoroughly before you use the product.
Keep this instruction manual for future reference.

Categories of Information

In this manual, safety and utilization information is categorized and indicated as follows.

Symbol	Significance
DANGER	Indicates critically hazardous situation that, if not avoided, may result in serious injury or death.
WARNING	Indicates indirectly or potentially hazardous situation that, if not avoided, may result in serious injury or death.
CAUTION	Indicates hazardous situation that, if not avoided, may result in minor or moderate injury, damage to the product, or fire.
NOTE	Indicates information for proper use of the product.
	Indicates information for convenient use of the product.
	Indicates reference for additional information.

Introduction

This operator's manual describes operation of the DAR-9500f Digital Angiography System.

Please read this manual thoroughly before using this equipment.

If precautions described in this manual are not kept, it may cause damage to the system, operators and patients. And also, it is difficult to describe an unpredictable precautions, so please contact our service representatives if you use the system by not described procedure or have any questions in this manual.

This manual should be kept available for future reference.

Disclaimer

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The contents of this Manual may be changed for improvement without notice.

Despite commitment and effort, errors and omissions found later in this Manual may not be immediately corrected in some cases.

Windows is either a registered trademark or trademark of Microsoft Corporation in the United States and/or other countries.

SHIMADZU Corporation is not liable for any consequence of operation following this Manual.

Precautions for Installation and Use of This System

Please observe the following “Operating Precautions for Safety in the Use of Electric Medical Equipment”.

Operating Precautions for Safety in the Use of Electric Medical Equipment

1. Only an experienced technician should operate the equipment.
2. When installing the equipment, pay attention to the following items:
   (1) Do not install system near water faucet or similar equipment.
   (2) Install it away from potential sources of problems such as abnormal pressure, temperature or humidity, drafts, direct sunlight, chlorine dust or sulfur gas.
   (3) During transportation and operation of the equipment, avoid tilting, vibration and any impact.
   (4) Keep the equipment away from areas where chemicals or gases are stored.
   (5) Use only the correct electrical power source with matching frequency, voltage and current (or wattage).
   (6) Check the condition of the battery power source (power and polarity) before operating the equipment.
   (7) Properly ground the equipment.
3. Before operating the equipment, pay attention to the following items:
   (1) Check the conditions of switch contacts, polarity, dial settings, and meters, and make sure the equipment performs correctly.
   (2) Confirm that the ground is connected properly.
   (3) Check all wiring for proper and correct connections.
   (4) Pay attention when using more than one unit at a time, because it may lead to an incorrect diagnosis and cause complications.
   (5) Check the conditions of any external electric circuit, that will be directly connected to a patient.
   (6) Check the condition of the battery power source.

4. While operating the equipment, pay attention to the following items:
   (1) Do not exceed recommended times or the amount of radiation needed for diagnosis or therapy.
   (2) Observe the equipment and patient continuously for early detection of problems.
   (3) When a problem is detected with the equipment, take proper action to stop the equipment without harming the patient.
   (4) Do not let the equipment touch the patient.
5. After operating the equipment, pay attention to the following items:
   (1) Turn off the switches and return the dials to their original position in the prescribed order. Then, turn off the main power switch.
   (2) Do not pull the power cable forcibly from the outlet using the power cord.
   (3) When storing the equipment, pay attention to the following factors:
      (i) Keep it away from the water.
      (ii) Store it away from the potential causes of problems such as abnormal pressure, temperature or humidity, draft, direct sunlight, chlorine dust or sulfur gas.
      (iii) Avoid tilting, vibration and any impact when storing.
      (iv) Store the equipment away from areas where chemicals and gases are stored.
   (4) Clean all attachments, cables and contacts, and store them in one place.
   (5) Keep the equipment clean to avoid problems during the next use.
6. When the equipment is found to be out of order, do not try to repair it. Immediately call a certified repair technician for repair.
7. Do not modify any part of the equipment.
8. Preventive maintenance:
   (1) The equipment and its parts should be periodically checked.
   (2) If the equipment has not been in operation for an extended period of time, test it prior to actual operation to make sure it works correctly and safely before use.
9. Operate properly according to the operating manual.

Precautions in Use

WARNING

The responsibility for managing use and maintenance of medical equipment lies with the user.

Use of this device is restricted to a diagnostic radiology technician or a person with a certificate indicating equal proficiency.

WARNING

Do not modify the equipment.

Repair and inspection of the inside of the equipment is dangerous. Be sure to contact our service agency for repair and inspection of any kind.

WARNING

Perform periodical maintenance.

Maintenance is required to assure the safety and performance of this equipment. For details on the maintenance inspections to periodically be performed by the operator, please refer to the descriptions contained in this operation manual.

WARNING

Repair and maintenance of this equipment can only be performed by engineers approved by SHIMADZU.

Maintenance must be assigned to specially trained experts. Contact the Shimadzu Service Representative for repair and maintenance.

WARNING

Prepare alternative system.

Prepare alternative system with fluoroscopy function, in case any trouble happens and fluoroscopy/radiography can not be operated normally.

WARNING

Beware of X-ray exposure.

Improper use of the X-ray equipment might cause the operator or patient to be accidentally exposed to X-ray radiation. During X-ray radiation, any person other than the subject patient should not stay in the irradiation room. If circumstances compel any non-subject person to stay in the room, ample protection should be provided for that person.

WARNING

Do not splash water on the equipment.

Splashing water might cause an electric shock. When cleaning the equipment, use a cloth dipped in an antiseptic solution (Medical Alcohol) and squeeze out all excess liquid before wiping only the surface.

WARNING

Accuracy of displayed values are not guaranteed.

Displayed values measured by the measurement functions of this equipment are not absolute values but relative values based on the capability of the instruments used.

WARNING

Do not use the Injector which is not conformed to the standard of IEC60601/1.

WARNING

If the operator has no experience in operating the equipment, be sure that he or she receives instruction on how to operate it from our engineers or someone who has enough experience to use the equipment.

In order to operate the equipment, safely, an explanation of the operation needs to be lectured. When installing the equipment, our engineers explain the operating procedure. Follow their directions and operate the equipment correctly.

WARNING

Do NOT perform any maintenance work on any part of the equipment during clinical use.

It may cause injury.

CAUTION

For California, USA Only

This product contains a battery that contains perchlorate material.

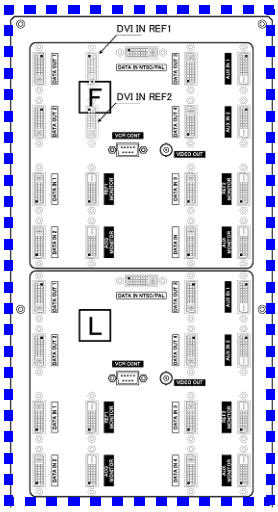
Perchlorate Material-special handling may apply.

See www.dtsc.ca.gov/hazardouswaste/perchlorate

Connector

WARNING

Do not connect other devices which are not specified by SHIMADZU, to any of the connectors (enclosed in a dashed-line box in the illustration below).



Other Software Installation

WARNING

Do not install other software on the computer. Do not connect peripheral equipment, or modify the computer hardware. Otherwise, the system may fail to start because of a change in the OS environment or a driver conflict. Not heeding this warning will invalidate the warranty.

Internet Connection

CAUTION

Do not connect this system to the Internet. Shimadzu shall not guarantee the security against virus infection or leak of hospital/patient information through Internet connection. Do not connect this system to other computer networks that can be linked to the Internet.

Scan Converter BNC Cable Positioning

⚠ CAUTION

(Applicable only to the BNC cables provided with the Scan Converter option.) Do not run the scan converter BNC video cables next to power or signal cables because this may cause video noise to appear.

Data Erasure or Loss

⚠ CAUTION

Data saved on magnetic disk may be erased because of improper operation or system accident. Be sure to backup important data to external storage such as CD-R.

Since it is possible that external backups may become damaged, multiple backups are recommended.

Note that Shimadzu will not be held responsible for data erasure or loss.

Disposal

If you must dispose of the product, the following caution must be observed:

⚠ CAUTION

The device contains substances which may pollute the environment if disposed of incorrectly. Contact our service office or representative for disposal of the system or any parts.

Cautions on Wireless Communication Using Mouse

⚠ WARNING

This system operates in the same frequency band as premises radio stations for identifying mobile devices in factory production lines (license required) and specified low-power radio stations (license not required) in addition to industrial devices (ex. microwave ovens), scientific instruments, and medical equipment complies with CISPR EMISSION requirements.

The use of this system may result in RF interference with the above mentioned equipment and radio stations. Make sure you understand and heed the following cautions when operating the system.

- Before using this system, make sure that no RFID premises radio stations and specified low-power radio stations or similar equipment are used in the immediate area.
- If this system causes damaging RF interference to affect an RFID premises radio station, stop using the system immediately and contact your Shimadzu service representative.
- If this system causes damaging RF interference to affect an RFID specified low-power radio station or amateur radio station, contact your Shimadzu service representative.
- This system may suffer interference from other equipment that emits radio waves (such as microwave ovens, Bluetooth devices, and digital cordless telephones). Use the system after moving such devices as far away as possible to prevent interference.

⚠ CAUTION

Do NOT use frequency channel (2.4 GHz band) of wireless mouse for other wireless devices.

Network Connection

⚠ CAUTION

1. Connect to the network in order to achieve the following purpose.

   •Acquire patient information, study information and past study image from the external equipment.
   •Send study image, study record, dose information and system maintenance information to the external equipment.

2. Connect to the IPv4 network that supports 1000 Base-T/100 Base-T.

3. Use UTP cable with enhanced category 5 (Cat 5e) or higher for LAN cable.

4. Intended information flow

Destination	Typical Information
Printer	Study image data
MWM Server PPS Manager	Patient information, Study information Study record, Dose information
DICOM Image Server	Study image data
Remote Maintenance Server	System maintenance information

5. Hazardous conditions in case of network failure

Destination	Hazardous Situation
Printer	Cannot print study image.
MWM Server PPS Manager	Cannot acquire patient information and study information. Cannot send study record and dose information.
DICOM Image Server	Cannot send study image. Cannot acquire past study image.
Remote Maintenance Server	Cannot send system maintenance information.

Action for Environment

To all users of Shimadzu equipment in the European Union:

Equipment marked with the following symbol indicates that it was sold on or after 13th August 2005, which means it should not be disposed of with general household waste. Note that our equipment is for industrial/professional use only.

WEEE Mark

Contact a Shimadzu service representative when the equipment has reached the end of its life. They will advise you regarding the equipment take-back.

With your cooperation, we are aiming to reduce contamination from waste electronic and electrical equipment and preserve natural resources through re-use and recycling.

Do not hesitate to ask a Shimadzu service representative, if you require further information.

Pediatric Imaging

General

X-ray diagnosis is convenient and useful to visualize inside of human body, however the use of X-ray has potential risk. This section describes pediatric imaging consistent with ALARA[1] principles to minimize the radiation dose.

Exposure to ionizing radiation is of particular concern in pediatric patients for three reasons:[2]

1. 1) younger patients are more radiosensitive than adults (i.e., the cancer risk per unit dose of ionizing radiation is higher for younger patients);
2. younger patients have a longer expected lifetime for the effects of radiation exposure to manifest as cancer; and
3. use of equipment and exposure settings designed for adult use can result in excessive radiation exposure for the smaller patient.

Besides this section, the some websites provide additional information for pediatric imaging.

American College of Radiology: http://www.acr.org

Image Gently: http://www.imagegently.org

US Food and Drug Administration, FDA: http://www.fda.gov

[1] ALARA: As Low As Reasonably Achievable

[2] FDA DRAFT GUIDANCE, Pediatric Information for X-ray Imaging Device Premarket Notifications, May 10, 2012

Suggestions for Pediatric Imaging

This section describes some suggestions for reducing dose of pediatric imaging. They are:

- minimizing unnecessary dose;
- adjusting parameters and
- monitoring dose indications.

Minimizing unnecessary dose

To minimize unnecessary dose, adjust the collimator to cover just region concerned and the region concerned to be center of the image. Before exposure, use proper protective means in accordance with predefined guidelines, ex. protective clothes, when applicable, and check the parameters or the selection of proper preset which influence the radiation dose, based on ALARA principles.

Adjusting parameters

Select a preset based on patient size or region concerned. That is a start point for adjusting parameters like kVp and MAS. Some of the systems equip detachable gird to reduce dose. Consultation with professionals to adjust proper parameters based on ALARA principles is strongly recommended.

Monitoring dose indications

It is important to measure and quantify radiation dose for each patient. Some of the X-ray Diagnostic Imaging Systems equip the means to display estimates of entrance dose (dosearea product for general radiographic system or air kerma for interventional or noninterventional fluoroscopic system). Some also have means to store radiation dose information in the DICOM header of each image or means to generate separate radiation dose information besides clinical images. It is suggested to utilize those capabilities to monitor radiation dose, and consequently to minimize radiation dose to the patient.

The Limited Product Warranty

The system warranty is for one year from the date of purchase.

The following failures or damage are not covered by the warranty:

1. Failure or damage due to the installation, relocation, or service not performed by a SHIMADZU Service Representative or a SHIMADZU designated contractor.
2. Failure or damage caused by products from other companies (except those purchased from SHIMADZU).
3. Failure or damage due to repairs using non-SHIMADZU certified service parts.
4. Failure or damage caused from not following the notices and procedures described in this manual.
5. Failure or damage due to an operating environment that is outside the requirements stipulated in this manual.
6. Failure or damage due to natural disasters such as fire, earthquake, flood, and lightning.

Service after the expiration of the warranty is available at a reasonable cost and should be performed by the SHIMADZU Service Representative.

Revision History

REVISION	DATE	COMMENT
Original	2011.3	
A	2011.5	
B	2012.11	• Update cable and accessory lists. • Add SuperCine. • Add Pixel Spacing. • Add E-Shutters. • Delete Injection Delay Settings and add Acquisition Parameter Settings. • Add status of an image. (LIVE/LIH/STORED) • Add SCORE 3D (DA/DSA/CT).
D	2013.3	• Apply to Bi-plane system. • Add description about license information and dose report. • Update window images. • Update the Direct X. • Add adjustment procedure of brightness and contrast with mouse. • Add correction of image comment. • Update the name of each button and item.
E	2013.7	• Add Peak Hold to DSA tool. • Update various images. • Update various buttons and items. • Add a NOTE on calibration after the power failure. • Update various images to Ver.5.2.6.
F	2013.9	• Apply to RDSR. • Update various images to Ver.5.2.11.
G	2013.9	• Add description about sending RDSR. • Update “Special Information” in chapter 2. • Update “Periodic Maintenance” in chapter 14.
J	2014.6	• Apply to SCORE PRO Advance. • Update the labels on DAR. • Apply to RoHS.
K	2015.1	• Update cable and accessory lists. • Update labels.
K	2015.1	• Update cable and accessory lists. • Update labels.

REVISION	DATE	COMMENT
L	2015.4	• Apply to Ver.6.0. • Add [Configure Display Unit] dialog in Problem and Action for “Startup the System” in chapter 13. • Add periodic replacement parts. • Add description of pediatrics. • Add Dose Meter Configuration. • Add description on TraceMAP. • Add description of contour enhancement. • Add description of ROI of SIMAP. • Add description of guide display.
M	2015.5	• Add [Geometry] in [Physicians] tab on configuration window. • Add [Geometry] in [Physicians] tab on configuration window.
N	2015.6	• Update [Physicians] and [DICOM] tab on configuration window in chapter 12.
P	2015.8	• Update description of Fluoro MAP, SIMAP (LIVE) and SIMAP (Sub).
R	2016.4	• Apply to Ver.6.2. • Update description of MAP. • Update functions of IVR NEO buttons. • Update Keyboard Shortcuts. • Update the section of Displaying RDSR. • Update description of Bi-plane Loop. • Update the configuration dialog box in chapter 12. • Add description of Processed Image Transfer. • Update the names of buttons and items. • Add [Temporal DSA] for FLUO and RAD DUP setting. • Update the section of Other in chapter 13.
T	2016.5	• Update the section of Displaying RDSR.

REVISION	DATE	COMMENT
V	2017.5	• Add description of Operator. • Update 4.8.1 IVR NEO Buttons. • Update 12.9 Options Configuration. • Add description of MPPS Support to section 4.2, 4.3.2, 6.2.2, and 12.8.2. • Add 4.11. • Update 13.1 Error Messages. • Add section 13.3 Error Report. • Update 13.4 Other. • Update 12.9.4 Menus and DUP Configuration.
Y	2017.9	• Apply to DAR-9500f S/W Ver.6.5. • Update main window. • Update DSA mode in section 2.5.1. • Update cable and accessory lists. • Update labels. • Add Warning and Caution for Precautions in Use. • Add description of Wireless Communication in chapter2. • Add description of Auto Stitching in chapter 2 and section 4.4.6. • Add description of SMART Touch in section 14.4. • Update New Study windows in section 4.3. • Update series tab of Studies Management window. • Update a dialog box of Media Write. • Update DSA Tool bar. • Update [Hardware] tab and [Physicians]-[Geometry Configuration] tab of option configuration window. • Add 4.11 SMART Touch (Either-or IVR NEO/IVR Shuttle).
AA	2017.11	• Add SMART Touch (Option) list in section 1.5. • Add standard components of SMART Touch in section 2.3.1. • Add description of Option button and Change of Preset in section 4.11.1. • Add [Touch] tab on [Physician] tab of option configuration window. • Add description of Flex-APS (Option) in section 2.5.3, 4.4.6, 4.8.1, 4.11.6 and 9.3. • Add description of Error Messages Related to SMART Touch in section 13.1 • Add 13.5 Displaying Image of SMART Display (Option).

REVISION	DATE	COMMENT
AB	2018.1	• Add Chapter 11 SCORE StentView (Option). • Add Chapter 12 SCORE StentShot (Option). • Add Chapter 13 Temporary License.
AC	2018.4	• Add "Note" in section 4.11.4 Monitor Panel (Only when SMART Display is connected). • Revise "Note" for Auto Stitching (Option) in section 4.4.6.
AD	2018.8	• Apply to DAR-9500f S/W Rev.6.7. • Add Chapter 13 SCORE Chase (Option). • Add Chapter 14 SMART Display (Option). • Add section 13.4.5 SPOT-DSA and 13.4.8 Change of Display. • Add description of SPOT-DSA in section 13.1.2, 13.3.1, 13.3.2.1, and 13.4.10. • Add "Note" in section 13.4.3 and 13.4.4.
AE	2018.11	• Add "Warning" and "Caution" in Precautions in Use. • Add "Note" in section 2.6.4.
AF	2018.11	• Modify the image defects.
AG	2018.12	• Apply to DAR-9500f S/W Rev.6.8. • Add "Note" of X-ray generator activation in section 3.1 and 4.3.2. • Add description of "Show dose warning" in section 4.2 and 4.4.1. • Change Set Acquisition Parameters window in section 4.4.8. • Modify default value of Brightness and Contrast in section 7.2.1 and 7.2.2. • Change Quantitative Coronary Analysis window, and add procedures from step 16 to 19 in section 8.2. • Update [Notification] tab and add description of dose in section 17.8.3. • Update [Devices] tab and add description of Screen Saver in section 17.8.3.
AH	2019.1	• Add "Note" in section 2.6.8. • Revise "Note" in section 3.1. • Add periodic replacement parts in section 19.3.2.
AJ	2019.1	• Revise "Note" in section 2.6.8. • Delete sentences in section 3.1. • Modify the list in section 4.2.

REVISION	DATE	COMMENT
AK	2019.5	• Update the cable list. • Delete labels in section 2.6.2. • Update [DICOM] and [Hardware] tabs in section 17.9.3. • Update [Hardware] tab in section 10.5.
AL	2019.8	• Apply to DAR-9500f S/W Rev.6.9.
AM	2020.7.31	• Modify periodic replacement parts in section 19.3.2.
AN	2021.2.8	• Add an item to "Image Pre-Processing" in the table of DUP parameters in section 17.9.4.
AP	2022.11.30	• Add a rating label in section 2.6.2.
AR	2023.5.8	• Update section 4.4.9 Manually Resetting the Dose.
AT	2024.4.30	• Add section 3.2 User Authentication. • Add section 4.5.11 Circle Display. • Add procedure in section 9.2. • Update [System] tab in section 10.5. • Add "NOTE" in section 13.4.6. • Update [Display] tab in section 17.8.3. • Add [Cyber Security] tab in section 17.8.3. • Add section 18.4 Unable to Sign In.

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Chapter 11 SCORE StentView (Option)

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Chapter 1

About this Manual

This chapter introduces this Manual, describing its organization and terminology.

Description of Chapter

1.1 Safety

Read all of the instructions contained in this manual before operating this product and save this manual for later use. Follow all warning, cautions, and instructions.

1.2 Manual Organization

This manual is organized in logical sequence that reflects typical product use. Product walkthroughs and user interface descriptions are provided firs, followed by reference material and advanced feature descriptions in later chapters. Administration-related material is presented last.

See ☞"17 Administration". This manual is intended to be read sequentially through the Studies Management chapter. See ☞"6 Studies Management". All later chapters can be referenced on an as-needed basis.

1.3 Operation Modes

DAR-9500f features two operation modes; User and Administration. Except when otherwise stated, the information in this manual is for the User.

Mode	Description
User	Any user not defined as Administrator runs DAR-9500f in User mode. This is the normal operation in which all day-to-day work should be done. There are usually at least two user types; Technician and Physician. The Technician prepares for a procedure by entering patient and procedure information whereas the Physician performs the procedure.
Administration	The system administrator runs DAR-9500f in Administration mode, gaining the ability to search specific servers and CD/DVD drives and perform full configuration.

1.4 Operator Profile

Item	Details
Age	Age that person can obtain the license of Radiological Technologist or a license equal to it.
Sex	No limitation.
Nationality	No limitation.
Education	Radiological Technologist or person who has a license equal to it.
Knowledge	Radiological Technologist or person who has a license equal to it.
Language	Can read and understand English.
Experience	Every operator needs to take training for operating the equipment before using the equipment.
Permissible Impairment	Corrected visibility is over 0.7 in the decimal number.

1.5 Terminology

The following terminology is used in this manual:

Terms	Description
GUI	Graphical User Interface, a graphical system of windows, buttons, and controls used to simply communicate with and operate systems.
Image or Loop	Used interchangeably, any still image or image sequence acquired during a study. A sequence of images can be played back at acquired speed (e.g., 30fps), providing high-resolution full-motion video.
Study	Refers to both the medical diagnostic procedure itself and all related information and images captured during the procedure. The study also includes descriptive information such as patient demographics and identification codes entered before the procedure is performed. It may also include annotated images.
DICOM	Digital Imaging and Communication in Medicine, is an set of rules that allow medical images and associated information to be exchanged between imaging equipment, computers, and hospitals.
Digital Program or DUP	Used interchangeably, digital user programs define the type of acquisition, either Rad or Fluoro, and various acquisition characteristics.
Lossless Compression	Digital compression in which data loss never occurs. Original data (image) condition is achieved after decompression.
Lossless Compression	Digital compression which in not fully reversible but typically allows images to retain sufficient detail for analysis.
Worklist	Also called Modality Worklist, this is a list of studies (entered earlier by administrative personnel) that should be performed by the physician(s).
MWM Server (Modality Worklist Sever)	An information system which provides study order information to the modality (DAR-9500f system).
Performing Physician	A physician who performs or is directly-involved in the study.
Referring Physician	The physician who originally requested the study that must later review the study result.
Procedure Step	The DICOM term of study.

FPD

Terms	Description
SFD-1612AF	16x12 inch FPD
SFD-1212/SFD-1212AF	12 inch FPD
SFD-0808/SFD-0808AF	8 inch FPD

SMART Display (Option)

Terms	Description
Video Input	Input image from PC, etc.
Segment	Display video input on the segment.
Layout	Split display into several segments by layout.
Preset	Video input is assigned to the segment within layout based on preset.

☞ "20.2 Glossary" P.20-3

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Chapter 2

System Overview

This chapter provides an overview of the system capabilities and features and describes optional functionality.

Description of Chapter

2.1 Introduction

DAR-9500f is a digital X-ray angiography system that automatically acquires digital images with FPD (Flat Panel Detector), applies digital processing such as auto window level, and makes the images available for review. Digital Subtraction Angiography (DSA) provides enhanced imaging of static physiology.

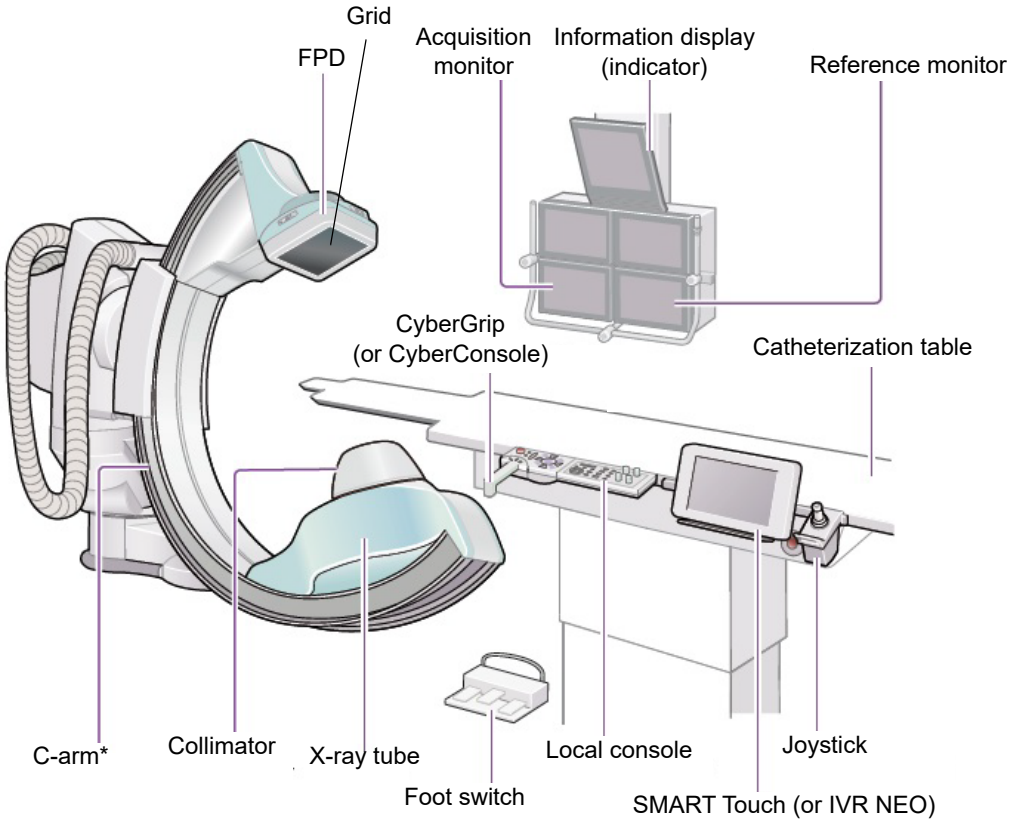
DAR-9500f provides a complete digital imaging system for catheterization (cath) labs that produces high-quality digital image loops that may be stored locally or sent to any DICOM 3.0+ archive server across a network.

Providing full connectivity to DICOM3.0+ networks, DAR-9500f supports lossless-compressed image format. DAR-9500f components including cabinet and monitors, are typically installed in the three rooms of a cath lab as follows.

No.	Room	Description
1	Examination Room	Acquisition and Reference monitor, displaying exactly what is shown on the equivalent monitors in the control room. The physician controls X-ray exposure via foot switches or hand-operated switches. The IVR NEO(*) bedside console provides configurable buttons, LED indicators, and a joystick, or the SMART Touch(*) provides configurable buttons and a joystick. A FPD (Flat Panel Detector) is installed on their C-arm system. (*) Either Smart Touch or IVR NEO.
2	Control Room	Digital reference cabinet with Acquisition (live) and Reference monitors, Reference computer with keyboard, mouse, CD/DVD writer and SMART Touch or IVR Shuttle (in option)(*). The Acquisition monitor displays all live image loops from the X-ray system. The Reference monitor is used to playback image loops and do other work such as initiating and completing studies, annotating images, and performing analysis. The SMART Touch provides configurable buttons and a joystick. (*) Either Smart Touch or IVR Shuttle (in option).
3	Equipment Room	The Digital acquisition cabinet with Acquisition computer, C-arm control cabinet, FPD cooling system, X-ray high voltage control cabinet, X-ray tube-cooling unit, and Maintenance computer.

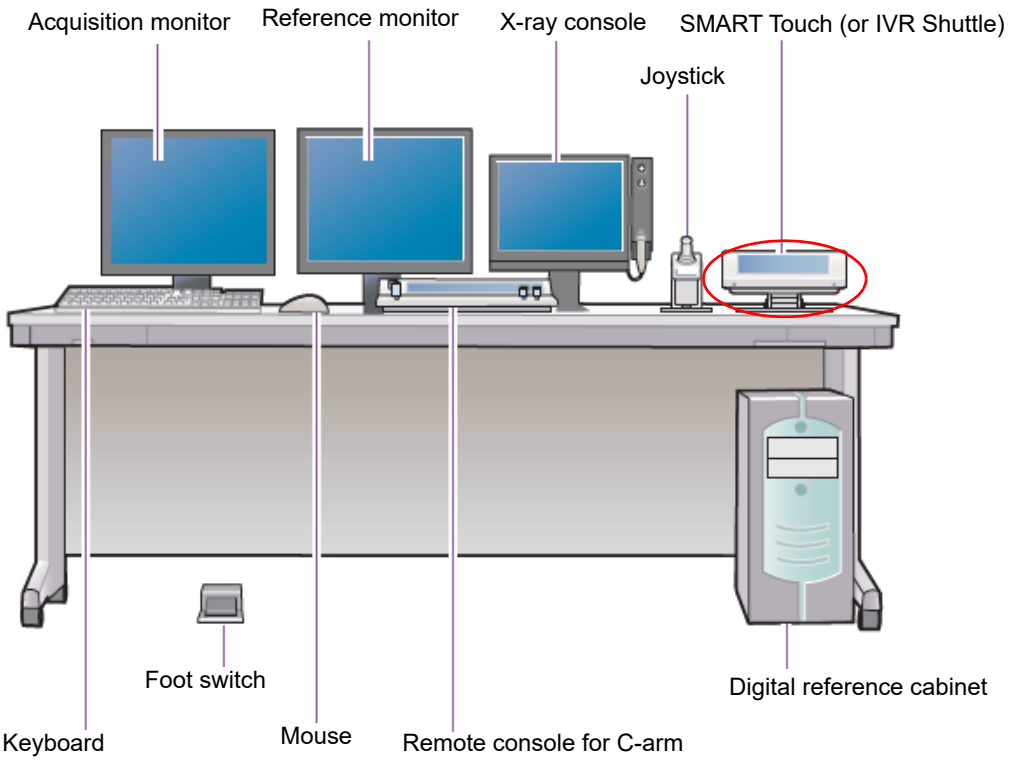
- Single-plane System

<Examination Room>



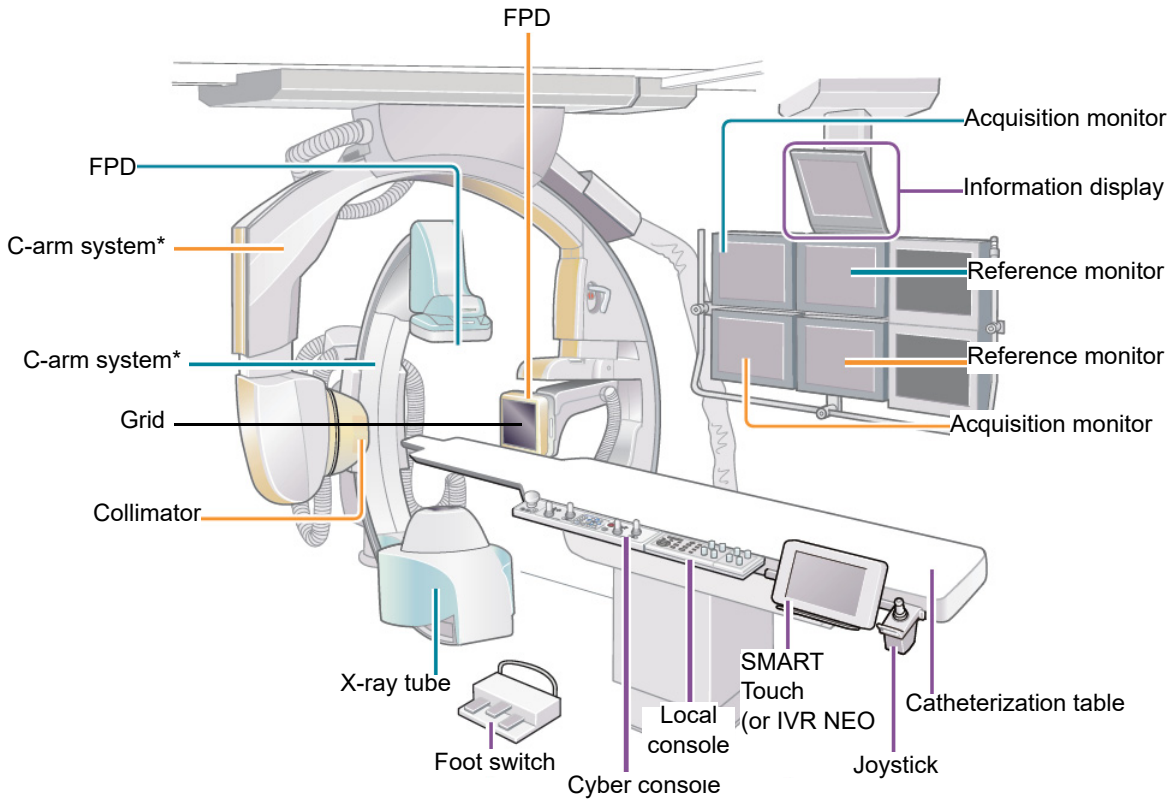
*The C-arm system is "C-arm Support MH-300". It is also possible to place with "Ceiling Suspended C-arm Support MH-200S".

<Control Room>



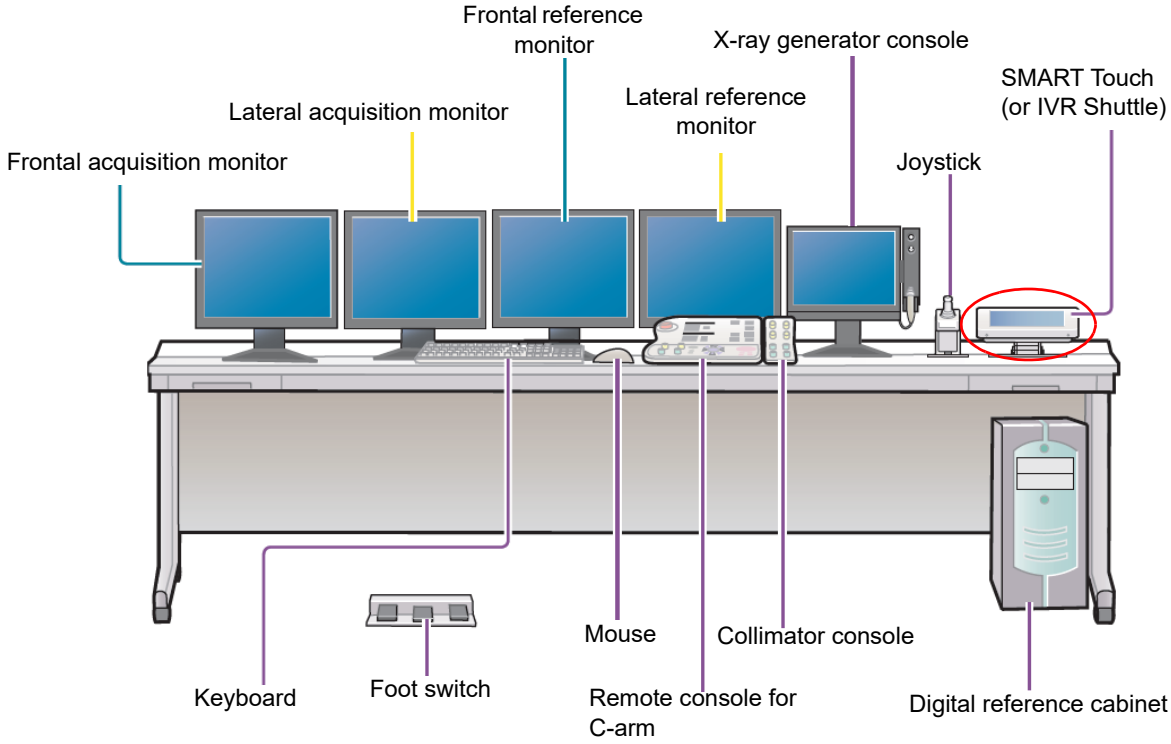
- Bi-plane System

<Examination Room>



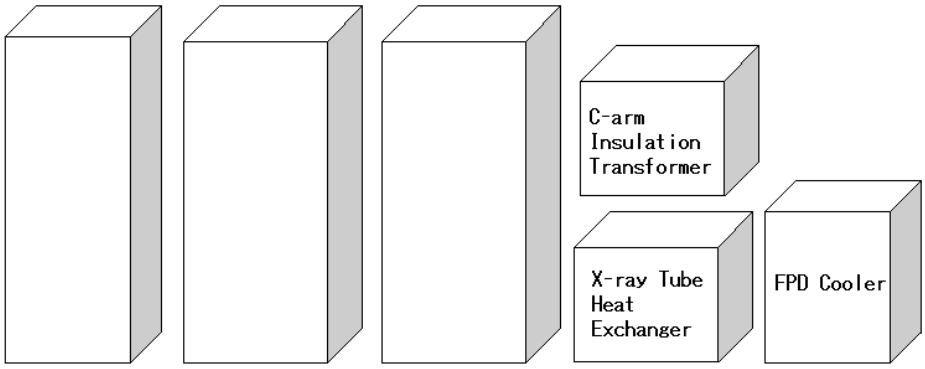
*The C-arm system is "C-arm Support MH-300" and "Ceiling Suspended C-arm Support MH-400"

<Control Room>



*For the optional feature of Live Image During Map (LIDM), a LIVE monitor can be added to the Examination room and the Control room.

<Equipment



C-arm control cabinet

Digital acquisition cabinet

Includes:

Maintenance computer
Main power supply
Transformer
UPS

X-ray high-voltage control cabinet

*For Bi-plane system, there are two sets for each equipment except maintenance computer and transformer. See chapter 10 for details.

2.2 Features

DAR-9500f has the following features:

1 Image loops are acquired at up to 30 frames per second with a resolution of 1024x1024 pixels.

2 Clearer fluoroscopy images and sharper radiographic images are provided through noise-reduction processing and edge enhancement.

3 The acquired image is stored on the high-speed image disk in real time, and after acquisition is completed, instantaneous review is available. The previous data can be easily searched by patient or other criteria.

4 Rad and Fluoro digital program menus make it easy for the operator to quickly set exposure conditions.

5 The IVR supporting environment is offered with the IVR NEO or SMART Touch bedside console operation panel.

6 Images and loops can be permanently stored in DICOM format on CD/DVD discs, providing both economy and portability.

2.3 System Components

DAR-9500f consists of the following standard and optional components. Refer to "Standard Components" for chapter 10.

☞ "10.1.1 Standard Components" P.10-2

2.3.1 Standard Components

IVR NEO

No.	Name	Installation Location	Quantity
1	Digital reference cabinet: with built-in reference computer	Control room	1 set
2	Digital acquisition cabinet: with built-in acquisition computer	Equipment room	1 set
3	FPD cooling unit	Equipment room	1 set
4	19" LCD monitor	Control room	2 sets
		Examination room	2 sets
5	Keyboard and mouse	Control room	1 set
6	Bedside console IVR NEO	Examination room	1 set
7	FPD (Flat Panel Detector)	Examination room	1 set

SMART Touch

No.	Name	Installation Location	Quantity
1	Digital reference cabinet: with built-in reference computer	Control room	1 set
2	Digital acquisition cabinet: with built-in acquisition computer	Equipment room	1 set
3	FPD cooling unit	Equipment room	1 set
4	19" LCD monitor	Control room	2 sets
		Examination room	2 sets
5	Keyboard and mouse	Control room	1 set
6	SMART Touch	Examination room	1 set
7	FPD (Flat Panel Detector)	Examination room	1 set

NOTE

The system includes 40GB of memory and 240GB or more of hard drive space.

2.3.2 Optional Components

No.	Name	Quantity
1	Scan converter	1 set
2	Dosimeter	1 set
3	Live Image During Map (LIDM)	1 set
4	IVR Shuttle (Combined with IVR NEO only)	1 set
5	SMART Display	1 set
6	SMART Touch (Control room)	1 set

2.4 Specifications

2.4.1 Image Processing

No.	Item	Specifications
1	Image input	• Density resolution: 12 bits/4,096 steps • Sampling frequency: 40.0 MHz
2	Image operation performance	The 1024x1024 image processing (noise reduction filter processing, etc.) is performed at a maximum of 30 frames/s.b
3	Display D/A converter	8 bits/256 steps or more

2.4.2 Image Display

No.	Item	Specifications
1	Output video signal	Non-interlaced
2	Display image matrix	1280x1024
3	Display step:	256 steps
4	Maximum brightness	400 cd/m^2 or higher in examination room
5	Image processing	• Noise reduction processing • Window level adjustment • Edge enhancement processing • Negative/Positive inversion • Gamma correction • Image magnification • Re-masking • Re-registration • Virtual collimation • Landmarking • Peak hold • Contour enhancement
6	Character display	• Fixed format (patient information etc.) • Free format (annotation etc.)
7	Image analysis	• QCA (Quantitative Coronary Analysis) • LV (Left Ventricular Analysis)

2.4.3 Image Recording

No.	Item	Specifications
1	Magnetic disk	• 1024 x 1024 pixels (12-bit): 100,000 frames
2	Media	CD-R (650 MB) • 512 x 512 pixels (8-bit): 4,800 frames or less per disk • 1024 x 1024 pixel (12-bit): 600 frames or less per disk DVD-R (4.7 GB) • 512 x 512 pixel (8-bit): 30,000 frames or less per disk • 1024 x 1024 pixel (12-bit): 4,000 frames or less per disk

2.4.4 Network

No.	Item
1	DICOM image/RDSR storage
2	DICOM image/RDSR receive
3	DICOM image storage commitment
4	DICOM image print
5	DICOM modality worklist

2.5 Function

2.5.1 Image Acquisition

No.	Item	Functions
1	DA Mode	Serial radiography at up to 30 frames/second is possible (for 12-bit image acquisition). Acquired images can be reviewed immediately. For example, it is easy to observe how contrast agent flows in a patient's body. Acquisition with Precession and Pendulum C-ram motion is also supported.
2	DSA Mode	DSA (Digital Subtraction Angiography) acquisition at up to 15 frames/second (in case of SFD-1612AF/SFD-1212AF/SFD-0808/SFD-0808AF)/12 frames (in case of SFD-1212) is possible (for 12-bit image acquisition). Acquired images can be reviewed immediately.
3	RSM-DSA Mode	RSM-DSA (Realtime Smoothed Mask DSA) filters enable enhanced imaging. As an alternative to DSA imaging, the RSM-DSA filter provides continuous automatic mask creation, enabling accurate enhanced imaging even with movement of the catheterization table or limb.
4	ROT-DA Mode	Perform DA radiography while rotating the C-arm.
5	RO-DSA Mode	Perform DSA radiography while rotating the C-arm.
6	ROT-RSM-DSA Mode	Perform RSM-DSA radiography while rotating the C-arm.
7	SPOT Mode	Perform radiography of a single image.
8	Stage Acquisition Mode	For every setting frame, perform DSA acquisition while reducing the acquisition rate. Following acquisition rate can be used for stage acquisition mode. Single Radiography: 6 fps, 4 fps, 3 fps, 2 fps, 1 fps Bi-plane Radiography: 6 fps, 4 fps, 3 fps, 2 fps, 1 fps

2.5.2 Fluoroscopy

No.	Item	Functions
1	Fluoroscopy Record	Images can be saved during or after fluoroscopy.
2	FluoroMAP	FluoroMAP assists in the positioning or a catheter in a complicated blood-vessel route. It hightlights in white, the path of contrast agent injection. The path is retained onscreen like a road map during subsequent Fluoro acquisitions to make it easy to see the moving catheter with little or no additional contrast agent. Subtract the background image such as bone, if necessary. In case of LIDM, a fluoroscopy image during radiation and vascular MAP image can be displayed at the same time.
3	DSA-MAP	DSA-MAP assists in the positioning of a catheter in a complicated blood-vessel route. Acquired blood-vessel image and fluoroscopy image can be displayed as a superimposed image. As it is not necessary to acquire the blood-vessel image again, radiation dosage and the volume of contrast agent can be reduced even more than FluoroMAP. Cannot use a blood-vessel image which is saved as a still image. Subtract the background image such as bone, if necessary. In case of LIDM, a fluoroscopy image during radiation and vascular MAP image can be displayed at the same time.
4	TraceMAP	Fluroscopy image and vessel contour image generated with DSA mode can be displayed as a superimposed. Interior of a blood-vessel is displayed in a transparent mode, so this is available when treat a large vessel. Cannot use a vessel contour image which is saved as a still image.
5	BlankMAP	Subtract the background image such as bone, and display the fluoroscopy image. It is useful for checking device and medical agent added after BlankMAP started.

2.5.3 Image Processing

No.	Item	Functions
1	Serial Animation Display (Cyclic Display)	Serial animation up to 30 frames/second is available.
2	Real-time Edge Enhancement	Sharp images are acquired by emphasizing the subject edge with spatial frequency emphasis. It is selectable as either 5x5 Convolution processing or unsharp processing, as a technique of the spatial frequency emphasis.
3	Negative/Positive Inversion Display	Images can be displayed as acquired (positive) or the inverse (negative).
4	Gamma Correction	The display gamma can be selected.
5	Animation Zoom	Still images and loops can be zoomed to up to 2.5 times of original size.
6	Auto Window Control	Images are displayed with automatically-controlled stabilized contrast.
7	Noise Reduction	Reduces image noise.
8	Re-masking of DSA Images	A new sub image is created by re-selecting the mask image arbitrarily.
9	Re-registration of DSA Images	The mis-registration is reduced by moving the mas image up, down, right and left, and by executing subtraction at the position with the live image.
10	Virtual Collimation	Displays the position of collimator on the window when moving the collimator.
11	Landmarking	Modifies the Mask weight on DSA image.
12	Peak Hold	Extract and display the position of white and black peak in the image.
13	Contour Enhancement	Automatically enhance the blood-vessel contour in the image.
14	Flex-APS (Option)	Adjusts the position of each region of mask image on DSA image.

2.5.4 Image Analysis

No.	Item	Functions
1	QCA (Quantitative Coronary Analysis)	The level of the blood-vessel stensis is quantitatively analyzed. The vessel wall is recognized automatically when the stenosis part is specified, and the stenosis rate is displayed.
2	LV (Left Ventricular Analysis)	The function of the left ventricle (LV) is quantitatively analyzed. When inner wall of LV is specified, LV lumen capacity and ejection fraction, etc. are calculated.

2.5.5 Network

No.	Item	Functions
1	DICOM Image/RDSR Storage	Image and RDSR are automatically transferred to the server via DICOM network.
2	DICOM Image/RDSR Receive	The server can be queried and then images and RDSR can be received via DICOM network.
3	DICOM Image Storage Commitment	Images are transferred to the image server via DICOM network, with full Storage Commitment support. Once the Storage Commitment feature verifies that the images were successfully received by the image server, the images can be safety deleted from the local system.
4	DICOM Image Print	Images can be printed on DICOM printers.
5	DICOM Modality Worklist	Study information, such as patient name, can be acquired from a worklist server. This speeds up patient information entry when creating a new study.

2.5.6 Image Recording

No.	Item	Functions
1	CD-R	The study including still images and loops can be saved on CD-R or DVD-R.
2	DVD-R	

2.5.7 C-arm Reposition

No.	Item	Functions
1	Filtering Images by C-arm Position	Display the image that matches the C-arm angle on the image selector.
2	C-arm Repositioning	The C-arm can be rotated to the same angle as the current image that is displayed on the Reference monitor.

2.5.8 Table Reposition

No.	Item	Functions
1	Table Repositioning (Combined with KS-100)	The table can be moved to the same position as the current image that is displayed on the Reference monitor.

2.6 Special Information

Special information of classification, labeling and environmental conditions are described in this section.

2.6.1 Classification

The classification of protection against electric shock:

- Class I equipment

NOTE

It means that CLASS I EQUIPMENT, that is, electrical equipment in which protection against electric shock does not rely on BASIC INSULATION only, but which includes an additional safety precaution in that means are provided for ACCESSIBLE PARTS of metal or internal parts of metal to be PROTECTIVELY EARTHED. (International standard IEC 60601-1:2005)

The degree of protection against electric shock:

- Equipment not including applied Part.

The classification of EMC (Electro-Magnetic Compatibility):

- Group 1 and Class A

NOTE

This system belongs to Group 1 and Class A equipment in accordance with EN60601-1-2:2007.

Class A equipment is equipment suitable for use in all establishments other than domestic and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

Group 1 contains all ISM equipment in which there is intentionally generated or used conductively coupled RF energy that is necessary for the internal functioning of the equipment itself.

The degree of protection against effects of water:

- Ordinary equipment:

WARNING

This equipment is not protected against immersion in liquid.

Never use this equipment in a place in which immersion in liquid may occur. Never spill liquid on the surface or inside the equipment. Otherwise, electrical shock may occur. When liquid is spilled, contact our service office or a Shimadzu service representative.

The degree of safety of application in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide:

- This equipment is not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.

WARNING

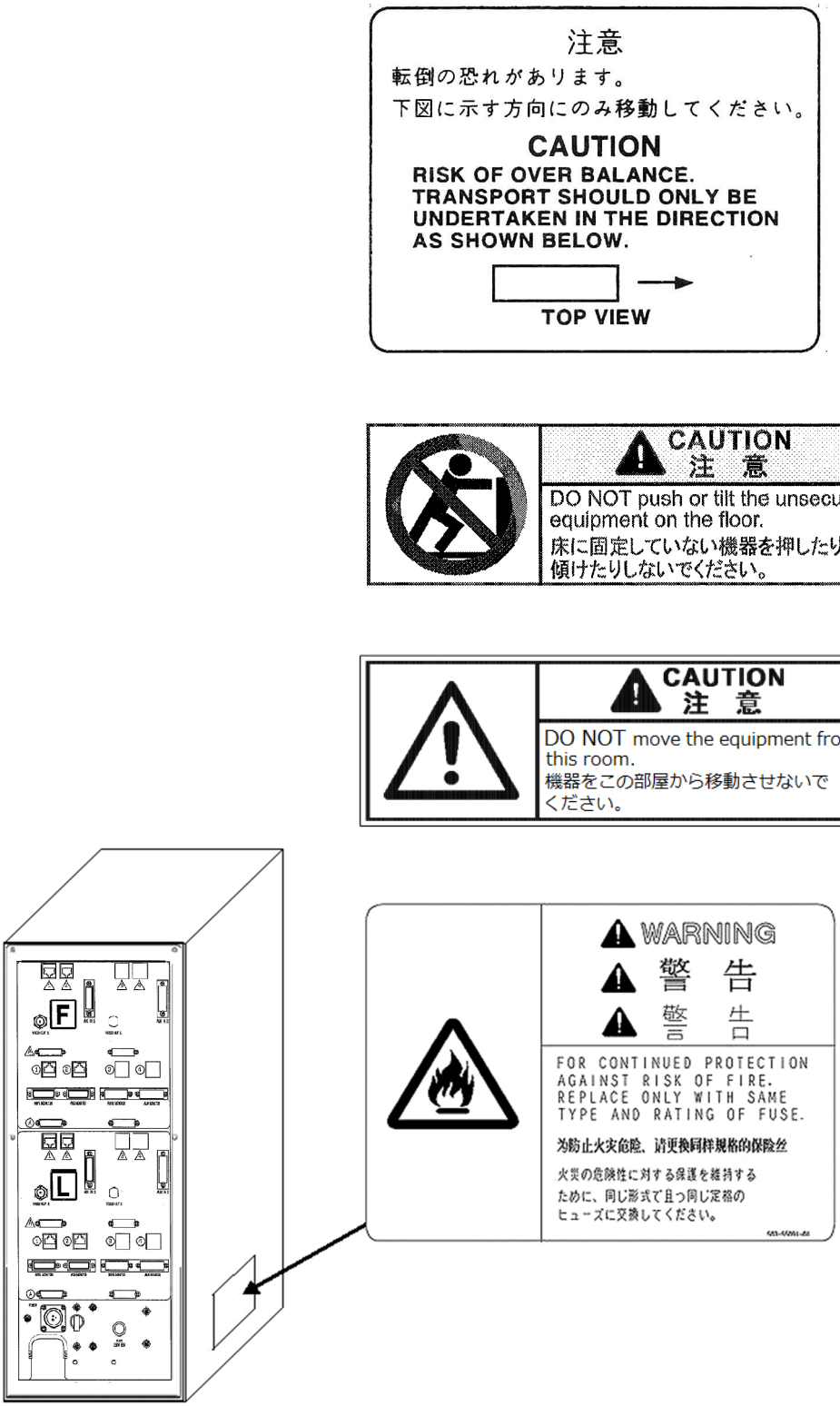
Risk of explosion:

There is a risk of explosion if the equipment is used near flammable anesthetics.

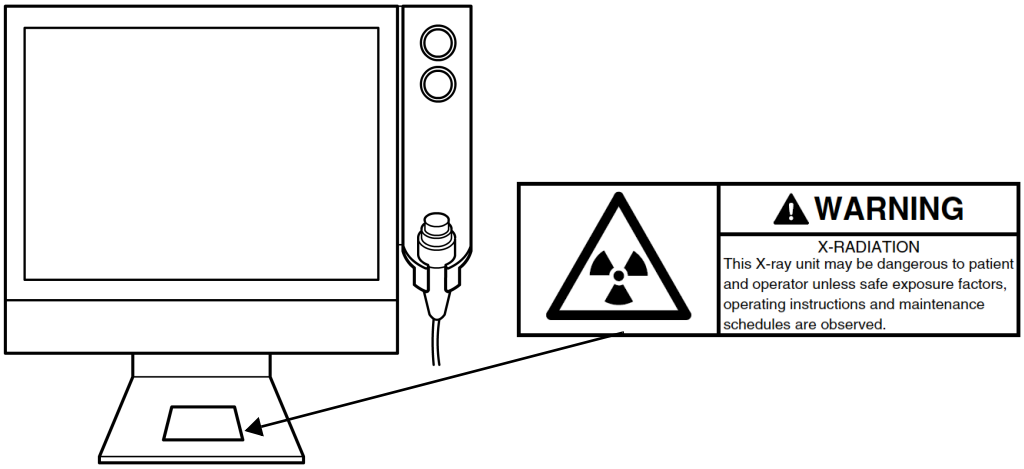
2.6.2 Labeling

Warning/Caution Labels

Warning/Caution labels are attached to the side of the main system cabinet like this:



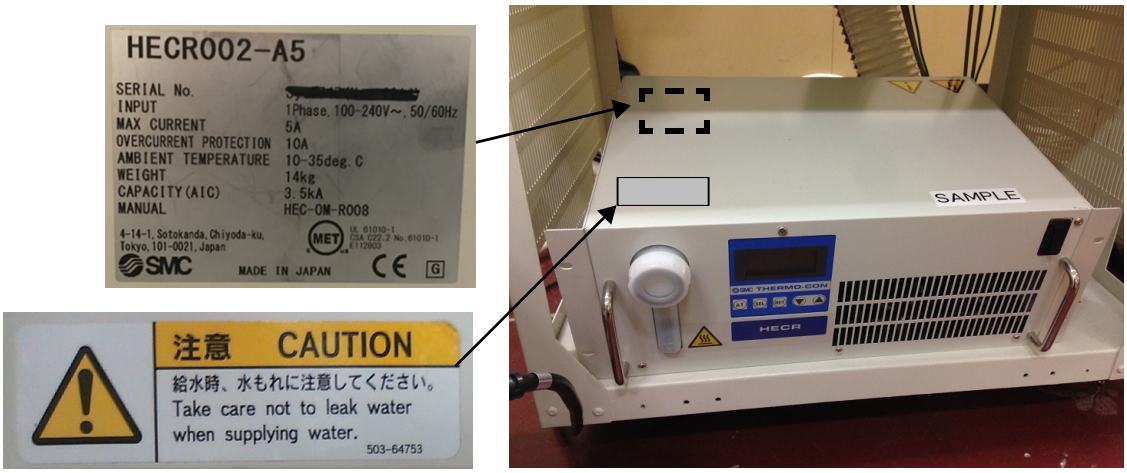
Warning label is attached to the System Display like this:



Caution and unit labels are attached to the back and side of water cooling unit like this:

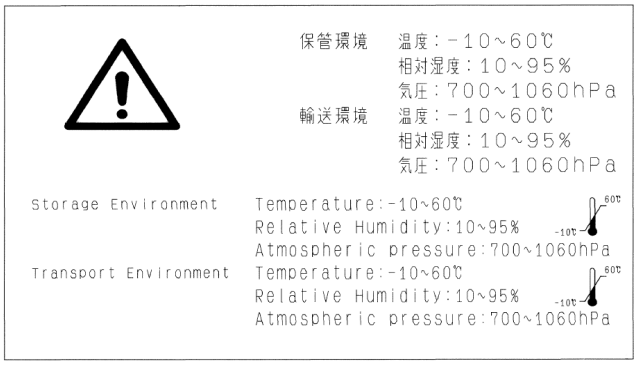
(1) HEC002-A5B-X101

(2) HECR002-A5



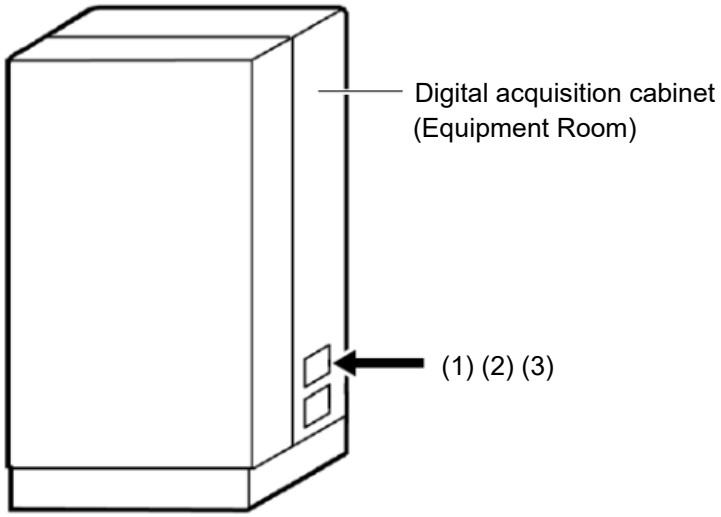
Storage and Transport Labels

The label for storage and transport condition is attached on the package.

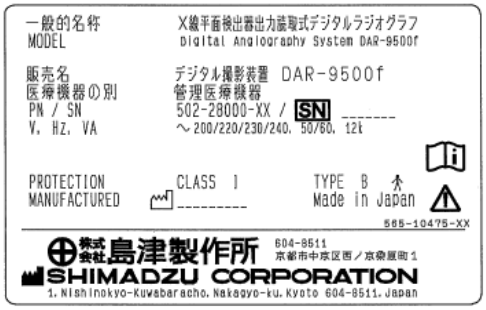


Others

Labels for Digital Acquisition Cabinet are located as follows:



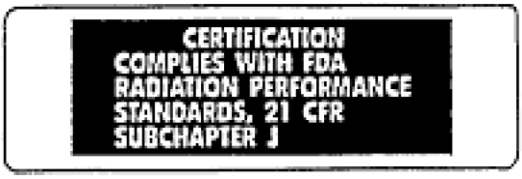
(1) Rating Label



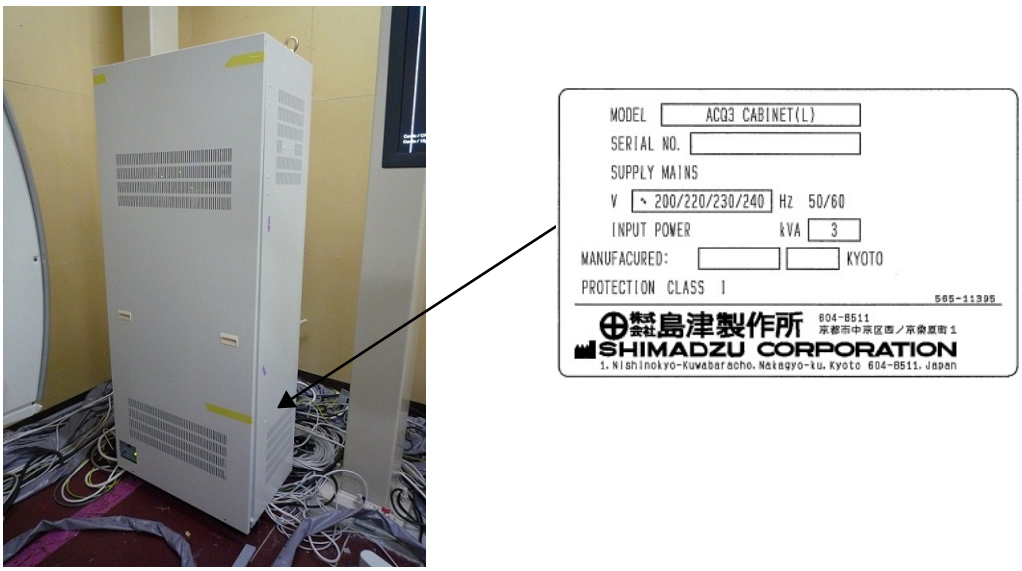
or

(2) cTUVus

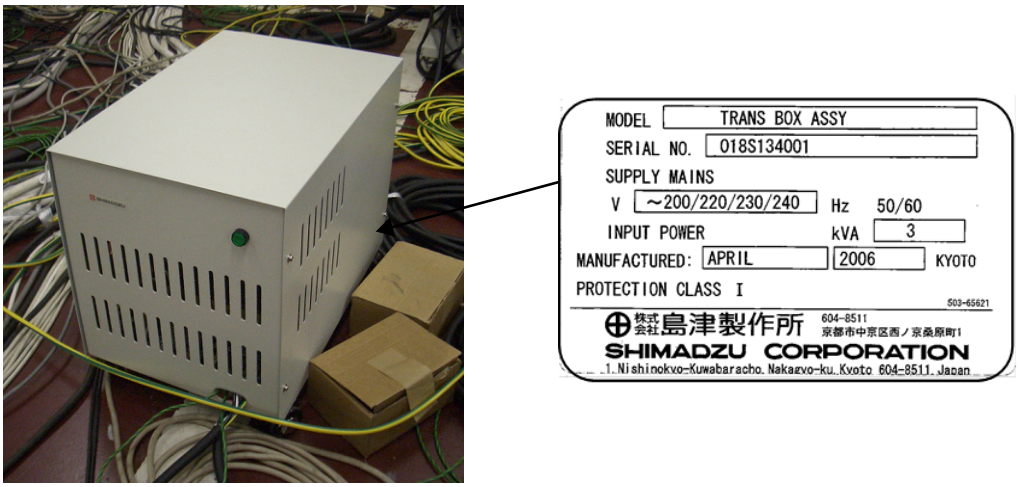
(3) FDA Certification



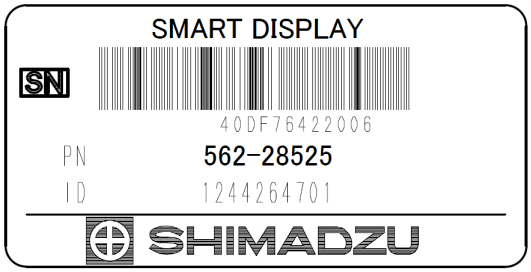
The rating label for Digital Acquisition Cabinet Lateral (option) is located as follows:



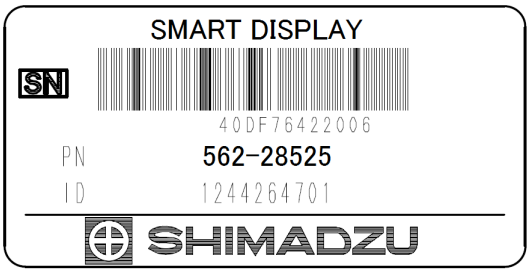
The rating label for Transformer Box (option) is located as follows:



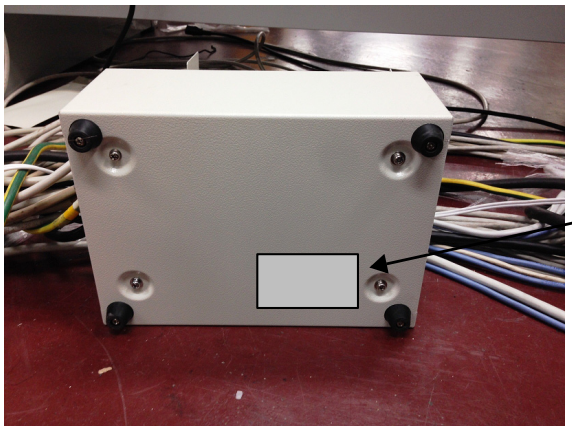
The rating label for Large Monitor Cabinet (option) is located as follows:

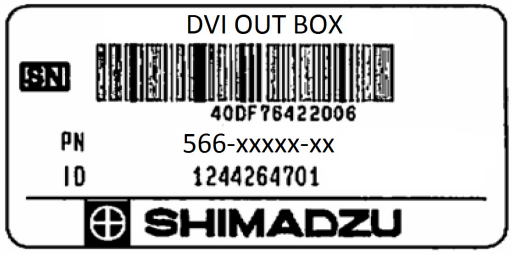


The rating label of Large Monitor Cabinet 2 (option) is located as follows:

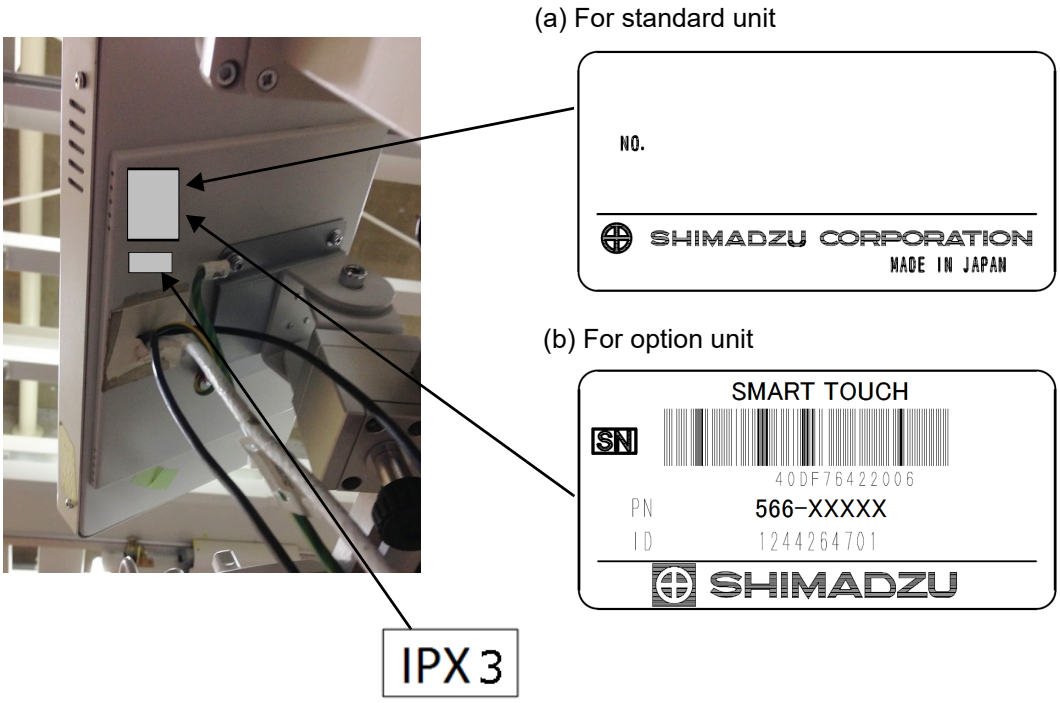


The rating label for DVI OUT BOX (option) is located as follows:

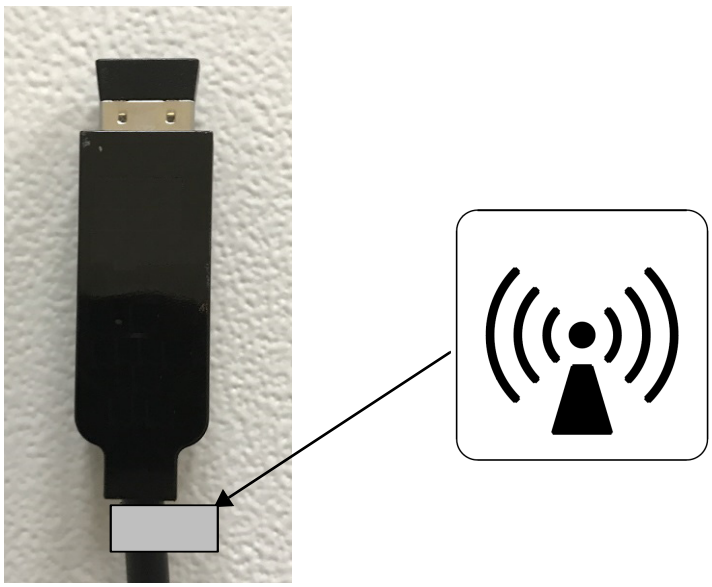




The rating label for SMART Touch is located as follows:

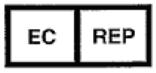


The rating label for Wireless Mouse is located as follows:



2.6.3 Symbols

Symbols used on this system are shown and described as follow:

No.	Symbol	Location	Meaning
1		On the back of the Digital processing system cabinet.	Risk of fire.
2		On warning/caution labels.	Attention: refer to Operation Manual and attachment
3		On System display	Turns on the equipment power.
4		On System display.	Turns off the equipment power.
5		On Digital processing system cabinet.	Turns on or off the equipment power.
6		On the breaker switch on the back of the Digital processing system cabinet and the transformer box.	Turns on the equipment power.
7		On the breaker switch on the back of the Digital processing system cabinet and the transformer box.	Turns off the equipment power.
8		Caution labels.	Alternating current.
9		Protective earth of power cable inside the system.	Protective earth.
10		In name plate on covers.	Refer to Operation Manual.
11		In name plate on covers.	Date of manufacture.
12		In name plate on covers.	Manufacturer.
13		In name plate on covers.	Serial number.
14		On the foot stand of the System display.	Ionizing radiation.
15		Integrated acquisition cabinet.	Authorized Representative in the European Community.
15		On the USB cable for wireless mouse.	RF transmitter.

2.6.4 Environmental Conditions

Setup and Operating

No.	Item	Environmental Conditions
1	Power Source	Digital Acquisition Cabinet: Single phase AC200/220/230/240 V, 3 kVA, 50/60 Hz Transformer Box*: Single phase AC 200/220/230/240 V, 3 kVA, 50/60 Hz A power source that is different than that of C-arm and X-ray High Voltage Control unit is required. (*)Used when adding an optional computer such as a 3D Workstation.
2	Temperature/Humidity	• Examination Room from 10 °C to 35 °C from 15 % to 75 % (non condensing) • Control Room from 10 °C to 35 °C from 15 % to 75 % (non condensing) • Equipment Room from 10 °C to 30 °C from 15 % to 75 % (non condensing)
3	Grounding	Grounding resistance: 100 Ohm max.
4	Generated Heat Quantity	• Equipment Room Digital acquisition cabinet: 1560 Kcal/h FPD cooling system: 1000 Kcal/h • Control Room Digital reference cabinet: 470 Kcal/h LCD Monitor 48 Kcal/h

NOTE

- When isolating the equipment from the power supply, open the circuit breaker or knife switch of the switchboard that the equipment is connected to.
- Prepare some locking mechanism to keep an OFF position of the circuit breaker and knife switch.

Storage and Transportation

No.	Item	Environmental Conditions
1	Temperature	from -10 °C to 60 °C
2	Humidity	from 10 °C to 95 °C
3	Pressure	from 700 hPa to 1060 hPa

Conformity of Equipment

Refer to the Operation Manual which system to be combined.

2.6.5 EMC (Electro Magnetic Compatibility) Information

Operating Condition

This system belongs to Group 1 and Class A equipment in accordance to IEC60601-1-2:2007.

The system uses radio-frequency energy only for its internal function and is not intended to deliver energy to the patient. But little leakage of radio-frequency energy does harm to high-sensitive equipment.

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

DAR-9500f needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in the ACCOMPANYING DOCUMENTS.

Portable and mobile RF communications equipment can affect the DAR-9500f.

2.6.6 Wireless Communications

Wireless Mouse

Item	Frequency Range	Modulation	Output Watts
–	2400-2483 MHz	GFSK	Max: 1.5 mW

Cable List

- In case of ACQ3

Digital Angiography System DAR-9500f				
No.	**Cable Type**	**Manufacturer**	**Cable Length (m)**	**Shielded**
1	AC Cable2 CCC	SHIMADZU	10	No
2	Earth Cable	SHIMADZU	10	No
3	AC DAR-TR Cable	SHIMADZU	20	No
4	Earth Cable	SHIMADZU	20	No
5	LAN Cable	SHIMADZU	20	No
6	Optical Power Cable	SHIMADZU	40	Yes
7	Power Cable attached with Chiller	SHIMADZU	10	No
8	Cooler Warning Cable	SHIMADZU	10	No
9	LAN DVI Extension Cable	SHIMADZU	30	Yes
10	LAN DVI Extension Cable	SHIMADZU	30	Yes
11	LAN DVI Extension Cable	SHIMADZU	30	Yes
12	LAN DVI Extension Cable	SHIMADZU	30	Yes
13	LAN DVI Extension Cable	SHIMADZU	30	Yes
14	LAN DVI Extension Cable	SHIMADZU	30	Yes
15	LAN DVI Extension Cable	SHIMADZU	30	Yes
16	LAN DVI Extension Cable	SHIMADZU	30	Yes
17	LAN DVI Extension Cable	SHIMADZU	30	Yes
18	LAN DVI Extension Cable	SHIMADZU	30	Yes
19	LAN DVI Extension Cable	SHIMADZU	30	Yes
20	LAN DVI Extension Cable	SHIMADZU	30	Yes
21	DVI PS Cable	SHIMADZU	30	Yes
22	DVI PS Cable	SHIMADZU	30	Yes
23	DVI PS Cable	SHIMADZU	30	Yes
24	AC Power Cable	SHIMADZU	2	No
25	AC Power Cable	SHIMADZU	2	No
26	AC Power Cable	SHIMADZU	2	No
27	AC Power Cable	SHIMADZU	2	No
28	DVI Cable	SHIMADZU	2	Yes
29	DVI Cable	SHIMADZU	2	Yes

Digital Angiography System DAR-9500f				
No.	**Cable Type**	**Manufacturer**	**Cable Length (m)**	**Shielded**
30	DVI Cable	SHIMADZU	2	Yes
31	DVI Cable	SHIMADZU	2	Yes
32	AC Power Cable	SHIMADZU	2	No
33	AC Power Cable	SHIMADZU	2	No
36	DVI Cable	SHIMADZU	5	Yes
37	DVI Cable	SHIMADZU	5	Yes
40	IVR NEO Cable ASSY	SHIMADZU	20	Yes
42	Power Cable Joint Box	SHIMADZU	5	No
43	Earth Cable Joint Box	SHIMADZU	5	No
44	IVR J11 Cable	SHIMADZU	20	Yes
45	JOINT BOX Cable	SHIMADZU	20	Yes
46	VGA Cable	SHIMADZU	30	Yes
47	VGA Cable	SHIMADZU	30	Yes
48	AUDIO SD Cable	SHIMADZU	30	Yes
49	Audio ID Cable	SHIMADZU	30	Yes
50	AC Power Cable	SHIMADZU	3	No
51	Earth Cable	SHIMADZU	3	No
52	SYS-DISP Cable	SHIMADZU	3	Yes
53	Touch Panel I/F Cable	SHIMADZU	3	Yes
54	AC Power Cable	SHIMADZU	2	No
55	IVR J10 Cable	SHIMADZU	3	Yes
56	J1F Cable	SHIMADZU	20	Yes
57	RSYS-XGENT-F Cable	SHIMADZU	10	Yes
58	DAR-ARCNET Cable	SHIMADZU	10	Yes
59	IBS Cable	SHIMADZU	20	Yes
60	Serial SDPC	SHIMADZU	15	Yes
61	SA60 Serial Cable	SHIMADZU	10	Yes
62	RS Cable	SHIMADZU	15	Yes
63	DOSE Meter Cable	SHIMADZU	30	Yes
64	Modular Cable	SHIMADZU	20	No
66	LAN Cable (cross)	SHIMADZU	15	No

Digital Angiography System DAR-9500f				
No.	**Cable Type**	**Manufacturer**	**Cable Length (m)**	**Shielded**
67	AC Power Cable	SHIMADZU	2.5	No
68	Cont. Microphone Cable	SHIMADZU	3	Yes
69	Cont. Microphone Cable	SHIMADZU	5	Yes
70	Cont. Speaker Cable	SHIMADZU	10	No
71	Exam. Microphone Cable	SHIMADZU	30	Yes
72	Exam. Speaker Cable	SHIMADZU	30	Yes
73	BNC Cable	SHIMADZU	30	Yes
74	AC Cable2 CCC	SHIMADZU	10	No
75	Earth Cable	SHIMADZU	10	No
76	AC Cable	SHIMADZU	20	No
77	Earth Cable	SHIMADZU	20	No
78	AC Cable	SHIMADZU	20	No
79	Earth Cable	SHIMADZU	20	No
80	LAN Cable	SHIMADZU	30	No
81	LAN Cable	SHIMADZU	30	No
82	LAN Cable	SHIMADZU	30	No
83	LAN Cable	SHIMADZU	30	No
84	AC Power Cable	SHIMADZU	2	No
85	AC Power Cable	SHIMADZU	2	No
86	AC Power Cable	SHIMADZU	2	No
87	AC Power Cable	SHIMADZU	2	No
88	AC Power Cable	SHIMADZU	2	No
89	AC Power Cable	SHIMADZU	2	No
90	AC Power Cable	SHIMADZU	2	No
91	AC Power Cable	SHIMADZU	2	No
92	DVI Cable	SHIMADZU	5	Yes
94	DVI Cable	SHIMADZU	5	Yes
95	DVI Cable	SHIMADZU	5	Yes
96	DVI Cable	SHIMADZU	5	Yes
97	DVI Cable	SHIMADZU	5	Yes
98	DVI Cable	SHIMADZU	5	Yes

Digital Angiography System DAR-9500f				
No.	**Cable Type**	**Manufacturer**	**Cable Length (m)**	**Shielded**
99	DVI Cable	SHIMADZU	5	Yes
100	DVI Cable	SHIMADZU	5	Yes
101	DVI Cable	SHIMADZU	5	Yes
102	DVI Cable	SHIMADZU	5	Yes
103	DVI Cable	SHIMADZU	5	Yes
104	VGA Cable	SHIMADZU	30	Yes
105	VGA Cable	SHIMADZU	30	Yes
106	VGA Cable	SHIMADZU	30	Yes
107	VGA Cable	SHIMADZU	30	Yes
108	KVM DVI Cable	SHIMADZU	1.8	Yes
109	KVM DVI Cable	SHIMADZU	1.8	Yes
110	DVI Cable	SHIMADZU	5	Yes
111	AC power Cable	SHIMADZU	1.9	No
112	KVM VGA Cable	SHIMADZU	1.2	Yes
113	KVM VGA Cable	SHIMADZU	1.2	Yes
114	Mouse EXT Cable	SHIMADZU	20	Yes
115	Earth Cable	SHIMADZU	20	No
116	AC Power Cable	SHIMADZU	2	No
117	AC Power Cable	SHIMADZU	2	No
118	DVI Cable	SHIMADZU	5	Yes
119	DVI Cable	SHIMADZU	5	Yes
120	DVI Cable	SHIMADZU	5	Yes
121	LAN Cable	SHIMADZU	30	No
122	G40 Serial Cable	SHIMADZU	20	Yes
123	LAN Cable	SHIMADZU	30	No
125	DVI LAN CABLE	SHIMADZU	36	Yes
126	DVI LAN CABLE	SHIMADZU	36	Yes
127	DVI LAN CABLE	SHIMADZU	36	Yes
128	DVI LAN CABLE	SHIMADZU	36	Yes
129	AC Power Cable	SHIMADZU	2	No
130	Power Cable Large Monitor	SHIMADZU	30	Yes

Digital Angiography System DAR-9500f				
No.	**Cable Type**	**Manufacturer**	**Cable Length (m)**	**Shielded**
131	Earth Cable	SHIMADZU	30	No
132	LAN Cable	SHIMADZU	30	Yes
133	DVI Extension Cable	SHIMADZU	36	Yes
134	Power Cable	SHIMADZU	30	No
135	Mouse	SHIMADZU	2	No
136	Keyboard	SHIMADZU	2	No
137	Mouse	SHIMADZU	2	No
138	Keyboard	SHIMADZU	2	No
139	Mouse	SHIMADZU	2	No
140	Keyboard	SHIMADZU	2	No
141	Mouse	SHIMADZU	2	No
142	Keyboard	SHIMADZU	2	No
143	Mouse	SHIMADZU	2	No
144	Keyboard	SHIMADZU	2	No
145	Mouse	SHIMADZU	2	No
146	Keyboard	SHIMADZU	2	No
147	Power Cable	SHIMADZU	30	No
148	Power Cable	SHIMADZU	30	No
149	LAN Cable	SHIMADZU	30	Yes
150	LAN Cable	SHIMADZU	30	Yes
151	AC Cable2 CCC	SHIMADZU	10	No
152	Earth Cable	SHIMADZU	10	No
153	LAN DVI Extension Cable	SHIMADZU	30	Yes
154	LAN DVI Extension Cable	SHIMADZU	30	Yes
155	LAN DVI Extension Cable	SHIMADZU	30	Yes
156	LAN DVI Extension Cable	SHIMADZU	30	Yes
157	LAN DVI Extension Cable	SHIMADZU	30	Yes
158	LAN DVI Extension Cable	SHIMADZU	30	Yes
159	LAN DVI Extension Cable	SHIMADZU	30	Yes
160	LAN DVI Extension Cable	SHIMADZU	30	Yes
161	LAN DVI Extension Cable	SHIMADZU	30	Yes

Digital Angiography System DAR-9500f				
No.	**Cable Type**	**Manufacturer**	**Cable Length (m)**	**Shielded**
162	LAN DVI Extension Cable	SHIMADZU	30	Yes
163	LAN DVI Extension Cable	SHIMADZU	30	Yes
164	LAN DVI Extension Cable	SHIMADZU	30	Yes
165	DVI PS Cable	SHIMADZU	30	Yes
166	DVI PS Cable	SHIMADZU	30	Yes
167	DVI PS Cable	SHIMADZU	30	Yes
168	AC Power Cable	SHIMADZU	2	No
169	AC Power Cable	SHIMADZU	2	No
170	AC Power Cable	SHIMADZU	2	No
171	AC Power Cable	SHIMADZU	2	No
172	DVI Cable	SHIMADZU	2	Yes
173	DVI Cable	SHIMADZU	2	Yes
174	DVI Cable	SHIMADZU	2	Yes
175	DVI Cable	SHIMADZU	2	Yes
176	AC Power Cable	SHIMADZU	2	No
177	AC Power Cable	SHIMADZU	2	No
178	DVI Cable	SHIMADZU	2	Yes
179	DVI Cable	SHIMADZU	2	Yes
180	SOLIOS CABLE	SHIMADZU	10	Yes
181	RSYS-CONV CABLE	SHIMADZU	10	Yes
182	LAN Cable	SHIMADZU	10	Yes
183	AC Power Cable	SHIMADZU	10	No
184	RS232C CABLE	SHIMADZU	10	Yes
185	LAN DVI Cable	SHIMADZU	30	Yes
186	Relay Cable	SHIMADZU	10	Yes
187	Optical Power Cable	SHIMADZU	40	Yes
188	Power Cable for Chiller	SHIMADZU	10	No
189	Cooler Warning Cable	SHIMADZU	10	No
190	RSYS-XGEN-L Cable	SHIMADZU	20	Yes
191	IBS Cable	SHIMADZU	20	Yes
192	Serial SDPC	SHIMADZU	20	Yes

Digital Angiography System DAR-9500f				
No.	**Cable Type**	**Manufacturer**	**Cable Length (m)**	**Shielded**
193	G40 Serial Cable	SHIMADZU	20	Yes
194	J1L Cable	SHIMADZU	20	Yes
195	AC Power Cable	SHIMADZU	10	No
196	LAN Cable	SHIMADZU	30	Yes
197	DOSE Meter Cable	SHIMADZU	30	Yes
198	AC Cable	SHIMADZU	20	No
199	Earth Cable	SHIMADZU	20	No
200	LAN Cable	SHIMADZU	30	Yes
201	DVI Extension Cable	SHIMADZU	36	Yes
202	AC Power Cable	SHIMADZU	2.5	No
203	AC Power Cable	SHIMADZU	3	No
204	USB Extension Cable	SHIMADZU	30	Yes
205	Keyboard	SHIMADZU	2	No
206	Mouse	SHIMADZU	2	No
207	BNC Cable	SHIMADZU	30	Yes
208	UPS Serial Cable	SHIMADZU	20	Yes
209	MH-400 Sync Cable	SHIMADZU	20	Yes
219	DVI LAN CABLE	SHIMADZU	36	Yes
220	AC POWER CABLE	SHIMADZU	2	No
221	LAN CABLE	SHIMADZU	30	No
222	LAN CABLE	SHIMADZU	30	No
223	LAN CABLE	SHIMADZU	30	No
224	LAN CABLE	SHIMADZU	30	No
225	LAN CABLE	SHIMADZU	30	No
226	LAN CABLE	SHIMADZU	30	No
227	LAN CABLE	SHIMADZU	30	No
228	LAN CABLE	SHIMADZU	30	No
230	Hand Switch Cable	SHIMADZU	0.2	No
231	AC Power Cable	SHIMADZU	3	No
232	Earth Cable	SHIMADZU	3	No
233	USB Cable	SHIMADZU	0.9	Yes

Digital Angiography System DAR-9500f				
No.	**Cable Type**	**Manufacturer**	**Cable Length (m)**	**Shielded**
234	AC Power Cable	SHIMADZU	30	No
235	Power Cable Touch Panel	SHIMADZU	4	Yes
236	Earth Cable	SHIMADZU	4	No
237	USB Cable	SHIMADZU	5	Yes
238	Power Cable Touch Panel	SHIMADZU	2	Yes
239	Earth Cable	SHIMADZU	2	No
240	USB Cable	SHIMADZU	0.9	Yes
241	LAN CABLE	SHIMADZU	30	Yes
242	LAN CABLE	SHIMADZU	30	Yes
243	LAN CABLE	SHIMADZU	30	Yes
244	USB EXT Cable	SHIMADZU	30	Yes
245	Earth Cable	SHIMADZU	0.9	No
246	AC Power Cable	SHIMADZU	30	No
247	LAN CABLE	SHIMADZU	30	No
248	LAN CABLE	SHIMADZU	30	No
249	AC Power Cable	SHIMADZU	2	No
250	AC Power Cable	SHIMADZU	2	No
251	DC Power Cable	SHIMADZU	0.5	No
252	LAN CABLE	SHIMADZU	30	Yes
253	DVI CABLE	SHIMADZU	5	Yes
254	DVI CABLE	SHIMADZU	5	Yes
255	Keyboard	SHIMADZU	4	No
256	Mouse	SHIMADZU	4	No
257	USB Cable	SHIMADZU	5	No
258	USB Cable	SHIMADZU	5	No
259	USB Cable	SHIMADZU	5	No
260	LAN CABLE	SHIMADZU	30	Yes

- In case of ACQ4

Digital Angiography System DAR-9500f				
No.	**Cable Type**	**Manufacturer**	**Cable Length (m)**	**Shielded**
1	AC Cable2 CCC	SHIMADZU	10	No
2	Earth Cable	SHIMADZU	10	No
3	JOINT BOX CABLE	SHIMADZU	25	Yes
4	DOSE Meter Cable	SHIMADZU	35	Yes
5	Optical Power Cable	SHIMADZU	40	Yes
6	Power Cable for Chiller	SHIMADZU	10	No
7	Cooler Warning Cable	SHIMADZU	10	No
10	LAN Cable	SHIMADZU	30	Yes
11	LAN Cable	SHIMADZU	30	Yes
12	LAN Cable	SHIMADZU	30	Yes
15	ISYS-XGEN Cable	SHIMADZU	20	Yes
16	IBS Cable	SHIMADZU	20	Yes
17	ACQ IO-XGEN CABLE	SHIMADZU	20	Yes
20	SYS DISP CABLE	SHIMADZU	3	Yes
21	Earth Cable	SHIMADZU	3	No
22	PC IF POWER CABLE	SHIMADZU	3	Yes
23	Hand Switch Cable	SHIMADZU	0.2	No
24	Keyboard	SHIMADZU	2	No
25	Mouse	SHIMADZU	2	No
26	Earth Cable	SHIMADZU	1.5	Yes
27	USB Cable	SHIMADZU	1.5	No
28	DVI Cable	SHIMADZU	5	Yes
29	DC Power Cable	SHIMADZU	1.5	No
30	DVI Cable	SHIMADZU	2	Yes
31	DVI Cable	SHIMADZU	2	Yes
32	DVI Cable	SHIMADZU	2	Yes
33	AC Power Cable	SHIMADZU	2	No
34	AC Power Cable	SHIMADZU	2	No
35	AC Power Cable	SHIMADZU	2	No
40	AC Power Cable	SHIMADZU	30	No

Digital Angiography System DAR-9500f				
No.	**Cable Type**	**Manufacturer**	**Cable Length (m)**	**Shielded**
41	Power Cable Touch Panel	SHIMADZU	4	Yes
42	Earth Cable	SHIMADZU	4	No
43	USB Cable	SHIMADZU	3	Yes
44	LAN Cable	SHIMADZU	30	Yes
45	AC Power Cable	SHIMADZU	30	No
46	Power Cable Touch Panel	SHIMADZU	2	Yes
47	Earth Cable	SHIMADZU	2	No
48	USB Cable	SHIMADZU	0.9	Yes
49	LAN Cable	SHIMADZU	30	Yes
50	AC Power Cable	SHIMADZU	3	No
51	Earth Cable	SHIMADZU	3	No
52	USB Cable	SHIMADZU	0.9	Yes
53	Earth Cable	SHIMADZU	0.9	No
54	LAN Cable	SHIMADZU	30	Yes
60	AC Power Cable	SHIMADZU	10	No
61	LAN Cable	SHIMADZU	30	Yes
62	Keyboard	SHIMADZU	2	No
63	Mouse	SHIMADZU	2	No
64	LAN Cable	SHIMADZU	30	No
65	LAN Cable	SHIMADZU	30	No
66	DVI Cable	SHIMADZU	5	Yes
67	DVI Cable	SHIMADZU	5	Yest
68	AC Power Cable	SHIMADZU	2	No
69	AC Power Cable	SHIMADZU	2	No
70	Keyboard	SHIMADZU	2	No
71	Mouse	SHIMADZU	2	No
72	LAN Cable	SHIMADZU	30	No
73	DVI Cable	SHIMADZU	5	Yes
74	AC Power Cable	SHIMADZU	2	No
75	AC Power Cable	SHIMADZU	2	No
80	AC Power Cable	SHIMADZU	2.5	No

Digital Angiography System DAR-9500f				
No.	**Cable Type**	**Manufacturer**	**Cable Length (m)**	**Shielded**
81	Cont. Microphone Cable	SHIMADZU	3	Yes
82	Cont. Microphone Cable	SHIMADZU	5	Yes
83	Cont. Speaker Cable	SHIMADZU	10	No
84	Exam. Microphone Cable	SHIMADZU	30	Yes
85	Exam. Speaker Cable	SHIMADZU	30	Yes
86	Cont. Microphone Cable	SHIMADZU	3	Yes
87	Cont. Microphone Cable	SHIMADZU	5	Yes
88	Cont. Speaker Cable	SHIMADZU	10	No
89	Exam. Microphone Cable	SHIMADZU	30	Yes
90	Exam. Speaker Cable	SHIMADZU	30	Yes
91	Modular Cable	SHIMADZU	20	No
92	LAN Cable	SHIMADZU	30	No
95	Mouse EXT Cable	SHIMADZU	30	Yes
96	Earth Cable	SHIMADZU	20	No
97	USB Extension Cable	SHIMADZU	30	Yes
100	DVI LAN Cable	SHIMADZU	36	Yes
101	DVI LAN Cable	SHIMADZU	36	Yes
102	DVI LAN Cable	SHIMADZU	36	Yes
103	DVI LAN Cable	SHIMADZU	36	Yes
104	Power Cable LM	SHIMADZU	30	Yes
105	Earth Cable	SHIMADZU	30	No
106	LAN Cable	SHIMADZU	30	Yes
107	DVI Extension Cable	SHIMADZU	36	Yes
110	AC Cable 2 CCC	SHIMADZU	10	No
111	Earth Cable	SHIMADZU	10	No
112	AC Cable	SHIMADZU	20	No
113	Earth Cable	SHIMADZU	20	No
114	AC Cable	SHIMADZU	20	No
115	Earth Cable	SHIMADZU	20	No
120	AC Power Cable	SHIMADZU	2	No
121	LAN Cable	SHIMADZU	30	No

Digital Angiography System DAR-9500f				
No.	**Cable Type**	**Manufacturer**	**Cable Length (m)**	**Shielded**
122	Mouse	SHIMADZU	2	No
123	Keyboard	SHIMADZU	2	No
124	DVI Cable	SHIMADZU	5	Yes
125	AC Power Cable	SHIMADZU	2	No
130	AC Power Cable	SHIMADZU	2	No
131	LAN Cable	SHIMADZU	30	No
132	Mouse	SHIMADZU	2	No
133	Keyboard	SHIMADZU	2	No
134	DVI Cable	SHIMADZU	5	Yes
135	AC Power Cable	SHIMADZU	2	No
140	AC Power Cable	SHIMADZU	2	No
141	LAN Cable	SHIMADZU	30	No
142	Mouse	SHIMADZU	2	No
143	Keyboard	SHIMADZU	2	No
144	DVI Cable	SHIMADZU	5	Yes
145	AC Power Cable	SHIMADZU	2	No
150	AC Power Cable	SHIMADZU	2	No
151	AC Power Cable	SHIMADZU	2	No
152	DC Power Cable	SHIMADZU	0.5	No
153	LAN Cable	SHIMADZU	30	Yes
154	DVI Cable	SHIMADZU	5	Yes
155	DVI Cable	SHIMADZU	5	Yes
156	Keyboard	SHIMADZU	4	No
157	Mouse	SHIMADZU	4	No
158	USB Cable	SHIMADZU	5	No
159	USB Cable	SHIMADZU	30	No
160	USB Cable	SHIMADZU	5	Yes
170	LAN Cable (cross)	SHIMADZU	15	No
171	LAN Cable	SHIMADZU	30	No
172	LAN Cable	SHIMADZU	30	No
173	LAN Cable	SHIMADZU	30	No

Digital Angiography System DAR-9500f				
No.	**Cable Type**	**Manufacturer**	**Cable Length (m)**	**Shielded**
174	LAN Cable	SHIMADZU	30	No
175	LAN Cable	SHIMADZU	30	No
176	LAN Cable	SHIMADZU	30	No
177	LAN Cable	SHIMADZU	30	No
178	LAN Cable	SHIMADZU	30	No
180	DVI Cable	SHIMADZU	2	Yes
181	DVI Cable	SHIMADZU	2	Yes
182	DVI Cable	SHIMADZU	2	Yes
183	DVI Cable	SHIMADZU	2	Yes
184	AC Power Cable	SHIMADZU	2	No
185	AC Power Cable	SHIMADZU	2	No
186	AC Power Cable	SHIMADZU	2	No
187	AC Power Cable	SHIMADZU	2	No

Guidance and Manufacturer's Declaration-Electromagnetic Emissions

Guidance and Manufacturer's Declaration-Electromagnetic Emissions		
DAR-9500f is intended for use in the electromagnetic environment specified below. The customer or the user of DAR-9500f should assure that it is used in such an environment.		
Emission Test	**Compliance**	**Electromagnetic Environment-Guidance**
RF emissions CISPR 11	Group 1	DAR-9500f 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 CISPR 11	Class A	DAR-9500f 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 purpose.
Harmonic emissions IEC 61000-3-2	Not applicable	
Voltage fluctuations/flicker emissions IEC 61000-3-3	Not applicable	

Guidance and Manufacturer's Declaration-Electromagnetic Immunity

Guidance and Manufacturer's Declaration-Electromagnetic Immunity			
DAR-9500f is intended for use in the electromagnetic environment specified below. The customer or the user of DAR-9500f should assure that it is used in such an environment.			
Immunity Test	**IEC 60601 Test Level**	**Compliance Level**	**Electromagnetic Environment-Guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
Electrical fast transient/burst IEC 61000-4-4	± 2kV for power supply lines ± 1kV for input/output lines	± 2kV for supply lines ± 1kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1kV line (S) to line (s) ± 2kV line (s) to earth	± 1kV line (S) to line (s) ± 2kV 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 IEC 61000-4-11	<5 %U_T T(>95 % dip in *Ur*) for 0.5 cycle 40 %U_T (60 % dip in U_T) for 5 cycle 70 %U_T (30 % dip in U_T) for 25 cycle <5 %U_T T(>95 % dip in U_T) for 5 s	Not applicable <5 %U_T T(>95 % dip in U_T) for 5 s	Mains power quality should be that of a typical commercial or hospital environment. If the user of the DAR-9500f requires continued operation during power mains interruptions, it is recommended that DAR-9500f be powered from an uninterruptible power supply or a battery.
Power frequency (50/60Hz) magnetic field 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

Remark) U_T is the a.c. mains voltage prior to application of the test level.

Guidance and Manufacturer's Declaration-Electromagnetic Immunity

Guidance and Manufacturer's Declaration-Electromagnetic Immunity DAR-9500f is intended for use in the electromagnetic environment specified below. The customer or the user of DAR-9500f should assure that it is used in such an environment.			
Immunity Test	**IEC 60601 Test Level**	**Compliance Level**	**Electromagnetic Environment-Guidance**
			Portable and mobile RF communications equipment should be used no closer to any part of DAR-9500f, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance:** d= 1.2√P
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz 80 MHz	3 Vrms 150 kHz to 1000 MHz	d= 1.2√P80 MHz to 800 MHz d= 2.3√P800 MHz to 2.5 GHz
Radiated RF IEC 61000-4-3	3 V/m 80 MHz 2.5 GHz	3 V/m 351.2 MHz 1980 MHz 2412 MHz	Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey should be less than the compliance level in each frequency range. Interference may occur in the vicinity of equipment marked with the following symbol: 

NOTE

At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE

These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

a) 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 DAR-9500f is used exceeds the applicable RF compliance level above, DAR-9500f should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating DAR-9500f.

b) Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

WARNING

An exemption has been used any DAR-9500f has not been tested for radiated RF IMMUNITY over the entire frequency range 80 MHz to 2.5 GHz.

DAR-9500f has been tested for radiated RF IMMUNITY only at selected frequencies.

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 Frequency**	**Modulation**
For Radiated Immunity				
Digital Transceiver	IC-DPR5	ICOM	351.2MHz	FSK (Frequency Shift Modulation)
Cellular Telephone	812SH	Sharp	1980MHz	PM (Phase Modulation)
Wireless LAN Station	WHR-HP-G	BUFALLO	2412MHz	OFDM (Orthogonal Frequency-Division Multiplexing)

Recommended Separation Distance Between Portable and Mobile RF Communication Equipment and the EQUIPMENT or SYSTEM

Recommended Separation Distances Between Portable and Mobile RF Communication Equipment and DAR-9500f			
DAR-9500f is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of DAR-9500f can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and DAR-9500f as recommended below, according to the maximum output power of the communications equipment.			
Rated Maximum Output Power of Transmitter W	**Separation Distance According to Frequency of Transmitter m**		
	150 kHz to 80 MHz d= 1.2√P	**80 MHz to 800 MHz d= 1.2√P**	**800 MHz to 2.5 GHz d= 2.3√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
For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.			

At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

⚠ WARNING

When using ACCESSORIES such as transducers and cables other than those specified, with the exception of those accessories sold by the Shimadzu of DAR-9500f as replacement parts for internal components, may result in increased EMISSIONS or decreased IMMUNITY of DAR-9500f.

⚠ WARNING

Do not use DAR-9500f next to or stack with other equipment. However, if it has to be used in that condition, DAR-9500f should be observed to verify that it operates normally.

Accessory List

The accessory list which conforms to EMC is shown below.

Item	Model	Manufacturer	Connection to
Monitor	SMD 18101 SCS	EIZO	DAR-9500f
Monitor	SMD 19102 SC	EIZO	DAR-9500f
Monitor	RadiForce G11-S	EIZO	DAR-9500f
Monitor	MVGD1519	Barco	DAR-9500f
Monitor	ME181L/r-B	TOTOKU	DAR-9500f
Monitor	RX150	EIZO	DAR-9500f
Monitor	CL19194	JVC KENWOOD	DAR-9500f
Monitor	ML19001	JVC KENWOOD	DAR-9500f
Monitor	LS560W	EIZO	DAR-9500f
Monitor	LX600W	EIZO	DAR-9500f
Monitor	LS580W	EIZO	DAR-9500f
Monitor	FlexScan EV2335W	EIZO	DAR-9500f
Monitor	FlexScan S2100	EIZO	DAR-9500f
Monitor	FlexScan S2133H	EIZO	DAR-9500f
Monitor	S1934	EIZO	DAR-9500f
Monitor	MX192	EIZO	DAR-9500f
Monitor	CL19196	JVC KENWOOD	DAR-9500f
Monitor	RX440	EIZO	DAR-9500f
Monitor	RX850	EIZO	DAR-9500f
Monitor	LCD-EA 193Mi-BM	NEC	DAR-9500f
Monitor	MDSC-8258	Barco	DAR-9500f
Large Monitor Manager	LMM56800	EIZO	DAR-9500f
Large Monitor Manager	LMM0802	EIZO	DAR-9500f
Large Monitor Controller	CID1000P	EIZO	DAR-9500f
Large Monitor Controller	CID1201P	EIZO	DAR-9500f
PC	Image Processing PC	HPC SYSTEMS	DAR-9500f
PC	GX620	DELL	DAR-9500f
PC	Precision380	DELL	DAR-9500f
PC	Precision390	DELL	DAR-9500f
PC	Precision670	DELL	DAR-9500f
PC	Precision690	DELL	DAR-9500f

Item	Model	Manufacturer	Connection to
PC	PrecisionT3400	DELL	DAR-9500f
PC	PrecisionT5400	DELL	DAR-9500f
PC	PrecisionT7400	DELL	DAR-9500f
PC	PrecisionT3500	DELL	DAR-9500f
PC	PrecisionT5500	DELL	DAR-9500f
PC	PrecisionT7500	DELL	DAR-9500f
PC	CELSIUS	Fujitsu	DAR-9500f
PC	Express	NEC	DAR-9500f
PC	PC, 3D-ANGIO	HPC SYSTEMS	DAR-9500f
PC	GATEWAY2	HPC SYSTEMS	DAR-9500f
PC	AR2200	PFU	DAR-9500f
PC	AR8300	PFU	DAR-9500f
PC	Express5800/56Xg	NEC	DAR-9500f
Local Image Controller	IVR NEO	SHIMADZU	DAR-9500f
Remote Image Controller	IVR Shuttle	SHIMADZU	DAR-9500f
Dosimeter	DIAMENTOR K2S	PTW	DAR-9500f
Dosimeter	DAP Meter	SHIMADZU	DAR-9500f
Dosimeter	VacuDAP	VACUTEC	DAR-9500f
System Display	System Display	SHIMADZU	DAR-9500f
Intercom	Interphone	SHIMADZU	DAR-9500f
KVM Switch	CS82A	ATEN INTERNATIONAL	DAR-9500f
KVM Switch	CS1782A	ATEN INTERNATIONAL	DAR-9500f
SMART Touch	SMART Touch	SHIMADZU	DAR-9500f

Essential Performance

- Image Acquisition
- Image Display
- Image Processing

2.6.7 Statement of Compliance (for Europe)

Regulatory Information

For Europe:

The product complies with the requirement of the Medical Device Directive 93/42/EEC and RoHS Directive 2011/65/EU.

