

GE Healthcare

# **SITE-PLANNING MANUAL**

Precision 600FP



**DREX-KL80**  
SITE-PLANNING MANUAL  
**2A305-690EN\*1**  
**5756081-1EN Rev.7**

© 2016 General Electric Company  
All rights reserved.

**IMPORTANT!**

1. No part of this manual may be copied or reprinted, in whole or in part, without written permission.
2. The contents of this manual are subject to change without prior notice and without our legal obligation.
3. The contents of this manual are correct to the best of our knowledge. Please inform us of any ambiguous or erroneous descriptions, missing information, etc.

<b>Revision History</b>			
Revision	Date	Reason for change	Page changed
5756081-1EN Rev.1	13Jul2016	Initial release 2A305-690EN	-----
5756081 Rev.1	22Nov2016	Addition of options, correction of space requirement	All pages
5756081 Rev.2	15Jun2017	<ul style="list-style-type: none"> <li>• Addition of options HDRK-HSFPD and HDRK-DATABK</li> <li>• Addition of XART-001A</li> </ul>	P. 9
5756081-1EN Rev.2	28Feb2018	Addition of options HDRK-REF and XACC-001A	P. 9
5756081 Rev.3	29Jun2018	Change of OEM DOC No.	All pages
5756081 Rev.4	31Oct2018	Addition of option FSW-20K	P. 9
5756081 Rev.5	01Jan2020	Correction of description concerning HDR-08A	P. 82
5756081 Rev.6	01Jan2020	<ul style="list-style-type: none"> <li>• Change BLR-15AA to BLR-1000A</li> <li>• Addition of option XGST-103B</li> </ul>	
5756081 Rev.7	03Feb2020	Change of Interunit Cable Connection	P. 60 to 68, 71
5756081-1EN Rev.7	03Apr2020	Addition of VFRS-3000A	

# Safety Precautions

## 1. Meaning of Signal Words

In this manual, the signal words **DANGER**, **WARNING**, and **CAUTION** are used to indicate safety and other important instructions. The signal words and their meanings are defined as follows. Please understand their meanings clearly before reading this manual.

Signal word	Meaning
 <b>DANGER</b>	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 <b>WARNING</b>	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 <b>CAUTION</b>	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
<b>CAUTION</b>	Indicates a potentially hazardous situation which, if not avoided, may result in property damage.

In addition to the above, the signal word **NOTE** is used to indicate other important information.

<b>NOTE</b>	Indicates reference information that enables more efficient use of the equipment.
-------------	---

CONTENTS

	Page
Safety Precautions -----	4
1. INTRODUCTION -----	7
1.1 Scope of Application -----	7
1.2 Outline -----	7
2. CONFIGURATION -----	8
2.1 Standard Configuration and Accessories -----	8
2.2 Options -----	9
3. REQUIRED SPACE FOR THE SYSTEM LAYOUT -----	10
3.1 Required Space for the System Layout -----	10
3.2 Rail Cut Condition -----	14
4. MAIN SYSTEM SPECIFICATIONS RELATED TO INSTALLATION PLANNING-----	16
4.1 Classification-----	16
4.2 Grounding -----	16
4.3 Operating Environmental Conditions-----	16
4.4 Installation Conditions -----	17
4.5 Installation Position-----	17
4.5.1 Selection of the installation position -----	17
4.6 Ceiling Conditions -----	17
4.6.1 Ceiling height of the room -----	17
4.6.2 Ceiling conditions for OTC system-----	19
4.7 Floor Conditions-----	20
4.8 Wall Conditions-----	20
4.9 Radiation Protection-----	21
4.10 Interference Conditions-----	21
4.11 Power Facility Requirements -----	21
4.12 Door Interlock-----	25
4.13 Air-Conditioning Requirements-----	25
5. OUTLINE AND RANGE OF WORK-----	26

- 5.1 Work To Be Performed by the User -----26
- 5.2 Work To Be Performed by Our Company-----26
- 6. WORK TO BE PERFORMED BY THE USER-----27
  - 6.1 Facility Work -----27
- 7. WORK TO BE PERFORMED BY OUR COMPANY -----48
  - 7.1 Determining the Bringing-In Method -----48
    - 7.1.1 Standard packed state -----48
    - 7.1.2 OTC system packed state-----52
    - 7.1.3 Vertical radiography stand packed state-----54
  - 7.2 Securing the Gantry, the Cable Stand, the Cabinet, and the Vertical Radiography Stand ----56
  - 7.3 Interunit Cable Connection -----70
    - 7.3.1 Interunit cable lengths (connection diagram)-----70
- 8. TRANSPORTATION BEFORE INSTALLATION AND STORAGE ENVIRONMENTAL  
CONDITIONS-----86
  - 8.1 Transportation and Storage Environmental Conditions -----86
- 9. APPENDIX -----87
  - 9.1 Outline Drawing -----87
  - 9.2 System Layout (Recommended room size)----- 101
  - 9.3 Interference Diagram ----- 105
  - 9.4 Clear Zone----- 106
    - 9.4.1 Clear Zone for X-ray diagnostic table ----- 106
    - 9.4.2 Ceiling Clear Zone ----- 107
  - 9.5 Tools Required for Checks