Product Name	Digital Angiography System
Model Name	DAR-9500f
Parts Number	562-28000
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, D-47269 Duisburg, F.R.Germany

Company's Quality System

The company's Quality System is satisfied with Annex II, Article 3 for 93/42/EEC, which is certified by TUV Rheinland Product Safety GbmH (Notified under No.0197) as Registration No.: HD 60011592 001.

2.6.8 Other

The system needs activation of X-ray generator during the system installation.

If hospital name in the digital system is changed after the installation, activation is needed as well. (After changing hospital name, there is a certain grace period until activation.)

The activation work needs authorization by Shimadzu.

*This is available for Trinias system shipped after February, 2019.

This system is connected to the hospital network via a router with firewall. The firewall function provides protection against threats to network security such as unauthorized access and viruses.

Chapter 3

System Startup and Shutdown

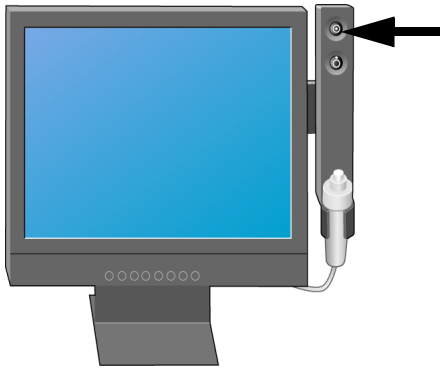
This chapter describes how to start up and shut down the system.

Description of Chapter

3.1 Startup

Follow this procedure to start up the system.

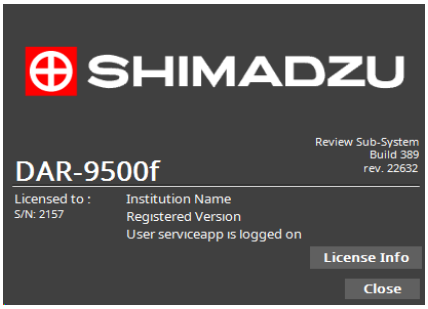
1 Press the system display ON button.



<System Display>

All the devices including the Digital processing system and the C-arm are activated.

2 As the GUI starts up, it briefly displays the software splash screen which includes information such as software version.



If the system ended while displaying a study, the study restarts automatically.

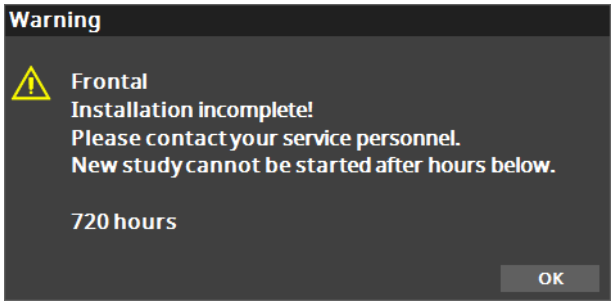
3 If using a Temporary License, the Temporary License status window is displayed. The window will be closed if fluoroscopy or new study starts.

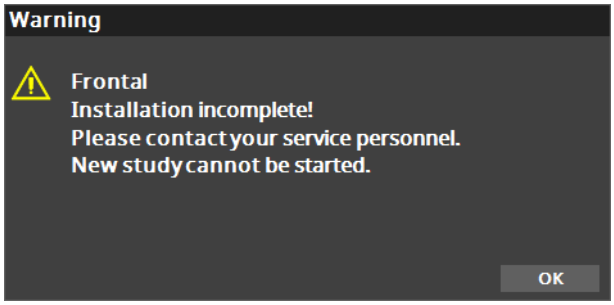
If you do not want to use a temporary license and the display bothers you, enable to expire it immediately on the license administration window displayed when pressing [License Info] button.

Refer to ☞ "15 Temporary License" P.15-1 for details.

NOTE

If installation of X-ray generator is not completed or the hospital name has changed, the following message may be displayed. If a message is displayed, please contact our service representatives.





3.2 User Authentication

If the Cyber Security feature is enabled, you can manage user accounts and record audit logs.

NOTE

This is initially disabled. Please contact our service representative to enable it.

3.2.1 User Level

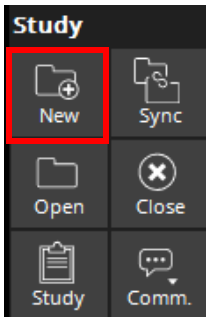
There are two user levels: "USER" for users and "SUPER" for administrators. To switch user levels, sign in using the user ID and password for each user level.
If you sign in with an administrator user ID, you can configure cybersecurity settings.

3.2.2 Sign In

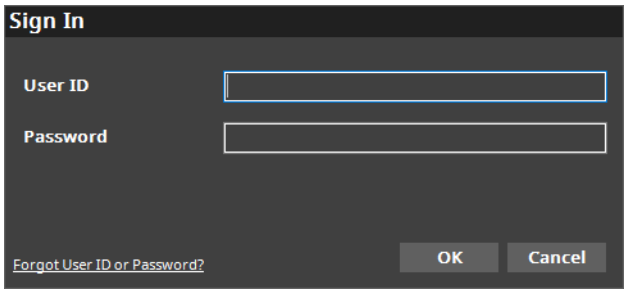
You must sign in to use the system.
Sign-in is required when you start a new study or using the Studies Management window.

[At the start of New Study]

1 Click [New] from the side menu.

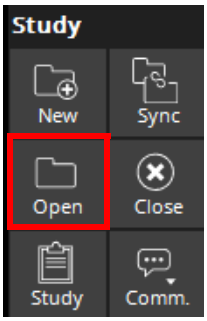


2 The Sign In window appears.

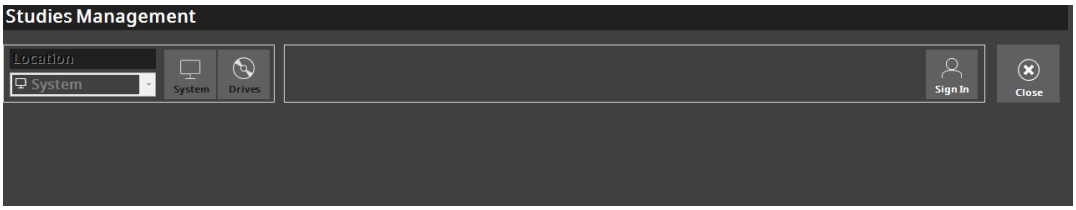


[When using Studies Management window]

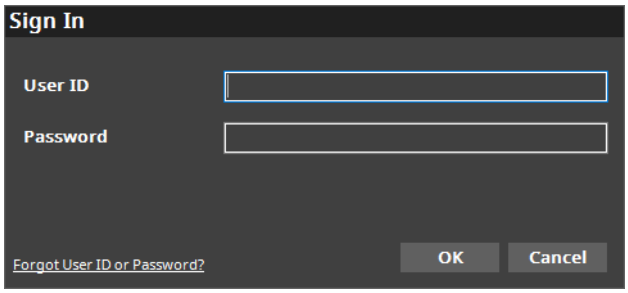
1 Click [Open] from the side menu.



2 Click the Sign In button on the Studies Management window.

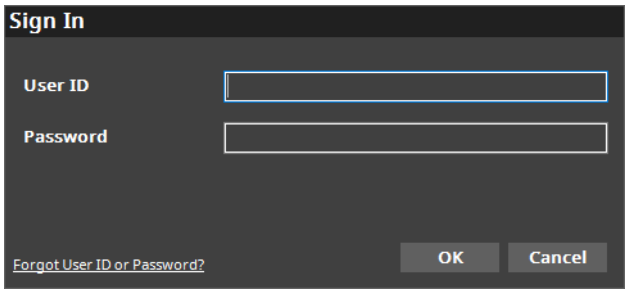


3 The Sign In window appears.



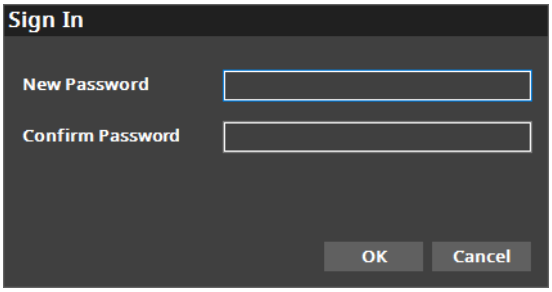
3.2.3 Input User ID and Password

1 On the Sign In window, enter the desired user level "User ID" and "Password".



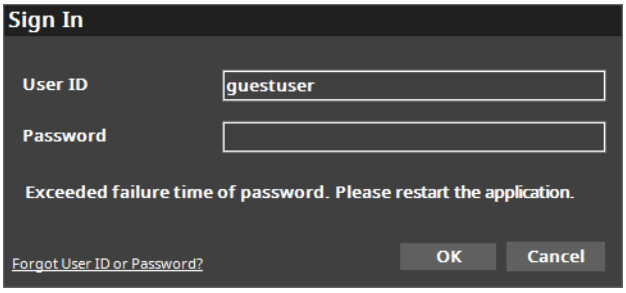
If you forgot your User ID or Password, click "Forgot User ID or Password?".
You can sign in with user rights by entering the name and reason.
☞"3.2.6 Emergency Sign In" P.3-8

2 Change the password only when you sign in for the first time. Enter "New Password" and "Confirm Password".



NOTE

If the sign-in failure reaches the "Password failure times for user account locking" configured in the password policy, please restart the application.



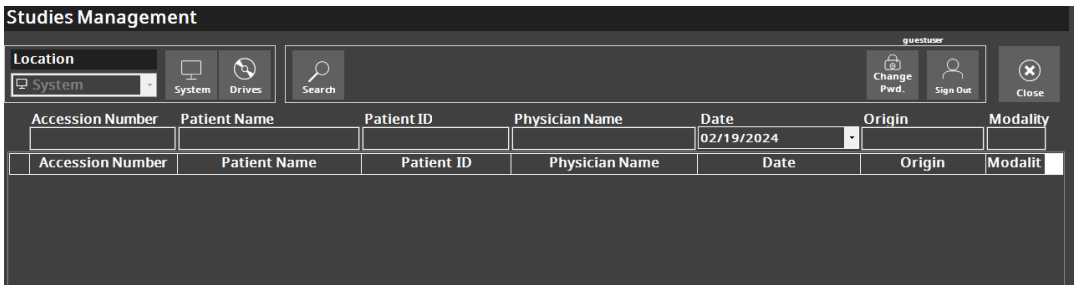
[At the start of New Study]

After sign in, the New Study window appears.

[When using Studies Management window]

After sign in, the Study Management window is enabled.

In addition, [Sign In] button changes to [Sign Out] button and displays a new User ID.

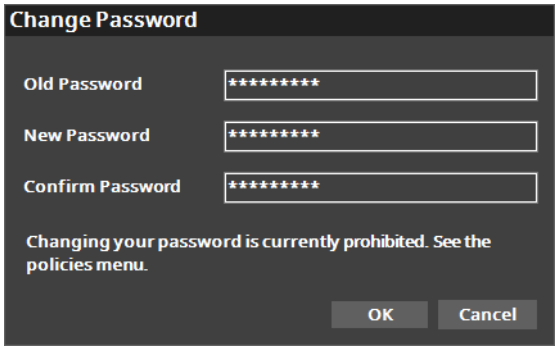


3.2.4 Change Password

Enable to change password.

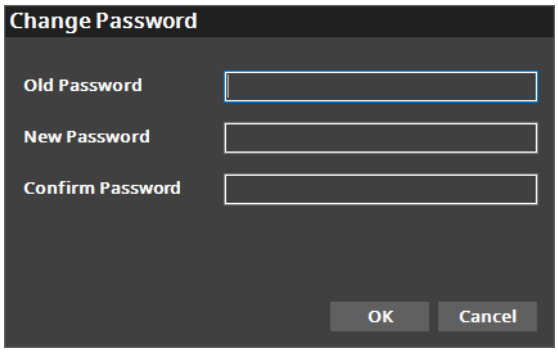
NOTE

If the password change prohibition period is set, you cannot change the password during that period.



1 Click [Change Pwd.] button.

2 Change the Password window appears. Enter "Old Password", "New Password", and "Confirm Password".



3.2.5 Sign Out

Sign out when you are finished with the system running.
Click [Sign Out] button on the Studies Management window.

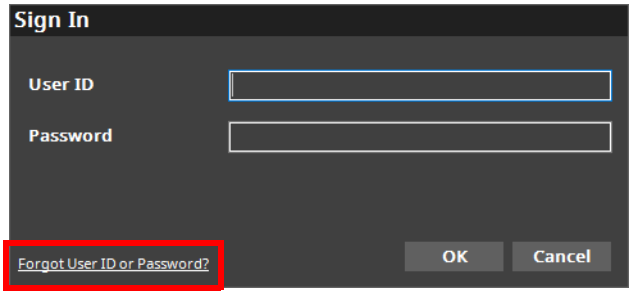
If it is out of study, you will be signed out if you exit the system while signed in.
If the system restarts during study, hold the sign-in status.

3.2.6 Emergency Sign In

If you forgot your User ID or Password, you can sign in with user rights by entering the name and reason. Emergency Sign In is intended for temporary use when it is impossible to contact the administrator. Please make sure to have the password changed from the administrator account.

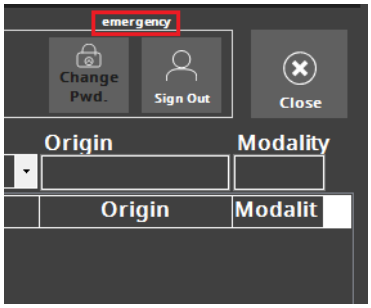
1 Click [Sing In].

2 Click [Forget User ID or Password?].



3 Enter "Full Name" and "Reason", then clikc [OK].

4 Then the user account name is displayed.



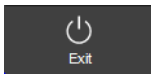
NOTE

The user level for "emergency" is "USER". User account management features is not available.

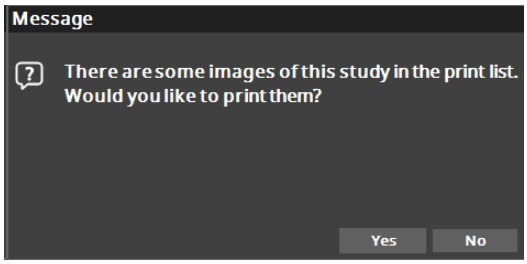
3.3 Shutdown

Follow this procedure to shut down the system:

1 On the Reference monitor side menu, click [Exit].

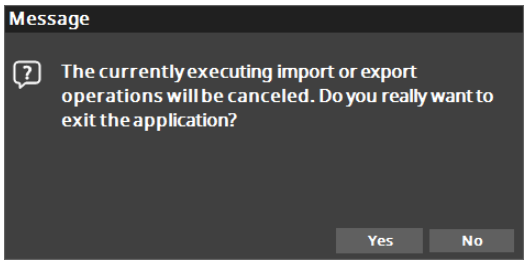


2 If there are images in the print list that have not yet been printed, you can choose to print them now.

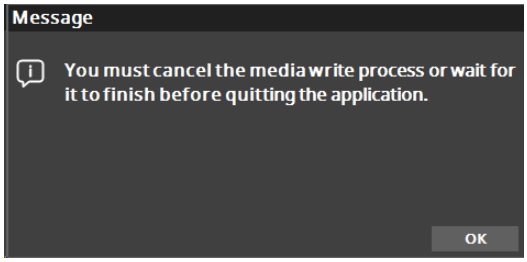


Click [No], to discard the images from the print list. Click [Yes] to print the images. Print window is displayed. Refer to ☞ "Print Images" P.7-21.

3 If a network transfer or CD/DVD read is in progress, you can wait for it to finish or cancel it. Click [No] to allow it to finish. Click [Yes] to cancel it; loops and images already transferred, will be available at next startup.

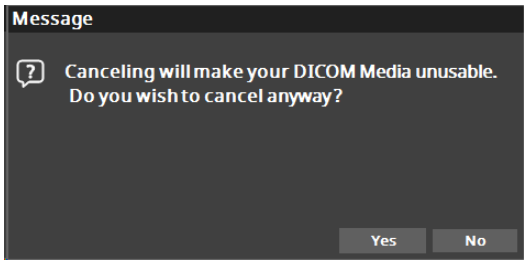


4 If media (CD/DVD) write is in progress, a message appears indicating that you can either wait for completion or cancel it. Click [OK] to clear the message. If possible, wait for the media write to finish.



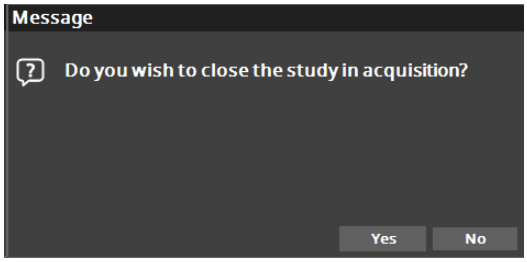
5 If necessary, you can click [Cancel Media Write] on the side menu.

When promoted, click [Yes] to cancel the write and discard the media or click [No] and wait for the write to finish.

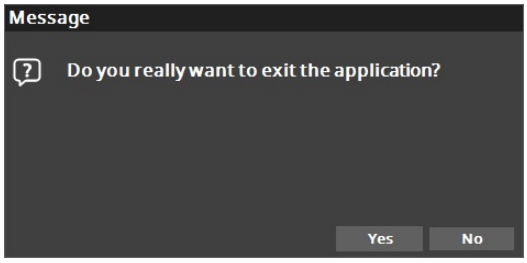


If the installation personnel or administrator configured a shell command to be executed upon shutdown, and the command fails, a message to this effect will remain on screen until it is acknowledged.

6 If a study is open for acquisition, a prompt appears. Click [Yes] to close the study now. Otherwise, click [No] to leave the study open (study will be continued at next startup).



7 Finally, you are prompted to complete the shutdown. Click [Yes] to complete the shutdown.



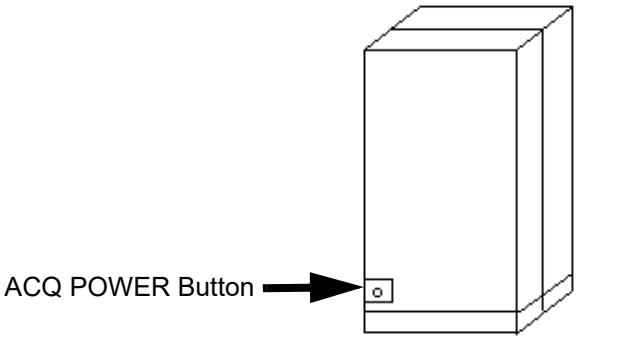
8 Wait for the Digital processing system to be completely off (display monitors go blank and green power indicators on cabinets go off).

NOTE

If trouble occurs when trying to shut down the Digital processing system via the GUI [Exit] button (system does not shut down), press and hold the Digital reference cabinet power button for at least five seconds until the power goes off (green indicator goes off). Press [ACQ POWER F] button of Digital acquisition cabinet in the Equipment room to turn off the power (indicated as ACQ PC in the cabinet).

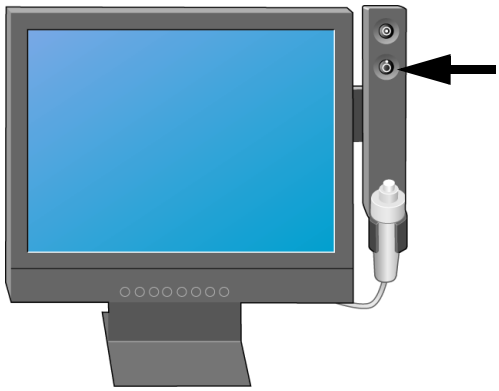
For Bi-plane system, also press [ACQ POWER L] button of Digital acquisition cabinet to turn off the power.

To restart the system, wait at least one minute after turning the power off the System Display, and press the ON button again.



Digital Acquisition Cabinet

9 Press the System display [OFF] button.



<System Display>

NOTE

If something occurs to the application and reboots the DAR-9500f application, press the [Tab] key while holding the [Alt] key on the keyboard. Then select [System Reboot], and click [OK] two times. The DAR-9500f application reboots.

3.4 Power Failure

When a power failure occurs, the GUI disappears. If the power is restored within 5 minutes, the GUI is displayed again and is immediately functional. However, if the power failure lasts more than 5 minutes, wait at least 10 minutes and startup the system as usual.

NOTE

This system is designed to minimize any data loss due to power failure. Only the specific image loop that was in acquisition at the time of the power failure is lost. If the power is restored after more than 10 minutes of power failure, the stud which was opened for acquisition right before the power failure restarts.

NOTE

If an instant power failure or a power failure occur, FPD calibration returns to default value and an appropriate image may not acquire until auto calibration is started.

Perform calibration manually after recovering from the power failure.

☞ "19.3.1 Calibration" P.19-5

NOTE

Shimadzu recommends to contact a service personnel when a power failure occurs.

WARNING

Startup of the system within 10 minutes of a power restore may damage the system.

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Chapter 4

Image Acquisition

This chapter introduces the main user interface window and describes how to acquire loops and images during a medical diagnostic procedure as follows:

Description of Chapter

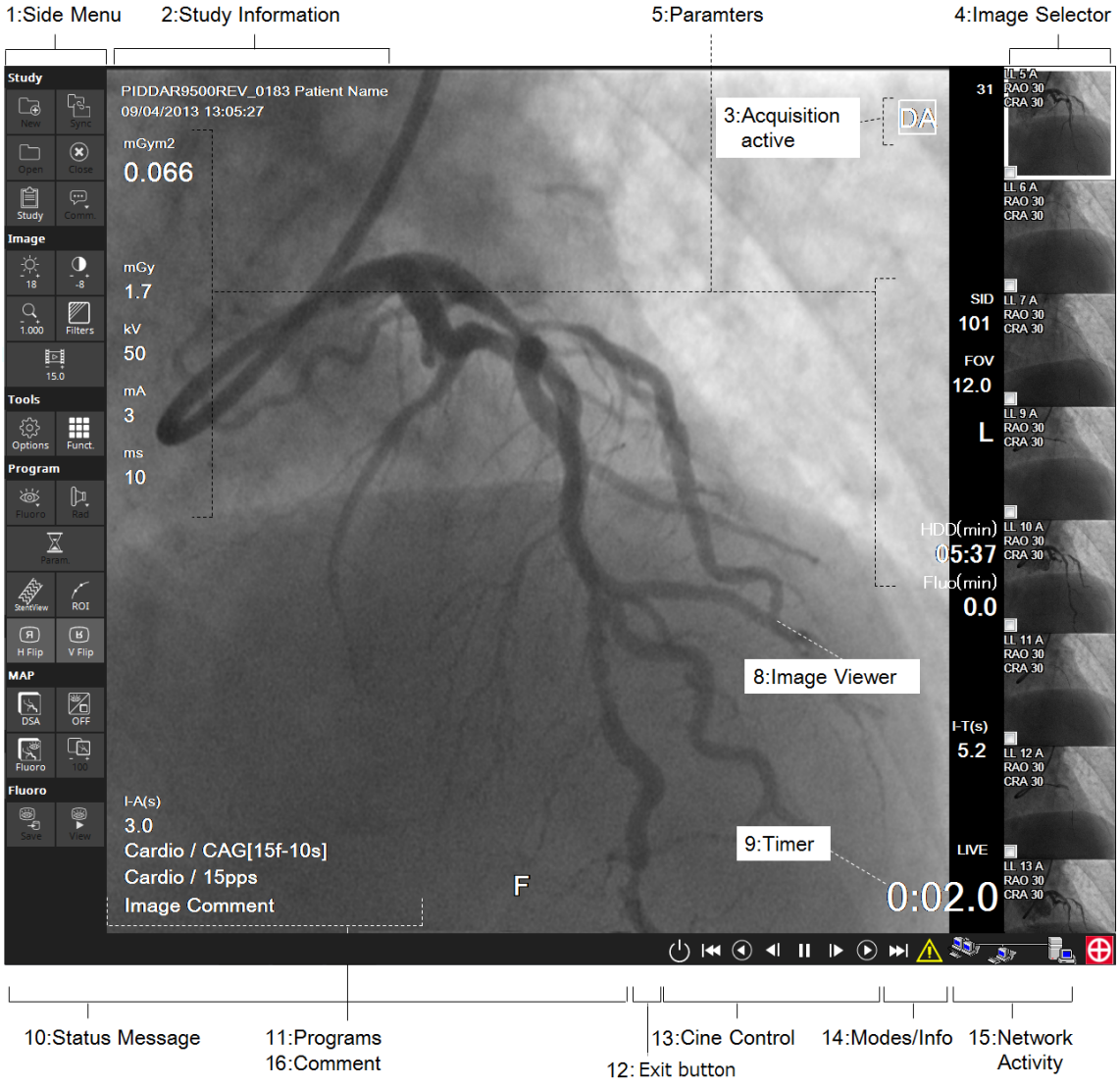
4.1 Introduction

DAR-9500f acquires loops during X-ray angiography diagnostic procedure. As a loop is acquired, it appears on the Acquisition monitor and soon after on the Reference monitor. Rad loops are recorded and Fluoro loops may optionally be recorded. A use-selected reference image can be selected and included with each loop. Loops from previous studies for the current patient can be displayed on the Reference monitor for comparison against the current loops displayed on the Acquisition monitor.

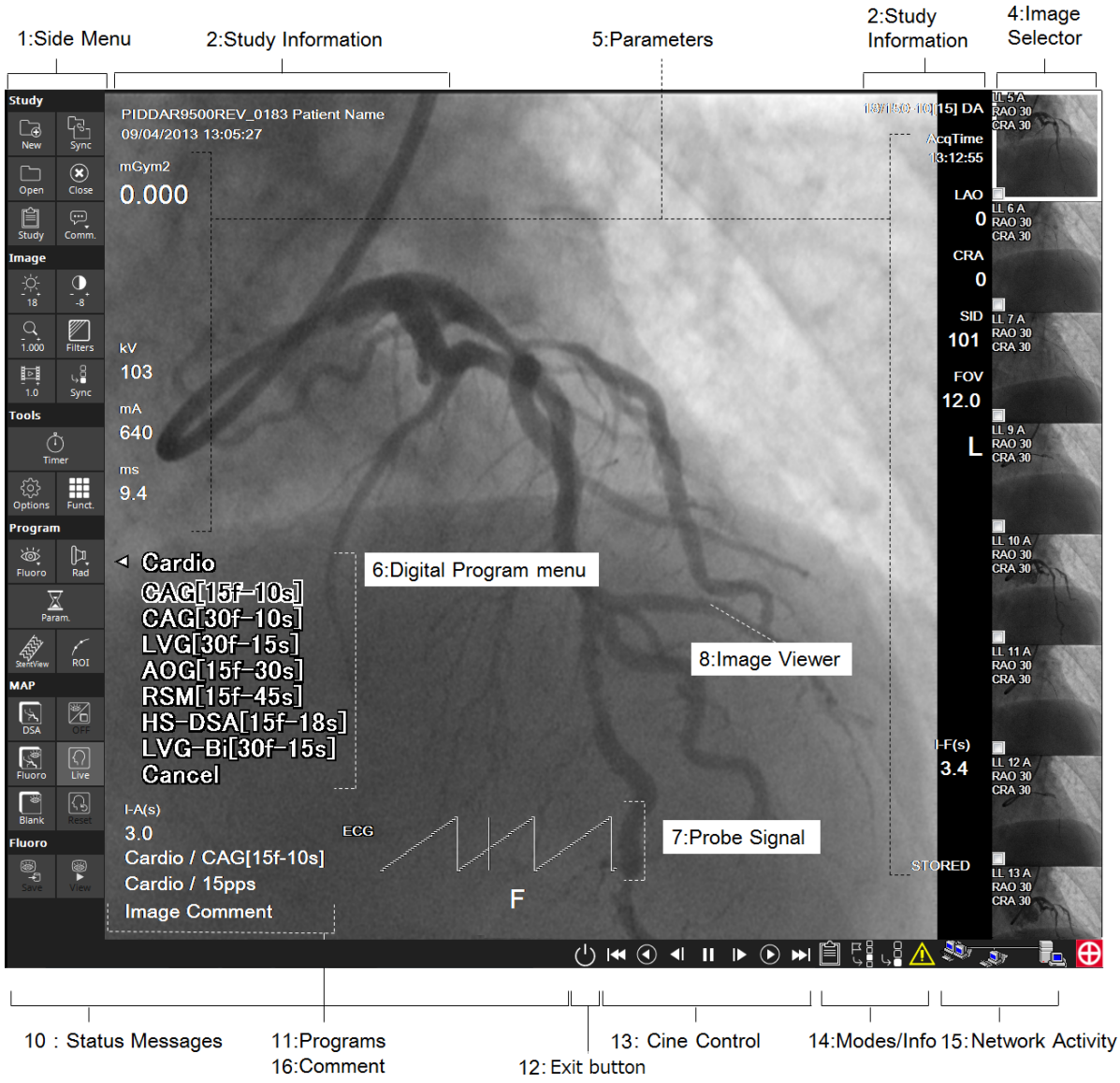
4.2 The Main User Interface Window

The main DAR-9500f graphical user interface (GUI) window is displayed on the Reference monitor and the Acquisition monitor. It features a Side Menu, an Image Viewer, an Image Selector, and a Cine Control and Status bar along the bottom. Additional elements such as Digital Program Pop-up Menus and acquisition parameters are superimposed over the Image Viewer window.

- Acquisition Monitor Main Window



- Reference Monitor Main Window



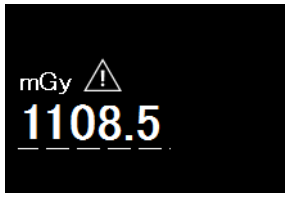
NOTE

The above sample screens are made from a composite of images. Not all elements appear at the same time.

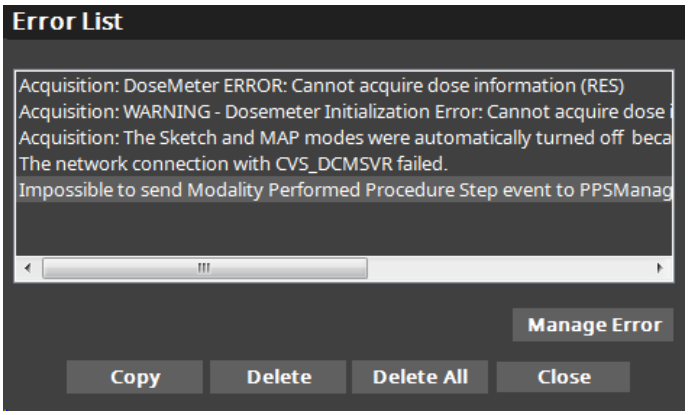
The key elements of the main DAR-9500f user interface window, numbered individually for the Reference and Acquisition monitors in the above illustrations, are defined in the following table.

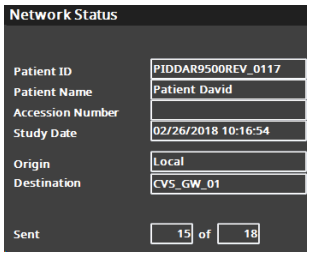
A: Display on Acquisition monitor, **R:** Display on Reference monitor.

No.	Item	Description	A	R
1	Side Menu	Provides access to all major functionality.	○	○
	Reference Indicator	(Not shown) When a monitor is in Reference mode (IVR NOE/IVR Shuttle), the indicator "Ref" appears in its upper-left corner.		
2	Study Information	Displays study information as follows: • Image/Loop, expressed as: FRAME/TOTAL_FR-IMAGE[TOTAL_IM] (IM_TYPE) FRAME= Frame number TOTAL_FR= Total number of frames in loop IMAGE= Current image/loop number (A for plane A or B for plane B) TOTAL_IM= Total number of loops IM_TYPE= Type of images (Such as DA, DSA, 3D-DA) (LL= Lossless (if not LL, then raw) • Study Accession Number • Patient Name • Patient Age • Patient Sex • Patient Birth Date • Patient ID • Study ID • Study Date and Time ☞ "4.3 Entering Study Information" P.4-10	○	○
3	Acquisition Active	Indicates the active acquisition type such as: Fluo, MAP, DA, DSA, RSM ☞ "4.4.4 Making Live Fluoro Acquisitions" P.4-30 ☞ "4.4.6 Recording Rad" P.4-40	○	
4	Image Selector	Displays one icon per loop or still image. For loops, the icon is automatically created from the image at one-third of the way into the loop. For example, if loop consisting of 270 images, the icon is created from the 90 th image. ☞ "5.3 Displaying Study Information" P.5-6	○	○

No.	Item	Description	A	R
5	Parameters	Dynamically-updated Information (individually configured):		
		mGym^2: Cumulative X-ray dosage since the beginning of study (Acquisition monitor). Displayed loop X-ray dosage (Reference monitor).	○	○
		mGy/min: (AKR)(Air kerma rate) Dose per unit of time. The total X-ray dosage (Rad and Fluoro) at Patient Entrance Reference Point (Interventional Reference Point), that would occur if the active exposure was continued for a minute. AKR is displayed only while performing fluoroscopy and radiography.	○	
		mGy: (AK)(cumulative air kerma) The cumulative dose of all X-ray exposures (Rad and Fluoro), since start of study or manual dose reset at Patient Entrance Reference Point (Interventional Reference Point). "Show dose warning" has been set, and if the dose exceeds the threshold, the underline and warning icon are displayed. 	○	
		kV: X-ray tube voltage in kilo-volts.	○	○
		mA: X-ray tube current in milliamperes.	○	○
		ms: X-ray pulse duration per image, in milliseconds.	○	○
		I-A (s): The time in seconds between injection of contrast agent and start of acquisition.	○	○
		AcqTime: Acquisition time.	○	○
		LAO-RAO: Oblique angle of the detector in degrees in which angles toward the patient's left are displayed with LAO, and angles toward the patient's right are displayed with RAO.	○	○
		CRA-CAU: Sagittal angle of the detector in degrees in which angles toward the patient's head are displayed with CRA, and angles toward the patient's foot are displayed with CAU.	○	○
		SID (cm): X-ray source to detector distance in centimeters.	○	○

No.	Item	Description	A	R
		FOV (in): Detector field of view in inches (diameter for image intensifiers).	○	○
		HDD (min): Possible remaining radiography time based on the hard disk capacity.	○	
		Fluo: The total number of minutes of Fluoro exposure since start of study or manual reset via generator console.	○	
		I-F: The period of time when turn ON the injector with overlay by frame.	○	
		I-T (s): Cumulative time in seconds since the beginning of injection of contrast agent.	○	○
		<seconds>: (not shown) (at bottom right) FluoroMAP Timer (seconds) counts down at the beginning of a FluoroMAP acquisition.	○	
		LIVE/LIH/STORED: The status of an image.	○	○
		Patient Direction: Direction of a patient body is indicated as follows: H=Head F=Feet R=Right L=Left A=Anterior P=Posterior ☞ "Display Tab" P.17-37 **NOTE** When acquiring the image by rotating the C-arm, the C-arm angle can be saved in each frame. However, there is an error up to 3 degrees more or less between angles to be saved in frame and actual C-arm angle depending on the system. If save or display angles after moving the C-arm, please contact our service representative.	○	○
6	Digital Program Menu	Selects Digital Programs for acquisition. ☞ "4.4.3 Choosing Acquisition Modes" P.4-26		○
7	Probe Signal	During review, up to four probe signals, including ECG and blood pressure, can be displayed as curves superimposed over the lower half of the Image Viewer window. A moving cursor (vertical line) is synchronized to the currently-displayed frame.	○	○

No.	Item	Description	A	R
8	Image Viewer	The main area for viewing and working with images. ☞ "4.2 The Main User Interface Window" P.4-2	○	○
9	Timer	The stopwatch-like timer displays from 0 to 59 min with a resolution of 0.1 s. Click the [Timer] side-menu button once or the IVR NEO/IVR Shuttle/SMART Touch [Timer] button once to start the timer, again to stop it, and a third time to hide it.	○	
10	Status Messages	Displayed when needed in both the Image Viewer and Studies Management windows. ☞ "6.1.7 Messages & Information" P.6-8	○	○
11	Programs	Displays names of selected Rad and Fluoro digital programs. ☞ "4.4.3 Choosing Acquisition Modes" P.4-26	○	○
12	Exit Button	Exit the system.	○	○
13	Cine Control	Provides transport controls for loop playback.  ☞ "4.7 Acquisition Keys and GUI Buttons" P.4-63 ☞ "5.2.1 Controlling Image Playback" P.5-5 ☞ "7.1.1 Mouse and Keyboard" P.7-2	○	○
14	Modes & Info.	These buttons appear as needed in this order: Display Study Information, Set Playback Mode, and Display Error List;  Click ⚠ to display the list like this.  Available buttons are shown as follows. [Manage Error]: Enable when selecting an error of MPPS support. Click [Manage Error] to cancel retry of MPPS support. [Copy]: Select any message to make a text copy of the message. [Delete]: Select any message to delete it. [Delete All]: Delete every message. [Close]: Close the error list. ☞ "6.1.7 Messages & Information" P.6-8		○

No.	Item	Description	A	R
15	Network Activity	Displays a simple animation during network activity. Also, click this area to display a Network Status box.  To hide the Network Status box, click the Network Activity area (lower right of bottom bar) again. ☞ "6.1.7 Messages & Information" P.6-8	○	○
16	Comment	The Comment (if any) selected from the list of site-specific comments. (When you select the comment in advance, you can acquire a loop with this comment displayed for the next acquisition.) ☞ "4.4.2 Adding a Comment" P.4-25	○	○

NOTE

Image edges may be blacked out by shutters.

4.2.1 Reference and Acquisition Monitors

Most GUI interaction occurs on the Reference monitor.

The keyboard and mouse normally control the Reference monitor.

☞ "4.7 Acquisition Keys and GUI Buttons" P.4-63

Some keyboard actions can be performed on the Acquisition monitor by holding down the Keyboard [Ctrl] key at the same time as pressing another keyboard key.

☞ "7.1.1 Mouse and Keyboard" P.7-2

The IVR NEO/IVR Shuttle/SMART Touch [Monitor Select] button enables the Reference or Acquisition monitor to be chosen. IVR NEO/SMART Touch joystick and button actions apply to the selected monitor.

☞ "4.8 IVR NEO (Either-or SMART Touch)" P.4-65, "4.10 IVR Shuttle (Option) (Either-or SMART Touch)" P.4-73, "4.11 SMART Touch (Either-or IVR NEO/IVR Shuttle)" P.4-77

NOTE

Unless otherwise stated, all GUI-interaction descriptions in this manual are for the Reference monitor.

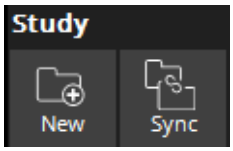
4.3 Entering Study Information

4.3.1 Introduction

A new study must be defined before image acquisition can be performed.

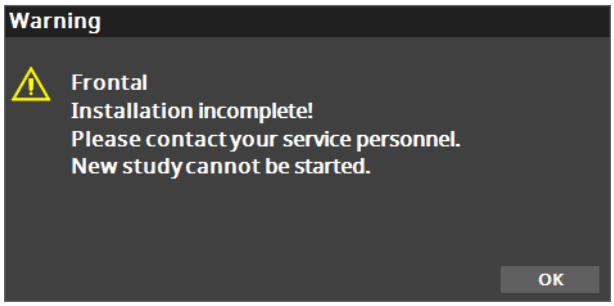
4.3.2 Defining a New Study

To define a new study, click [New] on the side menu.



NOTE

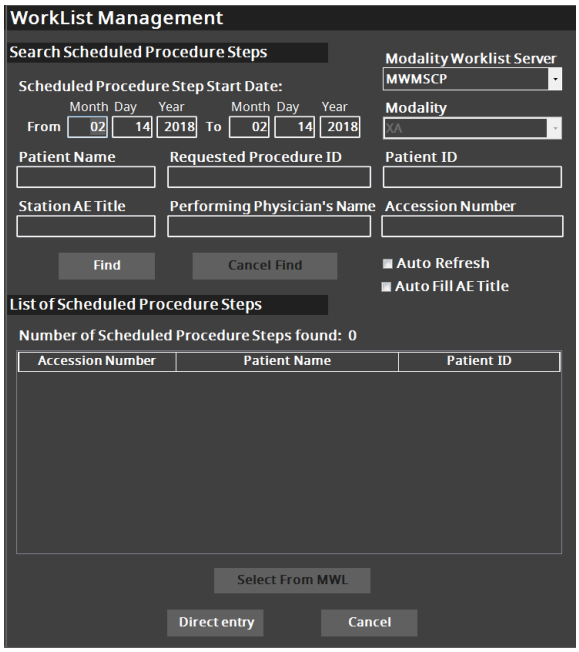
If installation of X-ray generator is not completed or the hospital name has changed, the following message may be displayed. If a message is displayed, please contact our service representatives.



Define New Study with Worklist Server Management

If the [Worklist Server Management] window appears, your institution uses a worklist server system that automates much of the new-study-definition process.

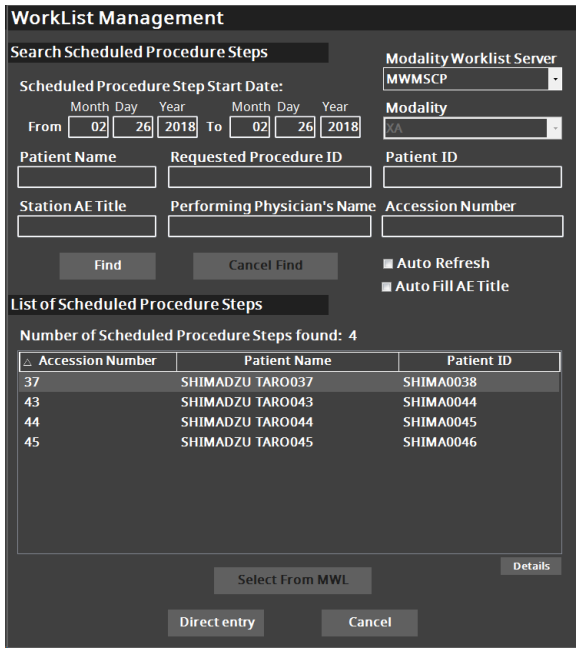
If an empty [New Study] window appears, continue with ☞"Define New Study with Direct Entry" P.4-17.



Follow this procedure to define a new study using worklist server management.

1 In the [Worklist Management] window, select the [Modality Worklist server] (if the default is not desired), enter an appropriate date range and any other search criteria and then click [Find].

After several seconds, [Procedure Steps] that match our criteria are displayed in the bottom half of the [Worklist Management] window. If check [Auto Fill AE Title], [DICOM AE Title] is set automatically to [Station AE Title]. If desired, click [Auto Refresh] (check mark appears) to cause automatic periodic refresh of the list.



NOTE

If you cannot find the desired worklist server, click [Direct entry] instead of [Select From MWM], or just double-check the desired procedure step. Continue with ☞"Define New Study with Direct Entry" P.4-17.

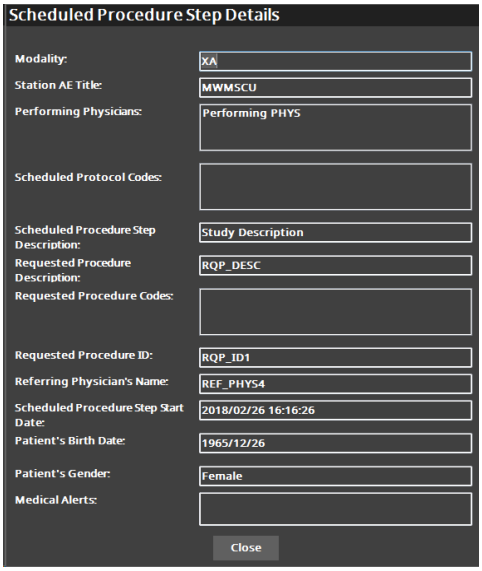
NOTE

If you click [Search] during media (CD/DVD) write, a message to stop media writing (discard the media) will be displayed before start searching. Stop writing the media, and click [Yes] to search and [No] to complete the media write.

2 Look through the procedure steps and select one.

It becomes highlighted in the list.

3 If MPPS support is enabled, click [Details] to display any available information about procedure.

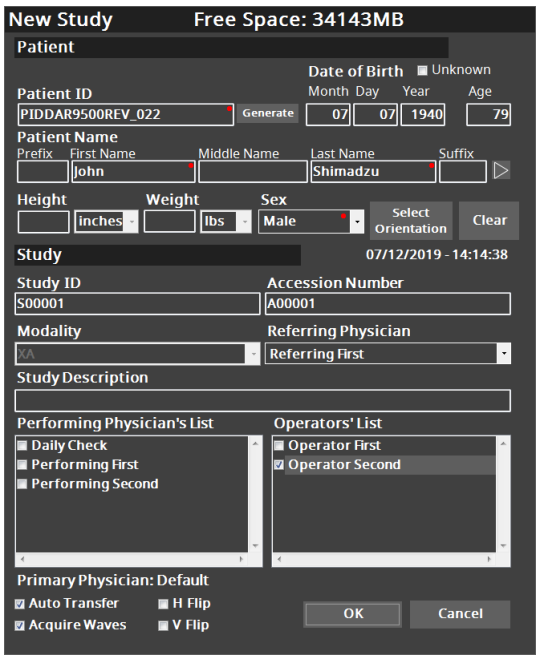


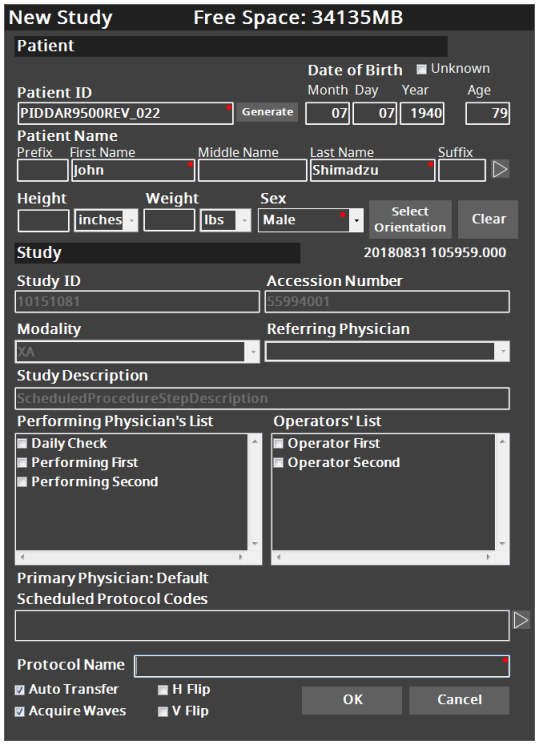
4 Click [Close].

Make sure that the correct procedure step is selected in the list, and then click [Select From MWM], or just double-check the desired procedure step.

5 The [New Study] window is displayed with all available information pre-entered.

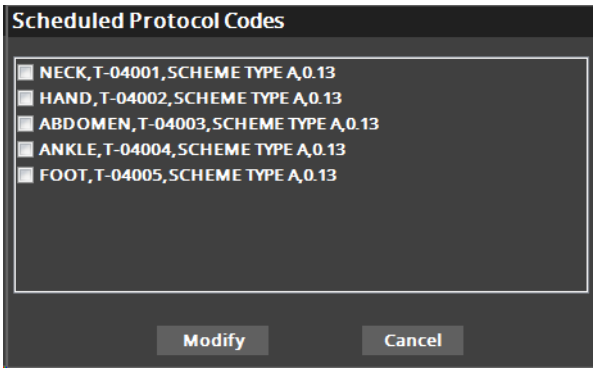
Items in gray cannot be changed. The [Free Space] of your hard disk is indicated at the top of the [New Study] window. (Without MPPS Support (left) and with (right))





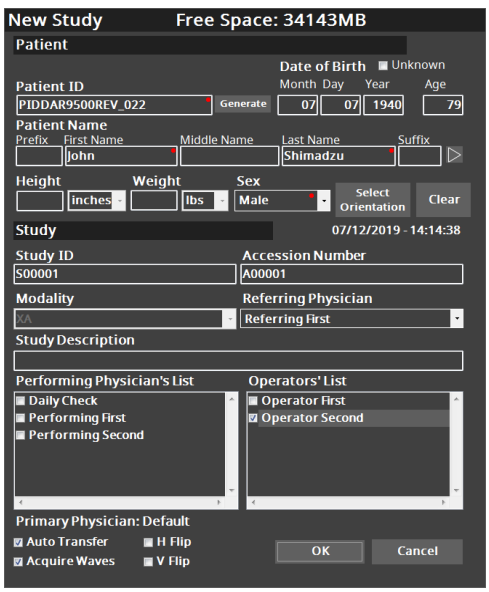
6 If MPPS support is enabled, you can change the list of codes appearing in the Scheduled Protocol Codes list at the bottom of the New Study window.

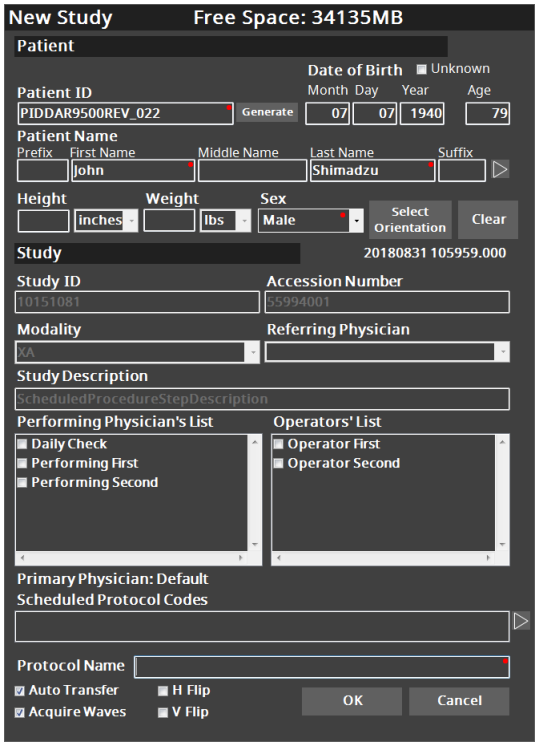
Click the right-arrow at the right edge of the list, and then check/uncheck the codes as desired. Checked codes appear in the list; unchecked codes do not. The list of available codes is defined by the institution. ☞"DICOM Tab" P.17-24



Click [Modify] to save any changes, otherwise [Cancel]. The Scheduled Protocol Codes window closes and the New Study window re-appears.

7 If desired, choose options in available lists such as [Performing Physician], fill in any blank field such as [Protocol Name], and select options like [Auto Transfer] and [Acquire Waves], as appropriate. (Without MPPS support (left) and with (right))





The field marked with a dot in the upper corner are considered mandatory, and must be filled in by either the worklist server manager or you.

Multiple performing physicians can be selected. If so, a primary physician is selected as default. Right-click on the performing physician's name to change the primary physician.

If MPPS support is enabled, take Protocol Name off from mandatory items. In this case, DUP group name will be used for Protocol Name as default.

☞"DICOM Tab" P.17-24

To automatically transfer studies to the default server, select [Auto Transfer]. Otherwise, ensure that [Auto Transfer] is deselected.

☞"Physicians Tab" P.17-44

To acquire waves (ECG) during a case, select [Acquire Waves]. Otherwise, ensure that [Acquire Waves] is deselected.

☞"Display Tab" P.17-37

8 Click [OK] when finished entering new study information.

If any mandatory fields have not been filled in by the worklist server manager or you, the [New Study] window opens in direct-entry mode enabling you to complete the mandatory fields. Complete such fields and click [OK]. The [New Study] window closes and the new study is opened and prepare for acquisition.

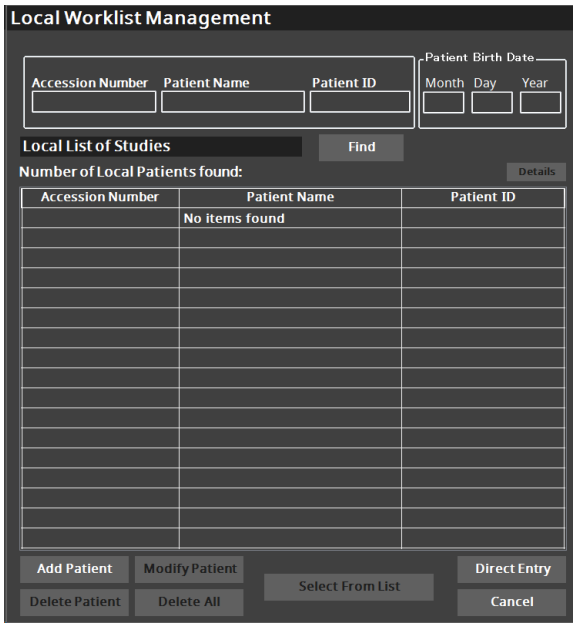
9 Continue with either ☞"Display New Study Information" P.4-21 or ☞"4.4 Making Acquisition" P.4-23.

Define New Study with Local Worklist Management

Valid the local worklist to display the [Local Worklist Management] window.

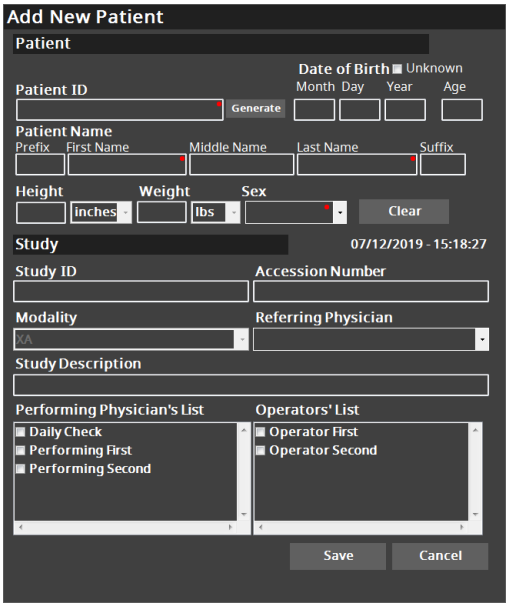
- **Registration of New Study**

Registration of new study is required in advance when using the local worklist. Follow the instruction below to input new study data.



1 Select [Add Patient].

2 [Add New Patient] window is displayed. Input required items and select [Save].



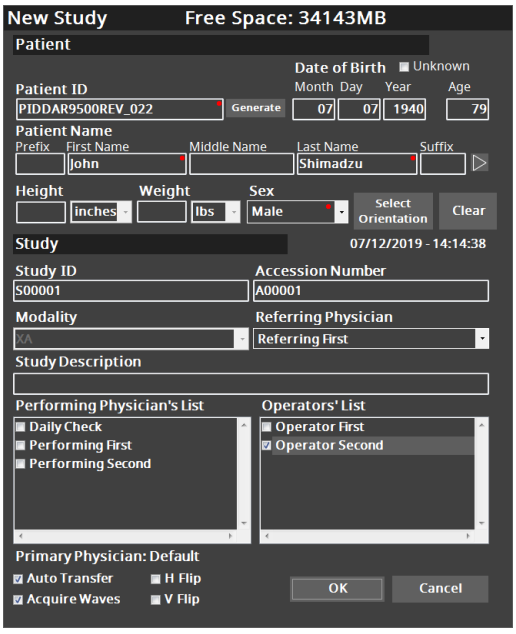
- **Selection of New Study**

1 Click [New] on the side menu.

2 Patient information registered in the local study list is displayed. Registered patient can be searched by accession No. Patient Name, Patient ID and Date of Birth. Enter the keyword in the search at the top of window and click [Find].

3 Select the patient and click [Select From List].

4 [New Study] window is displayed with registered patient data. Gray-out items are automatically entered and cannot fix them. "Free Space" at the top of [New Study] window indicates the capacity of hard disk.



5 Select [Performing Physician's List] and fill in the empty items if necessary.

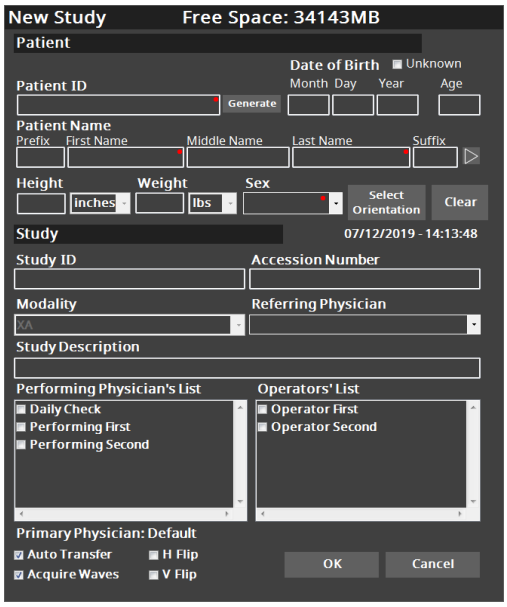
Multiple performing physicians can be selected. If so, a primary physician is selected as default. Right-click on the performing physician's name to change the primary physician.

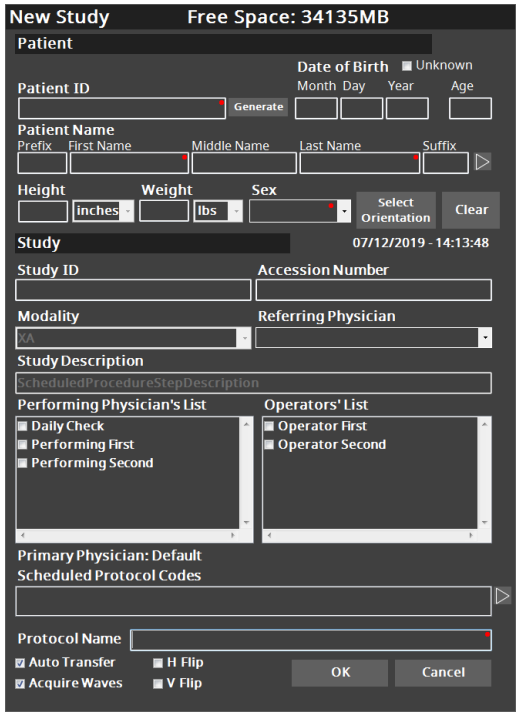
6 Click [OK] after input study information.

7 Continue with either "Display New Study Information" P.4-21 or "Making Acquisition" P.4-23.

Define New Study with Direct Entry

When there is no worklist manager or you clicked the [Direct entry] button on the [Worklist Management] window, a blank [New Study] window appears. The "Free Space" of your hard disk is indicated at the top of the [New Study] window. (Without MPPS support (left) and with (right))





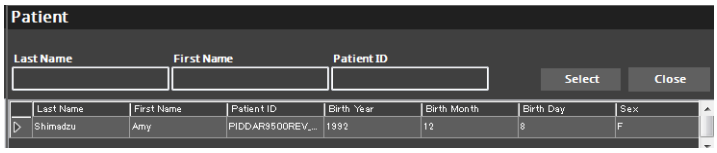
NOTE

When MPPS support is enabled and you choose [Direct Entry], the Accession Number field is not available (box background is gray).

With either blank [New Study] window, follow this procedure to define a new study without worklist management

1 If you worked with the patient before, you can select the patient from the Patient list. Click the right-arrow ▷ to the right of the Suffix box.

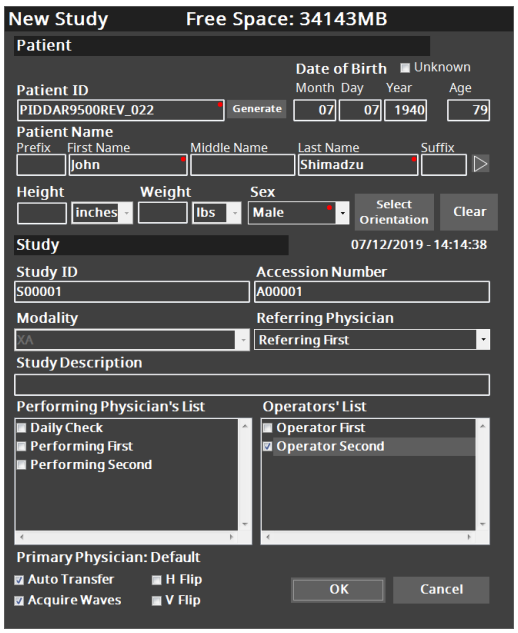
A patient list appears.

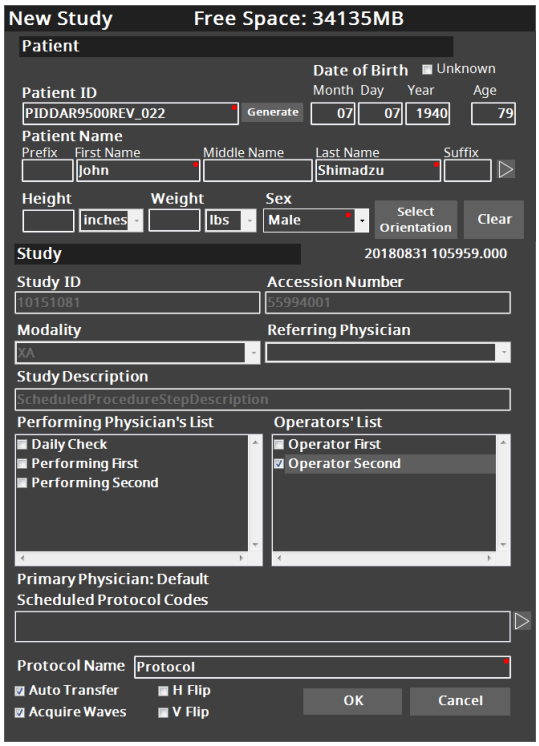


2 If desired, reduce the number of patients shown by entering search criteria in the provided boxes: Last Name, First Name, or Patient ID. Only patients matching what you enter will be displayed.

3 If you see the desired patient, click anywhere in its row and then click [Select].

This loads all available patient information into the [New Study] window, reducing the number of fields you must enter manually. (Without MPPS support (left) and with (right)





4 If the patient is not available in the list, you must manually enter the patient information in the [New Study] window.

Thereafter, the patient will be available in the patient list.

☞"Patient Orientation" P.4-19

5 Choose [Referring Physician], [Performing Physician] and [Operator] from the available lists.

Multiple performing physicians can be selected. If so, a primary physician is selected as default. Right-click on the performing physician's name to change the primary physician.

6 Fill in at least all blank mandatory fields (marked with a dot in upper corner).

For information on how the administrator can configure which fields are mandatory, see ☞"Study Information Tab" P.17-50.

If desired, click [Generate] to generate a unique Patient ID. If desired, click [Clear] to clear all fields in the Patient area of the dialog box.

To automatically transfer studies to the default server, select [Auto Transfer]. Otherwise, ensure that [Auto Transfer] is deselected.

☞"Physicians Tab" P.17-44

To acquire waves (ECG) during case, select [Acquire Waves]. Otherwise, ensure that [Acquire Waves] is deselected.

☞"Display Tab" P.17-37

7 When done, click [OK].

The [New Study] window closes and the new study is opened and prepared for acquisition.

NOTE

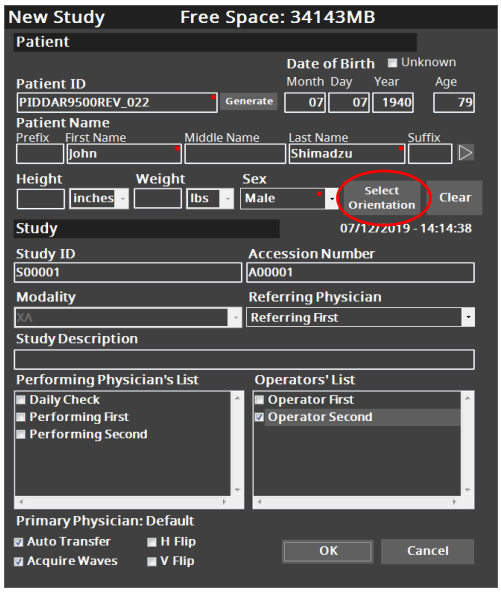
If you choose a patient and then make changes to their information in the [New Study] window, the changes are retained in the patient record and will be seen in any future uses of the patient for new-study definition.

8 Continue with either the section ☞"Display New Study Information" P.4-21 or "4.4 Making Acquisition" P.4-23.

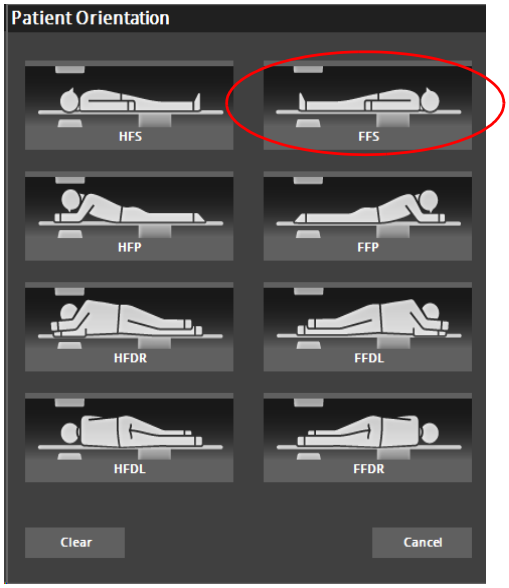
Patient Orientation

Set patient orientation during study if necessary.

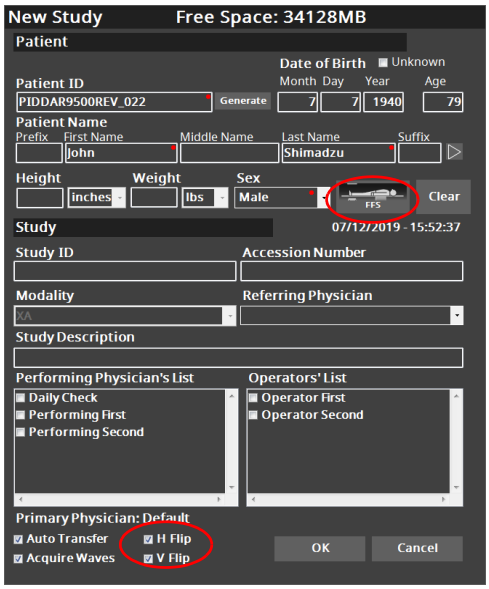
1 Click [Select Orientation] button.



2 Patient positions are listed as follows. Select an appropriate position.



3 Selected position is displayed as follows on [New Study] window. And H/V Flip is checked automatically depending on the selected position.

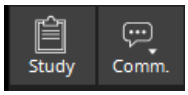


NOTE

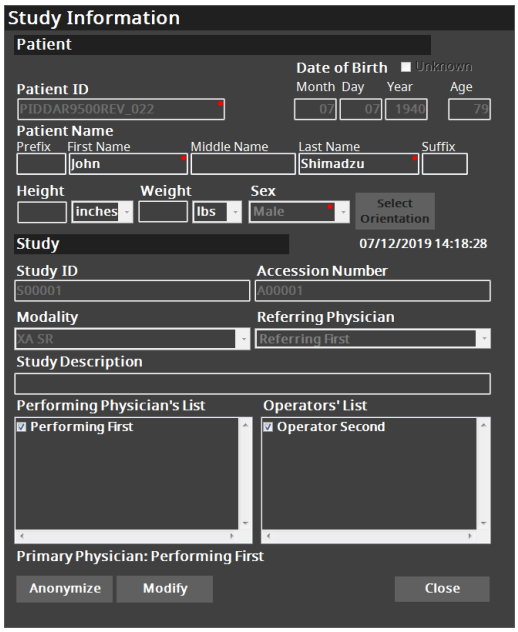
[Patient Orientation] can be selected only one position for one study. Do not select the position if changing patient orientation during study.

Display New Study Information

To display new study information, click [Study] on the side menu.



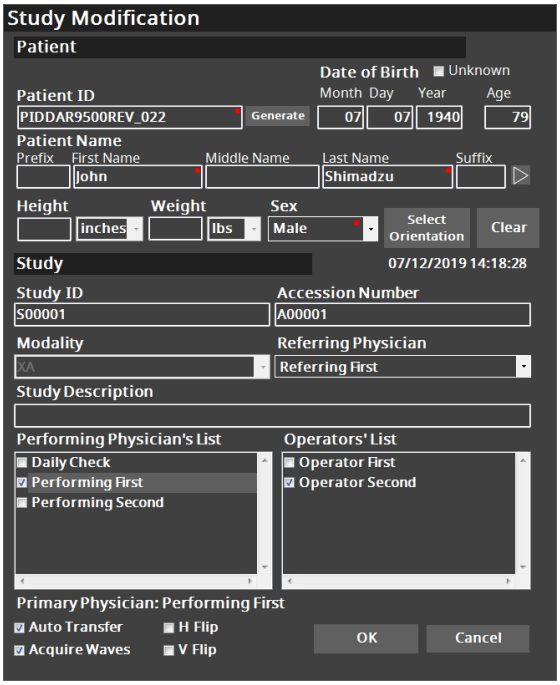
If MPPS support is enabled or any loops have been recorded or images have been saved or performed fluoroscopy for this study, the [Study Information] window appears. View the information and click [Close].



If MPPS support is not enabled or loops have not yet been recorded or images have not yet been saved/performed fluoroscopy, the [Study Modification] window is displayed instead. View the information, optionally make changed, and click [OK] to save changes or click [Cancel] to exit without saving. Items not available for modification are displayed in gray.

NOTE

Completed studies can have much of their information modified as described in ☞"7.5 Modifying Study Information" P.7-12.


Study Modification
Patient
Date of Birth
Unknown
Patient ID
Month
Day
Year
Age
PIDDAR9500REV_022
Generate
07
07
1940
79
Patient Name
Prefix
First Name
Middle Name
Last Name
Suffix
john
Shimadzu
Height
Weight
Sex
inches
lbs
Male
Select Orientation
Clear
Study
07/12/2019 14:18:28
Study ID
Accession Number
S00001
A00001
Modality
Referring Physician
XA
Referring First
Study Description
Performing Physician's List
Operators' List
Daily Check
Performing First
Performing Second
Operator First
Operator Second
Primary Physician: Performing First
Auto Transfer
Acquire Waves
H Flip
V Flip
OK
Cancel

4.4 Making Acquisition

NOTE

Any direction in this manual to expose Fluoro or Rad radiation are only for the purpose or procedure description. The operator must decide when it is medically safe to expose a patient to radiation.

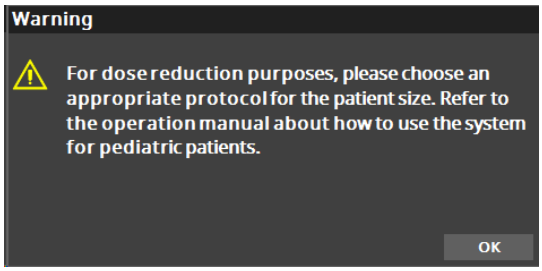
4.4.1 Introduction

Fluoro acquisitions can be made and displayed live at any time (without recording). When a study is open for acquisition, all acquisition modes are available: **Fluoro**, **FluoroMap**, **SIMAP, DA, DSA, RSM-DSA**, **ROT-DA**, **ROT-DSA**, **ROT-RSM-DSA**, **SCORE 3D-DA**, **SCORE 3D-DSA**, **SCORE CT, HQ-DSA, Stage Acquisition and SPOT.**

If you have not already done so, define a new study as described in ☞"4.3.2 Defining a New Study" P.4-10. When a new study is defined, the [Image Viewer] window is blank except for a study information line at the top.

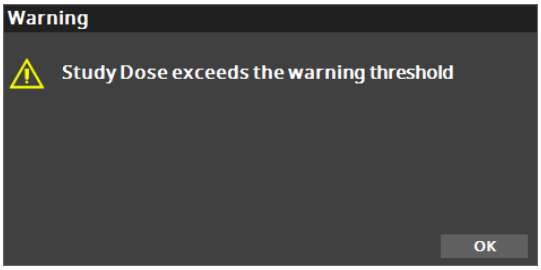
Display items of study information can be customized. See ☞"Study Information Tab" P.17-50.

Pediatrics setting is supported. The warning message will be displayed if patient is under the setting age. See ☞"Notifications Tab" P.17-42.



NOTE

"Show dose warning" has been set, and if the dose exceeds the threshold, the underline and warning icon are displayed. See ☞"Notifications Tab" P.17-42.



NOTE

For information about using the IVR NEO, IVR Shuttle and the GUI/Keyboard to assist with making acquisitions, see ☞"4.7 Acquisition Keys and GUI Buttons" P.4-63, ☞"4.8 IVR NEO (Either-or SMART Touch)" P.4-65, ☞"4.10 IVR Shuttle (Option) (Either-or SMART Touch)" P.4-73 and ☞"4.11 SMART Touch (Either-or IVR NEO/IVR Shuttle)" P.4-77. You can adjust image appearance of the recently-acquired loops as described in ☞"7.2 Adjusting Image Appearance" P.7-4.

The acquisition procedures are describe in the following sections.

No.	Section	Page
1	"4.4.2 Adding a Comment"	☞ P.4-26
2	"4.4.3 Choosing Acquisition Modes"	☞ P.4-26
3	"4.4.4 Making Live Fluoro Acquisitions"	☞ P.4-30
	"FluoroMAP"	☞ P.4-31
	"DSA-MAP"	☞ P.4-32
	"BlankMAP"	☞ P.4-34
	"LIVE Mode"	☞ P.4-37
	"TraceMAP"	☞ P.4-37
4	"4.4.5 Recording Fluoro"	☞ P.4-38
	"Direct Fluoro Record"	☞ P.4-38
	"Last N Seconds Fluoro Record"	☞ P.4-39

No.	Section	Page
5	"4.4.6 Recording Rad"	P.4-40
	"DA"	P.4-40
	"DSA"	P.4-41
	"RSM-DSA"	P.4-42
	"ROT-DA and ROT-RSM-DSA"	P.4-42
	"ROT-DSA"	P.4-43
	"SPOT"	P.4-45
	"Flipping Images"	P.4-47

4.4.2 Adding a Comment

NOTE

To add comments, the comment menu must be configured.

See "Configure the Comment Menu" P.17-70.

You can add a predefined comment to radiography and recorded fluoroscopy acquisitions.

To add a comment, follow this procedure.

1 Click [Study]-[Comm.] GUI button or press the equivalent IVR NEO or SMART Touch button.

The comment menu appears, in small font if launched from the GUI buttons or in large font if launched from the IVR NEO.

2 Once a comment menu launches, use the keyboard or IVR NEO/SMART Touch joystick menu selector to make comment menu choices as follows.

To move the selection highlight	
Keyboard:	Use the Up/Down arrow keys.
IVR NEO/SMART Touch:	Use the Up/Down motion of joystick.

To select a menu item	
Keyboard:	Press [Enter].
IVR NEO/SMART Touch:	Press the joystick button.

The highlighted menu item appears in black text with a white outline.

After selection, the menu is closed. Your selection in the menu is remembered until the study is closed, so that the same comment remains selected for all subsequent loops. When you select a comment, it is displayed at the bottom of the [Image Viewer] window as shown, for radiography and fluoroscopy acquisitions, playback and review, according to your specific settings.

See ☞"Display Tab" P.17-37.

3 Alternatively, select [Cancel] or press the [End] key (keyboard) to close the menu without choosing a comment.

4.4.3 Choosing Acquisition Modes

NOTE

Some acquisition modes are only available as options. Your system specific configuration might not include all modes. See ☞"2.5.1 Image Acquisition" P.2-11.

Before making acquisitions, you must first decide which acquisition modes to use. Programs define acquisition modes separately for Rad and Fluoro exposure. Default programs are individually preset for each performing physician by the administrator as described in ☞"Physicians Tab" P.17-44. Two Fluoro modes and various Rad modes exist.

Mode	Description
Fluoro	Fluoroscopy: Provides low X-ray dose images for help in positioning the catheter.

Mode	Description
FluoroMap	Fluoroscopy Map: assists in the positioning of the catheter in a complicated blood-vessel route. It highlights in white, the path of contrast agent injection. The path is retained on screen like a road map during subsequent Fluoro acquisitions to make it easy to see the moving catheter with little or no additional contrast agent.
DSA-MAP	DSA-MAP: superimpose the acquired image and fluoroscopy image for observation.
BlankMAP	BlankMAP: subtract the background image and display the fluoroscopy image.
Live Mode	Live Mode: a mode not to subtract the background image.
TraceMAP	TraceMAP: superimpose the vessel contour image and fluoroscopy image for observation.
DA	Digital Angiography: the normal acquisition mode for acquiring cardiac images.
DSA	Digital Subtraction Angiography: virtually removes constant structures (flesh, bone) of no diagnostic interest, enabling enhanced blood-vessel contrast. This mode is suitable for a non-moving catheterization table, with body parts such as limbs that can be kept stationary.
Flex-APS (Option)	
RSM-DSA	Real-time Smoothed Mask Digital Subtraction Angiography: (a special DSA mode), also virtually removes constant structures of no diagnostic interest, enabling enhanced blood-vessel contrast. In this mode the catheterization table can be moved and minor limb motion is acceptable.
ROT-DA	Rotational Digital Angiography: like DA but with C-arm rotation, including initial mask-acquisition rotation.
ROT-DSA	(Only for DSA option) Rotational Digital Subtraction Angiography: like DSA but with C-arm rotation, including initial mask-acquisition rotation.
ROT-RSM-DSA	Rotational Real-time Smoothed Mask Digital Subtraction Angiography: like RSM-DSA but with C-arm rotation.
SPOT	Single Image: acquisition of a single image.
Stage Acquisition	Stage Acquisition: enable to acquire the image corresponding to each blood flow rate of arterial and venous phase by combining fast and slow rate.
Auto Stitching	Auto Stitching:

Choose a Fluoro and Rad mode by selecting a program with the desired mode in its name as follows.

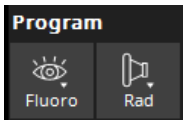
NOTE

You can select a program while performing a Fluoro acquisition. the selected program only applies after completion of the Fluoro acquisition.

1 Observe the current Rad and Fluoro program settings displayed at the bottom of the [Image Viewer] window.

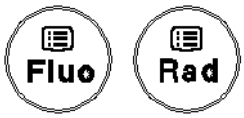
Default values specific to the Performing Physician are used when the new study is opened. Thereafter, the last digital program menu choice made is preserved separately for Rad and Fluoro. If the default digital program selections for Rad and Fluoro are adequate, continue with ☞"4.4.4 Making Live Fluoro Acquisitions" P.4-30.

2 Click Program: Fluoro] or [Program: Rad] GUI button or press the equivalent IVR NEO/IVR Shuttle/SMART Touch button.

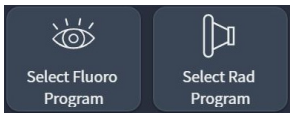


Side Menu

IVR NEO

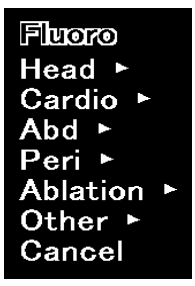


IVR Shuttle



SMART Touch

The appropriate digital program menu appears, either Fluoro or Rad, in a small font if launched form the GUI buttons or in a large font if launched from the IVR NEO/IVR Shuttle.



3 Once a digital program menu launches, use the keyboard, IVR NEO/SMART Touch joystick or IVR Shuttle menu selector to make program menu choices as follows.

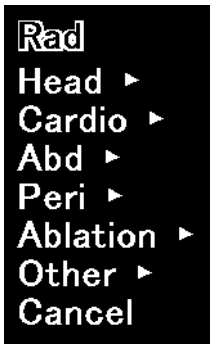
To move the selection highlight	
Keyboard:	Use the Up/Down arrow keys.
IVR NEO/SMART Touch:	Use the Up/Down motion of joystick.
IVR Shuttle:	Scroll Up/Down the menu selector.

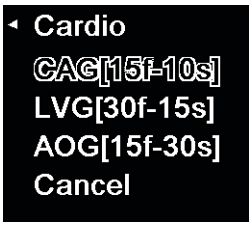
To change menu levels	
Keyboard:	Press [Enter].
IVR NEO/SMART Touch:	Use the Up/Down motion of joystick.
IVR Shuttle:	Scroll Up/Down the menu selector to highlight a menu ending with an arrow, and press the menu selector.

To select a menu item	
Keyboard:	Press [Enter].
IVR NEO/SMART Touch:	Press the joystick button.
IVR Shuttle:	Press the menu selector.

The highlighted menu item appears in black text with a white outline. Most parent-level menu choices lead to sub-menus as signified by menu items ending with an arrow. Menu choices that do not end in an arrow, select the indicated digital program.

For example, the Rad menu and one of its sub-menus.





You can select by directly clicking the menu with mouse instead of keyboard/joystick.

4 After program selection, the menu is closed. our position in the menu is remembered (Separately for Rad and Fluoro) so that the menu can be later reopened.at the same position. When you select a digital program, its name is displayed at the bottom of the [Image Viewer] window at all times except during review.

5 Select the parent-level to return to the parent menu and press the joystick or [Enter] key (keyboard).

Alternatively, select [Cancel] to close the menu without choosing a program.

4.4.4 Making Live Fluoro Acquisitions

Fluoroscopy provides low X-ray dose images for help in positioning the catheter. Live fluoro acquisition (no recording) can be made at any time, not just when a study is open for acquisition. To make live Fluoro acquisitions, follow this procedure.

1 On the Fluoro menu, select a Fluoro program.

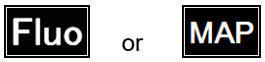
2 Press the [Fluoro] switch. Live Fluoro images (Live images) are displayed.

3 Start injecting the contrast agent.

4 After acquiring the images, release the [Fluoro] switch.

If configured, the last Fluoro image acquired is held on the Acquisition monitor until another acquisition is made. And enable to perform fluoroscopy any time except opening the study for acquisition. Also, by selecting an optional image from the image selector on Acquisition monitor during fluoroscopy, enable to change the image to be displayed after fluoroscopy.

Fluoroscopy exposure time is defined by the length of time the [Fluoro] switch is pressed (with configurable maximum time). During Fluoro acquisition ([Fluoro] switch pressed), a message indicating that Fluoro acquisition is in progress is superimposed over the upper-right area of the [Image Viewer] window.



It is also possible to change the Acquisition mode from the side menu during fluoroscopy.

See ☞"4.4.3 Choosing Acquisition Modes" P.4-26.

To change image brightness and contrast for the next Fluoro acquisition, select a fluoro loop from the Image Selector on the acquisition station and adjust image brightness and contrast using the side-menu buttons or the mouse. And then perform fluoro acquisition. The adjustments remains until a fluoro DUP is selected.

NOTE

Rad (DA, DSA, RSM-DSA, ROT-DA, ROT-DSA, SCORE 3D-DA, Stage Acquisition, SPOT and SCORE CT) acquisition takes priority over Fluoro. If the [Acquisition] switch is pressed during Fluoro, the Fluoro is stopped and Rad acquisition is made. When the Acquisition switch is released, Fluoro will continue if either the Fluoro or Fluoro Record switch is still pressed.

FluoroMAP

FluoroMAP is a mode to help positioning a catheter by superimposing blood-vessel and fluoroscopy images. Contrast agent is used to create the mask image which is subtracted from the fluoroscopy image. This mode is useful to position the catheter in a complicated blood-vessel route during study.

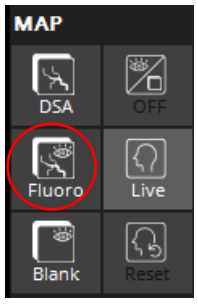
To make FluoroMap acquisitions, follow this procedure.

1 Select DUP for any purpose from Fluoro program.

2 Click [MAP]-[Fluoro] on the side menu.

A message of current mode (FluoroMAP MASK creation) is displayed at the bottom-left of the acquisition monitor.

Acquisition Monitor



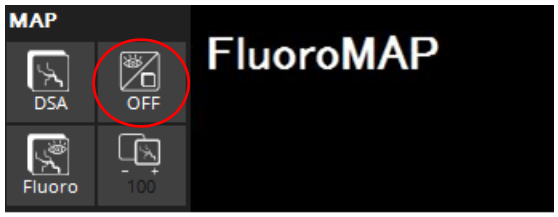
Reference Monitor

3 Press [Fluoro] switch. And start acquiring the background image.

4 Mask creation will start after acquiring the background image. And start injecting contrast agent.

5 When the mask image for catheter operation is acquired, release [Fluoro] switch.

A message of current mode (FluoroMAP) is displayed at the bottom-left of the acquisition monitor.



6 When keep pressing [Fluoro] switch, the subtraction image of mask and Fluoro image created in step 4 is displayed.

7 FluoroMAP images can be recorded.

☞ "4.4.5 Recording Fluoro" P.4-38.

8 Select [MAP]-[Vessel Power] to change mask image brightness from ACQ PC side menu. Right-click the [Vessel Power] button to increase and left-click to decrease the image brightness.

9 If the desired effect is not achieved, repeat step 2 to create the mask again.

10 To return to normal fluoro mode, select [MAP]-[ON] (MAP mode) on the side menu. Keep FluoroMAP mask until new mask is set.

11 During normal (non-Map) fluoro mode, click [MAP]-[OFF] (MAP mode) on the side menu to change the mode to MAP mode.

DSA-MAP

DSA-MAP is a mode to subtract the background image and observe by superimposing existing blood-vessel and fluoroscopy images while positioning the catheter. As it is not necessary to acquire the blood-vessel image again, radiation dosage and volume of contrast agent is reduced.

To make DSA-MAP acquisitions, follow this procedure.

1 Select a DUP for any purpose from Fluoro menu.

2 Select the blood-vessel image from the Image Selector on the Reference or Acquisition monitor.

Cannot use a vessel contour image which is saved as a still image.

3 If entire blood-vessel image is not necessary, click the [Region] button on the DSA Tools bar and set ROI for the necessary blood-vessel.

4 Click [MAP]-[DSA] from Reference monitor side menu and set the selected image in Step 2 as the mask image. To set the image of Acquisition monitor, click [MAP]-[DSA] on the Acquisition monitor.

A message of current mode (DSA-MAP) is displayed at the bottom-left of the Acquisition monitor.

Acquisition Monitor

Reference Monitor

5 When pressing the [Fluoro] switch, start acquiring the background image.

6 Superimposed image of Mask image created in Step 4 and the fluoroscopy image is displayed.

7 DSA-MAP images can be recorded.

☞ "4.4.5 Recording Fluoro" P.4-38.

8 [MAP]-[Vessel Power] to change mask image brightness from ACQ PC side menu. Right-click the [Vessel Power] button to increase and left-click to decrease the image brightness.

9 To return to normal mode, select [MAP]-[ON] (MAP mode) on the side menu. Keep DSA-MAP mask until new mask is set.

10 During normal (non-Map) Fluoro mode, click [MAP]-[OFF] (MAP mode) on the side menu to change the mode to MAP mode.

Acquisition Monitor

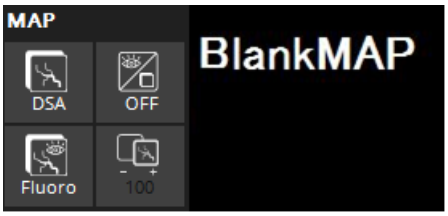
Reference Monitor

BlankMAP

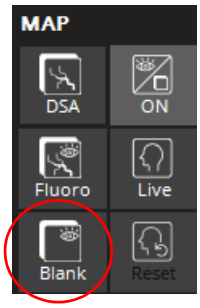
BlankMAP is a mode to subtract the background image such as bone and display fluoroscopy images. This is useful when checking device and medical agent added after BlankMAP is started.

To make BlankMAP acquisitions, follow this procedure.

1 Click [MAP]-[Blank] from side menu on the reference monitor. A message of current mode (BlankMAP) is displayed at the bottom-left of the acquisition monitor.



Acquisition Monitor



Reference Monitor

2 Press [Fluoro] switch. And start acquiring the background image.

3 Acquisition of subtraction image will stt after acquiring the background image.

4 BlankMAP images can be recorded.

☞"4.4.5 Recording Fluoro" P.4-38.

5 To acquire the background image again, click [MAP]-[Reset] and press [Fluoro] switch.

Reference Monitor

6 To return to normal fluoro mode, click [MAP]-[ON] (MAP mode) on the side menu.

Reference Monitor

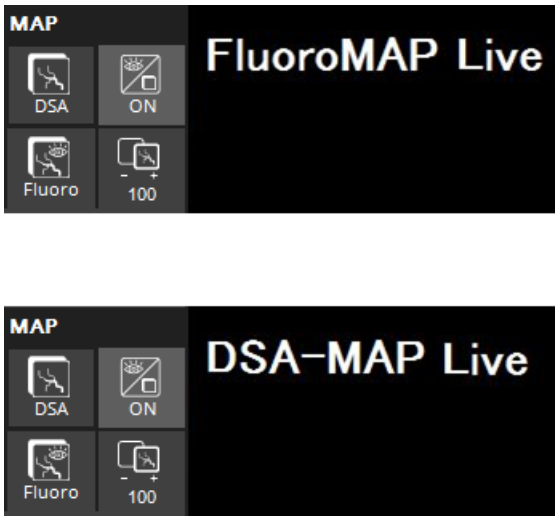
LIVE Mode

LIVE mode is a mode not to subtract the background image such as bone. This mod is available in FluoroMAP and DSA-MAP acquisition.

1 Click [MAP]-[OFF] (MAP mode) on side menu of the reference monitor. If MAP mode is not valid, perform FluoroMAP or DSA-MAP.

☞"FluoroMAP" P.4-31 and "DSA-MAP" P.4-32

2 Click [MAP]-[LIVE] from the side menu. A message of current mode (Live) is displayed on the bottom-left of the acquisition monitor.



Acquisition Monitor

Reference Monitor

3 Press [Fluoro] switch. Acquire fluoroscopy image without subtracting the background image.

4 Live mode images can be recorded.

☞"4.4.5 Recording Fluoro" P.4-38

5 Click [MAP]-[Live] on the side menu to return to MAP mode.

Reference Monitor

NOTE

If [Coordination with Geometry] is available on [Physicians] tab, normal fluoroscopy may be performed though it is set to MAP mode.

☞ [Selecting Geometry Configuration] of "Physicians Tab" P.17-44.

- Changing C-arm Angle (RAO/LAO/Cranial/Caudal) and SID:
  When changing the C-arm angle and SID, normal fluoroscopy is performed though it is set to MAP mode. And when return to the original position, MAP will be performed.
- Changing the C-arm Parallel Position/Bed Position:
  When changing the position of C-arm or bed, mask image will be deleted and MAP mode will be canceled. It is set to normal fluoroscopy mode, and MAP will not be performed though return to the original position.

NOTE

- In case of LIDM, a fluoroscopoy image during radiation and vascular MAP image can be displayed at the same time.
- Vascular MAP image is displayed on the Acquisition monitor during fluoroscopy and fluoroscopy image is displayed on Reference monitor in Examination room.
- When adding LIVE monitor, fluoroscopy image can be displayed on the LIVE monitor.
- When releasing the [Fluoro] switch, displayed LIVE image will be switched to currently selected image on Reference and Acquisition monitor. At this point, it requires a little bit of time for switching. And nothing will be displayed on the LIVE monitor except for performing fluoroscopy.
- Image quality of LIVE image is a little bit different from a normal fluoroscopy image.
- LIVE image flips with HV flip on the Acquisition monitor during fluoroscopy.
- Zoom cannot apply to the LIVE image.

TraceMAP

TraceMAP is a mode that fluoroscopy image and vessel contour image generated with DSA mode can be displayed as a superimposed. Interior of a blood-vessel is displayed in a transparent mode, so this is available when treat a large vessel.

To make TraceMAP acquisitions, follow this procedure.

1 Select DSA radiography program.

2 Press the [Radiography] switch and inject contrast agent to acquire a blood-vessel image.

3 After the acquisition, release the switch.

4 Select the blood-vessel image from the Image Selector on the Reference monitor. Or use the Peak Hold function to display the whole blood-vessel image.

☞"9.4 Peak Hold" P.9-6

5 Select the image to enhance contour and click the [Contour] button on [DSA Tools] bar.

6 Apply contour enhancement with default parameters for the blood-vessel image on the monitor. Adjust parameters on the dialog and display an appropriate image.

☞"9.5 Contour Enhancement" P.9-8

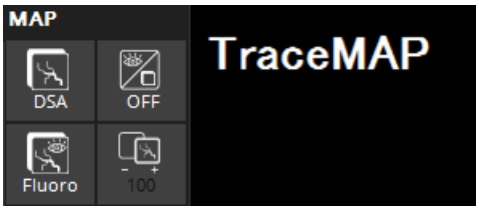
7 Enable to replay the back ground image while displaying a contour image. Confirm that the vessel is enhanced correctly.

8 If the entire contour enhancement image is not necessary, click [Region] button on the [DSA Tools] bar and set ROI for the necessary contour.

☞"9.6 Mask Region" P.9-11

9 Click [MAP]-[DSA] on the side menu and select created contour enhancement image as a superimposed image. If contour is displayed, the DSA-MAP will operate as the [TraceMAP] button.

A message of current mode (TraceMAP) is displayed at the bottom-left of the Acquisition monitor.



Acquisition Monitor

Reference Monitor

10 Press the [Fluoro] switch to display superimposed image of blood-vessel contour and fluoroscopy images. Refer to step 5 to 9 of making DSA-MAP Acquisitions for subsequent operations.

4.4.5 Recording Fluoro

Although the main purpose of the system is to record Rad acquisitions, it is also possible to record Fluoro acquisitions in one of two modes: Direct Record or Last N Seconds. Direct Record requires you to press a button for each Fluoro recording. Last N Seconds causes the most recent Fluoro images to always be recorded in a temporary buffer. The images in the buffer can then he saved when desired. The Fluoro record mode is set individually for the default physician and each performing physician.

☞"Physicians Tab" P.17-44

The images displayed after fluoroscopy can be changed by selecting any loop from the image selector on the Acquisition monitor during fluoroscopy.

☞" The acquisition procedures are describe in the following sections." P.4-24

Direct Fluoro Record

NOTE

To use Direct Record, the default physician must be configured as [Fluoro Record]-[Direct] or if you are logged in as a configured performing physician, you must be configured the same.

☞"Physicians Tab" P.17-44

Unable to record the LIVE fluoroscopy image if it is displayed with the optional feature of LIDM.

Unable to use Direct Record during fluoroscopy without a record (while pressing a [Fluoro] switch).

To use Direct Fluoro Record, follow this procedure.

1 Choose your Rad and Fluoro programs as described in ☞"4.4.3 Choosing Acquisition Modes" P.4-26.

2 Make Fluoro acquisitions.

3 When it is desired to record the next Fluoro acquisition, click [Fluoro]-[Direct Record] button on the GUI side menu.

The GUI button appears pushed in. Press the [Fluoro] switch to begin Fluoro acquisition with recording. Release the [Fluoro] switch to stop acquisition and recording.

The GUI [Fluoro]-[Direct Record] button pops back out.

Last N Seconds Fluoro Record

NOTE

To use Last N Seconds, the default physician must be configured as [Fluoro Record]-[Last N Seconds] or if you are logged in as a configured performing physician, you must be configured the same.

☞"Physicians Tab" P.17-44

To use Last N Seconds Fluoro Record, follow this procedure.

1 Choose your Rad and Fluoro programs as described earlier in ☞"4.4.3 Choosing Acquisition Modes" P.4-26.

2 Make Fluoro acquisitions.

3 If it is desired to save your most recent Fluoro acquisition, click [Fluoro]-[Save] button on the GUI side menu or press the IVR NEO/IVR Shuttle/SMART Touch [Save Fluoro] button.

The Fluoro acquisition is saved and transferred to the archive server and Reference computer. Optionally, click the [Fluoro]-[View] button on the GUI side menu to first playback the recorded (but not yet saved) Fluoro images on the Acquisition monitor to see if they are worth saving.

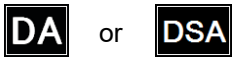
NOTE

If the Fluoro acquisition duration is longer than the configured maximum number of seconds (shown in program name), only the first portion (up to configured limit) is kept in the recording buffer and made available for saving.

4.4.6 Recording Rad

Digital Angiography is the normal acquisition mode for acquiring cardiac images. Rad acquisitions are always recorded.

Rad exposure time is defined by the length of time the [Acquisition] switch is pressed (with configurable maximum number of images). During Rad acquisition ([Acquisition] switch pressed), a message indicating the active mode is superimposed over the upper-right area of the Image Viewer.



Playback of the acquired loop starts.

> **NOTE**
>
> Acquisition (DA, DSA, RSM-DSA, ROT-DA, ROT-DSA, SCORE 3D-DA, SCORE 3D-DSA, Stage Acquisition, SPOT and SCORE CT) takes priority over Fluoro. If [Acquisition] switch is pressed during Fluoro, the Fluoro is stopped and DA acquisition is made. When the [Acquisition] switch is released, Fluoro will continue if either the [Fluoro] or [Fluoro Record] switch is still pressed.

If required, choose a comment as described in ☞"4.4.2 Adding a Comment" P.4-25.

To make acquisitions, follow this procedure.

DA

DA is the normal acquisition mode for cardiac images.

1. Select a DA program on the Rad menu.
2. Press the [Acquisition] switch.
3. X-ray exposure starts and live images are displayed and recorded. Start injecting the contrast agent.
4. When image acquisition is complete, release the [Acquisition] switch.
5. Playback of the acquired loop starts.

DSA

If the catheterization table must be moved, or the limb cannot be kept motionless, use RSM-DSA instead (described in the next section).

DSA mode virtually removes constant structures (flesh, bone) of no diagnostic interest, enabling enhanced blood-vessel contrast. These modes are suitable for a non-moving catheterization table, with motionless body parts such as limbs. DSA acquisitions are always recorded.

1. Select a DSA program on the Rad menu.
2. Press the [Acquisition] switch.
3. X-ray exposure starts and the first images are used to create the mask, as configured in the DUP.
4. Start injecting the contrast agent for subtraction. Images are displayed subtracted to reveal enhanced blood-vessel contrast.
5. When image acquisition is complete, release the [Acquisition] switch.
6. Playback of the acquired loop starts.

Flex-APS (Option)

Flex-APS is a special DSA mode virtually adjusts the position of image automatically to reduce the effect of body movement when creating a subtraction image.

NOTE

Do not use Flex-APS for a region with movement inside the body such as flatus. Artifact may be occurred.

1. Select a Flex-APS program from Rad program.
2. Press [Acquisition] switch.
3. X-ray exposure starts and the mask image is displayed. And then start injecting the contrast agent for subtraction.
4. When image acquisition is complete, release the [Acquisition] switch.
5. Playback of the acquired loop starts.

NOTE

Enable to OFF the acquired automatic position correction for acquired image.

Refer to ☞ "9.3 Reregistration" P.9-5 for details.

RSM-DSA

RSM-DSA, a special DSA mode, also virtually removes constant structures (flesh, bone) of no diagnostic interest, enabling enhanced blood-vessel contrast. In this mode, it is acceptable to have catheterization table motion and/or minor limb motion. RSM-DSA acquisitions are always recorded.

1 Select RSM-DSA program on the Rad menu.

2 Press the [Acquisition] switch.

3 Start injecting the contrast agent. Images are displayed subtracted to reveal enhanced blood-vessel contrast. It is possible to move the catheterization table during image acquisition.

4 When the image acquisition is complete, release the [Acquisition] switch.

5 Playback of the acquired loop starts

ROT-DA and ROT-RSM-DSA

Acquisitions can be made by rotating C-arm.

1 In case of Bi-plane mode, move the Lateral C-arm to the park position.

2 Select a DA or RSM-DSA program on the Rad menu.

3 A message is displayed on the top of the Acquisition monitor.

4 Register the C-arm rotation start and stop position as follows:

1 Position the C-arm to the stop position first and press the left-arrow button on the C-arm local console (or remote console).

2 Position the C-arm to the rotation start position and press the blinking button again to register the position.

5 While the C-arm is close to the catheterization table, a message is displayed on the Acquisition monitor to press the [SET] button on the C-arm local console (or remote console.)

Press the [SET] button on the C-arm local console (or remote console) to position the C-arm where the registration is enabled.

6 After registration, press the [TEST RUN] button on the C-arm local console (or remote console) to confirm the position.

> **NOTE**
>
> The [TEST RUN] uses fluoroscopy to confirm that the focus region stays the center of the field of view while rotating. The test run ends when the button is released.

7 To position the C-arm after test run completion, press the [CANCEL] button to cancel the rotation mode.

8 Press and hold the [SET] button to move the C-arm to the start position. Hold the [SET] button until the indicator of the switch stops blinking and illuminates.

When the system is ready for acquisition, the message "X-RAY READY" is displayed on the Acquisition monitor.

9 Prepare the injector, and press and hold the [Acquisition] switch to perform radiography.

10 The acquisition ends when the [Acquisition] switch is released or when the maximum number of acquired images is reached (acquisition continues even after the C-arm reaches the rotation stop position).

During acquisition, a message indicating the active mode is superimposed over the upper-right area of the Image Viewer window.

ROT-DSA

1 In case of Bi-plane mode, move the Lateral C-ram to the park position.

2 Select a ROT-DSA program on the Rad menu.

3 A message is displayed on the top of the Acquisition monitor.

4 Register the C-arm rotation start and stop position as follows:

1 Position the C-arm to the stop position first and press the left-arrow button on the C-arm local console (or remote console).

2 Position the C-arm to the rotation start position and press the blinking button again to register the position.

5 While the C-arm is close to the catheterization table, a message is displayed on the Acquisition monitor to press the [SET] button on the C-arm local console (or remote console.)

Press the [SET] button on the C-arm local console (or remote console) to position the C-arm where the registration is enabled.

6 After registration, press the [TEST RUN] button on the C-arm local console (or remote console) to confirm the position.

NOTE

The [TEST RUN] uses fluoroscopy to confirm that the focus region stays the center of the field of view while rotating. The test run ends when the button is released.

7 To position the C-arm after test run completion, press the [CANCEL] button to cancel the rotation mode.

8 Press and hold the [SET] button to move the C-arm to the start position. Hold the [SET] button until the indicator of the switch stops blinking and illuminates.

When the system is ready for acquisition, the message "X-RAY READY" is displayed on the Acquisition monitor.

9 Start injecting the contrast agent and press the [Acquisition] switch. The C-arm starts rotating and mask acquisition starts.

10 Acquisition ends when the [Acquisition] switch is released, when the C-arm reaches the rotation stop position or when the maximum number of acquired images is reached.

11 After acquiring the mask images, press the [SET] button to move the C-arm back to its start position.

12 Press the [Fluoro] switch.

The MAP image is displayed on the Acquisition monitor.

13 Ask a patient to hold his/her breath at the position of the least misregistration. Prepare the injector, and press and hold the [Acquisition] switch to perform radiography.

14 The acquisition ends when the C-arm reaches the position in which the mask acquisition has ended or the [Acquisition] switch is released.

NOTE

If DSA image acquisition occurs for a smaller rotational range than mask acquisition, then any mask images that do not have a corresponding live image are not used.

SPOT

SPOT acquisition is the normal acquisition mode for acquiring cardiac images. DA (Rad) acquisitions are always recorded. To make SPOT acquisitions, follow this procedure.

1. Select a SPOT program on the Rad menu.
2. If required, choose a comment as described in "4.4.2 Adding a Comment" P.4-25.
3. Press the [Acquisition] switch. X-ray exposure starts and one live image is displayed and recorded.
4. Release the [Acquisition] switch.

During SPOT acquisition ([Acquisition] switch pressed), a message indicating the active mode is superimposed over the upper-right area of the Image Viewer window.

NOTE

SPOT acquisition takes priority over Fluoro. If the [Acquisition] switch is pressed during Fluoro, the Fluoro is stopped and SPOT acquisition is made. When the [Acquisition] switch is released, Fluoro will continue if either the [Fluoro] or [Fluoro Record] switch is still pressed.

Precession/pendulum DA and RSM-DSA

To make Precession/Pendulum DA or RSM-DSA acquisitions, follow this procedure.

1. Select a DA or RSM-DSA program on the Rad menu.
2. If required, choose a comment as described in "4.4.2 Adding a Comment" P.4-25.
3. On the C-arm local console (or remote console), press the [Precession] or [Pendulum] switch.
4. On the C-arm local console (or remote console), press the [SET] button until the C-ram has fully moved to the default (start) position.
5. Perform fluoro acquisitions as needed.

6 When ready, press the [Acquisition] switch.

The C-arm motion and acquisition starts.

7 Inject contrast agent as needed.

8 Acquisition continues until the [Acquisition] switch is released or the C-arc moves a total of three cycles.

When acquisition is complete, playback of the acquired loop starts.

During acquisition, a message indicating the active mode is superimposed over the upper-right area of the Image Viewer window.

Stage Acquisition

On this mode, acquire DSA image by reducing acquisition rate for each specified number of frames that are set within the radiography program, in one acquisition. Enable to acquire the image corresponding to each blood flow rate of arterial and venous phase by combining fast and slow rate.

1 Select the stage acquisition mod program from radiography program.

2 Press the radiography switch.

3 X-ray is exposed and th mask image is displayed. Subtraction is started, so inject the contrast medium.

4 Acquisition rate is reduced after each scheduled number of frames are acquired. Acquisition will be completed when specified number of images are acquired.

5 Automatic review of acquisition data is started after radiography.

4.4.7 Flipping Images

Images can be flipped horizontally or vertically at acquisition time. Click the [H Flip] button (left in the following figure) or [V Flip] button (right in the following figure) on the side menu of Acquisition monitor to flip the images for the next acquisition horizontally or vertically, respectively.

Default setting is determined depends on a patient's orientation set at the start of study.

Orientation	H Flip	V Flip
HFS	OFF	OFF
HFP	ON	OFF
HFDR	OFF	OFF
HFDL	OFF	OFF

Orientation	H Flip	V Flip
FFS	ON	ON
FFP	OFF	ON
FFDL	OFF	ON
FFDR	OFF	ON

You can flip fluoroscopy or radiography images, but only for the next acquisition.

To flip the acquired image, click the [Filter]-[H Flip] or [Filter]-[V Flip] button on the side menu of Reference monitor.

☞"Applying Filters" P.7-7

Flip fluoroscopy Live image according to the HV flip of Acquisition monitor during fluoroscopy.

4.4.8 Changing the Acquisition Parameter Settings

The injection delay settings allows for the contrast agent to spread the area under study and include the injection-acquisition delay and the mask-acquisition delay in advance. And enable to change values during study. The injection-acquisition delay is the delay in seconds between the activation of the acquisition switch and the beginning of acquisition. The mask-acquisition delay is the delay in seconds between the end of mask acquisition and the beginning of live acquisition.

Default values are configured for each Fluoro and Rad program. To temporary change these values during study, follow this procedure.

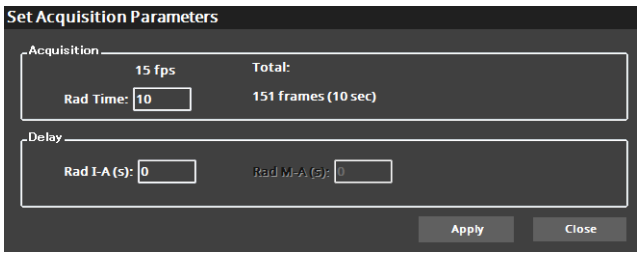
1 Click [Acq param] on the side menu of Acquisition monitor.

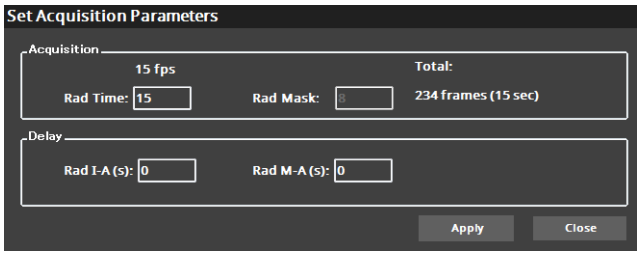
Single-plane

Bi-plane

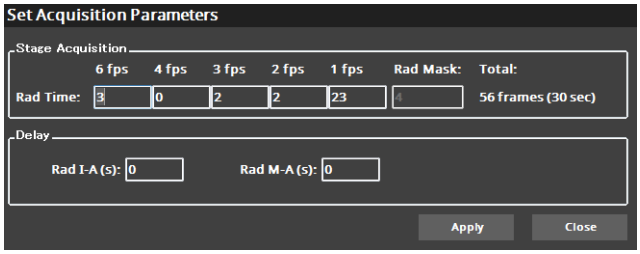
The [Set Acquisition Parameters] window opens. The default values are displayed.

[If DUP other than HQ-DSA is selected]





[If DUP of HQ-DSA is selected]



2 Change the parameters as needed and click [Apply] button.

Delay units are in seconds and can be set t a precision of up to one decimal. These values remain until you select a Fluoro or Rad program.

☞"4.4.3 Choosing Acquisition Modes" P.4-26

3 Click the [Close] button to close the window.

4 You are now ready to begin acquisition.

NOTE

Injection-Acquisition Delay can be displayed at the bottom-left of the Acquisition and Reference monitors.

☞"Reference Monitor" P.17-17

4.4.9 Manually Resetting the Dose

Automatic dose reset can be configured to occur at the end of a study or the beginning of the next one. If a study is not open, manual dose reset is also available. To manually reset the dose, click [Funct]-[Reset] on the side menu of Acquisition monitor.

4.5 Actions When Study Open for Acquisition

Although the purpose of having a study open for acquisition is to acquire loops, other actions can be performed.

No.	Title	Reference
1	Continuing a Study	☞"4.5.1 Continuing a Study" P.4-50
2	Using Select	☞"4.5.2 Using Select" P.4-51
3	Using Split	☞"4.5.4 Filtering Images by C-arm Position" P.4-53
4	Filtering Images by C-arm Position	☞"4.5.4 Filtering Images by C-arm Position" P.4-53
5	Moving C-arm to Match Selected Image (Reposition)	☞"4.5.5 Moving C-arm to Match Selected Image (Reposition)" P.4-54
6	Moving Table to Match Selected Image (Table Reposition)	☞"4.5.6 Moving Table to Match Selected Image (Table Reposition)" P.4-55
7	Sending Selected Image	☞"4.5.7 Sending Selected Image" P.4-55
8	Deleting Selected Image	☞"4.5.8 Deleting Selected Image" P.4-56
9	Displaying Previous Studies	☞"4.5.9 Displaying Previous Studies" P.4-56
10	Sketch Display	☞"4.5.10 Sketch Display" P.4-57
11	Working with Reference Images	☞"4.6 Working With Reference Images" P.4-60
12	Annotating	☞"7.7 Working with Image Annotations" P.7-17
13	Saving	☞"7.8 Saving Images" P.7-20
14	Printing	☞"7.9 Print Images" P.7-21
15	Analyzing	☞"8 Performing Angiographic Analysis" P.8-1
16	Adjusting DSA Images	☞"9 DSA Image Adjustment Tools" P.9-1

4.5.1 Continuing a Study

Studies initiated from a worklist server can be continued with additional acquisitions even after closure. To continue such a study, click [New] on the side menu and then fine and select the desired study in the worklist. Perform additional acquisitions and create additional images as desired. The new loops and images are added at the end of the study.

4.5.2 Using Select

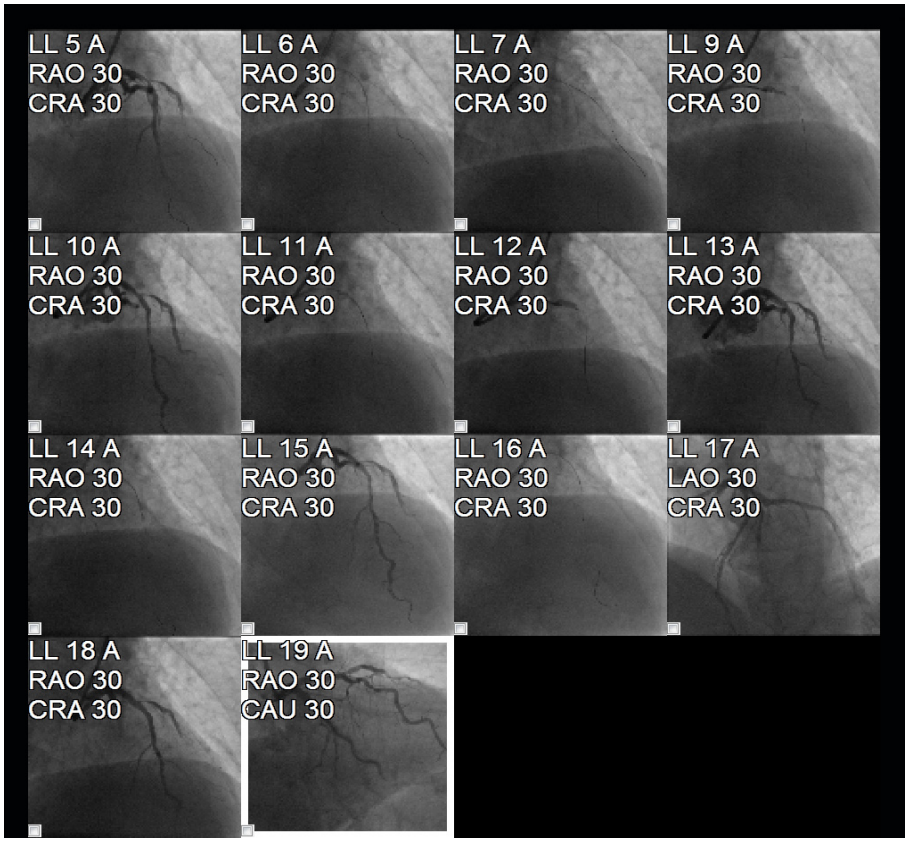
The [Select] function is provided primarily for use by the physician in the examination room to enable easy loop selection with the IVR NEO/SMART Touch buttons and joystick. Additionally, the control-room technician may use equivalent mouse actions or keyboard keys.

Use [Select] as follows.

1 Press the [16-Up Selector] button on the IVR NEO/SMART Touch or the [Funct]-[Select] button on the side menu.

The Image Viewer changes to a 4x4 grid of image thumbnails. The loop number and C-arm position CRA-CAU/RAO/LAO) are superimposed in large letters over each thumbnail. Also, a Loop/Still Image icon is superimposed over th upper-right corner of each thumbnail, indicating whether a loop or still image is represented.

A light-colored selector box surrounds the thumbnail of the current loop, the loop that was on screen when [Select] was chosen.



2 To choose a particular loop to display at full size, first move the selector (light-color box) with the IVR NEO/SMART Touch joystick, keyboard arrow or [PageDown]/[PageUp] keys, so that the thumbnail of the desired loop is surrounded.

3 Click the IVR NEO/SMART Touch joystick button or press [Enter] on the keyboard. Alternatively, just click any thumbnail with the mouse.

The selected loop appears full size in the Image Viewer window.

4 If there are more than 16 loops and still images in the study, scroll the thumbnail list downward by moving the IVR NEO/SMART Touch joystick down or by right-click upward dragging the Additional thumbnail grid with the mouse, or by pressing the keyboard down arrow or [PageDown] key. Additional thumbnails are revealed from below and the initial thumbnails are scrolled off the top.

Select a loop for display as already described.

5 To exit the Select mode without choosing a loop for display, press [16-Up Selector] button on the IVR NEO/SMART Touch or the [Funct]-[Select] button on the side menu.

4.5.3 Using Split

(For Reference monitor only.)

To split the Image Viewer into two side-by-side paned, press the [Single Display]/[Split Display] button on the IVR NEO/SMART Touch or click [Funct]-[Split] on the side menu. The Image Viewer splits down middle with the selected loop displayed on the left pane and the right pane empty. The next loop will be displayed in the right pane. A selection box surrounds the left pane.

To display a loop in the right pane, press the [Left/Right Focus] button on the IVR NEO/SMART Touch or click the right half of the Image Viewer window (the selection box now surrounds the right pane) and then choose a loop (or image) in the Image Selector.

When both panes contain loops, the loop in the selected pane can be played and the loop in the other pane is paused. Pan to the left or right to see the entire loop.

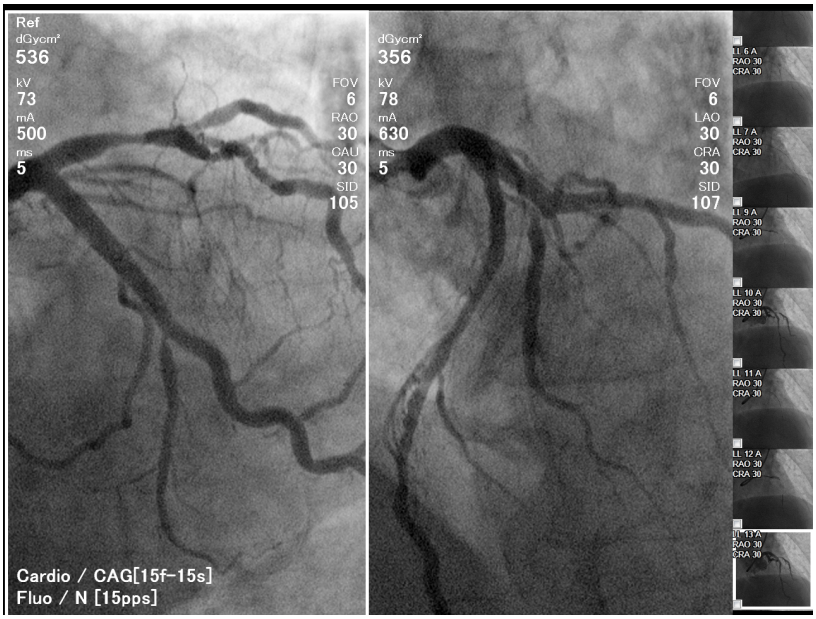


Image processing (Brightness, Contrast, Auto Window Level, Filters, LUT) and playback controls are only applicable to the selected pane.

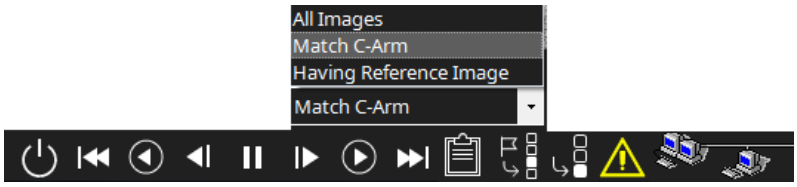
To evaluate different image processing settings, place the same loop in both panes, select a pane and make adjustments. The effects are shown only in the selected pane. This way, you can experiment with different image processing to see how the loop looks both with and without the image processing.

To un-split the display, choose the Split feature again. Whatever was in the last-selected pane is shown in the full Image Viewer window.

4.5.4 Filtering Images by C-arm Position

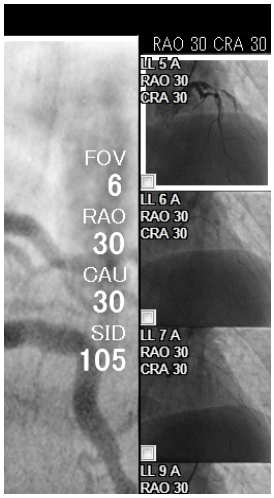
To filter the Image Selector so only icons for images that were acquired with a C-arm position that matches the current C-arm position (within configurable tolerances), follow this procedure.

1. Position the C-arm at the desired position.
2. Press the IVR NEO/SMART Touch [Filter by C-Arm] button. (LED of IVR NEO turns on)
3. Alternatively, click the Image Filtering button on the bottom GUI bar and then, in the Image Filtering list, choose [Match C-Arm].



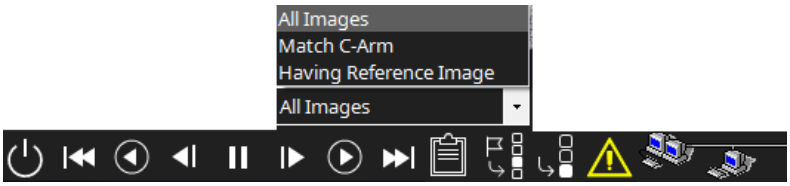
The Image Selector is filtered so only the icons of images that were acquired at the current C-arm position are shown with the LAO/RAO and CRA/CAU angles at the top like this.

The Image Selector is no-longer filtered; icons are shown like this.

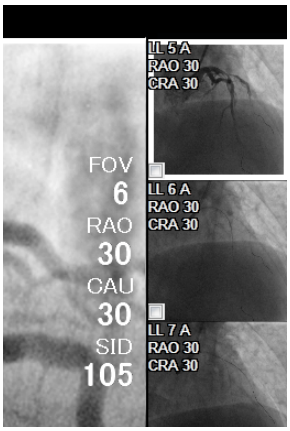


4 To revert an unfiltered Image Selector, press the IVR NEO/SMART Touch [Filter by C-Arm] button again.

LED of IVR NEO button turns off, or click the Image Filtering button on the bottom GUI bar and then, in the Image Filtering list, choose [All Images].



The Image Selector is no-longer filtered; icons are shown like this.

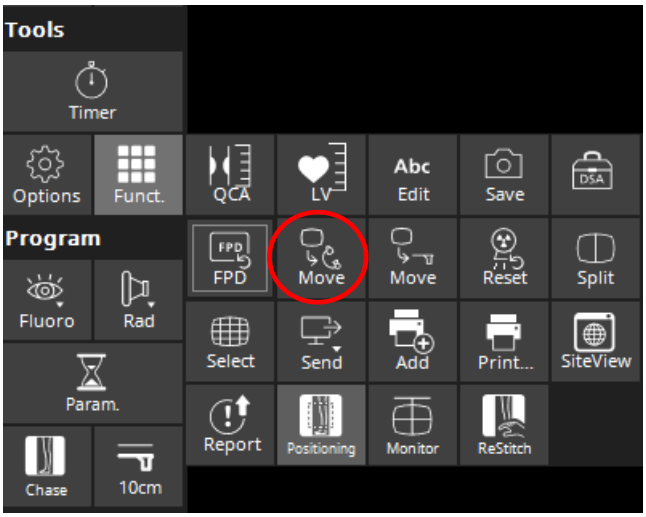


4.5.5 Moving C-arm to Match Selected Image (Reposition)

To move the C-arm to the position at which the selected image was acquired, follow this procedure.

1 Select the desired image or loop.

2 Press the IVR NEO/SMART Touch [C-arm Reposition] button (LED of IVR NEO turns on), or click [Funct]-[Move] on the side menu.



3 Press the C-arm [Direct Memory] button as it blinks.

The C-arm moves to the position at which the selected image was acquired. If the C-arm cannot move to the requested position, a message to that effect is displayed.

4.5.6 Moving Table to Match Selected Image (Table Reposition)

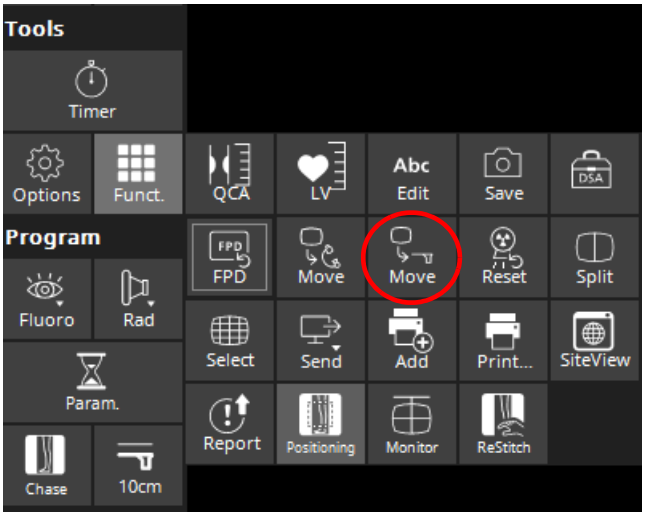
NOTE

Enable to use when angiographic catheterization table KS-100 is installed.

To move the table to the position at which the selected image was acquired, follow this procedure.

1 Select the desired image or loop.

2 Press the IVR NEO/SMART Touch [Table Reposition] button (LED of IVR NEO turns on), or click [Funct]-[Move] on the side menu.



3 Press the table [SET] button as it blinks.

The table moves to the position at which the selected image was acquired. If the table cannot move to the requested position, a message to that effect is displayed.

4.5.7 Sending Selected Image

Enable to send the selected image. To send the image, follow this procedure.

1 From image selector on Reference monitor, put a check mark in the check box at the bottom left of a desired still image or loop.

Right-click on the image selector and select [Select All] on the displayed pop-up menu, enable to select all the images.

2 Click [Funct]-[Send] button on the side menu. A pop-up menu to select destination is displayed. Or right-click the image selector and click [Send], a pop-up menu to select destination is displayed.

3 Check [Process Before Transfer] in a pop-up menu for image processing.

See ☞"DICOM Tab" P.17-24 for processing setting.

4 Click the destination.

Replaying frame will be sent.

4.5.8 Deleting Selected Image

Enable to delete the selected image. To delete the image, follow this procedure.

1 From image selector on Reference monitor, put a check mark in the check box at the bottom left of a desired still image or loop.

Right-click on the image selector and select [Select All] on the displayed pop-up menu, enable to select all the image.

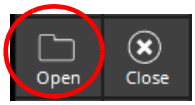
2 Right-click on the image selector and select [Delete] on the pop-up menu, and the message is displayed.

4.5.9 Displaying Previous Studies

While a study is open for acquisition, the performing physician can request that the control room technician displays an earlier study for the same patient (same Patient ID) on the Reference monitor. The technician can then find the specific image or loop that the physician wants to see for comparison purposes.

To load a previous study for the patient, follow this procedure.

1 Click [Open] on the side menu.



The Studies Management window appears and a search is performed for all studies with the same Patient ID as the active study.

2 Double-click the desired study or select it and click [View]. You are prompted with the following message:

"Do you want the study STUDY NAME_ACCESSION NUMBER to a replace the current study?"

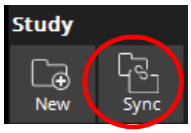
3 Click [Yes] to replace whatever is displayed with the selected study.

> **NOTE**
>
> This only refers to temporarily replacing the images displayed on the Reference monitor with the selected study. Later, you can re-synchronize on the active study in acquisition by clicking [Sync] on the side menu.

The study is displayed in the Image Viewer. The physician in the examination room can now compare the current images against the previous. The current images are shown on the Acquisition monitor, and the previous on the Reference monitor.

4 Loops can be played back and specific frames can be shown on the both the Acquisition and Reference monitors via keyboard keys as described in ☞"5.2.1 Controlling Image Playback" P.5-5.

5 Once image comparison is finished, click [Sync] on the side menu tor re-synchronize the Reference monitor with the active study on the Acquisition monitor.



If a new acquisition is not taking place, and the Acquisition monitor is playing the last acquired loop, the Reference monitor will begin playing the same loop (if configures).

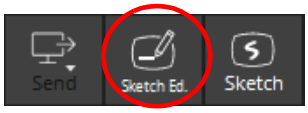
4.5.10 Sketch Display

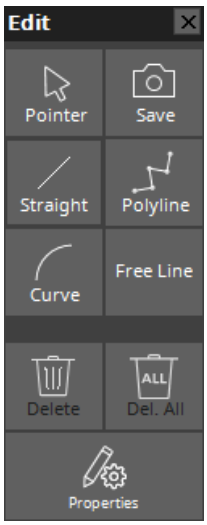
Use the Sketch Display on Acquisition monitor.

Enable to place a sketch for such as a stent. To display the sketch on the image, follow this procedure.

1 On Acquisition monitor, display a frame such as DSA image, which you want to place a sketch.

2 Click [Funct]-[Sketch Ed.] on the GUI side menu. [Edit] window is displayed. Straight line is selected as a default.





NOTE

Enable to set a type of default line selected on [Edit] window.

See [Selecting 2D Guidance Configuration] on ☞"Physicians Tab" P.17-44.

3 Click on the image. A point is displayed. And click another place to display a straight line which links these points. The straight line is specified in pair and the third point is the starting point of new straight line.

4 Polyline, Curve, and Free Line can be placed also. In this case, after selecting a desired sketch from Sketch Edition window, click on the image.

5 After placing the sketch, close the Sketch Edition window. The sketch continues to display after closing the window.

6 Click [Funct]-[Sketch] on the side menu of the Acquisition monitor to hide the sketch, or follow the instruction below.

- If the mode is MAP mode, click [MAP]-[ON] (setting MAP mode) on the side menu and set to fluoroscopy mode.
- On [Physicians] tab, change the geometry when [Coordination with Geometry] is set.

NOTE

The sketch switches Display and Hide as follows depending on the changed geometry.

- C-arm Angle (RAO/LAO/Cranial/Caudal) and SID.

If C-arm angle and SID are changed, the sketch will be hidden, but displayed again if return to original position. See [Selecting 2D Guidance Configuration] on ☞"Physicians Tab" P.17-44.

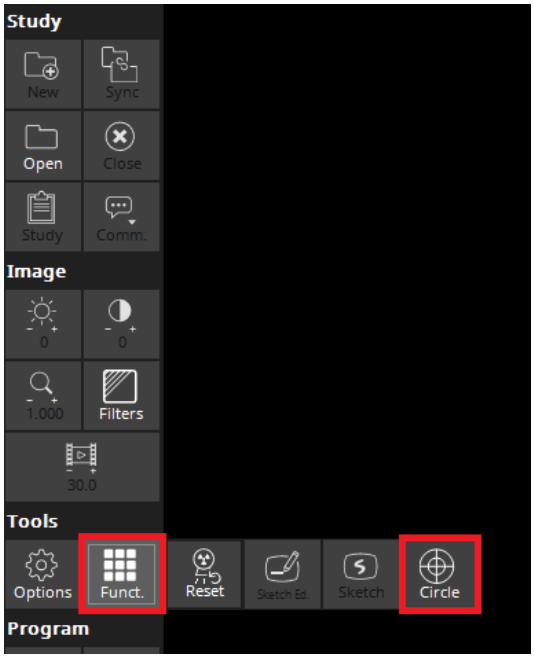
- C-arm Parallel Position and Catheterization Table Position

If C-arm or catheterization table position is changed, the sketch will be deleted at this point and not be displayed if return to original position.

4.5.11 Circle Display

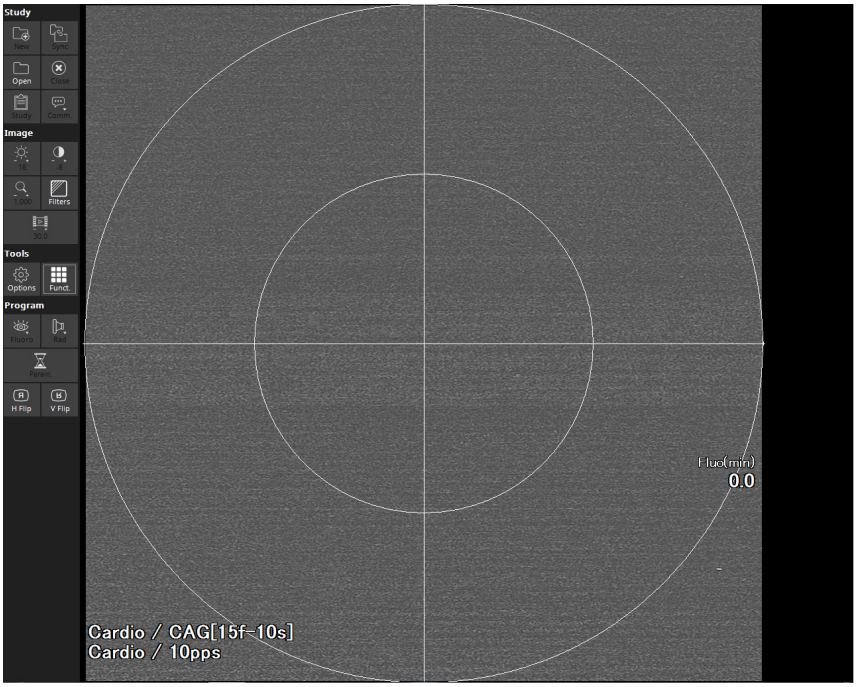
Use the circle to align the subject with X-ray irradiation area and the center of the image.

1 From the side menu in the Acquisition monitor, select [Funct.]-[Circle].



For bi-plane system, select [Circle] button on both frontal and lateral Acquisition monitor.

2 Make sure the circles appear on the image in Acquisition monitor.



3 Align the subject to the center of the circle.

4.6 Working With Reference Images

NOTE

Reference images can be added or deleted for the study that is open for acquisition. Later, in review, reference images can be viewed as still images.

4.6.1 Introduction

Any image loop frame can be selected as the reference image for the loop. At study closure, the reference images are created and saved with the study as still images.

4.6.2 Adding a Reference Image

To add a reference image to a study that is open for acquisition, follow this procedure.

1 Use the IVR NEO/IVR Shuttle/SMART Touch [Monitor Select] button to chose the Reference or Acquisition monitor.

Move the joystick up or down to jump between loops and then pause on the image you wish to select as a reference image for the loop. If you wish to choose a loop that does not yet have a Reference image, make sure that the IVR NEO is not in Reference mode (IVR NEO [Reference Mode] button is OFF.) If configured, the indicator "Ref" also appears in the upper-left corner of each monitor that is Reference mode.

2 Alternatively, click the desired Image Selector icon and pause on the image you wish to select as a reference image for the loop.

3 Press the IVR NEO/IVR Shuttle [Add Reference Image] button or SMART Touch [Add Ref Image], or on the keyboard, press the [Insert] key.

The selected image frame is marked for saving in the study as a full-size reference image when the study is closed. The Image Selector icon is replaced with a small version of the selected image.

As a reminder, the image frame number of the selected image is added inside square brackets to the right of the loop number like this (image frame 39 of loop 12).

The reference images themselves, do not appear in the Image Selector until the study is closed and opened in review. When reviewing, scroll down in the Image Selector to see the reference images.

NOTE

All reference image selections (image frame number in square brackets on Image Selector icon) on the Reference monitor are automatically shown on the Acquisition monitor.

4.6.3 Displaying Images Selected as Reference

Since the actual reference images are only created at study closure, they are not yet available for display. However, you can jump to each loop that has a selected reference image and automatically pause on the selected image.

With the IVR NEO/SMART Touch, select the desired monitor, either Reference or Acquisition. Ensure that the IVR NEO/SMART Touch is in Reference mode, pressing the IVR NEO/SMART Touch [Reference Mode] button if it is not already ON. Move the joystick up/down or use the [Select Reference Image] button on the IVR Shuttle to jump to the previous/next loop with a reference image and automatically pause on the selected image.

NOTE

The Reference and Acquisition monitors can be independently set to Reference mode. If configured, the indicator "Ref" also appears in the upper-left corner of each monitor that is in Reference mode. The indicator disappears when the monitor is not in Reference mode.

Alternatively, regardless of Reference mode state, press the [Page Up/Page Down] keyboard keys to jump to the previous/next loop with a reference image.

4.6.4 Deleting a Reference Image

Move the IVR NEO/SMART Touch joystick up/down or use the [Select Reference Image] button on the IVR Shuttle to select the desired loop.

Alternatively, on the keyboard, press the [Page Up/Page Down] keys to jump to select the desired loop and press the keyboard [Delete] key.

The image frame number in square brackets disappears from the Image Selector icon and the icon is again constructed from the image frame that was acquired at 2.5 s after radiography has started.

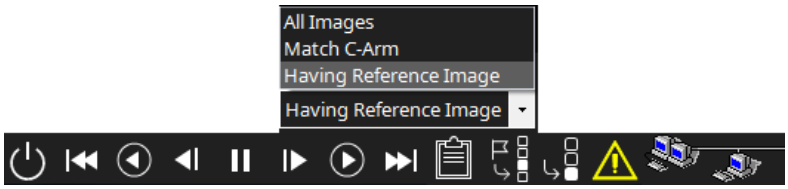
Keep NumLock set (the default) on the bedside console.

4.6.5 Filtering a Reference Image

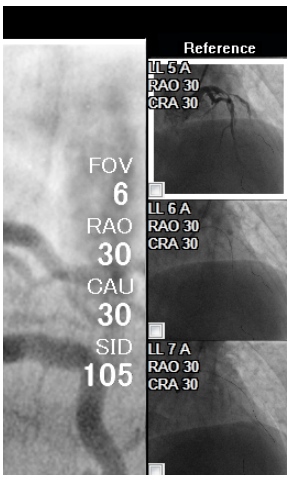
To filter the Image Selector so only icons for images that were added as reference images, follow this procedure.

1 Press the IVR NEO [Reference Image] button or the SMART Touch [Filter Ref Image] button. (LED of IVR NEO turns on)

2 Alternatively, click the [Image Filtering] button on the bottom GUI bar and then in the Image Filtering list, choose [Having Reference Image.



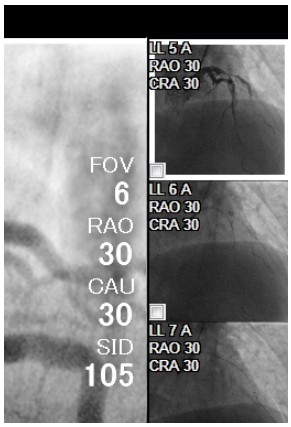
The Image Selector is filtered so only the icons of images that were added as reference image.



3 To revert to an unfiltered Image Selector, press the IVR NEO [Reference Image] button or the SMART Touch [Filter Ref Image] button again.

IVR NEO of LED turns off. Or click the [Image Filtering] button on the bottom GUI bar and then in the Image Filtering list, choose [All Images].

The Image Selector is no-longer filtered; all icons are shown like this.



4.7 Acquisition Keys and GUI Buttons

The following tables summarize the keyboard keys and GUI buttons available to interact with a study that is open for acquisition. All keyboard keys referenced are in the keyboard edit group between the main keys and the keypad.

A: Acquisition monitor, R: Reference monitor

Menu Interaction (If Digital Program Menu is not displayed)

No.	Action	Keyboard	GUI	A	R
1	Display Fluoro program menu.				○
2	Display Rad program menu.				○
3	Display Image Comment menu				○
4	Play/show next loop/image.				○
5	Play/show previous loop/image.				○
6	If playing, pause.	 or 			○
7	If paused, show next/previous frame.	 / 	 / 		○
8	If paused, start playing. (Keyboard only: Hold key for more than 2 seconds to begin forward/backward and play)	 / 	 / 		○

*From No.4 to 8 keyboard keys can be used in combination with the [Ctrl] key to perform the same functions on the Acquisition monitor.

No.	Action	Keyboard	GUI	A	R
1	Playback speed: increase (right-click)/decrease (left-click)				○
2	Brightness: increase (right-click) / decrease (left-click).				○
3	Contrast: increase (right-click) / decrease (left-click).				○
4	Zoom: increase (right-click) / decrease (left-click).				○

*These keyboard keys can be used in combination with the [Ctrl] key to perform the same functions on the Acquisition monitor.

Menu Interaction (If Rad, Fluoro, Comment Menu are displayed)

No.	Action	Keyboard	GUI	A	R
1	Highlight next menu option.				○
2	Highlight previous menu option.				○
3	Highlight the top menu option.				○
4	Highlight the bottom menu option.				○
5	For Comments, select highlighted comment and close menu. For Rad / Fluoro first-level menu, display second-level menu for highlighted item. For Rad / Fluoro second-level menu, select highlighted program and close menu.				○

Reference Images

No.	Action	Keyboard	GUI	A	R
1	Insert Reference image.				○
2	Delete Reference image.				○
3	Go to next loop with image selected as Reference and pause on the image.				○
4	Go to previous loop with image selected as Reference and pause on the image.				○

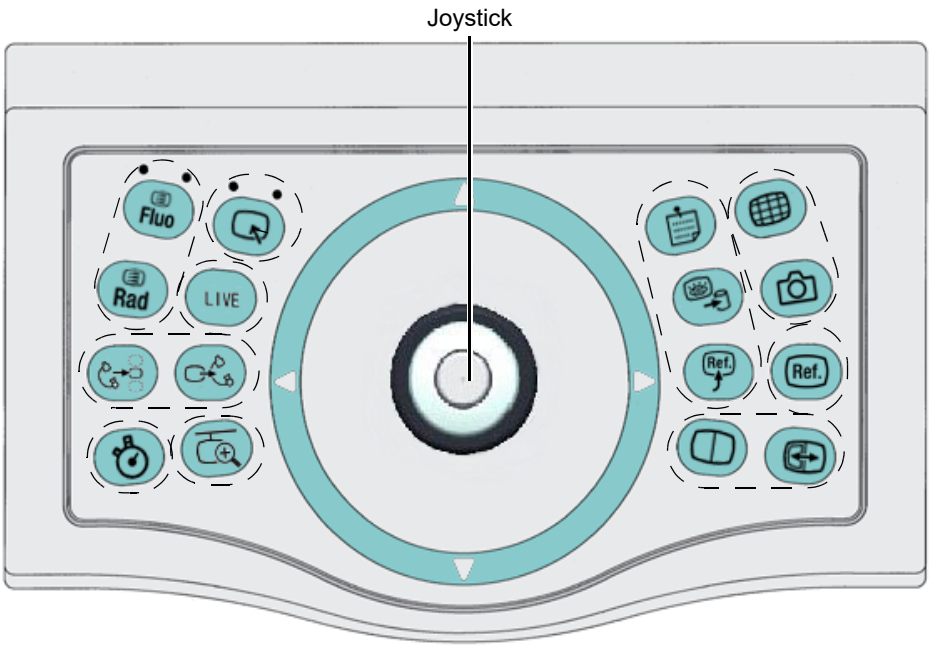
*No. 3 and 4 keys can be used in combination with the [Ctrl] key to perform the same functions on the Acquisition monitor.

16 Up Select

No.	Action	Keyboard	GUI	A	R
1	Move selector box down one row. (When at bottom row, wrap around to top.)				○
2	Move selector box up on row. (When at top, wrap around to bottom.				○
3	Move selector box to right one column. (When at right column, wrap around to left.)				○
4	Move selector box to left one column. (When at left column, wrap around to right.)				○
5	Move selector box down four rows. (When at down, wrap around to top.)				○
6	Move selector box up four rows. (When at top, wrap around to bottom.)				○

4.8 IVR NEO (Either-or SMART Touch)

The default IVR NEO features 16 pre-configured buttons (each with an indicator LED), and a joystick with button. Default button settings are as follows.



See ☞ "Physicians Tab" P.17-44 for changing the default settings of these buttons.

NOTE

The IVR NEO and IVR Shuttle operation is replicated to one another, as they work with each other. For example, when switching the IVR NEO focus from the Reference monitor to the Acquisition monitor with the IVR NEO [Monitor Select] button, the IVR Shuttle operation is activated on the Acquisition monitor as well. Therefore, do not use the IVR NEO and IVR Shuttle at the same time.

4.8.1 IVR NEO Buttons

IVR NEO button and LED indicator functionality is summarized in the following table (see button numbers indicated in above IVR NEO illustration). However, functionality availability varies depending on the type of studies you have chosen, such as cardiac or head, so some buttons may not be activated.

Category	Button Name	LED State	Icon	A	R
Fluoroscopy	Select Fluoro Program	ON= Fluoro menu shown. Goes OFF once selection made.			○
	DUP-Fluoro	Associated predefined Fluoro mode selected upon selection.		○	○
	Save Fluoro	ON= Save available. ([Fluoro]-[Save] buttons on the side menu is also available.)		○	○
	Save Last Fluoro	ON= Fluoroscopy images can be saved mode.		○	○
	View Fluoro	Last acquired Fluoro loop shown upon selection. ON= Last acquired Fluoro loop shown.			○
	Direct FLUORO Record	Direct Record mode enabled upon selection. ON= Direct Record Mode. LED goes OFF upon completion of next Fluoro acquisition.			○
Radiography	Select Rad Program	ON= Rad menu shown. Goes OFF once selection made.			○
	DUP-Rad	Associated predefined Rad mode selected upon selection.		○	○
	Change Planes	(Biplane only) Change the plane in order of Frontal, Bi and Lateral.		○	○
	Bi-plane	(Biplane only) Change the plane to Bi-plane.		○	○
	Frontal	(Biplane only) Change the plane to Frontal.		○	○
	Lateral	(Biplane only) Change the plane to Lateral.		○	○
MAP	DSA-MAP	ON= DSA-MAP mode.		○	○
	DSA-MAP (Live)	ON= DSA-MAP Live mode.		○	○
	DSA-MAP (Sub)	ON= DSA-MAP Sub mode.		○	○

Category	Button Name	LED State	Icon	A	R
MAP	FluoroMAP	ON= FluoroMAP Mask Creation mode.		○	○
	FluoroMAP (Live)	ON= FluoroMAP Live mode.		○	○
	FluoroMAP (Sub)	ON= FluoroMAP Sub mode.		○	○
	BlankMAP	Register the Blank mask.			○
	MAP mode	ON= MAP mode.		○	○
	LIVE mode	ON= Live mode.			○
	Reset BG Mask	Reset the background mask.			○
	TRANS	ON= IVR NEO joystick changes MAP Power.		○	
	Sketch Display	ON= Sketch Display mode.		○	
	Sketch Edition	ON= Sketch Edition window is displayed, and the Joystick becomes available.		○	
	Contour	Display the contour enhanced image.			○
	Mask Region	ROI of SIMAP is displayed on the image and the joystick is in the operation mode.			○
DSA	LIVE	ON= Display DSA Live image.		○	○
	Peak Hold	Display the peak hold image.			○
	Peak Hold (All Frames)	Display the peak hold image which used all frames.			○
	Flex APS (Option)	ON= Display the position offset image.			○
Actions	X-ray OFF	ON= Ban the X-ray exposure.		○	○
	Start/Stop/Close Timer	ON= Timer shown on the Acquisition monitor.		○	
	C-arm Reposition	Send the angle of displayed image to the C-arm.			○

Category	Button Name	LED State	Icon	A	R
Actions	Add Reference Image	ON= Add Reference Image available.		○	○
	Delete reference Image	Reference image deleted upon selection. ON= Delete Reference Image available.		○	○
	Save Still Image	ON= Save available. Blank once upon selecting.			○
	Add Print	Image is added for printing upon selection. ON= Add Print available.			○
	Monitor Select	ON= Acquisition monitor selected. OFF= Reference.		○	○
	Lateral Operation	(Bi-plane only) Enable to operate from ACQ-L when "Edit Sketch" and "MAP Power" are changed.		○	
	Reference Mode	ON= Reference Mode.		○	○
	Ref Sync	ON= RefSync mode.			○
	PCI View Mode	ON= PCI View mode.		○	
	Selecting the Last Loop	Select the last loop on the image selector.		○	○
	Table Reposition	ON= Send the position of displayed image to the tabletop.			○
	Fluoro Alarm	Cancel fluoro alarm sound.		○	○
Display	Filter by C-arm	ON= Images filtered to match C-arm position.			○
	Reference Image	Search and display the added reference images.		○	○
	16-up Selector	ON= 16-up Select mode. Goes OFF once selection made.			○
	Single/Split Display	IVR NEO focus= Reference. Reference split.			○
	Left/Right Focus	ON= Right half of split Reference monitor selected.			○
	Cine Area Zoom	ON= Zoom the image in the Examination room.		○	○

Category	Button Name	LED State	Icon	A	R
Display	Zoom In	Zoom level increases slightly upon selection. ON= Zoom In available.		○	○
	Zoom Out	Zoom level decreased slightly upon selection. ON= Zoom out available.		○	○
	H-Flip	Flip an acquisition image horizontally.			○
	V-Flip	Flip an acquisition image vertically.			○
Play	Play Forward	Loop plays forward upon selection. ON= Play Forward available.		○	○
	Play Backward	Loop plays backward upon selection. ON= Play Backward available.		○	○
	Play/Sync Mode	ON= Play Single Loop with Synchronize mode. OFF= Play Single Loop mode.			○
Analysis	LV Mode	LV menu shown upon selection. ON= LV menu shown.			○
	QCA Mode	QCA menu shown upon selection. ON= QCA menu shown.			○
	Select Image Comment	ON= Comment menu shown. Goes OFF once selection made.			○
	Add annotation's Text	Add text tool selected upon selection.			○
	Add annotation's Line	Line tool added at mouse cursor location upon selection.			○
	Add annotation's Curve	Curve tool added at mouse cursor location upon selection.			○
	Add annotation's Arrow	Arrow added at mouse cursor location upon selection.			○
	Add annotation's Caliper	Caliper tool added at mouse cursor location upon selection.			○
	Add annotation's Analysis	Analysis results added upon selection.			○
	Add annotation's Study	Study information added upon selection.			○
	Clear last annotation	Last annotation deleted upon selection.			○
	Clear all annotations	All annotations deleted upon selection.			○

Category	Button Name	LED State	Icon	A	R
Analysis	Show Annotation properties	Annotations properties shown upon selection.			○
	Add annotation's Pointer	Pointer tool selected upon selection.			○

A: relevant to Acquisition monitor, R: relevant to Reference monitor

NOTE

Change DUP or radiography mode during fluoroscopy by shortcut keys and IVR NEO buttons, after completing current fluoroscopy.

NOTE

Some shortcut keys are available at the same time with [AcqSync] button on the REF-PC side menu.

4.8.2 IVR NEO Joystick

The IVR NEO joystick can be used to playback images and perform other actions as follows.

No	Category	Initial GUI State	Joystick Function	A	R
1	Menu	Fluoro Program menu displayed	Up = move to previous menu item. Down = move to next menu item. Left = move to first menu item. Right = move to last menu item. Click joystick button = select highlighted menu item.		○
		Rad Program menu displayed			○
		Image Comment menu displayed			○
2	Playback	Cyclic Mode: (Playback in forward direction at acquisition speed.)	Up / Down = Play previous / next loop. In reference mode, display the previous / next reference image. Click joystick button = Switch to Still mode, pausing on image shown when clicked button.	○	○
		Still Mode: (Paused on still image in loop.)	Up / Down = Display previous / next loop. If a loop contains a reference image, display the reference image. In reference mode, display the previous / next reference image only. Left / Right then release (below threshold) = Display previous frame (to left) or next frame (to right) and then pause. Left / Right and hold (above threshold) = Play frame-by-frame backward (to left) / forward (to right) at speed (10% to 200%) set by joystick volume. Release joystick to Pause. Click joystick button = Switch to Cyclic mode and play loop forward at acquired speed.	○	○
3	Selection	16-up Selector window displayed	Left, Right, Up, Down = Move selection box around screen.		○
			Up / Down at screen top/bottom = Scroll Selection screen if more than 16 images.		○
			Click joystick button = Switch to Cyclic Mode and play selected loop (in single-image Image Viewer window) at acquired speed.		○
4	ROI	ROI Move Mode	Left, Right, Up, Down = Move ROI in parallel.		○
			Click joystick button = Switch to ROI Size Modification Mode.		○
		ROI Size Modification Mode	Left, Right, Up, Down = Modify ROI size by operating the peak of bottom-right of ROI as fixing the peak of upper-left of ROI.		○
5	MAP Power	MAP Power Modification Mode	Left= Decrease MAP power. Right= Increase MAP power.	○	

A: relevant to Acquisition monitor, R: relevant to Reference monitor. Playback of the image is common in both normal and split display.

4.9 Keyboard ShortCuts

Keyboard function keys have equivalent operation as IVR NEO buttons. ([Monitor Select] and [Reference Mode] functions are supported only for IVR NEO)

Move the mouse to Acquisition monitor to operate on Acquisition monitor.

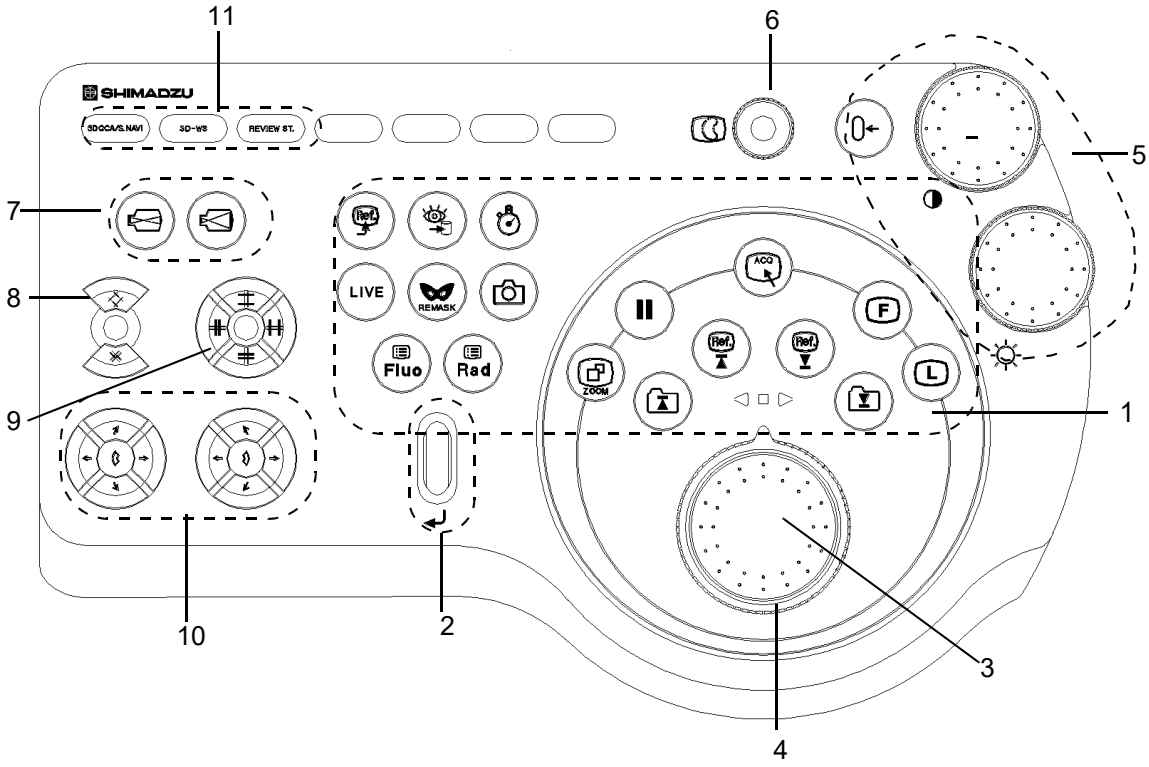
☞ "IVR NEO Buttons" P.4-66.

The following functions are set to IVR NEO and Shortcut Key as default. It is enable to set functions by holding down the left Shift key and press a function key (F1~F12).

IVR NEO		Shortcut Key	
Key	Description	Key	Description
B1	Select Fluoro Program	F1	Select Fluoro Program
B2	Monitor Select	F2	Select Rad Program
B3	Select Rad Program	F3	Live
B4	Live	F4	Filter by C-arm
B5	Filter by C-arm	F5	C-arm Reposition
B6	C-arm Reposition	F6	Start/Stop/Close Timer
B7	Start/Stop/Close Timer	F7	Cine Area Zoom
B8	Cine Area Zoom	F8	Select Image Comment
B9	Select Image Comment	F9	16-up Selector
B10	16-up Selector	F10	Save Fluoro
B11	Save Fluoro	F11	Save Still Image
B12	Save Still Image	F12	Add Reference Image
B13	Add Reference Image	Left Shift+F1~ Left Shift+F12	Not configured
B14	Reference Mode		
B15	Single/Split Display		
B16	Left/Right Focus		

4.10 IVR Shuttle (Option) (Either-or SMART Touch)

The IVR Shuttle features 17 buttons (each with an indicator LED) and 14 controls, including a dual-control shuttle. Button and control settings are as follows.



NOTE

The IVR NEO and IVR Shuttle operation is replicated to one another, as they work with each other. For example, when switching the IVR NEO focus from the Reference monitor to the Acquisition monitor with the IVR NEO [Monitor Select] button, the IVR Shuttle operation is activated on the Acquisition monitor as well. Therefore, do not use the IVR NEO and IVR Shuttle at the same time.

4.10.1 Functions of IVR Shuttle Buttons and Controls

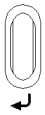
1 Buttons

Category	Button Name	Description	Icon	A	R
Acquisition	Select Fluoro Program	ON= Fluoro menu is displayed. Scroll up and down the menu selector (2) to move to the menu items. Press the menu selector to select the highlighted menu.	Fluo		○
	Select Rad Program	ON= Rad menu is displayed. Scroll up and down the menu selector (2) to move to the menu items Press the menu selector to select the highlighted menu.	Rad		○
	Add Reference Image	ON= Add Reference Image available.	Ref.	○	○
	Save Fluoro	ON= Save available. Fluoroscopy loop can be saved in buffer.		○	○
	Start/Stop/ Close Timer	Press once to display the timer on acquisition monitor to start. Press again to stop and press third time to hide the timer.		○	
Monitor	Monitor Select	ON= Acquisition monitor is selected. OFF= Reference monitor is selected.	ACQ	○	○
	Zoom	ON= Zoom is available. Scroll up and down the menu selector(2) to change the magnification.	ZOOM	○	○
	Live	ON= DSA image is displayed. OFF= LIVE image is displayed.	LIVE	○	○
	REMASK	ON= Create the mask again.	REMASK		○
	Pause	ON= LIVE image is paused.		○	○
	Select Reference Image	Select reference image. Display the previous image.	Ref.	○	○
		Display the next image.	Ref.	○	○
	Select Loop	ON= Acquisition monitor is selected. OFF= Reference monitor is selected.		○	○
		Review next loop.		○	○
	Frontal	For Bi-plane system, select a target processing for F or L individually. Adjusting Brightness/ Contrast, modifying Edge Enhancement and Save Still Image are processing.	F		○
	Lateral		L		○

Category	Button Name	Description	Icon	A	R
Others	Save Still Image	ON= Save available.			○

A: relevant to Acquisition monitor, R: relevant to Reference monitor

2 Menu



Scroll up and down to move to the menu items. Press the menu selector to select the highlighted menu.

3 Change Frame

Turn the internal dial to the right to display the next frame or to the left to display the previous frame.

4 Loop Speed Adjust

Turn th external dial to the right to play the loop forward and to the left to play the loop backward. Turn more in either direction to increase speed.

5 Brightness/Contrast Rest

Turn the [Brightness] dial to the right to increase image brightness or to the left to decrease brightness (max. 100, min. -100). And turn the [Contrast] dial to the right to increase image contrast or to the left to decrease contrast (max. 2000, min. -100). Press [Reset]  to return to the default brightness and contrast values.

6 Edge

Adjust the [Convolution] filter. Turn the [Edge] dial to the right to increase the sharpness of the image and to the left to decrease sharpness (max. 100, min. -100). Press the dial to return to the default value.

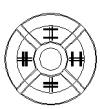
7 Change Field of View

Press the right button to increase the size of the FOD field of view and left reduce.

8 Collimator C-leaf and Peripheral Filter

Use the upper button to open the C-leaf collimator and the lower button to close it.

9 Collimator V/H-leaf



Open and close the collimator V/H-leaf. Use the up (open) /down (close) button for the collimator V-leaf and the right (open) / left (close) button for the collimator H-leaf. Press the center button to fully open the H, V and C leaf.

10 Compensation Filter

Open, close and rotate the right and left compensation filter.

11 Exam Room Switch Monitor

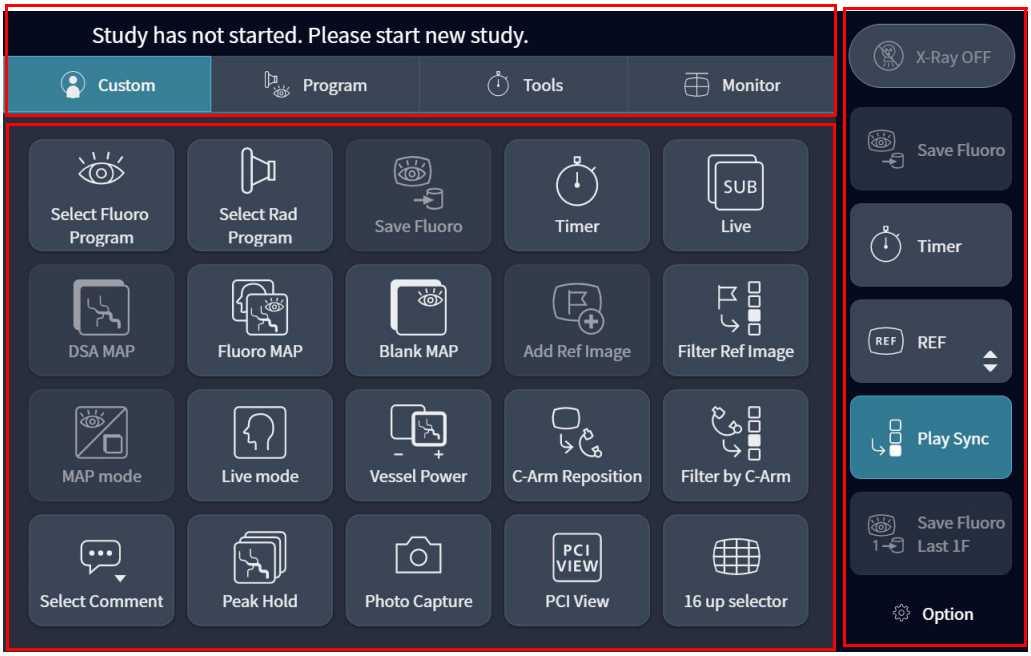
If there are option computers such as 3D workstation, connect display in the examination room.

4.11 SMART Touch (Either-or IVR NEO/IVR Shuttle)

SMART Touch is consist of Tab Area, Panel Area and Side Menu. And a joystick is connected to SMART Touch, and menu selection and image control are available.

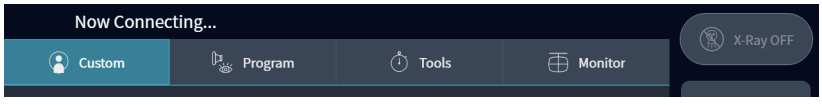
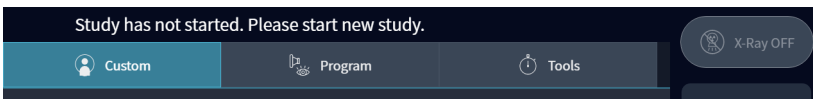
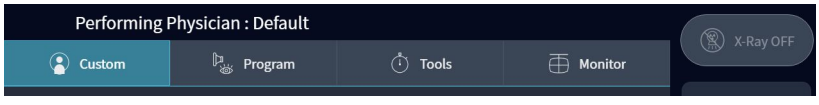
1. Tab Area

3. Side Menu



2. Panel Area

The following table shows description of each area.

No.	Function	Outline
1	Tab Area	Consist of message area and tabs to switch the panel display. Type of tabs are as follows: Custom Tab, Program Tab, Tool Tab and Monitor Tab (when connected to SMART Display) Following messages are displayed in the Message Area. When connected to DAR-9500f system:  Before start new study:  During study: 
2	Panel Area	Contents of display will change depending on the selected tab.

No.	Function	Outline
3	Side Menu	Consist of [X-ray OFF], [Option] buttons, and 5 of function buttons. And if fluoroscopy time exceeds the setting fluoroscopy time, [Fluoro Alarm] button will be displayed.

NOTE

Enable to connect up to 3 SMART Touch.

As each SMART Touch synchronized, operation of SMART Touch reflects to other SMART Touch. (For example, if change the target monitor from REF monitor to ACQ monitor with [Monitor Select] button of SMART Touch which s placed in the control room, SMART Touch which is placed in the examination room will also control the ACQ monitor.) So, do not use several SMART Touch at the same time.

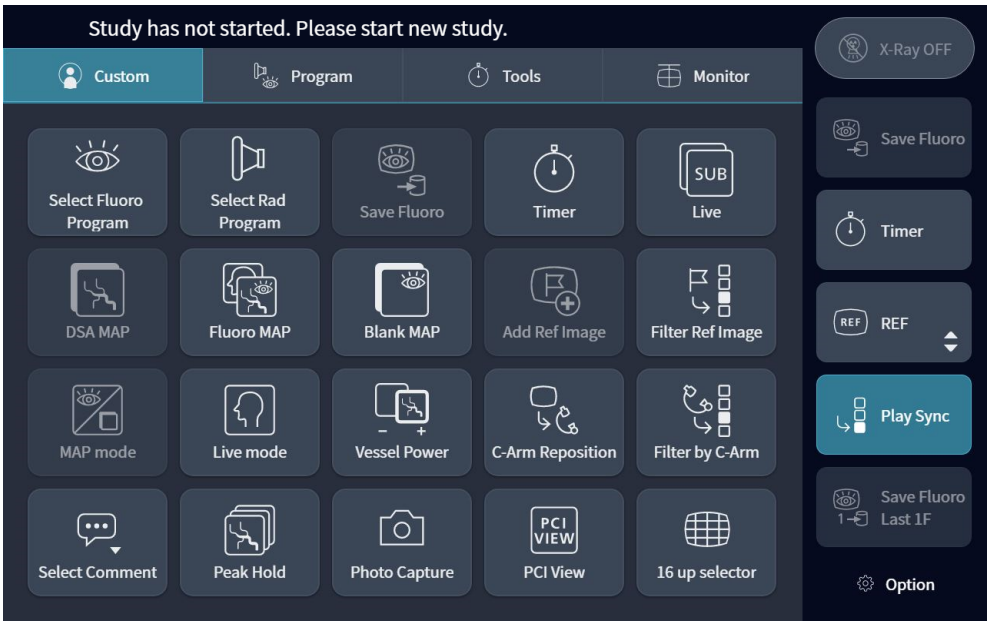
NOTE

Function buttons are configurable individually for each SMART Touch.

4.11.1 Custom Panel

Custom panel is displayed shortly after the system startup and touching the Custom Tab. An optional function can be registered for each physician on the Custom panel.

The following figure shows default settings.



Refer to ☞ "4.11.6 SMART Touch Buttons" P.4-100 for each function.

Option Button

NOTE

Unable to use [Option] button during study.

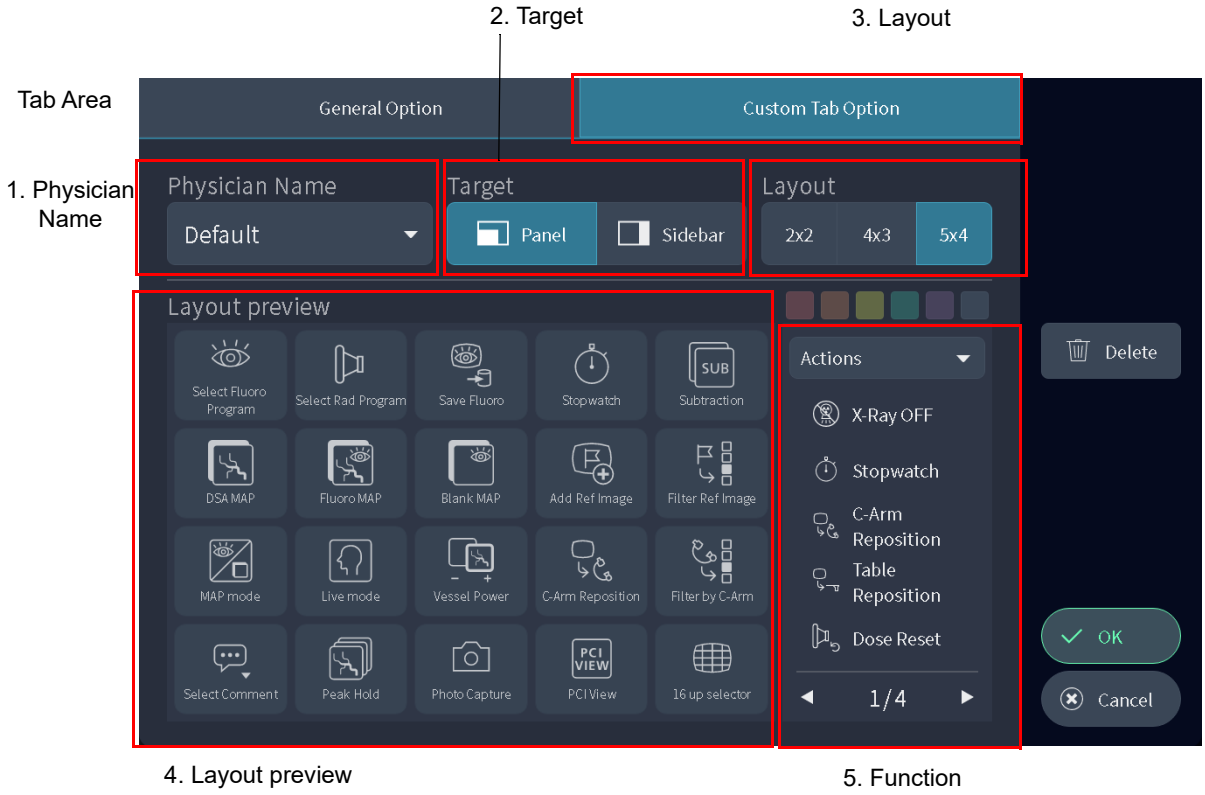
Modify the following settings from the Option window.

- Assignment of buttons on the Custom Panel and Side Menu
- Layout of Custom Panel
- Color Theme
- Volume

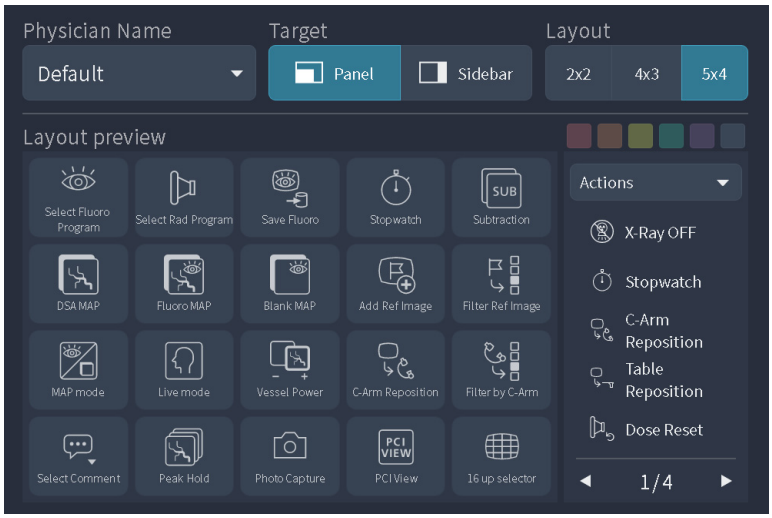
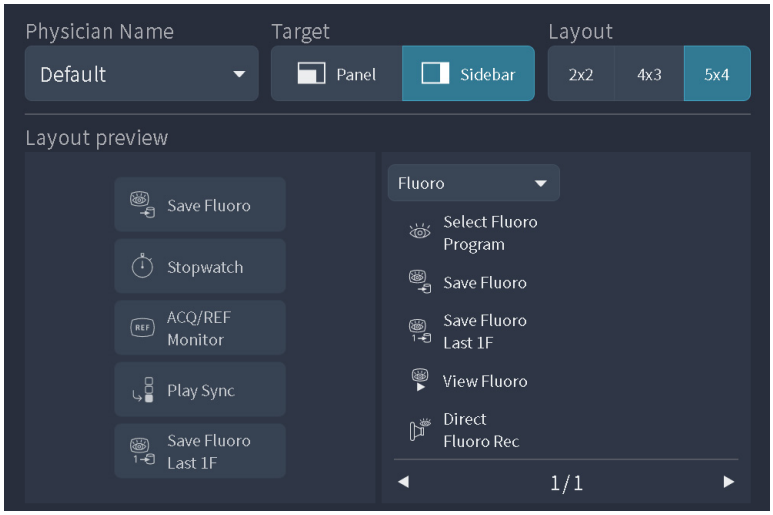
Configuration is available for each physician on the Option window.

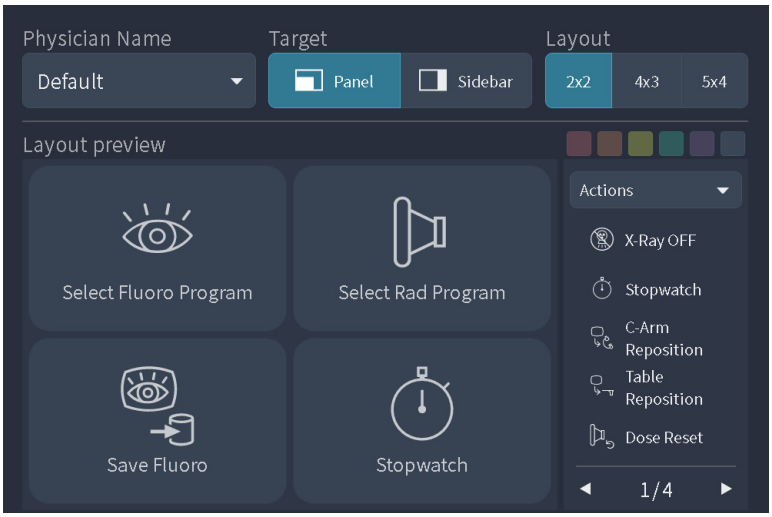
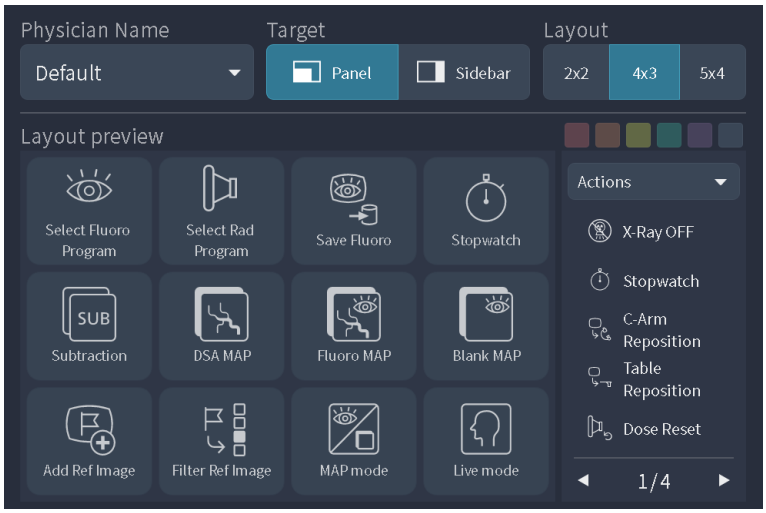
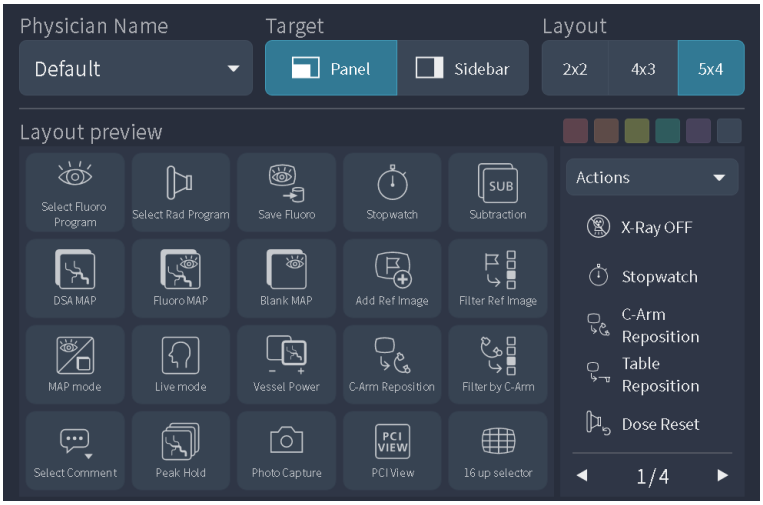
And if install several SMART Touch, enable to set for each SMART Touch appropriate to usage and operator.

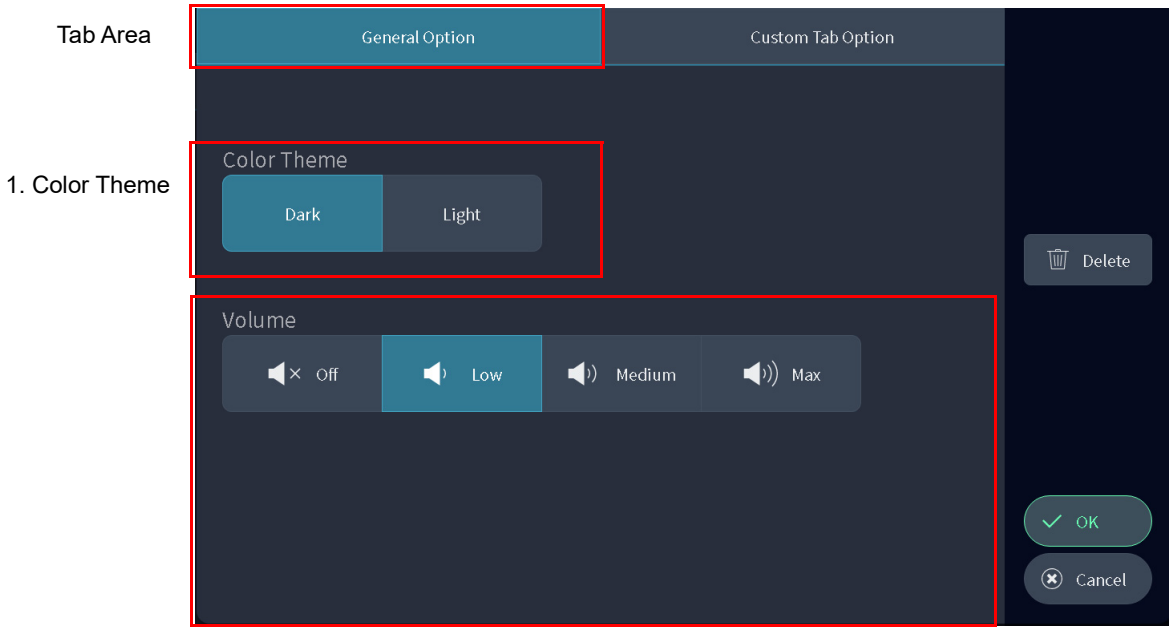
Tab Area is consist of [General option] and [Custom tab option].

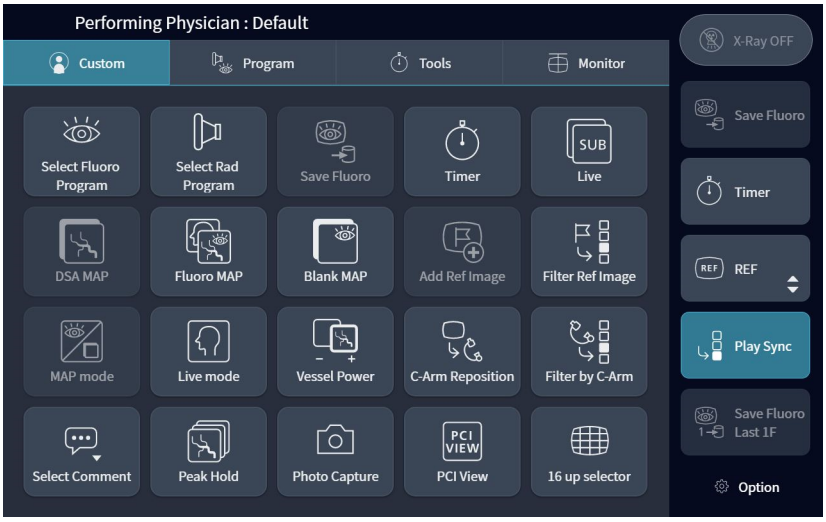


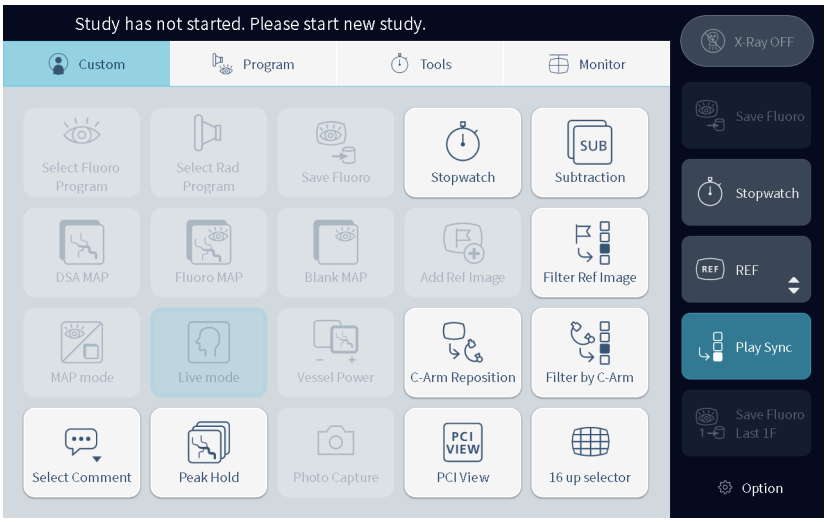
No.	Area	Outline
Custom Tab Option		
1	Physician Name	Select a physician to customize.

No.	Area	Outline
2	Target	Select a target to customize from Panel Area and Sidebar. Panel Area:  Sidebar: 

No.	Area	Outline
3	Layout	Select the number of buttons to display on the Custom Panel from [2x2], [4x3] and [5x4] 2x2:.  4x3:  5x4: 
4	Layout preview	Display the buttons assigned to the Custom Panel and Sidebar.
5	Function	Display functions that are to be assigned.



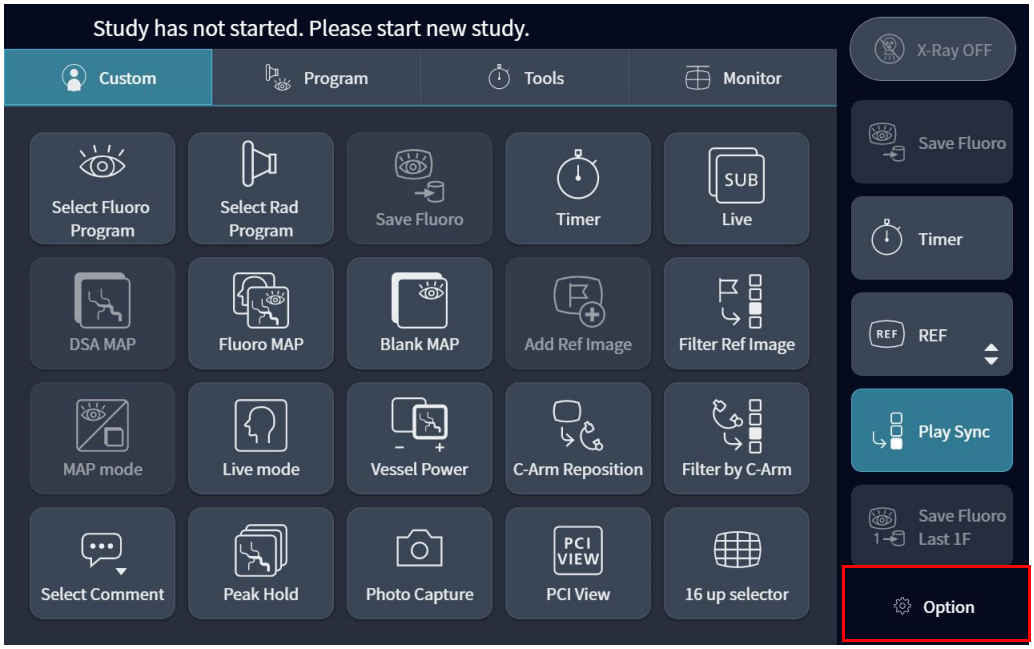
No.	Area	Outline
General Option		
1	Color Theme	Modify the display color. Dark: 

No.	Area	Outline
		Light: 
2	Volume	Modify the volume of Touch sound.

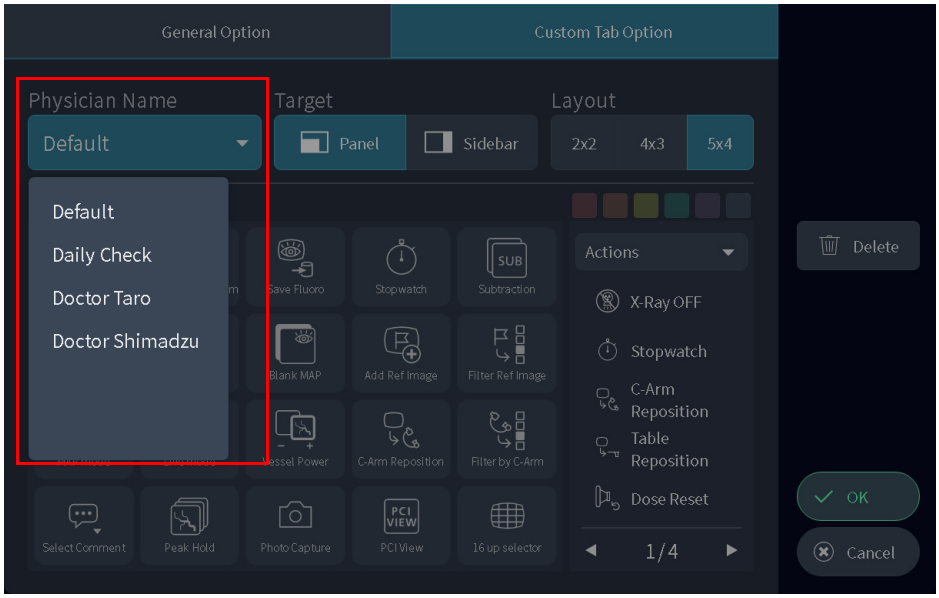
Modify Assignment of Buttons

Assign optional buttons to Custom Panel and Side Menu for each physician and SMART Touch.

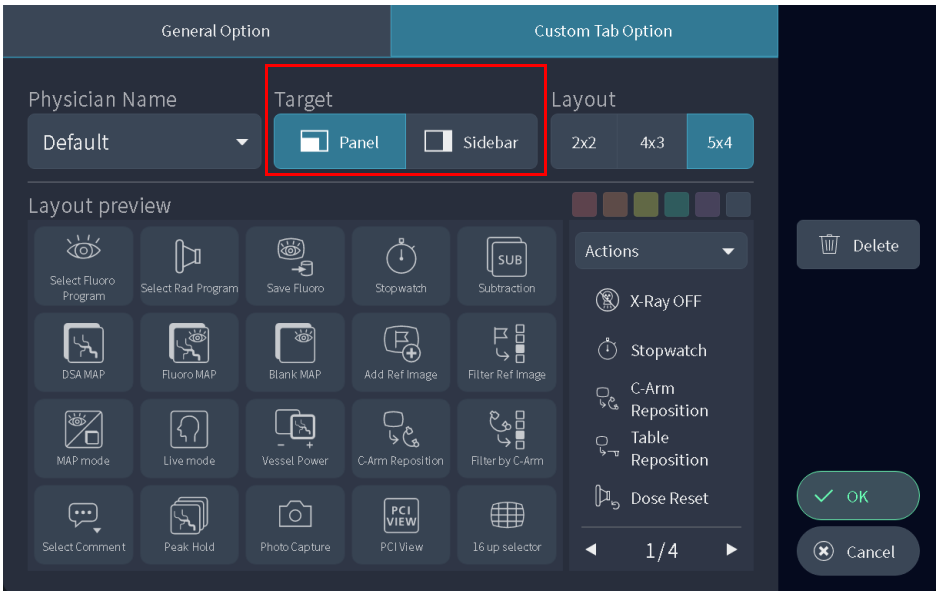
1 Touch [Option].



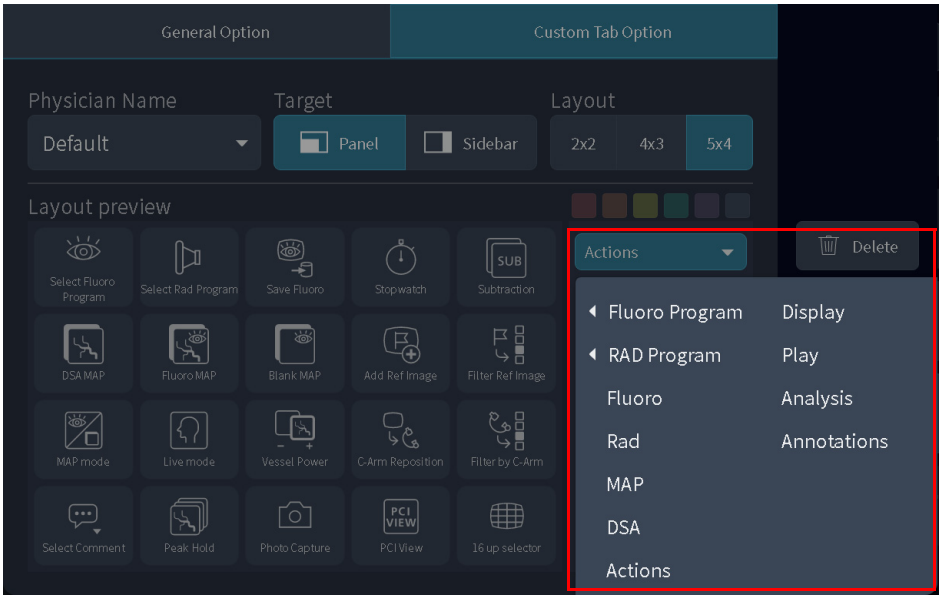
2 Select customized physician from [Physician Name].



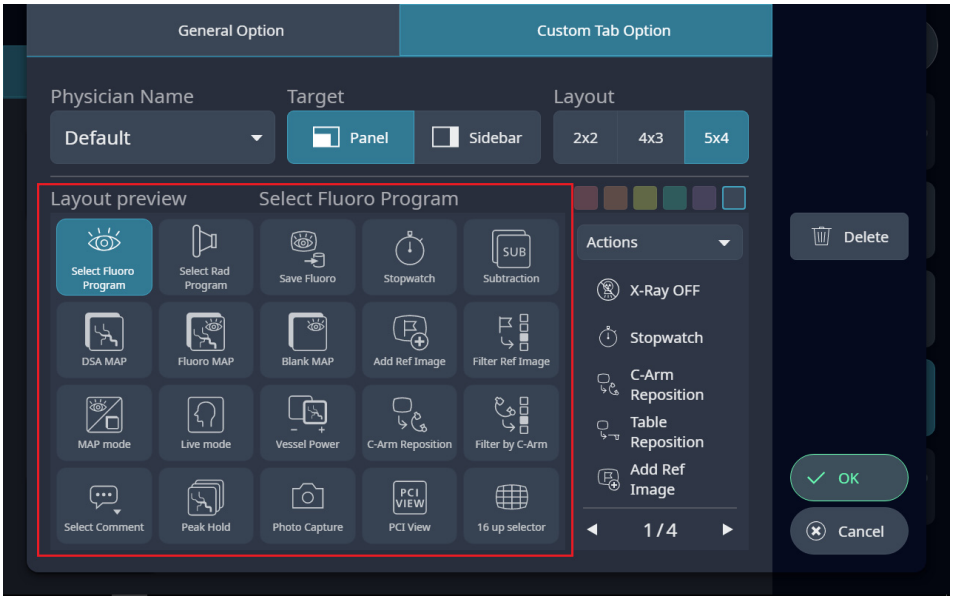
3 Select [Panel] or [Sidebar] from [Target]. Display of Layout preview is changed.



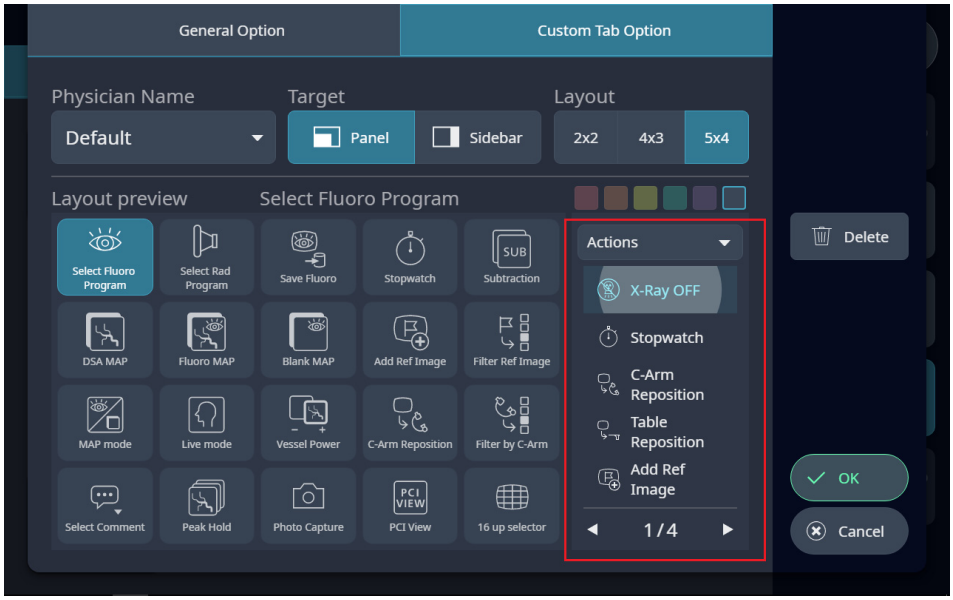
4 Select a category from [Function].



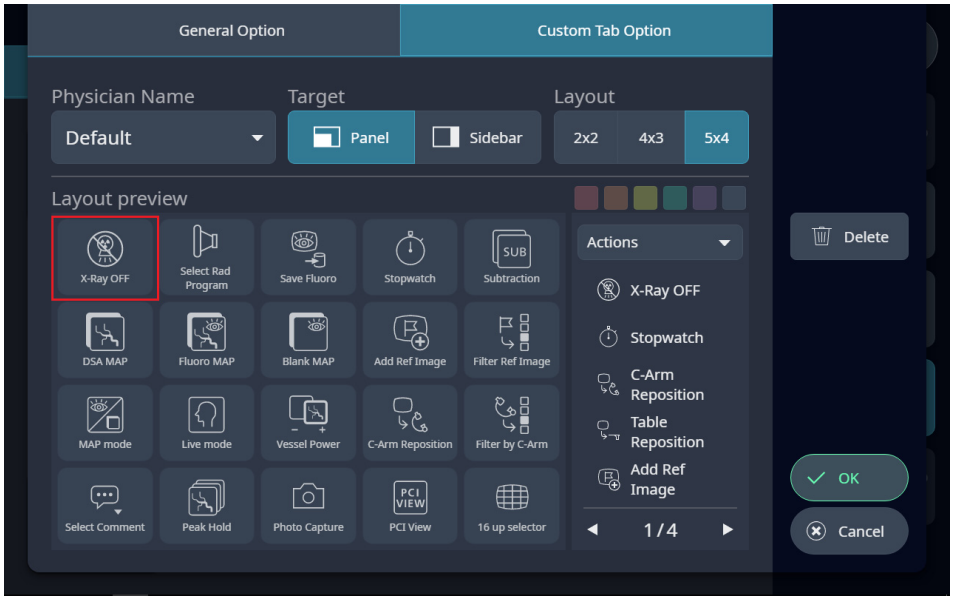
5 Select a button to be modified from [Layout preview].



6 And then select a button to be assigned.

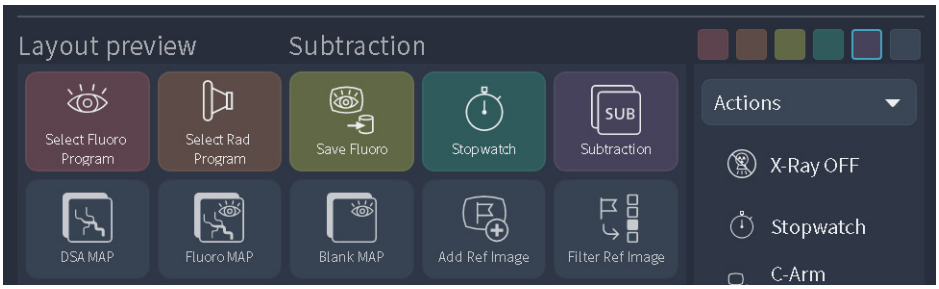


The button is modified.

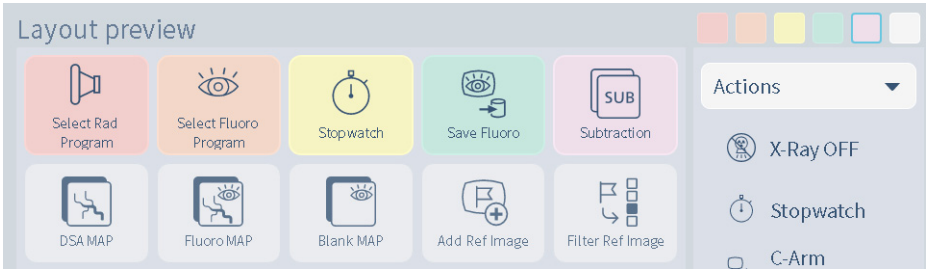


Change of Button Colors

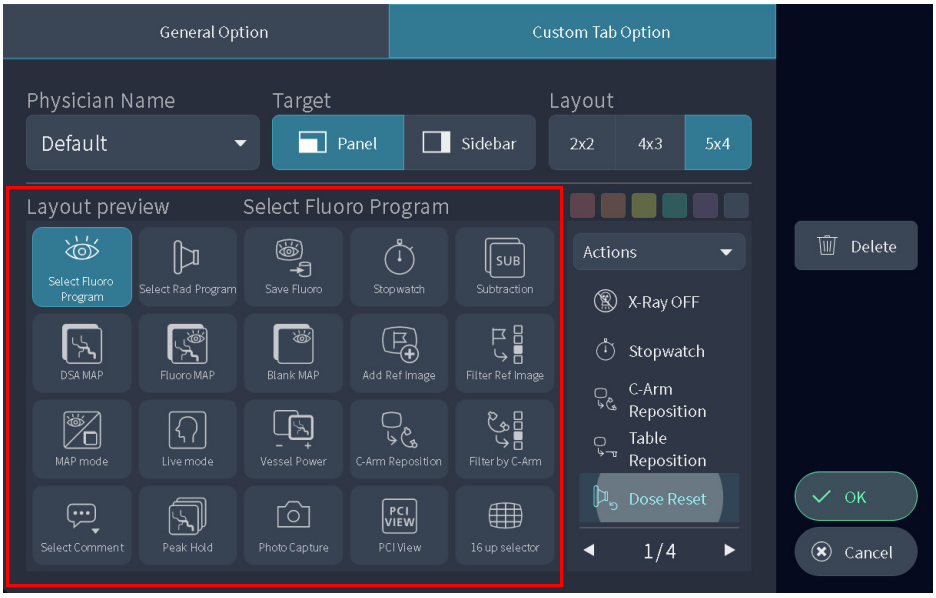
Change the color of buttons on the Custom Panel. If display color is Dark, enable to set the following colors.



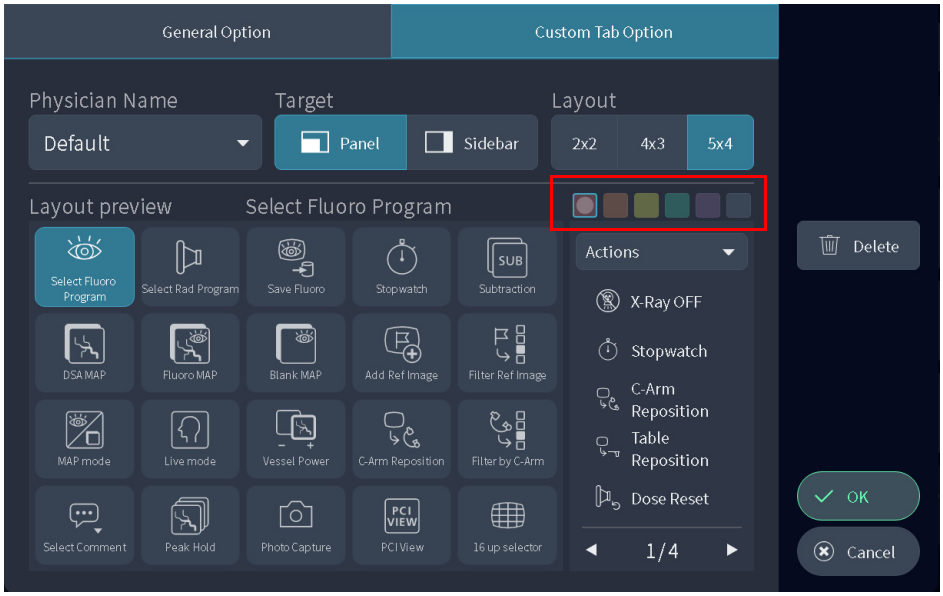
If display color is Light, enable to set the following colors.



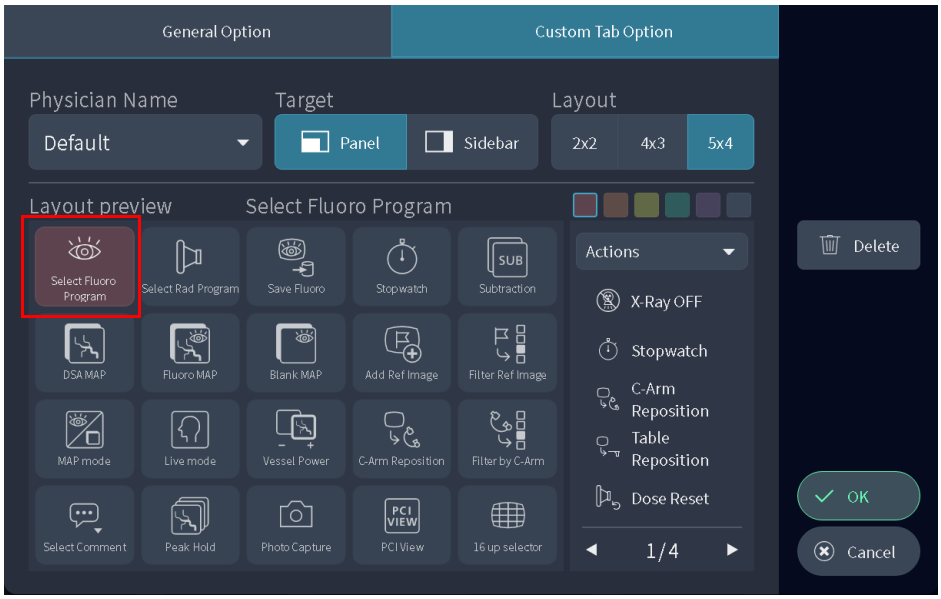
1 Select a button to be modified from [Layout preview].



2 Select the color of button.

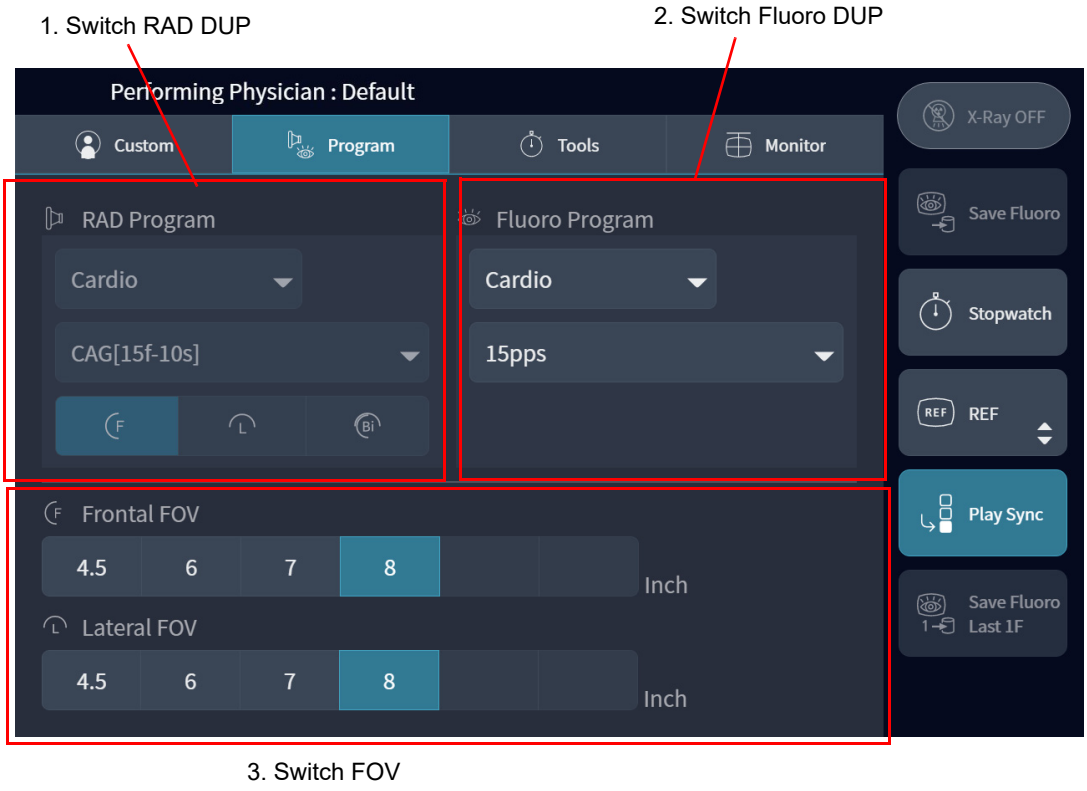


The color of button will be changed.



4.11.2 Program Panel

Program Panel is displayed when touching the Program tab. There are buttons to switch Digital User Program (DUP), Radiography Plane, and FOV.

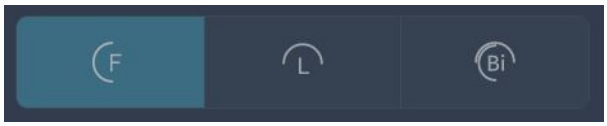


Switch RAD DUP

Touch RAD menu to display a pull-down menu and touch desired DUP.

Switch RAD Plane (In case of Bi-plane system)

Touch the plane to perform radiography.

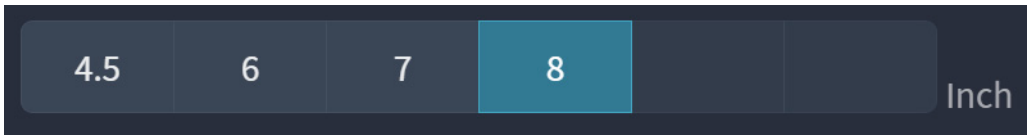


Switch Fuoro DUP

Touch Fluoro menu to display a pull-down menu and touch desired DUP.

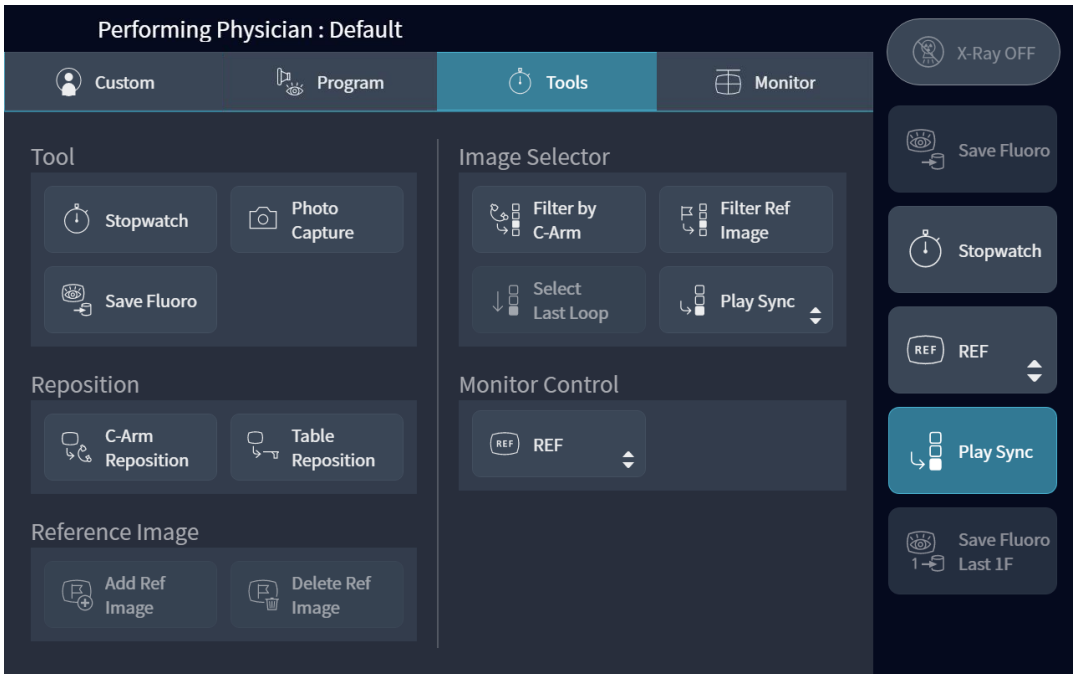
Switch FOV

Touch FOV to be used.



4.11.3 Tool Panel

Tool panel will display when touch the Tool Tab. There are pre-assigned buttons on the tool tab.



The following table shows the registered functions.

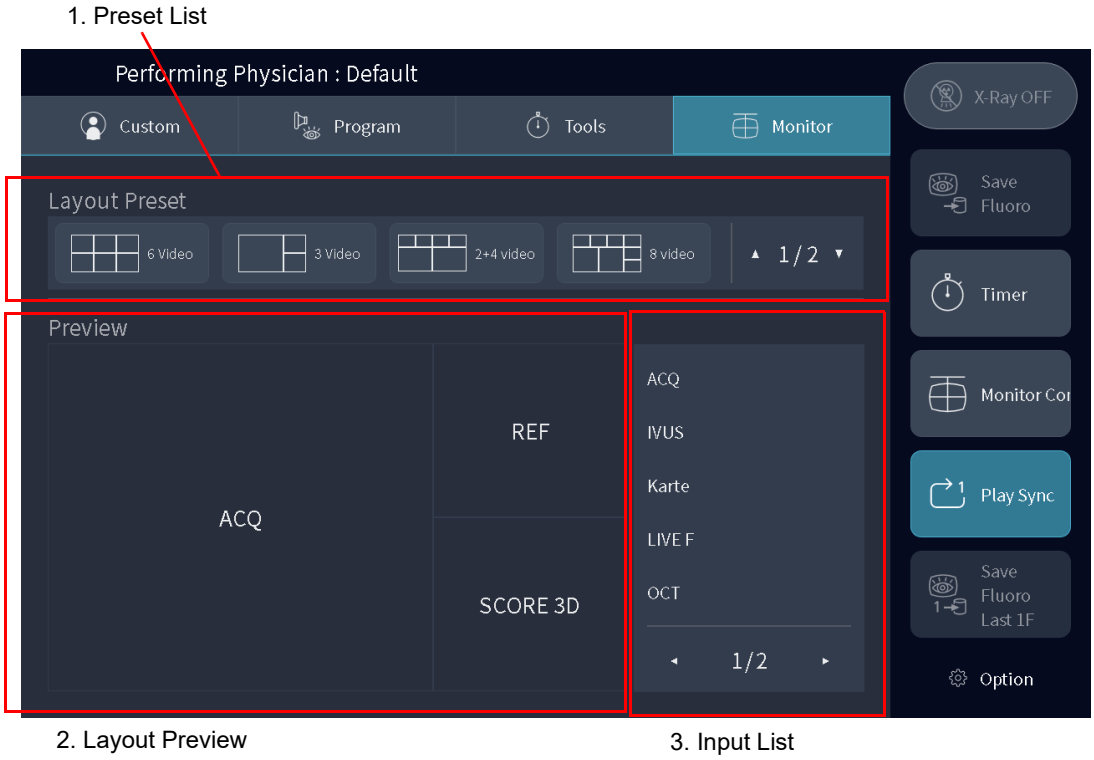
Function	Outline
Tool Area	
Stopwatch	Timer shown on the acquisition monitor.
Photo Capture	Save still image.
Save Fluoro	Save fluoroscopy image.
Reposition Area	
C-Arm Reposition	Move the C-arm to position of the image.
Table Reposition (Combined with KS-100)	Move the table to position of the image.
Reference Image Area	
Add Ref Image	Register reference image.
Delete Ref Image	Delete reference image.
Image Selector Area	
Filter by C-Arm	Filter the image based on the C-arm.
Filter Ref Image	Filter the image based on the reference image.
Select Last Loop	Select the last acquisition image.
Play Sync/Play	Switch [Sync] and [Play].

Function	Outline
Monitor Control Area	
ACQ Sync	(For Bi-plane system only) Synchronize the operation of ACQ-F monitor and ACQ-L monitor.
REF Sync	(For Bi-plane system only) Synchronize the operation of REF-F monitor and REF-L monitor.
ACQ	Operation target is ACQ monitor.
REF	Operation target is REF monitor.
Frontal	Operation target is Frontal.
Lateral	(For Bi-plane system only) Operation target is Lateral.

4.11.4 Monitor Panel (Only when SMART Display is connected)

> **NOTE**
>
> Be sure to include acquisition monitor in the preset.

Monitor panel will display when touch the Monitor Tab. Select SMART Display preset and switch video input.



The following table shows description of each area.

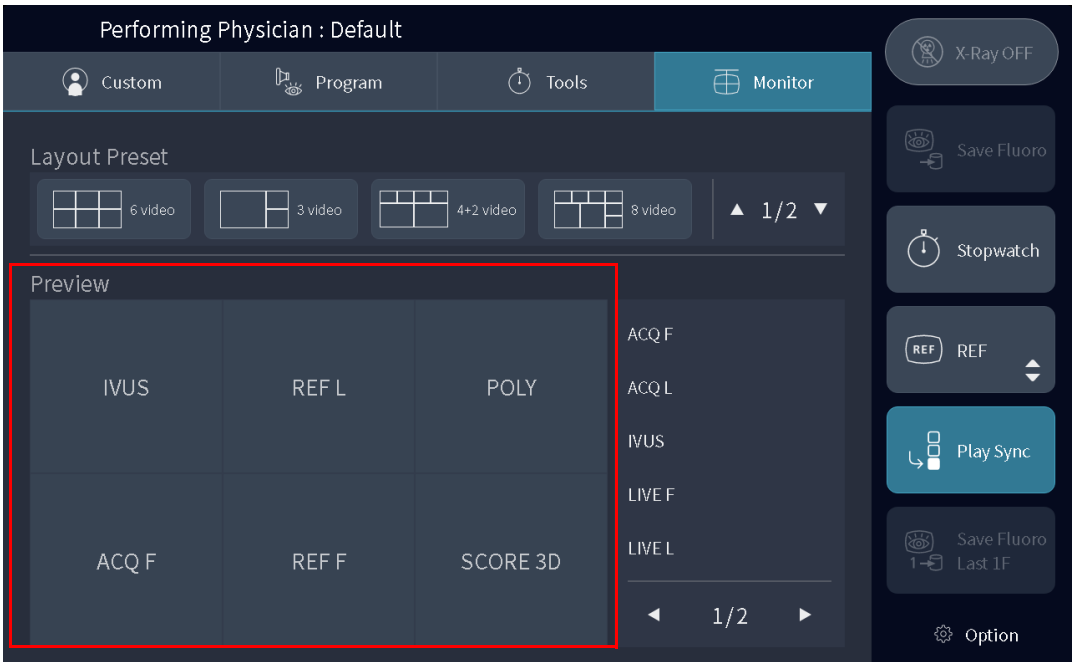
No.	Area	Outline
1	Preset List	Select preset of SMART Display. Selected preset is displayed on the preset preview.
2	Preset Preview	Display preset of SMART Display. Display video input on each area in the preset preview.
3	Input List	List video input that can be displayed on the SMART Display.

Change of Preset

1 Select preset from the preset list.

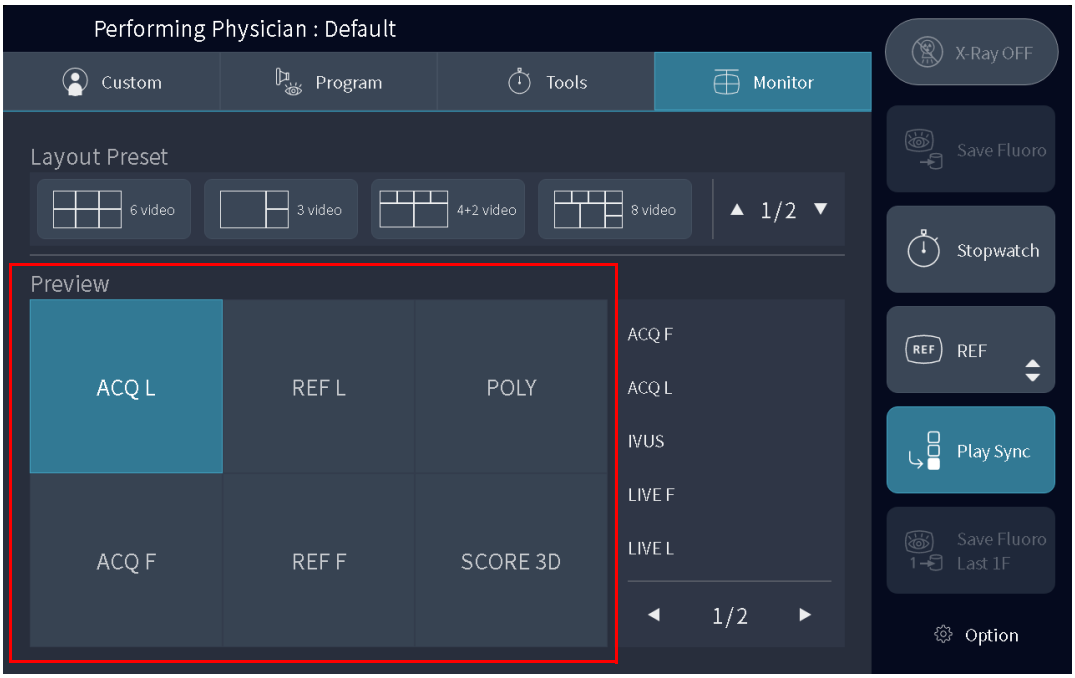
Touch an arrow key to change the page of preset list.

2 Select preset to display selected preset on the preset preview.

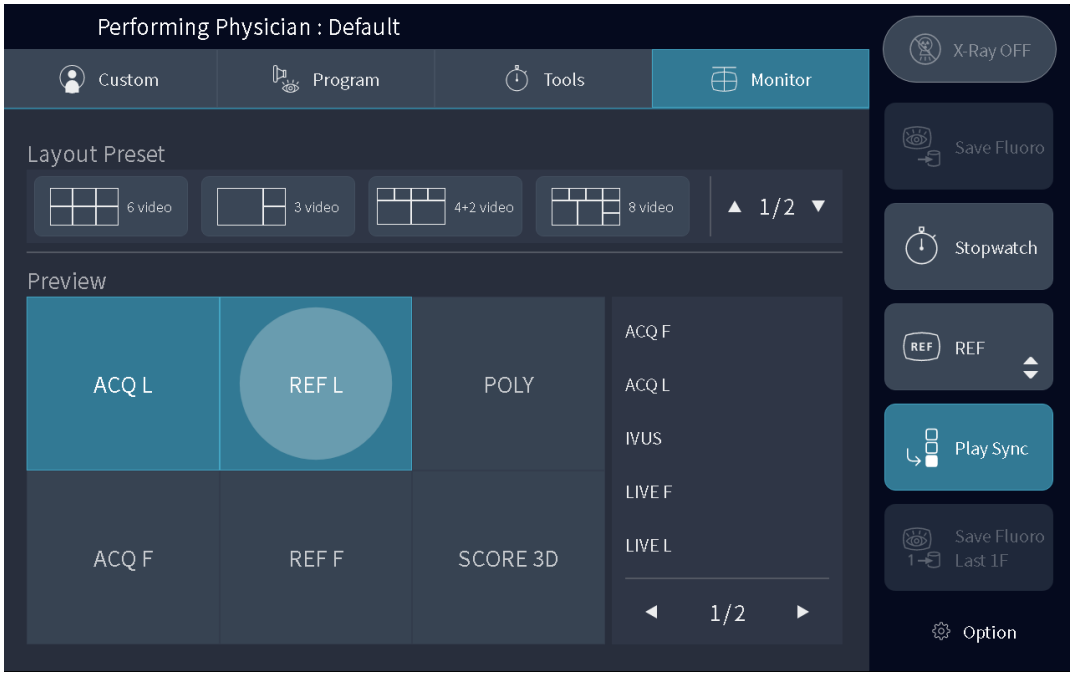


Change of Segment

1 Select segment to change the display position on the preset preview.



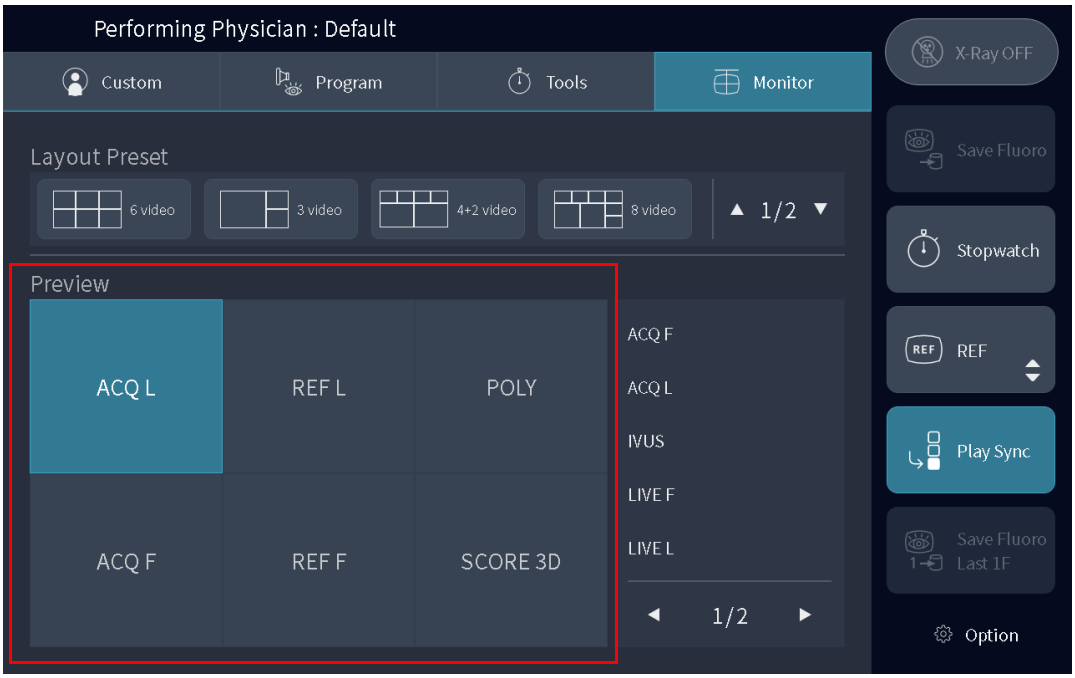
2 Select segment to be displayed.



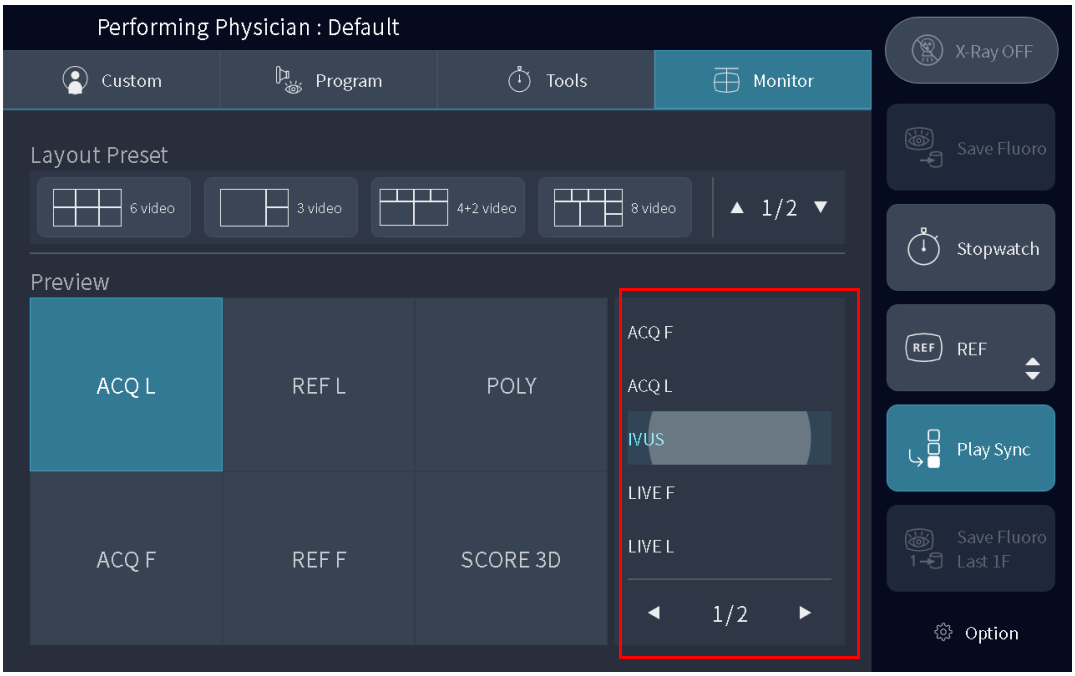
Segment is changed.

Change of Video Input

1 Select video input to be changed on the preset preview.



2 Select video input to be displayed from the input list.



Video input is changed.

4.11.5 Side Menu

There are [X-ray OFF] button and function buttons on the side menu. And if exceed setting fluoroscopy time, [Fluoro Alarm] stop button display.

1. X-ray OFF button

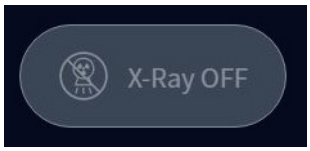
2. Option button

3. Fluoro Alarm stop button

X-ray OFF

Touch [X-ray OFF] button to stop X-ray radiography and fluoroscopy. X-ray OFF icon turns to red if it is selected. Touch the button again to enable X-ray radiography and fluoroscopy.

X-ray ON



X-ray STOP

Function Button

The following figure shows default setting.

Refer to ☞ "4.11.6 SMART Touch Buttons" P.4-100 for each function.

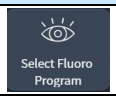
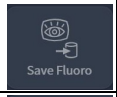
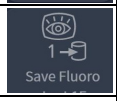
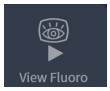
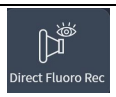
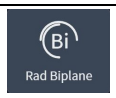
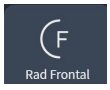
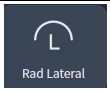
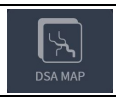
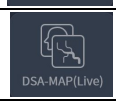
Stop Fluoro Alarm

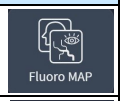
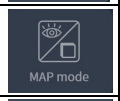
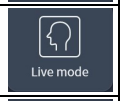
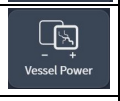
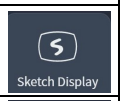
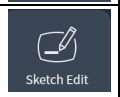
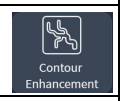
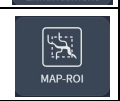
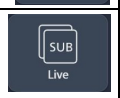
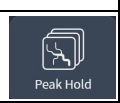
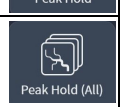
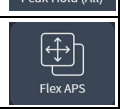
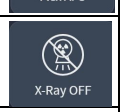
If exceed setting fluoroscopy time, [Fluoro Alarm] stop button will display. Touch [Fluoro Alarm] stop button to stop fluoroscopy alarm.

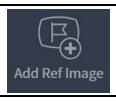
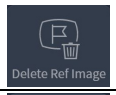
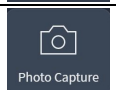
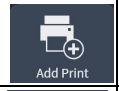
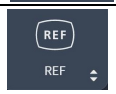
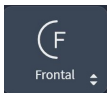
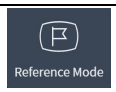
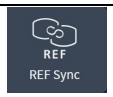
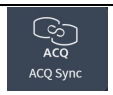
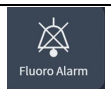
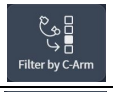
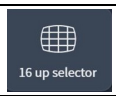
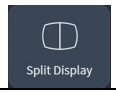
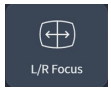
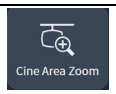
4.11.6 SMART Touch Buttons

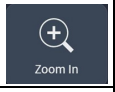
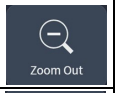
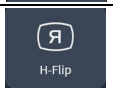
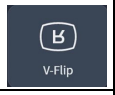
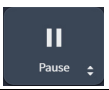
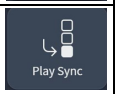
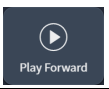
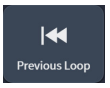
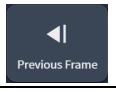
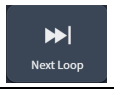
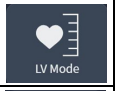
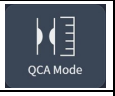
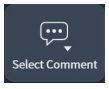
SMART Touch buttons are summarized in the following table.

Color of button turns green when it is available. And button turns grayout when it is not available.

Category	Button Name	LED State	Icon	A	R
Fluoroscopy	Select Fluoro Program	Display fluoro menu.			○
	DUP-Fluoro	Associated predefined Fluoro mode selected upon selection.		○	○
	Save Fluoro	Record the latest fluoro loop. ([Fluoro]-[Save] buttons on the side menu is also available.)		○	○
	Save Last Fluoro	Record the latest frame of fluoro loop.		○	○
	View Fluoro	Last acquired Fluoro loop shown upon selection.			○
	Direct Fluoro Rec	Save at the same time with fluoroscopy acquisition. It becomes unavailable after fluoroscopy acquisition.			○
Radiography	Select Rad Program	ON= Rad menu shown. Goes OFF once selection made.			○
	DUP-Rad	Associated predefined Rad mode selected upon selection.		○	○
	Toggle Rad Mode	(Biplane only) Change the plane in order of Frontal, Bi and Lateral.		○	○
	Rad Biplane	(Biplane only) Change the plane to Bi-plane.		○	○
	Rad Frontal	(Biplane only) Change the plane to Frontal.		○	○
	Rad Lateral	(Biplane only) Change the plane to Lateral.		○	○
MAP	DSA-MAP	DSA-MAP mode.		○	○
	DSA-MAP (Live)	DSA-MAP Live mode.		○	○
	DSA-MAP (Sub)	DSA-MAP Sub mode.		○	○

Category	Button Name	LED State	Icon	A	R
MAP	FluoroMAP	FluoroMAP Mask Creation mode.		○	○
	FluoroMAP (Live)	FluoroMAP Live mode.		○	○
	FluoroMAP (Sub)	FluoroMAP Sub mode.		○	○
	BlankMAP	Register the Blank mask.			○
	MAP mode	MAP mode.		○	○
	LIVE mode	Live mode.			○
	Reset BG Mask	Reset the background mask.			○
	Vessel Power	SMART Touch joystick changes Vessel Power.		○	
	Sketch Display	Sketch Display mode.		○	
	Sketch Edit	Sketch Edition window is displayed, and the Joystick becomes available.		○	
	Contour	Display the contour enhanced image.			○
	Mask Region	ROI of SIMAP is displayed on the image and the joystick is in the operation mode.			○
DSA	LIVE	Display DSA Live image.		○	○
	Peak Hold	Display the peak hold image.			○
	Peak Hold (All Frames)	Display the peak hold image which used all frames.			○
	Flex-APS (Option)	Display the offset position image.			○
Actions	X-ray OFF	Ban the X-ray exposure.		○	○
	Timer	Timer shown on the Acquisition monitor.		○	
	C-Arm Reposition	Send the angle of displayed image to the C-arm.			○

Category	Button Name	LED State	Icon	A	R
Actions	Table Reposition	(When combined with KS-100) Send the position of displayed image to the tabletop.			○
	Add Reference Image	Add Reference Image available.		○	○
	Delete reference Image	Reference image deleted upon selection.		○	○
	Photo Capture	Save still image (must be paused).			○
	Add Print	Image is added for printing upon selection.			○
	Monitor Select	Select the monitor operating with SMART Touch.		○	○
	Lateral Operation	(Bi-plane only) Enable to operate from ACQ-L when "Edit Sketch" and "MAP Power" are changed.		○	
	Reference Mode	Reference Mode.		○	○
	REF Sync	(Bi-plane only) RefSync mode.			○
	ACQ Sync	(Bi-plane only) RefSync mode.			○
	PCI View	PCI View mode.		○	
	Select Last Loop	Select the last loop on the image selector.		○	○
	Fluoro Alarm	Cancel fluoro alarm sound.		○	○
Display	Filter by C-Arm	Images filtered to match C-arm position.			○
	Filter Ref Image	Search and display the added reference images.		○	○
	16-up Selector	Display in 16-up Select mode.			○
	Split Display	Split review monitor in vertically.			○
	Left/Right Focus	Click a half (left or right) of split image on the Reference monitor.			○
	Cine Area Zoom	Zoom the images only in the Examination room.		○	○

Category	Button Name	LED State	Icon	A	R
Display	Zoom In	Zoom level increases slightly upon selection.		○	○
	Zoom Out	Zoom level decreased slightly upon selection.		○	○
	H-Flip	Flip an acquisition image horizontally.			○
	V-Flip	Flip an acquisition image vertically.			○
Play	Play/Pause	Switch Play/Pause.		○	○
				○	○
	Play Sync	ON= Play Single Loop with Synchronize mode.			○
	Play Forward	Loop plays forward upon selection.		○	○
	Play Backward	Loop plays backward upon selection.		○	○
	Previous Loop	Play/show previous loop/image.		○	○
	Previous Frame	If paused, show previous frame.		○	○
	Next Loop	Play/show next loop/image.		○	○
	Next Frame	If paused, show next frame.		○	○
Analysis	LV Mode	LV menu shown upon selection.			○
	QCA Mode	QCA menu shown upon selection.			○
Annotation	Select Image Comment	Comment menu shown. Goes OFF once selection made.			○

A: relevant to Acquisition monitor, R: relevant to Reference monitor

4.11.7 SMART Touch Joystick

The SMART Touch joystick can be used to playback images and perform other actions as follows.

No	Category	Initial GUI State	Joystick Function	A	R
1	Menu	Fluoro Program menu displayed	Up = move to previous menu item. Down = move to next menu item. Left = move to first menu item. Right = move to last menu item. Click joystick button = select highlighted menu item.		○
		Rad Program menu displayed			○
		Image Comment menu displayed			○
2	Playback	Cyclic Mode: (Playback in forward direction at acquisition speed.)	Up / Down = Play previous / next loop. In reference mode, display the previous / next reference image. Click joystick button = Switch to Still mode, pausing on image shown when clicked button.	○	○
		Still Mode: (Paused on still image in loop.)	Up / Down = Display previous / next loop. If a loop contains a reference image, display the reference image. In reference mode, display the previous / next reference image only. Left / Right then release (below threshold) = Display previous frame (to left) or next frame (to right) and then pause. Left / Right and hold (above threshold) = Play frame-by-frame backward (to left) / forward (to right) at speed (10% to 200%) set by joystick volume. Release joystick to Pause. Click joystick button = Switch to Cyclic mode and play loop forward at acquired speed.	○	○
3	Selection	16-up Selector window displayed	Left, Right, Up, Down = Move selection box around screen.		○
			Up / Down at screen top/bottom = Scroll Selection screen if more than 16 images.		○
			Click joystick button = Switch to Cyclic Mode and play selected loop (in single-image Image Viewer window) at acquired speed.		○
4	ROI	ROI Move Mode	Left, Right, Up, Down = Move ROI in parallel.		○
			Click joystick button = Switch to ROI Size Modification Mode.		○
		ROI Size Modification Mode	Left, Right, Up, Down = Modify ROI size by operating the peak of bottom-right of ROI as fixing the peak of upper-left of ROI.		○
5	MAP Power	MAP Power Modification Mode	Left= Decrease MAP power. Right= Increase MAP power.	○	

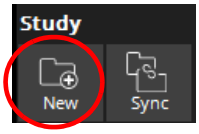
A: relevant to Acquisition monitor, R: relevant to Reference monitor. Playback of the image is common in both normal and split display.

4.12 Closing the Active Study

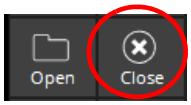
Once the diagnostic procedure has been completed, you must close the active study.

Follow this procedure.

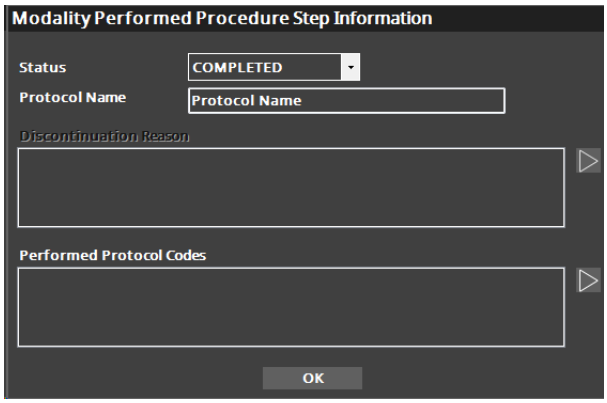
1 When a new diagnostic procedure will begin immediately, typically for a different patient, click [New] on the side menu.



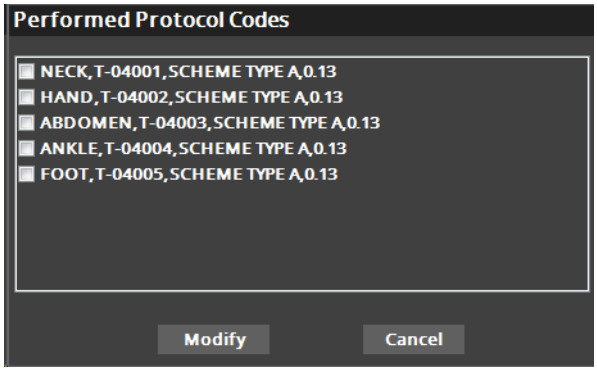
2 The active study is closed and a new study is initiated. When you do not have a new diagnostic procedure to begin immediately, click [Close] instead.



3 When MPPS support is enabled, if a Performed Procedure Step manager is used, you will be prompted to select the status of the completed (or discontinued) study like this:

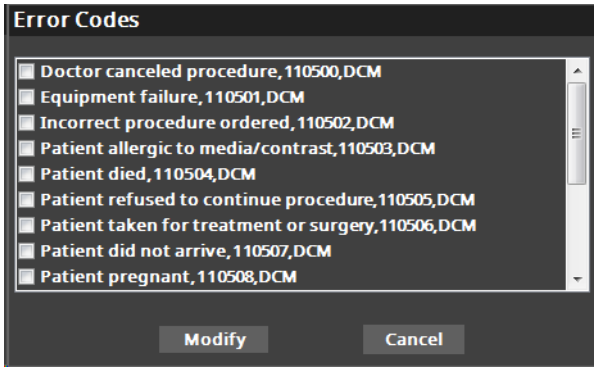


For completed studies, choose [COMPLETED] in the Status list, and optionally, adjust the Performed Protocol codes by clicking the arrow button. Once back at the above window, click [OK] to complete the study.



For discontinued studies, choose [DISCONTINUED] in the status list and open the Discontinuation Reason list by clicking the arrow button.

Choose the reason and then click [Modify] to return to the above window. Click [OK] to close the discontinues study.



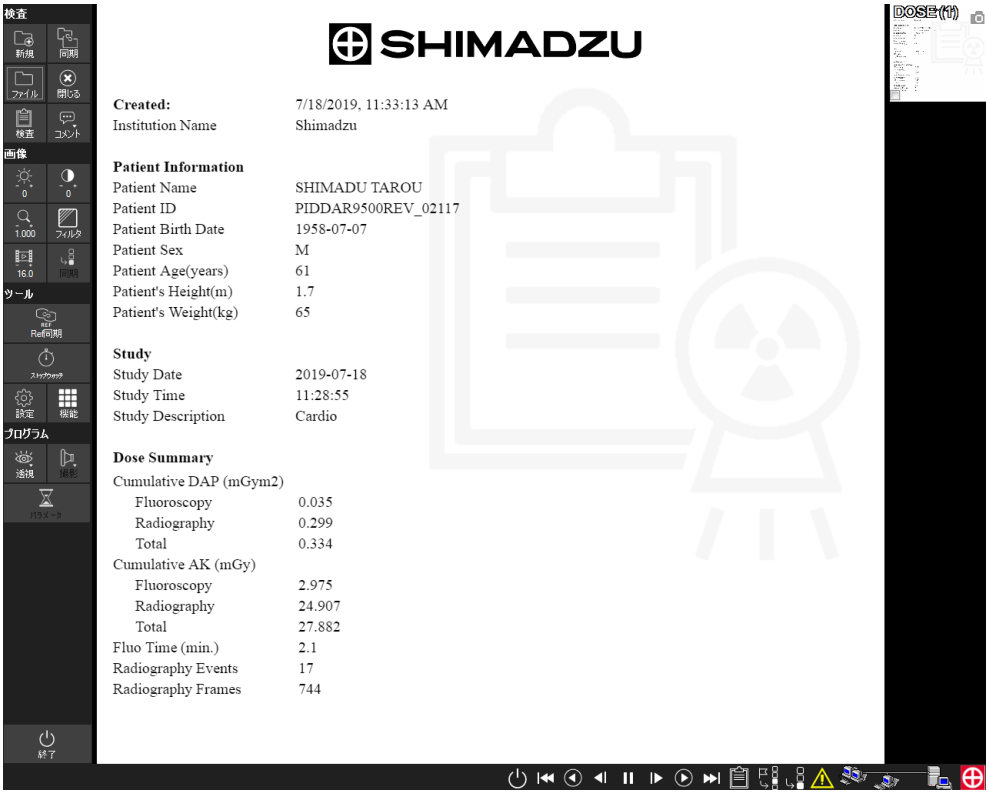
If configured, a Grayscale Softcopy Presentation State is automatically created and saved for all loops just acquired in the study.

Depending on what has already occurred in the study, any number of the following actions may also occur at study closure.

- When MPPS (modality performed procedure step) feature is installed, the PPS (performed procedure step) manager is notified by the MPPS of the study closure and its result, either [Completed] or [Discontinued].
- Reference images are saved as DICOM objects and if configured, are sent to the archive server.
- If configured, media writing (CD/DVD) is automatically started. The media tray opens so that you can insert a blank disc. If your hardware supports it, you may be prompted to choose your media type, CD or DVD, for example. Choose the media type if prompted, insert a blank disc, and close the media tray. If configure, media writing begins automatically once valid blank media is sensed. Otherwise, a pop-up window appears, enabling you to select specific study series to write.
  ☞ "Insert Additional Blank CD/DVDs" P.6-19

4.13 Dose Report Image

Dose report image is created automatically after study. Since that the exposure information of study is stored as DICOM image, enable to control exposure of study even if the network server does not support the files in DICOM RDSR format.



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Chapter 5

Review Basics

This chapter takes you on a tour of the Review process, including finding studies and playing and printing their images.
The key steps of the Review process are introduced here as follows:

Description

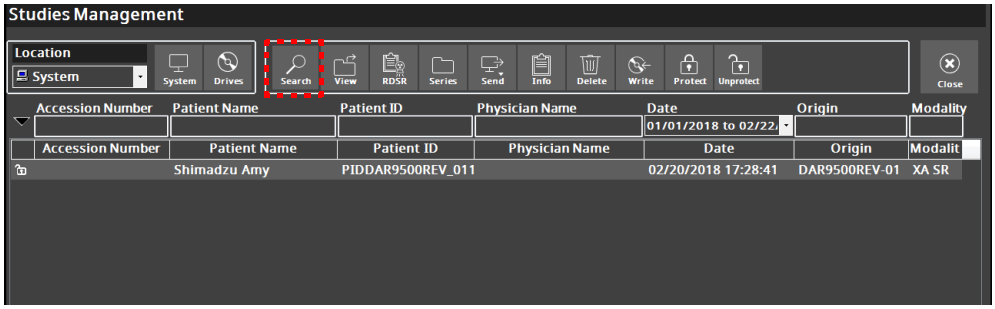
5.1 Startup and Study Selection

1 In the upper-left corner of the Image Viewer window, click [Open] to display the [Studies Management] window.

"6.1 The Studies Management Window" P.6-2

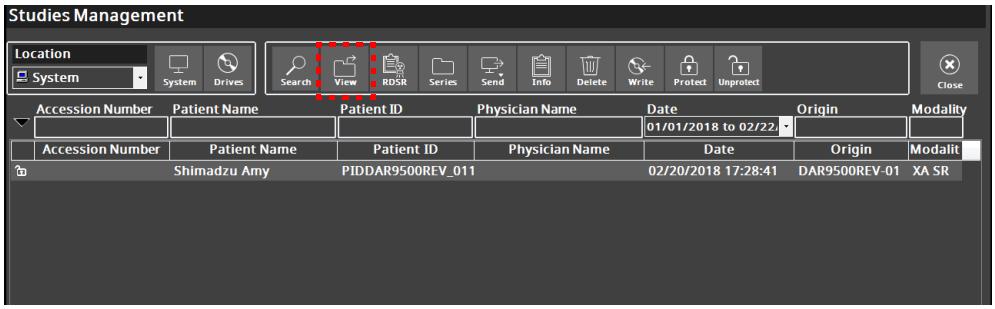
2 Click [Search] to search for all studies performed within the default date range.

All matching studies are listed with one row of information per study in descending Date order.



If security is enable, th schedule list is further restricted to only those studies for which the current user is listed as the performing physician

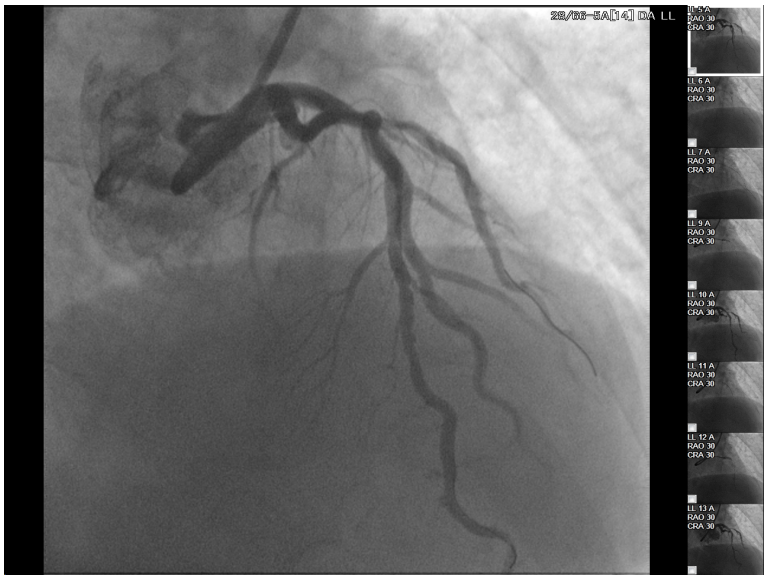
3 Click anywhere in the row for the study that you wish to review and then click [View]. Alternatively, just double-click any row to view a study.



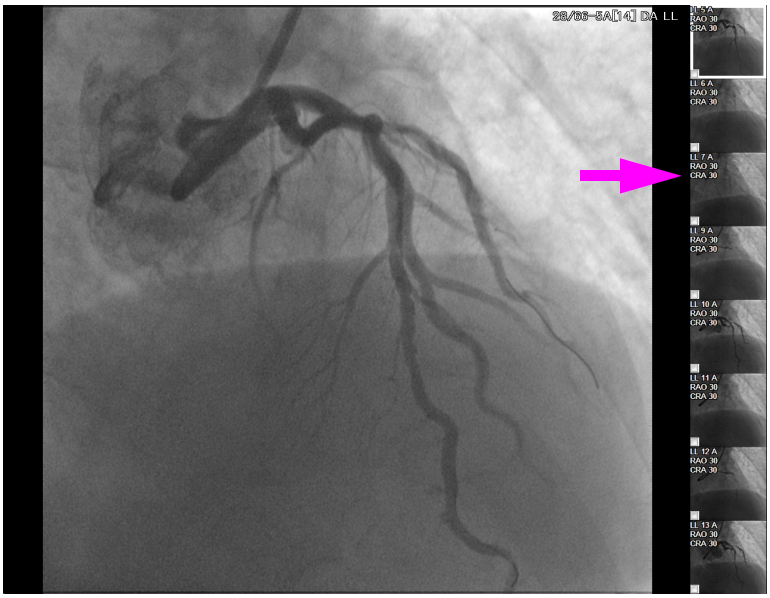
The first loop of the study begins automatic playback.

5.2 Viewing Images

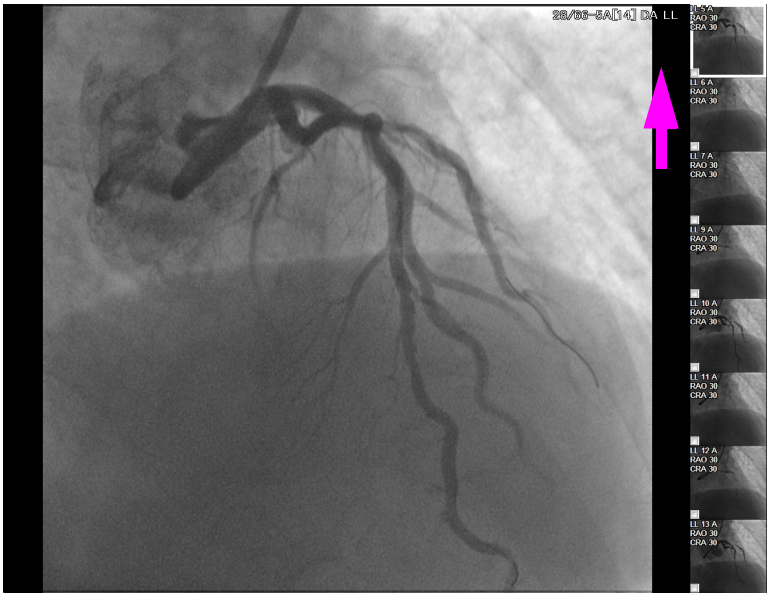
To review a loop other than the first one, click one of the Image-Selector icons. The loop corresponding to the icon begins playing.



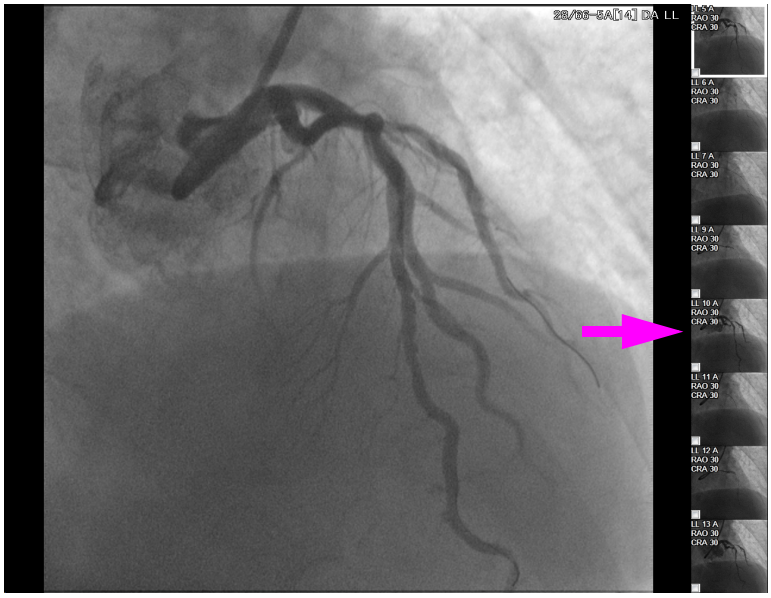
If there are many loops in the study, Image Selector may continue off the bottom of the window. Right-click (without releasing mouse button) on an icon near the bottom of the window (for example, loop LL7A).



Drag the mouse upward, scrolling icons for earlier off the top of the window to reveal previously hidden icons.



When you see the icon of a loop that interests you, release the mouse button and then click the icon to begin playing that loop. In this example, we are playing loop LL10A.



5.2.1 Controlling Image Playback

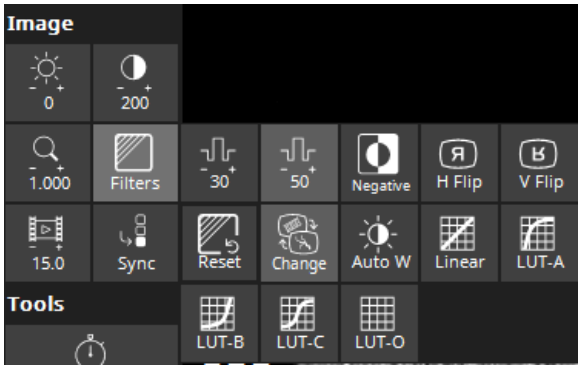
Control image playback with the mouse wheel or via the on-screen Cine Control bar on the bottom border of the Image Viewer window.

For details, including information on keyboard shortcuts and the IVR NEO/IVR Shuttle, see ☞ "7.1 Controlling Image Playback" P.7-2.

5.2.2 Adjusting Image Appearance

Adjust image appearance via on-screen [Brightness], [Contrast], [Zoom] and [Filters] button on the side menu, and also [Auto W] button from the [Filters] fly-out menu.

☞ "7.2 Adjusting Image Appearance" P.7-4



5.2.3 Identifying Loops and Still Images

The Image Selector shows small images for both loops and still images. Small icons are super-imposed over the upper-right corner of each small image to indicate whether the small image represents loop or still image.

No.	Icon	Meaning
1		A still image created as either an annotated image or reference image. Still images appear in the Image Selector after the loops. The loop number, and in square brackets, the image frame number, are displayed in the upper-left corner of still Image Selector icons.
2		A multi-image rad loop that can be played back as video. The loop number is displayed in the upper-left corner of the Image Selector icon.

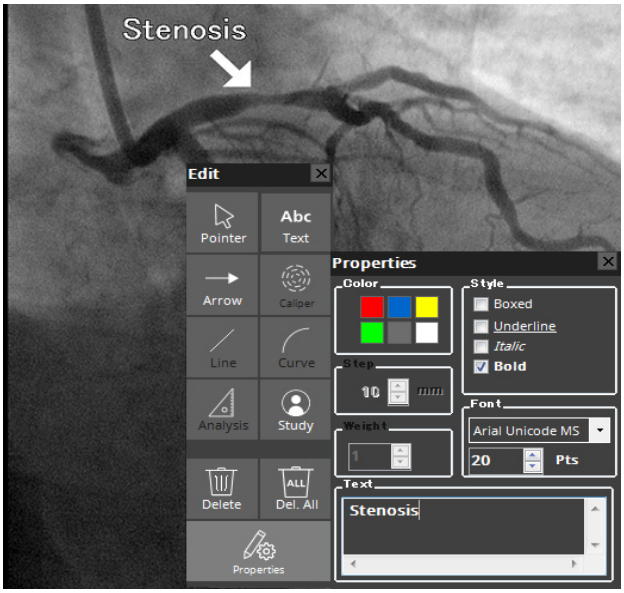
5.3 Displaying Study Information

To display study information including patient demographics, click [Study] on the side menu. The [Study Information] dialog box for the study being reviewed appears.

"7.4 Displaying Study Information" P.7-10

5.4 Creating Image Annotation

To add annotations to a loop image, pause on the image of interest and click [Funct]-[ABC Text] on the side menu. You can now add arrows and text and set properties such as color and size for each item you add.



"7.7 Working with Image Annotations" P.7-17

5.5 Saving an Image as a New Object

To save an image, including any annotations, as a new still-image object, click [Funct]-[Save] on the side menu, and then [Yes] to confirm the save.

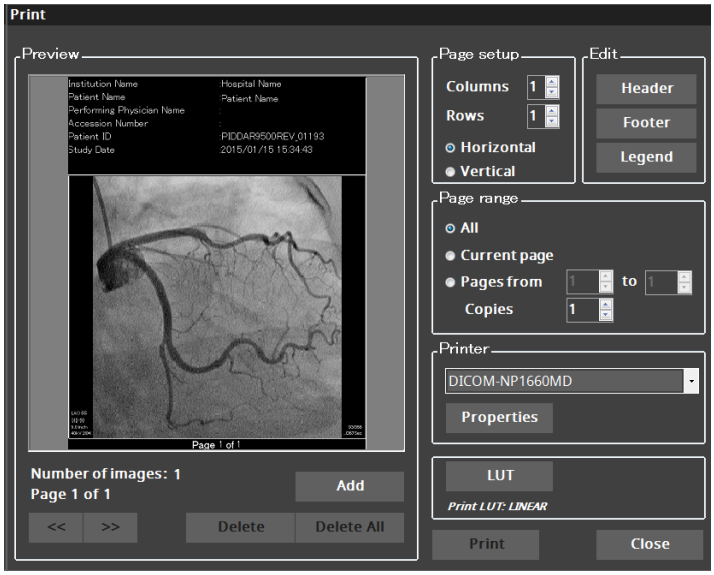
☞ "7.8 Saving Images" P.7-20

Alternatively, press [Save Still Image] button on the IVR NEO/IVR Shuttle/ [Photo Capture] button on the SMART Touch.

5.6 Printing Images

To print an image, including any annotations, display the image that you wish to print and then click [Funct] on the side menu. Then click [Print].

The print window appears with an image preview.



Choose the desired printer in the Printer list and click [Print] to print the page as previewed.

☞ "7.9 Print Images" P.7-21

5.7 Using Advanced Features

To use advanced features, consult their respective chapters as follows:

☞ "8 Performing Angiographic Analysis"
☞ "9 DSA Image Adjustment Tools"

5.8 Completing Your Review

When you have finished reviewing a study, click [Close] on the side menu. You can then click [Open] to open the [Studies Management] window and select other studies for review.

This completes the tour of the review process.

Chapter 6

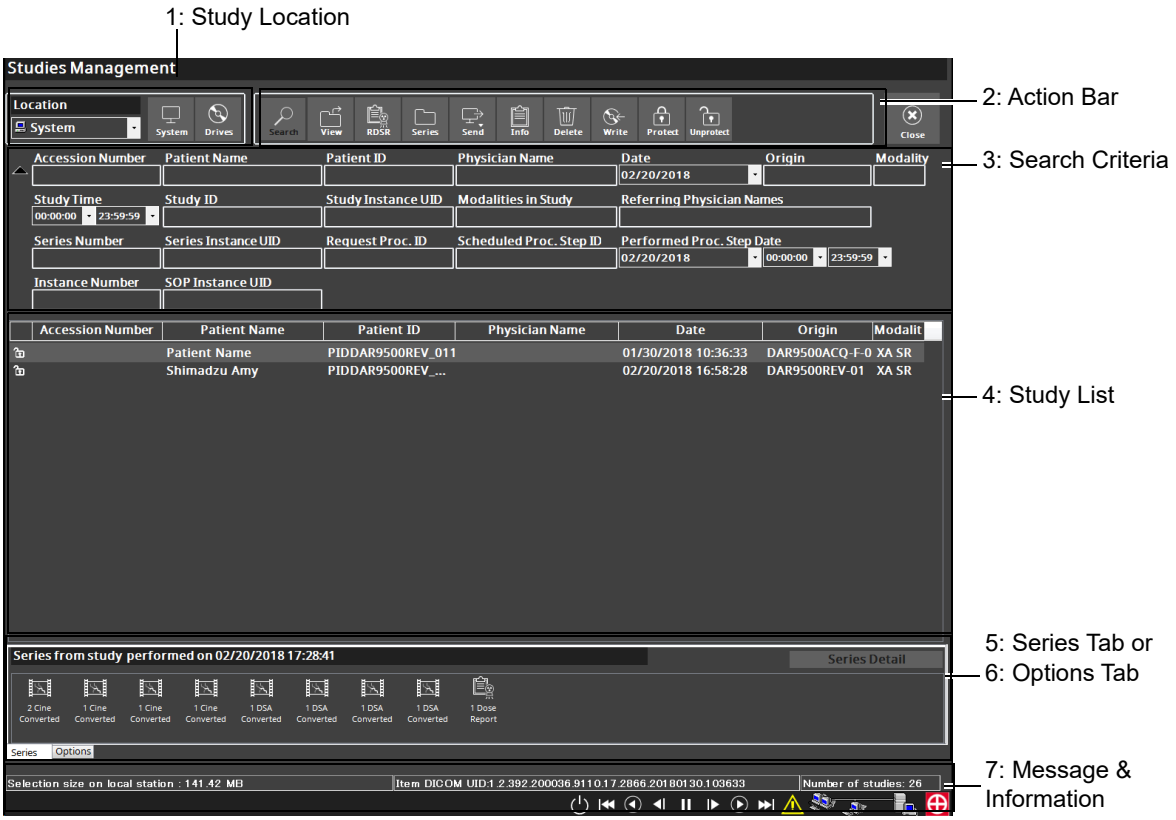
Studies Management

This chapter walks you through the Studies Management process, beginning with a look at its user interface.

Description

6.1 The Studies Management Window

The [Studies Management] window is displayed by clicking [Open] on the Image Viewer window side menu. It is made up of a columnar Study List, Search Criteria boxes and an Action Bar along the top. Study series and messages are displayed at the bottom.



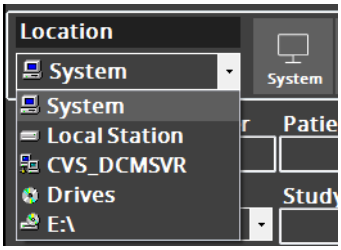
NOTE

The above sample screen is made from a composite of images from both monitors. Not all elements appear on both monitors or at the same time. Lines 2, 3, and 4 of the Search Criteria only appear when MPPS support is enabled. "DICOM Tab" P.17-24

The key components of the Studies Management interface are described here as follows:

6.1.1 Study Location

The [Location] box and buttons [System] and [Drives] set the target of the [Search] button as follows:

No.	Display	Purpose
1		[System] sets the [Search] target to the local system hard drives plus all configured servers. Enter search criteria and click [Search] to find studies.
2		[Drives] sets the [Search] target to the CD/DVD drives. It then searches all CD/DVD drives, displaying the results in the Study List.
3		[Location] becomes a drop-down list enabling individual selection of servers and drives as the [Search] target.

6.1.2 Action Bar

Studies Management functionality is accessed via the action bar.

> **NOTE**
>
> Not all Action Bar buttons appear at all times and in all modes.

The purpose of each Action Bar button is summarized as follows:

No.	Button	Name	Purpose
1		Search	Searches based on the search target set by the [System] and [Drives] buttons, plus all search criteria. All matching studies are displayed in the Study List. The Date search criteria is always used.
2		View	Displays the selected study or studies in the Image Viewer window. Alternatively, you can double-click anywhere in a Study List row to view a study.
3		Dose Report	(Available if there is dose report.) Displays the dose report.
4		Series	(For non-local studies) When a single study is selected in the Study List, Series displays all study series types contained in this study. When two or more studies are selected in the Study List, this button causes the Study Series information to be retrieved for each study but not displayed until only a single study is selected. Series are automatically displayed for local studies.
5		Receive	Available only for studies on a network server or CD/DVD, [Receive] copies all selected studies to the local system.
6		Send	Sends selected studies to another server or system. If configured, notification messages are displayed and emails are sent for each send.
7		Information	Available only when a single study is selected in the Studies Management window for the local system or CD, [Info] displays detailed information about the patient who is the subject of the selected study. You can also use this button to anonymize or modify information in the local study.
8		Delete	(Present for users only if enabled by installation personnel) Available only for unprotected studies on the local system, [Delete] permanently deletes the selected studies from the local system after asking for confirmation. Protected studies cannot be deleted, although they can be first unprotected (see [Unprotect] below) and then deleted. To preserve the integrity of your archive system, do not delete studies that have not yet been archived to server or CD/DVD.
9		Write	Available only for studies on the local system or a network server, [Write] prepares the selected studies for writing and then writes them to CD/DVD.

No.	Button	Name	Purpose
10		Protect	Available only for studies on the local system, [Protect] enables protection for the selected studies so that they cannot be deleted.
11		Unprotect	Available only for studies on the local system, [Unprotect] clears protection for the selected studies. It is generally not recommended to unprotect studies that have not yet been archived to server or CD/DVD.

Detailed usage information for these buttons is provided as needed throughout this manual.

6.1.3 Search Criteria

One Search Criteria box is provided above each column in the Study List. You can filter what is searched for by entering words or parts of words in one or more Search Criteria boxes and then clicking [Search]. All studies matching the search criteria are listed. See ☞ "6.2.2 Finding Studies" P.6-10.

6.1.4 Study List

The Study List provides one row of information per study in columns organized as follow:

No.	Column	Contents
1	Icon	Denotes each study's location and protection state as follows: Icon:  — Location and Protection State: Protected on local system Icon:  — Location and Protection State: Unprotected on local system Icon:  — Location and Protection State: On a network server Icon:  — Location and Protection State: On a CD/DVD
2	Accession Number	A unique identification number for the study.
3	Patient Name	The full patient name, with last name first.
4	Patient ID	The patient ID code.
5	Physician Name	The full name of the study's performing physician, with last name first.
6	Date	The date on which the study was performed.
7	Origin	An institution-defined field which more precisely indicates the origin of the study. For example, this could indicate the diagnostic lab in which the study was performed. There can be multiple Origins per Site.
8	Modality	The DICOM abbreviation for the imaging modality, for example, XA for angiography.

Sorting

Click any column heading to sort by information in the column. Each click of a column heading alternates between ascending and descending sort order.

Scrolling in the Study List

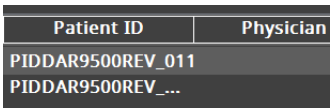
You can scroll the Study List contents both horizontally and vertically by clicking and dragging the respective scroll bars.

The vertical scroll bar only appears when these are too many studies to fit in the Study List display area. To scroll the Study List vertically, drag (point to slider, click down without releasing, and drag mouse in desired direction) the vertical scroll bar slider downward to see studies further down the list, or upward to see studies up the list. Alternatively, spin the mouse wheel (if available) toward yourself to scroll down the list or away from yourself to scroll up the list.

The horizontal scroll bar only appears when all columns of information cannot fit across your display. To scroll the Study List horizontally, drag the horizontal scroll bar slider to the right to see more columns to the right or drag it to the left to see more columns to the left. If you have a high-resolution display, the horizontal scroll bar may not appear at all.

Widen or Narrow Columns as Desired

If the text in any columns ends with "..." that means there is hidden text to the right. To reveal the text, use the mouse to widen the column by pointing to its right heading edge, waiting for the mouse pointer to change to a vertical bar with arrows, and then clicking the mouse and dragging the column edge to the right. Release the mouse button once the column is the desired width. To narrow a column, do the opposite by dragging the heading's right column edge to the left.



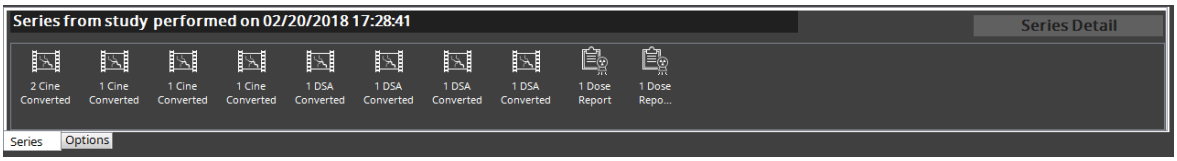
Making Selections in the Study List

You can select studies in the Study List in a variety of ways as follows.

- To select a single study, click the mouse anywhere in the desired study row. The row becomes highlighted.
- To select several non-adjacent studies, use this [Ctrl]-click technique. Point to the first study row and click the left mouse button. The row becomes highlighted. Press and hold down the [Ctrl] key and then continue clicking all other desired rows without releasing the [Ctrl] key. When finished selecting rows, release the [Ctrl] key. Al selected rows are highlighted.
- To select two or more adjacent study rows, use this [Shift]-click technique. Point to the highest row that you want and click the left mouse button. Point to the lowest row that you want and hold down the [Shift] key and click the left mouse button. Release the [Shift] key. All selected rows are highlighted.
- To select all studies in the Study List, use [Ctrl]-A (press [Ctrl] key and [A] key simultaneously.

6.1.5 Series Tab

Sharing the same screen area as [Options] tab, the Study Series appears when you click the [Series] tab to the left of the [Options] tab.The [Series] tab is shown by default. Most studies contain one or more series of images, image loops or special items such as reference images. When a single local study is selected in the Study List, all series for the study are shown in the Study Series with one icon per type. Series type icons include a brief label beneath them, indicating the type preceded by the number of items within that series.



If MPPS support is available, specific series detail can be displayed. Select one series and click [Series Detail] at the right edge of [Series] tab.

Possible series types and their corresponding icons are as follows:

No.	Icon	Series Type
1		Cine (raw) Cine DSA (raw)
2		Photo Capture Reference Image
3		Dose Report Dose Report Image

The Studies Series type icons are only displayed when a single study is selected in the Study List.

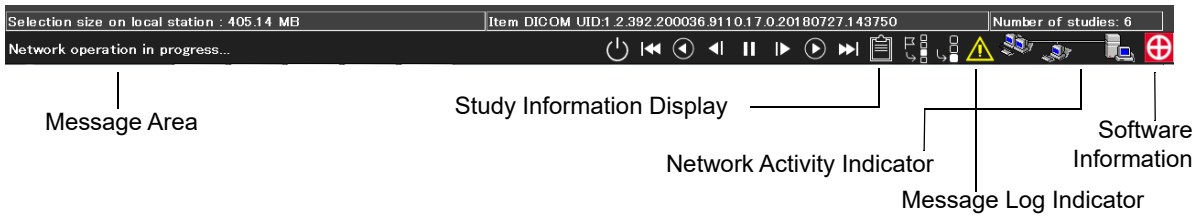
6.1.6 Options Tab

Sharing the same screen area as Study Series, the [Options] tab appears when you click its title to the right of the [Series] tab in the lower-left window area.

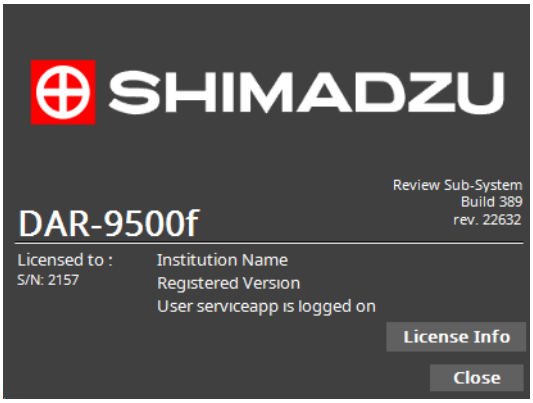
☞ "17.7.2 Options Tab"

6.1.7 Messages & Information

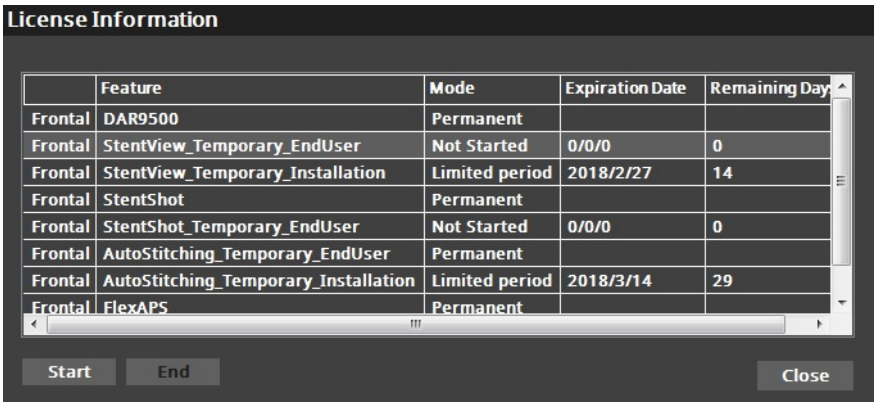
The Messages & Information area at the bottom of the window provides messages, error messages, DICOM UID (Unique Identifier), study count, a message log indicator, a network activity indicator, and software version information. For detailed network activity information, click the [Network Activity] indicator, an information box appears. Click the [Network Activity] indicator again to close the information box.



For details of version license information, click [Software Information]. Information dialog box of software is displayed.



To display the license information, click [License Info] button. The license information dialog box is displayed.



6.2 Managing Studies

6.2.1 Introduction

This section describes how to perform common study management tasks as follows.

No.	Section	Page
1	"6.2.2 Finding Studies"	P.6-10
2	"6.2.3 Downloading Studies from Servers"	P.6-12
3	"6.2.4 Displaying RDSR"	P.6-13
4	"6.2.5 Importing Studies from CD/DVD"	P.6-14
5	"6.2.6 Sending Studies"	P.6-14
6	"6.2.7 Writing to CD/DVD"	P.6-15
7	"6.2.8 Setting Study Protection"	P.6-19
8	"6.2.9 Deleting Local Studies"	P.6-20

NOTE

Before continuing, become fully familiar with "6.1 The Studies Management Window" P.6-2.

6.2.2 Finding Studies

NOTE

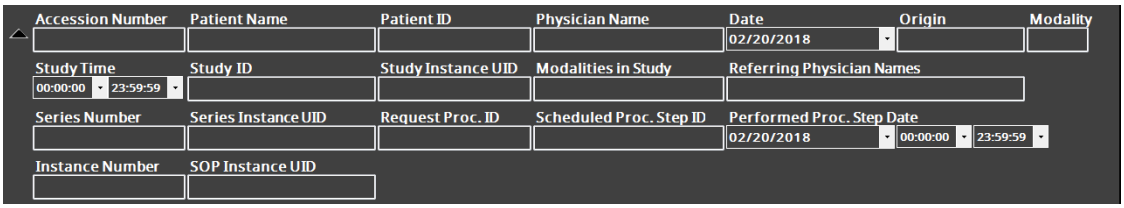
If you open the Studies Management window while a new study is in acquisition, a find is automatically performed for all studies with the same Patient ID as the active study.

To find studies to work with, follow this procedure from the Studies Management window.

1 Set the Date criteria to include the dates of the desired studies. Choose the desired value from the Date list.

No.	Date	Selection
1	Today	Studies dated today.
2	Yesterday	Studies dated yesterday.
3	This Week	Studies dated in this calendar week. For example, if you choose this on a Wednesday, the Studies list will be restricted to the four days Sunday through Wednesday.
4	Last 7 Days	Studies dated within the last 7 days including today.
5	This Month	Studies dated on any day so far in this calendar month, including today. For example, if you choose this on July 11, the Studies List will be restricted to studies dated July 1 through 11.
6	Last 30 Days	Studies dated within the last 30 days, including today.
7	This Year	Studies dated on any day so far in this calendar year, including today. For example, if you choose this on January 15th, the Studies List will be restricted to 15 days, whereas if you choose this on December 15, the Study List will be restricted to approximately 349 days.
8	Last Year	Studies dated on any day in the previous calendar year.
9	All Time	All dates. When a server is included in the search, it is enforced that the All Time Date criteria be combined with at least one other criteria item to avoid excessive results.
10	Custom Date	Studies dated on the specific date chosen from a calendar.

2 If desired, click the arrow to the left of Accession Number to show additional search criteria fields. This available only when MPPS is enabled. ☞ "DICOM Tab" P.17-24.

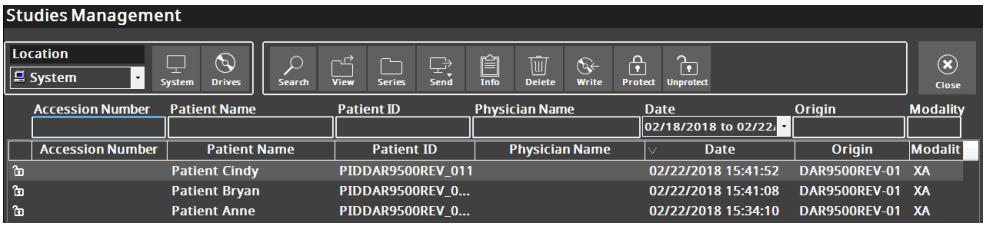


3 Enter your search by entering whole or partial words that you know appear in the desired studies in one or more search criteria boxes.

By default, search criteria matching is only performed That the beginning of the searched text in the corresponding fields of the Search List (for example: criteria*). This can be changed so that search criteria matching is performed throughout the searched text (for example: *criteria*) by checking the [Search by keyword] option as described in ☞ "17.7.2 Options Tab" P.17-14.

4 Click [Search] to perform the search.

The Studies List is now restricted to all studies that match the search criteria.



If there are too many studies to fit in the Study List, use the vertical scroll bar to scroll downward as previously described in ☞ "Scrolling in the Study List" P.6-6.

5 To see columns that have scrolled off the right side of the Study List, use the horizontal scroll bar.

6 If a column contains text that ends in "..." widen the column as previously described in ☞ "Widen or Narrow Columns as Desired" P.6-6. If this causes a column to disappear off the right edge, use the horizontal scroll bar to scroll to the right.

6.2.3 Downloading Studies from Servers

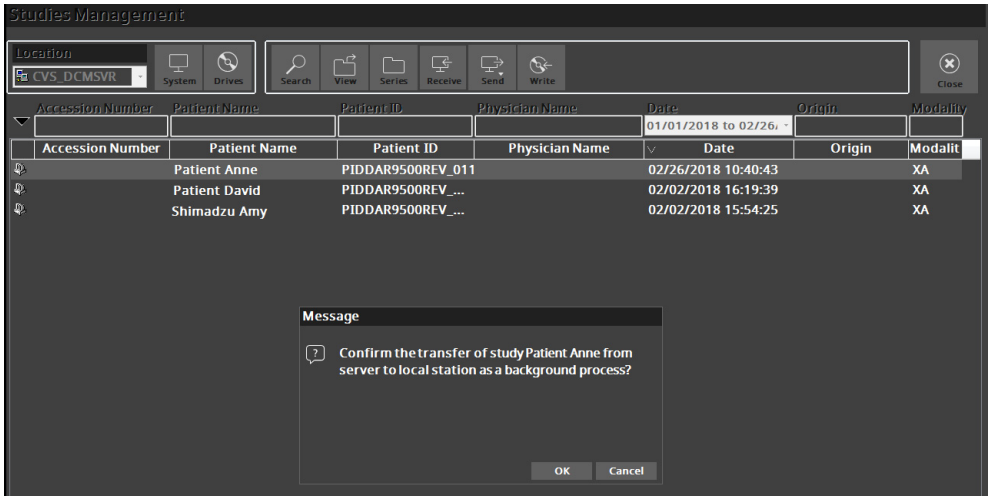
Once you have found the desired studies in the System Study List, you can download them to the local system.

> **NOTE**
>
> If you do not download studies before writing them to CD/DVD, they will first be automatically downloaded to the local system before any writing occurs. You may find it preferable to manually download the studies as described here to avoid delaying the writing process.

To download studies from the network, follow this procedure.

1. Click [System] button.
2. Enter the desired search criteria and click [Search].

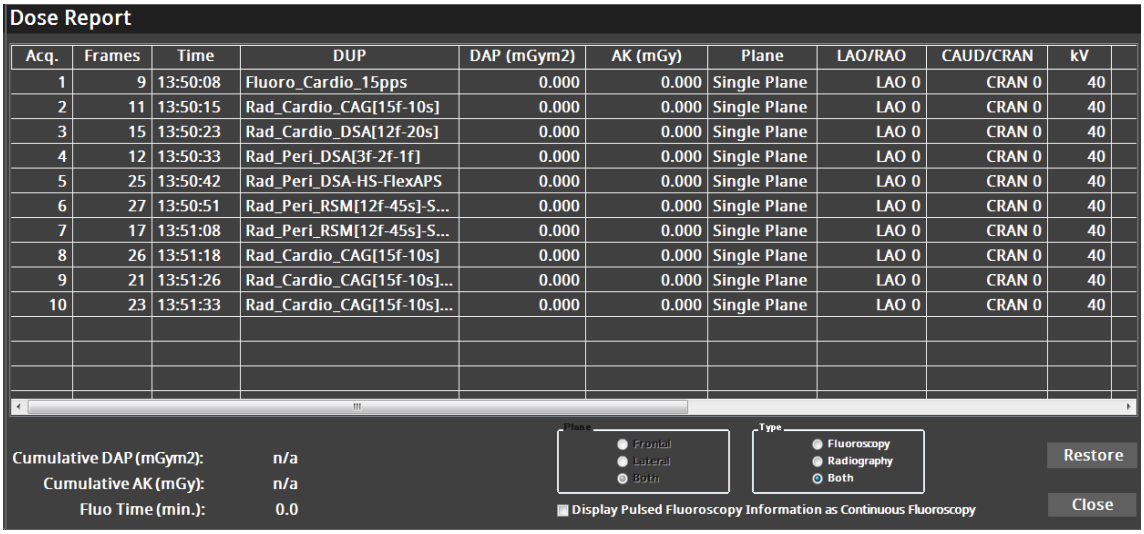
   All matching studies contained on the local system and all configured servers are displayed. Studies on a server are denote with in the Icon column of the Study List.
3. With the desired studies selected in the Studies List, click the [Receive] button. A confirmation box appears.
4. Click [OK] to confirm the downloading of all highlighted files.



5. A message is displayed once a study has been downloaded.

6.2.4 Displaying RDSR

If there is RDSR in the study, click [RDSR] on the action bar to display the [Dose Report] window to check he description.



On the [Dose Report] window, enable to modify the display by following operations.

- Drag and move the title to change the order of titles.
- Right-click on the title to display the list to select the display title.
- When check [Display Pulsed Fluoroscopy Information as Continuous Fluoroscopy], enable to display "mA", "ms" and "Exposure time" as continuous fluoroscopy.
- Select desired plane in [Plane] to display dose information of the plane.
- Select Fluoroscopy or Radiography in [Type] to display dose information of the type.
- Click [Restore] button to return to the initial setting.
- Click [Close] button to save the changes.

NOTE

Method of calculation for fluoroscopy time is different on RDSR and system. Therefore, fluoroscopy time is not correspond completely with each other.

For RDSR, calculate with pulse length and pulse number to consistent between each parameter. By contrast, time the fluoroscopy time at regular time interval between turn on and off the foot switch of high-voltage generator.

6.2.5 Importing Studies from CD/DVD

You can import studies to the local system from any compatible DICOM Standard CD/DVD. This often useful when you wish to work with studies that were performed outside your institution.

To import studies from CD/DVD, follow this procedure.

1. Insert the CD/DVD from which you wish to import studies into the CD/DVD drive.
2. Click the [Drives] button in the upper-left corner of the Studies Management window.
3. The CD/DVD drive is searched for DICOM studies. All studies found appear in the Study List of the Studies Management window.

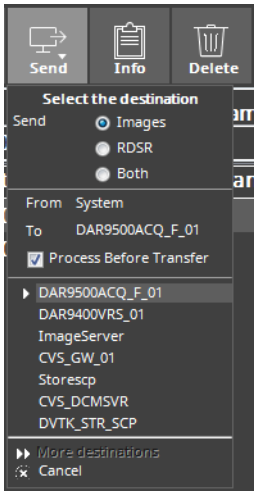
   A warning message is displayed if the CD/DVD drive contain no DICOM studies. This message can be ignored if the drive is empty or contains a disc.
4. To import one or more studies from CD/DVD into the local system.

   Select them in the Drive Study List and then click [Receive]. A confirmation box appears.
5. Click [OK] to confirm the importation of all highlighted files. Once completed, a message to that effect is displayed.
6. You can now see the newly-imported studies in the Studies Management window. Click [System] to return to the Studies Management window. Adjust or remove any search criteria to that the studies can be seen.

6.2.6 Sending Studies

Studies, loops, images and dose report can be transmitted to DICOM station. To sent studies, follow this procedure.

1. Select the desired studies in the Study List.
2. Click [Send]. A menu appears with a choice of destinations.



3 Select the sent type and click the desired destination.

Check [Process Before Transfer] to start image processing on playback frame and transfer.

See ☞"DICOM Hosts Tab" P.17-20 for processing setting.

4 When the confirmation prompt appears, click [OK] to confirm the operation.

If there is no [Send] button on the top action button bar, a destination host must first be configured as described in the DICOM Hosts AE Table item of the ☞ "DICOM Hosts Tab" P.17-20.

If configured, an administrator-defined message will be displayed on the local system upon completion of each send operation. One message appears per send operation whether the operation includes one study or may.

Once all studies that you wish to write are visible in the System Study List, you can select them and then write them to CD/DVD.

6.2.7 Writing to CD/DVD

Recommended Media (As of January, 2015)

*Recommended media may change in the future without notice.

Disc, CDR80WKY10SV (Parts No.: 088-58818-18)

Disc, DR-47WWY10SNT (Parts No.: 088-58818-21)

⚠ CAUTION

Use the media which is provided from Shimadzu for the system. There is no warranty for functionality and operation when using other media.

NOTE

Unable to use DVD-RW.

NOTE

Do not write to the media during a study. Write to the media after completing the study.

NOTE

Recommended media as of January 2012. The recommended Media may change in the future without notice.

NOTE

Writing may stop when start writing on DVD after writing on CD.

Select the Studies

1 Select desired studies as described in ☞"6.1.4 Study List" P.6-5 or "" P.6-7.

2 Click the [Write] button.

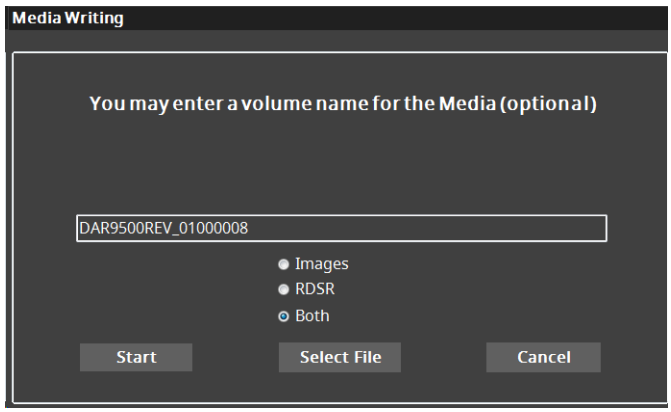
You are prompted to insert blank disk into the writer. Do this and close the disc tray. Any needed file conversion is performed.

NOTE

If the [Auto-accept Default] option is configured (see ☞"Devices Tab" P.17-56), writing begins and you are only prompted for additional blank discs. Continue with section ☞"Insert Additional Blank CD/DVDs" P.6-19.

3 When the Media Writing dialog box appears, optionally change the proposed volume name. You can select the writing item from [Images, [RDSR] or [Both]. Enter a volume name and select the writing item and then click [Start] button.

The proposed name is based on a unique sequence number so if you change the volume name, it is advisable to keep the volume name unique, possibly by including numerical digits.

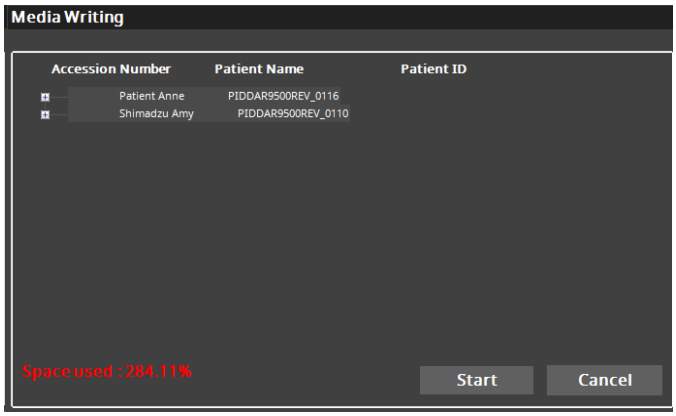


Optionally Select Fewer Items

If you wish to write fewer items than selected earlier on the Studies Management window, follow this procedure.

1 Click [Select File].

The detailed selection window appears, initially showing one line of information per study with three columns of information: Accession Number, Patient Name and Patient ID. This information is displayed in a tree format with the first level being the study, the second level being the study series type, and the third and final level being the study series items themselves.

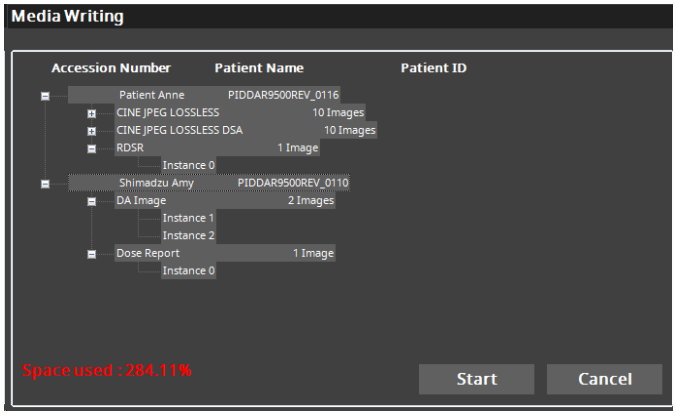


In this example, 3 studies are shown. Any tree branch can be expanded (click the "+" symbol) to reveal all series types for the study, and each series type branch can be expanded t reveal the items in the series.

2 Depending on what level of the tree you click, you can select or deselect studies (first level), study series types (second level), or the actual series items themselves (third level).

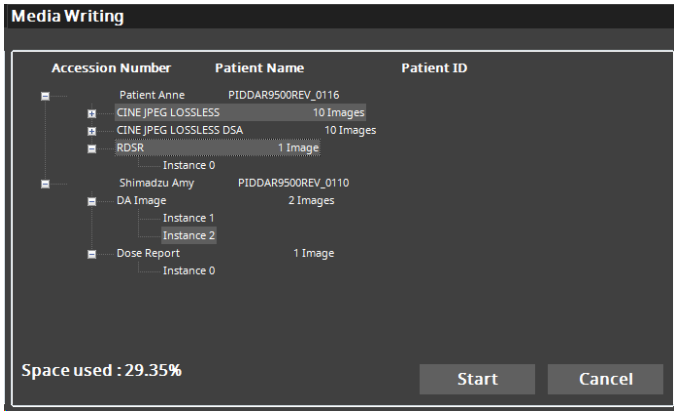
For the first two levels, a "+" or "-" symbol appears at the left edge of each line in the tree. Click the "+" symbol to expand that branch. Click the "-" symbol to contract an expanded branch.

When the tree-based selection window first appears, ever study is selected as indicated by the gray highlight. Click "+" symbols as needed to reveal study series types and the series items. Click "-" symbols to contract studies or series types you do not need to see in detail. Once you start clicking the "+" and "-" symbols, the global selection disappears and the individual studies, study series types, and series items for the line in the tree that you clicked.



3 You can now use the [Shift]-click techniques (selecting adjacent item) or [Ctrl]-click techniques (selecting non-adjacent item) to select specific studies, study series types, and series items.

In this example, one of the studies is only partially selected.



4 Observe the Space used percentage valued at the bottom of the selection window.

Percent values greater than 100 indicated that two or more discs must be written. For space efficiency, it is recommended that you make selections so that the percent value is close to but not over 100 % or 200 %, and so on.

Perform the Write

Follow this procedure to complete the writing process.

1 To begin writing, click the [Start] button. All study series items are checked for integrity.

If any errors are detected and the Auto-accept Defaults option is not configured, the study series item tree window of the Media Writing dialog box appears with the offending items highlighted. If desired, take note of the problem items. Click [Continue] to go ahead and write everything else except the offending study items.

If errors are detected and the Auto-accept Defaults option is configured, automatic continuation occurs without prompting, skipping items with errors.

CD/DVD writing begins. During the write process, the CD/DVD writer tray is locked shut. Do not attempt to open the tray until the CD/DVD writing finishes.

2 If a defective blank disc or a non-blank disc is inserted, it will be rejected and you will be prompted to insert a new blank disc. Discard the rejected disc and insert a new one.

Close the disc tray to continue.

NOTE

By default, DSA (Digital Subtraction Angiography) images are saved to media in their subtracted state. This enables easy DSA image viewing in most viewers.

Insert Additional Blank CD/DVDs

When CD/DVD writing finishes, you may be prompted to insert another blank disc. Keep inserting blank discs when prompted until finished.

When writing is completed, insert the media to tray again. Display from the Studies Management window and check that CD/DVD has written correctly.

Cancel a Media Write Operation

Usually, if you cancel a media (CD/DVD) write, the media must be discarded. To cancel a media write, click [Cancel Wrote] on the Image Viewer window on the side menu. Or, n the Studies Management window, click [Write] and then respond [Yes] to the [Cancel Media Write] prompt.

Label CD/DVD

According to your organization's standard, label the CD/DVD, typically at least including the volume name and date. CD/DVD-safe permanent markers can be used to write directly on the top of the CD/DVD.

NOTE

If you plan on affixing paper labels to the CD/DVD, be aware that the labels could partially come off while inside a writer, possibly causing damage, or the CD/DVD may vibrate when spinning due to an unbalanced label. If you must use such labels, assure that they are perfectly centered and are firmly attached without any loose edges.

See ☞ "16.1 The Mini Viewer" P.16-2 for mini viewer.

6.2.8 Setting Study Protection

tudies can be protected or unprotected as desired by respectively clicking the [Protect] or [Unprotect] action buttons. The first column of the Study List indicates protection status, either protected (closed-lock icon) or unprotected (open-lock icon).

6.2.9 Deleting Local Studies

(Feature present for uses only if enabled by installation personnel.) Studies on the local system that are in an unprotected state can be manually deleted with the [Delete] button. To manually delete a study, select one or more unprotected studies and click [Delete]. Confirm or cancel the deletion.

Studies on a network server cannot be deleted. Protected studies cannot be deleted until they have been unprotected. Eventually, unprotected studies that are not manually deleted will be automatically deleted if the system needs to recover the cache space that they are occupying. Automatic deletion of unprotected studies occurs in least-recently accessed order.

Chapter 7

Review Reference

Become fully familiar with ☞ "4.2 The Main User Interface Window" P.4-2 before beginning this chapter.

For as long as a study remains on he local system (including studies viewed from the network or CD/DVD), the following settings are preserved on a per loop/image basis: Brightness/Contrast, Auto Window Level, LUT, Filters, Zoom, Pan, and DSA parameters such as shutter positions and mask number.

This chapter provides detailed reference information on the Review process as follows.

Description

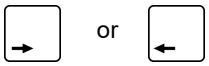
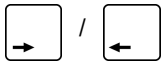
7.1 Controlling Image Playback

As soon as a study is opened for review, the first loop begins playback. You control playback via the mouse, keyboard or IVR NEO/IVR Shuttle/SMART Touch.

7.1.1 Mouse and Keyboard

The Cine Control bar on the bottom border of the Image Viewer window provides seven GUI buttons for controlling playback with mouse clicks.

The keyboard arrow keys and mouse wheel can also be used.

No.	Action	Keyboard	GUI
1	Play/show next loop/image.		
2	Play/show previous loop/image.		
3	If playing, pause.		
4	If paused, show next/previous frame.		
5	If paused, start playing. *(Keyboard only: Hold key for more than 2 seconds to begin forward / backward play.)*		

> **NOTE**
>
> Use only the arrow keys on the keyboard edit group to the right of the main keys.

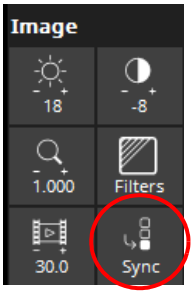
> **NOTE**
>
> Although intended for use during acquisition, the IVR NEO/IVR Shuttle/SMART Touch is capable of many playback functions.
>
> ☞"4.8 IVR NEO (Either-or SMART Touch)" P.4-65, "4.10 IVR Shuttle (Option) (Either-or SMART Touch)" P.4-73, "4.11 SMART Touch (Either-or IVR NEO/IVR Shuttle)" P.4-77

Play Acquisition Monitor with Keyboard

Hold down [Ctrl] key on keyboard and use arrows keys above to control the play of acquisition monitor. Release [Ctrl] key to switch the play to reference monitor.

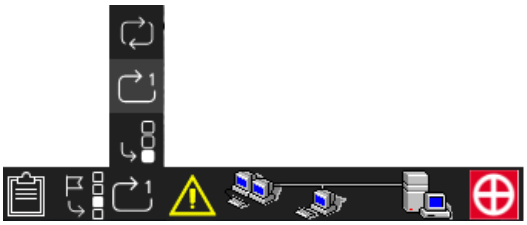
7.1.2 Loop Playback Mode

Use the button on the side menu to change loop playback mode.



Change the mode "Play Single Loop" and "Play Single Loop with Synchronize".

Three Loop Playback Mode buttons are available in the bottom bar.



Button	Name and Function
	**Play All Loops**: Plays back each loop, one after the other. Still images are skipped. Repeats once all loops have been played.
	**Play Single Loop**: Plays back the selected loop continuously.
	**Play Single Loop with Synchronize**: *(Reference monitor only)* Like Play Single Loop, plays back selected single loop until a new loop is received. Then, the new loop is selected and played back continuously.

7.1.3 Adjusting Playback Speed

The current playback speed, in frames (images) per seconds (fps) is displayed at the bottom of the Play Speed button on the side menu. This button enables you to precisely adjust loop playback speed in either direction (from 10 % to 200 % of recorded speed) as follows.

- Right-click the Play Speed button once to increase the playback speed slightly. Right-click it multiple times to increase playback speed gradually up to maximum speed. Right-click and hold the mouse button to rapidly increase playback speed.
- Conversely, left-click the Play Speed button to reduce playback speed.
- To reset playback speed to recorded speed, click the Play Speed button simultaneously with both mouse buttons.

7.2 Adjusting Image Appearance

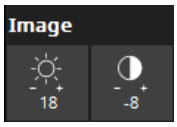
You adjust image appearance using GUI buttons and the keyboard.

> **NOTE**
>
> The monitors are already pre-adjusted to optimize contrast and brightness. Do not adjust these settings on the monitors. Instead, make your adjustments as described here. Image-appearance adjustments do not alter image files, although the effects of the adjustments are preserved per image/loop for as long as the study is on the local system.

7.2.1 Basic Brightness/Contrast Control

Image brightness and contrast are adjusted on screen using the respective side menu buttons or with the mouse.

Using Side Menu Buttons



Adjust image brightness (left button) as follows:

- Right-click the Adjust Brightness button to increase image brightness (maximum 100).
- Conversely, left-click the Adjust Brightness button to decrease image brightness (minimum -100).
- To reset brightness to its default, click the Adjust Brightness button simultaneously with both mouse buttons.

Adjust image contrast (right button) as follows:

- Right-click the Adjust Contrast button to increase image contrast (maximum 2000).
- Conversely, left-click the Adjust Contrast button to decrease image contrast (minimum -100).
- To reset contrast to its default, click the Adjust Contrast button simultaneously with both mouse buttons.

Using the Mouse

Change image brightness and contrast as follows:

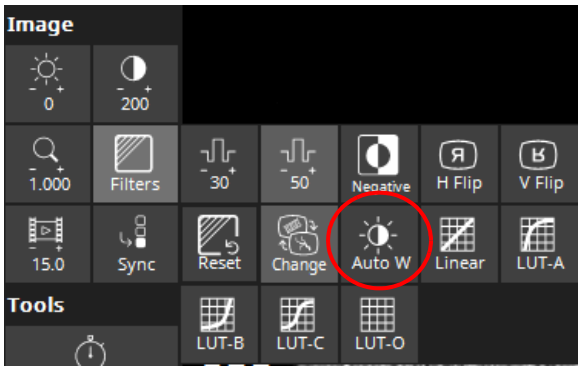
- Press and hold both left and right buttons.
- Move the mouse up/down (brightness) or left/right (contrast) within the visualization zone.

The change in image brightness and contrast is proportional with the mouse speed. Keeping the [Alt] key pressed makes the change independent of the mouse speed.

7.2.2 Advanced Brightness/Contrast Control

Auto Window Level Feature

When enabled, click [Filters] button on the side menu and select [Auto W] button from the fly-out menu. The Auto Window Level Feature enables brightness/contrast optimization on a frame-by-frame basis.



This automatically compensates for image loops whose images have varying brightness and contrast levels from frame to frame. This can occur, for example, when some frames from a loop of a beating heart, feature many bright areas whereas other frames are substantially darker. When Auto Window Level is enabled, the Brightness and Contrast controls are used to fine tune the brightness/contrast (-100 to 100 Brightness, -100 to 2000 Contrast) set by Auto Window Level. For example, if the results produced by Auto Window Level appear too dim, increase the brightness by right-clicking the brightness control.

NOTE

There are two sets of Brightness and Contrast values; one for when Auto Window Level is active, and one for when it is not.

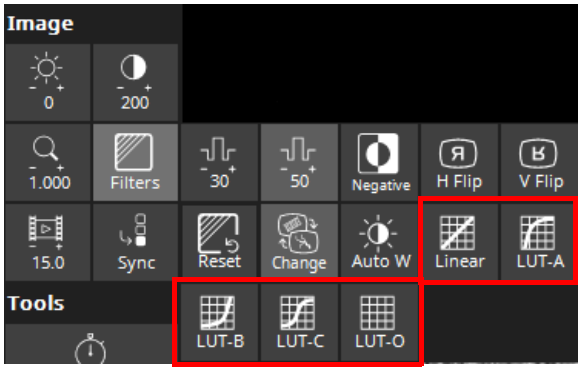
LUT Feature

To further optimize image brightness and contrast, you can apply special brightness/contrast profiles to your images via the LUT (Look-up Table) feature.

To apply a LUT profile to our images, follow this procedure.

1 Click [Filters] on the side menu.

The LUT fly-out menu appears.



2 Click one of the Curve buttons [LUT-A], [LUT-B], or [LUT-C] to select one of three standard profiles.

- LUT-A: Darkens the image by making all grays except for those close to black or white, lighter.
- LUT-B: Darkens the image by making all grays except for those close to black or white, darker.
- LUT-C: Increases the contrast by darkening the dark grays and lightening the light grays while having little effect on the middle grays.

3 Alternatively, click [LUT-O] and choose the desired custom profile from the list.

A graph above the list indicates approximate profile characteristics.

4 To revert to the default LUT profile, click [Linear] on the LUT fly-out menu.

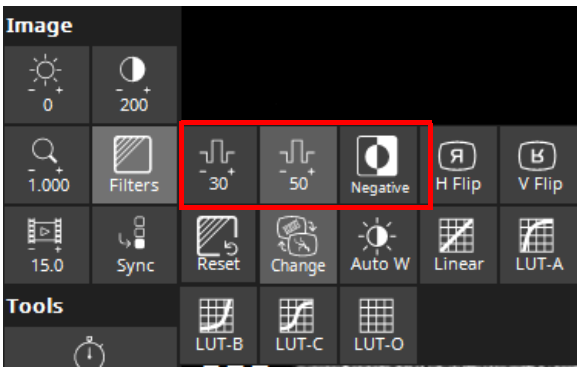
Additional LUT profiles can be created by the administrator as described in ☞ "17.5 Working with LUT Profiles" P.17-4.

NOTE

The chosen LUT profile applies only to the selected loop/image.

7.2.3 Applying Filters

Image appearance can be enhanced by applying filters. Click [Filters] on the side menu. Several buttons fly out to the right. Click one of the first three buttons to set a filter. A filter is only active when its button appears pushed in. Click [Reset] to deactivate all filters. The filters are used as follows.



- The first two filters, Sharpness (Unsharp Mask) and Convolution (High Pass Convolution) enable you to increase the perceived sharpness of the image through edge enhancement. Increase the effect by right-clicking the button or decrease the button in the range -100 to 100. Only one of these filters can be active at a time. Click the button simultaneously with both mouse buttons to set the filter to its default (fixed at 0).
- Click [Negative] to invert the image so that black is changed to white, white is changed to black, dark gray changed to light gray, and so on. This effect is in addition to either sharpness filter. To clear this filter, click the button again so that it no longer appears pushed in.
- Images can be flipped horizontally or vertically. Click the [H Flip] button (the figure on the left) or [V Flip] button (the figure on the right) on the side menu to flip horizontally or vertically.

7.2.4 Zooming and Panning

You can zoom and pan images with the IVR NEO/SMART Touch, the GUI and mouse, or the keyboard.

Using the Zoom Button and Mouse

The current zoom level is displayed at the bottom of the [Adjust Zoom] button on the side menu.

This button enables you to precisely control zoom level as follows.

- Right-click the Adjust Zoom once to increase the zoom level slightly. Right-click it multiple times to increase zoom level gradually up a maximum of 2.5 (250 %) for 1024x1024 images and 5 (500 %) for 512x512 images. Right-click and hold the mouse button to rapidly increase zoom level.
- Conversely, left-click the [Adjust Zoom] button to reduce zoom level. Minimum zoom is 1 (100 %) for 1024x1024 images and 2 (200 %) for 512x512 images.
- When zoomed in, you can pan the image by pointing to the area of interest, clicking down on the right mouse button, and without releasing the button, moving the mouse pointer toward screen center. Release the mouse button once the area of interest is centered on screen.
- To reset zoom level to the default (1 for 1024x1024 images, and 2 for 512x512 images), click the [Adjust Zoom] button simultaneously with both mouse buttons.

7.3 Working with Multiple Studies

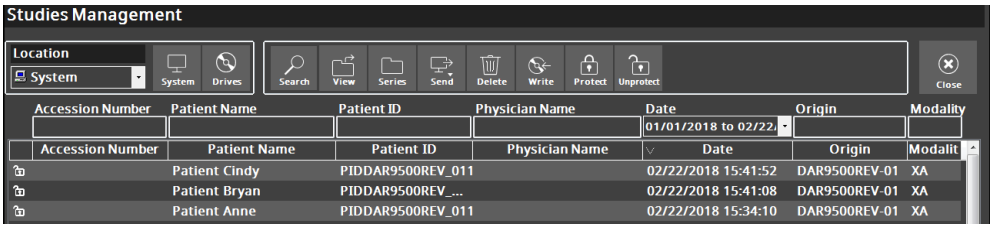
It can be convenient to work with more than one study at a time.

Follow this procedure.

1 In the Image Viewer window, click [Close] to close any studies and then click [Open] to open the [Studies Management] window.

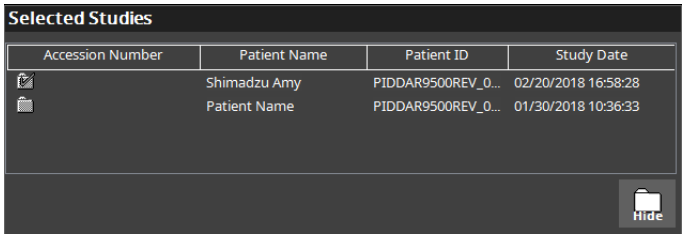
2 Select multiple studies in the [Studies Management] window.

Hold down [Shift] key to select on the range and [Ctrl] key to select individually.



3 Click [View].

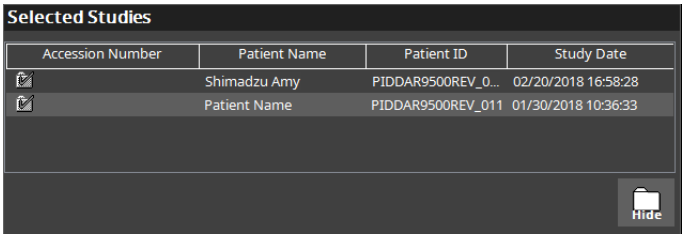
The newest study's first loop is played in the Image Viewer. Also a [Selected Studies] list is displayed at the bottom of the window with a tick mark next to the selected study.



4 Choose loops and images for display as desired.

5 Click a different study in the [Selected Studies List].

A tick mark appears next to the study and the study's first loop is played in the Image Viewer.



6 Display loops/images and select other studies as desired.

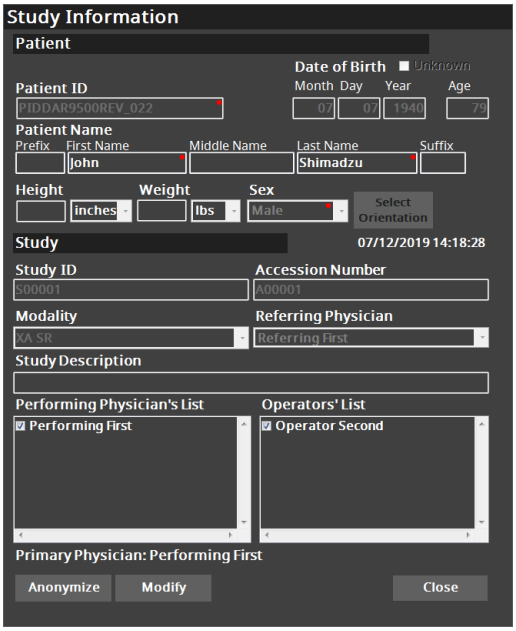
7 Click the [Hide] button to hide the Selected Studies list.

Click the [Selected Studies List] icon  on the bottom window border to re-display it.

7.4 Displaying Study Information

As seen in the chapter "5 Review Basics", a [Study Information] dialog bx can be displayed by clicking the [Info] button in the Studies Management window. The same information window can be displayed by clicking [Study] on the side menu, or by clicking the [Display Study Information] button on the right side of the bottom window border and then clicking the [Display Study Information] button (top) on the fly-put menu that appears.

The [Study Information] dialog box includes patient demographics and other information:



Expert users can also display DICOM header information by clicking the Display Study Information button, and then clicking the Display all DICOM Information button (bottom) on the fly-out menu that appears.

NOTE

This information is mainly of interest to those familiar with interpreting DICOM image file headers.

The DICOM Information window provides detailed DICOM header information:

7

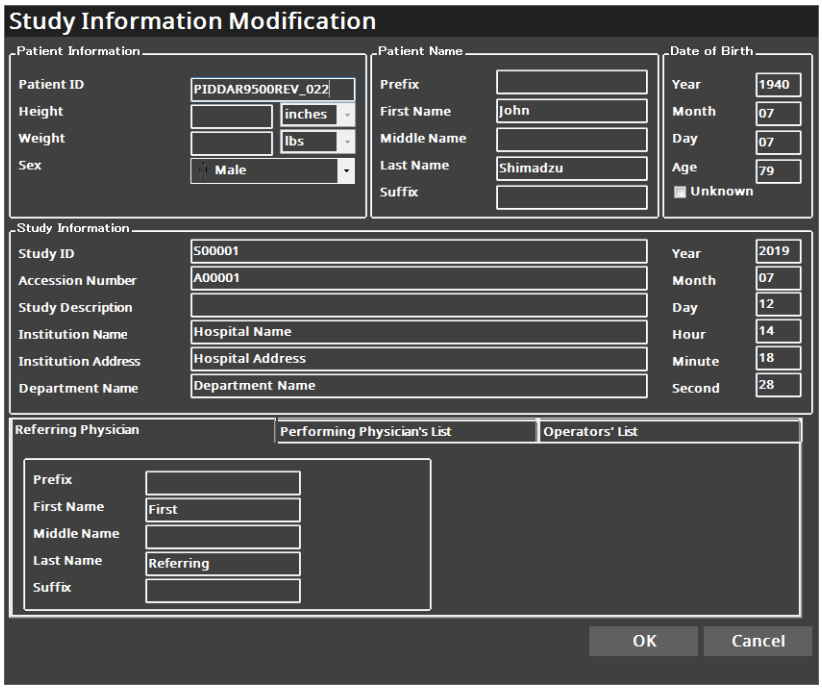
7.5 Modifying Study Information

Text-based study information, including patient demographics, can be modified locally for the purpose of making minor corrections before printing or exporting images.

> **NOTE**
>
> Modifications are only made on the local system.

To modify study information, follow this procedure.

1. Click [Open] button on the side menu to pen the Studies Management window.
2. Click the study you wish to modify.
3. Click [Info]. The Study Information dialog box appears.
4. Click [Modify] and enter the administrator (super) password, and click [OK]. The [Study Information Modification] dialog box appears.



5 Change items as desired.

Ensuring that the following value ranges are respected.

No.	Group/Item		Max Length	Permitted Characters/Numbers	Max Total Characters
1	Patient Information	Patient ID	64	Alpha, Number, hyphen <->, period <.>, underscore <_>.	
		Weight	6	Number, decimal point: 1 to 250 (kg), 2.2 to 550 (lb)	
		Height	6	Number, decimal point: 30 to 242 (cm), 11.8 to 95.2 (inches)	
2	Patient Name	Prefix, First, Middle, Last, Suffix	60	*Combined length of all name fields cannot be greater than 60.* Alpha, Accents, hyphen, apostrophe <'>, underscore.	60
3	Date of Birth	Year	4	Number, no more than 107 years before current.	
		Month, Day	2	Number. Month: 1-12, Day: 1-31.	
		Age	3	Number. 0-107.	
4	Study Information	Study ID	16	Alpha, Number, hyphen, period, underscore.	
		Accession Number			
		Study Description	64	Alpha, Number, Accents, hyphen, period, apostrophe, underscore.	
		Institution Name		Alpha, Number, Accents, Special.	
		Department Name			
		Institution Address	1024	Alpha, Number, Accents, Special, backslash <\>.	
		Year	4	Number. *Cannot be in future. No more than 107 years before current.*	
		Month, Day	2	Number. 1-12, 1-31.	
		Hour, Minute, Second	2	Number 0-23, 0-59, 0-59.	
5	Referring Physician	Prefix, First, Middle, Last, Suffix	60	*Combined length of all name fields cannot be greater than 60.* Alpha, Accents, hyphen, apostrophe.	60

No.	Group/Item		Max Length	Permitted Characters/Numbers	Max Total Characters
6	Performing Physician's List	First, Middle, Last	60	Alpha, Accents, hyphen, apostrophe.	60
7	Operator's List	First, Middle, Last	60	Alpha, Accents, hyphen, apostrophe.	60

The following accents are available:
Alpha: A-Z a-z
Number: 0-9
Accents: àâäçèéêëîïôöùûüÀÂÇÉÈÊËÎÔ <space>
Special: <backslash excluded>

6 To add a new performing physician, click [New] in the [Performing Physicians List], fill in the name fields, and click [Save]. To edit a performing physician, click the left or right-arrow button to display the previous/next name and then make the changes and click [Save]. To delete the displayed physician, click [Remove].

7 When finished making changes, click [OK] and then [Yes] to begin the modification process.

Depending on the size of the study, it will take from several seconds to a minute or two to apply the modifications to every loop and image in the study. A progress bar grows toward the right during this process.

8 Once the modifications are complete, the Study List in the [Studies Management] window is refreshed, showing any modifications that you may have mad to the fields that appear in the Study List.

7.6 Anonymizing Study Information

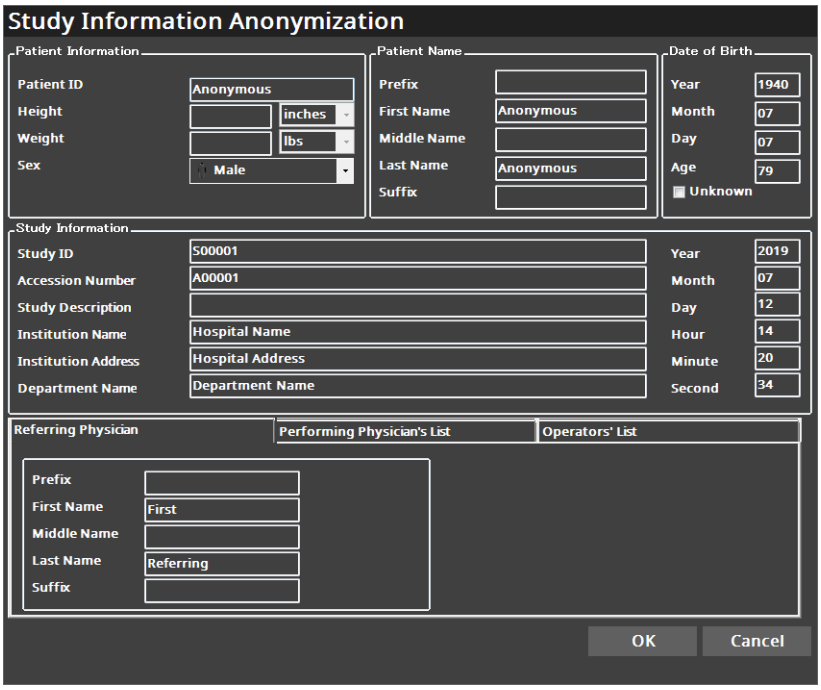
A study can be copied and then have all patient-identity information replaced with generic values to protect a patient's identity. This is useful when images must be printed or transferred in a non-secure environment.

To create an anonymous copy or a study while leaving the original study untouched, follow this procedure.

1 Open the [Studies Management] window and click the study you wish to anonymize.

2 Click [Info]. The Stud Information Anonymization dialog box appears.

3 Click [Anonymize]. The Study Information Anonymization dialog box appears with Patient ID and Patient Name set to the generic value "Anonymous".

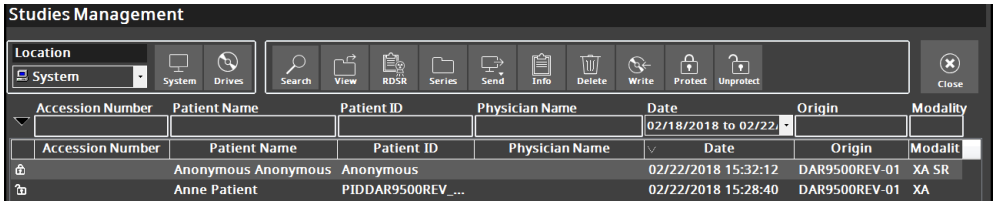


4 Make any additinal modifications (respecting value ranges described in ☞"7.5 Modifying Study Information" P.7-12 and click [OK] and then [Yes] to begin the anonymization process.

Depending on the size of the study, it will take from several seconds to a minute or two to make a complete anonymized copy of the study including all loops and images. A progress bar grows toward the right during this process.

5 Once the anonymization is complete, the Study List in the [Studies Management] window is refreshed to show the just-added anonymous study.

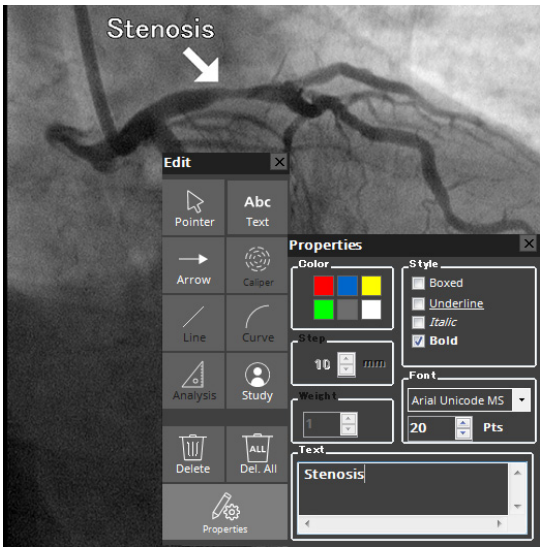
By default, the new anonymous copy of the study retains the original accession number, however, its time and date are changed to the anonymous copy creation time.



7.7 Working with Image Annotations

Any area of interest in an image can be annotated with arrows and text superimposed on the image.

In this sample image, a stenosis has been highlighted with the annotation tool.



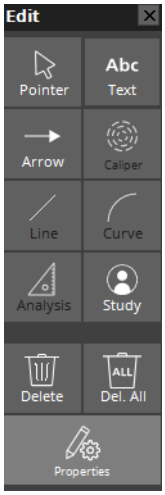
NOTE

After saving an image, you can no longer annotate it.

To annotate an image, follow this procedure.

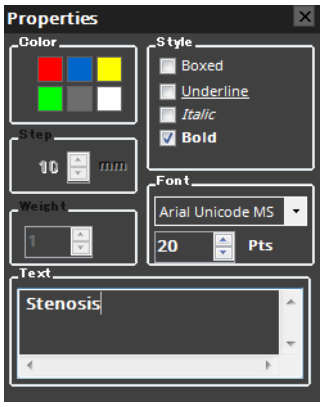
1 Pause a loop on the image you wish to annotate.

Click [Func]-[Abc Edit] on the side menu. The [Edit] tool bar appears floating over the image.



2 To add text, click [Text] button.

Move the pointer to where you wish to add text, click and begin typing. The text appears in the [Properties] dialog box and it is also superimposed over the image. Set color and style as desired.



3 Position the text by dragging it over the image. To add an arrow, click [Arrow] button, point to the area of interest in the image and click.

An arrow appears. Move the arrow around the image by dragging its head. Change the tail angle or length by dragging the tail. Set its color properties as desired.

4 If QCA or LV analysis feature is active while creating an annotation, the analysis information is superimposed over the image and the [Analysis] button on the [Edit] tool bar is automatically activated.

To hide this information, click the [Analysis] button so that it is not longer pushed in.

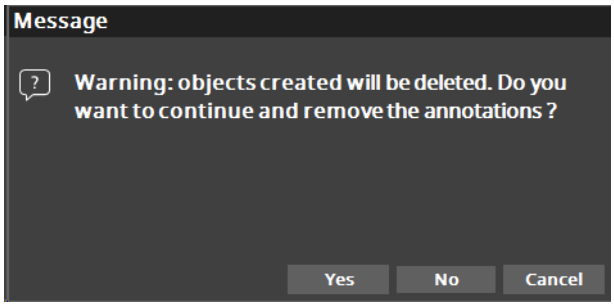
NOTE

When image annotations are saved with the study as DICOM objects, all colors are converted to black and white. So once an annotated image has been saved with a study, closed, and then reopened, any colors will be gone. If desired, you can externally save the annotated image, including any color effects as described in ☞ "7.10 Modifying Image Comments" P.7-33.

5 To add a copy of the Study Information displayed at the top of the Image Viewer window to the annotated image, click [Study] on the [Edit] tool bar.

A movable Study Information line appears over the image. Position it as desired.

6 When selecting other loop, the following dialog will display.



Click [No] to maintain the annotation.

7 Save your annotated image as described in the next section ☞"7.8 Saving Images" P.7-20.

7.7.1 Measurement Tools

ISO center value is used for calibration coefficient as a default. Once an image has been calibrated as described in ☞"8.4 Image Calibration Methods" P.8-11, three additional tools become available on the [Edit] tool bar. The [Caliper], [Line] and [Curve] tools can be used to make measurements in an image.

Caliper

Select the [Caliper] tool and click on the image. The caliper appears. Grab the Caliper in the center and move it where you like. Size the Caliper by clicking the largest circle and then dragging inward to shrink it or outward to expand it.

Line and Curve

Select the [Line] or [Curve] tool and click on the image. A point appears. Click elsewhere on the image to add a second point, and so on. The straight line (curve) connecting those points, is displayed. The dotted line is also displayed starting from the first point, and the length is displayed at the edge of the dotted line. If new points are added or deleted at the edge of the line, the length value is updated.

To stop entering points, click the [Pointer] button. To delete a point, select it at the edge of the dotted line that shows the straight line (curve) length and then click both mouse buttons simultaneously.

The edge point of the dotted line can be moved. When the point is moved, it is possible to change the position of where the straight line (curve) length is displayed. To move the point, drag it to a new position.

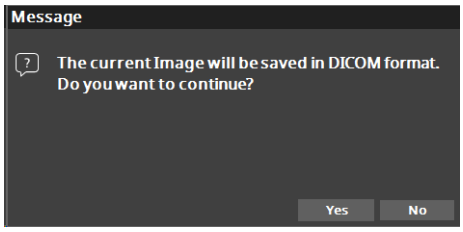
7.8 Saving Images

> **NOTE**
>
> Save is only available for saving images from loops displayed on the Reference monitor.
>
> Save is not available for pre-existing still images.

The [Save] button on the side menu can be used to save still images (with any annotations) from loops when a study is open for acquisition or review.

To save an image, follow this procedure.

1 Pause on the image if it is a playing loop then click [Func]-[Save]. The following prompt appears.



2 Click [Yes] to perform the save. Any color in the image is converted to black an white before saving. Note that once you click [Yes], you cannot delete the new image object.

A new icon is added to the end of the Image Selector list for each image you save. The upper-left corner of the icon includes the loop number from which the image was saved, and in square brackets, the image frame number.

Also, when back in the [Studies Management] window, if you select this study and then click [Series], you will see your just-added object indicated by an increase in the number of objects in the [Annotated Image] series.

> **NOTE**
>
> (Primary Archive mode only, for unprotected studies) When you save an image while in review, the entire study becomes protected because of the change to the study. See the Primary Archive section of ☞ "System Tab" P.17-17.

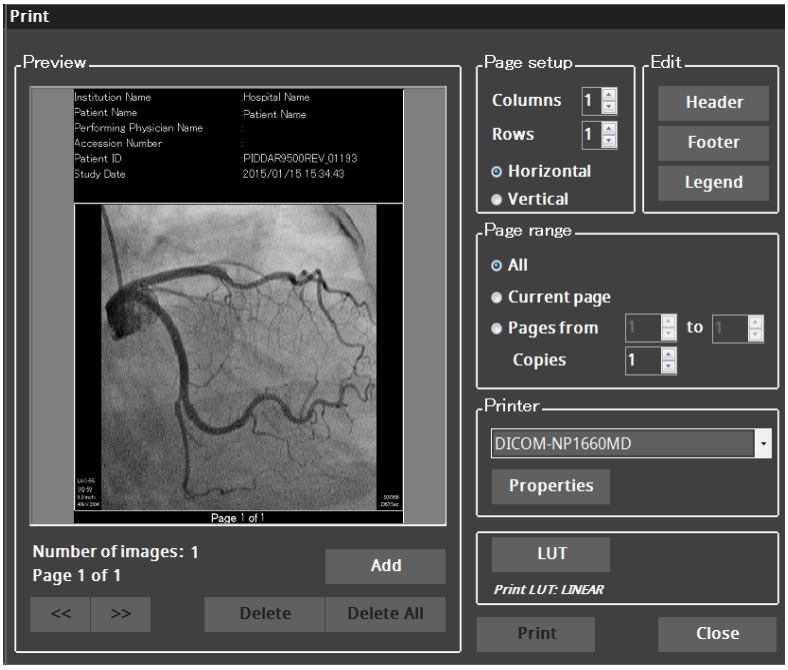
7.9 Print Images

7.9.1 Selecting Images for Printing

To select images for printing, including annotated and reference images, navigate to each image that you wish to print, pausing on it if it is in a playing loop, and click [Funct]-[Add] on the side menu. Continue adding as many images as you like. When ready to see the print preview, click [Funct]-[Print].

> **NOTE**
>
> The [Add] and [Print] side-menu buttons are grayed out if no printers are configured. Consult your system administrator for assistance.

If you click [Print], the print window appears like this.



You can then choose the desired DICOM printer in the Printer list. You can also configure Headers, Footers and Legends for both printer types. With the DICOM printer, you can print on special media such as photographic paper and film.

7.9.2 Printing Basics

After choosing [Funct]-[Add] to add images, click [Funct]-[Print]. A preview of your selected images is shown, arranged according to the Page setup values. Sufficient pages are added to accommodate the images. For example, if you add a total of 8 images and Columns=2 and Rows=2, (4 images per page), 2 pages will be required.

1. Navigate through the preview images with the [<<] and [>>] buttons in the lower-left corner.

2. Add images with the [Add] button.

   If desired, you can close the Print window to see the images better and the click [Funct]-[Print] again to reopen the window.

3. Delete images, by selecting a preview image (it is highlighted with a box) and then clicking [Delete].

   Click [Delete All] to delete every image from the print list.

4. In the Page setup box, set the number of Rows and Columns of images per page.

   For example, setting both Rows and Columns to 3 will give you 9 images per page.

5. Choose the desired printer in the Printer list.

6. Optionally configure printer features and set DICOM printer options as described in the two following sections.

   When read, click [Print] to print the images.

7. If desired, you can click [Close] without printing and print later.

   Your images are preserved in the Print list until you delete them or close the study.

Printed images can be of diagnostic quality only when printed on an approved medical-grade printer that has been calibrated.

7.9.3 Print Features

Print Features such as Headers and Footers can be configured.

> **NOTE**
>
> To print in color (if possible), all color information added to the image will be printed in color. However, only black and white images will be saved, but not color images.

Horizontal/Vertical

In the Page setup box, you can choose [Horizontal] to fill the page left to right and then down, or [Vertical] to fill it top to bottom and then to the right. For example, if Columns and Rows are set to 2, for 4 images per page, selecting [Horizontal] will cause the first image to be placed in the upper-left area, the second to be placed in the upper-right area, the third to be placed in the lower-left area, and so on. In contrast, [Vertical] will cause the second image to be placed in the lower left and the third image to be placed in the upper-right.

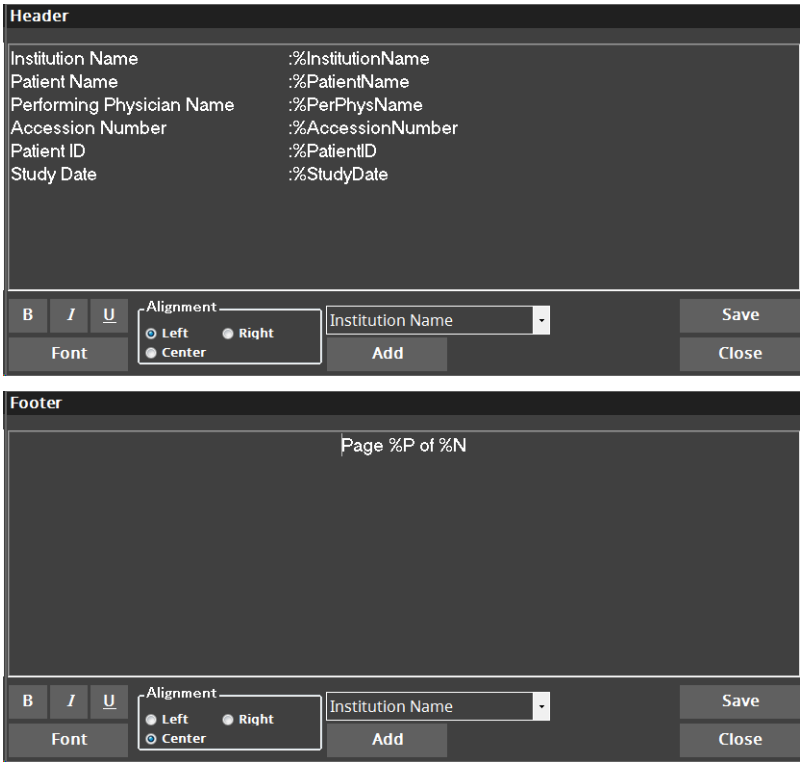
Modifying the Header and Footer

By default, a header and footer is included on every page. You can use the defaults, adjust them, or completely replace them.

To modify the Header or Footer, follow this procedure.

1 Click the [Header] or [Footer] button.

The Header or Footer edit box appears.



2 Enter any text you like. Press [Enter] key to start a new line.

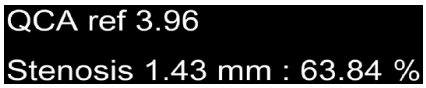
Press the keyboard [Tab] key to align text in columns. To delete text, select it (drag over text with mouse button pressed so that selection becomes highlighted) and press the keyboard [Delete] key.

3 Variables and macros for common information such as Patient Name can be included by selecting them from the drop-down list above the [Add] button and then clicking [Add].

During preview and printing the variables are replaced with the actual values from the study. You can add, delete, and rearrange macros and variables or your own text in any way desired. The variables provide information specific to the image added to the print list.

The following variables are supported:

Variable	Notes
General: These variables provide general information about the study.	
%InstitutionName	
%PerPhysName	
%PatientName	
%StudyDate	
%PatientID	
%StudyID	
%Patient Sex	
%Patient Birth Date	
%AccessionNumber	
%Page Number	
%Number of pages	
Parameters: These variables replicate any parameter information associated with the selected image.	
%Oblique Angle	Oblique angle of the detector in degrees in which angles toward the patient's left are displayed with LAO, and angles toward the patient's right are displayed with RAO.
%Sagittal Angle	Sagittal angle of the detector in degrees in which angles toward the patient's head are displayed with CRA, and angles toward the patient's foot are displayed with CAU.
%sid	X-ray source to detector distance in centimeters.
%fov	FPD field of view in inches.
%kV	X-ray tube voltage in kilo-volts.
%mA	X-ray tube current in milliamperes.
%mAs	Function of X-ray tube current and time expressed in milliamperes second.
%Time	X-ray pulse (exposure) duration for this image, in milliseconds.
%Image Comment	The selected comment (if any).
%Dose Of The Loop	Total dosage of the loop.

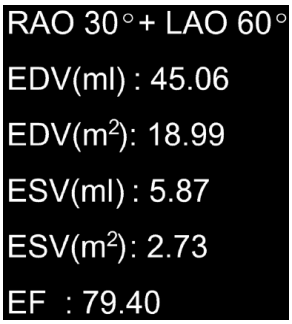
<table>
<tr><th>Variable</th><th>Notes</th></tr>
<tr><td>%Image Number</td><td>Number of the image.</td></tr>
<tr><td>%Acquisition Time</td><td>The time which the image was taken.</td></tr>
<tr><td colspan="2">Frame Information: These variables provide frame information.</td></tr>
<tr><td>%Frame</td><td>The image from which this image was taken.</td></tr>
<tr><td>%n_frame</td><td>The total number of frames in the loop.</td></tr>
<tr><td>%Frame Time</td><td>The number of seconds since start of loop at which the image was acquired.</td></tr>
<tr><td>%Injection Time</td><td>The period of time when turn ON the injector with overlay by frame in milliseconds.</td></tr>
<tr><td>%Inverted</td><td>The image is inverted.</td></tr>
<tr><td colspan="2">Quantitative Coronary Analysis (QCA): ☞ "8.2 Quantitative Coronary Analysis" P.8-2</td></tr>
<tr><td>%QCA Reference
%QCA RAO Stenosis mm
%QCA RAO Stenosis</td><td>These variables are used inside the %qca macro to provide QCA result values for images with active QCA analysis at the time they are added to the print list.
The default %qca macro definition is as follows:
%qca(
QCA ref %QCA Reference
Stenosis %QCA RAO Stenosis mm mm : %QCA RAO Stenosis % %
)
Enter this entire definition in one of the legend boxes. This causes QCA results to be displayed like this:
 

The variables in this macro only produce results for images on which QCA results had been calculated at the time the image was added to the print list. If this is not he case, no QCA result values are printed.
If desired, you can omit some of the individual variables or re-sequence them.
Although not used in the default %qca macro definition, variable %Calib Type provides calibration type information like this, according to selected calibration type:
Distance: 20.0 mm
Grid: 2x2
Catheter 10F 3.33 mm</td></tr>
</table>

<table>
<tr><th>Variable</th><th>Notes</th></tr>
<tr><td colspan="2">Left Ventricular Analysis (LVA): ☞ "8.3 Left Ventricular Analysis" P.8-7</td></tr>
<tr><td>%LV RAO EDV ml
%LV RAO EDV M^2
%LV RAO ESV ml
%LV RAO ESV M^2
%LV RAO EF</td><td>These variables are used inside the default %lvrao macro to provide LV RAO values for images with active LV analysis at the time they are added to the print list.
The default %lvrao macro definition is as follows:
%laver(
RAO 30º
Defame) : %LV RAO EDV ml
Defame): %LV RAO EDV m2
ESV(m2) : %LV RAO ESV ml
ESV(m2) : %LV RAO ESV m2
EF : %LV RAO EF

Enter this entire definition in one of the legend boxes. This causes LV RAO results to be displayed like this.
 
If desired, you can omit some of the individual variables or re-sequence them.

The patient’s height and weight must be entered on the LV tool bar before proper result can be calculated.</td></tr>
</table>

Variable	Notes
%LV RAO LAO EDV ml	These variables are used inside the default **%lvraolao** macro to provide LV RAO values for images with active LVA analysis at the time they are added to the print list. The default **%lvraolao** macro definition is as follows: %lvraolao(RAO 30º+ LAO 60º EDV(ml) : %LV AO LAO EDV ml EDV(m2): %LV RAO LAO EDV m2 ESV(ml) : %LV RAO LAO ESV ml ESV(m2) : %LV RAO LAO ESV m2 EF : %LV RAO EF This causes LV RAO LAO results to be displayed like this:  If desired, you can omit some of the individual variables or re-sequence them. The patient's height and weight must be entered on the LV tool bar before proper results can be calculated.
%LV RAO LAO EDV m^2	
%LV RAO LAO ESV ml	
%LV RAO LAO ESV m^2	
%LV RAO LAO EF	

NOTE

Special variables, such as those containing QCA or LV analysis results (e.g., %QCA RAO Stenosis %), will only have a value for images that were added to the print list when the QCA or LVA results were displayed.

4 To format, select the desired text and variables, and then click one or more of the buttons: [B] for bold, [/] for italic, [U] for underlined, or [Font] for font.

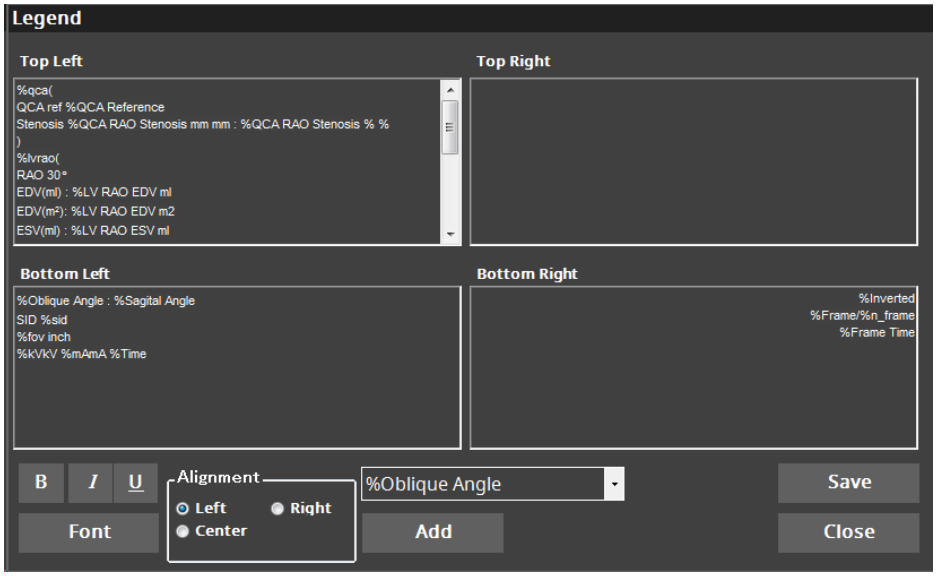
For Font, choose Font, font style, and Size from the dialog box that appears.

5 Change text alignment by selecting one or more lines of text and clicking an Alignment button: [Left], [Right], or [Center].

6 When finished, click [Save]. Your changes are immediately reflected in the Preview.

Modifying the Image Legend

Any Legend text you like can be superimposed over the four corners of the image.To add Legend text, click the [Legend] button, enter your text and variables, and then apply formatting like done for Header in any of the four boxes.



Click [Save] when done. Add a new image and check the result in the Preview. Until modified, this legend will be included on all images subsequently added to the Print list.

Selecting Page Range

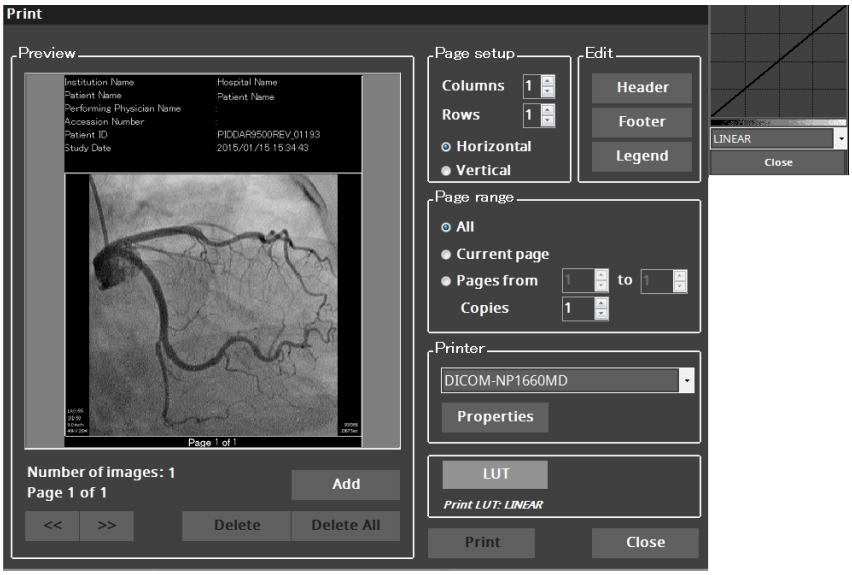
If you wish to print fewer than all image, select the desired page(s) in the Page range box.

Setting Printer LUT

If configured at your site, you may be permitted to select alternative printer LUT profiles to control image brightness and contrast. If the current printer LUT profile (name displayed near LUT button) is not appropriate, follow this procedure to set a different one.

1 Click [LUT] button.

A small profile selection box appears at the upper-right corner of the [Print] window.



2 Choose the desired profile from the drop-down list.

The chosen profile name appears near [LUT] button. If desired, click [Close] to close the drop-down list.

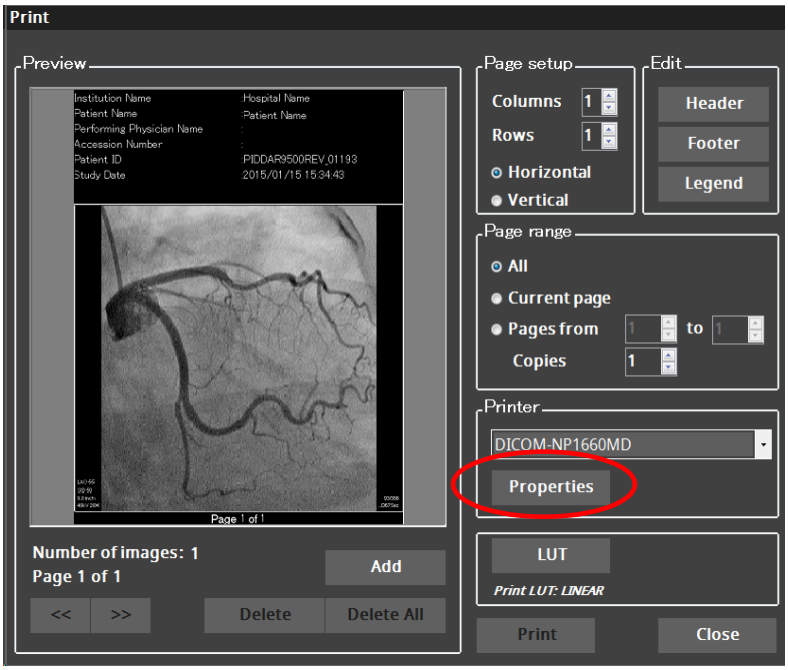
Setting Printer

Select from [Printer] on the [Print] window and click [Properties]. The following [Printing Configuration] window appears.

7.9.4 Setting DICOM Printer

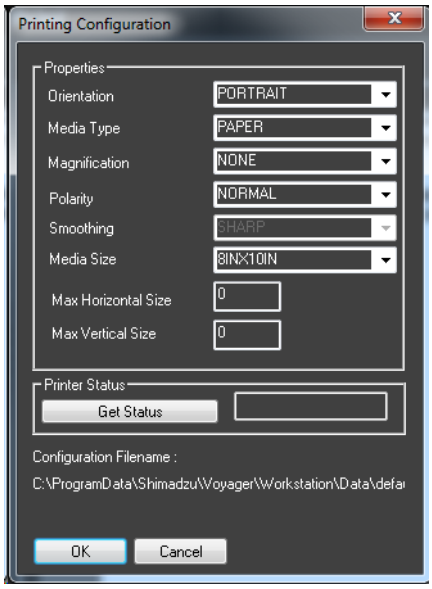
There are several DICOM printer properties that are configured as follows.

Select [Funct]-[Print] from the side menu and click [Properties] for [Printer].



7

The following [Printing Configuration] window is displayed.



No.	Item	Description
1	Orientation	Choose [LANDSCAPE] for a page that is wider than it is long, or [PORTRAIT] for the opposite.
2	Media Type	Choose media such as paper, photographic paper, or film, according to what is supported and available. Black text on a white background is used for paper, and white (clear) text on a black background is used for film.
3	Magnification	Choose the scaling algorithm used to fit images into the designated page region. For example, BICUBIC will produce better quality than CUBIC, however it will take more time.
4	Polarity	Only for the image itself, choose [NORMAL] for normal printing or [REVERSE] for reverse (white inverted to black, black inverted to white) printing.
5	Smoothing	Select smoothing level of the image from a pull-down list. Enabled only for some [Magnification] values (e.g., [CUBIC]). Select a value supported by the selected printer.
6	Media Size	Choose media size.
7	Max Horizontal Size	Select the document maximum horizontal size (in inches).
8	Max Vertical Size	Select the document maximum vertical size (in inches).
9	Get Printer Status / Get Status	Click to display DICOM printer [Status].

7.10 Modifying Image Comments

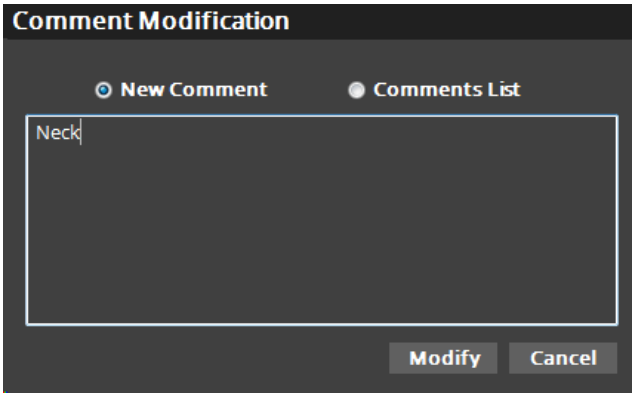
Enable to modify comments on the image after study. Follow the procedure below to modify the comments.

1 Display an image which comment to be modified.

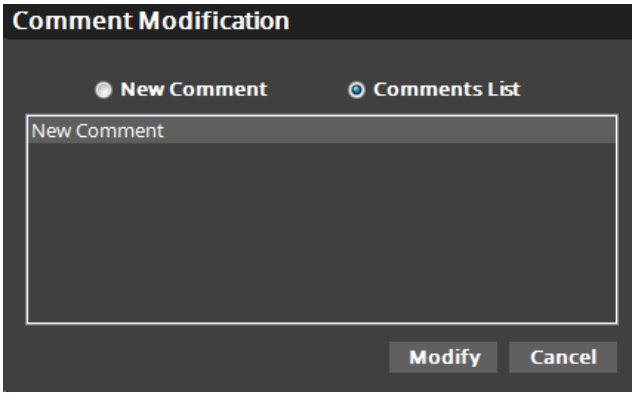
2 Click [Comment] on the side menu.

3 Select [New Comment] to set a new image.

4 After entering a comment, click [Modify] button.



5 To select from registered image comments list, select [Comments List].



6 After selecting an image comment, click [Modify] button.

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Chapter 8

Performing Angiographic Analysis

This chapter describes the Quantitative Coronary Analysis (QCA) and Left Ventricular (LV) analysis features and their related calibration procedures. This chapter provides detailed information on the analysis process as follows.

Description

8.1 Introduction

Quantitative Coronary Analysis (QCA) and Left Ventricular (LV) features are available to help assess coronary stenosis and ventricular volumes.

8.2 Quantitative Coronary Analysis

The QCA feature enables you to accurately measure coronary artery stenosis. In automatic mode, you just click a few points in the general area of the stenosis and the QCA feature does the rest, drawing a contour and calculating the degree of stenosis.

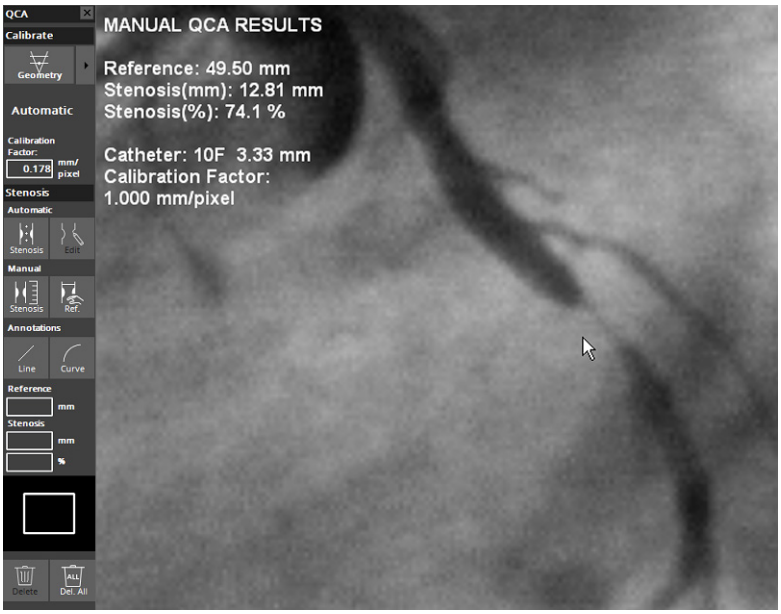
WARNING

Measuring a vessel diameter from angiography causes several errors. Therefore, do not diagnose or treat based solely upon this analysis result. Use the analysis result as a reference value.

To measure coronary artery stenosis, follow this procedure.

1 Display a study containing both calibration reference and stenosis images. Click [Funct]-[QCA].

The image is automatically zoomed and the [QCA] tool bar is displayed. Calibration and analysis information is superimposed over the image, if configured (see ☞ "Display Tab" P.17-37).



2 ISO center value is registered for calibration coefficient as a default value. For more detailed analysis result, perform calibration as described in ☞"8.4 Image Calibration Methods" P.8-11.

This determines the mm to pixel ratio of the image. When calibrated, display an image with a good view of the stenosis.

3 If needed, pan (right-click drag) the image so that the area f interest is centered in the Image Viewer.

4 You can also pan the image by dragging the pan box at the bottom of the tool bar with either the mouse (left-click drag) or, if configured, the joystick (hold down button)

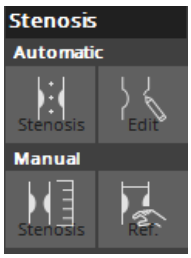
Drag the pan box in the direction you wish to pan the image.

5 You can zoom in and out the displayed image.

Right-click on the following button on the side menu to zoom in and left-click to zoom out.

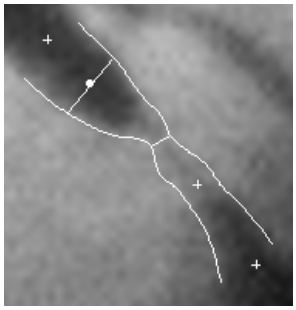
6 Click the [Automatic]-[Stenosis] button.Then click three points along the stenosed artery.

With the first point on one side of the stenosis, the second point near the stenosis, and the third on the other side of the stenosis. Then click a fourth point on the part of the artery you judge to be the coronary reference diameter.



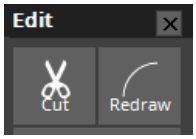
7 A contour is drawn along the artery.

With the reference point marked by a white dot with a line through it extending to the artery edges. the narrowest part of the artery, the suspected stenosis, is marked with a white line across the artery. The degree of stenosis is calculated based on the ratio between the width of the artery at the reference point versus the width of the artery at the most stenosed point. Drag the reference line along the artery, or adjust other points as desired. The percent stenosis is recalculated instantly.



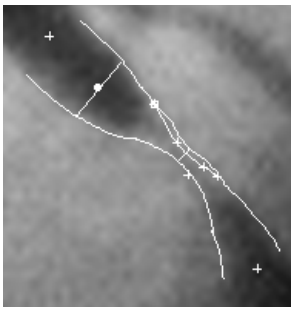
8 To adjust an auto-generated contour line to fit the artery edge more closely, click [Edit] on the [QCA] tool bar.

The image is zoomed in so you can see the artery more closely. Right-click drag the image to center the area of interest. Click [Redraw] on the Edit tool bar.



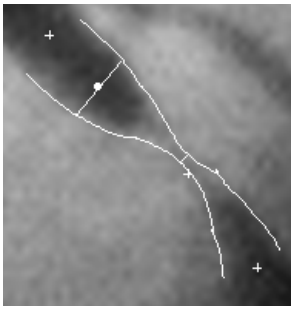
9 On the image, click where you want to start adding points and then click to add other new points along the artery edge where the automatic contour is not close enough. Drag the new points as needed to follow the artery edge. The first and last new points automatically connect to the automatic contour. Click [Apply] to change the contour and recalculate stenosis.

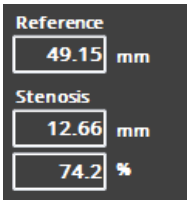
When adjusting the contour, press the keyboard space bar to temporarily hide the automatic contour so that you can clearly see the artery edge.



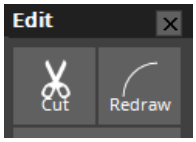
10 The contour is modified, the stensis indicator line is moved to the new narrowest point.

Stenosis is recalculated and displayed.

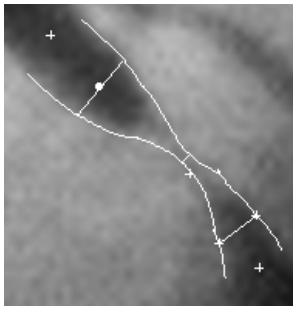




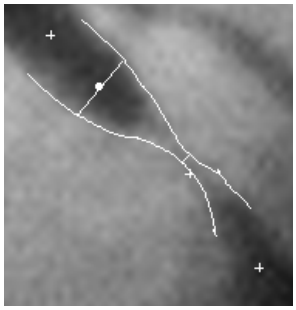
11 To trim off the ends of the contour lines, click [Edit] on the [QCA] tool bar and then [Cut] on the [Edit] tool bar.



12 Click points on either side of the ends of the contour lines like this so that the connecting line bisects the contour lines at the desired trim points.

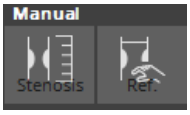


13 Click [Apply] to trim the contour lines where indicated.



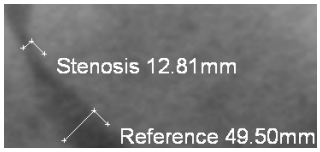
14 To measure stenosis manually, click [Manual]-[Stenosis] button. Click points on opposite sides of the narrowest part of the stenosed artery.

The stenosis is measured and indicated on screen.



15 Click [Manual]-[Ref.] button. Click points on opposite sides of the part of the artery that you consider to be un-stenosed.

The reference distance is measured and indicated on screen. The percent stenosis is also calculated and displayed.



16 Select [Line] or [Curve] and click on the image to show points. Lines or curves connecting the points are displayed.

A dotted line which begins from the first point is displayed at the same time, and length is displayed at the end of the dotted line. The length of line and curve displayed at the end of the dotted line is updated when adding or deleting the points.

17 To delete the points, select the end of dotted line showing the length of straight line or curve, and click both right and left mouse buttons at the same time.

18 Click [Delete] to delete currently selected object.

19 Click [Del. All] to delete all the objects except QCA calibration object.

8.3 Left Ventricular Analysis

The left ventricular analysis feature enables youto calculate left ventricular volume and analyze the regional and global wall motion with the Modified Centerline method. These values are determined starting with a right oblique anterior projection at 30 degrees, a left oblique anterior projection at 60 degrees, and their spatial combination.

⚠ CAUTION

For optimal Left Ventricular analysis, both the heart and the calibration device should be positioned at the center of the image for RAO 30 degrees and LAO60 degrees. In other words, they should be positioned at ISO center.

To perform left ventricular analysis, follow this procedure.

1 Display a study containing both a calibration reference image and other images showing he left ventricle in its various states.

2 Click [Funct]-[LV].

3 The [LV] tool bar is displayed.

Calibration and analysis information is superimposed over the image, if configured. See ☞ "Display Tab" P.17-37.

4 If needed, pan (right-click drag) the image so that the area of interest is centered in the Image Viewer window.

You can also pan the image by dragging the pan box. at the bottom of the tool bar with either the mouse (left-click drag) or the joystick (hold down button). Drag the pan box in the direction you wish to pan the image.

5 ISO center value is registered for calibration coefficient as a default value. For more detailed analysis result, perform calibration as described in ☞"8.4 Image Calibration Methods" P.8-11. This determines the mm to pixel ratio of the image.

NOTE

If the image has not been calibrated, only the results of the ejection fraction and segmental LV function will be available.

6 In the Contour group of the [LV] tool bar, click the projection icon that corresponds to the image (the End of Distole image (ED), or the End-of Systole image (ES) of RAO or LAO projection).

RAO ED RAO ES LAO ED LAO ES

7 Working with only RAO ED and RAO ES projections, two contours can be traced, and if the LAO projection is also used, four contours may be traced.

The selected projection is indicated by the highlighted projection icon on the LV tool bar.

8 Using the mouse, outline the ventricle's contour by clicking multiple points along the ventricular wall. Start contouring from the base of the aorta.

It is sufficient to click a few points along the contour by clicking the left mouse button and then the outline curve is automatically created.

9 Move a point by clicking and dragging it to a new position.

10 Delete a point by clicking it with the left and right mouse buttons simultaneously.

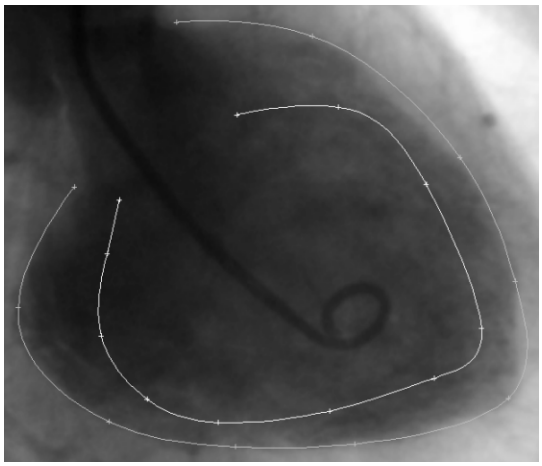
11 To erase the entire curve, click [Clear]. Alternatively, to cancel recent changes and restore previous values, click [Cancel].

12 Once the contour is defined up to the lower-right aortal base, validate the contour by clicking the icon of the next projection to be drawn.

Once validated, an opaque square surrounds the projection icon to indicate that the corresponding contour has been entered and validated.

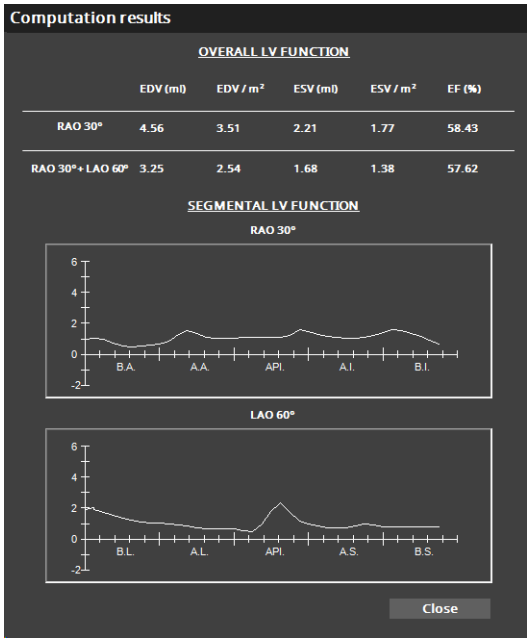
13 Select the image for ES and define its contour.

Here is a sample with the ED and ES contours completed.



14 Click [Compute] icon.

The results of the ventricular analysis are displayed like this.



Abbreviations:

BA= Basal Anterior, AA= Apical Anteriro, API= Apical, AI= Apical Inferior, BI= Basal Inferior, BL= Basal Lateral, AL= Apical Lateral, AS= Apical Septal, BS= Basal Septal

⚠ CAUTION

This analysis is calculated with an approximation formula called “Area Length,” so the calculation result includes approximation errors.

⚠ CAUTION

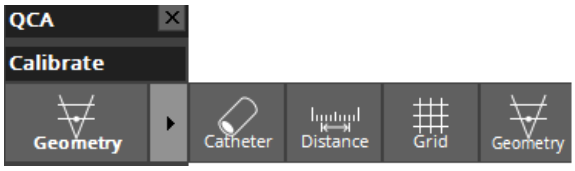
Analyze both LAO and RAO for high precision analysis. Also, Perform either of calibration once.

⚠ CAUTION

Calibrate on either the LAO or RAO image. It is not necessary to calibrate on both. Be sure to adjust the target region to the ISO center and perform LAO and RAO radiography without changing SID. Also, perform either of calibration once.

8.4 Image Calibration Methods

Calibration options available for the QCA and LV features are as follows.



CAUTION

If you choose a different loop after calibrating, a message may be displayed asking if you wish to keep the existing calibration. Keep the existing calibration **ONLY** if you know that the acquisition configuration and C-arm parameters are the same for the different loop.

8.4.1 Using ISO Center Value

ISO center value is used as a default, however, perform calibration by manual if needed.

8.4.2 Using a Catheter (QCA)

To calibrate an image using a catheter, follow this procedure.

1. Display an image that contains a catheter of known diameter.
2. On the [QCA] tool bar, click the arrow button below [Calibrate] and choose [Catheter]. Then click the [Catheter] button.
3. Choose one of the predefined catheter diameter values from the drop-down list or enter the exact value (mm) in the box provided.

   Enable to enter the value up to 50 mm.
4. Click [Catheter].
5. Click 3 points along the middle of the catheter.
6. The calibration factor in mm pixel is calculated and displayed in the [Calibration Factor] box.

   To adjust the outline and improve the mm per pixel accuracy, click any of the three points and drag it while keeping the mouse button pressed.

⚠ CAUTION

If the target vessel for measurement and geometric expansion of catheter for calibration is different, then the expansion difference causes errors.

8.4.3 Using Reference Distance (QCA)

⚠ CAUTION

This method is only valid if the object of known dimensions lies in the same plane as the structure to be measured in the image.

To calibrate an image using a reference distance, follow this procedure.

1. Display an image that contains an object of known dimensions.
2. On the [QCA] tool bar, click the arrow button below [Calibrate] and choose [Distance]. Then click [Distance].
3. Enter the known reference distance (mm) in the box provided.
4. Click [Distance] button.
5. Click two points on the image to mark the exact starting and ending points of the object of known dimensions. A line segment is drawn between the two points.
6. The calibration factor in mm per pixel is calculated and displayed in the [Calibration Factor] box.
7. If desired, adjust the line segment as follows.
   - Move the segment on the image by clicking the first point of the segment and dragging it while keeping the mouse button pressed.
   - Stretch or reduce the segment by clicking the last point of the segment and dragging it while keeping the mouse button pressed.

8.4.4 Using a Grid (QCA and LV)

> **⚠ CAUTION**
>
> This method is only valid if the grid of known dimensions lies in the same plane as the structure to be measured in the image.

To calibrate an image using a grid, follow this procedure.

1. Display an image that contains a grid of known dimensions.
2. On the [QCA] or [LV] tool bar, click the arrow button below [Calibrate] and choose [Grid]. Then click [Grid].
3. Choose a grid from the drop-down list, from 1 mm square up to 7x7 mm.
4. Click [Grid].
5. Click four points on the image to mark the initial position and size of the grid. A grid is drawn over the image. Now position the grid over a corresponding number of grid cells in the image.

   For example, if you chose a 2x2 grid, position the on-screen grid so that it is superimposed over a 2x2 grouping of grid cells in the image.
6. The calibration factor in mm per pixel is calculated and displayed in the [Calibration Factor] box.

8.4.5 Using a Reference Ball (LV)

To calibrate an image using a reference ball, follow this procedure.

1. Display an image that contains a reference ball of known diameter.
2. On the [LV] tool bar, click the arrow button below [Calibrate] and choose [Ball]. Then click [Ball] again.
3. Enter the diameter of the ball (mm) in the box provided.
4. Click [Ball].
5. Click 3 points on the ball circumference. The ball is outlined and the calibration factor in mm per pixed is calculated and displayed in the [Calibration Factor] box.

   If desired, adjust the ball outline by clicking and dragging any of the 3 points.

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Chapter 9

DSA Image Adjustment Tools

This chapter describes how to adjust Digital Subtraction Angiography (DSA) images with the tools provided.

Description

9.1 Introduction

Images captured in DSA mode have constant structures of no diagnostic interest virtually removed, enabling enhanced blood-vessel contrast.

Tools are provided to adjust DSA images to ensure the best-possible image quality.

9.2 Adjusting Subtraction Parameters

To modify the subtraction parameters of a loop.

1 Display the DSA loop.

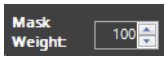
2 Click [Funct]-[DSA] on the side menu.

3 The [DSA Tools] bar is displayed with the frame numbers of the mask frames shown in the [Mask #] box. The default number of consecutive frames used to create the mask (defined in Rad program definition) is shown in the [Mask #] selection box.

4 To change from the automatically-selected mask frames, pause on the image frame to be used as the first frame for the new mask and click [Set Mask] button on the [DSA Tools] bar. This frame and the appropriate number (defined in Rad program definition) of additional consecutive frames are used as the mask.

5 To change the number of additional consecutive frames used to create the mask, select a different value from the [Mask #] drop-down list of the [DSA Tools] bar.

6 To change the Mask Weight, use [Mask Weight] button to change the value (from 0 to 100%).



Increment for the Up/Down button can be changed in the range of 1 to 25. ☞ "Display Tab" P.17-37.
After changing the increment, close the [DSA Tools] bar, and then open it again.

7 If necessary, display the image in subtracted mode and use the side menu buttons to adjust the gray scale.

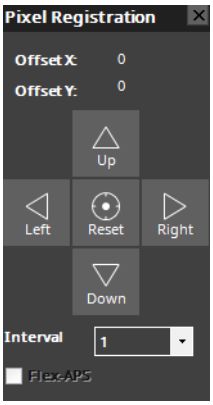
8 For DSA images, subtraction mode is the default. To review images in non-subtraction mode, click [Subtract] button on the [DSA Tools] bar to deselect it (no longer appears pushed in).

Click [Subtract] again to return subtracted mode.

9 To change blood vessel contrast in non-subtraction mode, change the value of [Vessel Power] (from 0 to 1000).

9.3 Reregistration

If necessary, use the [Pixel Registration] tool to reposition the image mask.



1. Click [Shift] on the [DSA Tools] bar.
2. Move the image along any of the four-axis by clicking the appropriate arrow button on the [Pixel Registration] tool bar.
3. If it is desired to move less than one pixel per click, select a different interval increment from the [Interval] drop-down list on the [Pixel Registration] tool bar.
4. To reposition the mask to the initial position (0,0), click [Reset] on the [Pixel Registration] tool bar.
5. Acquired with Flex-APS (option) and position adjusted loop is checked on the check box of [Flex-APS]. Uncheck this box to stop position adjustment.

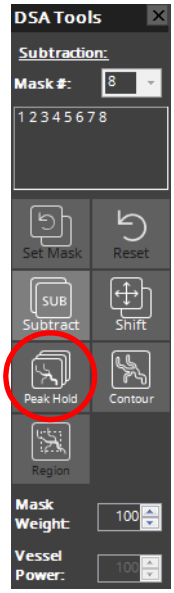
9.4 Peak Hold

Create peak hold image.

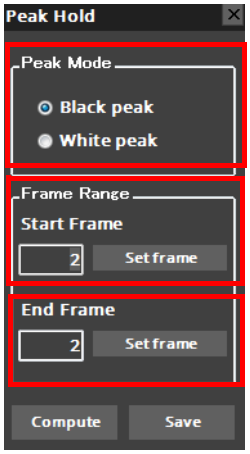
> **NOTE**
>
> Cannot use Mask Weight in combination with Peak Hold.

1 Click [Peak Hold] button on the [DSA Tools] bar and the peak hold will automatically apply to displaying image.

The peak hold setting is that peak mode is black and the frame range is currently selected frame to the last frame.



2 In case of that adjustment of peak hold image is necessary, use the peak hold dialog and set as follows.



1 Select either black or white peak.

2 Frame range applying peak hold. Display Start frame and click [Set Frame] button. And then display [End frame] and click [Set Frame] button.

3 Click [Compute] to recreate the peak hold image.

Using Mask Image

Enable to use created Peak Hold Image as a mask image.

To use as a mask image, click [Fluoro]-[DSA MAP].

4 Click [Save] to save the created peak hold image as a still image.

NOTE

Still image cannot register as a mask image. To superimpose the image on fluoroscopy image, use the image just after creating the peak hold image.

9.5 Contour Enhancement

Use contour function to create an contour enhanced blood-vessel image from DSA image. Superimpose and display the created image on the fluoroscopy image.

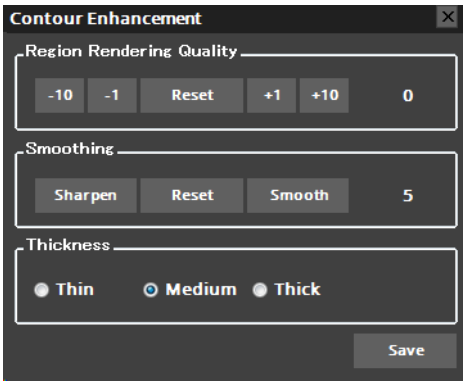
> **NOTE**
>
> Contour Enhancement is a function to know the shape of blood-vessel and branch position for large blood-vessel diameter such as aorta. Therefore, when apply this function to small blood-vessel, the blood-vessel may not be rendered, or rendered blood-vessel diameter may be too wide or too narrow.

1 Display the target image on REF monitor.

2 Click [Contour] button on the [DSA Tools] bar.

3 The image on the monitor will be edge enhanced with default parameters.

4 In case of that adjustment of vessel contour is necessary, set parameters of [Region Rendering Quality], [Smoothing] and [Thickness] on the Contour Enhancement dialog.



Description of each parameter is shown in the following table.

1	Region Rendering Quality	Click [+1] or [+10] button to render wider region of blood-vessel for displaying more less density of blood-vessel contour. And click [-1] or [-10] button to render narrower region of blood-vessel, if rendered region is too wide or too much noise.
2	Smoothing	Enable to specify the smoothness of displaying blood-vessel. Click [Smooth] button to smooth the blood-vessel image and [Sharpen] to reflect accurate shape of the blood-vessel.
3	Thickness	Enable to change contour thickness.

Enable to set default parameters for each physician. ☞ "Devices Tab" P.17-56

5 Click [Save] button to save the image as a still image.

NOTE

Still image cannot register as a mask image. To superimpose the image on fluoroscopy image, use the image just after applying Contour processing.

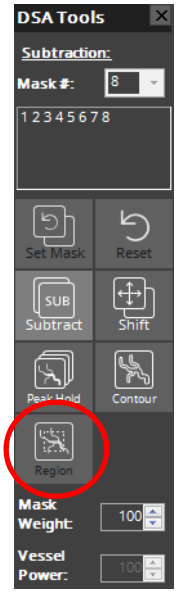
6 After creating the contour enhancement image, click [MAP]-[DSA] button on the side menu. Enable to register the image as a Mask image. ☞"DSA-MAP" P.4-32

9.6 Mask Region

To superimpose only a part of blood-vessel image of peak hold, contour enhancement and DSA images, enable to set ROI of SIMAP.

1 Display an image such as peak hold, edge enhancement and DSA images to be registered as SIMAP.

2 Click [Region] button on the [DSA Tools] bar.



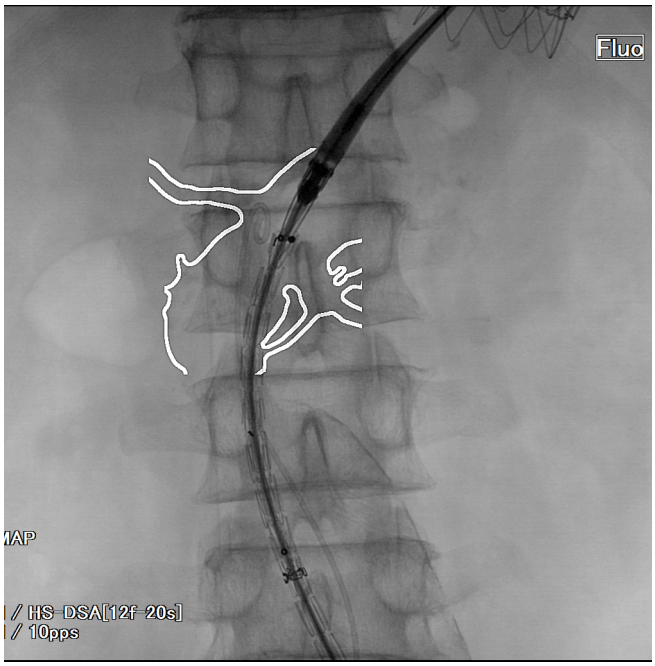
3 ROI is displayed on the image.

9

4 Set ROI where you want to use as MAP image on the displayed image. Drag a mouse on ROI to move and drag the edge of ROI to modify the size. Enable to move and modify the size with IVR NEO/SMART Touch.

5 Click [MAP]-[DSA] button on the side menu. ROI area is superimposed and displayed on subsequent fluoroscopy image.

☞ "DSA-MAP" P.4-32



9.7 Adjusting Shutter

Shutter completely block out image edges. Use shutters to hide distracting portions of an image, so that you can focus on areas of interest.

Combined circular and rectangular shutters are always adjustable. Shutter positioning and sizing information is retained for each group.

to move the shutter edges, position the mouse pointer at the edge of the image and find the shutters which are displayed as a white rectangle and circle. Use the left mouse button to resize the shutters by dragging a shutter edge inwards to make the visible image area smaller or outwards to make it larger.

The four sides of the rectangular shutters can be individually dragged to their desired position. The image shows through the intersecting portion inner area of the combined circular and rectangular shutters.

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Chapter 10

Difference with Bi-plane Option

This chapter describes differences when using the Bi-plane option to provide simultaneous frontal and lateral imaging.

Description

10.1 Introduction

10.1.1 Standard Components

The standard components of a bi-plane system are as follows.

No.	Name	Installation Location	Quantity
1	Digital reference cabinet: With built-in Reference computer	Control room	1 set
2	Digital acquisition cabinet: With built-in acquisition computer, CP2 (Panel Control Unit), UPS	Equipment room	2 sets
3	FPD cooling unit	Equipment room	2 sets
4	Monochrome LCD monitor	Control room	4 sets
		Examination room	4 sets
5	Keyboard and mouse	Control room	1 set
6	Bedside console IVR NEO	Examination room	1 set
7	FPD (Flat Panel Detector)	Examination room	2 sets
8	FPD high and low-voltage power unit	Examination room	2 sets
9	IVR Shuttle (Option)	Control room	1 set

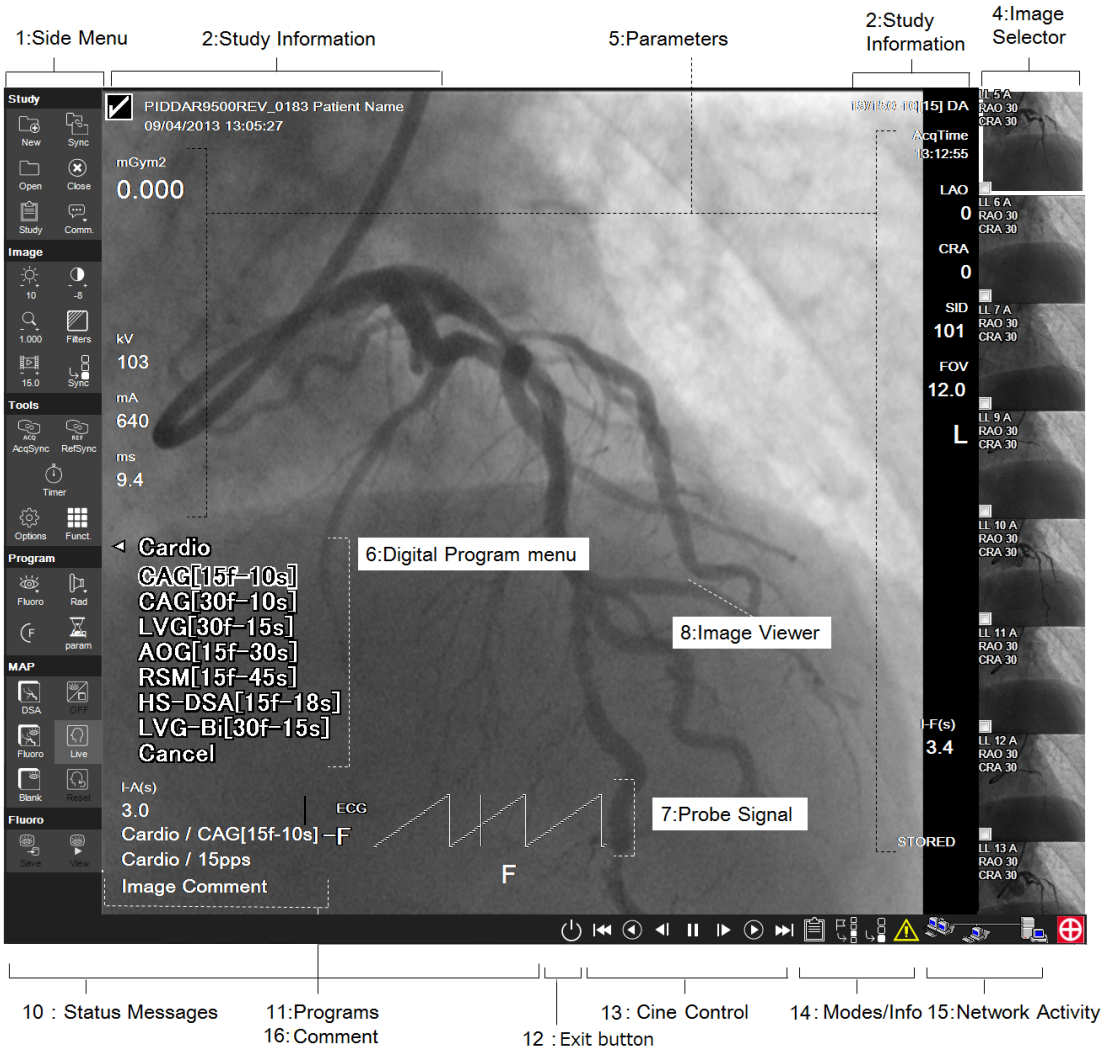
10.1.2 Bi-plane User Interface

With the bi-plane option, a second C-arm, X-ray generator and acquisition computer are added for the Latest plane so that simultaneous Frontal/Lateral imaging can be performed. A second Reference monitor, the Reference-Lateral monitor, is included for synchronized Frontal and display Lateral image.

Images and loops acquired on a Bi-plane system include a plane indicator in the icon labels shown in the Image Selector (A for plane A (Frontal) and B for plane B (Lateral)). The Plane A/B designation is also included in the DICOM tags. An active-plane indicator icon is displayed in the top left corner of the Reference monitors.

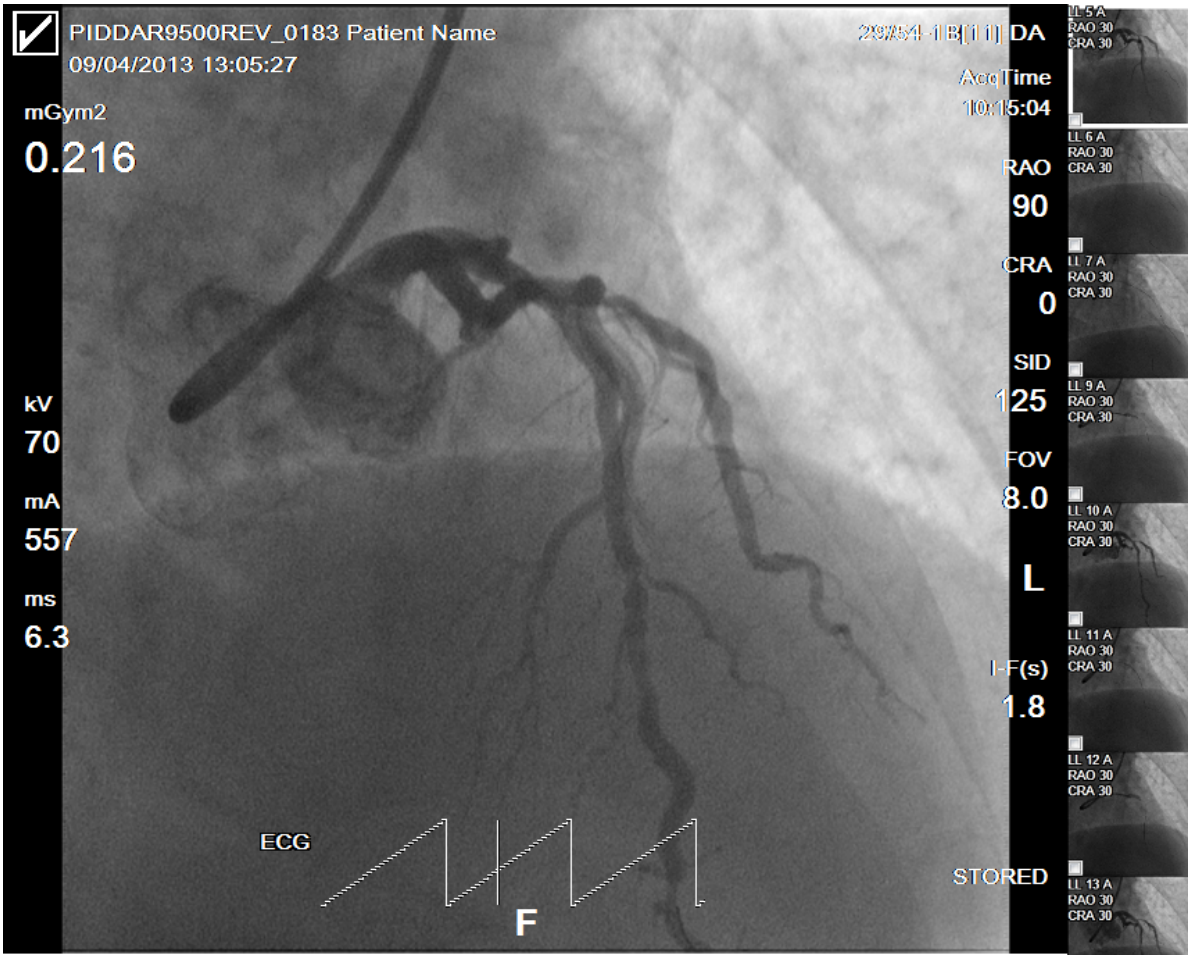
For example, the Reference-Frontal monitor showing the Frontal images and the Reference-Lateral monitor showing the Lateral images.

- **Reference-Frontal Monitor**



For detailed descriptions of these window elements, see "4.2 The Main User Interface Window" P.4-2.

- **Reference-Lateral Monitor**



Loops 1A and 1B were acquired at the same time, loops 2A and 2B were acquired at the same time, and so on. Additionally, the image frames are acquired in synchronization, meaning that 1A frame 1 corresponds to 1B frame 1, 2 to 2, 3 to 3, and so on.

NOTE

When using a Bi-plane system as a Single-plane system, move the Lateral C-arm to the park position and use the Frontal arm only.

10.1.3 Reference Monitors

Only the Reference-Frontal monitor displays the full GUI with side menu and bottom bar. Both Reference monitors display their respective (Frontal or Lateral) loops, image, Image Selectors, identification and parameters. Frontal/Lateral Loop playback is always synchronized.

Mono-plane loops (loops acquired on a bi-plane system but only on one plane) are displayed on their respective Reference monitor with the other Reference monitor paused, showing an "X" mark in the upper-left check box. The Frontal Image Selector shows only Frontal image and loop icons. The Lateral Image Selector shows only Lateral image and loop icons.

10.2 Bi-plane Image Acquisition

10.2.1 Entering Study Information

Study information is entered in the same way as for non-bi-plane systems. Follow the procedure in ☞ "4.3 Entering Study Information" P.4-10.

10.2.2 Acquiring Loops when Bi-plane Active

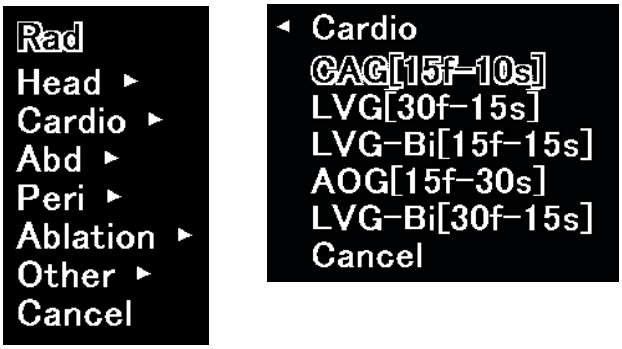
When Bi-plane is active, loops are acquired in similar manner to when it is not active (see ☞ "4.4 Making Acquisition" P.4-23).

- Fluoro acquisition is performed on the Frontal or Lateral planes according to the Fluoro switch pressed. Press either the Frontal Fluoro switch or the Lateral Fluoro switch.
- When pressing both Frontal and Lateral fluoro switches at the same time at 30 pps, you cannot perform Bi-plane fluoroscopy (irradiating the Frontal and Lateral planes at the same time).
- Rad acquisition is performed on the Frontal, Lateral or simultaneously on both planes, according to the program selected. Choose Rad programs as follows.

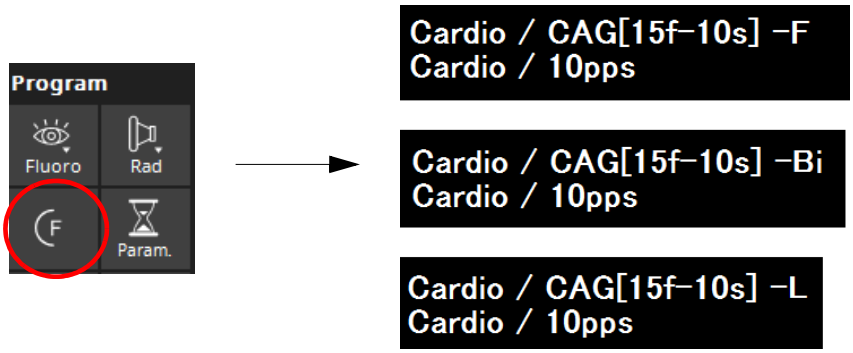
1 Click [Program: Rad] or press the button on IVR NEO/IVR Shuttle/SMART Touch.

Side Menu　IVR NEO　IVR Shuttle　SMART Touch

2 Select Rad program.



3 To change the plane, click [Program: Change Acquisition Plane] and select the desired plane. Currently selected DUP can be changed to F, L or Bi-plane.



NOTE

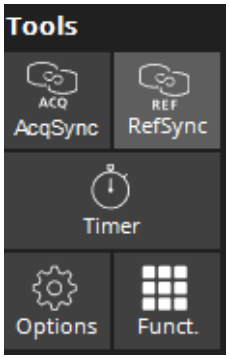
On DUP which acquisition plane is restricted, disable to change the plane with [Change Acquisition Plane] button.

- Images from one or both planes are then transmitted to the Reference system. Bi-plane images are displayed synchronized on the two monitors.
- For DSA-MAP on Bi-plane, enable to register the following images as a blood-vessel image depending on the monitor selecting [DSA-MAP] button on the side menu.
  1 When selecting on the Frontal Acquisition monitor, register the displayed image on this monitor a s a blood-vessel image.
  2 When selecting on the Acquisition monitor, register the displayed image on this monitor a s a blood-vessel image.
  3 When selecting on the Reference monitor and if it is in RefSync mode, register the image on both Frontal/Lateral Reference monitors as blood-vessel images at the same time on each Acquisition monitor. And if it is not in RefSync mode, register the selected plane image as a blood-vessel image.
- When selecting DSA-MAP on the Reference monitor, if it is in RefSync mode, register the image on both Frontal/Lateral Reference monitor as blood-vessel images at the same time. And if it is not in RefSync mode, register the selected plane image as a blood-vessel image.

10.2.3 Bi-plane Loop

Reference Monitor

- **Ref Synchronized Mode**
  In Ref Synchronized mode (RefSync side menu button pushed in), image playback (loop and frame) direction and speed (fps), and zoom are always synchronized on the two Reference monitors.

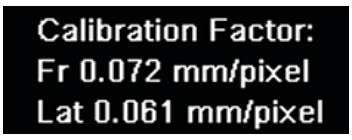


Other functionality is controlled separately on the selected plane (Reference-Frontal or Reference Lateral.) For bi-plane loops, Reference-Frontal is always selected by default at startup and after navigating from any loop to another. To select Reference-Lateral, click only in the Image Viewer area of the Lateral monitor.

A check appears in the active-plane indicator on the Reference monitor of the selected plane. For mono-plane studies (studies performed on a bi-plane system but only on one plane), an "X" appears in the active-plane indicator on the Reference monitor of the unused plane.

QCA is performed on the selected plane. Click anywhere in the viewing area of the desired Reference monitor to select that plane. On the side menu, click [Funct]-[QCA]. ISO center value is registered to calibration coefficient as an initial setting value. Manually perform the calibration if necessary, and then QCA analysis.

For LVA, click [Funct]-[LVA] on the side menu. Display the End Diastolic (ED) images and click anywhere in the viewing area of the desired Reference monitor on which you wish to perform calibration. ISO center value is registered to calibration coefficient as an initial setting value. Manually perform the calibration if necessary, and then LV analysis. The same calibration tool must be used for both planes. Each plane can be calibrated separately. Both calibration factors are displayed on the Reference monitors.



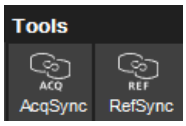
Draw the RAO-ED contour on the monitor of one plane, and the LAO-ED contour on the monitor of the other plane. Then display the End Systolic (ES) image, and draw the RAO-ES contour on

the monitor of one plane, and the LAO-ES contour on the monitor of the other plane. Finally, click [Compute].

Image annotations can be made on one plane at a time. On the side menu, click [Funct]-[ABC Edit]. Click anywhere in the viewing area of the desired Reference monitor to select that plane. Make annotations on the selected plane. If you use the [Funct]-[Save] option to save your annotated image, only the image of the active plane is saved.

For Bi-plane loop, images are added to on both Frontal and Lateral plane at the same time when adding reference images. Reference images on each plane is displayed on each monitor. When the single-plane loop with a reference image is selected, other plane will stop. See ☞ "4.6.2 Adding a Reference Image" P.4-60.

- **Switching to Independent Mode**
  If it is desired to switch into Ref Independent mode, click [RefSync] button on the Reference monitor side menu (button no longer appears pushed in).

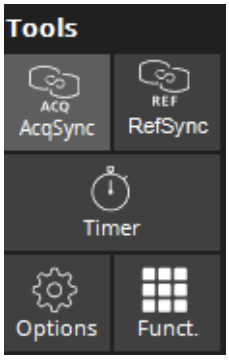


In Ref Independent mode, enable to perform actions independently on either the Frontal or Lateral Reference monitors. Image playback, playback speed, and zoom are performed only on selected plane monitor.

- **IVR NEO/SMART Touch**
  The IVR NEO/SMART Touch [Monitor Select] button changes focus between the Reference and Acquisition monitors. For IVR NEO, when the button LED is on, the Acquisition monitors are selected. When it is off, the Reference monitors are selected. For SMART Touch, focused monitor is displayed ([ACQ] or [rEF]). Thereafter, commands are applied to the selected (focused) monitors.
  If you select Ref Independent mode in the GUI, work with the IVR NEO on the selected plane.

Acquisition Monitor

- **Acq Synchronized Mode**
  Click Acq Synchronized mode (AcqSync side-menu button pushed in) for Acq Synchronized mode. When this mode is selected, enable to operate both Frontal and Lateral Acquisiton PC at the same time by pressing [Ctrl] key.



Press [Ctrl]+[->] or [Ctrl]+[<-]. The loop on the Frontal Acquisition monitor jumps to the next ([Ctrl]+[->]) or previous ([Ctrl]+[<-]) frame and pauses. The Lateral Acquisition monitor does the same (regardless of what frame it was showing before), pausing on the same frame number (but Lateral plane) as on the Frontal monitor.

Example:

1. Frontal is paused on frame 125 in loop 1, Lateral is paused on frame 75 in its loop 1.
2. Click [In sync] on the Reference monitor ide menu.
3. Press [Ctrl] and [->] on keyboard.
4. Frontal displays loop 1, frame 126, and Lateral displays its loop 1, frame 126.

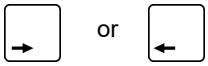
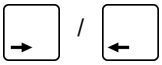
And you can control playback speed by pressing [Ctrl] and mouse-clicking the speed control on the Reference monitor side menu. For other available features, see the next section "Acquisition Control with Keyboard and Mouse".

NOTE

When in Acq Synchronized mode, [Ctrl] and [Ctrl]+[Alt] do the same thing. Press nether the [Ctrl] nor [Ctrl]+[Alt] keys to interact with the Reference monitor GUI.

- **Keyboard and Mouse**

  Since there is no keyboard and mouse on both Acquisition computers, Acquisition GUI interaction is performed with the keyboard and mouse in one of two modes, "Acq Synchronized" or "Independent". The following table summarizes how the keyboard and mouse can be used to interact with the Acquisition monitor GUI when Frontal and Lateral are Synchronized. (If Independent, use [Ctrl] key for Frontal, and [Ctrl]+[Alt] keys for Lateral)

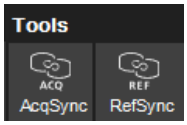
No.	Action	[Ctrl]+Keyboard or GUII
1	Play/show next loop/frame.	
2	Play/show previous loop/frame.	
3	If playing, pause.	
4	If paused, show next/previous frame.	
5	If paused, start playing. *(Hold key for more than 2 seconds to begin forward / backward play.)*	
6	Playback speed: increase (right-click) / decrease (left-click).	
7	Brightness: increase (right-click) / decrease (left-click).	
8	Contrast: increase (right-click) / decrease (left-click).	
9	Zoom: increase (right-click) / decrease (left-click).	

NOTE

For No. 7 and 8 in the table above, disable to change the value of brightness and contrast on Frontal and Lateral at the same time by using keyboard though [AcqSync] button on the side menu is selected.

- **Switching to Acq Independent Mode**

  In Acq Independent mode, use keyboard or mouse to perform actions independently on either the Frontal or Lateral Acquisition computers. Select the Frontal (A) Acquisition GUI by pressing the [Ctrl] key, and select the Lateral (B) Acquisition GUI by pressing the [Ctrl]+[Alt] keys together.



  If it is desired to switch into Acq Independent mode, click [AcqSync] button on the Reference monitor side menu (button no longer appears pushed in).

- **IVR NEO/SMART Touch**

  The IVR NEO/SMART Touch Monitor Select button changes focus between the Reference and Acquisition monitors. For IVR NEO, when the button LED is on, the Acquisition monitors are selected.

  IVR NEO interaction is always synchronized regardless of Acq Synchronized/Independent mode settings in the GUI. If you select Acq Independent mode in the GUI and then work with the IVR NEO, it is switch to Acq Synchronized mode.

NOTE

The Select and Split functions ([16-up Selector] and [Single/split Display] buttons respectively) of IVR NEO/SMART Touch are not available for the Acquisition-Lateral monitor.

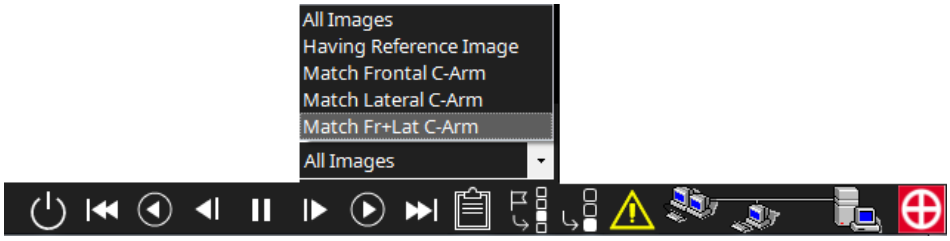
10.2.4 Filtering Bi-plane Images by C-arm Position

To filter Image Selector icons for images acquired with a C-arm position that matches the current C-arm position (within a configurable tolerance), follow this procedure. Tolerance is configurable.
☞ "Software Tab" P.17-27.

1 Position the Frontal or Lateral C-arm, or both at the desired position.

2 Press the IVR NEO/SMART Touch [Filter by C-arm] button. The LED of IVR NEO turns on to indicate that Filter mode is selected.

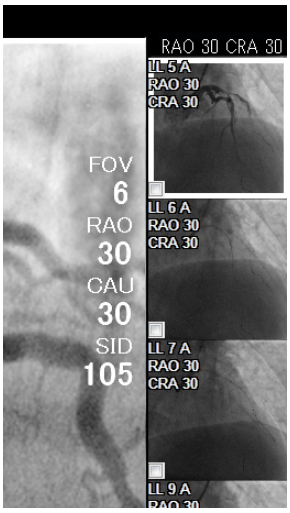
3 Alternatively, click [Image Filtering] button on the bottom GUI bar and then in the Image Filtering list, choose [Match Fr+Lat C-Arm] mode.



The three filtering modes work as follows:

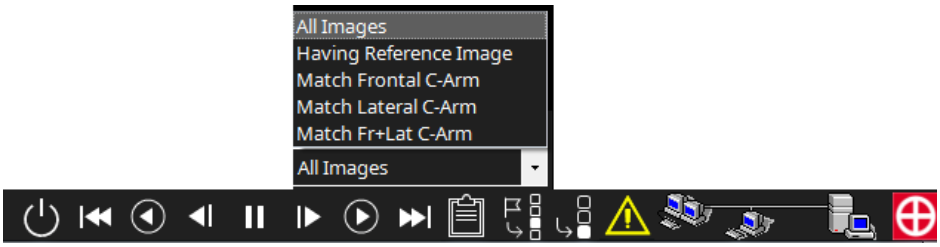
Option	Description
Match Frontal C-Arm	Reference-Frontal Image selector is filtered to show icons for loops that match Frontal C-arm position. The Lateral Image Selector is unaffected.
Match Lateral C-Arm	Reference-Lateral Image selector is filtered to show icons for loops that match Lateral C-arm position. The Frontal Image Selector is unaffected.
Match FR+Lat C-Arm	Both Image Selectors are filtered to match the respective C-arm positions.

The Reference-Frontal and/or Reference-Lateral Image Selectors are filtered so only the icons of images that were acquired at the current C-arm position for the selected plane(s) are shown with the LAO/RAO and CRA/CAU angles at the top like this:

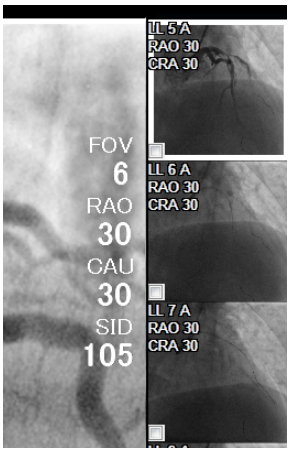


4 To revert to a non-filtered Image Selectors, press the IVR NEO/SMART Touch [Filter by C-Arm] button again (LED of IVR NEO turns off).

Or click the Image Filtering button on the bottom GUI bar and then, in the Image Filtering list, choose [All Images].



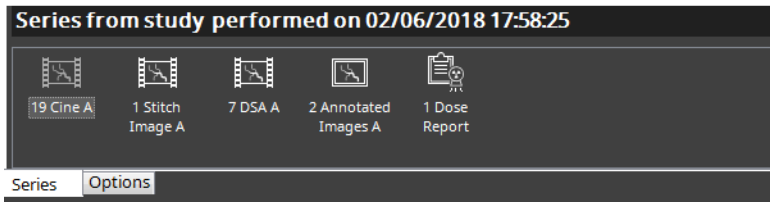
The Image Selectors are no-longer filtered; all icons are shown like this:



10.3 Bi-plane Image Preview

Series Display on Studies Management Window

In the Series area of the Studies Management window, loops are identified as to the their plane, either **A** for Frontal or **B** for Lateral.



GUI Interaction During Review

When no study is open for acquisition and reviewing a study on the Reference monitors, the [Ctrl] and [Ctrl-Alt] keys are not used. Reference monitor GUI interaction is performed with the keyboard and mouse. Loop playback is always synchronized between the Reference-Frontal and Reference-Lateral monitors. When a mono-plane loop is selected on the Reference-Frontal or Reference-Lateral monitor, the non-applicable plane loop is paused. Non-acquisition-related IVR NEO/SMART Touch functionality, including joystick playback control, is also available during review.

10.4 Shutdown

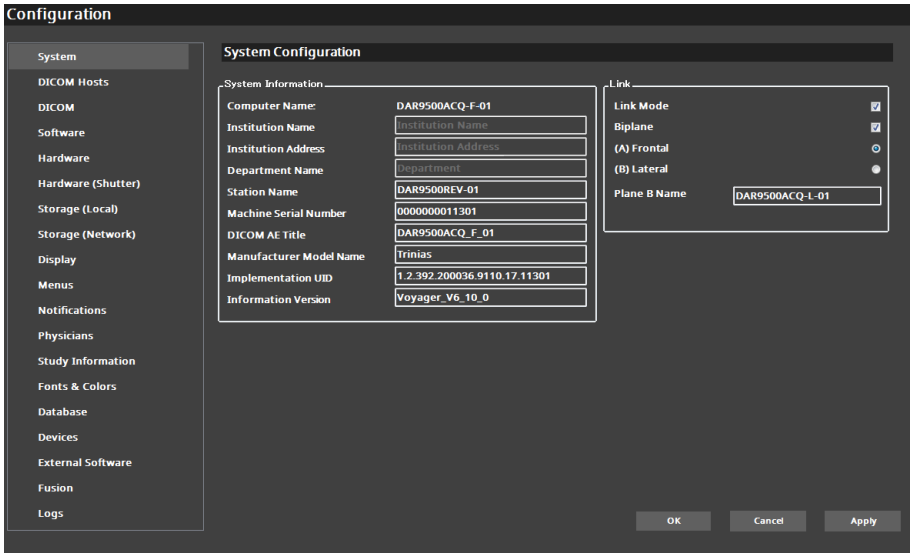
On the Reference monitor side menu, click [Exit].All three computers are shutdown simultaneously. For additional details, see ☞ "3.2 User Authentication" P.3-4.

10.5 Administration

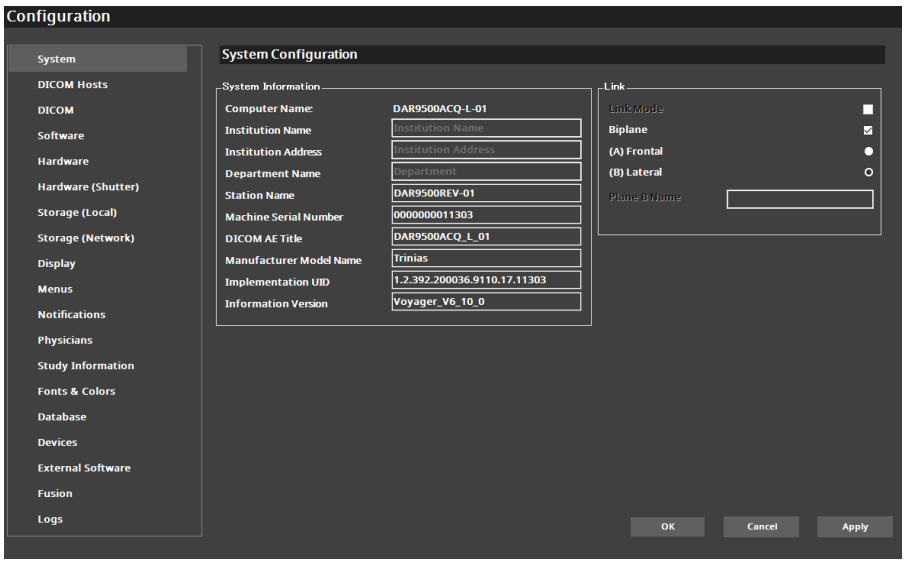
Several Options tabs have additional values related to the Bi-plane option.

Bi-plane options are configured on the two Acquisition computer [System] tabs as follows:

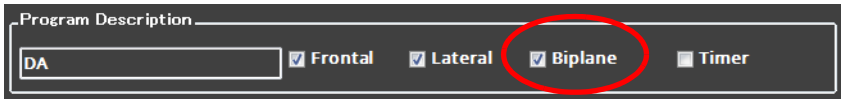
- On the Frontal [System] tab, in the Link box, Biplane and (A) Frontal are selected and the Computer Name of the Lateral Acquisition computer is entered in Plane B Name.



- On the Lateral [System] tab, Biplane and (B) Lateral are selected.

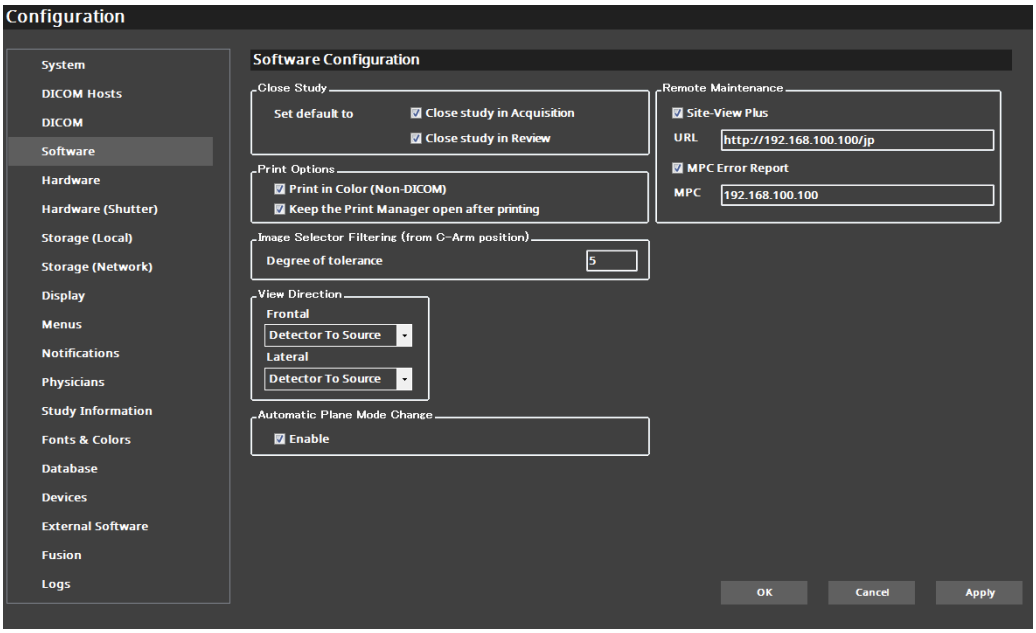


- On DUP setting window of the Reference monitor, select [Biplane] in [Program Description] to set Bi-plane program.



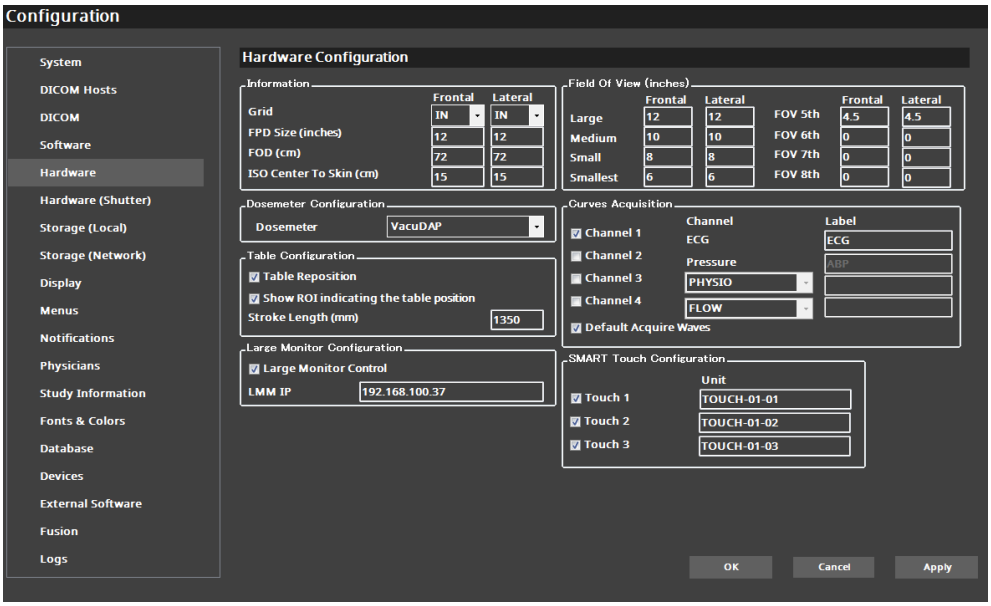
See also ☞ "17.7.4 Menus and DUP Configuration" P.17-69.

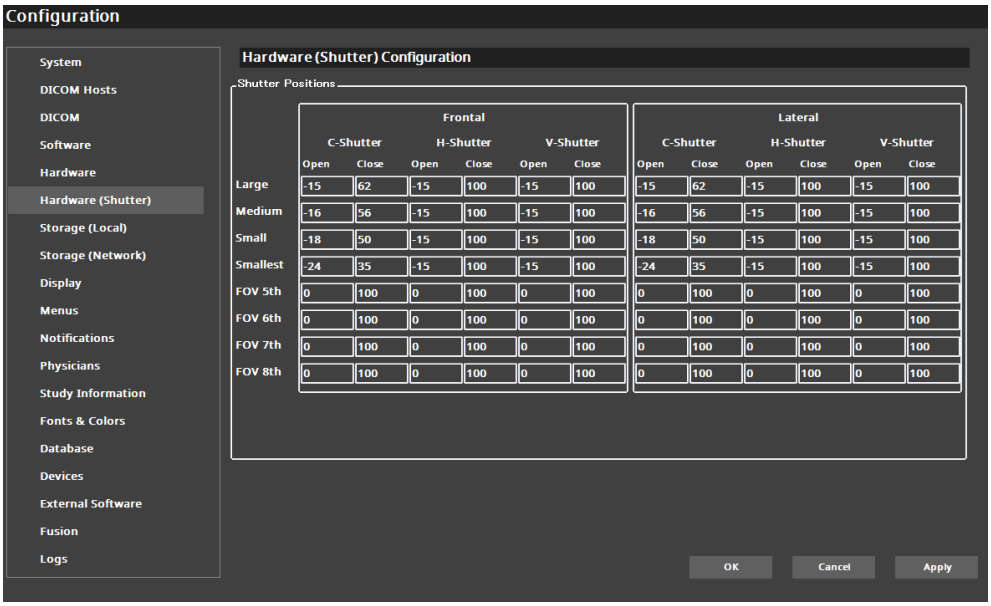
- On the Reference monitor [Software] tab, Bi-plane options are configured as follows:



Item	Description	Modify
View Direction	Frontal: Set Frontal eye direction. Lateral: Set Lateral eye direction.	×
Automatic Plane Mode Change	**Automatically change the plane depending on the C-arm condition.** **Ex.)** • When changing the C-arm mode from Bi-plane to Single-plane, it will be changed to Frontal or Lateral. • When changing the C-arm mode from Single-plane to Bi-plane, acquisition plane will be changed to “Bi”. **Do not check this item usually.** **NOTE** When changing the C-arm mode to Bi-plane, acquisition plane will surely be changed to “Bi”. Do not valid this setting if there are many cases to acquire images on Frontal or Lateral after changing to “Bi”.	○

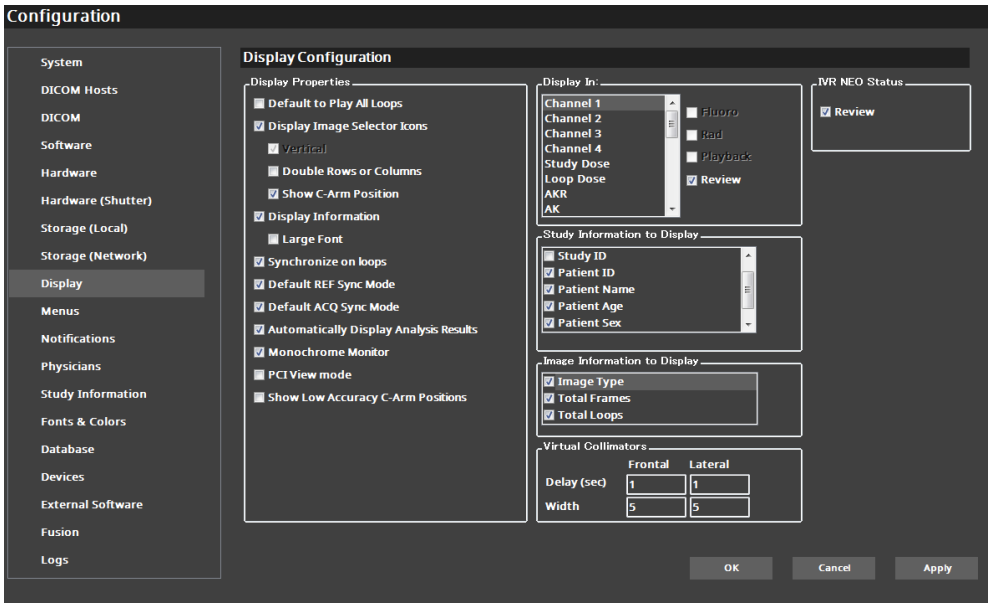
- On the Reference monitor [Hardware] and [Hardware (Shutter)] tab, Bi-plane options are configured as follows:





Item	Description	Modify
Grid	Defines whether a grid is used in the Frontal and Lateral X-ray imaging system. Select **IN** if a grid is used. This option is used to complete the DICOM information for acquired images. This option must match the installation.	×
FOD (cm)	Specifies the focal point to object (ISO Center) distance for the Frontal and Lateral planes. Also known as SOD (Source to Object Distance). This is a fixed value (typically 72cm) according to C-arm model. This value (cm) must match the installation. (0 to 100.)	×
Field of View	Defines eight field of view values (inches) for each plane. This option is used to complete the DICOM information for acquired images. This option must match the installation. **Large** can be no larger than **FPD Size**. **Medium**, **Small**, and **Smallest** must be progressively smaller.	×

- Settings of [Display] tab for Bi-plane option are shown as follows.



Item	Description	Modify
Virtual Collimator	Virtual collimators are displayed on the Acquisition monitor showing the position of the hardware collimators. **Delay (sec)** defines the time in seconds (0 to 100) that virtual collimators are displayed after the hardware collimators have stopped moving. Width defines the thickness of the displayed line (range 2 to 30). **NOTE** Virtual collimation function indicates the collimator leaf position before fluoroscopy as a suggestion. Therefore, the position may misalign by the field of view size, C-arm position, and etc. **NOTE** [For Bi-plane] When operating Virtual collimator from the local console in examination room, Virtual collimator will be displayed on the acquisition monitor which performed the last fluoroscopy.	○

See also ☞ "17.7 Options Configuration" P.17-14.

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Chapter 11

SCORE StentView (Option)

Description

11.1 Overview

SCORE StentView Option (hereafter called “StentView”) is an attachment function to DAR-9500f SHIMADZU digital angiography system. Extract the marker position from real-time image and highlight the device by digital image processing. When using two Stent, this function is good for confirming the second Stent position.

11.1.1 Features

StentView has the following features.

- Apply the processing to real-time acquisition image and display the device highlighted image in live image.
- Enable to install on DAR-9500f standard system. Work station is not necessary.

11.2 Specification

11.2.1 Specification of SCORE StentView

Acquisition Rate	15fps, 30fps
Image Size	<Full Screen View> (Whole) 1024x1024 matrix
Image Processing	• Automatic gray level adjustment • Edge enhancement processing • ROI setting

11.2.2 Features

11.2.2.1Image Acquisition

No.	Items	Features
1	StentView	Extract a marker position from a real-time image and enhance and display the device by digital image processing. Add some frames and display enhanced stent image. This is useful when place 2 stent and confirm the position of second one.

11.2.2.2Image Processing

No.	Items	Features
1	Auto Window Level	Images are displayed with automatically-stabilized contrast.
2	Real-time Edge Enhancement	Sharp images are acquired by emphasizing the subject edge with spatial frequency emphasis.
3	ROI Setting	If images have more than three points of markers or include high-contrast artificial structures, enable to detect markers correctly and display the result by using ROI setting to remove unnecessary area.

11.3 Handling Method

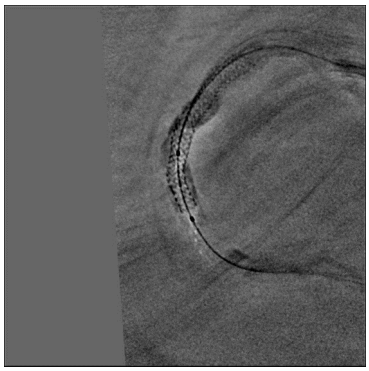
11.3.1 Introduction

By pressing StentView button to enable StentView processing for the next radiography. StentView button is enabled only when StentView is selected on Digital User Program (hereafter called “DUP”).

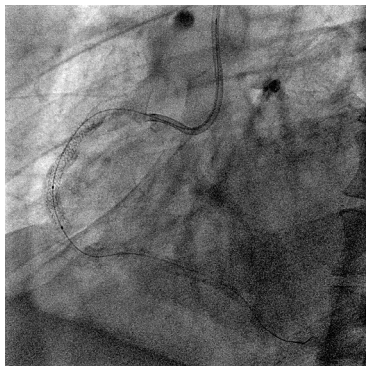
11.3.2 Displaying StentView

Full Screen View

During StentView processing, a zoomed StentView image on the ACQ monitor and X-ray exposed whole image on the REF monitor will be displayed.



ACQ Monitor

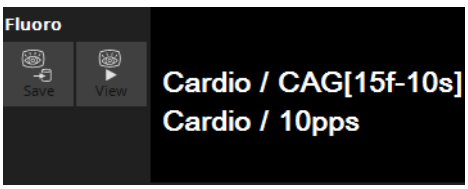


REF Monitor

11.3.3 StentView Processing

Follow the instructions below to apply StentView processing.

1 Confirm the current radiography digital program setting displayed at the bottom of image viewer window. Be sure that program is set to StentView.



2 Position the marker. Change the C-arm angle, bed position and FOV size to position the marker to be fit in the image.

3 Click [Program: StentView] on the side menu or press [StentView] button on IVR NEO/SMART Touch for StentView radiography.

*If StentView button is assigned on Keyboard shortcut, enable StentView radiography from the shortcut key.

Side Menu


IVR NEO

SMART Touch

NOTE

When selecting unassigned StentView option, RAD StentView button cannot be used.

4 Press the radiography switch (foot switch or hand switch). StentView radiography is started and StentView image is displayed.

WARNING

If unable to detect markers normally during StentView radiography, display the last image detected markers and "LIH" will display at the bottom-right of ACQ monitor. StentView result is wrong if markers are not detected normally. Stop using StentView option immediately.

Refer to "11.4.1 Phenomenon and Action" for handling problems.

WARNING

Two marker points are required for recognition for StentView. If a point and more than three marker points are existed within ROI, it gives not correct results.

WARNING

If contrasty artificial structure such as a pacemaker and a prosthetic valve is placed within the same ROI as a marker, structure may fail to recognize as a marker and may not obtain correct result.

NOTE

As displaying StentView by adding a number of frames, it cannot obtain correct results if the position of marker and device, and X-ray exposure angle has changed. And if contrast media is injected, the false results may be displayed because the marker is hidden with the contrast media.

5 After the image acquisition, release hand switch or foot switch.

When releasing a switch, automatically a marker detected frame starts playing.

6 If you want to continue StentView radiography, go back to step 2.

When completing SentView radiography, it returns to the normal radiography program automatically. If you want to continue StentView radiography, repeat procedures from step 2.

NOTE

Measurement tools such as QCA (Quantitative Coronary Artery Analysis) and LV (Left Ventricle Analysis) cannot use for StentView radiography acquisition image.

11.3.3.1Setting ROI

If marker does not detect normally because of body or artificial structures similar to marker shape, set one or two ROI to reduce the possibility of false detection. Follow the instructions below to set ROI.

1 Perform fluoroscopy at least two seconds and check the change of marker position by heartbeat.

2 Click ROI setting button of StentView on the side menu or IVR NEO/SMART Touch and ROI is displayed on ACQ monitor which is currently selected as an acquisition plane. When ROI is displayed on LIH (Last Image Hold), automatically replays the last fluoroscopy image.

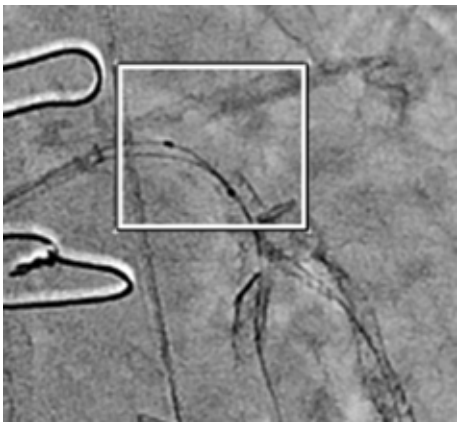
<table>
<tr><td>GUI</td><td colspan="2"> 
</td></tr>
<tr><td></td><td>Button</td><td>Description</td></tr>
<tr><td></td><td> 
</td><td>Displays when ROI is not setting.
Click to display one ROI.</td></tr>
<tr><td></td><td> 
</td><td>Displays when one ROI is displayed.
Click to display two ROI.</td></tr>
<tr><td></td><td> 
</td><td>Displays when two ROI are displayed.
Click to disable ROI and enables normal StentView mode.</td></tr>
<tr><td>IVR NEO/
SMART
Touch/
Keyboard</td><td> 
</td><td>Press a button to change the number of ROI as 1-2-0.</td></tr>
<tr><td></td><td> 
</td><td>Press a button to display one ROI. If already displayed, ROI will be disabled.</td></tr>
<tr><td></td><td> 
</td><td>Press a button to display two ROI. If already displayed, ROI will be disabled.</td></tr>
</table>

3 Set ROI on the ACQ monitor. Adjust the number, position and size of ROI if necessary.

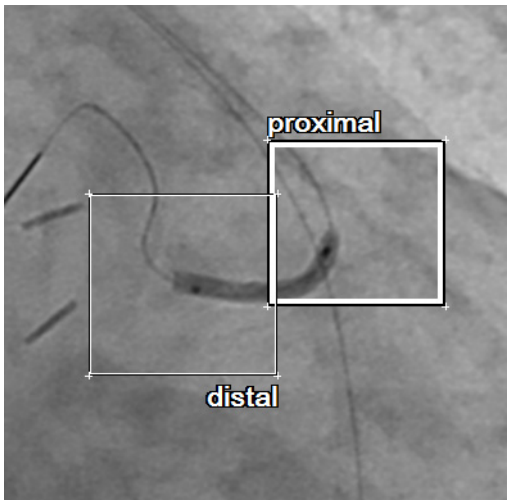
NOTE

ROI must include all range of movement of marker by heartbeat to get correct result. Set the number, position and size of ROI as checking fluoroscopy image replaying on the Acquisition monitor.

- **Setting Numbers**
  [1-ROI]
  Set ROI including the range of movement of two markers.



- **[2-ROI]**
  Set two ROI for Proximal and Distal markers. It is no problem if those two ROI overlap, but one marker must be included.



- **Setting Position**
  [Mouse]
  Move the mouse pointer to the ACQ monitor and click, drag and drop within the ROI to modify the position.

  [IVR NEO/SMART Touch]
  ROI does activate with move mode. When tilting the joystick of IVR NEO up/down or right/left, ROI moves to the tilting direction.
  When pressing the joystick button, ROI mode is changed to size modification mode. Each mode will change as follows.

  [1-ROI]
  Move mode-->Size Modification mode-->Move mode

  [2-ROI]
  Proximal Move mode-->Proximal Size Modification mode-->Distal Move mode-->Distal Size Modification mode-->Proximal Move mode.

  Enable to distinguish the move mode and size modification mode by shape of ROI.

  To change the Lateral position, press [Lateral Operation] button and then set the position.

- **Setting Size**
  [Mouse]
  Move the mouse pointer to the ACQ monitor and click, drag and drop within the ROI to modify the size.

  [IVR NEO/SMART Touch]
  When ROI is in the move mode, ROI mode is changed to size modification mode by pressing the joystick button.
  During size modification mode, tilt the joystick to up/down and right/left to fix the point at the top-left of ROI, and the point at the bottom-right of ROI does activate to change the size.

  To change the Lateral size, press [Lateral Operation] button and then set the size.

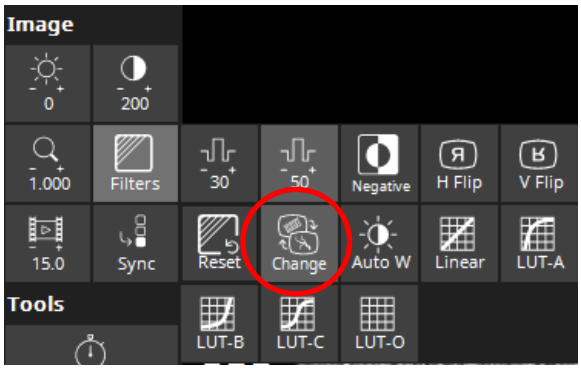
4 Press the radiography switch (foot or hand switch). StentView radiography starts and StentView image will display.

11.3.4 Change View

On ACQ and REF monitor, enable to change the display from StentView to original image by canceling a special image processing StentView.

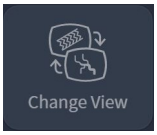
Click [Change] button on the side menu to change the image. It is start playing from the 1st frame when playing an original StentView image.

*If change StentView is assigned to keyboard shortcut and IVR NEO/SMART Touch button, enable to change StentView with a shortcut key.



Side Menu

IVR NEO



SMART Touch

11.3.5 Setting StentView

NOTE

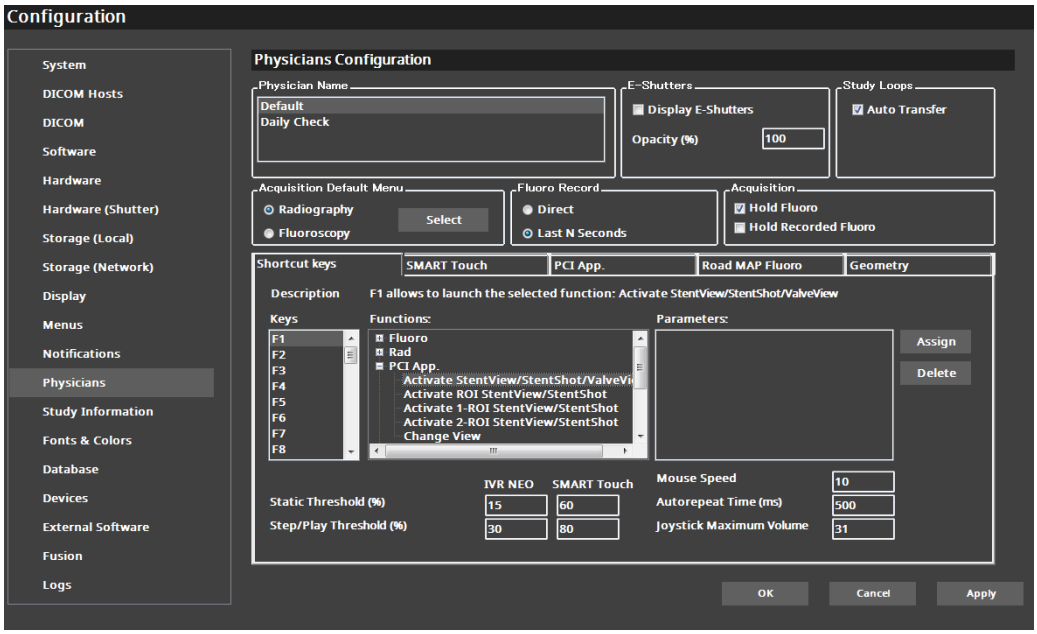
Configure StentView on REF PC.

Setting Shortcut Keys

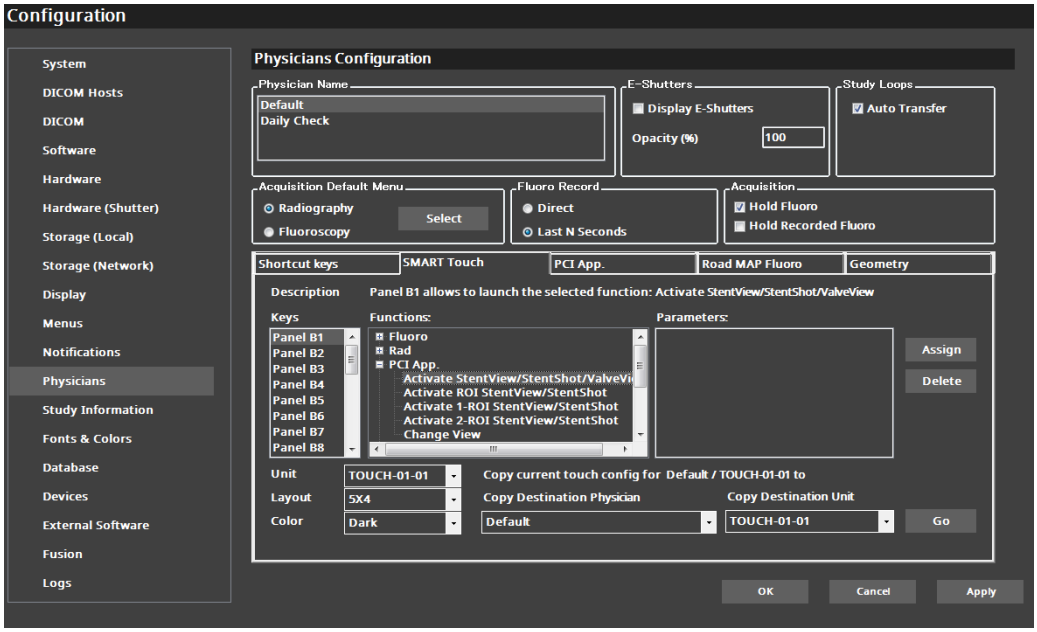
Set IVR NEO and Shortcut keys with [Shortcut keys]/[SMART Touch] on [Physicians] tab. Only Shimadzu or specified service representatives can change the settings.

Refer to "17.7 Options Configuration" for setting procedure.

Selecting Shortcut keys:



Selecting SMART Touch:

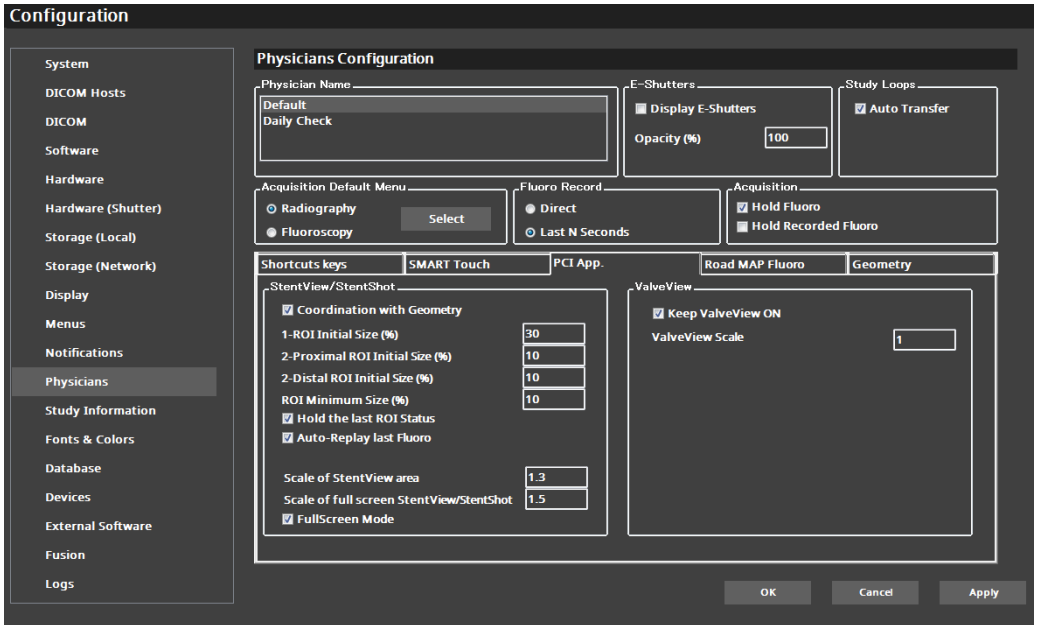


Description of StentView/StentShot of [Shortcut keys] and [SMART Touch] tab is shown as follows.

No.	Item	Description
Shortcut keys/SMART Touch		
StentView/StentShot		
1	Activate StentView/StentShot	Change Enable/Disable of StentView/StentShot.
2	Activate ROI-StentView/StentShot	Change disable of 1-ROI StentView/2-ROI StentView 1-ROI StentShot/2-ROI StentShot.
3	Activate 1-ROI StentView/StentShot	Change Enable/Disable of 1-ROI StentView/StentShot.
4	Activate 2-ROI StentView/StentShot	Change Enable/Disable of 2-ROI StentView/StentShot.
5	Change View	Change StentView/StentShot image view/Original image view.

Setting StentView

Set StentView/StentShot with [PCI App.] on [Physicians] tab.



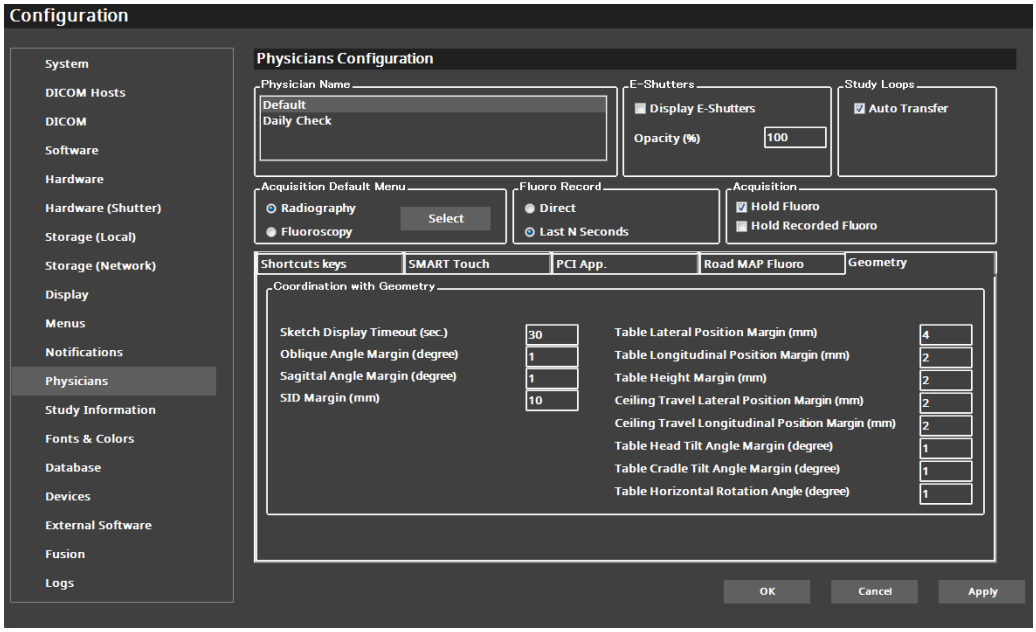
Description of [PCI App.] tab is shown as follows.

No.	Item	Description
StentView/StentShot		
1	Coordination with Geometry	Check this item to disable ROI when changing geometry.
2	1-ROI Initial Size (%)	During study, enable to register the initial size of first 1-ROI. Enable to set value at rate of 100% of the whole image as 100%.
3	2-Proximal ROI Initial Size (%)	During study, enable to register the Proximal initial size of first 2-ROI.
4	2-Distal ROI Initial Size (%)	During study, enable to register the Distal initial size of first 2-ROI.
5	ROI Minimum Size (%)	Enable to set minimum size of ROI.
6	Hold the last ROI status	Check this item to save the last ROI position and size, and enable to use the same ROI for next StentView. However, if mechanical equipment such as tabletop and C-arm operate, ROI position and size will be initialized even though this item is checked. Uncheck this item to display ROI always in the center of the image.
7	Auto-Replay last Fluoro	Check this item to replay the last fluoro for 2 seconds automatically, when ROI is displayed on LIH.
8	Scale of StentView area	Enable to change the magnification percentage of StentView area. Normally, do not change the value which is 1.3 times of default percentage.

No.	Item	Description
9	Scale of full screen StentView/ StentShot	Enable to change the magnification percentage of full screen StentView/StentShot. Normally, do not change the value which is 1.5 times of default percentage.
10	FullScreen Mode	Check this item to display StentView area in full screen.

Geometry

Enable to set margins that automatically disable ROI with [Geometry] on [Physicians] tab.



Description of [Geometry] tab is shown as follows.

No.	Item	Description
Coordination with Geometry		
1	Guide Display Timeout (sec.)	Not used.
2	Oblique Angle Margin (degree)	If Coordination with Geometry is checked and the C-arm is changed more than input angle in an oblique direction, SIMAP and Guide Line will hide.
3	Sagittal Angle Margin (degree)	If Coordination with Geometry is checked and the C-arm is changed more than input angle in a sagittal direction, SIMAP and Guide Line will hide.
4	SID Margin (mm)	If Coordination with Geometry is checked and SID is changed more than input value, SIMAP and Guide Line will hide.
5	Table Longitudinal Position Margin (mm)	If Coordination with Geometry is checked and the table moves more than input value in a longitudinal direction, SIMAP and Guide Line will hide.
6	Table Transversal Position Margin	If Coordination with Geometry is checked and the table moves more than input value in a transversal direction, SIMAP and Guide Line will hide.
7	Table Height Margin	If Coordination with Geometry is checked and the table height is changed more than input value, SIMAP and Guide Line will hide.
8	Ceiling Travel Longitudinal Position Margin (mm)	If Coordination with Geometry is checked and the C-arm moves more than input value in a longitudinal direction, SIMAP and Guide Line will hide.

No.	Item	Description
9	Ceiling Travel Transversal Position Margin (mm)	If Coordination with Geometry is checked and the C-arm moves more than input value in a transversal direction, SIMAP and Guide Line will hide.

11.4 Troubleshooting

11.4.1 Phenomenon and Action

When StentView does not work normally, perform following actions.

Phenomenon
Nothing appears on StentView area.
Assumed Cause
Disable to set marker position.
Action
If disabling to set marker, there are some possible cases. Perform following actions correspond to the situation. [Case 1] Marker is placed outside the window because of heartbeat. Change FOV size and bed position to fit the marker within the display area. [Case 2] Fast heartbeat. The faster the marker moves by heartbeat, the more the marker detection rate goes down. Perform StentView radiography with higher exposure rate. [Case 3] Large FOV size. The larger the FOV size gets, the smaller the marker size gets and detection rate goes down. Set FOV size smaller or set ROI within the range of movement of the marker. [Case 4] Large C-arm angle. The deeper the C-arm angle gets, the more the marker contrast and detection rate goes down. Reach performance limits. Perform StentView radiography with shallower angle.

Phenomenon
When showing StentView image, delay a showing of next/previous image. Slow reaction and operation of a mouse. Image does not transfer from ACQ to REF.
Assumed Cause
PC is highly-load excessively.
Action
Do not perform StentView radiography for a while (a minute or two). If it does not improve for a long time, restart the system.

Phenomenon
StentView does not activate, even when pressing a hand switch.
Assumed Cause
Software error, hardware malfunction.
Action
Restart the system. If it is not improved after restarting the system, perform normal fluoroscopy and radiography, and contact our service agency.

Phenomenon
Abnormal image of StentView radiography is shown.
Assumed Cause
StentView parameter is not setting correctly.
Action
Select other DUP once and then select StentView DUP again. If abnormal image is shown for normal fluoroscopy, restart the system.

Phenomenon
Result does not display correctly on the StentView area though setting ROI.
Assumed Cause
Marker is placed outside the ROI.
Action
Set ROI including the range of movement of marker by heartbeat.

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Chapter 12

SCORE StentShot (Option)

Description

12.1 Overview

SCORE StentShot Option (hereafter called “StentShot”) is an attachment function to DAR-9500f SHIMADZU digital angiography system. Extract the marker position from real-time image and highlight the device by digital image processing. When using two Stent, this function is good for confirming the shape of placed Stent.

12.1.1 Features

Stent has the following features.

- Apply the processing to real-time acquisition image and display the device highlighted image in live image.
- Enable to install on DAR-9500f standard system. Work station is not necessary.

12.2 Specification

12.2.1 Specification of SCORE StentShot

Acquisition Rate	15fps, 30fps
Image Size	<Full Screen View> (Whole) 1024x1024 matrix
Image Processing	• Automatic gray level adjustment • Edge enhancement processing • ROI setting

12.2.2 Features

12.2.2.1Image Acquisition

No.	Items	Features
1	StentShot	Extract a marker position from a real-time image, and enhance and display the device by digital image processing. Add some frames and display enhanced stent images. This is useful for confirming the shape of placed stent.

12.2.2.2Image Processing

No.	Items	Features
1	Auto Window Level	Images are displayed with automatically-stabilized contrast.
2	Real-time Edge Enhancement	Sharp images are acquired by emphasizing the subject edge with spatial frequency emphasis.
3	ROI Setting	If images have more than three points of markers or include high-contrast artificial structures, enable to detect markers correctly and display the result by using ROI setting to remove unnecessary area.

12.3 Handling Method

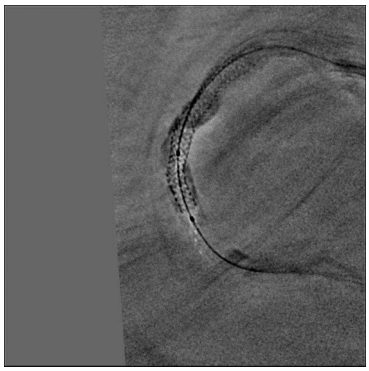
12.3.1 Introduction

By pressing StentShot button to enable StentShot processing for the next radiography. StentShot button is enabled only when StentShot is selected on Digital User Program (hereafter called “DUP”).

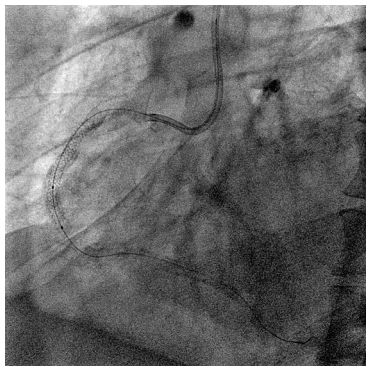
12.3.2 Displaying StentShot

Full Screen View

During StentShot processing, display zoom in StentShot image on ACQ monitor and X-ray exposed whole image on REF monitor.



ACQ Monitor



REF Monitor

12.3.3 StentShot Processing

Follow the instructions below to apply StentShot processing.

WARNING

As displaying StentShot by adding a number of frames, it cannot obtain correct results if the position of marker and device has changed between frames.

Do not operate catheter during StentShot.

1 Confirm the current radiography digital program setting displayed at the bottom of image viewer window. Be sure that program is set to StentShot.

2 Position the marker. Change the C-arm angle, bed position and FOV size to position the marker to be fit in the image.

3 Click [Program: StentShot] on the side menu or press [StentShot] button on IVR NEO/SMART Touch for StentShot radiography.

*If StentShot button is assigned on Keyboard shortcut, enable StentShot radiography from the shortcut key.

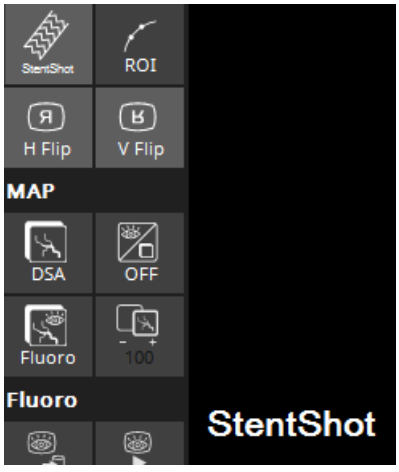
Side Menu

IVR NEO

SMART Touch

NOTE

When selecting unassigned StentShot option, RAD StentShot button cannot be used.



12

4 Press the radiography switch (foot switch or hand switch). StentShot radiography is started and StentShot image is displayed.

WARNING

If unable to detect markers normally during StentShot radiography, display the last image detected markers and "Cannot detect target devices" will display at the top of ACQ monitor. StentShot result is wrong if markers are not detected normally. Stop using StentShot option immediately.

Refer to "12.4.1 Phenomenon and Action" for handling problems.

WARNING

Two marker points are required for recognition for StentShot. If a point and more than three marker points are existed within ROI, it gives not correct results.

WARNING

If contrasty artificial structure such as a pacemaker and a prosthetic valve is placed within the same ROI as a marker, structure may fail to recognize as a marker and may not obtain correct result.

NOTE

As displaying StentShot by adding a number of frames, it cannot obtain correct results if the position of marker and device, and X-ray exposure angle has changed. And if contrast media is injected, the false results may be displayed because the marker is hidden with the contrast media.

5 After the image acquisition, release hand switch or foot switch.

When releasing a switch, the last frame will be displayed. For an original image, transfer the image to the image server as usual radiography image. And to send an image-processed image, only the last frame will be sent.

NOTE

After StentShot radiography, do not start image acquisition until display the last frame on ACQ monitor

6 If you want to continue StentShot radiography, go back to step 2.

When completing SentShot radiography, it returns to the normal radiography program automatically. If you want to continue StentShot radiography, repeat procedures from step 2.

NOTE

Measurement tools such as QCA (Quantitative Coronary Artery Analysis) and LV (Left Ventricle Analysis) cannot use for StentShot radiography acquisition image.

12.3.3.1Setting ROI

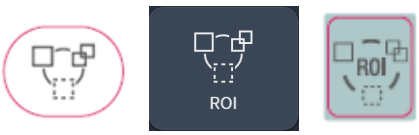
If marker does not detect normally because of body or artificial structures similar to marker shape, set one or two ROI to reduce the possibility of false detection. Follow the instructions below to set ROI.

1 Perform fluoroscopy at least two seconds and check the change of marker position by heartbeat.

2 Click ROI setting button of StentShot on the side menu or IVR NEO/SMART Touch and ROI is displayed on ACQ monitor which is currently selected as an acquisition plane.

When ROI is displayed on LIH (Last Image Hold), automatically replays the last fluoroscopy image.

When ROI is displayed on StentShot image, automatically replays the original Image.

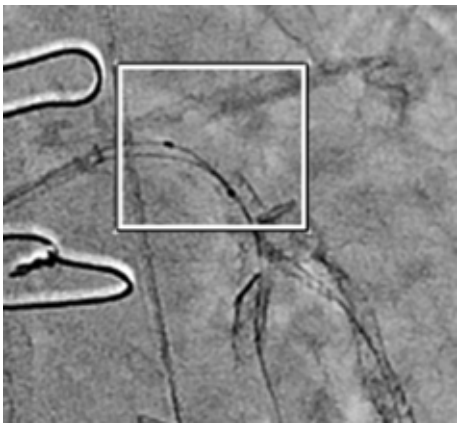
<table>
<tr><td>GUI</td><td colspan="2"> 
</td></tr>
<tr><td></td><td>Button</td><td>Description</td></tr>
<tr><td></td><td> 
</td><td>Displays when ROI is not setting.
Click to display one ROI.</td></tr>
<tr><td></td><td> 
</td><td>Displays when one ROI is displayed.
Click to display two ROI.</td></tr>
<tr><td></td><td> 
</td><td>Displays when two ROI are displayed.
Click to disable ROI and enables normal StentShot mode.</td></tr>
<tr><td>IVR NEO/
SMART
Touch/
Keyboard</td><td> 
</td><td>Press a button to change the number of ROI as 1-2-0.</td></tr>
<tr><td></td><td> 
</td><td>Press a button to display one ROI. If already displayed, ROI will be disabled.</td></tr>
<tr><td></td><td> 
</td><td>Press a button to display two ROI. If already displayed, ROI will be disabled.</td></tr>
</table>

3 Set ROI on the ACQ monitor. Adjust the number, position and size of ROI if necessary.

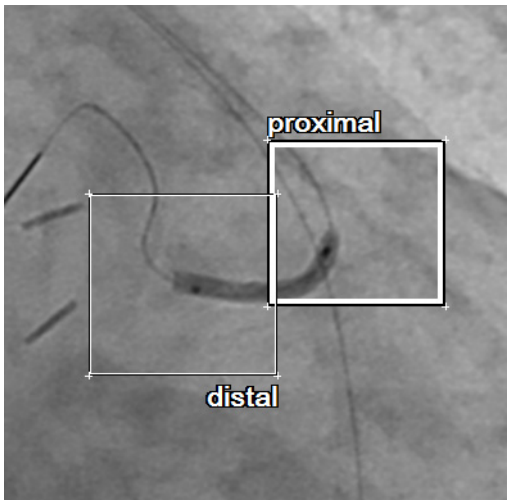
NOTE

ROI must include all range of movement of marker by heartbeat to get correct result. Set the number, position and size of ROI as checking fluoroscopy image replaying on the Acquisition monitor.

- **Setting Numbers**
  [1-ROI]
  Set ROI including the range of movement of two markers.



- **[2-ROI]**
  Set two ROI for Proximal and Distal markers. It is no problem if those two ROI overlap, but one marker must be included.



- **Setting Position**
  [Mouse]
  Move the mouse pointer to the ACQ monitor and click, drag and drop within the ROI to modify the position.

  [IVR NEO/SMART Touch]
  ROI does activate with move mode. When tilting the joystick of IVR NEO up/down or right/left, ROI moves to the tilting direction.
  When pressing the joystick button, ROI mode is changed to size modification mode. Each mode will change as follows.

  [1-ROI]
  Move mode-->Size Modification mode-->Move mode

  [2-ROI]
  Proximal Move mode-->Proximal Size Modification mode-->Distal Move mode-->Distal Size Modification mode-->Proximal Move mode.

  Enable to distinguish the move mode and size modification mode by shape of ROI.

  To change the Lateral position, press [Lateral Operation] button and then set the position.

- **Setting Size**
  [Mouse]
  Move the mouse pointer to the ACQ monitor and click, drag and drop within the ROI to modify the size.

  [IVR NEO/SMART Touch]
  When ROI is in the move mode, ROI mode is changed to size modification mode by pressing the joystick button.
  During size modification mode, tilt the joystick to up/down and right/left to fix the point at the top-left of ROI, and the point at the bottom-right of ROI does activate to change the size.

  To change the Lateral size, press [Lateral Operation] button and then set the size.

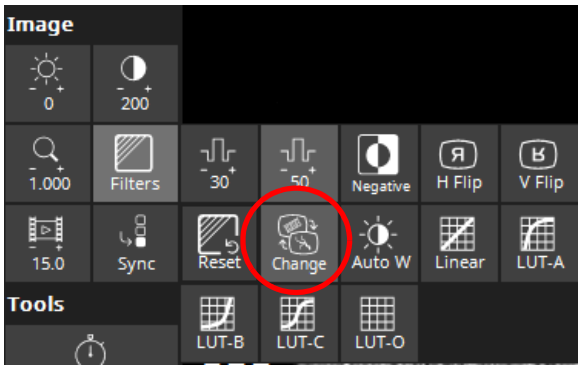
4 Press the radiography switch (foot or hand switch). StentShot radiography starts and StentShot image will display.

12.3.4 Change View

On ACQ and REF monitor, enable to change the display from StentShot to original image by canceling a special image processing StentShot.

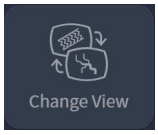
Click [Change] button on the side menu to change the image. It is start playing from the 1st frame when playing an original StentShot image.

*If change StentShot is assigned to keyboard shortcut and IVR NEO/SMART Touch button, enable to change StentShot with a shortcut key.



Side Menu

IVR NEO



SMART Touch

12.3.5 Setting StentShot

NOTE

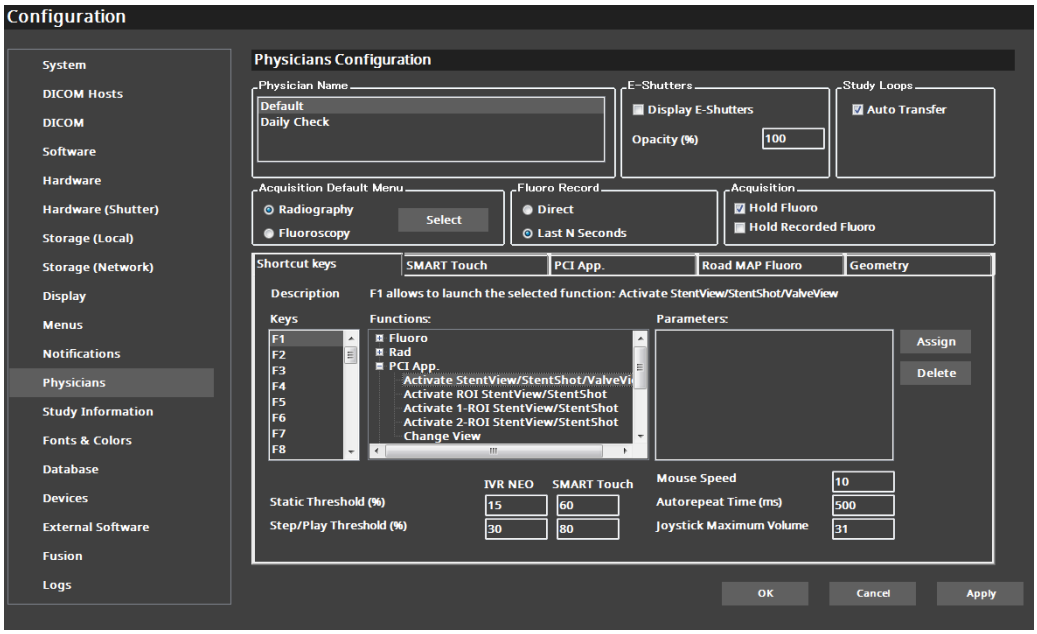
Configure StentShot on REF PC.

Setting Shortcut Keys

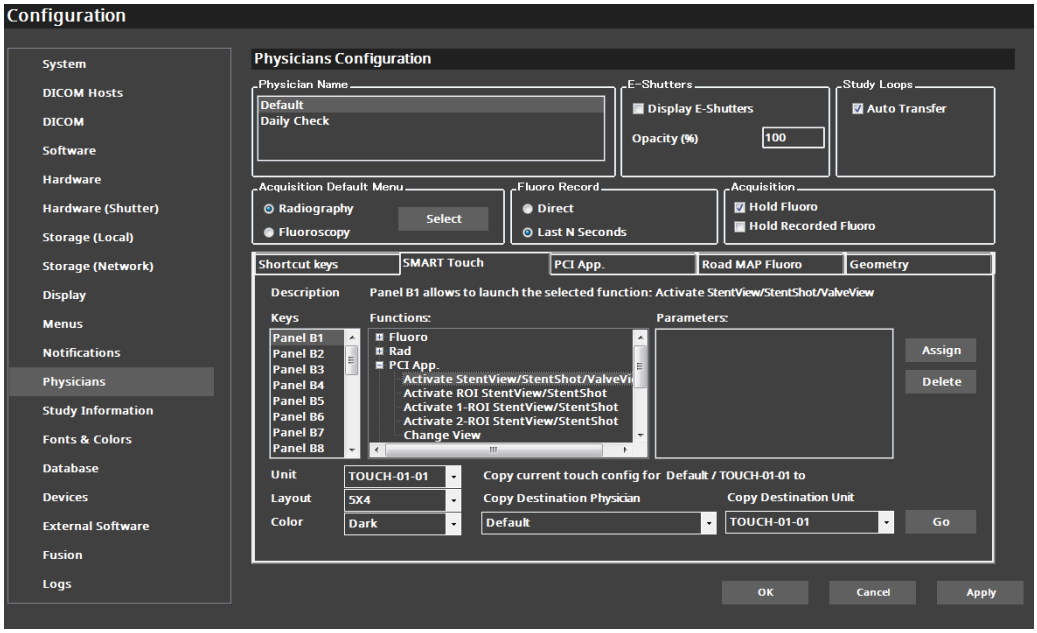
Set IVR NEO and Shortcut keys with [Shortcut keys]/[SMART Touch] on [Physicians] tab. Only Shimadzu or specified service representatives can change the settings.

Refer to "17.7 Options Configuration" for setting procedure.

Selecting Shortcut keys:



Selecting SMART Touch:

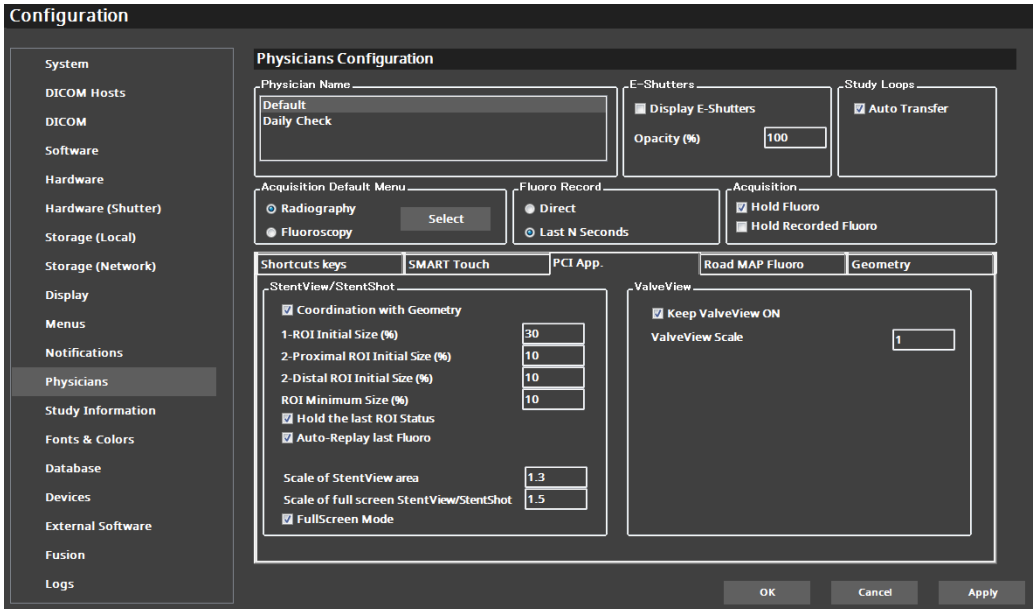


Description of StentView/StentShot of [Shortcut keys] and [SMART Touch] tab is shown as follows.

No.	Item	Description
Shortcut keys/SMART Touch		
StentView/StentShot		
1	Activate StentView/StentShot	Change Enable/Disable of StentView/StentShot.
2	Activate ROI-StentView/StentShot	Change disable of 1-ROI StentView/2-ROI StentView 1-ROI StentShot/2-ROI StentShot.
3	Activate 1-ROI StentView/StentShot	Change Enable/Disable of 1-ROI StentView/StentShot.
4	Activate 2-ROI StentView/StentShot	Change Enable/Disable of 2-ROI StentView/StentShot.
5	Change View	Change StentView/StentShot image view/Original image view.

Setting StentShot

Set StentView/StentShot with [StentView/StentShot] on [Physicians] tab.



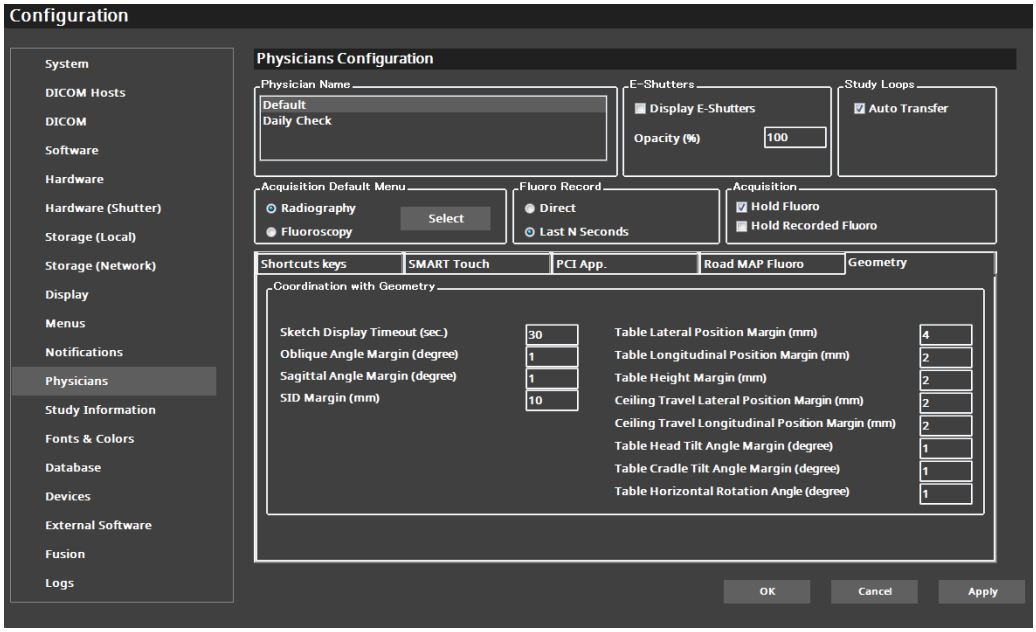
Description of [StentView/StentShot] tab is shown as follows.

No.	Item	Description
StentView/StentShot		
1	Coordination with Geometry	Check this item to disable ROI when changing geometry.
2	1-ROI Initial Size (%)	During study, enable to register the initial size of first 1-ROI. Enable to set value at rate of 100% of the whole image as 100%.
3	2-Proximal ROI Initial Size (%)	During study, enable to register the Proximal initial size of first 2-ROI.
4	2-Distal ROI Initial Size (%)	During study, enable to register the Distal initial size of first 2-ROI.
5	ROI Minimum Size (%)	Enable to set minimum size of ROI.
6	Hold the last ROI status	Check this item to save the last ROI position and size, and enable to use the same ROI for next StentShot. However, if mechanical equipment such as tabletop and C-arm operate, ROI position and size will be initialized even though this item is checked. Uncheck this item to display ROI always in the center of the image.
7	Auto-Replay last Fluoro	Check this item to replay the last fluoro for 2 seconds automatically, when ROI is displayed on LIH.
8	Scale of StentView area	Enable to change the magnification percentage of StentView area. Normally, do not change the value which is 1.3 times of default percentage.

No.	Item	Description
9	Scale of full screen StentView/ StentShot	Enable to change the magnification percentage of full screen. Normally, do not change the value which is 1.5 times of default percentage.
10	FullScreen Mode	Check this item to display StentShot area in full screen.

Geometry

Enable to set margins that automatically disable ROI with [Geometry] on [Physicians] tab.



Description of [Geometry] tab is shown as follows.

No.	Item	Description
Coordination with Geometry		
1	Guide Display Timeout (sec.)	Not used.
2	Oblique Angle Margin (degree)	If Coordination with Geometry is checked and the C-arm is changed more than input angle in an oblique direction, SIMAP and Guide Line will hide.
3	Sagittal Angle Margin (degree)	If Coordination with Geometry is checked and the C-arm is changed more than input angle in a sagittal direction, SIMAP and Guide Line will hide.
4	SID Margin (mm)	If Coordination with Geometry is checked and SID is changed more than input value, SIMAP and Guide Line will hide.
5	Table Longitudinal Position Margin (mm)	If Coordination with Geometry is checked and the table moves more than input value in a longitudinal direction, SIMAP and Guide Line will hide.
6	Table Transversal Position Margin	If Coordination with Geometry is checked and the table moves more than input value in a transversal direction, SIMAP and Guide Line will hide.
7	Table Height Margin	If Coordination with Geometry is checked and the table height is changed more than input value, SIMAP and Guide Line will hide.
8	Ceiling Travel Longitudinal Position Margin (mm)	If Coordination with Geometry is checked and the C-arm moves more than input value in a longitudinal direction, SIMAP and Guide Line will hide.

No.	Item	Description
9	Ceiling Travel Transversal Position Margin (mm)	If Coordination with Geometry is checked and the C-arm moves more than input value in a transversal direction, SIMAP and Guide Line will hide.

12.4 Troubleshooting

12.4.1 Phenomenon and Action

When StentShot does not work normally, perform following actions.

Phenomenon
Normal image displays after the 9th frame. Does not update StentShot image and “Cannot detect target devices” is displayed at the top of ACQ monitor.
Assumed Cause
Disable to set marker position.
Action
If disabling to set marker, there are some possible cases. Perform following actions correspond to the situation. [Case 1] Marker is placed outside the window because of heartbeat. Change FOV size and bed position to fit the marker within the display area. [Case 2] Fast heartbeat. The faster the marker moves by heartbeat, the more the marker detection rate goes down. Perform StentShot radiography with higher exposure rate. [Case 3] Large FOV size. The larger the FOV size gets, the smaller the marker size gets and detection rate goes down. Set FOV size smaller or set ROI within the range of movement of the marker. [Case 4] Large C-arm angle. The deeper the C-arm angle gets, the more the marker contrast and detection rate goes down. Reach performance limits. Perform StentShot radiography with shallower angle.

Phenomenon
When showing StentShot image, delay a showing of next/previous image. Slow reaction and operation of a mouse. Image does not transfer from ACQ to REF.
Assumed Cause
PC is highly-load excessively.
Action
Do not perform StentShot radiography for a while (a minute or two). If it does not improve for a long time, restart the system.

Phenomenon
StentShot does not activate, even when pressing a hand switch.
Assumed Cause
Software error, hardware malfunction.
Action
Restart the system. If it is not improved after restarting the system, perform normal fluoroscopy and radiography, and contact our service agency.

Phenomenon
Abnormal image of StentShot radiography is shown.
Assumed Cause
StentShot parameter is not setting correctly.
Action
Select other DUP once and then select StentShot DUP again. If abnormal image is shown for normal fluoroscopy, restart the system.

Phenomenon
Result does not display correctly on the StentShot area though setting ROI.
Assumed Cause
Marker is placed outside the ROI.
Action
Set ROI including the range of movement of marker by heartbeat.

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Chapter 13

SCORE Chase (Option)

Description

13.1 Overview

13.1.1 Purpose

SCORE Chase Option (hereafter called "SCORE Chase") is a feature attached to Shimadzu Digital Radiography System DAR-9500f. Perform radiography by moving the table to combine acquired images of different parts of the body, and create a stitched image.

SCORE Chase is useful when treat over a wide range of body parts such as the lower extremity.

13.1.2 Feature

SCORE Chase has the following features.

- Perform radiography by moving the table, cut and combine small areas filled with contrast agent, and generate and display a stitched image.
- When combined with KS-100, move the table remotely and enable to generate a stitched image without X-ray operator to be exposed to radiation. And perform radiography twice with the same table movement to generate a stitched DSA image which extracted only a blood-vessel image.
- When combined with KS-100, enable to move the table to selected position on the stitched image to reduce X-ray exposure.
- When combined with KS-100, perform an additional radiography at specified position to create DSA image.
- Use an acquired image to change frames for use and reference height, and generate a stitched image with post-processing.
- Display current X-ray exposure position on the stitched image and set radiation position to desired treatment region without being exposed to radiation.

13.2 Components

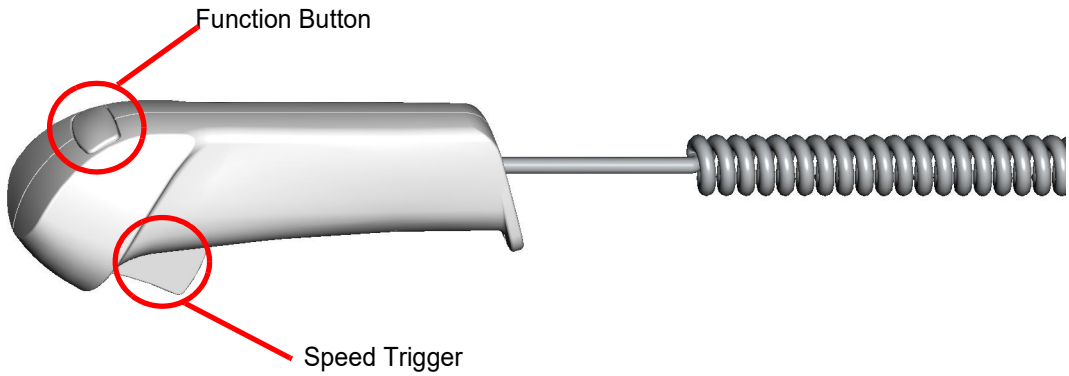
For the system with Cardiovascular Catheterization Table KS-100, the Chase Console is attached to SCORE Chase option.

The table can operate remotely from the control room by using the Chase Console.

System Display

No.	Part Name	Quantity
1	Chase Console	1 set

13.2.1 Chase Console



Function Button	Use the function button when assigned to enter the RemoteChase mode and move the table to initial position. Table position at the time of pressing the key is registered as radiography start position of RemoteChase and RemoteChase-DSA. And after the test run mode and RemoteChase-DSA Live acquisition, continue to press the key to move the table to the start position of radiography.

Speed Trigger	Use this trigger for table operation during RemoteChase and test run. The table speed will change automatically depending on how hard you pull the trigger.

13.3 Specification

13.3.1 Specification of SCORE Chase

Acquisition Rate	<ManualChase /RemoteChase> [DA] Single Radiography: 30 fps, 15 fps, 10 fps, 7.5 fps Bi-plane Radiography: 15 fps, 10 fps, 7.5 fps [RSM] SFD-1212 Single Radiography: 12 fps, 6 fps Bi-plane Radiography: 6 fps SFD-1612AF/SFD-1212AF Single Radiography: 15 fps, 7.5 fps Bi-plane Radiography: 7.5 fps SFD-0808/SFD-0808AF Single Radiography: 15 fps, 10 fps, 7.5 fps Bi-plane Radiography: 15 fps, 10 fps, 7.5 fps <RemoteChase-DSA/SPOT-DSA> SFD-1212 Single Radiography:6 fps Bi-plane Radiography: 6 fps SFD-1612AF/SFD-1212AF/ SFD-0808/SFD-0808AF Single Radiography: 7.5 fps Bi-plane Radiography: 7.5 fps <SPOT-DSA> SFD-1212 Single Radiography:6 fps SFD-1612AF/SFD-1212AF/ SFD-0808/SFD-0808AF Single Radiography: 7.5 fps
Image Size	[Acquisition Image] 1024 x 1024 Matrix [Stitched Image] Max. 4096 x 16384 Matrix

13.3.2 Features

13.3.2.1Image Acquisition

No.	Items	Features
1	ManualChase	Perform radiography by moving the table freely without pre-registered table position information, and combine acquired images to generate a stitched image.
2	RemoteChase	Perform radiography by moving the table remotely with the Chase Console Speed Trigger, and combine acquired images to generate a stitched image. As remote operation becomes available, enable to reduce X-ray exposure to physicians.
3	RemoteChase-DSA	Inject contrast agent for the first radiography and acquire an image with RemoteChase. And then perform second radiography (mask acquisition) on the same trace to generate a stitched DSA image which extracted only a blood-vessel image.
4	SPOT-DSA	Specify the image acquired with ManualChase or RemoteChase to position the C-arm and table, and perform additional radiography to create DSA image. And then use the last frame of acquired image to enable DSA-MAP automatically. As creating DSA image with acquired image, enable to reduce contrast agent.

13.3.2.2Image Processing

No.	Items	Features
1	Positioning	According to current table position and height, C-arm position, SID, and FOV, display X-ray radiation position on a stitched image.
2	PostProcess Stitch	Use an image acquired with Chase mode, change the number of frames used and reference height to regenerate a stitched image.

13.4 Handling Method

13.4.1 Introduction

Select [Chase] or [Chase Console] button, acquisition mode changes to the Chase mode for the next radiography. The Chase button is valid only when the program with enabled Chase mode is selected on Digital User Program (hereafter called "DUP").

13.4.2 Manual Chase

Perform radiography by moving the table freely without pre-registered table position information, and combine acquired images to generate a stitched image.

NOTE

FOV size should be more than 8 inches for radiography.

NOTE

When operating the C-arm and table tilt or roll during radiography, the image acquired after the operation is not included in a stitched image.

NOTE

Move the table that contrast agent density peak to be set in the center of image. If not, it may not generate stitched image properly.

NOTE

Generate a stitched image based on the latest image acquired on each table position. If return the table to position where no contrast agent is filled, blood vessel image may be ended at that position.

1 Select a radiography program which enables the Chase mode from radiography program.

2 Select [Chase] button on the side menu or SMART Touch.

Side Menu

IVR NEO

SMART Touch

NOTE

Unable to click [Chase] button while selecting a program which Chase feature is not assigned.

3 Modify the reference height from the side menu if needed.

Select from [ISO Center], [Table Height], [Table Height +5 cm], [Table Height +10 cm] and [Table Height +15 cm].

4 Completely filled with contrast agent, and then start radiography.

Move the table that contrast agent density peak to be set in the center of the image.

NOTE

If not filled with contrast agent completely and start radiography, contrast blood vessel may not be included in the stitching image. The time from injection of contrast agent to start of radiography is adjustable.

5 After radiography, a stitched image is displayed on the reference monitor.

WARNING

Enable to use measurement and QCA functions for stitched image, but they cause several errors. Therefore, do not diagnose or treat based solely upon this analysis result. Use the analysis result as a reference value.

13.4.3 RemoteChase

NOTE

RemoteChase is enabled when cardiovascular catheterization table KS-100 is installed.

NOTE

Before RemoteChase, move the table over the entire range for the safety.

NOTE

When extending the cable for Chase console operation, pay attention not to put pressure on the base of cable unit.

NOTE

To start RemoteChase after recovering from emergency stop, check if the table moves horizontally by manual or automatic for system status check. If not checking, a message of [Interlock!] is displayed and cannot start RemoteChase.

Perform radiography by moving the table remotely with the Chase console speed trigger, and combine acquired images to generate a stitched image. As remote operation becomes available, enable to reduce X-ray exposure to physicians.

1 Select a radiography program which enables the Chase mode from radiography program.

2 Move the table to the start position of radiography.

3 Press the Chase console function button or [Chase] switch of function switch on the local console.

[Chase] button on the side menu becomes ON mode automatically.

NOTE

When assigned to a function switch on the local console, please contact our service representative.

NOTE

If selecting a program which is not assigned a Chase mode function, cannot press [Chase] button with Chase console function button or function switch on the local console.

4 A message of “Start acquisition” is displayed on the acquisition monitor.

NOTE

Pull the Chase console speed trigger to perform test run and check the table position.

Release the speed trigger to finish test run.

After test run, press the Chase console function button or press [SET] switch of local console or remote console to move the table to the start position.

NOTE

To reposition after test run, press [CANCEL] switch to cancel the Chase mode once, and then reposition.

CAUTION

When operating the table with Chase console, operate where you can reach to the [STOP] switch of remote console, CyberConsole or CyberGrip immediately.

If the table does not stop though releasing the speed trigger, press [STOP] switch immediately. The table stops.

5 Change the reference height of generating a stitched image if necessary.

6 Inject contrast agent and start radiography.

7 Pull the speed trigger to move the table.

CAUTION

When operating the table with Chase console, operate where you can reach to the [STOP] switch of remote console, CyberConsole or CyberGrip immediately.

If the table does not stop though releasing the speed trigger, press [STOP] switch immediately. The table stops.

NOTE

If the table exceeds to contrast agent, press [SET] switch ion the remote console to move the table in the opposite direction.

8 After radiography, a stitched image is displayed on the reference monitor.

13.4.4 RemoteChase-DSA

NOTE

RemoteChase-DSA is enabled when cardiovascular catheterization table KS-100 is installed.

NOTE

Before RemoteChase-DSA, move the table over the entire range for the safety.

NOTE

When extending the cable for Chase console operation, pay attention not to put pressure on the base of cable unit.

NOTE

To start RemoteChase-DSA after recovering from emergency stop, check if the table moves horizontally by manual or automatic for system status check. If not checking, a message of [Interlock!] is displayed and cannot start RemoteChase-DSA.

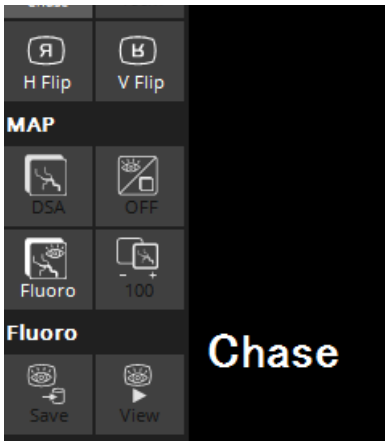
RemoteChase-DSA is an option to generate a stitched DSA image. Inject contrast agent for the first radiography and acquire an image with RemoteChase. And then perform second radiography (mask acquisition) on the same trace to generate a stitched DSA image which extracted only a blood-vessel image.

1 Select a radiography program which enables the RemoteChase-DSA from radiography program.

2 A message of “Press Function button on Chase Console” is displayed on the top of acquisition monitor.

3 Move the table to the start position of radiography.

4 Press Chase console function button or [Chase] switch of function switch on the local console.



5 A message of “Start acquisition” is displayed on the acquisition monitor.

NOTE

Pull the Chase console speed trigger to perform test run and check the table position.

Release the speed trigger to finish test run.

After test run, press the Chase console function button or press [SET] switch of local console or remote console to move the table to the start position.

NOTE

To reposition after test run, press [CANCEL] switch to cancel the Chase mode once, and then reposition.

NOTE

To start radiography with appropriate X-ray conditions, perform fluoroscopy approximately 2 seconds before radiography.

⚠ CAUTION

When operating the table with Chase console, operate where you can reach to the [STOP] switch of remote console, CyberConsole or CyberGrip immediately.

If the table does not stop though releasing the speed trigger, press [STOP] switch immediately. The table stops.

6 Change the reference height of generating a stitched image if necessary.

7 Inject contrast agent and start radiography.

8 Pull the speed trigger to move the table.

⚠ CAUTION

When operating the table with Chase console, operate where you can reach to the [STOP] switch of remote console, CyberConsole or CyberGrip immediately.

If the table does not stop though releasing the speed trigger, press [STOP] switch immediately. The table stops.

NOTE

If the table exceeds to contrast agent, press [SET] switch ion the remote console to move the table in the opposite direction.

9 After radiography, a stitched image is displayed on the reference monitor.

10 A message of “Press Function Button to set table to start position” is displayed on the acquisition monitor.

Press the Chase console function button or press [SET] switch of local console or remote console to move the table to the start position.

11 After the table moved to the start position, a message of “Start acquisition” is displayed on the acquisition monitor.

Press the radiography switch to start mask acquisition (the table moves automatically).

12 When the table moves to the same position as live acquisition, automatically complete the acquisition.

13 After the acquisition, stitched DSA image is displayed on the reference monitor.

13.4.5 SPOT-DSA

NOTE

SPOT-DSA can be used when Cardiovascular Catheterization Table KS-100 is installed.

NOTE

SPOT-DSA is available only for frontal radiography.

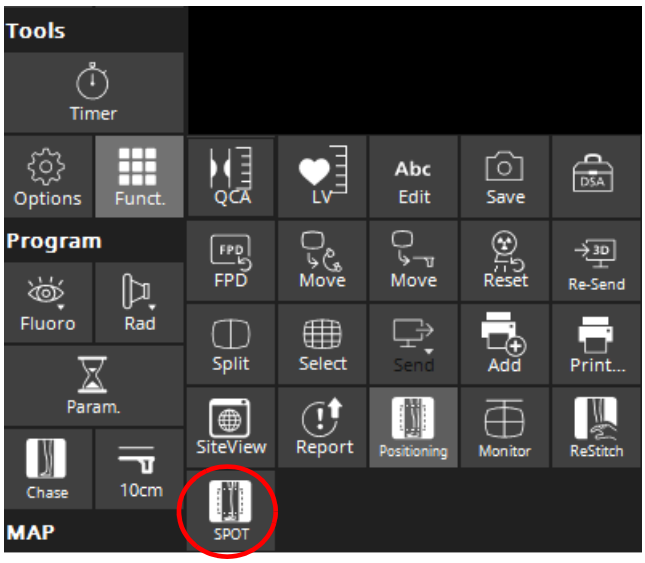
On SPOT-DSA, specify the image acquired with ManualChase or RemoteChase to position the C-arm and table, and perform additional radiography to create DSA image. And then use the last frame of acquired image to enable DSA-MAP automatically. As creating DSA image with acquired image, enable to reduce contrast agent.

1 From Image Selector on the reference monitor, select an image acquired with ManualChase or RemoteChase, and then select a frame of position to be acquired as DSA image.

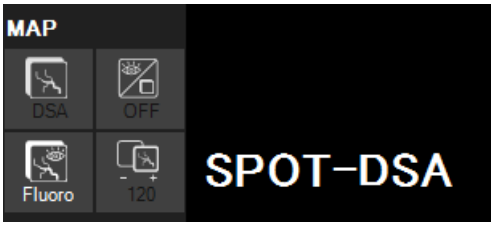
NOTE

Cannot apply SPOT-DSA with a different C-arm position and swivel angle, table tilt/roll/swivel angle and FPD rotation angle of image.

2 Click [Funct.]-[SPOT] on the side menu of reference monitor and register the target image.



The same DUP (Digital User Program) and FOV as same as the selected image will be selected automatically, and radiography time is changed to 1 second automatically.



3 To move to the target position, the C-arm and table positions are notified and the [SET] button blinks. A message of "Press SET key to move to specified position" is displayed on the acquisition monitor. Press each [SET] button and move the C-arm and table to the radiography position.

4 After the C-arm and table move to their setting position, a message of "Start acquisition" is displayed. Press the radiography switch and start the mask acquisition.

5 After radiography, the last frame is displayed and DSA-MAP mode will be enabled.

NOTE

If PCIView is enabled, DSA-MAP mode cannot be enabled.

13.4.6 PostProcess Stitch

Use the image acquired with Chase mode and regenerate a stitched image.

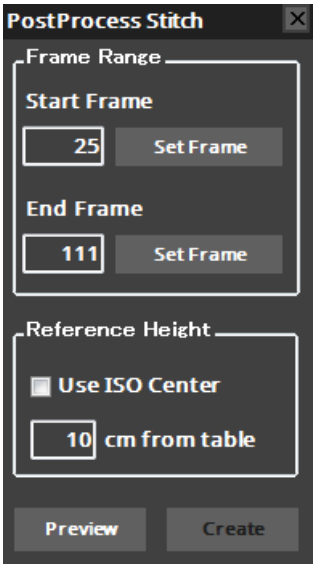
It is possible to recreate a stitched image from an image not acquired with the Chase mode.

> **NOTE**
>
> Only DA or RSM images with a FOV size of 8 inch or more and a protocol of 6 fps or higher can be recreated from images not acquired with the Chase mode.

1 Select an image (acquired with DA or RSM of at least FOV 8 inch and at least 6 fps) that can be recreated a stitched image from an image selector.

2 Click [Funct.]-[Restitch] on the side menu.

[PostProcess Stitch] window is displayed.



3 Register the frame range to generate a stitched image.

Display the start frame and click [Set Frame]. And display the end frame and click [End Frame]. Or directly input the number of [Start Frame] and [End Frame].

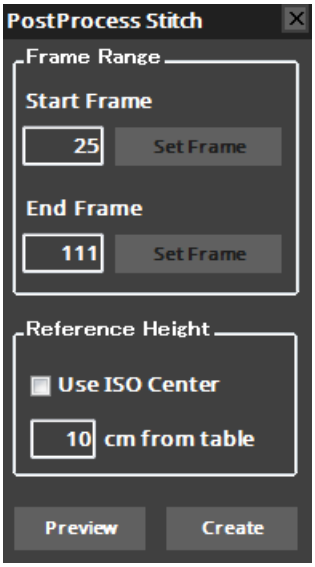
4 Register the reference height.

Check the checkbox when using ISO center. Input of value from 0 to 30 is enabled when specifying the height.

5 Click [Preview] to display regenerated stitched image.

[Create] button is enabled, so click [Create] to save the image.

6 Click [Create] button to save the image displayed on a preview as a stitched image, and add to the image selector.



NOTE

To add an annotation, generate a stitched image first, add an annotation, and then save the image.

13.4.7 Positioning

According to current table position and height, C-arm position, SID, and FOV, display X-ray irradiation position on a stitched image. When irradiation position changes due to the operation of table top and C-arm, irradiation position on the stitched image also follow to move.

NOTE

Not following the C-arm swivel and rotation angle, table tilt, roll and swivel angle, and collimator position.

NOTE

Display of radiation position is just a simulation result, so it contains error with actual radiation position.

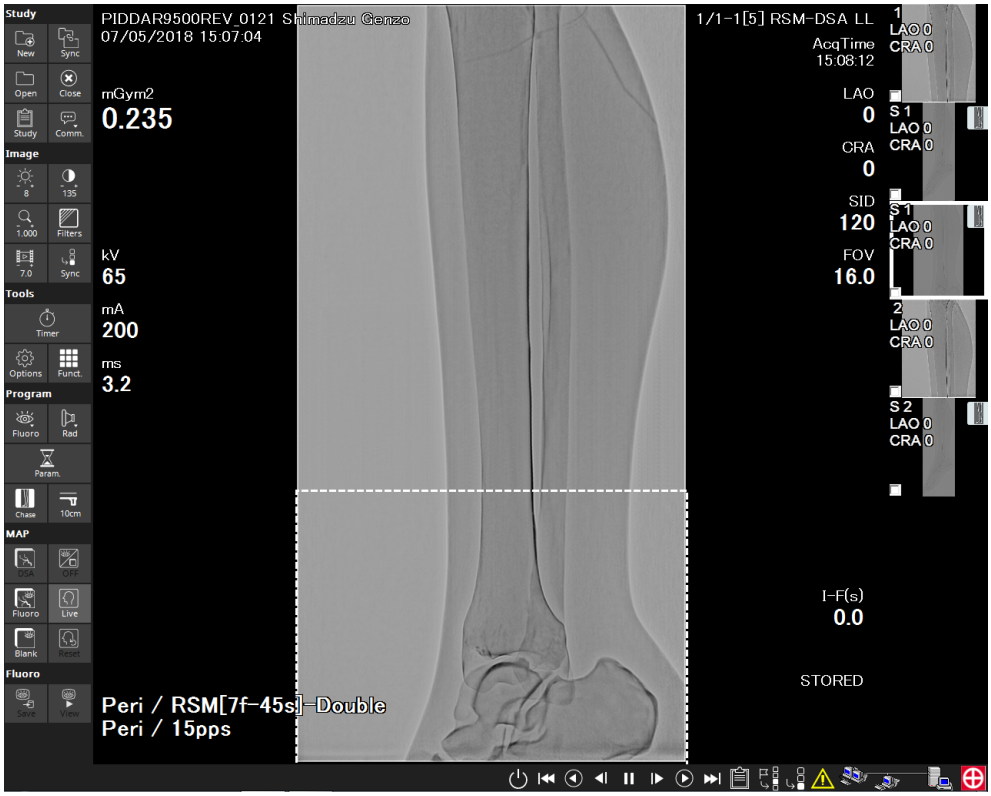
Perform fluoroscopy before acquisition, and then check radiation position.

1 Select a stitched image from image selector.

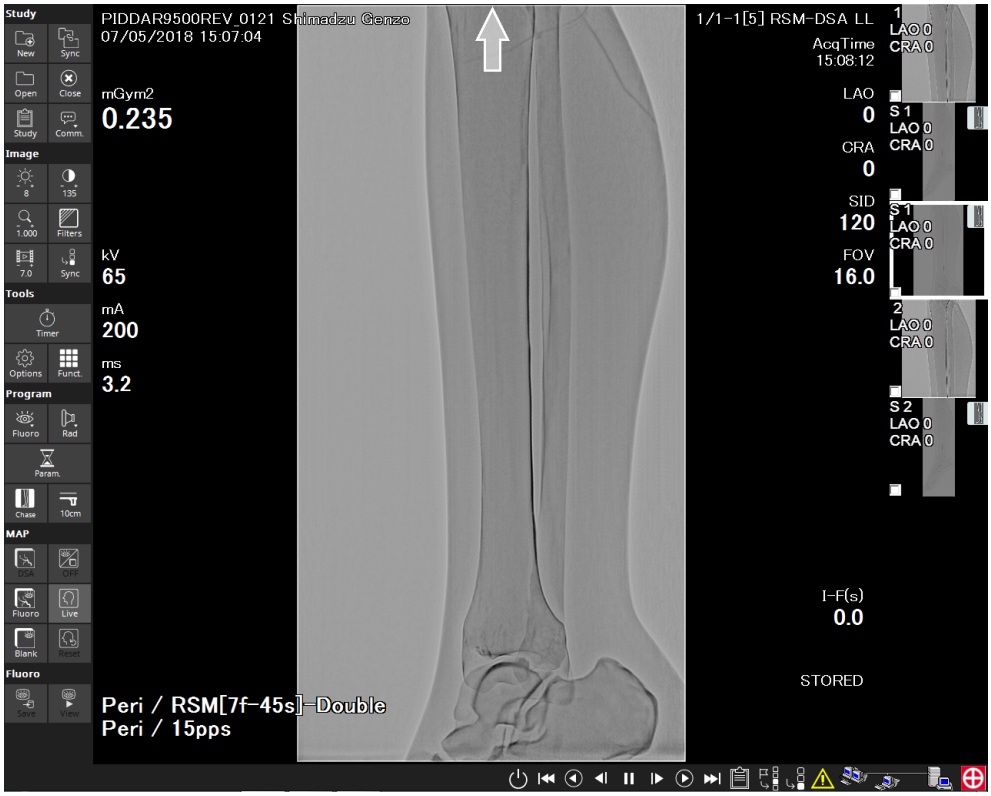
2 Click [Funct.]-[Positioning] on the side menu.

NOTE

For a setting procedure of [Position] button, see "13.4.10 Setting of SCORE Chase" P.13-23 for details.



When moving the table or radiation position disappeared from the window due to zoom-in of the image, an arrow is displayed in the direction of radiation position.



NOTE

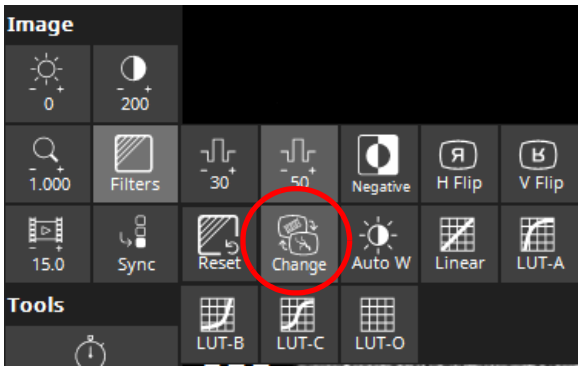
Radiation position is hidden automatically when swivel the C-arm. Radiation position for the stitched image acquired with different C-arm swivel position.

13.4.8 Change of Display

On ACQ and REF monitor, enable to change the display to the original image by canceling DSA processing applied with RemoteChase-DSA or SPOT-DSA.

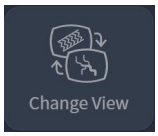
Click [Change] button on the side menu to change the image.

*If [Change] is assigned to keyboard shortcut and IVR NEO/SMART Touch button, enable to change the display with a shortcut key.



Side Menu

IVR NEO



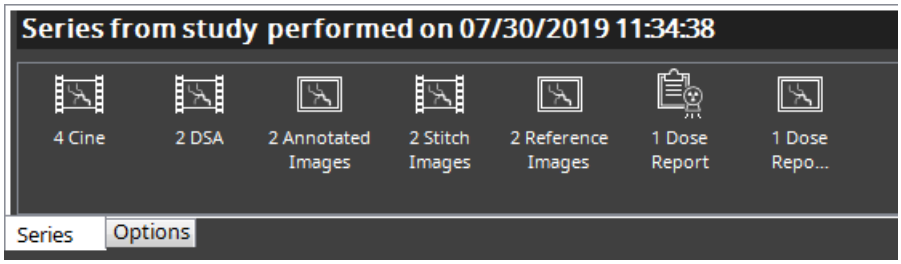
SMART Touch

13.4.9 Image Loop and Identification of Stitched Image

Both image loop and stitched image are displayed as an image selector icon on the image selector. A small icon is displayed on the upper-right of each image selector icon to show whether it is a loop or a stitched image.

No.	Icon	Description
1		An image generated as a stitched image. “S” which indicates as a loop number and a stitched image is displayed on the image selector icon.

And when a single local study is selected in the study list in the Studies Management window, all series for the study are shown in the Study Series with one icon per type. Series type icons include a brief label beneath them, indicating the type preceded by the number of items within that series.

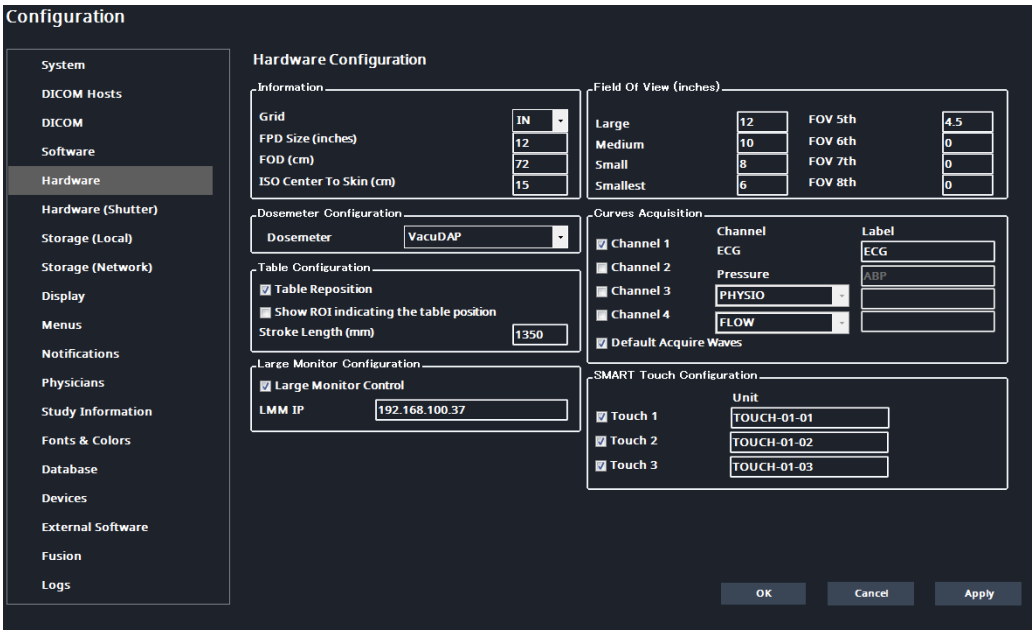


Possible series type and its corresponding icon is as follows:

No.	Icon	Series Type
1		Stitched image

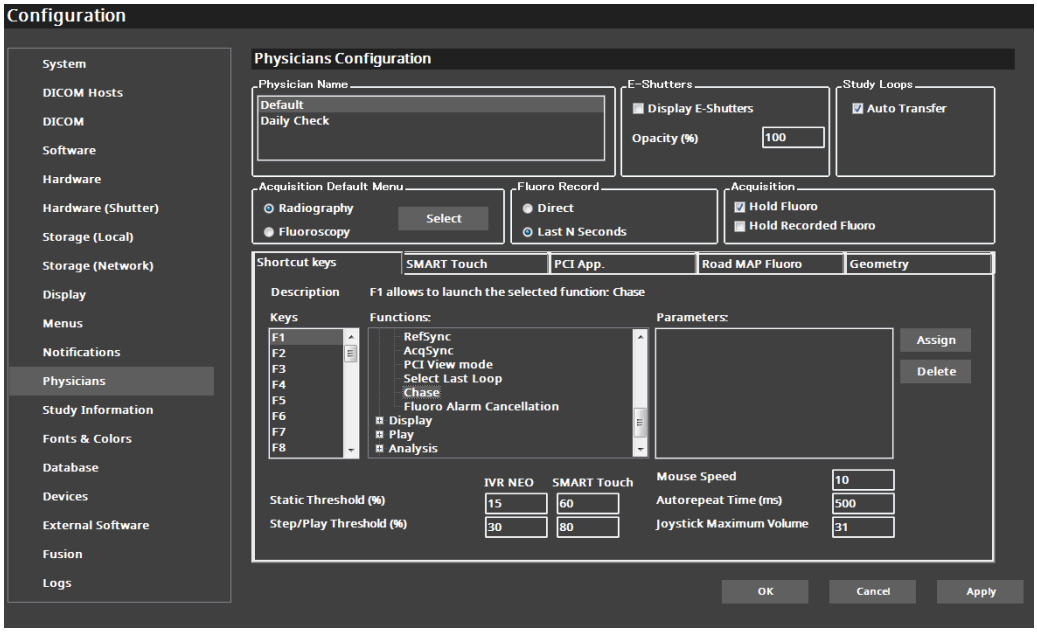
13.4.10Setting of SCORE Chase

Default Setting of Table Position Display



No.	Item	Description
1	Show ROI indicating the table position	When put a check mark, Positioning mode becomes active as a default.

Setting IVR NEO and Shortcut Keys

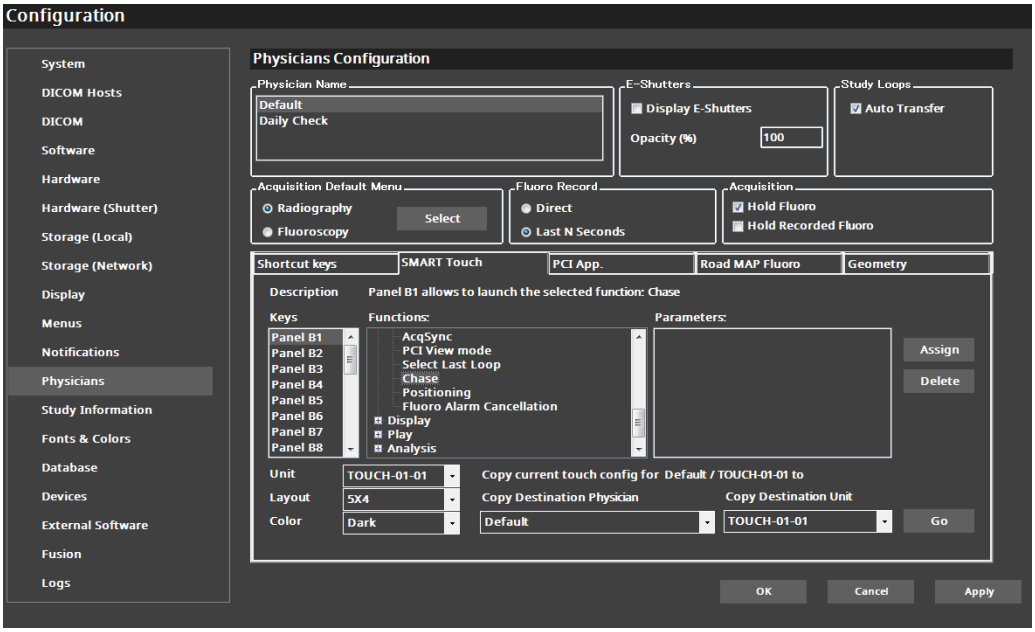


SCORE Chase setting of Shortcut keys tab is configured as follows.

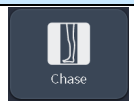
Category	Button Name	Function	Icon	A	R
Actions	Chase	Change Enable/Disable of Chase mode. ON= Chase is enabled.		○	○

A: relevant to Acquisition monitor, R: relevant to Reference monitor

Setting of SMART Touch



SCORE Chase setting of SMART Touch tab is configured as follows.

Category	Button Name	Function	Icon	A	R
Operation	Chase	Chase mode is available.		○	○
	Positioning	Display radiation position on the stitched image.			○
	SPOT-DSA	SPOT-DSA mode is available.		○	○

A: relevant to Acquisition monitor, R: relevant to Reference monitor

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Chapter 14

SMART Display

This chapter describes how to use the Mini Viewer to display images and loops on other computers.

Description

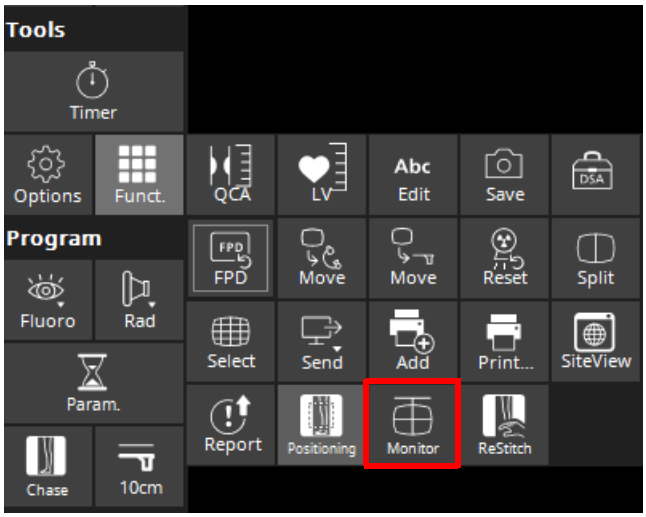
14.1 Introduction

NOTE

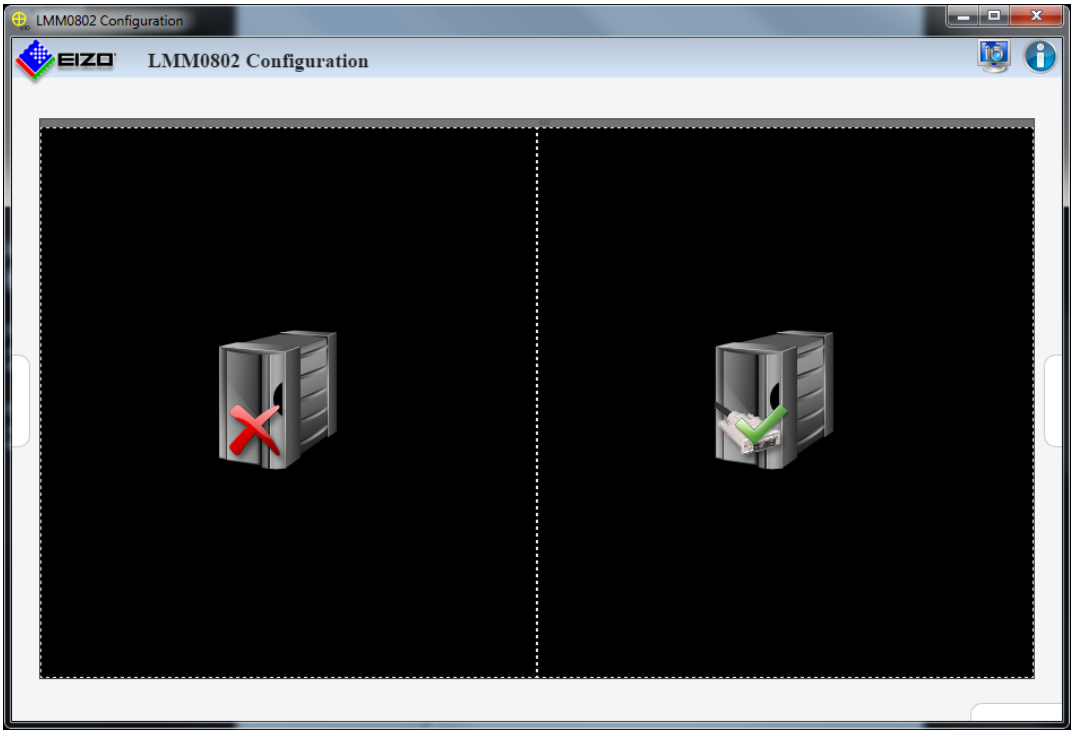
Available only when SMART Display (option) is installed.

Set SMART Display (option) from reference monitor. Display the monitor setting window according to the following instructions.

1 Select [Funct.]-[Monitor] from the side menu.



2 Monitor selection window is displayed.

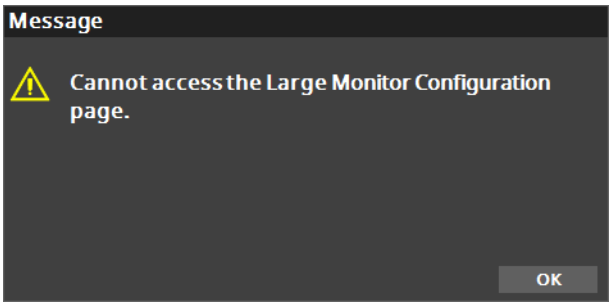


.

NOTE

When display [Large Monitor Configuration] window and error occurs, click [Funct.]-[Monitor] again.

If it does not work, please contact our service representative.



14.2 Handling Method

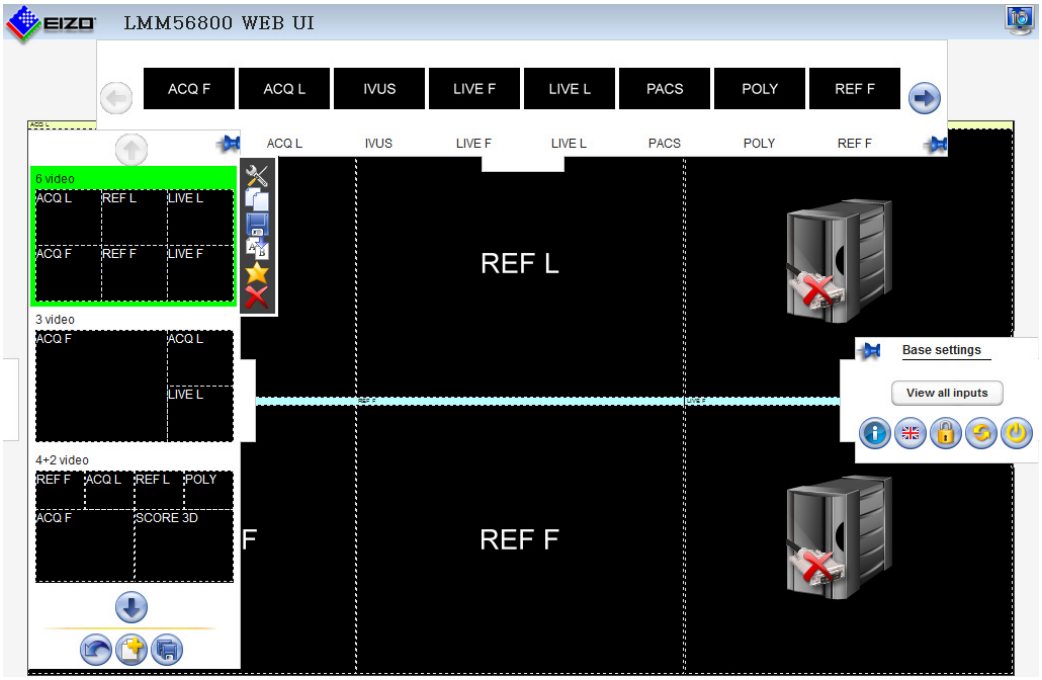
14.2.1 Main Screen

Enable to select preset, switch video input and customize preset with the mouse and keyboard.

NOTE

Move the mouse pointer to the right edge of screen to display [Base settings].

Click  (setting language) button to change the language.



(1) Base settings

Set language and restart video manager.

(2) Preset

Display the preset list displaying on 58-inch monitor. Select and customize preset.

(3)Video Input

Display video input displaying on 58-inch monitor.

14.2.2 Basic Settings

Move the mouse pointer to the right edge of screen to display [Base settings].

The following table shows description of each button.

	Display general information about the system.
	Language of the dialog window/menu will be changed.
	The dialog window for rebooting SMART Display is displayed.
	The dialog window for shutting down SMART Display is displayed.

NOTE

Do not shut down SMART Display.

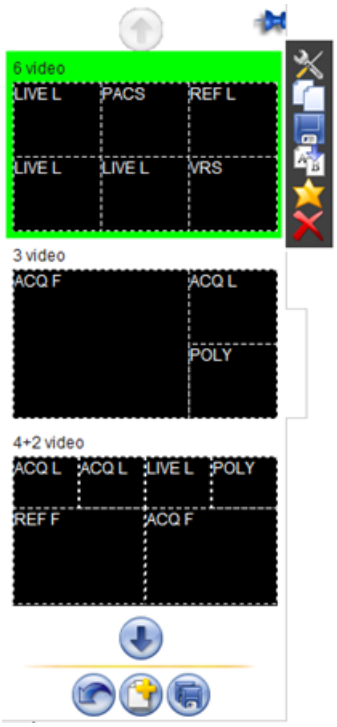
Or the power supply of digital acquisition cabinet should be turned on.

NOTE

It takes about 3 minutes to restart SMART Display. Image will not display and operate on 58-inch monitor while restarting.

14.2.3 Preset

Move the mouse pointer to the left edge of screen to display [Preset]. Enable to select preset and customize preset.



Left-click the mouse to select preset. The color of currently selected preset is in reverse.

The following table shows description of each button.

	Create new preset.
	Change the name of preset.
	Set preset a default. Restart 58 inch monitor to display the default preset.
	Edit preset.
	Duplicate preset.
	Delete preset.
	Save the change of preset.
	Reverse the operation before saving the changes.

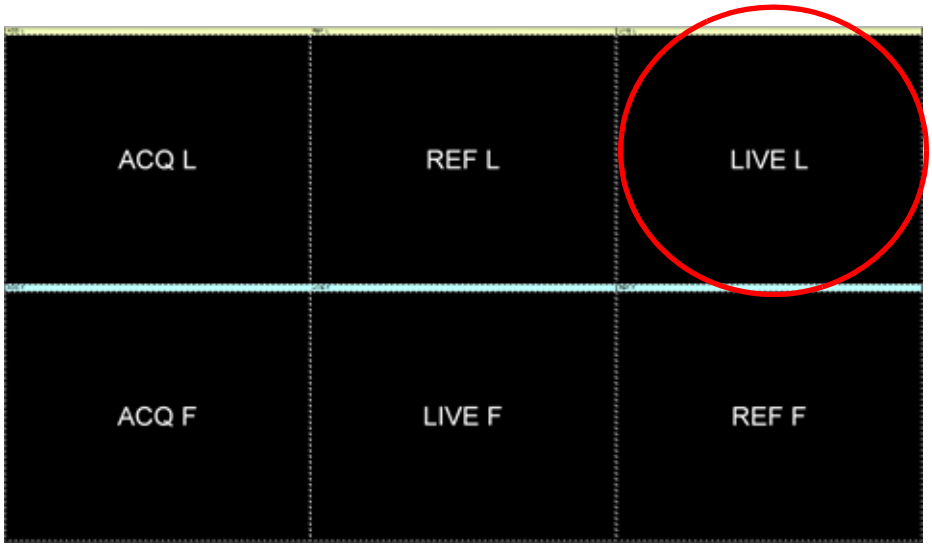
14.2.4 Video Input

Move the mouse pointer to the upper edge of screen to display [Video Input].

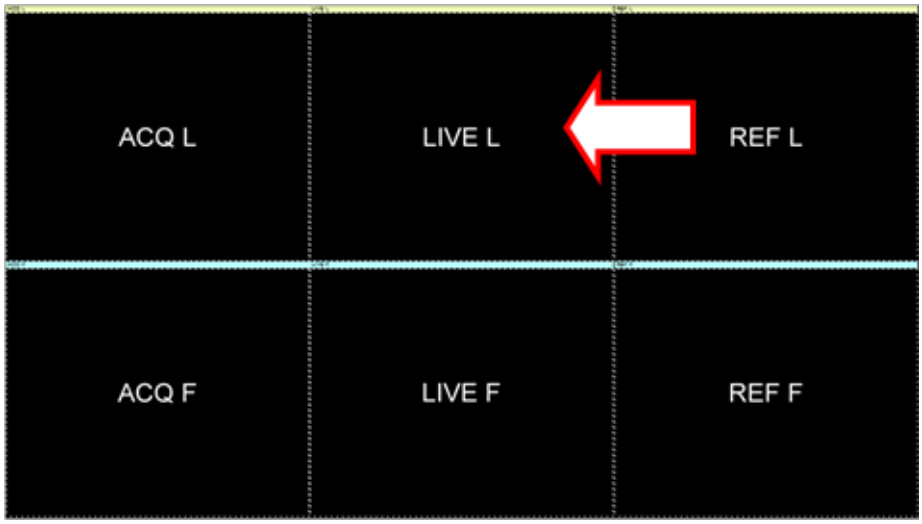
Thumb nail of video input displaying on 58-inch monitor is displayed.

14.2.5 Switch Segment

1 Select the segment to change displaying position.



2 Drag and drop to the segment which to be displayed. Segment will be switched.

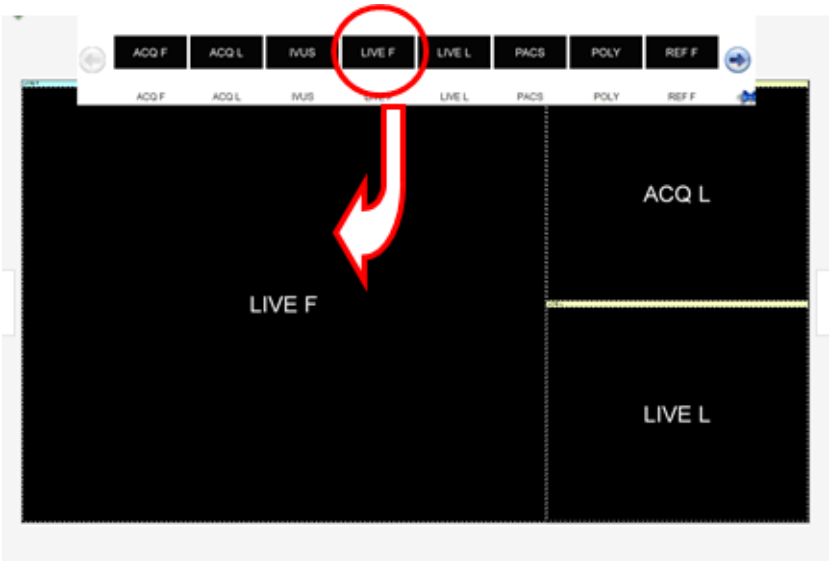


14.2.6 Switch Video Input

1 Move the mouse pointer to the upper edge of screen to display [Video Input].

2 Select video input to be displayed.

3 Drag and drop to displaying segment.



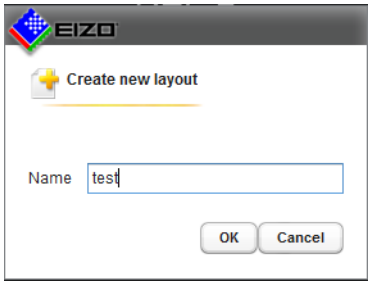
14.2.7 Creating Preset

Create new preset according to the following instructions.

1 Move the mouse pointer to the left edge of screen to display [Preset].

Select  button.

2 [Create new layout] is displayed.

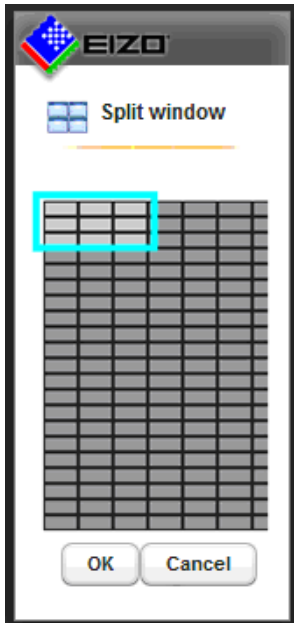


Enter an optional name for the name and click [OK].

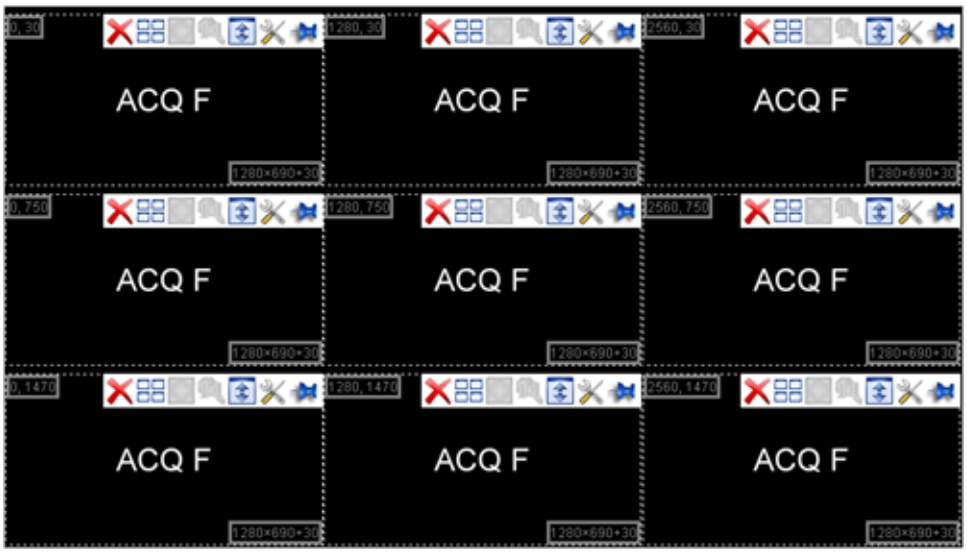
3 Screen will be displayed in 1 screen (segment).

Click  button.

4 [Split window] is displayed. Select desired layout.



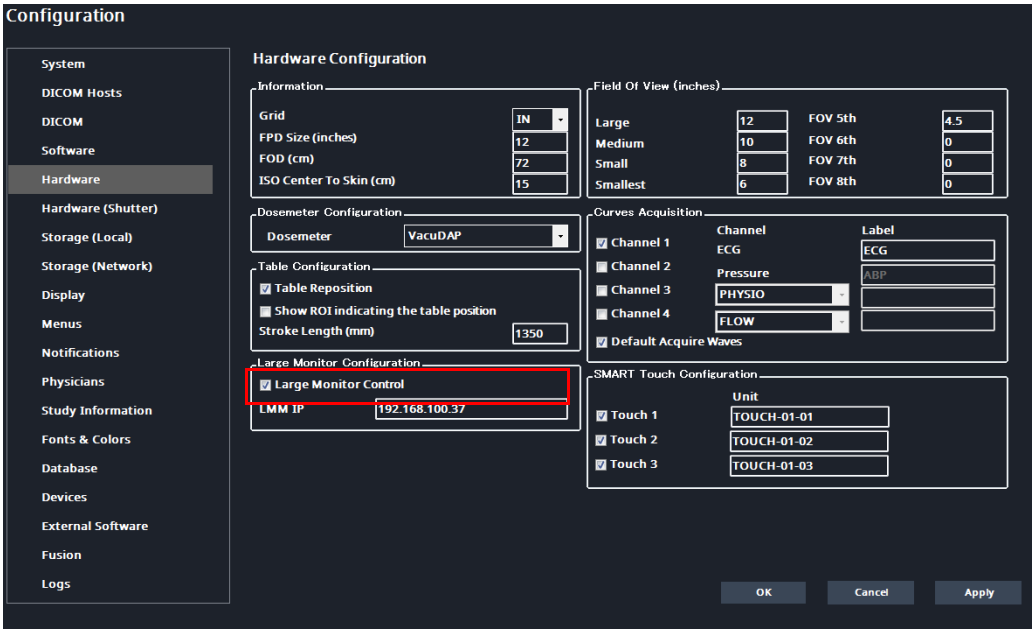
5 Assign an optional video input to each segment. (Refer to "14.2.6 Switch Video Input" P.14-8)



6 After preset is completed, click  button in preset. Preset will be saved.

14.3 Setting of SMART Display

Setting of IP Address

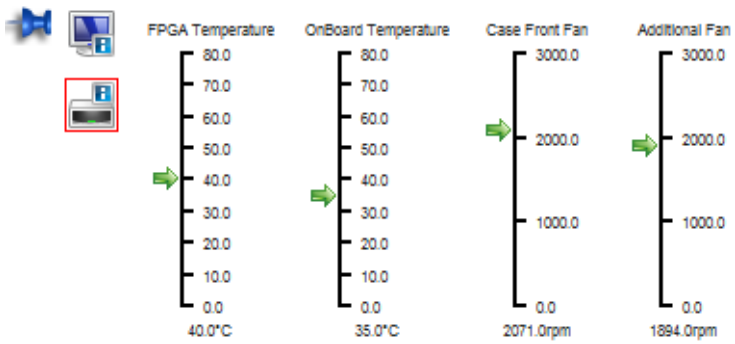


Item	Description
LMM IP	Set IP address of SMART Display.

14.4 Trouble Shooting

14.4.1 Error Message

[Error Message] will be displayed at the right bottom of screen if any failure occurs on some hardware.

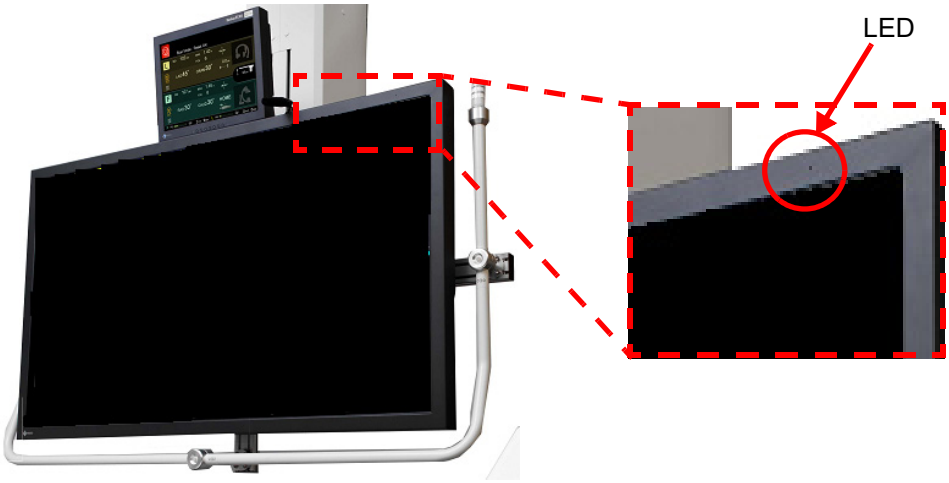


Blinking red frame indicates hardware with any trouble occurs.

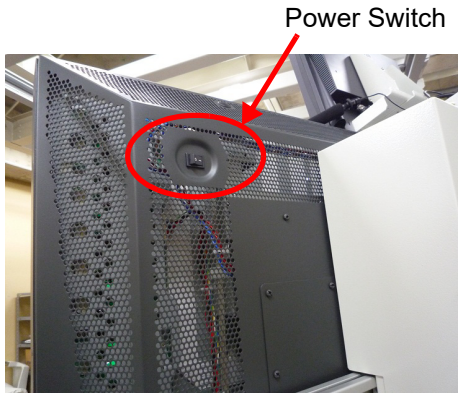
Display	Explanation	Action
FPGA Temperature	Error occurs on FPGA temperature.	Contact our service representative.
OnBoard Temperature	Error occurs on Hardware temperature.	
Case Font Fan/Additional Fan	Error occurs on FAN.	

14.4.2 Displaying Image

If an image is not displayed on 58 inch monitor, check color of LED.

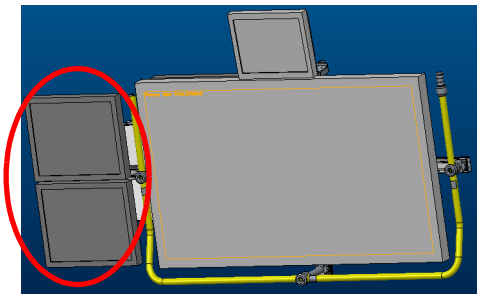


LED	Explanation	Action
Yellow	No video input.	Contact our service representative.
Red	Failure of 58 inch monitor.	
Light Out	Failure of 58 inch monitor.	Power of 58 inch monitor is turned off.Check that the power of 58 inch monitor is turned on. The power switch is on the back of monitor.

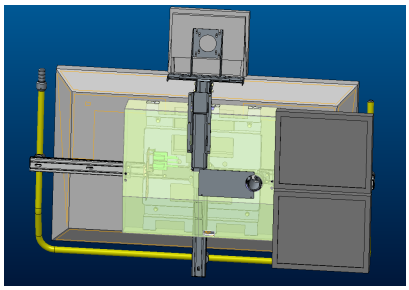


If an image is not displayed on 58 inch monitor in spite of confirming the way above, use the monitor cart or Folding Backup Monitors to confirm an image.

Monitor cart (Example)



Folding Backup Monitor (in use)



Folding backup monitor (not in use)

NOTE

Do not use both of the Cart and Backup Monitor Kit for a purpose without mounting backup monitor.

NOTE

Use the Monitor Cart or Folding Backup Monitors only when SMART Display breaks down.

Especially, keep the Folding Backup Monitors in full-fold position when not in use.

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Chapter 15

Temporary License

Description

15.1 Introduction

This chapter describes how to use a temporary license for 90 days of optional application. The following applications have a temporary license.

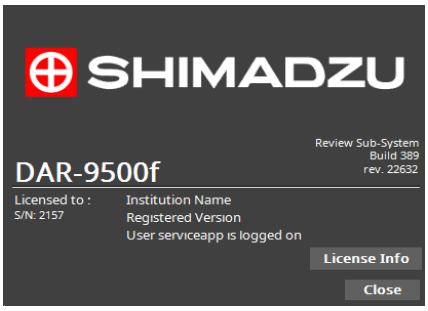
Name	Function
SCORE StentView	Extract a marker position from a real-time image and enhance and display the device by digital image processing. Add some frames and display enhanced stent image. This is useful when place 2 stent and confirm the position of second one.
SCORE StentShot	Extract a marker position from a real-time image, and enhance and display the device by digital image processing. Add some frames and display enhanced stent images. This is useful for confirming the shape of placed stent.
SCORE Chase	Perform radiography by moving the table without pre-registered table position information, and combine acquired images to generate a stitched image. When combined with KS-100, enable to move the table to the position selected on the stitched image to reduce X-ray exposure.

Hear an explanation of application usage from application instructor or service engineer, and then start a temporary license.

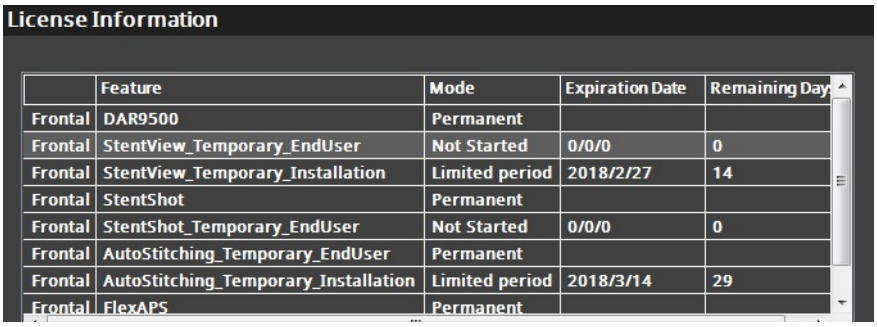
15.2 Start a Temporary License

1 On REF monitor, click mark at the bottom-right of the monitor.

2 Click [License Info].

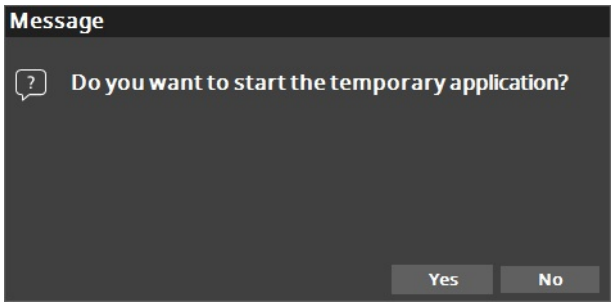


3 Select an application to start a temporary license and click [Start].



4 A message dialog of "Do you want to start the temporary application?" is displayed.

Click [Yes] to start a temporary license. Application is available for 90 days.



Expiration date and the remaining days are displayed every time start the system.

15.3 End a Temporary License

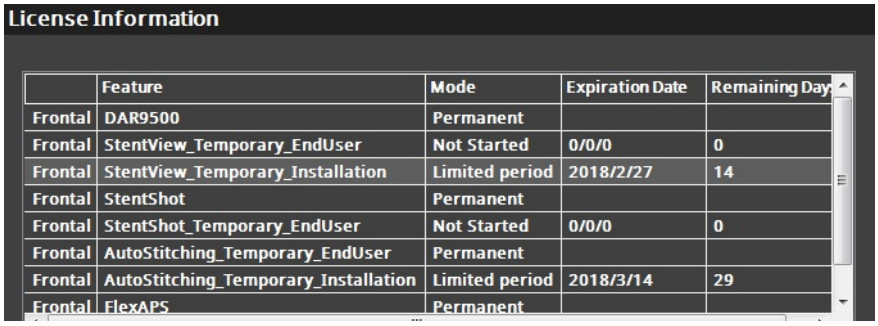
An application will end after 90 days from the start of use.

End the temporary license with the following procedure.

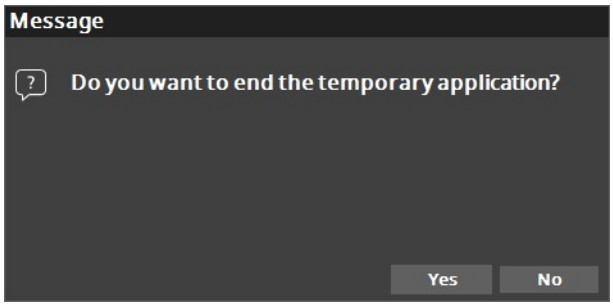
NOTE

Unable to restart a temporary license once you have completed.

1 Select an application to end a temporary license on [License Information], and then click [End].



2 A message dialog of "Do you want to end the temporary application?" is displayed.



Click [Yes] to end.

Chapter 16

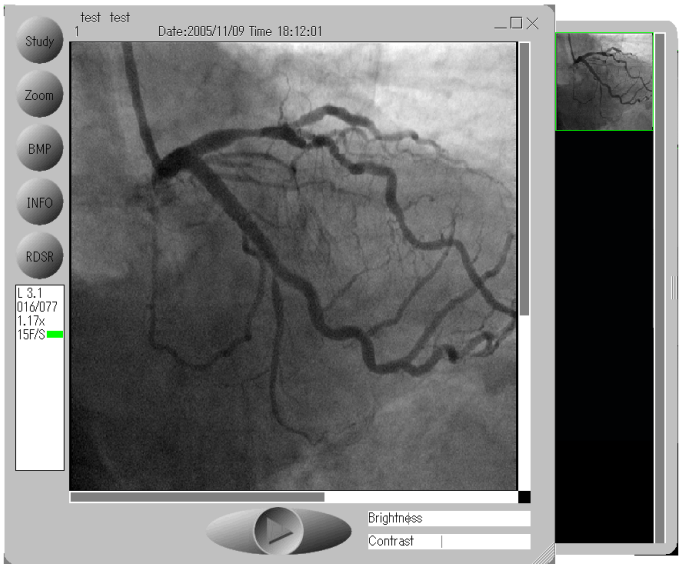
Mini Viewer

This chapter describes how to use the Mini Viewer to display images and loops on other computers.

Description

16.1 The Mini Viewer

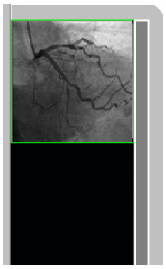
When writing a DICOM CD, the Mini Viewer application (EIViewer.exe) is included with the images files on the DICOM CD. The Mini Viewer can be used to view loops and images on any Windows computer. When you launch the Mini Viewer (double-click EIViewer.exe), the first image loops is displayed like this:



The following information is displayed at the edges of the window:

Location	Description
Top	Patient name and study information.
Right	Image Selector, with image icons.
Bottom	Playback / Pause button and Brightness / Contrast adjustment buttons.
Left	Function buttons.

No.	Button/GUI	Name	Function
1		Playback/ Pause	Click once to start playback and again to pause.
2		Study	Display the list of studies from which you can select one to review.
3		Zoom	Click [Zoom] once to make the complete image fit into the image area. Click [Zoom] again to display the image to actual size.
4		BMP	Save the displayed image (pause loop first) in a Windows BMP (bitmap) image file.
5		Info	Display version information (About tab) and Help information (Help tab).
6		RDSR	Click to check the description of RDSR. See ☞ "6.2.4 Displaying RDSR" P.6-13

No.	Button/GUI	Name	Function
7		Brightness/ Contrast	With the mouse, drag the slider (vertical line) to the right to increase Brightness / Contrast, or to the left to decrease it.
8		Full-screen Mode	Click the small square in the upper-right window corner to display switch to full-screen mode. Left-click anywhere in the Mini Viewer to switch back to normal size.
9		Window size	You can make the Mini Viewer window larger by dragging the size handle down and to the right, or reduce its size by dragging the handle upward and to the left.
10		L n.n	Series number. Loop number
		nnn/nnn	Frame number / total number of frames
		n.nnx	Zoom level, 1.00 =100 %, 1.50 = 150 % of original size.
		nnF/S or Pause	Playback speed in frames per second, or “Pause”.
11		Image Selector	Click the icon of the desired loop or Scroll the Image Selector up or down by right-clicking and dragging the Image Selector.
12		Exit Mini Viewer	Click the “**X**” in the upper-right corner to close the Mini Viewer.

Keyboard Operation

The keyboard arrow keys can be used to control playback. Press Left / Right to move to the previous / next loop image within the selected loop. Press Up / Down to move to the previous / next loop. Press the space bar to switch between playback and pause.

NOTE

Biomedical signals such as ECG curves and parameters such as FOV and SID, are not displayed by the Mini Viewer.

Install DirectX 11

The Mini Viewer requires at least DirectX 11.

NOTE

Do not attempt to install DirectX 11 or use the Mini Viewer on a DAR-9500f computer. It is intended only for use on other Windows computers.

NOTE

Consult Microsoft documentation for full installation instructions. The information provided here is in summary form.

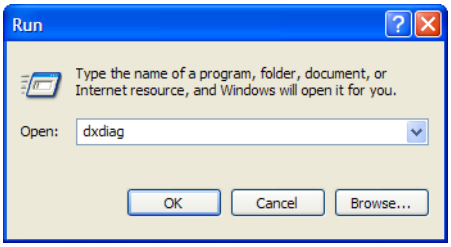
- **Check Current Version**

First if at least DirectX11 is already installed.

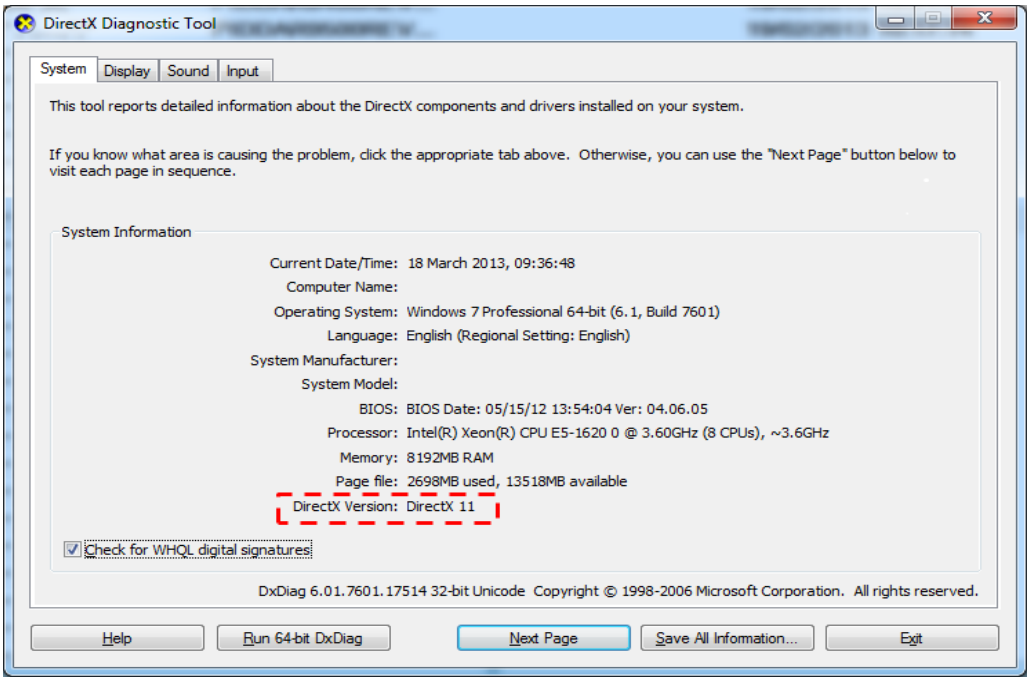
Set up according to the following procedure (for Windows7).

1 On the Windows Start menu, choose [Run].

2 Enter “dxdiag” and click [OK].



The DirectX Diagnostic Tool appears. Check the DirectX version item near the bottom (marked with a dashed box in the image below).



If this dialog does not appear, DirectX might not be installed or an old version might be present. Refer to the following paragraph to get DirectX 11 and to install or update it.

- **Installing DirectX 11**

If you do not have at least DirectX 11, follow the Microsoft instructions on how to get and install it at:

http://www.microsoft.com/ja-jp/download/details.aspx?id=35

⚠ CAUTION

Please note that we assume no responsibility for any problems encountered as a result of installing DirectX 11.

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Chapter 17

Administration

This chapter describes how to administer the system and includes the following.

Description

17.1 Introduction

Administration mode enables you to fully configure the product and access individual network servers and CD/DVD drives.

17.2 Switching Modes

You switch between User and Administration mode by logging in to your operating system with a user name that is configured in DAR-9500f to have the desired user type, either user or administrator.

17.2.1 Switch to Administration Mode

Follow this procedure to switch from User mode to Administration mode:

1. Execute the shutdown procedure as described in ☞ "3.2 User Authentication" P.3-4.
2. Execute the startup procedure as described in ☞ "3.1 Startup" P.3-2.
   After Windows startup, hold down the keyboard [Ctrl]+[Alt]+[Delete] key t force display of the Windows login prompt and log off.
3. Log in with ab administrator user name "super".
   Double-click the DAR-9500f icon on the desktop to start he software. The GUI starts in Administrator mode.

Now, when you click the [Options] button in the image Viewer window, you will be able to configure any option.

17.2.2 Switch to User Mode

To switch back to User mode, follow this procedure:

1. Execute the shutdown procedure as described in ☞ "3.2 User Authentication" P.3-4.
2. Execute the startup procedure as described in ☞ "3.1 Startup" P.3-2.
   Windows automatically logs in as user and the GUI starts in User mode.

17.3 Viewing User Type

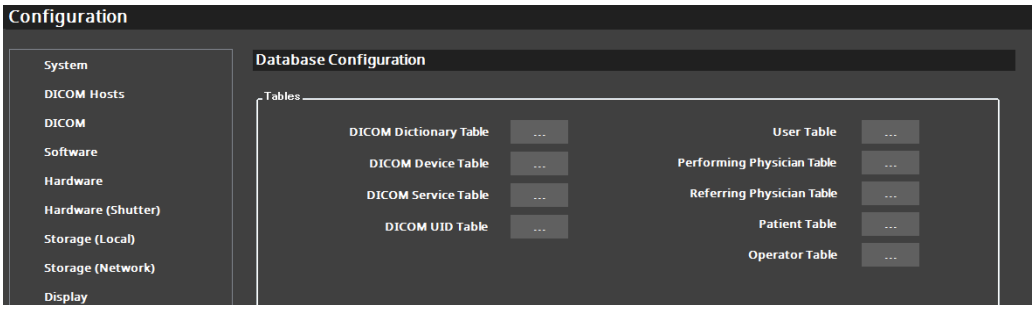
Regular users of DAR-9500f should log in to the operating system with a user name that has been configured in DAR-9500f to have a user type of [USER]. Normally, automatic login to User mode is performed. Only the system administrator should log in with a DAR-9500f user type of [SUPER].

Follow this procedure to view and optionally set user types:

1 Run DAR-9500f in Administration mode as described above in ☞"17.2.1 Switch to Administration Mode" P.17-2.

2 Click [Options] on the side menu.
The tabbed Configuration dialog box appears.

3 Click [Database] tab.
It looks like this.



4 In the upper-right corner, click [User Table].
The [User] dialog box appears like this:

⚠ CAUTION

Do not change the User Type settings. Otherwise, service personnel will not be able to perform system maintenance or the system may not operate properly.

17.4 Storage Commit Messages

If the DICOM archive server supports it, Storage Commit can be used to ensure greater integrity in all server updates. Several messages can appear related to Storage Commit as follows.

- The “Server_Name” does not support Storage Commit.
  In the [AE Hosts] table, uncheck the [Storage Commit] option for this server.
- The maximum number of retries without answer on server “Server_Name” for the study “Study_Name” is exceeded.
  This can occur when the network is disconnected for a long period of time. Normal operation is resumed soon after the network connection is re-established.
- The maximum number of failures is reached on server “Server_Name.”
  This indicates that there may be a problem with the network connection or file format. Contact the DICOM archive server administrator.

17.5 Working with LUT Profiles

17.5.1 Introduction

Images are acquired with 12 bits (4096 levels) of grayscale, manipulated as 32-bit data, and then displayed or printed as 8-bit data (256 levels of grayscale).

The many gray levels in the image data must be mapped to fewer gray levels for display and printing. By default, a linear mapping scheme is used. However, since most display monitors and printers do not display or print gray levels in a linear manner, custom display and printer profiles can be created to match the non-linear device characteristics. Furthermore, due to differences in lighting, personal preference, and perception, display monitors sometimes need additional adjustment beyond basic linearization.

In DAR-9500f, mapping profiles are defined independently for monitor and printer via what is called a lookup table (LUT).

Printer linearization and display adjustment profile LUTs are defined graphically via a simple curve editor.

The curve is converted into a lookup table (LUT) that is applied to the image data at display and print time.

Display monitor linearization profiles are defined at installation time according to the [DICOM part 14 Grayscale Standard Display Function]. For details, see ☞ "17.6 DICOM Monitor Linearization" P.17-10.

17.5.2 LUT Profile Definition

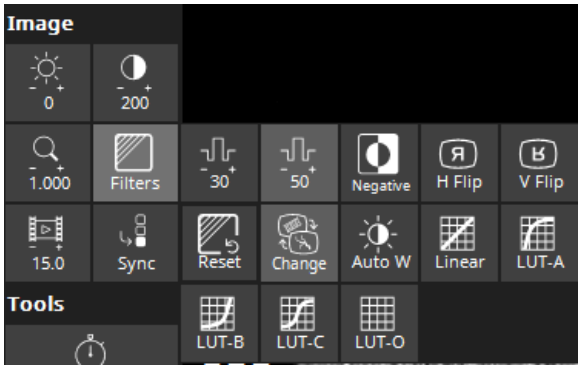
To define either printer linearization or display adjustment LUT profiles, follow this procedure.

1 If you are not ready in Administration mode, switch to it now as described in ☞"17.2.1 Switch to Administration Mode" P.17-2.

2 Display a reference image, preferably one featuring all possible gray levels.

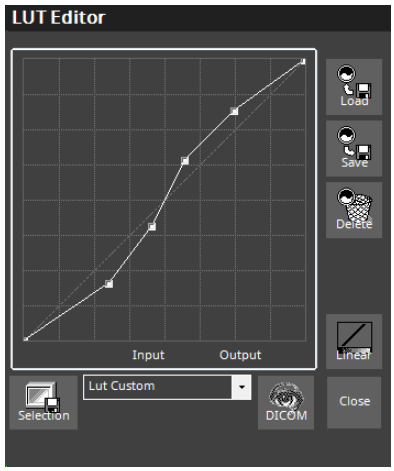
3 Click [Filters] on the side menu.

The [LUT] fly-out menu appears.



4 Click [LUT-O] button.

The [LUT Editor] dialog box appears.



The curve portion of the [LUT Editor] dialog box, defines the profile graphically as follows:

- The permanent dashed line from the lower-left corner to the upper-right corner represents the input data with a value of 0 to 255. With a linear profile, the output is the same as the input.
- The curve that you draw defines what the output value will be, also in the range 0 to 255. Points above the default dashed line will cause the output to be brighter (higher number) than the input. Conversely, points below the dashed line will cause the output to be darker (lower number) than the input. Whenever the pointer is in the graph area, both the input and output values are shown for the pointer position. In this example, we see that a gray input value of 80 is darkened to a gray output value of 57.

- This sample graph increases contrast as follows. It causes gray levels below middle gray (center of graph) to be made darker (added points are below the dashed line) and gray levels above middle gray to be made lighter (added points are above the dashed line). Note also how that the pure black (0) and pure white (255) inputs are output unaltered as 0 and 255 respectively, because the curve starts and ends on the default linear center line.

5 In the drop-down list to the right of the [Selection] button, choose either [Lut Custom] to define a display profile or [Lut Print] to define a printer profile.

6 If an existing curve is similar to the curve you wish to define, click [Load] and choose it as your new curve starting point.

7 In the curve portion of the [LUT Editor] dialog box, define your curve by clicking points in the graph area. Connecting lines are drawn automatically from the curve box corners and between the points. Reposition a point by dragging it. Delete a point by clicking it with the left and right mouse buttons pressed simultaneously.

For display profiles, the image appearance changes as you shape the curve. For all profile types, the input and output values are updated as you move the pointer.

8 When satisfied with the curve, click [Save], enter a meaningful name (up to 50 characters), and click [Save].

9 To delete a profile, click [Delete] and then the profile name.

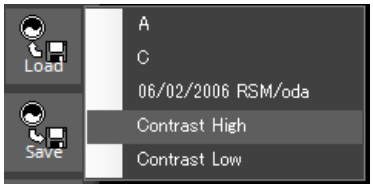
You may find it convenient to create several profiles and then see how various images display or print with the profiles applied to them.

17.5.3 Assigning Display Adjustment LUT Profiles

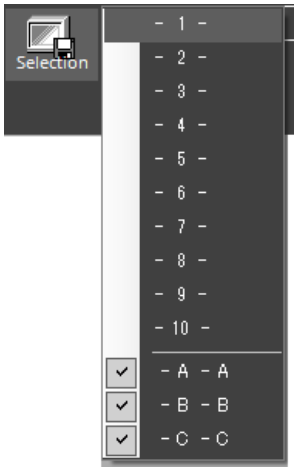
Once you have defined a display adjustment LUT profile, you can assign it to one of 10 positions in the profile list as follows.

1 In the drop-down list to the right of the [Selection] button, choose [Lut Custom].

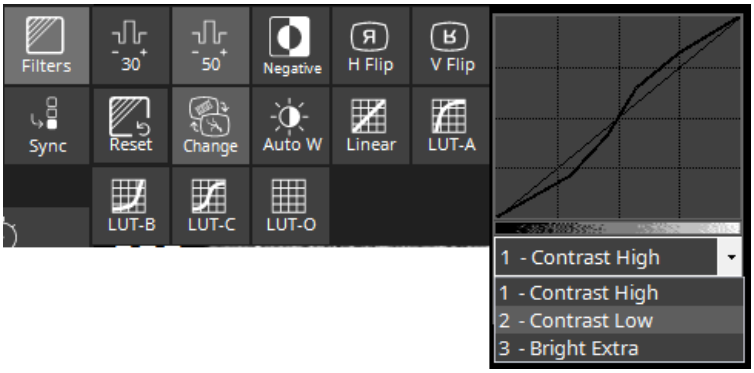
2 Click [Load] and then the profile that you wish to assign.



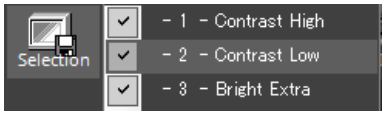
3 Click [Selection] and then click the position in the list to which you wish to assign this profile.



When in User mode, the assignments that you make here are shown as choices on the [Filter]-[LUT-O] list.

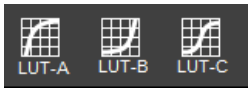


4 To delete an assignment, click [Selection] and then the assignment that you wish to delete. Assignments have a check mark to their left.



NOTE

It is OK to adjust the three predefined profiles LUT-A, LUT-B and LUT-C, however, do not change the shape of these curves so much that they no longer resemble the shapes shown on the buttons.



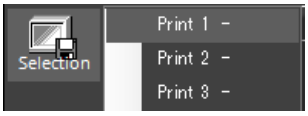
17.5.4 Assigning Printer LUT Profiles

Once you have defined a printer LUT profile, you can assign it to one of 10 positions in the print profile list as follows.

1 In the drop-down list to the right of the [Selection] button, choose [LUT Print].

2 Click [Load] and then the profile that you wish to assign.

3 Click [Selection] and then click the position in the list to which you wish to assign this profile.



The assignments that you make here are shown as choices in the LUT list of the print windows. See the next section "17.5.5 Setting the Default Printer LUT Profile" P.17-9.

4 To delete an assignment, click [Selection] and then the assignment that you wish to delete.

Assignments have a check mark to their left.

17.5.5 Setting the Default Printer LUT Profile

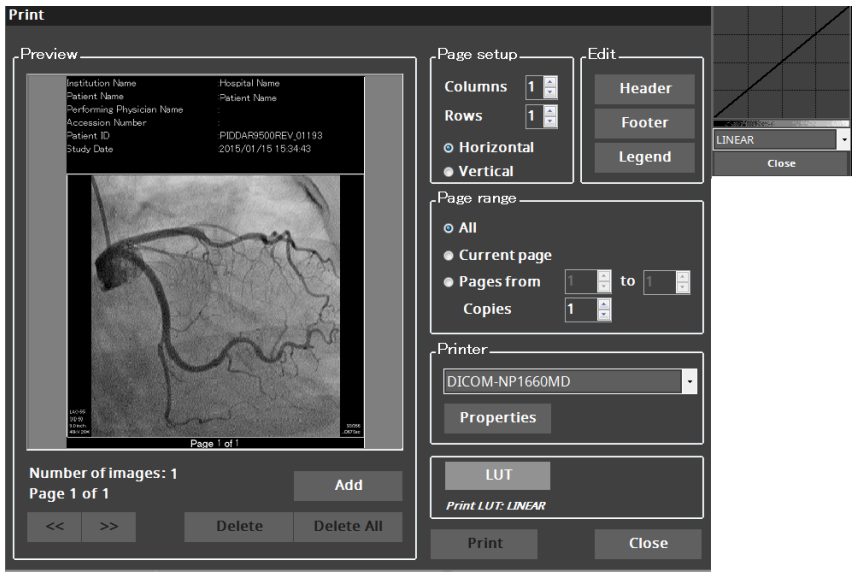
To set the default printer LUT profile, follow this procedure.

1 If you are not already in Administration mode, switch to it now as described in ☞"17.2.1 Switch to Administration Mode" P.17-2.

2 Click [Funct] and [Print] on the side menu.

3 The print window appears. Click the [LUT] button.

A small profile selection box appears at the upper-right corner of the print window.



4 Choose the desired default profile from the drop-down list.

The chosen profile name appears near the LUT button. If desired, click [Close] to close the drop-down list.

5 To test the selected profile, click [Add] to add the current image to the print list with the selected profile applied.

You can preview and print the same image with several different profiles applied and then choose the best one as the default. When finished, click [Close] to close the print window.

17.6 DICOM Monitor Linearization

> **NOTE**
>
> This section gives basic information on how to perform DICOM monitor linearization using the tool available on the LUT Editor dialog box. You must provide your own photometer and are encouraged to consult the DICOM PS3.14 standard.

Typically performed by the installer, the Reference monitor can be linearized with a photometer and the provided test pattern. Luminance readings can be taken from the monitor for the full range of the video adapter Discreet Data Levels (DDLs). The readings can then be entered in a grid to compute the characteristic display curve LUT for the monitor.

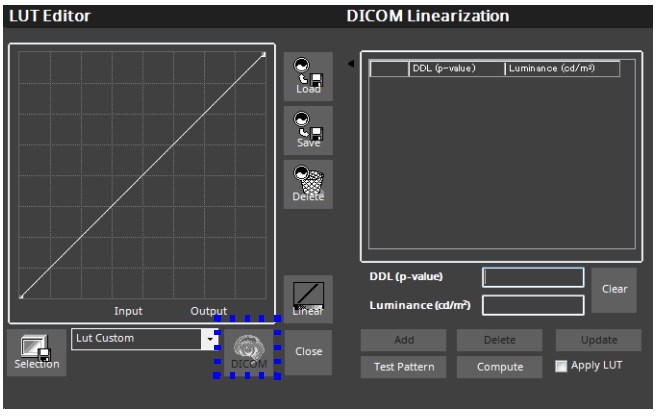
Luminance is defined as the luminous intensity per unit area projected in a given direction, measured in candela per square meter (cd/m2). The luminance generated by an emissive display system may be measured with a photometer.

DDL (Discreet Data Level) is defined as a digital value, typically in the range 0 to 255 (0=darkest, 255=lightest) (for each of the 3 colors red, green, and blue) sent to the video adapter to produce luminance levels on the monitor.

Follow this procedure to perform DICOM monitor linearization. (Recommended photometer: Siemens, SMfit ACT Calibration).

1. Log in to the DAR-9500f.
2. Load an image or loop that contains as many gray levels as possible.
3. Wait for the monitor to warm up for at least 10 minutes.
4. Set the room lighting to a normal level.
5. Choose [Filters]-[LUT-Others], and then click [DICOM] button in the lower-right corner of the [LUT Editor].

   The [LUT Editor] dialog box expands to the right with the DICOM Linearization panel.



NOTE

Unless otherwise started, all the following button references are for the [DICOM Linearization] panel.

6 Use the [Delete] button to delete any existing values in the [Monitor Characteristic Curve] grid.

7 Click the [Test Pattern] button.
The test pattern is displayed with a 20% gray background and a square (defaults to white) in the middle.

8 If not already set to 255, adjust the DDL value of the square to 255 (100%) by pressing and holding the right-arrow key.

9 Using the Brightness/Contrast controls of the monitor set the Brightness and Contrast so that the white square in the middle is the brightest white possible without making the background gray (20% gray) too light.

10 Place the photometer on the center of the monitor, over the white square.

11 With the DDL value at 255 (100%), record the luminance value reported by the photometer.

12 Decrease the DDL value by pressing the left-arrow key until a change in luminance is detected.

13 Record the DDL value and luminance.

14 Repeat this process until you have at least three DDL/Luminance pairs. Normally, at least ten pairs are needed for good curve definition.
The readings should be spaced over the entire 0-255 DDL range.

15 Enter the largest DDL value and its corresponding Luminance value in the two boxes below the grid and click [Add]. If, before clicking [Add] you wish to clear both entry boxes, click [Clear].

16 Add all other DDL/Luminance pairs in descending-DDL order.

NOTE

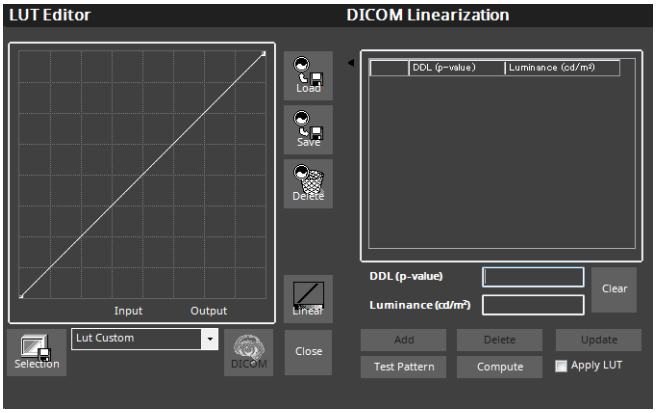
The luminance value entered MUST BE less than or equal to the Luminance value entered for any larger DDL. For example, if you add DDL/Luminance pair 215/305.2890, the Luminance value for DDL 214 must be no more than 305.2890.

17 To change a value in an existing row, click the row (an arrow appears at the left edge), make your changes in the two boxes below the grid, and then click [Update].

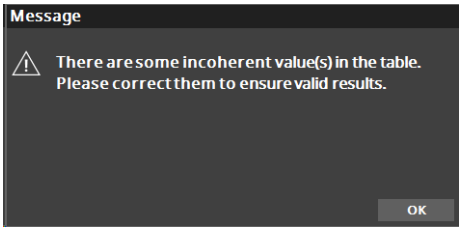
18 To delete a row from the grid, click the row (an arrow appears at the left edge) and then click [Delete].

19 Once you are satisfied with your list of DDL/Luminance pairs, click [Compute]. The display characteristic curve is calculated and saved as a LUT.

A message to this effect is displayed



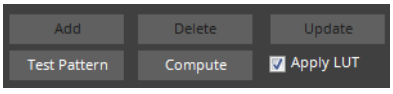
20 If there are problems with your DDL/Luminance pairs, an error message indicating that incoherent values were encountered is displayed.



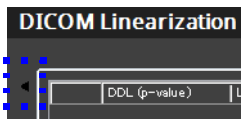
If this happens, adjust the values so that the rule described in step 16 above is respected and click [Compute] again.

21 To apply your new display linearization LUT, click [Apply LUT]so that the check mark appears. The visual effects are immediate.

This LUT will remain in effect for all future image viewing on this monitor as long as Apply LUT remains checked.



22 To close the [DICOM Linearization] panel of the [LUT Editor], click the arrow at the upper-left edge of the [Monitor Characteristic Curve] grid.



NOTE

If the monitor or video adapter is replaced (even with the same model) redo the DICOM monitor linearization.

17.7 Options Configuration

17.7.1 Introduction

Although the Installation personnel perform the initial configuration according to your institution's specifications, you can further adjust the configuration as needed. Configuration is performed via the [Options] tab in the [Studies Management] window and the [Options] button on the side menu.

17.7.2 Options Tab

Three basic configuration items are available on the Options tab of the Studies Management window. Click the **Options** tab to reveal its three check boxes which are defined as follow.

No.	Check Box	Description
1	Automatic Refresh (with adjustable minutes value)	When checked (a check mark appears in the check box), the Study List is automatically refreshed (redrawn) on the screen, showing any new studies that have arrived since the last refresh or other status changes. The refresh interval in minutes, is entered in the combo box to the right of [Automatic Refresh]. Permissible values are 1 to 120 minutes with a default of 30.
2	"All Time" study query	When "All Time" study query is checked, the default Date search criteria automatically entered in the Date box is changed from today's date to [All Time], meaning all studies in the Study List.
3	Search by keywords	Normally, with [Search by keyword] unchecked, search criteria matching is only performed at the beginning of the searched text so that with the Patient Name criteria set to "rog", only last names *beginning* with "rog" such as "Rogers" and "Roget" would be found. Names such as "Smith Roger" would not be found. With [Search by keyword] checked, search criteria matching is performed throughout the searched text so that with the same Patient Name criteria of "rog", all patient names with the three letters (in sequence) *anywhere* in the searched text would be found, including names such as "Smith Roger."

17.7.3 Configuration Dialog Box

To display the Configuration dialog box, click [Options] on the side menu of either the Reference or Acquisition monitors. The tabbed Configuration dialog box appears with the System tab initially displayed.

⚠ CAUTION

In the option description tables appearing throughout this section, do not modify items with an “X” mark in the "Mod" column. The system might not operate properly if such items are modified. Items marked “OK” can be modified according to supplied information.

NOTE

If you only see the Menus, Display, Software, Devices, Notifications, and Fonts and Colors tabs, you are still in User mode. If you are not already in Administration mode, switch to it now as described in ☞"17.2.1 Switch to Administration Mode" P.17-2.

NOTE

If you sign in with user mode, the Cyber Security tab appears only if you sign in at the SUPER level.

NOTE

DAR-9500f systems have two computers, one for Reference with its monitor and the other for Acquisition with its monitor. For users, a keyboard and mouse is only available for the Reference computer. To configure the Acquisition computer, the administrator must make sure that a mouse and keyboard is connected to the Acquisition computer (these may already be connected, but hidden from the user). It is not necessary to turn off the Acquisition computer before connecting the mouse and keyboard.

NOTE

Unless otherwise directed, enter identical configuration values on both the Reference and Acquisition computers. When indicated, enter values only on the Reference computer. They will be automatically propagated to the Acquisition computer.

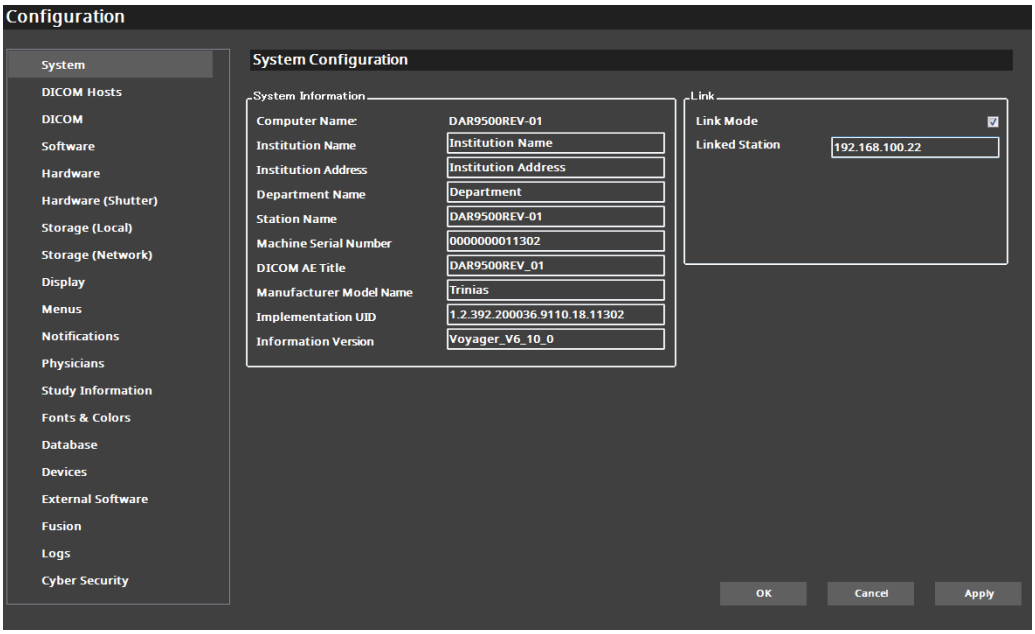
NOTE

In this Manual, when a Configuration dialog box tab is identical for Reference and Acquisition, only one is shown. When there is a difference, both are shown.

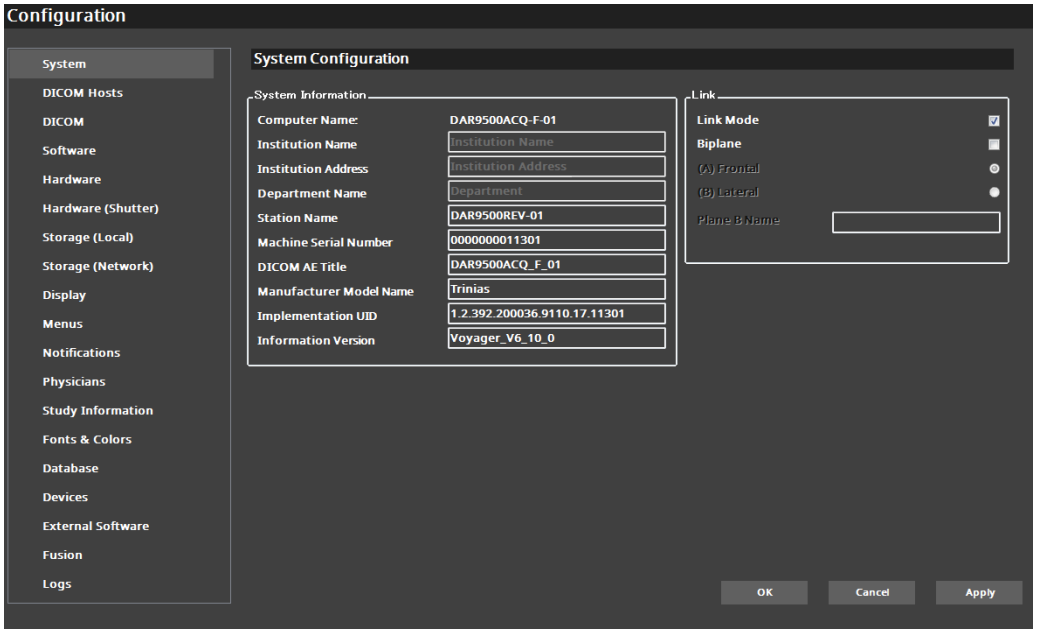
System Tab

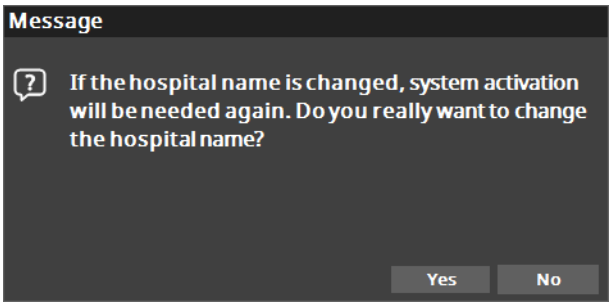
System options are configured as follows.

Reference Monitor



Acquisition Monitor

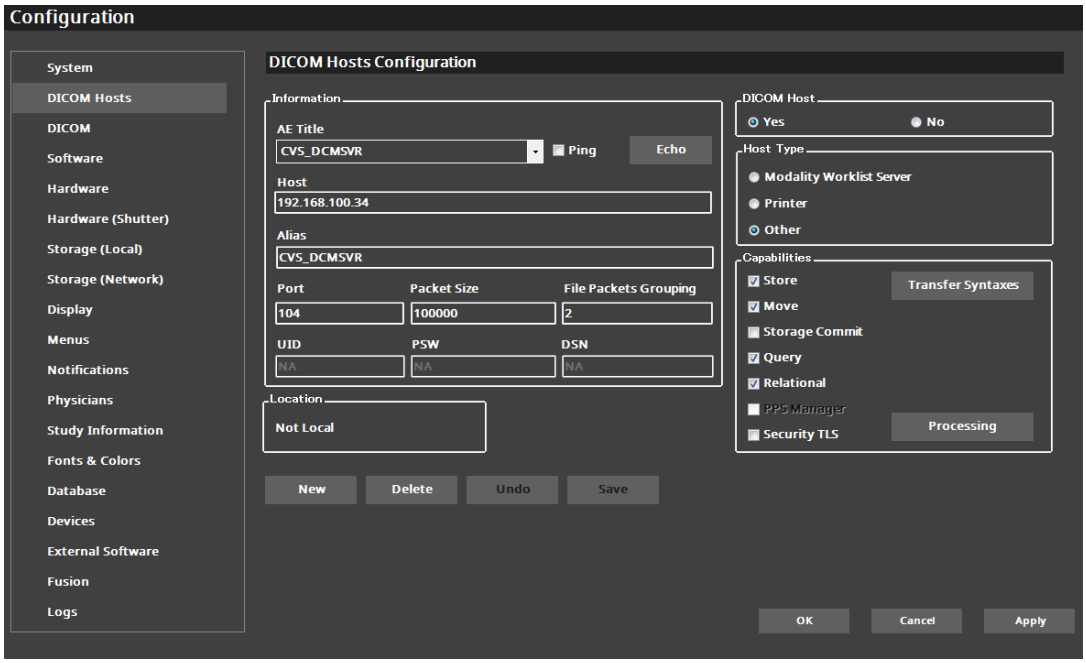


Item	Description	Mod
System Information		
Computer Name	The name of this computer configured in Windows. Enter the name ONLY on the Reference computer. It is propagated to the Acquisition computer.	×
Institution Name	Administrator-defined institution name set according to your needs. Enter the name ONLY on the Reference computer. It is propagated to the Acquisition computer. (Up to 64 characters (no backslash “\”), 35 recommended maximum.) You must shut down and restart the system after changing this item. **NOTE** When the system needed activation during installation, system activation will be needed again if the hospital name is changed. 	○
Institution Address	Administrator-defined institution address set according to your needs. Enter the address ONLY on the Reference computer. It is propagated to the Acquisition computer.	○
Department Name	Administrator-defined department name set according to your needs. Enter the name ONLY on the Reference computer. It is propagated to the Acquisition computer. (Up to 64 characters (no backslash “\”), but recommended maximum of 35.) You must shut down and restart the system after changing this item.	○
Station Name	Administrator-defined station name. The name entered here appears in the Origin column of the Studies Management window. Enter the name ONLY on the Reference computer. It is propagated to the Acquisition computer. (Up to 16 characters: alpha, number, hyphen “-”, underscore “_”, period “.”, apostrophe “’”.)	○
Machine Serial Number	A number (should be unique for this type of system) that identifies this computer and is used in creation of the Study Unique ID. The software must be restarted after changing this option so it automatically exits. (Up to 13-digit number with forced leading zeros if fewer than 13 digits.)	×
DICOM AE Title	The DICOM device name of the computer. The default is auto-generated from the Machine Serial Number. (Up to 16 characters: alpha, number, underscore “_”, period “.”.)	×
Manufacturer Model Name	Enter a product model name (such as Trinias) if necessary.	○

Item	Description	Mod
Implementation UID	Fixed tags appearing in the DICOM files produced by this product.	×
Version Information	Displays Version of this product.	×
Link		
Link Mode	Always enabled, specifies that the Reference and Acquisition computers are linked to form the DAR-9500f system.	×
Linked Station	(Reference only) Must be set to the name shown in the [Computer Name] field on the Acquisition computer Configuration dialog box or IP address of Acquisition computer.	×
Biplane	(Option) (Acquisition only) Enables Biplane mode in which two separate acquisition computers are used for the simultaneous acquisition of images at two angles. Both computers must have Biplane checked. One computer must also have [(A) Frontal] checked and the Windows machine name of the other computer (plane B) entered in [Plane B Name], and the other computer must have [(B) Lateral] checked. See ☞ "10 Difference with Bi-plane Option" P.10-1	×

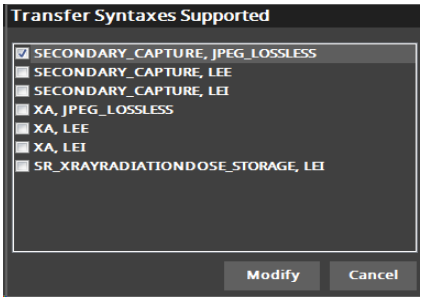
DICOM Hosts Tab

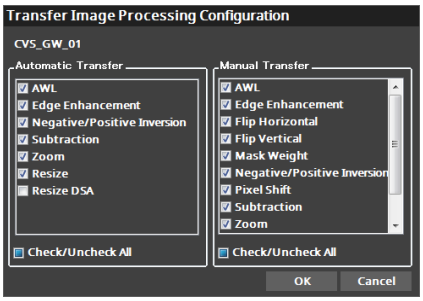
The Hosts tab defines DICOM devices with which this DAR-9500f can communicate. Its options are defined as follows.



Item	Description	Mod
Information		
AE Title	The DICOM device name of the station. (Up to 16 characters.) To enter a new host, Click [New] and fill in the information.	○
Echo	To verify that the connection to a DICOM device such as a server is valid, choose the name in the drop-down list below the Echo button and optionally check [Ping]. Click [Echo] to perform the test. If [Ping] is selected, the device is first pinged, and then the DICOM echo is performed. As appropriate, success or failure messages are displayed.	○
Host	The TCP/IP protocol host name or IP address of the DICOM device. (Up to 64 characters.)	○
Alias	Alias for Host. When using the Send feature on the Studies Management window, this name appears in the Destination list. Also, when in Administration mode, this name appears in the Location drop-down list. ***Do not enter more than 11 characters.***	○
Port	The port number used by the DICOM device. Most DICOM devices default to port 104. (0 to 65535.)	○
Packet Size	The maximum packet size supported by the DICOM device. The default of 99280 is usually acceptable. (10,000 to 1,000,000 (one million).)	○
File Packets Grouping	Defines how many packets should be grouped together for socket-level communications (1 to 5).	○
UID/PSW/DSN	Unused except for external studies.	○
DICOM Host		
Yes/No	Indicates whether it is a DICOM host or not.	○

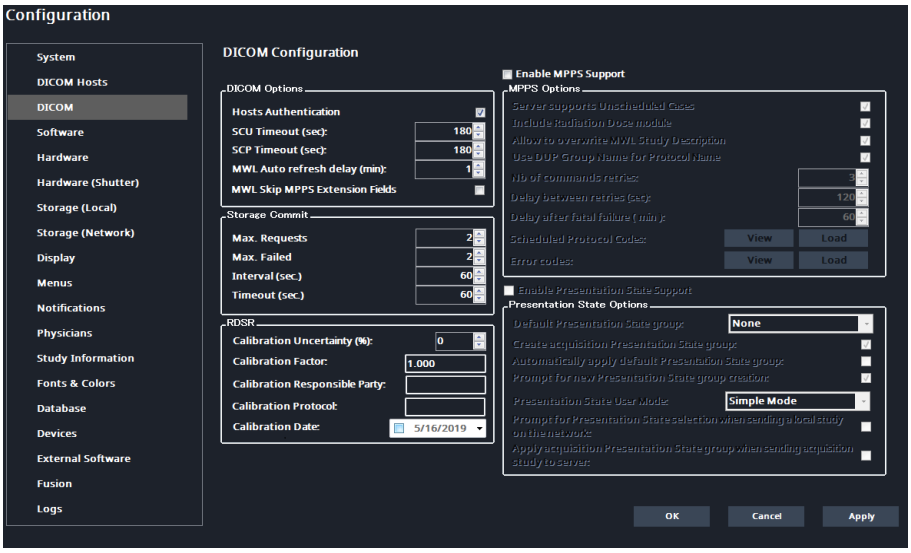
Item	Description	Mod
Host Type		
Modality Worklist Server	The DICOM device interfaces to a Hospital Information System (HIS). When selected, and a new study is started, the chosen modality worklist server will be queried for procedures waiting to be done.	○
Printer	The device is a DICOM networked printer.	○
Other	The DICOM device is a server or destination station.	○
Capabilities		
Store	The DICOM device can store (archive) DICOM data.	○
Move	The DICOM device can be asked to transmit DICOM data to other devices (third-party move).	○
Storage Commit	The DICOM device is a server that supports Storage Commit, a feature that ensures that the server properly receives each transmission.	○
Query	When DICOM Host is [Yes], the default, and Query is checked, the DICOM device is a server that supports standard DICOM queries. When DICOM Host is [No], and Query is checked, the DICOM device is a server that supports SQL queries.	○
Relational	The DICOM device is a server that supports relational query types. When not selected, only hierarchical queries are supported.	○
PPS Manager	(Available only when IHE Support is enabled. This option must be selected for exactly one host.) Select this option to designate this host as a Performed Procedure Step Manager. This activates redistribution of Performed Procedure Step information.	○
Security TLS	Not used. Do not check the box.	×

Item	Description	Mod
Transfer Syntaxes	(Available only for hosts with Store capability.) Configured separately on the Acquisition and Reference computers, defines which transfer syntaxes are to be negotiated for Send operations from the Acquisition and Reference computers to this host. The syntaxes do not apply to Default Copy operations or the automatic Acquisition to Reference transfers. Click [Transfer Syntaxes]. The Transfer Syntaxes Supported dialog box appears.  There are three syntax groups, [XA] for loops, [SECONDARY] for still images (Reference and Annotation), and SR for RDSR. Within each group, there are two uncompressed syntaxes, [LEI] for little endian implicit, and [LEE] for little endian explicit, plus a [JPEG] syntax. Select all desired syntaxes in both the [XA] and [SECONDARY] groups (check marks appear). Select all desired syntaxes in both the [XA] and [SECONDARY] groups (check marks appear). Then, with the mouse, drag all selected syntaxes into the desired priority order (highest priority at top). Before the Send operation begins, all selected XA and Secondary syntaxes (that correspond to what was selected in the Studies Management window) are proposed to the host. Then, within each group (XA and Secondary), the highest-priority syntax that is accepted by the host, [that is already in the cache], is used for the transfer. Even if it is not selected, an implied LEI selection (lowest priority) always exists. If one of the selected syntaxes is also the native syntax (typically Lossless) then it is given priority over all other selected syntaxes. If the host rejects all proposed syntaxes, then LEI is used. If in the unusual circumstance, LEI is rejected, an error occurs and nothing is sent. If no syntaxes are selected, then whatever was selected in the Studies Management window (first priority) plus LEI are proposed to the host. If the Studies Management selection is rejected, LEI is used.	○

Item	Description	Mod
Processing	Set image processing when transfer the image. Click [Processing] to display [Transfer Image Processing Configuration] window is displayed. Select an appropriate image processing and click [OK].  **NOTE** If changing the setting of auto transfer after specifying default server, the change does not reflect to ACQ PC. Specify the default server again or set the same setting to ACQ PC.	○

DICOM Tab

DICOM options are configured as follows.



Item	Description	Mod
DICOM Options		
Hosts Authentication	Causes this computer to use DICOM host authentication when communicating with any DICOM device.	×
SCU Timeout	Defines the maximum number of seconds to wait for an answer while acting as an SCU. If communication is not successful within this maximum, an error will occur.	×
SCP Timeout	Defines the maximum number of seconds to wait for an answer while acting as an SCP. If communication is not successful within this maximum, an error will occur.	×
MWL Auto refresh delay	Defines the number of minutes to delay between each automatic refresh of the procedure steps list when the Worklist Management dialog box is open and its Auto Refresh is enabled.	×
MWL Skip IHE Extension Fields	Defines the description of the “scheduled procedure steps (0040,0007)” to remove from a query when acquiring patient information on the Worklist Management.	×
Storage Commit		
Max. Requests	The maximum number of storage commit requests without response that can be reached for a DICOM file before generating an error. A storage commit request is considered to be without response if the response has not occurred within Timeout seconds.	×
Max. Failed	The maximum number of failed storage commit requests before aborting file transfer attempts and displaying an error.	×
Interval	The number of seconds between each scan of studies in the local cache to verify whether there are storage commit requests to be sent. The first scan is made this number of seconds after the start of the GUI.	×
Timeout	The maximum number of seconds permitted to elapse between a storage commit request being sent and a retry being made if there was no response to the request.	×

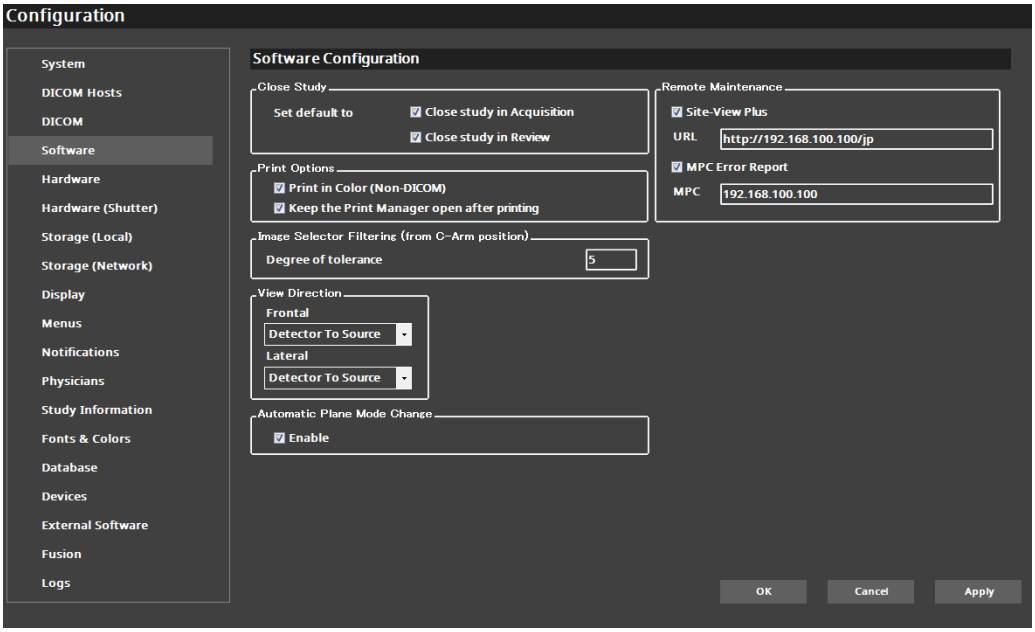
Item	Description	Mod
RDSR (For acquisition use only)		
Calibration Uncertainty (%)	Acceptable value of error from measurement value by dosimeter.	○
Calibration Factor	Coefficient of dosimeter used in calibration.	○
Calibration Responsible Party	Name of manager or group for calibration.	○
Calibration Protocol	Protocol name for calibration.	○
Calibration Date	Calibration date.	○
MPPS Options		
Enable MPPS Support	Enables MPPS Support when checking the check box, and the following option can be modified. If this option is selected, at least one host should be able to use PPS manager. ☞ "DICOM Hosts Tab"P.17-20	×
Server supports Unscheduled Cases	Support MPPS for unscheduled studies when checking the check box.	×
Include Radiation Dose module	Check if sending dose information to MPPS server.	×
Allow to overwrite MWL Study Description	Activate to be able to correct [Study Description] when starting the study from MWM server with PPS manager.	×
Use DUP Group Name for Protocol Name	Activate to start new study without inputting protocol name on “New Study” window, when starting the study from MWM server with PPS manager. In this case, default DUP group name will be used for protocol name. Ex.) Cardio, Head, Abd…	×
Nb of commands retries:	Maximum number of retries of IHE command if failed.	×
Delay between retries (sec):	Delay between retries.	×
Delay after fatal failure (min):	(Applies when IHE command is not succeed though it reaches the maximum number of retries.) Defines the waiting time before repeating retries. Retries will not cancel unless the user cancels the command.	×
Scheduled Protocol Codes:	Click **View** to display or edit current protocol code. Click **Load** to import the setting file and replace all protocol codes to new protocol codes of files provided from HIS.	×
Error codes:	Click **View** to display or edit current error code. Click **Load** to import the setting file and replace all error codes to new error codes of files provided from HIS. Also includes default error.	×
Presentation State Options		
Enable Presentation State Support	IHE support is enabled if you checked, and the following options can be used. If this option is selected, at least one host must enable PPS manager. See "DICOM Hosts Tab"P.17-20	×
Default Presentation State group:		×
Create acquisition Presentation Stage group:		×

Item	Description	Mod
Automatically apply default Presentation State group:		×
Prompt for new Presentation State group creation:		×
Presentation State User Mode:		×
Prompt for Presentation State selection when sending a local study on the network:		×
Apply acquisition Presentation State group when sending acquisition study to server:		×

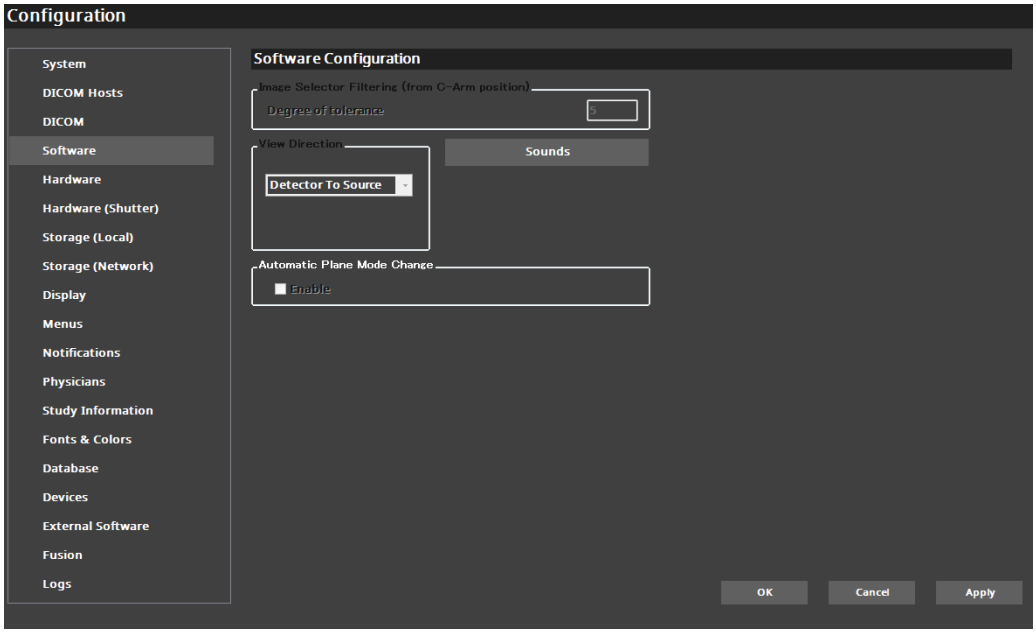
Software Tab

Software options are configured as follows.

Reference Monitor



Acquisition Monitor



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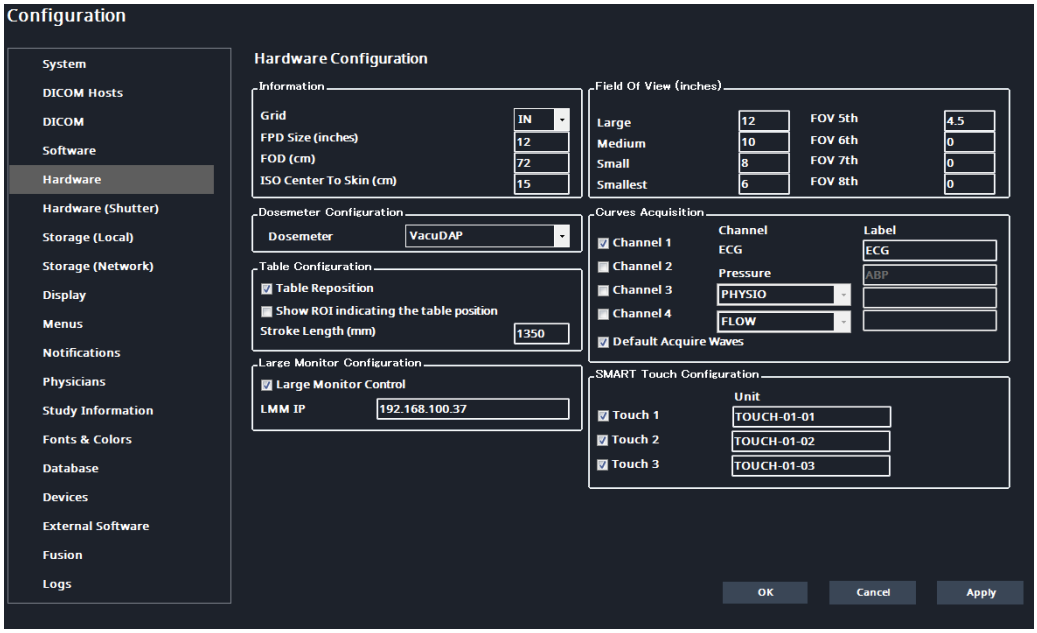
Item	Description	Mod
Close Study		
Close Study	(Reference only) Defines the default settings in the Close confirmation message box that appears when a study in acquisition or review is closed. Check the options that you want to have checked by default in the confirmation box.	○
Print Options		
Print Options	(Reference only) Check [Print in Color] so that color elements will be printed on non-DICOM printers that support color such as laser and ink jet. NOTE If you print an image that has already been saved in DICOM format, colors will appear as shades of gray. NOTE If you print an image that has already been saved in DICOM format, colors will appear as shades of gray.	×
Image Selector Filtering		
Image Select Filtering	For when filtering the Image Selector icons by C-arm position. Degree of tolerance defines within how many degrees of the current C-arm position an image's C-arm position must be, to be included in the filtered list. Both angles must be within the tolerance. For example, if Degree of tolerance is **5** and the C-arm is at position LAU-35/CAU-48, images acquired at a position of LAU-39/CAU-50 will be included in the list but images from position LAU-45/CAU-55 will not.	○
View Direction		
Frontal	Set eye direction from Frontal.	○
Automatic Plane Mode Change		
Automatic Plane Mode Change	See ☞ "10.5 Administration" P.10-15 for details.	×
Remote Maintenance		
SiteViewPlus+	Not used.	×

Item	Description	Mod
MPC Error Report	Set IP address of MPC. NOTE Making a contract with remote maintenance is necessary to enable MPC Error Report.	×

Hardware Tab

Hardware options are configured as follows.

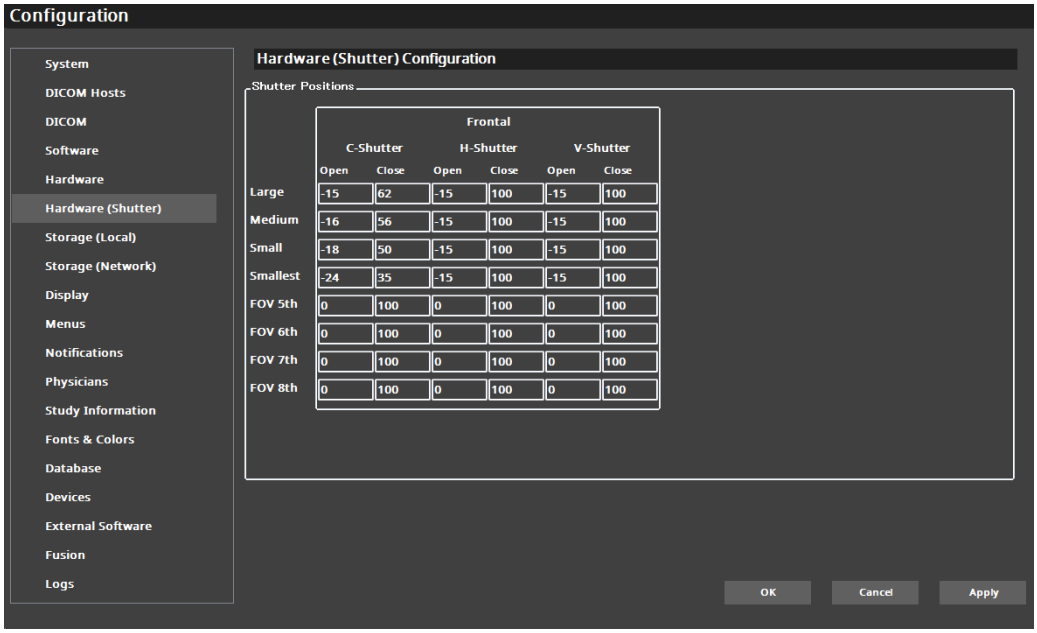


Item	Description	Mod
Information		
Grid	Defines whether a grid is used in the X-ray imaging system. Select **IN** if a grid is used. This option is used to complete the DICOM information for acquired images. This option must match the installation.	×
FPD Size	Specifies the size (inches) of the FPD (Flat-Panel Detector) (maximum 25 inches). This option is used to complete the DICOM information for acquired images. This value must match the installation.	×
FOD	Specifies the focal point to object (ISO Center) distance. Also known as SOD (Source to Object Distance). This is a fixed value (typically 72 cm) according to C-arm model. This value (cm) must match the installation. (0 to 100.)	×
ISO Center to Skin	The offset distance from the FOD (ISO Center) toward the focal point, to the point approximately at the patient's skin surface (top of table) at which dosage is measured. The FDA requires this value to be 15 cm.	×
Field of View		
Field of View	Defines eight field-of-view values (inches). Specify the length of one side of each field-of-view. This option is used to complete the DICOM information for acquired images. This option must match the installation. Large and FOV 5th to FOV 8th can be no larger than FPD Size. Medium, Small, and Smallest must be progressively smaller.	×

Item	Description	Mod
Curves Acquisition		
Curves Acquisition	Defines which (check mark shown) probe signals are to be acquired at the same times as images. Channels 1 and 2 are dedicated to ECG and Blood Pressure. Channels 3 and 4 are individually selectable. Labels entered in the **Label** column appear on screen at the left edge of the probe signal (Up to 64 keyboard characters, excluding the semi-colon ";"). [Default Acquire Waves] makes [Acquire Waves] selected by default for new studies. See "4.3.2 Defining a New Study" P.4-10. **NOTE** For meaningful information, make sure that what is configured here matches the hardware installation.	×
Dose Meter Configuration		
Dose Meter Configuration	Select a dosimeter connected to DAR-9500f.	×
Table Configuration		
Table Reposition	If check this box, table reposition becomes available. Check if Catheterization Table KS-100 is installed.	×
Show ROI indicating the table position	When put a check mark, Positioning mode becomes active as a default.	×
Stroke Length (mm)	Set the length of stroke in the longitudinal direction of the table.	×
Large Monitor Configuration		
Large Monitor Control	Check this box if SMART Display is installed.	×
LMM IP	Set IP address of SMART Display.	×
SMART Touch Configuration		
SMART Touch Configuration	Set unit name of SMART Touch. Select a connected unit.	×

Hardware (Shutter) Tab

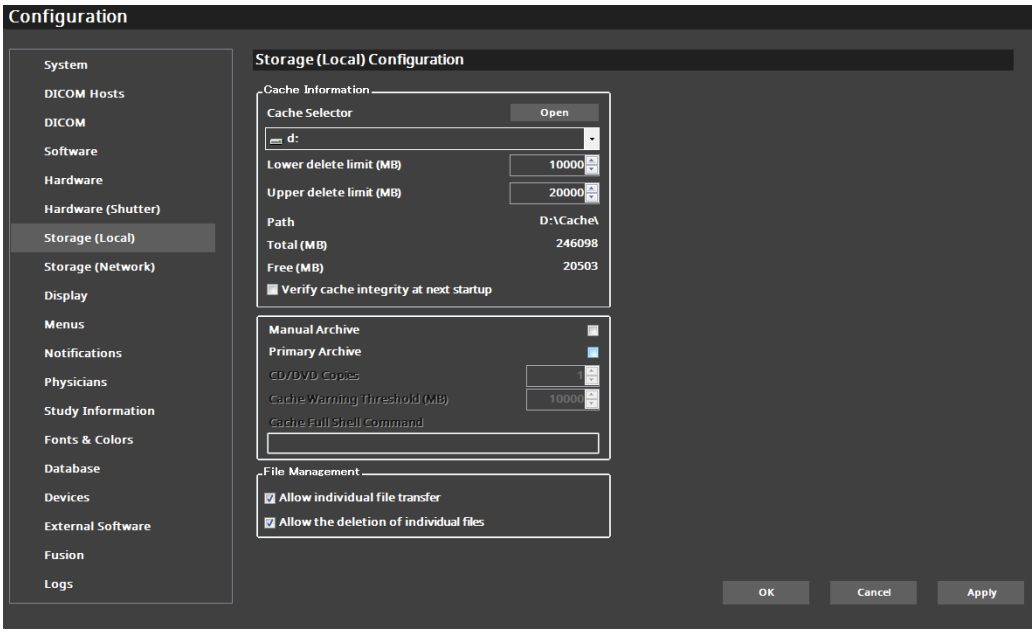
Hardware (Shutter) options are configured as follows.



Item	Description	Mod
Shutter Positions		
Shutter Positions	Defines the cross-direction collimator (C-shutters), horizontal (H-shutters) and vertical (V-shutters) shutters position range for each field of view of the installation. Position values are normalized to 0 to 100, where smaller values represent more open shutters (more x-ray exposure) and larger values represent more closed shutters (less X-ray exposure). [Open] must be set to a value lower than [Close].	×

Storage (Local) Tab

Storage (Local) options are configured as follows.



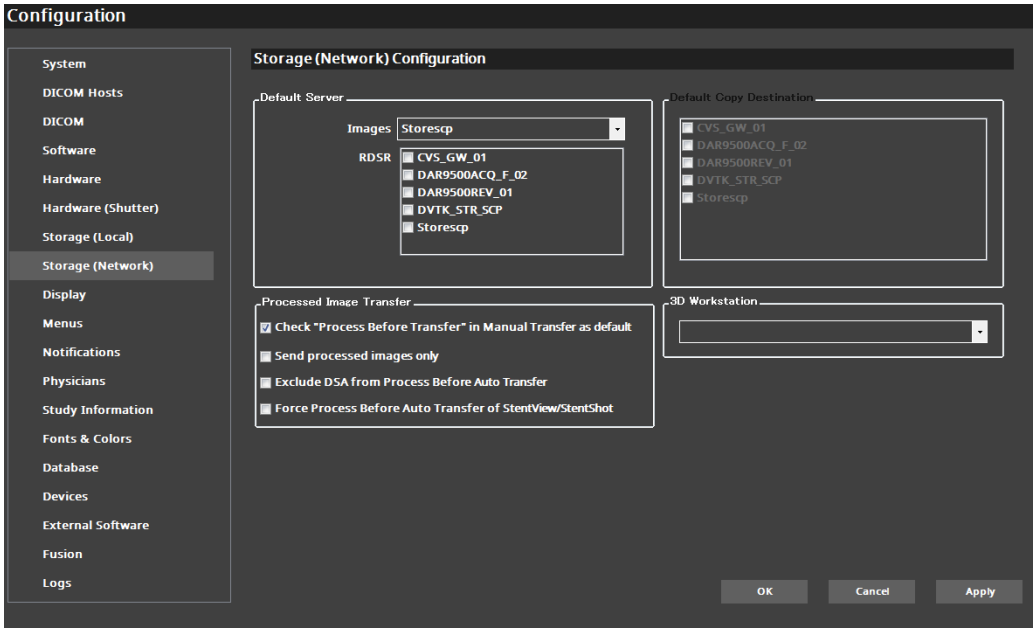
Item	Description	Mod
Cache Information	Hard disk space is used for both data cache (folder \Cache) and network cache (\Cache\NetCache). Incorrect cache settings can cause unexpected system behavior so DO NOT modify items in this box.	
Open	Open cache folder.	×
Cache Selector	Choose the letter of the hard drive on which the two cache folders will reside. Folders \Cache and \Cache\NetCache are automatically created on the chosen drive. **NOTE** The cache must reside on a separate dedicated drive or drive array. Other software must never access this drive. **NOTE** If you change the drive letter for the local cache and wish to preserve existing studies, exit the software, move all data from the old \Cache folder to the new one, and then restart the software.	×

Item	Description	Mod
Lower and Upper Delete Limit	[Upper delete limit] defines the minimum amount of space you want to keep free on your Cache drive. Whenever free space drops below this threshold, unprotected studies are deleted, starting with the least-recently accessed, until there is at least this amount of free space on the Cache drive. When a study is open for acquisition, deletion of studies only starts when the amount of free space falls below [Lower delete limit]. Both these values are expressed in MB, where 1MB equals 1024x1024 or 1,048,576 bytes. For each GB of cache space, enter 1024 MB. For example, for 50 GB, enter 51200 MB (50*1024). The difference between [Upper delete limit] and [Lower delete limit] should be a little larger than the largest study that you ever expect to create. Here are guidelines for setting the [Upper delete limit] assuming the following: • MS=Maximum size of one study (e.g., 2000 MB) • MN=Maximum space consumed in NetCache (e.g., 3000 MB) • DF=Desired free space remaining with full cache (e.g., 5000 MB) [Upper delete limit] is calculated as MS+MN+DF, or 10000 MB.	×
Primary Archive		
Manual Archive	Not used.	×
Primary Archive	Designates the local system as the primary archive system for your department or institution. In this mode, the system must write a study to CD/DVD before it can be unprotected and subsequently deleted.	×
CD/DVD Copies	(Primary Archive mode only) Defines how many times the local system must write a study to CD/DVD before it is automatically unprotected and subject to deletion. (1 to 9.)	○
Cache Warning Threshold (MB)	(Primary Archive mode only) This value, specifies in megabytes, (default 8000) the minimum amount of free space required on the local system cache drive to avoid having a low-cache warning being entered in the DAR-9500f message log (question-mark icon in status bar), and if configured, a warning message being sent to an administrator's computer. Do not enter a value of less than the [Upper delete limit] value of the Cache Information (System tab). The Cache Full Shell Command can be used to display a warning message on the administrator's monitor.  To free up space, you can delete studies from the local system (Studies Management window) that have already been written to CD/DVD the required number of times. You can also write studies to CD/DVD and then delete them from the local system.	○
File Management		
File Management	(Reference only) Enables [Allow individual file transfer] function, when checking the check box.	○

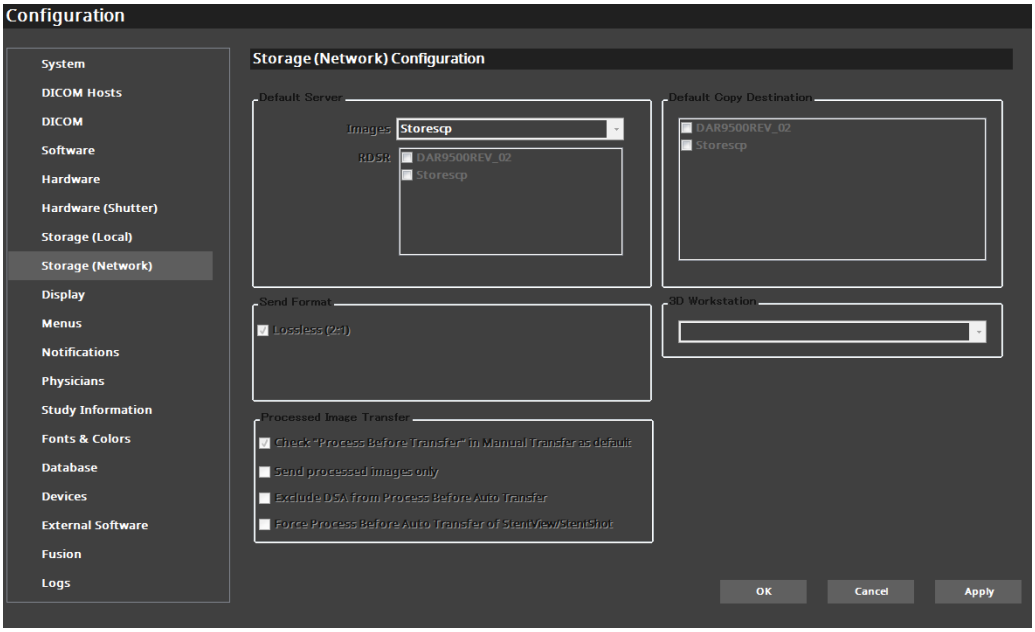
Storage (Network) Tab

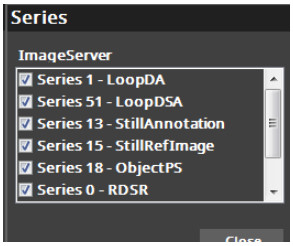
Storage (Network) options are configured as follows.

Reference Monitor



Acquisition Monitor

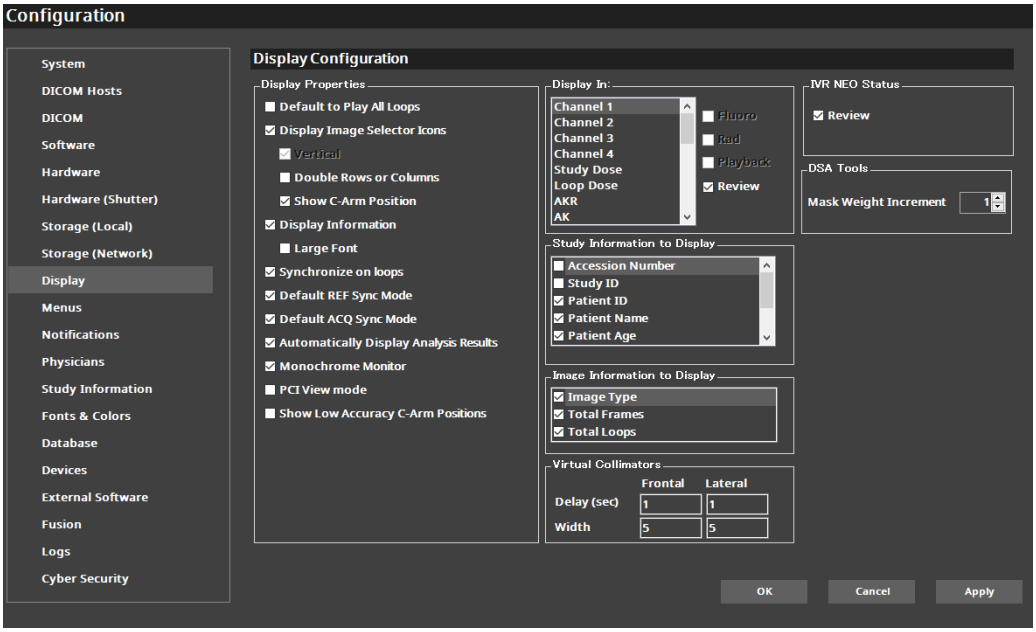


Item	Description	Mod
Default Server		
Images	(When **Primary Archive** mode not selected) Select the server from the Default Server drop-down list. All newly-acquired images during studies and the dose report images created after study will be sent to the archive server. Choose this ONLY on the Reference computer.	○
RDSR	(When **Primary Archive** mode not selected) Newly-created RDSR reports will be sent to the selected server. Choose this ONLY on the Reference computer.	○
Send Format		
Send Format	(Acquisition only) Usually check lossless.	×
Default Copy Destination		
Default Copy Destination	(Available only if the default server supports “Move” operations.) The check box list shows every station with Store capability **except the default server** as defined in DICOM Hosts AE Table of the Hosts tab. Check each station in the list to which you want a copy of the study sent as soon as the study in acquisition is closed. This is in addition to the study being first transferred from the Acquisition station to the default server. The completed study is copied from the default server to every station checked in this list. Furthermore, you can define which study series types are to be included in the copy. To do this, right-click a station in the list. The Series pop-up appears. Check only the series types you want sent and then click **Close**. For example, you could choose to send only annotated and reference images to a reporting server. 	×
3D Workstation		
3D Workstation	Choose the name of the 3D workstation to which each new acquisition will be sent.	×
Processed Image Transfer		
Check "Process Before Transfer" in Manual Transfer as default	Transfer the image after processing when sending individually.	
Send processed images only	Only processed images will be transferred.	
Exclude DSA from Process Before Auto Transfer	Transfer the DSA image without image processing for auto transfer.	
Force Process Before Auto Transfer of StentView/StentShot	Transfer the image by forcing the image processing on StentView and StentShot image for auto transfer.	

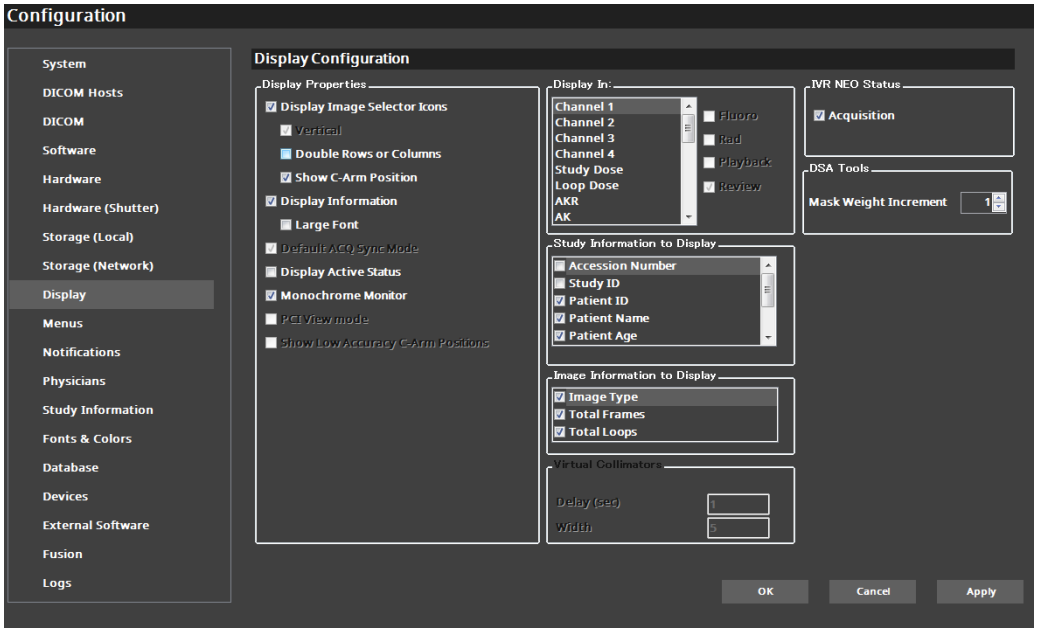
Display Tab

Display options are configured as follows.

Reference Monitor



Acquisition Monitor



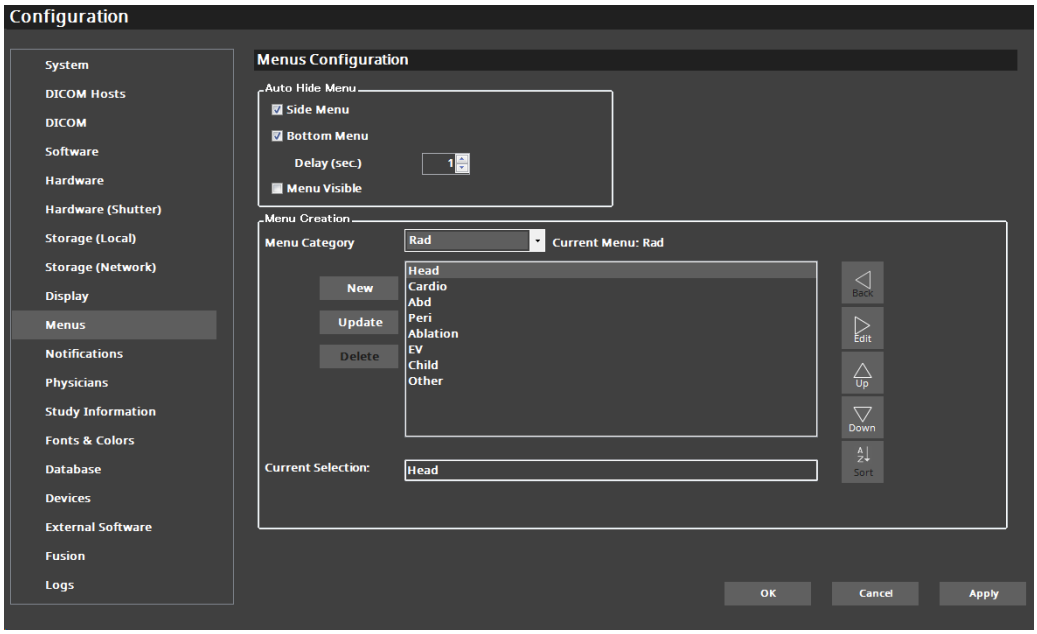
Item	Description	Mod
Display Properties		
Default to Play All Loops	(Reference only) Causes loops to be played back one after the other instead of just playing the selected loop continuously.	○
Display Image-Selector Icons	Causes the Image-Selector icons to be displayed on the monitor right edge, either in a single column, the default, or in a double column when [Double Rows or Columns] is checked. Leave [Vertical] checked. C-arm position is displayed on the image selector when [Show C-Arm Position] is checked.	×
Display Information	Displays the study information line at the top left of the Image Viewer window, optionally in a Large Font.	×
Synchronize on Loops	(Reference only) If the Reference computer is displaying the study currently in acquisition (loops or stills), when a new acquisition is received by the Reference computer, it will begin playing the just-acquired loop.	○
Default REF Sync Mode	(Reference only) Frontal Reference monitor and Lateral Reference monitor are synchronized.	○
Default ACQ Sync Mode	ACQ Frontal and ACQ Lateral are synchronized.	○
Automatically Display Analysis Results	(Reference only) Displays the QCA and LV analysis results in the upper left of the Image Viewer window.	○
Display Active Status	(Acquisition only) (Off by default) Displays the floating status icon in the Image Viewer window. This has been replaced by the Acquisition Active message that is displayed in the upper-right area of the Image Viewer window during Fluoro and Rad acquisition.	○
Monochrome Monitor	Optimize the side menu GUI buttons for monochrome monitor. Normally check this box.	×
PCI View mode	If check this box, display loops selected before X-ray exposure.	○
Show Low Accuracy C-Arm Position	Acquisition with Precession and Pendulum C-arm motion can also save angle information for each frame. However, there is an error up to 3 degrees between them.	○
Virtual Collimator		
Virtual Collimator	Virtual collimators are displayed on the Acquisition monitor showing the position of the hardware collimators. [Delay (sec)] defines the time in seconds (0 to 100) that virtual collimators are displayed after the hardware collimators have stopped moving. [Width] defines the thickness of the displayed line (range 2 to 30). **NOTE** Virtual collimation function indicates the collimator leaf position before fluoroscopy as a suggestion. Therefore, the position may misalign by the field of view size, C-arm position, and etc.	○

Item	Description	Mod
Display In		
Display In	Choose a parameter in the list and then check any available combination of Fluoro, Rad, Playback, Review or Displayed. Some parameters can only be displayed at certain times, as follows: • Rad: (Acquisition monitor only) During actual Rad acquisition. Applicable only when a study is open for acquisition. • Fluoro: (Acquisition monitor only) During actual Fluoro acquisition, and if configure, during hold of last Fluoro image. Applicable at all times. • Playback: (Acquisition monitor only) When a Rad loop or an optionally-recorded Fluoro loop is automatically played back, or the last Fluoro image frame is being displayed, both after an acquisition. Applicable only when a study is open for acquisition. • Review: For all playback on Reference monitor. (Acquisition monitor only) When both a study is open for acquisition and a loop is manually selected for playback. • Displayed: For Study dose, AK (Acquisition monitor only) and Storage (Acquisition monitor only). The correspondence between parameter names in this list and their on-screen labels are as follows: dGym^2: Study Dose (Total dosage since start of study), (Acquisition monitor) and Loop Dose (Dose of the loop), (Reference monitor) mGy/min: AKR kV: kV mA: mA ms: Exp Time LAO or RAO: LAO-RAO CRA or CAU: CRA-CAU SID (cm): SID IA Delay (s): IA-Delay FOV (in): FOV Fluoro (min): Fluoro Time Acq Inj Time (s): Acq Inj Time Storage (min): Storage <custom>: Channel 1 (probe signal) <custom>: Channel 2 (probe signal) <custom>: Channel 3 (probe signal) <custom>: Channel 4 (probe signal) <text>: Image Comment <seconds>: Fluoro Map Time Fram Inj Time(s): Frame Inj Time Acquisition Time: Acq Time <LIVE/LIH/STORED>: Image Displays <L/R/A/P>: Orientation 1 <F/H/A/P>: Orientation 2	○ ○

Item	Description	Mod
Study Information Display		
Accession Number	Displays at the very top of Study Information on the image viewer at the start of new study.	○
Study ID	Displays at the very top of Study Information on the image viewer at the start of new study.	○
Patient ID	Displays at the very top of Study Information on the image viewer at the start of new study.	○
Patient Name	Displays at the very top of Study Information on the image viewer at the start of new study.	○
Study Date	Displays at the very top of Study Information on the image viewer at the start of new study.	○
Patient Age	Displays at the very top of Study Information on the image viewer at the start of new study.	○
Patient Sex	Displays at the very top of Study Information on the image viewer at the start of new study.	○
Patient Birth Date	Displays at the very top of Study Information on the image viewer at the start of new study.	○
Image Information to Display		
Image Type	Displays at the upper-right of Study Information on the image viewer.	○
Total Frames	Displays at the upper-right of Study Information on the image viewer.	○
Total Loops	Displays at the upper-right of Study Information on the image viewer.	○
IVR NEO Status		
Review (Reference only)	Causes the indicator “Ref” to appear in upper-left corner of each monitor that is in Reference mode (IVR NEO).	○
Acquisition (Acquisition only)		○
DSA Tools		
Mask Weight Increment	Set an increment for the Up/Down button of "Mask Weight" used in DSA tools. (1 to 25) Default value is "1".	○

Menus Tab

Menus options are configured as follows.



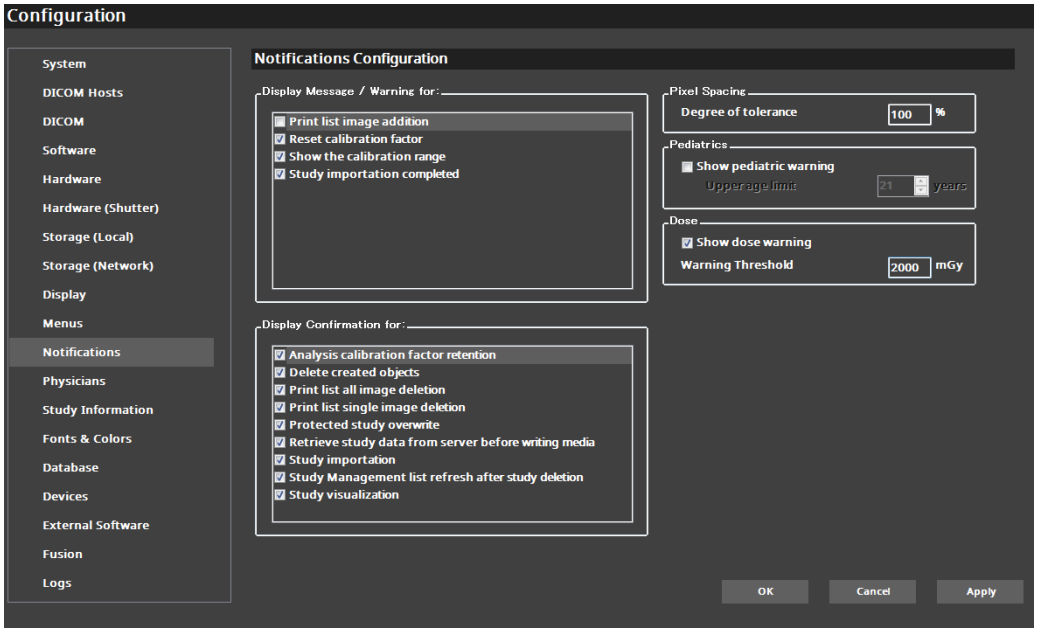
Item	Description	Mod
Side Menu	Causes the side menu at the left edge of the Image Viewer window to be automatically hidden after [Delay (sec.)] seconds (1 to 10) without mouse activity. Moving the mouse to the left screen edge restores both the side menu and bottom status bar.	○
Bottom Menu	Causes the Cine Control / Status bar along the bottom of the Image Viewer window to be automatically hidden after [Delay (sec.)] seconds (1 to 10) without mouse activity. Moving the mouse to the bottom screen edge, restores only the bottom status bar.	○
Menu Visible	Causes a thin gray bar to be shown in place of the hidden side menu and / or bottom status bar, indicating where you can move the pointer to restore the hidden elements.	○

For information about items in the [Menu Creation] group, see ☞"17.7.4 Menus and DUP Configuration" P.17-69.

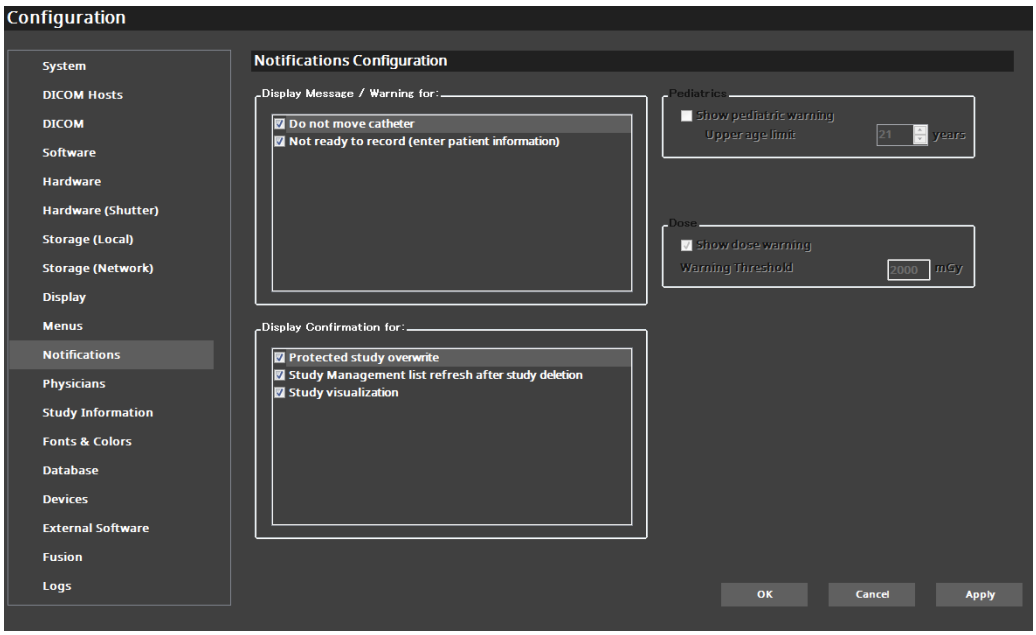
Notifications Tab

Notifications options are configured separately on the Reference and Acquisition computers as follows.

Reference Monitor



Acquisition Monitor



Select the messages that you wish to have shown in prompt boxes. If you do not select a message, the user can usually rely on equivalent messages displayed in the status bar.

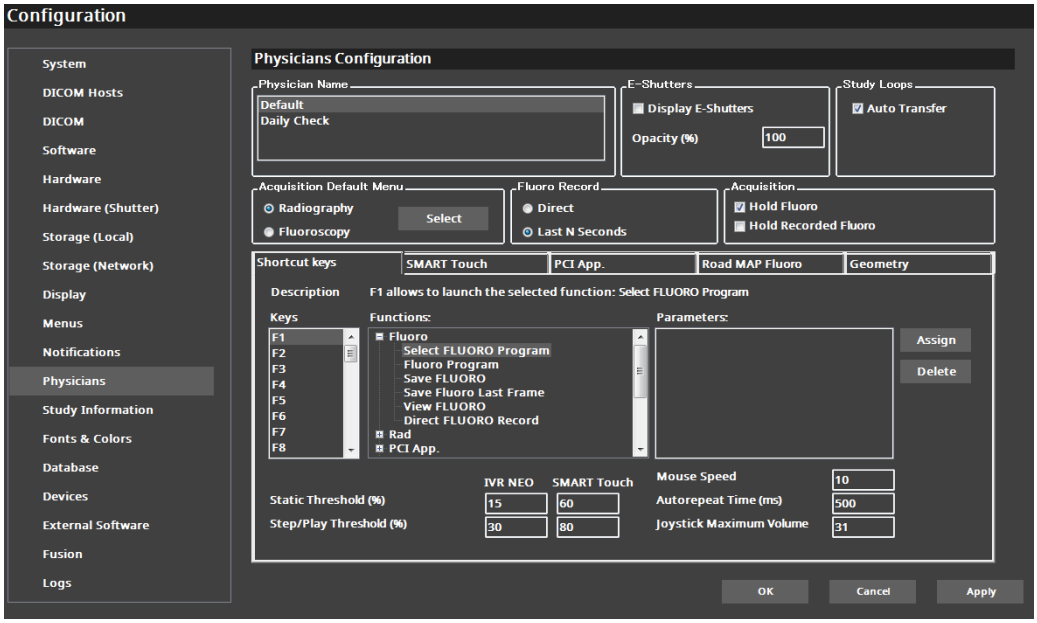
Item	Description	Mod
Pixel Spacing		
Pixel Spacing	Set acceptable value of Pixel Spacing. Setting percentage is the acceptable value for calibration result.	○
Pediatrics		
Show pediatric warning	If check this box, warning is displayed at the start of new study if patient age is under the [Upper age limit].	○
Dose		
Show dose warning	If check this box, warning is displayed on the Acquisition monitor if dose exceeds the [Warning Threshold].	○

Physicians Tab

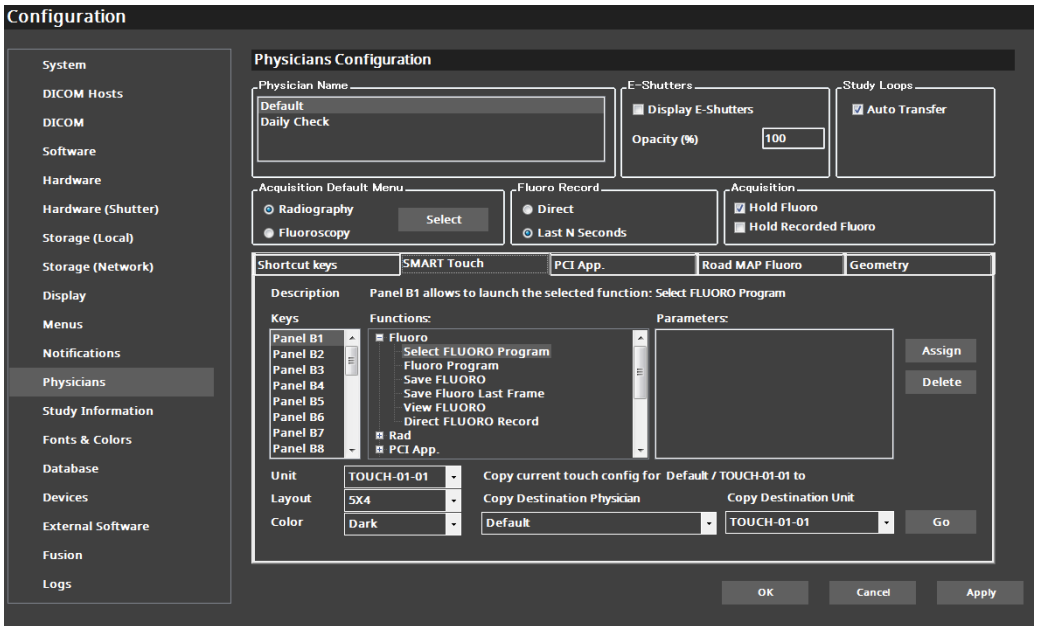
> **NOTE**
>
> [Physicians] configuration is performed only on the Reference computer.

The [Physicians] tab enables you configure options specific to each performing physician, including the default. For each physician, you can select the default Radiography and Fluoroscopy programs and Fluoro record mode, and configure the IVR NEO/SMART Touch. Before setting options here, first enter all performing physicians by adding them to the [Performing Physicians Table] found on the [Database] tab. Physician options are configured as follows.

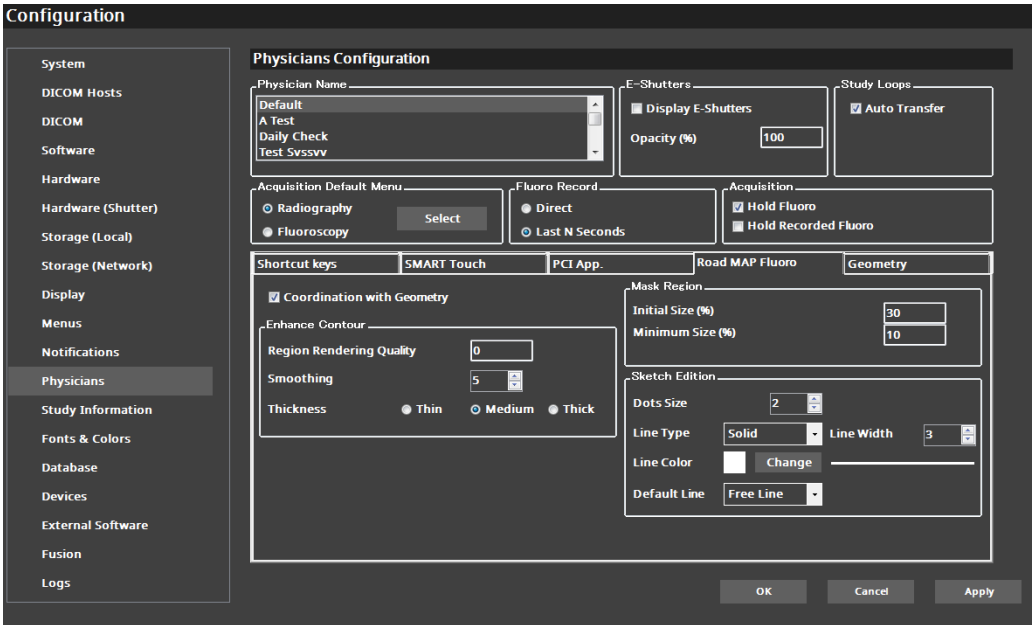
Selecting Shortcuts keys Configuration:



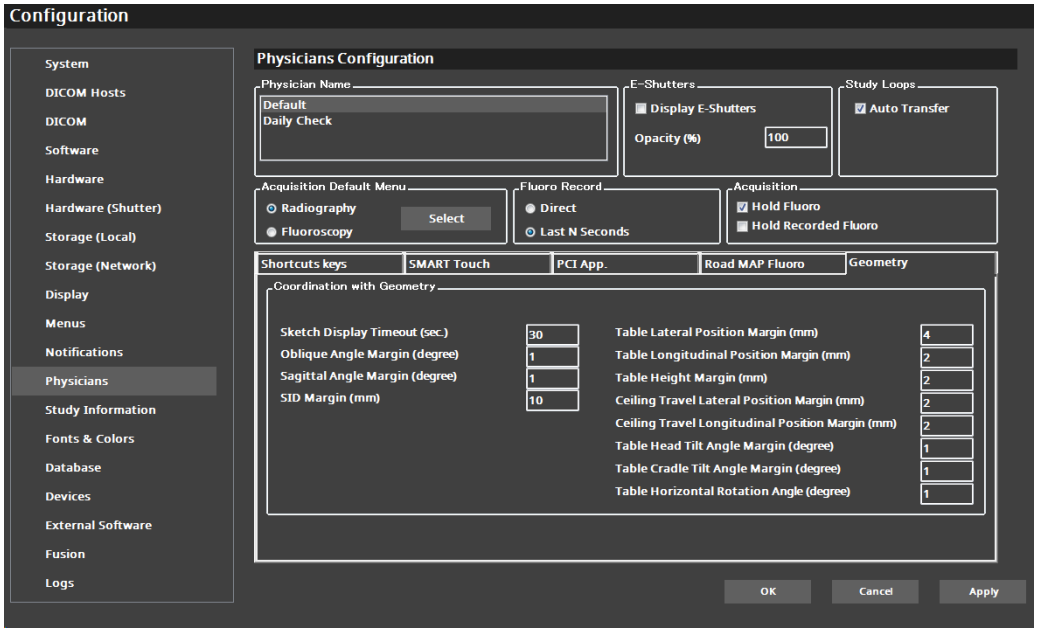
Selecting SMART Touch Configuration:



Selecting Road MAP Fluoro Configuration:



Selecting Geometry Configuration:



Item	Description	Mod
Physician Name	Choose a physician from [Physician Name].	○
Acquisition Default Menu	• Set [Study Loops]. To set the default [Auto Transfer] setting for new studies, select [Auto Transfer]. When selected, study loops are automatically sent to the default server. • To set the default Fluoro program, select [Fluoroscopy], click [Select], navigate through the displayed program menu and click the desired default program (selected item will be highlighted). • To see what programs are set for a particular physician, choose the physician from the [Physician] list, and then click [Select]. The selected program is indicated by the highlighted program menu item.	○
Fluoro Record	Set the default Fluoro Record mode for the physician, either [Direct] or [Last N Seconds]. [Direct], requires the physician to choose when to record. [Last N Seconds] causes Fluoro images to always be recorded, allowing the physician to decide when to [Save].	○
Acquisition	Select [Hold Fluoro] to have the last Fluoro image acquired held on the Acquisition monitor after each unrecorded Fluoro acquisition. If [Hold Fluoro] is not enabled, the Acquisition monitor reverts to whatever was displayed before the Fluoro acquisition (for example, a playing Rad loop). (Only applicable to unrecorded Fluoro when a study is open for acquisition.)	○
E-Shutters	Set [E-Shutters].	○
Study Loops	Set [Study Loops]. To set the default [Auto Transfer] setting for new studies, select [Auto Transfer]. When selected, study loops are automatically sent to the default server. See ☞ "4.3.2 Defining a New Study" P.4-10.	○
Shortcuts keys		
Description	Indicates the explanations of functions for selected keys.	
Keys	Selects function keys and IVR NEO buttons to be assigned. A letter “F” indicates the function key and “B” for IVR NEO button. To remove the function assigned a key, select the key and click the [Delete] button.	○
Functions	Selects functions to be assigned for selected keys. See ☞ "4.8.1 IVR NEO Buttons" P.4-66.	○
Parameters	Enables to assign some functions with parameters if necessary. Selects parameters and click [Apply] button.	○
Static Threshold	Defines percent of maximum joystick deflection (from center position) that is permitted to occur without any action being taken. This allows for small unintentional joystick movements around the center position to be ignored. Entered as percent from 0 to 100. This value must always be smaller than [Step/Play Threshold].	○
Step/Play Threshold	Defines percent of maximum joystick deflection (from center position to left or right) to be used as the threshold for where joystick movement changes from single frame forward / backward, to variable-rate frame-by-frame mode. Entered as percent from 0 to 100. This value must always be larger than [Static Threshold].	○

Item		Description	Mod
Mouse Speed		Optionally adjust joystick [Mouse Speed]. This option defines how fast on the on-screen pointer is moved with the joystick when in mouse mode, for example, during angiographic analysis (QCA/LVA). Entered as a number from 2 to 100.	○
Autorepeat Time		Optionally adjust joystick [Autorepeat Time]. This option defines the amount of time (milliseconds) to wait before moving to the previous / next icon in the Image Selector when holding the joystick in the up or down position. The default of 500 ms means that when the joystick is continuously held up or down, each loop will be played for 0.5 seconds before skipping to the next one. Entered as a number from 100 to 2000 ms.	○
Joystick Maximum Volume		Set Joystick Maximum Volume. **NOTE** Do not change the [Joystick Maximum Volume] (range 1 to 100) as this is preset according to the hardware-specific value for the joystick model installed.	○
SMART Touch			
Key		Selects a function and parameter associated with the function (if any) and click [Assign] button. Repeat this process for each button. To remove the function assigned a button, select the button and click the [Delete] button.	○
Unit		Specifies SMART Touch which is going to be applied the displayed setting. DAR-9500f can connect with several SMART Touch units. Setting of each SMART Touch is accessible from REF-PC.	○
Layout		Specifies the number of buttons on Custom Panel. The default is "5x4" and 20 buttons are displayed.	○
Color		Specifies the color style of SMART Touch application. The default is Dark.	○
Physician Name		Specifies the physician being copied to.	○
Unit		Specifies the SMART Touch unit as the destination of the setting. Click [Go].	○
Road MAP Fluoro			
Coordination with Geometry		When checked, SIMAP Mask image and the Sketch will hide.	×
Contour Enhancement	Region Rendering Quality	Specify the default value of contour range. See ☞ "9.5 Contour Enhancement" P.9-8.	○
	Smoothing	The setting value will be used as default value. See ☞ "9.5 Contour Enhancement" P.9-8.	○
	Thickness	Specify default value of contour thickness.	○

Item		Description	Mod
Sketch Edition	Dots Size	Specify dots size when placing the sketch.	○
	Line Type	Specify line style.	○
	Line Width	Specify line width.	○
	Line Color	Specify line color.	○
	Default Line	Specify the type which is selected when [Edit] window is displayed.	○
Mask Region	Initial Size (%)	Modify the initial size when setting ROI. Initial size is specified by percentage of the image. If the initial value is 30, the size of ROI will be displayed as 30% in vertically and horizontally. See "9.6 Mask Region" P.9-11	○
	Minimum Size (%)	Set minimum size of ROI.	×
Geometry			
Sketch Display Timeout (sec)		If communication is disconnected, specify the time (sec) before invalid the sketch automatically. If input “0”, it will not invalid though the communication is disconnected.	×
Oblique Angle Margin (degree)		If Coordination with Geometry is checked and the C-arm is changed more than input angle in an oblique direction, SIMAP and Sketch Line will hide.	×
Sagittal Angle Margin (degree)		If Coordination with Geometry is checked and the C-arm is changed more than input angle in a sagittal direction, SIMAP and Sketch Line will hide.	×
SID Margin (mm)		If Coordination with Geometry is checked and SID is changed more than input value, SIMAP and Sketch Line will hide.	×
Table Lateral Position Margin (mm)		If Coordination with Geometry is checked and the table moves more than input value in a transversal direction, SIMAP and Sketch Line will hide.	×
Table Longitudinal Position Margin (mm)		If Coordination with Geometry is checked and the table moves more than input value in a longitudinal direction, SIMAP and Sketch Line will hide	×
Table Height Margin (mm)		If Coordination with Geometry is checked and the table height is changed more than input value, SIMAP and Sketch Line will hide.	×
Ceiling Travel Longitudinal Position Margin (mm)		If Coordination with Geometry is checked and the C-arm moves more than input value in a longitudinal direction, SIMAP and Sketch Line will hide.	×
Ceiling Travel Transversal Position Margin (mm)		If Coordination with Geometry is checked and the C-arm moves more than input value in a transversal direction, SIMAP and Sketch Line will hide.	×
Table Head Tilt Angle Margin (degree)		(If Catheterization Table KS-100 is installed) If Coordination with Geometry is checked and the table moves more than input value in a tilt direction, hide SIMAP and Sketch Line.	×
Table Cradle Tilt Angle Margin (degree)		(If Catheterization Table KS-100 is installed) If Coordination with Geometry is checked and the table moves more than input value in a cradle direction, hide SIMAP and Sketch Line.	×
Table Horizontal Rotation Angle (degree)		(If Catheterization Table KS-100 is installed) If Coordination with Geometry is checked and the table moves more than input value in a rotation direction, hide SIMAP and Sketch Line.	×

NOTE

Do not re-assign functions for the B keys. These keys are associated to the IVR NEO for which button assignments are preset.

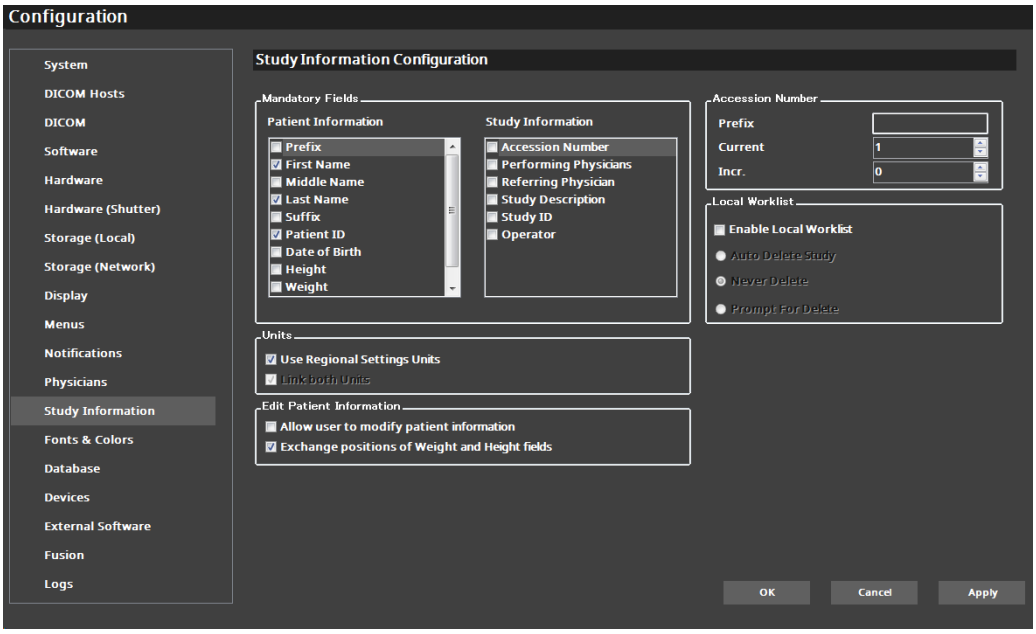
NOTE

The default physician options are used if a performing physician is not selected when creating a new study.

Study Information Tab

Study Information options are configured as follows.

> **NOTE**
>
> Study Information is performed only on the Reference computer.



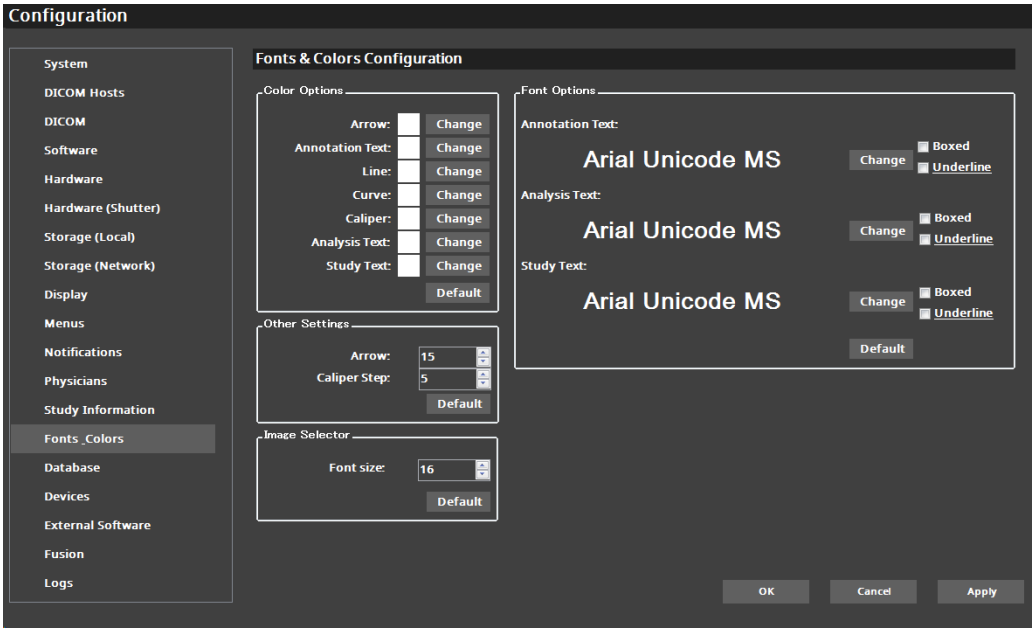
Item	Description	Mod
Mandatory Fields		
Patient Information, Study Information	Defines which fields in the New Study dialog box are to be made mandatory. Set a check mark to indicate *mandatory* or clear a check mark to indicate *optional*.	○
Accession Number		
Prefix	Defines the 6-character (maximum) alphanumeric value used as the prefix for the auto-generated accession number that will be used to identify each study loop. If the [Site] field is used, the value entered there is copied into this field. (Up to 6 characters: alpha, number, underscore "_", period ".".)	○
Current	(Enter only on Reference) Shows and optionally sets the current auto-incremented portion of the auto-generated Accession number. If [Prefix] is used, it appears in the accession number before this generated Current value. Accession numbers, including prefix, can be up to 16 digits in length. Make sure that you do not enter a value that will cause an Accession number to not be unique. For example, do not reset this number to a lower value that was used before. (0 to 10,000,000 (10 million).)	○
Incr.	(Enter only on Reference) Sets the increment that is added to the [Current] value when automatically generating the next Accession Number. Alternatively, set this value to zero to turn off automatic Accession Number generation, so, for example, it can be set by an HIS/RIS system, or manually. (0 to 100.)	○

Item	Description	Mod
Local Worklist		
Local Worklist Enabled	Local Worklist Management Window is displayed when starting New Study. The study selected from Local Worklist can be deleted as the following instruction.	○
Auto Delete Study	Selected study will delete automatically.	○
Never Delete	Selected study will not delete.	○
Prompt For Delete	After creating a new study, user is prompted.	○
Units		
Use Regional Settings Units	(Enter only on Reference) Causes the New Study dialog box to set the patient Height and Weight measurement system according to regional settings (e.g., metric or U.S.). When not checked, the user can choose the desired system.	×
Link both Units	(Enter only on Reference) Only applicable when [Use Regional Settings Units] is not selected, this option forces the user to use the same measurement system for both patient height and weight (e.g., metric or U.S.).	×
Edit Patient Information		
Allow user to modify patient information	(Enter only on Reference) If check this box, enable to modify study information without input administrator’s password.	○
Exchange positions of Weight and Height fields	If check this box, show study information in order of "Height" and "Weight".	○

Fonts and Colors Tab

Fonts and Colors options are configured as follows.

> **NOTE**
>
> Font & Colors is performed only on the Reference computer.



Item	Description	Mod
Color Options		
Arrow	Set Arrow color of Annotation.	○
Annotation Text	Set Text color of Annotation.	○
Line	Set Line color of Annotation.	○
Curve	Set Curve color of Annotation.	○
Caliper	Set Caliper color of Annotation.	○
Analysis Text	Set Text color of QCA/LV.	○
Study Text	Set Text color of Study of Annotation.	○
Change	Click the [Change] button next to each item to open the Color window. Select a color for that item and click [OK].	○
Default	Click [Default] to reset color for all items to white.	○
Font Options		
Annotation Text	Set font and font size of Annotation.	○
Analysis Text	Set font and font size of QCA/LV.	○

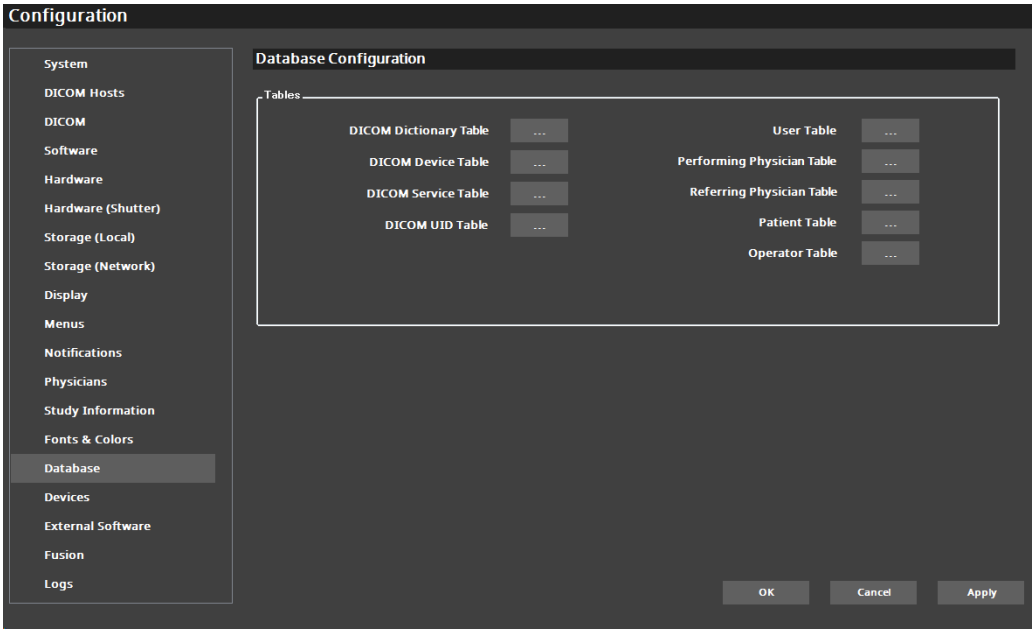
Item	Description	Mod
Study Text	Set font and font size of Study of Annotation.	○
Change	Click the [Change] button next to each text type to open the Font window. Select a font, font style and size, and click [OK].	○
Boxed	Select [Boxed] to have a box surrounding the specified type of text.	○
Underline	Select [Underline] to underline the specified type of text.	○
Default	Click [Default] to reset all text parameters to default.	○
Other Settings		
Arrow Weight	Defines the arrow weight.	○
Caliper Step	Defines the caliper step.	○
Default	Click [Default] to reset both arrow weight and caliper step parameters to default.	○
Image Selector		
Font size	Select [Font size] to set font size of angle information displayed on the image selector.	○
Default	Click [Default] to reset font size.	○

NOTE

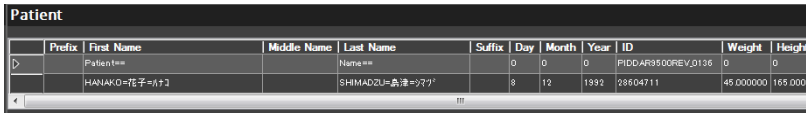
When changing Font size of Image Selector on Acquisition monitor during study, the change will be available in the next study.

Database Tab

The Database tab contains up to eight buttons, one for each table.

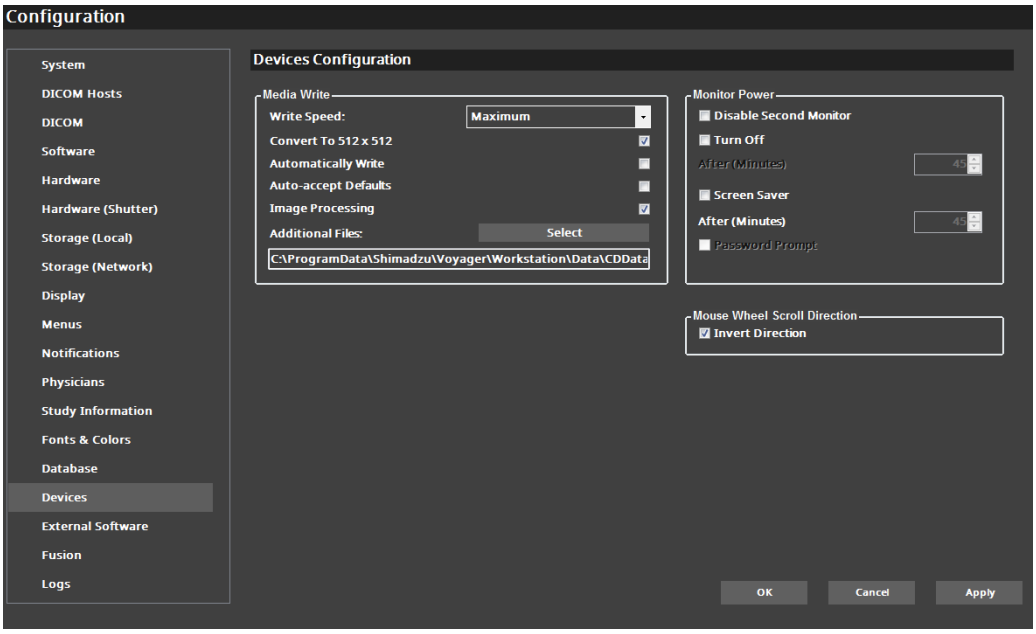


Item	Description	Mod
DICOM Tables	The four DICOM tables are for DICOM experts only and are to be left as is.	×
User Table	(Present only when Security feature is not installed.) This table enables the administrator to view, add, edit, and delete users. On the Database tab, click [User Table] to view all users. The table contains several items (columns) per user (row).  To add a user, click [Add]. A new blank row appears. Fill in each item in the row. To edit an item, click it and make the desired changes. To save changes, click a different row or [Add] or [Close]. The [Refresh] button also saves any changes and moves the pointer to the first row. To delete a user, select the user (click anywhere in the row) and click [Delete]. Do not delete standard users such as "super", "operator", and "serviceapp". See "17.3 Viewing User Type" P.17-3	×

Item	Description	Mod
Performing, Referring Physicians and Operator Tables	(Reference monitor only) These tables enable the administrator to view, add, edit, and delete physicians. The physicians defined in these tables are made available for selection when creating a new study. See "4.3 Entering Study Information" P.4-10. On the Database tab, click [Performing Physician], [Referring Physician], or [Operator] to view physicians. The table contains separate fields (columns) for each part of the physician name with one physician per row.  To add a physician, click [Add]. A new blank row appears. Fill in each part of the name. Prefix and Suffix can be left blank. At least enter the first and last names. To edit an item, click it and make the desired changes. To save changes, click a different row or [Add] or [Close]. The [Refresh] button also saves any changes and moves the pointer to the first row. To delete a physician, select the physician (click anywhere in the row) and click [Delete]. To modify a physician, delete the physician and add a new one.	○
Patient Table	(Reference monitor only) The Patient table enables the administrator to view and delete patients. The patients contained in this table are made available for selection when creating a new study without worklist management. See "Define New Study with Local Worklist Management"P.4-15. On the Database tab, click [Patient Table] to view patients. The table contains separate fields (columns) for each patient information item with one patient per row.  To delete a patient, select the patient (click anywhere in the row) and click [Delete]. The [Refresh] button moves the pointer to the first row. The Add feature of Patient Table is not enabled. Instead, add new patients when creating new studies in direct-entry mode. See "Define New Study with Local Worklist Management"P.4-15.	○

Devices Tab

Device options are configured as follows.

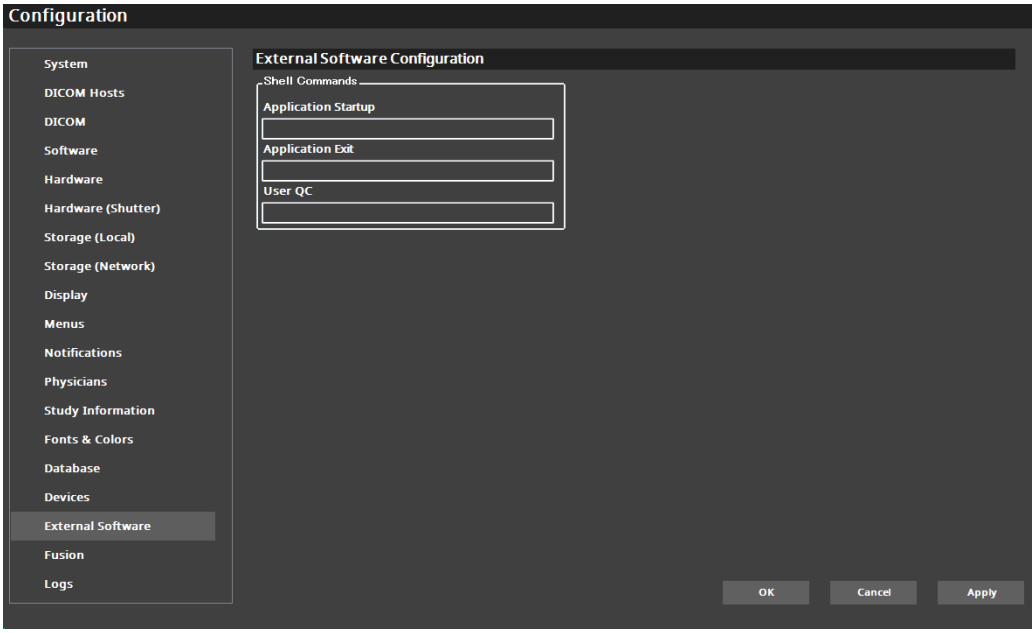


Item	Description	Mod
Media Write		
Write Speed	Choose [Maximum] to write at the maximum speed supported by the writer and detected media. Choose any other value to reduce the maximum write speed. If you choose an unsupported speed, the speed is automatically adjusted. **You must restart the system after changing this value.**	×
Convert to 512x512	Defines whether studies are converted to a lossless compressed DICOM format (512x512 8-bit) before writing to removable media. If unchecked, the DICOM format (1k x 1k 12-bit) is written to the media. Large uncompressed Cine (raw) studies may not fit on a single CD so it is recommended to check this box if using CD.	○
Automatically Write	(Reference monitor only) When a study that is open for acquisition is closed, the user is automatically prompted to insert blank media onto which the study will be written. Check the media type for which the user should be prompted. If you check neither CD nor DVD, no automatic prompting occurs. If you check both, the user will be prompted to choose the media type.	○
Auto-accept Defaults	Causes only the prompts related to inserting blank media to be displayed in a pop-up window. All other media writing-related prompts appear in the status bar of the Studies Management and Image Viewer windows. Furthermore, the prompt to select specific series is skipped.	○
Image Processing	Causes image processing including DSA subtraction to be applied to the images before writing them to CD/DVD. See	○
Additional Files	Enables you to include additional files (such as a player) on the media. Click[Select] and choose a folder that contains the additional files. All files and folders in the selected folder will be written to the root of the media. File names must have the 8.3 format. Folder names must be no more than 8 characters in length.	×
Monitor Power		
Disable Second Monitor	Not used.	×

Item	Description	Mod
Turn Off	When selected, the [After (Minutes)] value defines how many minutes (1 to 60) must elapse without keyboard, mouse, or IVR NEO/IVR Shuttle activity, before the monitor screen blanks and switches into its power-save mode. Windows screen savers must be disabled. NOTE Turn Off feature is disabled whenever a study is open for acquisition or review.	○
Screen Saver	When selected, the [After (Minutes)] value defines how many minutes (1 to 60) must elapse without any activity, screen saver activates. When selecting [Password Prompt], you will be asked for a password when canceling screen saver.	○
Mouse Wheel Scroll Direction	Set scroll direction of mouse wheel. When check [Invert Direction] and scroll the mouse wheel to downward to show the next frame.	×

External Software Tab

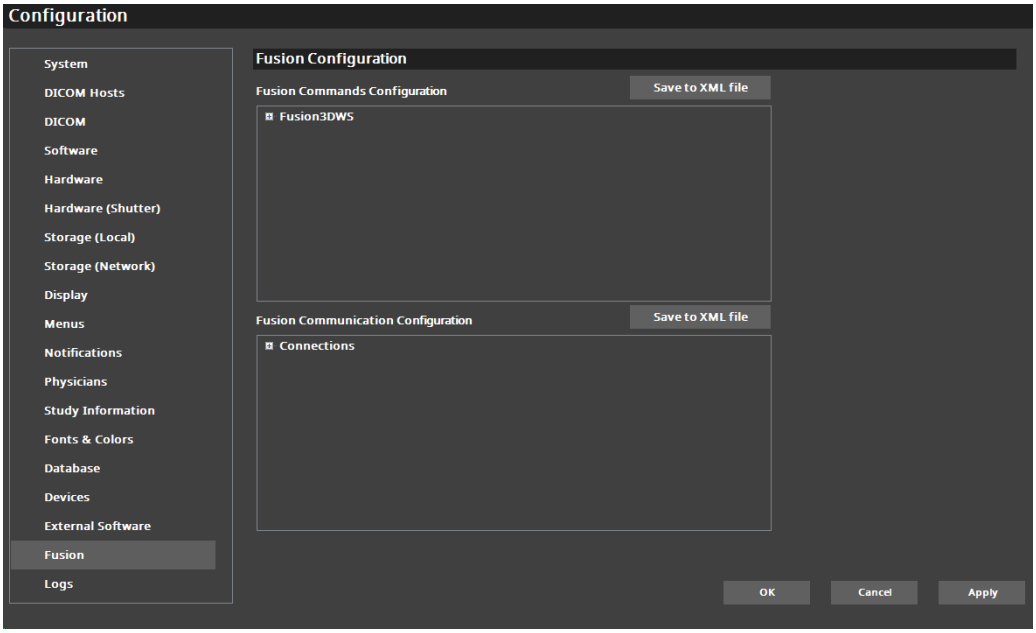
External Software options are configured as follows.



Item	Description	Mod
Shell Commands	Enter any shell command (with drive letter and path) that is to be executed before [Application Startup] or after [Application Exit]. For example, "c:\Shutdown.exe" could be entered in [Application Exit] to cause the system to shut down upon exit.	×

Fusion Tab

Use [Fusion] tab for setting communication with 3D workstation. Do not change the settings except Shimadzu or specified service personnel.



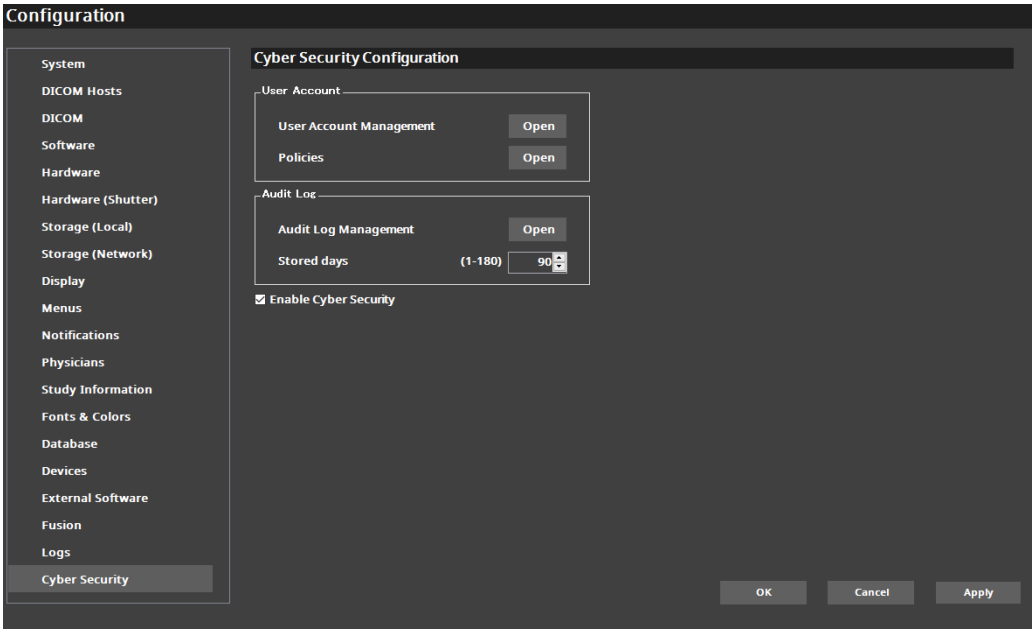
Logs Tab

The [Log] tab enables you to log various events. Do not use this tab to activate logging unless you have been directed to do so by Shimadzu technical support.

Cyber Security Tab

> **NOTE**
>
> Cyber Security is initially disabled. Please contact our service representative to enable it.

Cyber Security options are configured as follows.

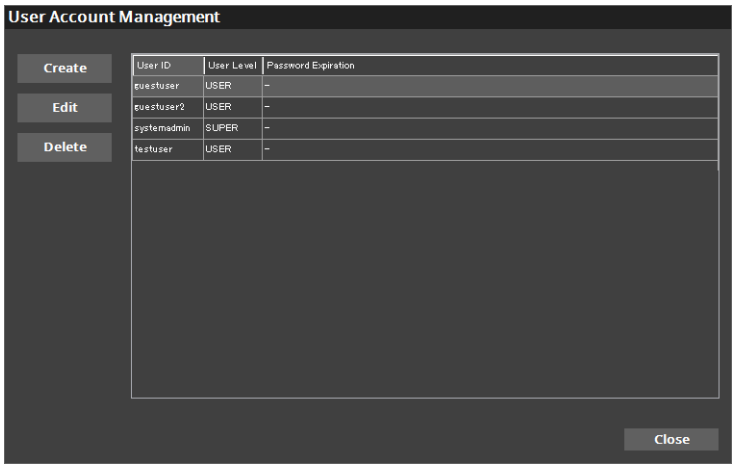


Item	Description	Mod
User Account		
User Account Management	Create, edit and delete user account.	○
Policies	Set user ID and password policies.	○
Audit Log		
Audit Log Management	Browse, export and delete audit log.	○
Stored days	Set the number of days to store audit log. (1 to 180) Default is 90 (days).	○

User Account Management

Create, edit and delete user account.

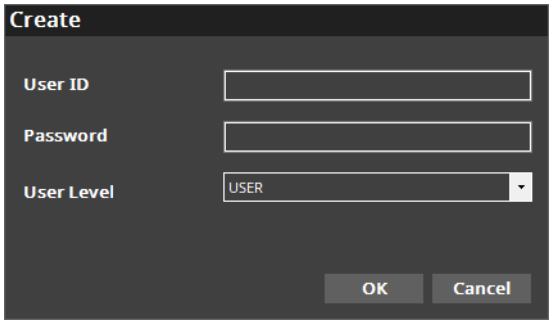
Click [User Account Management] on the Cyber Security Configuration window. The User Account Management window appears.



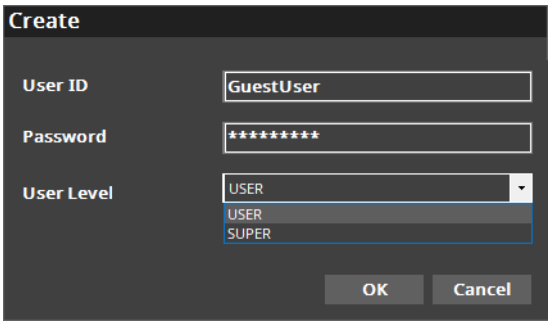
- **Create User Account**

1 Click [Create].

2 The Create window appears.



3 Enter User ID and Password, and set User Level.

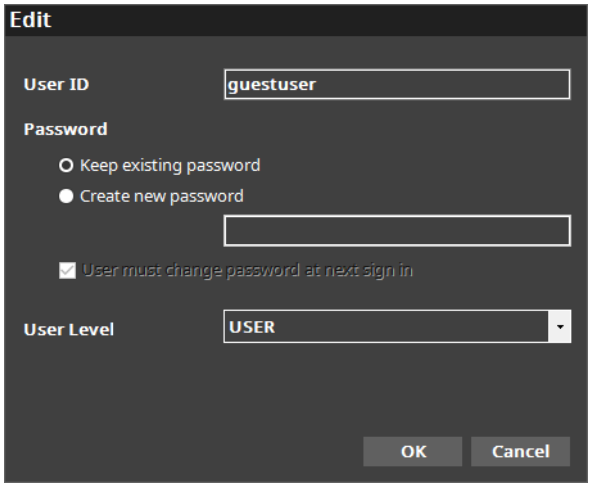


Item	Description
USER	Starting and ending a study Operation on the Studies Management window • Display of past study • Searching study • Browsing study information • Viewing RDSR • Sending study • Receiving study • Media writing of study information • Protection and unprotection of study • Deleting study
SUPER	Functions that can be performed at the USER level Audit log related operations • Viewing audit logs • Outputting audit logs User Account Management Functions • Creation of user accounts • Deleting user accounts • Editing user accounts • User account policy settings
(Available without Sign in)	Operating side menu items • Fluoroscopy • [Funct.] menu FPD Calibration Error Report Monitor • Configuration • Error List • Network

- **Edit User Account**

1 Click [Edit].

2 The Edit window appears.



3 To change the password, select [Create new password] and register the new password.
Also, if you check the "User must change password at next sign in" check box, the user can change the password at the first sign-in.

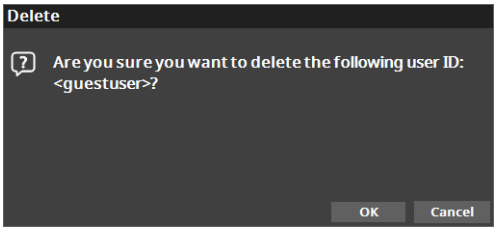
NOTE

Cannot change User ID.

4 Change User Level if necessary.

- **Delete User Account**

1 Select an User ID to delete, then click [Delete].

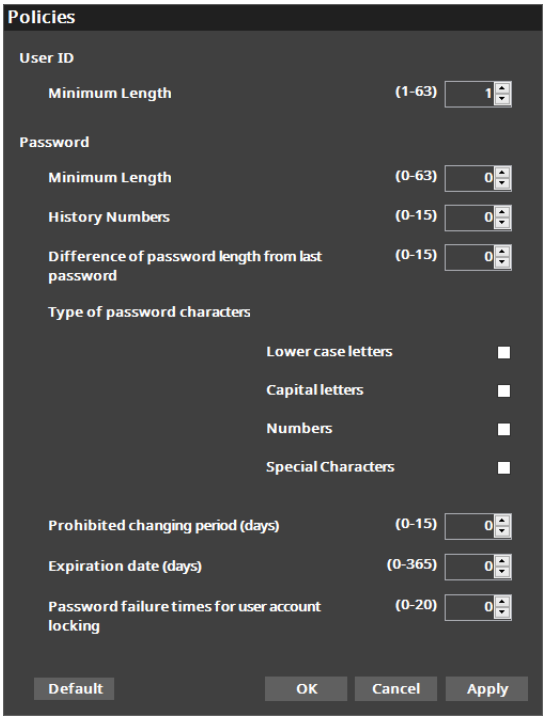


2 A confirmation dialog appears and click [OK].
User ID is deleted and the list will be updated.

- **Policies**

Set policies for User ID and Password.

Click [Policies] on the Cyber Security Configuration window. The Policies window appears.



Item	Description	Default Value (Input Range)
User ID		
Minimum Length	Set the minimum number of characters for user ID.	1 (1 to 63)
Password		
Minimum Length	Set the minimum number of characters for password. If "0" is set, no password is required.	0 (0 to 63)
History Numbers	Set the number of times password are recorded. If "0" is set, setting the same password as the current password is permitted when changing the password. If "1" is set, the same password as the current password is not permitted when changing the password.	0 (0 to 15)
Difference of password length from last password	When changing password, set the difference of password length from last password. If "0" is set, setting the same password as the current password is permitted.	0 (0 to 15)

Item	Description	Default Value (Input Range)
Type of password characters	Set the type of characters used for password.	Uncheck Capital letters (A to Z) Lower case letters (a to z) Numbers (0 to 9) Special Characters (~ ! @ # $% ^ & * ( )_ - + ={ } [ ] \ | : ; "' <> , . ? /)
Prohibited changing period (days)	Set the number of days that the password can be changed after changing the password. If "0" is set, the password is allowed to be changed again even on the day it is changed.	0 (0 to 15)
Expiration date (days)	Set password expiration date. If "0" is set, password will not expire. If "90" is set, you will be requested for a new password on day 91.	0 (0 to 365)
Password failure times for user account locking	Set the number of failed password entries that result in the user account is locked. If "0" is set, the password is not locked.	0 (0 to 20)

Audit Log Management

Enable to browse, export, and delete audit log on audit log management.

> NOTE
>
> Deleting audit log is only available in serviceapp.

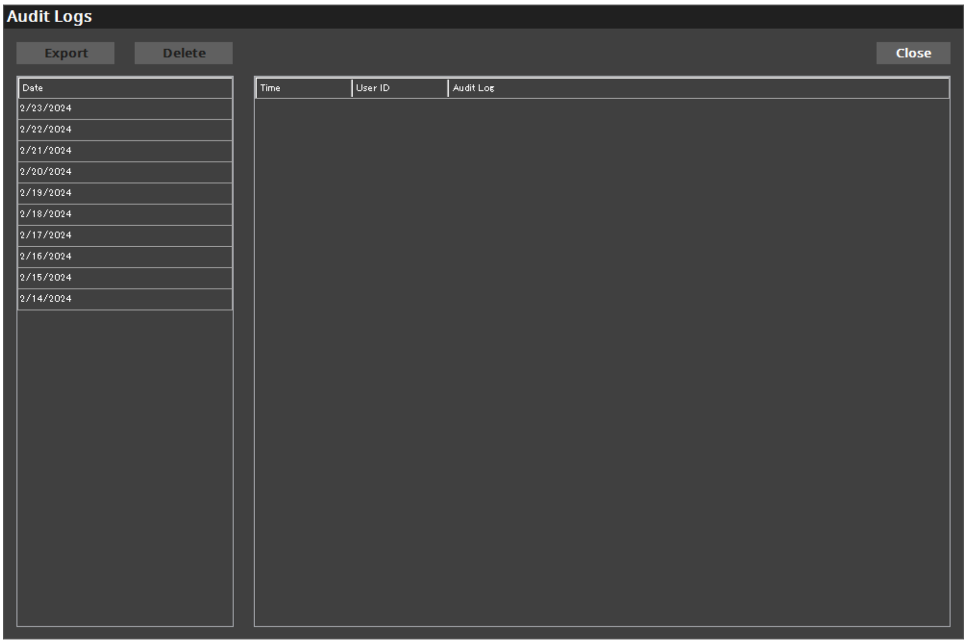
Leave the following items in the audit log:

- Sign in / Sign out
- Operation of Studies Management window
    - Show past study
    - Search for study
    - Browse study
    - Viewing RDSRs
    - Sending study
    - Receiving study
    - Outputting study to Media
    - Protecting study / Unprotecting study
    - Deleting study
    - Anonymizing study
- Operations related to audit logs
    - Viewing audit log
    - Output of audit log
    - Delete of audit log
- User account management functions
    - Creating user accounts
    - Editing user accounts
    - Deleting user accounts
    - Editing user account policies

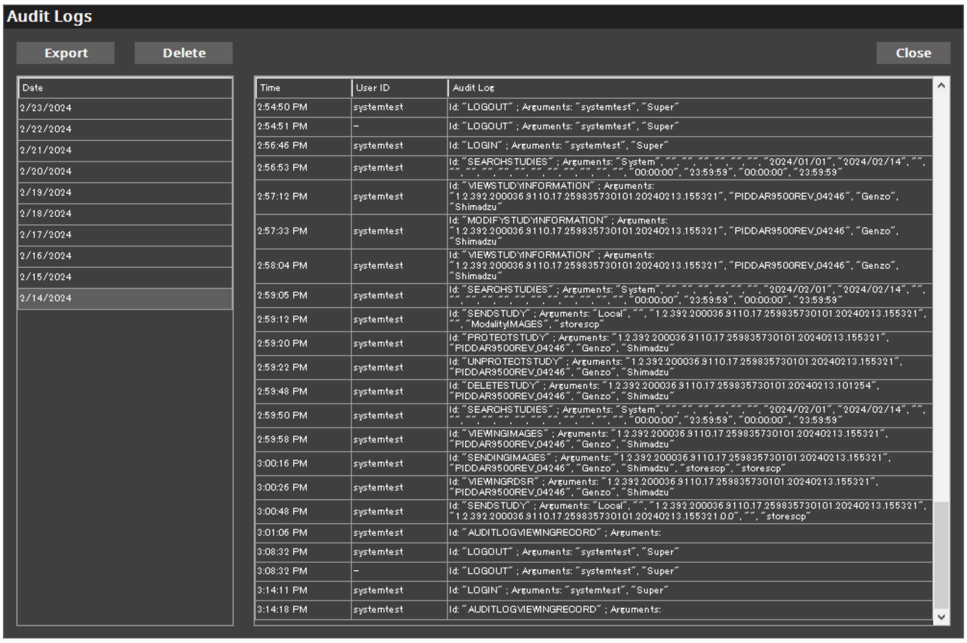
- **Browse Audit Log**

1 Click [Audit Log Management] on the Cyber Security Configuration window.

2 The Audit Logs window appears.



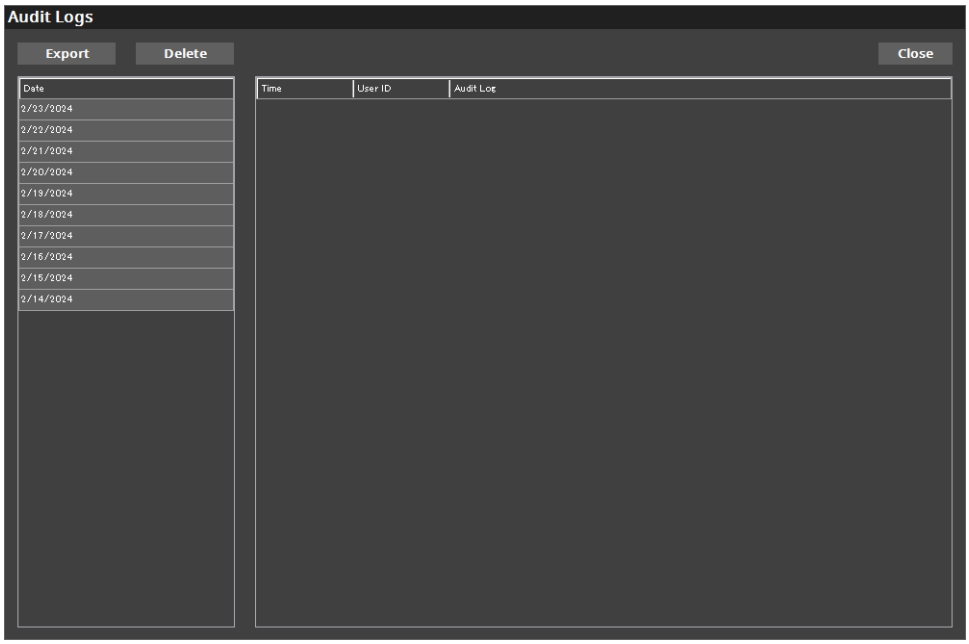
3 Select a date and audit logs are displayed.



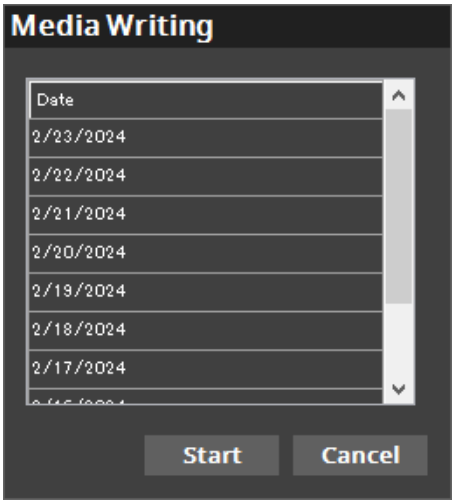
- **Export Audit Log**

1 Select a date to export. Multiple selections are available.

2 Click [Export].



3 The Media Writing window appears. Click [Start].



4 Start writing media.

17.7.4 Menus and DUP Configuration

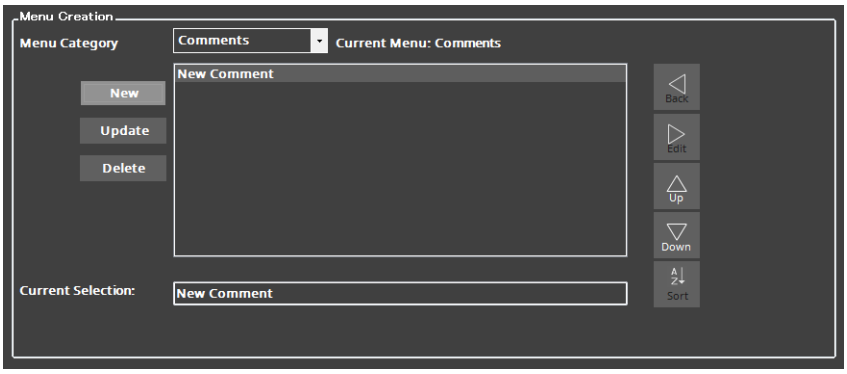
NOTE

Any changes you make to menus and DUPs do not take effect until you create a new study.

NOTE

Menus and DUP configuration is performed only on the Reference computer.

The [Menu Creation] group of the [Menus Configuration] tab enables the installation personnel and administrator to configure Fluoro, Rad, and Comment menus, and Fluoro and Rad Digital User programs (DUPs).



In the [Menu Category] list you can choose [Comments], [Fluoro], or [Rad] to configure the respective menus.

Configure the Comment Menu

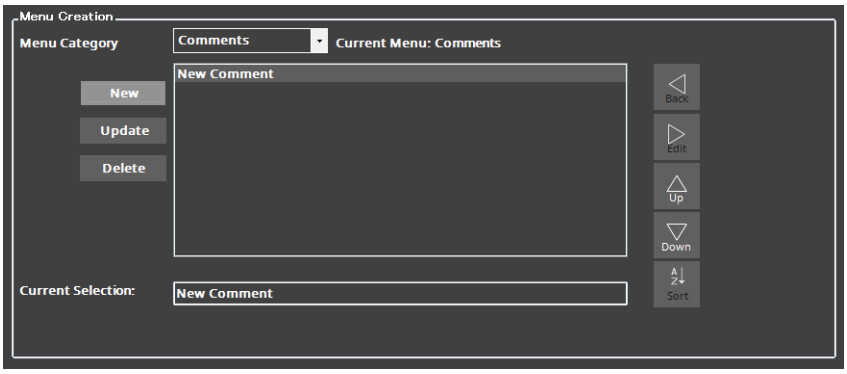
In DAR-9500f, the Comment menu can be displayed whenever a study is open for acquisition by clicking [Comm] on the side menu. The menu displays a list of standard comments about various aspects of the procedures performed.

The content of this menu is site-specific and is typically initially configured by the installation personnel according to customer wishes.

To configure the Comment menu, follow this procedure.

1 In the [Menu Category] list, choose [Comments].

The current Comments menu configuration is show below.



2 To add a new comment (up to 50 total), click [New].

The comment "New Comment" appears at the bottom of the list.

3 Select the [New Comment] item in the list, and then in the [Current Selection] box change the text "New Comment" to whatever you like.

(1 to 48 characters, excluding underscore “_”, back slash “\”, number “#”, equals “=”, angle brackets “<>”, and “:” colon)

4 Click [Update].

The comment list is updated with the new text of your comment.

5 Position the comment with [Up/Down] as desired.

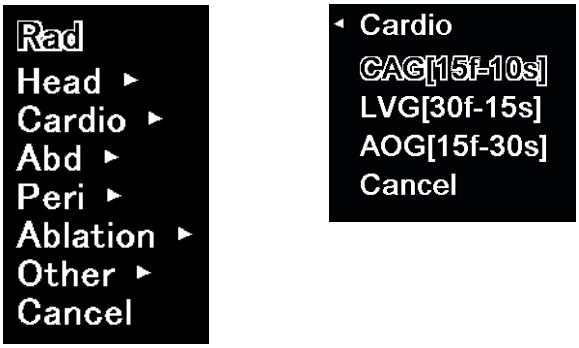
6 To sort comments in alphabetical order, click the [Sort] button.

7 To delete a comment, select it and then click [Delete].

8 When finished, click [Apply] to save your changes.

Configure Fluoro/Rad Menus and DUPs

In DAR-9500f, Fluoro and Rad menus enable the operator to quickly choose digital user programs (DUPs) that define exposure and acquisition characteristics. For example, a Rad menu, with its two levels shown.



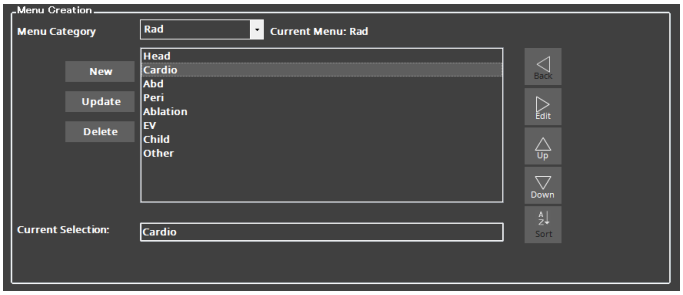
The Menu creator enables you to define menu item text and sequence for both menu levels, plus DUP parameters for second-level menu items. The menus created here are displayed by the operator when preparing to perform an acquisition. The content of these menus and associated DUP parameters are site-specific and are typically configured by the installation personnel according to customer wishes.

Configure Fluoro/Rad Menus

To configure Fluoro and Rad menus follow this procedure (except where otherwise noted, this procedure applies equally to Fluoro and Rad).

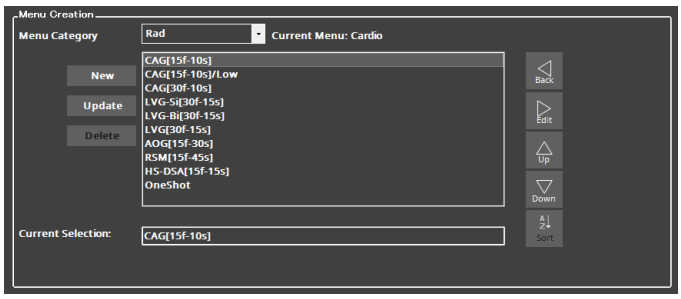
1 In the [Menu Category] list, choose either [Fluoro] or [Rad].

The current menu configuration (first level) is shown.



2 To see the second menu level, select a menu item and click [Edit].

The second level menu appears.



3 Each item on second-level menus has a set of Digital User Program (DUP) parameters associated with it.

For details on how to configure DUP parameters, see the next section "Configure Fluoro/Rad DUPs".

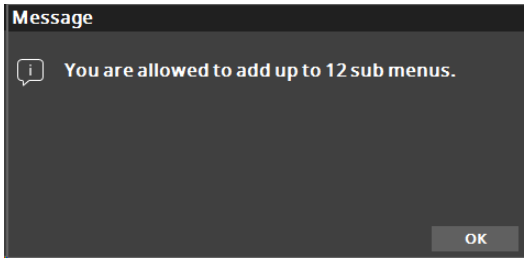
4 To position a menu item vertically, select it and then move it up or down with the [Up/Down] buttons.

5 To add a new menu item, first select an existing menu item whose DUP parameters most closely match the purpose of the new DUP and click [New].

A copy of the item is added to the menu item list. Select the new (copied) item and edit its text in the Current Selection box (1 to 48 characters, excluding underscore "_", back slash "\", number "#", equals "=", angle brackets "<>", and colon ":").

6 Click [Update]. Position the new item with [Up/Down] as desired.

A limited number of menu items are permitted at each level. If you attempt to add too many, a warning message similar to this is displayed. Either delete an unnecessary menu item and then click [New] again, or rename / modify an existing item.



7 To rename a menu item, select it, enter the new name in the Current box and then click [Update].

Although each menu can be up to 48 characters long, come characters will be truncated on the right side if the full menu name does not fit in one line. Therefore, after configuring menu names, verify that each name displays without truncation.

8 To delete a menu item, select it and then click [Delete].

The first menu item at each level is always present and cannot be deleted, however, it can be renamed.

9 To go back to a previous menu level, click [Back].

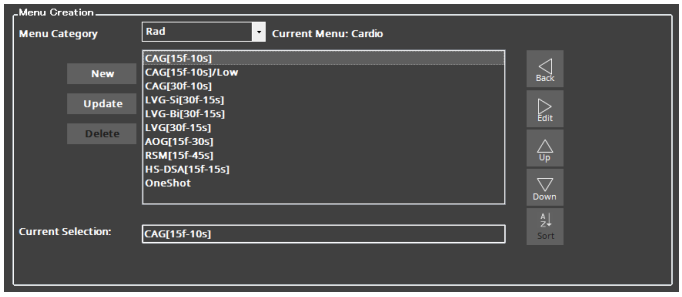
10 When finished, click [Apply] to save your changes.

Configure Fluoro/Rad DUPs

> **NOTE**
>
> It is a good practice to work on a copy of an existing good DUP rather than directly modifying the DUP. To do this, select the DUP to be copied, click [New], adjust or enter a new name in Current Selection, and then click [Update]. Then edit the copy with your new values.

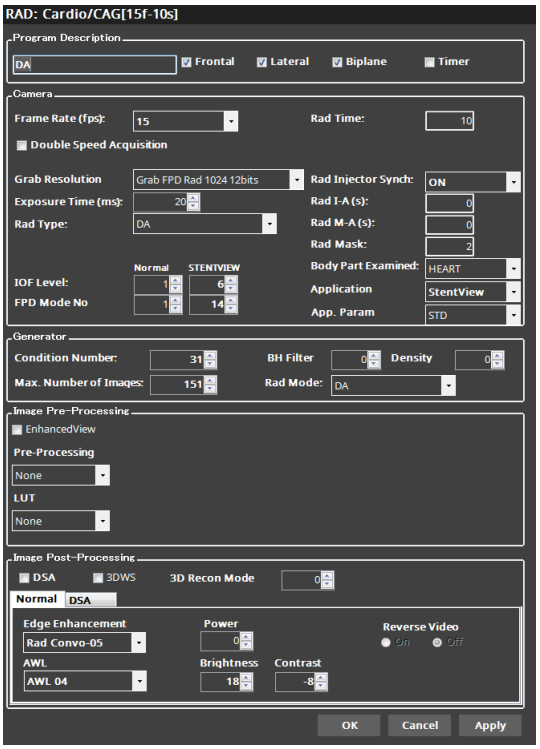
To configure Fluoro and Rad digital user programs (DUPs), follow this procedure (except where otherwise noted, this procedure applies equally to Fluoro and Rad).

1 Navigate (arrow keys or mouse) to the desired second-level menu item and click the [Edit] button.

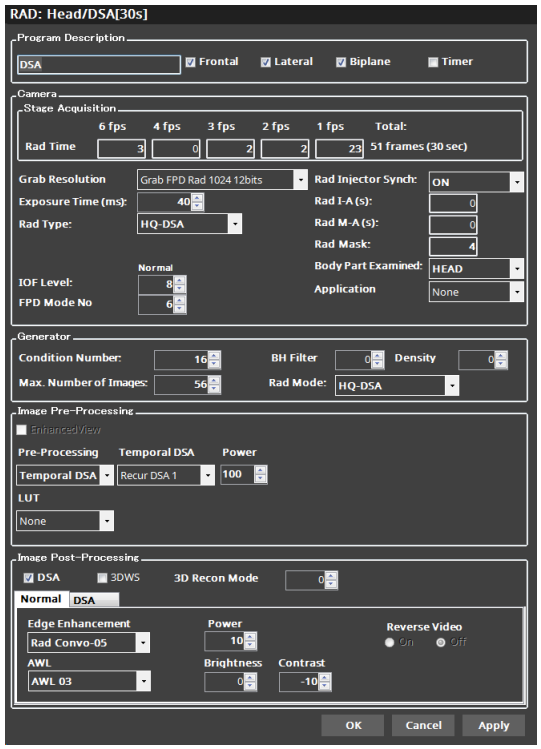


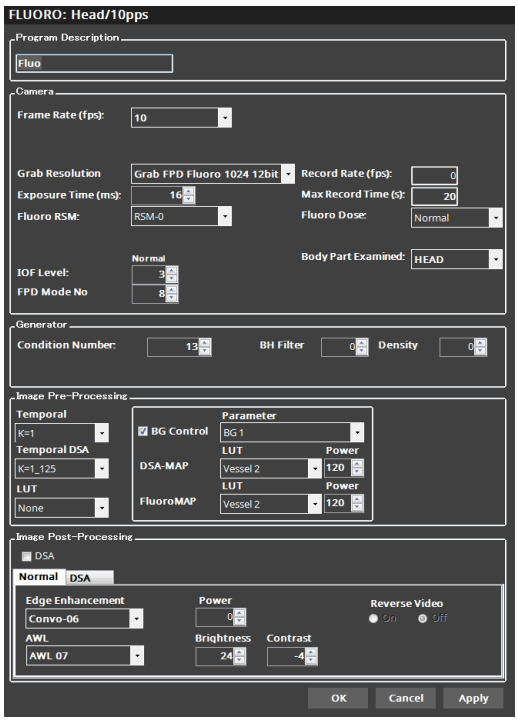
The DUP parameters are displayed like this (Rad and then Fluoro shown):

<RAD Type: Other then HQ-DSA>



<RAD Type: HQ-DSA>





2 Edit the DUP parameters as needed.

The purpose of each parameter is briefly described in the following table (differences between Fluoro and Rad parameters are indicated).

NOTE

DUP parameters only set the initial values to be used during subsequent acquisitions.

No	Group/Item	Description	R	F	Mod
1	Program Description	Defines the Acquisition Active message that is displayed in the upper-right area of the Image Viewer window during actual image acquisition (e.g., “DA”, “RSM”, or “Fluo”). During Direct Fluoro Record, the additional word “rec” is added to the right as in “Fluo rec”. (Any characters, except underscore “_”, back slash “\”, number “#”, equals “=”, and angle brackets “<>”).	○	○	○
2	Timer	The timer will start when acquisition starts. Use Timer button on the side menu or IVR NEO/IVR Shuttle/SMART Touch button to stop the timer.	○		○
Camera					
3	Frame Rate	The X-ray pulse rate in frames per second.	○	○	×
4	Double Speed Acquisition	Not used.	○		×
5	Grab Resolution	The acquisition image resolution (1024x1024 or 512x512) and bit depth.	○	○	×

No	Group/Item		Description	R	F	Mod
6	Exposure Time		The exposure time in milliseconds for the acquisition of one image.	○	○	×
7	Acquisition Plane (F/L/Bi)		The plane for which acquisition will occur: Frontal, Lateral, or Both	○		×
8	Rad Time		The total radiographic time in seconds, not including Spot.	○		×
9	Rad Type		The radiography type such as DA or DSA.	○		×
10	Rad Mask		For FPD Rad Mask. Sets the number of frames in the mask. (1 to 16)	○		×
11	Rad Injector Synch		Turns injection synchronization ON or OFF.	○		×
12	Rad I-A		The delay in seconds between injection and beginning of live acquisition.	○		○
13	Rad M-A		The delay in seconds between mask acquisition and beginning of live acquisition.	○		○
14	Fluoro RSM		RSM filter type: [RSM-0], [RSM-1], [RSM-2]		○	×
15	Record Rate		The maximum rate (frames per second) at which Fluoro can be recorded. (0 to Frame Rate (30 for Continuous).)		○	×
16	Max Record Time		The maximum number of seconds that Fluoro can be recorded for one acquisition.		○	○
17	Fluoro Dose		Dose mode: Normal, Low, or High.		○	×
18-1	Stage Acquisition	Exposure Time	Rad Time (sec) for each frame rate. If "0" is set, the frame rate will not be used.	○		○
18-2		Total Number of Exposure	Total number of exposure of all frame rate. For 3fps and over acquisition rate, total number of exposure is limited to 90. For all frame rate, total number of exposure is limited to 150. No exposure will be performed for more than those limited number of times.	○		○
19	IOF Level		Not used.	○	○	×
20	FPD Mode No.		Specifies the acquisition table number. Usually do not modify.	○		×
21	Sub		Not used.	○		×
22	Body Part		Selects the body part where to be studied.	○		×
23	Application		Set an application (option) to be used.	○		×
Generator						
24	Condition number		Generator Program Number. (0 to 255)	○	○	×
25	Max. number of Images		Specifies the maximum number of images (frames) that can be acquired during one acquisition for this program, regardless of how long the exposure switch is pressed. (0 to 1023)	○		○
26	BH Filter		Specify the low energy X-ray reduction filter. “0” is the system standard.	○		×
27	Rad Mode		Not used.	○		×

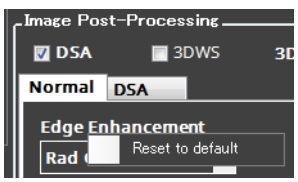
No	Group/Item		Description	R	F	Mod
28	Density		Specify Input Dose for FPD. Change approximately 15% in one step. “0” is the system standard.	○		×
Image Pre-Processing						
29	EnhancedView		This function is not available.	×	×	×
30	Pre-Processing		Enables image pre-processing filters such as Temporal, Temporal DSA and Fluoro Map. Choose [None] to disable pre-processing. Image pre-processing is applied to the images as they are being acquired, before saving.	○	○	×
31	Filter	Temporal	Temporal filtering can be selected to reduce image noise with a sliding-window-averaging technique. The [Power] value (-100 to 100) controls filter behavior. A value of -100 means only the previous temporal result is used, 0 means 50 % of the previous temporal result plus 50 % of the current image are used, 100 means only the current image is used (same as no temporal filtering). Useful range is from -20 to 90. Each time you choose an item from the list, the corresponding default [Power] value is selected.	○	○	×
32		Temporal DSA	As same as [Temporal], but optimize for FluoroMAP.		○	×
33	LUT		The [LUT] list provides several predefined LUT values used to control how images are compensated to achieve better quality. [Reverse Video] can be enabled if desired. Each time you choose an item from the [LUT] list, the corresponding default [Reverse Video] setting is selected.	○	○	×
34	BG Control		Select parameters for the background image used for MAP function.		○	×
35	Vessel LUT		Select from the list setting LUT and a power apply to the mask image used for Fluoro MAP, SIMAP (LIVE) and SIMAP (Sub).		○	×
Image Post-Processing						
36	Image Post-Processing		Enables image post-processing that is applied to the image as they are being displayed. This processing generally does not change the image files.	○	○	×
37	DSA		Enables DSA image processing.	○	○	×
38	3DWS		Enable the necessary image post-processing to prepare images for transmission to a 3D workstation. This post-processing makes image files that are compatible with the 3D workstation.	○		×
39	3D Recon Mode			○		×
40	Filter, Edge Enhancement		Images can be made to appear sharper by applying Unsharp mask filtering or Convolution filtering. The Edge Enhancement list contains several predefined filters such as [Unsharp 1]. The [Power] value (-100 to 100) defines the strength of the selected filter. Negative values smooth the image, and positive values sharpens the image. Each time you choose an item from the [Edge Enhancement] list, the corresponding default [Power] value is selected.	○	○	×

No	Group/Item		Description	R	F	Mod
41	Auto Window Level	AWL	Auto Window Level provides advanced automatic Brightness/Contrast optimization. The [AWL] list provides several predefined Auto Window Level configurations. The AWL None choice corresponds to Auto Window Level not active (as when the Auto W. Level button on the Reference monitor side menu is not pushed.) All other choices correspond to Auto Window Level Active (as when the [Auto W. Level] button on the Reference side menu is pushed.) Each time you choose an item from the AWL list, the corresponding initial Brightness and Contrast values are selected.	○	○	×
42		Brightness	Set a number in the -100 to 100 range.	○	○	×
43		Contrast	Set a number in the -100 to 2000 range (notice the different maximum than that of Brightness).	○	○	×
44	Auto Window Level DSA	DSA AWL	Auto Window Level DSA provides advanced automatic Brightness/Contrast optimization. The [AWL] list provides several predefined Auto Window Level DSA configurations. The [AWL None] choice corresponds to Auto Window Level DSA not active (as when the [Auto W. Level] button on the Reference monitor side menu is not pushed.) All other choices correspond to Auto Window Level DSA Active (as when the [Auto W. Level] button on the Reference side menu is pushed.) Each time you choose an item from the [AWL] list, the corresponding initial [DSA Brightness] and [DSA Contrast] values are selected.	○		×
45		DSA Brightness	Set a number in the -100 to 100 range.	○		×
46		DSA Contrast	Set a number in the -100 to 2000 range (notice the different maximum than that of Brightness).	○		×
47		Mask Weight	Set the default of mask factor in subtraction.	○		×
48		Mask Integration	Set the number of frames for integrating mask.	○		×

R= Parameters apply to Rad DUP, F= Parameters apply to Fluoro DUP

3 Most of DUP parameters have default values.

Right-click DUP parameter to display [Reset to default] button, and click to reset to default value.



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Chapter 18

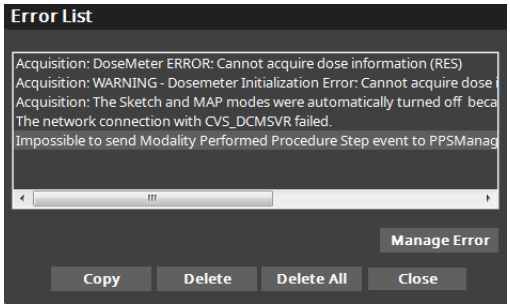
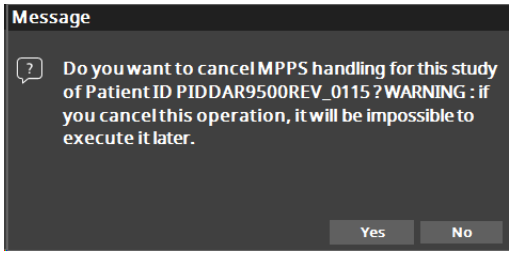
Troubleshooting

This chapter provides information on what to do if trouble is encountered while using the system.

Description

18.1 Error Messages

If you see one of the following error messages on the system monitor, take the suggested action to resolve the problem.

No.	Message	Action
1	An error occurred during cache space reservation.	If you operate with CD storage, write any unsaved data to the CD. If not, please contact our service representative.
2	No available cache.	
3	Burn Operation Failed.	Insert a blank CD-R and re-execute the operation.
4	Can not retrieve media information.	Confirm whether the media is inserted properly.
5	Cannot write DICOMDIR to CD-R (DVD-R). No patient has been added.	Confirm that writable media is inserted.
6	Character <*x*> is not valid. "<*x*>" represents variable information.	Try other characters.
7	Could not find the PPS Manager. Please configure your PPS Manager in the hosts table.	Please contact our service representative.
8	Error: Invalid query criteria entered.	Input an appropriate value.
9	No DICOM media found in drive <*x*>.	Insert DICOM media.
10	Cannot send MPPS of patient xxxx to MPPS manager xxxx.	Check communication with MPPS manager. To cancel retry of MPPS support, click ⚠ at the bottom menu.  Select an error of MPPS support in the Error List and click [Manage Error]. And click [Yes] on a dialog.  

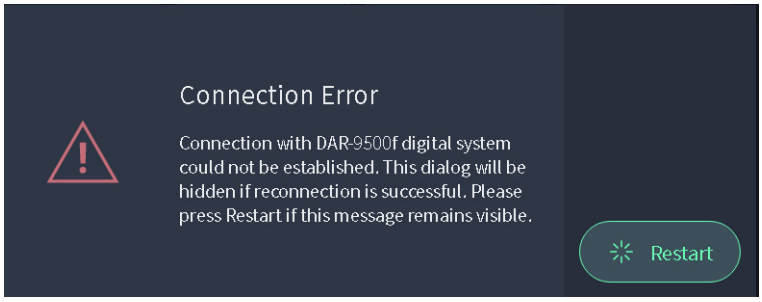
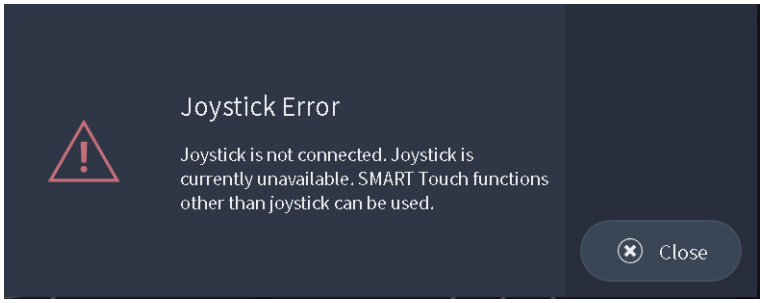
Error Messages Related to FPD

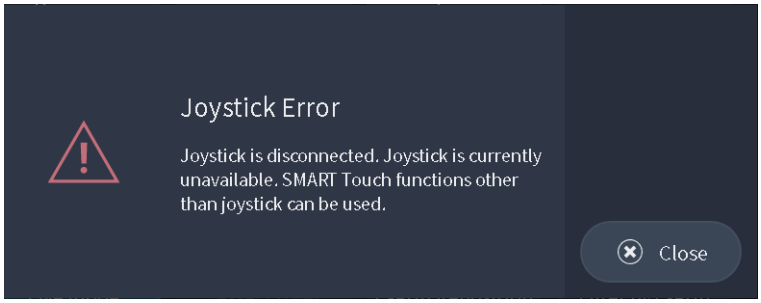
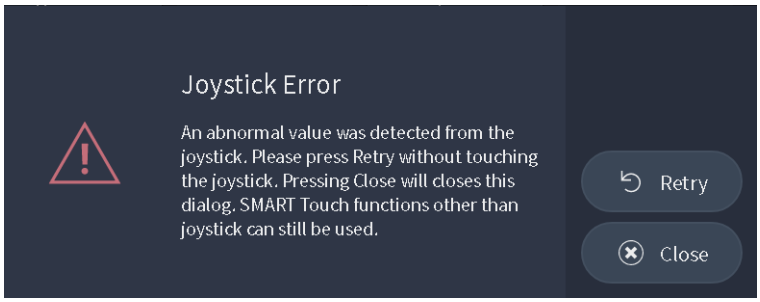
When “FPD ERROR” is displayed at upper left of the system monitor, errors in the following list are also displayed. If an error message related to FPD is displayed, stop study immediately and contact Shimadzu service representative.

No.	Message	Description	Action
1	[Cooling Unit]: Water flow error	Error of FPD cooling unit water flow.	Stop study immediately and contact Shimadzu service representative.
2	[Sensor]: Temperature error	Error of sensor chassis temperature.	Stop study immediately and contact Shimadzu service representative.
3	[HV/DC Power]: Emergency shutdown	FPD shut down immediately. Fluoroscopy and radiography become disabled.	Stop study immediately and contact Shimadzu service representative.
4	[Cooling FAN-1]: Error detected	Error of FAN cooling ISYS and IOF board.	Please contact our service representative.
5	[Cooling FAN-2]: Error detected	Error of FAN cooling ISYS and IOF board from the back of a front panel of DAR cabinet.	Please contact our service representative.

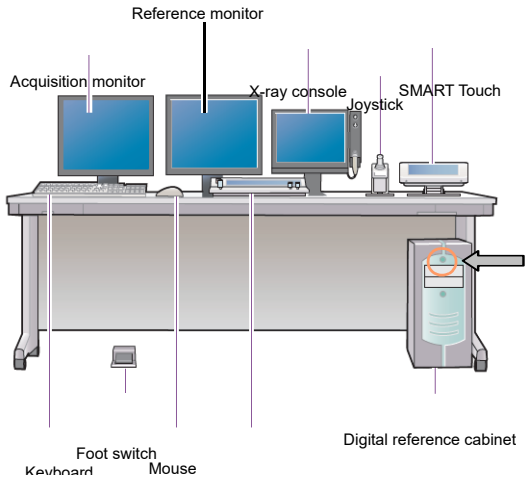
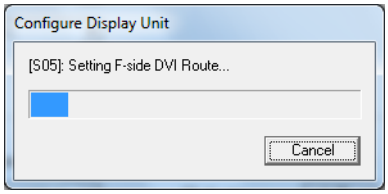
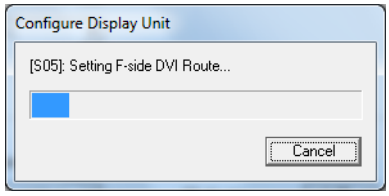
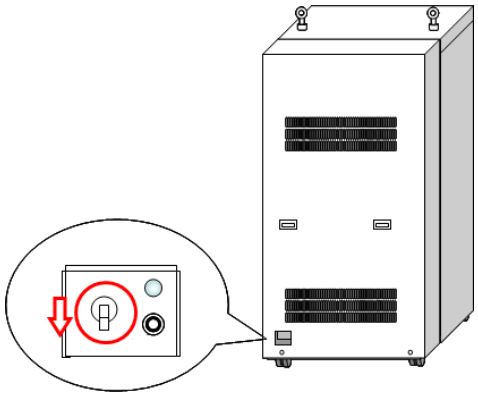
Error Messages Related to SMART Touch

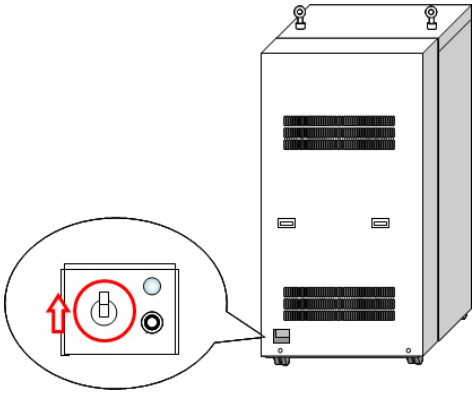
If an error message related to SMART Touch is displayed on the SMART Touch, contact Shimadzu service representative.

No.	Message	Action
1		If the Connection Error message is still displayed on the SMART Touch after reboot the application, reboot the system. If it does not solve the problem, contact Shimadzu service representative.
2		Touch [Close] and the SMART Touch functions other than joystick can be used. To use joystick, contact Shimadzu service representative.

No.	Message	Action
3		Touch [Close] and the SMART Touch functions other than joystick can be used. To use joystick, contact Shimadzu service representative.
4	 	Touch [Close] and the SMART Touch functions other than joystick can be used. If error occurs though touching [Retry], contact Shimadzu service representative.

18.2 Startup the System

Problem	Action
The power of monitor in the control room is not turned on, even turn ON the power of the system.	Press the power of digital reference cabinet. 
A progress bar in [Configure Display Unit] dialog displayed on the Acquisition monitor does not proceed.  	Turn on the power supply of digital acquisition cabinet according to the following procedure. *1* Press [Cancel] on the [Configure Display Unit] dialog.  *2* Turn OFF the breaker of digital acquisition cabinet in the equipment room. And then wait approximately 60 seconds. 

Problem	Action
	3 Turn ON the breaker of digital acquisition cabinet in the equipment room. Check that Cine Area Zoom operates normally.  • Cine Area Zoom • LIDM

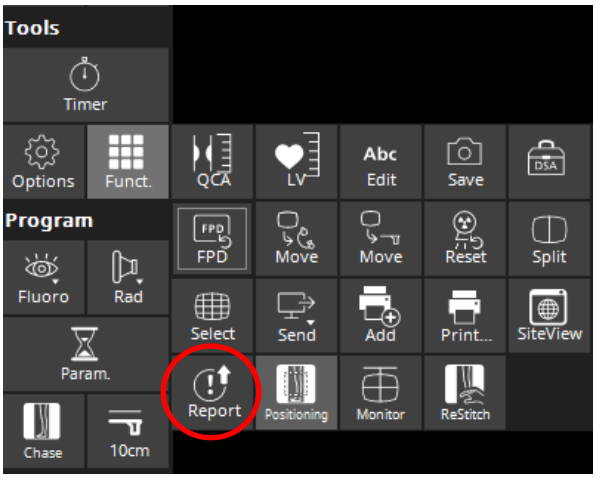
18.3 Error Report

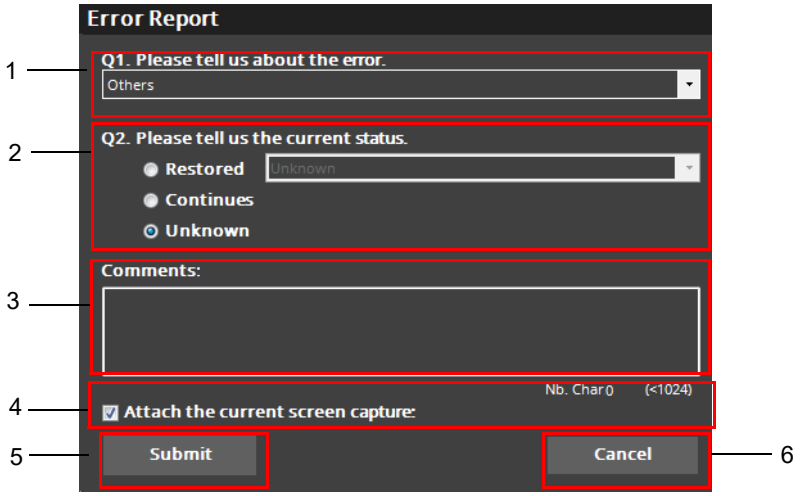
> **NOTE**
>
> Making a contract with remote maintenance is necessary to enable Error Report.

Errors and screen capture will be reported when error occurs while using the system.

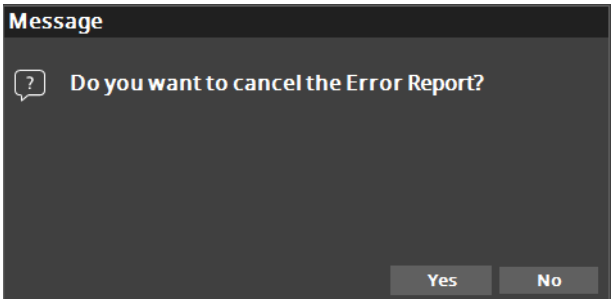
1 Click [Funct.]-[Report] on the side menu of REF monitor.

[Error Report] window is displayed.



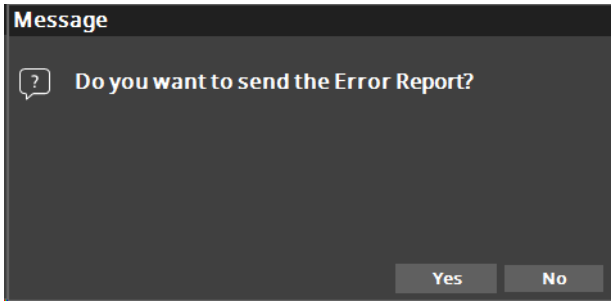


No.	Item	Description
1	Q1. Please tell us about the error.	Select an error from the followings: • Acquired image is abnormal • Troubles occurred on the C-Arm or the catheterization table • No X-rays are exposed • Others

No.	Item	Description
2	Please tell us the current status.	Select the current status from the followings: • Restored • Continuous • Unknown And if [Restored] is selected, select recovery procedure from the followings: • Cabinet breaker ON/OFF • Reboot the system • Reboot the application • Restore spontaneously • Unknown
3	Comments:	Input error description.
4	Attach the current screen capture:	Check this item to capture the image displayed on ACQ and REF monitor. Include an annotation for screen capture. NOTE Captured screen may include personal data.
5	Submit	Send an error report.
6	Cancel	Cancel input description and close [Error Report]. 

2 Input necessary information and click [Submit].

3 Confirmation message is displayed. Click [Yes].



Click [No] to cancel the sending of an error report.

NOTE

An error report could not send if a message of [The connection with the server is not established yet.] is displayed after sending the report. Please contact our service representative.

NOTE

For an emergency contact for serious trouble, please contact our service representative by phone.

NOTE

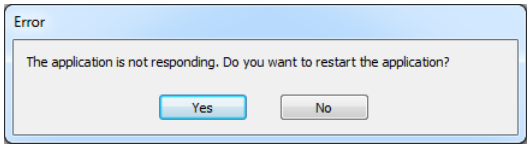
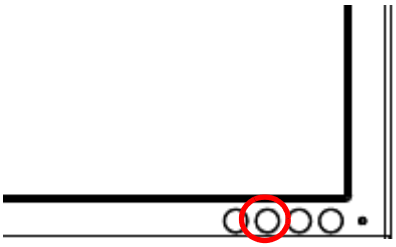
An error report may not send due to the communication line trouble. If no response from our service representative, please contact by phone.

18.4 Unable to Sign In

If you are unable to sign in while the cybersecurity is enabled, do the following:

- Able to contact with the system administrator
  Have the administrator change the password.
  ☞"• Edit User Account" P.17-63
- Unable to contact with the system administrator
  ☞"3.2.6 Emergency Sign In" P.3-8

18.5 Other

Problem	Action
The mouse pointer is locked within one mirror.	Press the keyboard [Scroll Lock] key to de-activate the function.
Unknown errors are displayed. 	Application is not responding. Click [Yes] and restart the application.
The screen became black. Something like a grayscale image is displayed on the monitor.	Press the second button from the left on the lower-right corner of the monitor. 
Unable to use SMART Touch. Unable to use a joy stick of SMART Touch.	Press the power supply button on the back of SMART Touch and turn off the power. And when the screen display of SMART Touch disappeared, turn on the power of SMART Touch to startup.

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Chapter 19

Maintenance

This chapter describes how to maintain the system and includes the following.

Description

19.1 Introduction

Maintenance of the system allows for vivid diagnostic images while assuring safety of the operator and patient.

The system is shipped in optimum condition through quality management and inspections. Regular maintenance is necessary to maintain the condition of the system.

The preventive inspection is classified as follows.

No.	Type		Performance	Maintenance Cycle
1	Daily Maintenance	Startup Maintenance	Operator	Daily (before operation)
		Post-operation Maintenance	Operator	Daily (after operation)
2	Periodic Maintenance	Calibration	Operator	Every 3 months
		Preventive Maintenance	Service Representative	Every 6 months

19.2 Daily Maintenance

The daily maintenance involves the startup and post-operation maintenance. The daily maintenance allows for longer duration of the product.

Startup maintenance procedures and finishing operations described in this section should be followed.

19.2.1 Startup Maintenance

Purpose

The startup inspection, prior to operations, is necessary for perfect and trouble-free performance during examination of patients.

Procedures

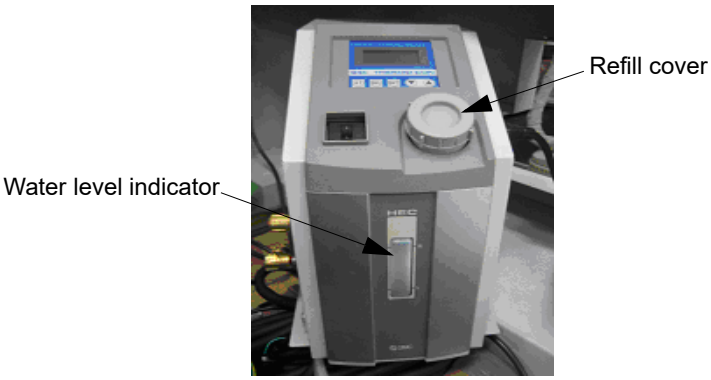
Follow the instruction below.

1 Visually check for the following.

No.	Check Point	Procedure
1	Pinched, twisted or stripped cables	Fix or repair as required.
2	Damage on chassis or cable	Check visually and if something is wrong, contact Shimadzu Service Representative.

2 Check the FPD Cooling System as follows. The FPD Cooling System is located in equipment room.

No.	Check Point	Procedure
1	Temperature displayed in front of the Cooling System must be 30 + 1°C.	If the displayed temperature is not within specified limits, contact Shimadzu Service Representative.
2	There is enough water in the tank.	Replenish with specified distilled water about once a month. (P/N:502-40086, Container for Distilled Water, 1L). The appropriate solution level must be between the two level indicators. The system does not operate if the solution level is below the low-level indicator.
3	Temperature and humidity of the examination and equipment room must be within the following: Temperature: 10 to 35°C (examination room) 10 to 35°C (equipment room) Humidity: 15 to 75%	If temperature or humidity is not within specified, condensation may occur. Adjust temperature of air-conditioning.



HEC002-A5B

3 Turn the power ON.

4 Verify that the system is operating normally by checking for the following.

No.	Check Point	Procedure
1	No error messages on both the Acquisition and Reference monitors.	If there is an error message, refer to Chapter 13 Troubleshooting. If you are unable to resolve the problem, contact technical support.
2	Fluoroscopy images are displayed.	Make sure that fluoroscopy images are properly displayed on monitors. If there is an error message, refer to Chapter 13 Troubleshooting. If you are unable to resolve the problem, contact technical support.
3	Radiography images are displayed.	If a dummy patient does not exist, create one. Use the dummy patient to make sure that radiography images are properly displayed on monitors. If there is an error message, refer to Chapter 13 Troubleshooting. If you are unable to resolve the problem, contact technical support.

19.2.2 Finishing Operations

This section describes the post-operation maintenance.

Post-operation Maintenance

Check the following when finishing operations.

No.	Check Point	Procedure
1	Dust or dirt is not removed.	Remove

19.3 Periodic Maintenance

Periodic maintenance includes calibration which is performed by a technician and preventive maintenance performed by the Shimadzu Service Representative.

19.3.1 Calibration

Automatic FPD calibration is supported to the system. Manual calibration is not necessary, so follow the instruction below when manually calibrating the system.

FPD Calibration

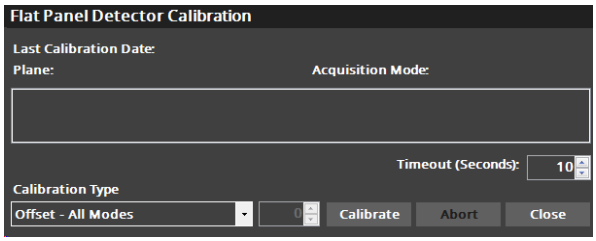
1 Click [Funct]-[FPD] on the side menu.

The Flat Panel Detector Calibration dialog box appears.

2 Make sure that the [Timeout] value is set to 10 seconds.

This defines the maximum number of seconds to wait before canceling if there is a problem communicating with the FPD.

3 Select [Offset-All Modes] in the [Calibration Type] list.



4 When ready, click [Calibrate] button.

Calibration progress messages are displayed. The Acquisition Mode item indicates the mode being calibrated. Completion messages are displayed when calibration is completed. Completion messages are displayed when calibration is completed. After the calibration, select the fluoroscopy mode which will be used for the first study.

5 If you must interrupt the calibration before it finishes, click [Abort] button, then click the [Close] button to close the window.

You must later re-do the calibration before performing acquisitions.

NOTE

Calibration data is not updated if you click the [Cancel] button.

19.3.2 Preventive Maintenance

Preventive maintenance is performed by the Shimadzu Service Representative. This maintenance requires sufficient knowledge of the internal mechanism and is hazardous.

The maintenance is performed every 6 months and will be charged after the guarantee expires.

Periodic Part Replacement

To maintain system performance, some parts must be periodically replaced. Part replacement must be performed by a Shimadzu Service Representative.

Parts that require periodic replacement are shown as follows:

Part	Part No.	Rated Voltage	Rated Current	Type	Interrupt Rating	Qty	Replace-ment period (year)
Digital Acquisition Cabinet							
Fuse, FLM30	072-01659-88	250 V	30 A	Slow Blow	10,000 A@ 250 VAC	2	2
Fuse, FLM10	072-01659-83	250 V	10 A	Slow Blow	10,000 A@ 250 VAC	2	2
Battery Unit, RBC6L	074-81311-25	-	-	-	-	1	2
Power Supply, SUA1500JB	074-81311-09	-	-	-	-	1	5
Battery Unit, BNB300S	074-81330-71	-	-	-	-	1	2
Power Supply, BN150S	074-81330-03	-	-	-	-	1	5
Battery, CR2032H	074-73306-08	-	-	-	-	2	2
HDD	-	-	-	-	-	1	5
IOF FAN2 ASSY F	565-13125-01	-	-	-	-	1	5
I-SYS FAN2 ASSY F	565-13126-01	-	-	-	-	1	5
Digital Acquisition Cabinet Lateral							
Fuse, FLM30	072-01659-88	250 V	30 A	Slow Blow	10,000 A@ 250 VAC	2	2
Fuse, FLM10	072-01659-83	250 V	10 A	Slow Blow	10,000 A@ 250 VAC	2	2
IOF FAN2 ASSY L	565-13125-02	-	-	-	-	1	5
I-SYS FAN2 ASSY L	565-13126-02	-	-	-	-	1	5
Digital Reference Cabinet							
Fuse, 314 015	072-01670-16	250 V	15 A	Fast Blow	750 A@ 250 VAC	1	2
Battery, CR2032H	074-73306-08	-	-	-	-	1	2
Mouse	-	-	-	-	-	1	5

Part	Part No.	Rated Voltage	Rated Current	Type	Interrupt Rating	Qty	Replace-ment period (year)
Keyboard	-	-	-	-	-	1	5
HDD	-	-	-	-	-	1	5
Integrated Cabinet							
Fuse, FLM30	072-01659-88	250 V	30 A	Slow Blow	10,000 A@ 250 VAC	2	2
Fuse, FLM315	072-01659-85	250 V	10 A	Slow Blow	10,000 A@ 250 VAC	2	2
Fuse, FLM10	072-01659-83	250 V	10 A	Slow Blow	10,000 A@ 250 VAC	2	2
HDD	-	-	-	-	-	1	5
IVR NEO							
WATERPROOF COVER NEO	503-63823	-	-	-	-	1	1
FPD Cooling System							
Container for Anti-freezing solution, 10 L	502-40190	-	-	-	-	1	2
Container for Distilled Water, 1 L	502-40086	-	-	-	-	1	2
Transformer Box (Option)							
Fuse, FLM30	072-01659-88	250 V	10 A	Slow Blow	10,000A@ 250 VAC	1	2
Fuse, FLM20	072-01659-86	250 V	10 A	Slow Blow	10,000A@ 250 VAC	4	2
Fuse, FLM10	072-01659-83	250 V	10 A	Slow Blow	10,000 A@ 250 VAC	2	2
ECP							
Fuse, 0326010.XP	072-01665-34	250 V	10 A	Slow Blow	300 A@ 250 VAC	1	2
Intercom (Option)							
Fuse, 313 002P	072-01664-26	250 V	2 A	Slow Blow	100 A@ 250 VAC	2	2

NOTE

For IVR NEO and FPD cooling system, refer to the part number start with “56~” for RoHS.

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Chapter 20

Appendix

Description

20.1 DICOM Concepts

This section provides basic DICOM conceptual information.

20.1.1 The DICOM Standard

DICOM is a communications and data encoding standard that provides interoperability between vendors. The DICOM standard specifies how to communicate data between stations rather than the type of data or how it is used.

To further understand DICOM, it is helpful to answer several key questions:

- **What is the DICOM standard?** The DICOM (Digital Imaging and Communications in Medicine) standard is a set of rules that allow medical images and associated information to be exchanged between imaging equipment, computers, and hospitals. The standard establishes a common language that permits medical images and information produced on one vendor's machine to be available for use on the digital system of another vendor.
- **Who wrote the DICOM Standard?** The DICOM Standard has evolved over the past ten years through meetings between medical imaging company representatives (represented through the National Electrical Manufacturers Association, NEMA) and representatives from major medical societies, including the American College of Cardiology, American College of Radiology, American Society of Echocardiography, European Society of Cardiology, and American Society of Cardiology.
- **Is compression of image data part of the standard?** Several compression schemes are defined in DICOM, but are limited by modality (X-ray, CAT, MRI, ultrasound). JPEG (Joint Photographic Experts Group) lossless compression, allows perfect reconstruction of the original image. It is mandated by the standard for cardiac angiography. JPEG lossy compression, which does not support perfect reconstruction, is a currently defined option only for echocardiography interchange; echocardiography also allows lossless data.
- **Can the exchange of digital images be standardized?** Concerned about incompatibility, members of the ACC, ASE, ESC and ASNC, working with the ACR-NEMA DICOM Standard committees began in 1992 to work on extensions to the standard to enable exchange of digital X-ray angiographic, echocardiography, and nuclear cardiac images. Each working group has recommended CD-R as an exchange medium because CD-R is non-erasable, sturdy, and easily obtained by both manufacturers and users. This allows each of these imaging modalities to be exchanged either separately or with each other, depending on the particular implementation of the standard.

Parts of this section are extracted from ACC's printed views on DICOM and the CD-R exchange media standards.

20.2 Glossary

All information in this glossary is provided in the context of medical imaging and this product.

ACC	The American College of Cardiology.
ACR	The American College of Radiology.
Cache	A special reserved area on a hard disk that the product uses to temporarily store images and information.
Cath	Cardiac Catheterization.
CAU	Cranio-Caudal Projection.
CCD	Charge-coupled device. A light-sensitive semiconductor device used in digital image capture.
CD **CD-ROM** **CD-R**	Often used interchangeably, Compact Disc and Compact Disc Read only Memory can only be read and are produced in a pressing plant. Compact Disc Recordable (CD-R) discs can be written to in a computer drive but cannot be erased.
Cine Run (loop)	Video (multi-frame) images captured by medical imaging equipment.
CRA	Caudo-Cranial Projection.
DA	Digital Angiography.
Diastole	The dilation (expansion) of the heart chambers that occurs after contraction. Also referred to as “End Diastolic” state.
DICOM	Digital Imaging and Communication in Medicine, is a set of rules that allow medical images and associated information to be exchanged between imaging equipment, computers, and hospitals.
DSA	Digital Subtraction Angiography. A technique used to virtually remove constant structures of no diagnostic interest, enabling enhanced blood-vessel contrast.
ESC	European Society of Cardiology.
FPD	Flat Panel Detector.
Grayscale (Monochrome)	Black, white, and gray images that can have, for example, 256 unique shades with eight-bit data.
HIS	Hospital information system.
IHE	Integrating the Healthcare Enterprise.
JPEG	Joint Photographic Experts Group, defines a set of standards for compression of still images and video (multi-frame) images.
LAO	Left Anterior Oblique.
LIDM	Live Image During Map
Lossless Compression	Digital compression in which data loss never occurs. Original data (image) condition is achieved after decompression.
Lossy Compression	Digital compression which in not fully reversible but typically allows images to retain sufficient detail for analysis.

LUT	Look Up Table (used for brightness / contrast compensation).
LVA	Left Ventricular Analysis.
MR / MRN	Medical Record / Medical Record Number.
MWM	Modality Worklist Management.
NEMA	National Electrical Manufacturers Association.
PPS	Performed Procedure Step.
QCA	Quantitative Coronary Analysis.
RAO	Right Anterior Oblique.
RDSR	DICOM Radiation Dose Structure Report
RSM-DSA	Real-time Smoothed Mask Digital Subtraction Angiography.
Stenosis	An undesired narrowing of a patient's blood vessel.
Stent	A small tubular medical apparatus permanently inserted in a patient's blood vessel to prevent undesired narrowing.
Systole	The contraction of the heart chambers as blood is pumped into the aorta from the left ventricle and into the lungs from the right ventricle. Also referred to as "End Systolic" state.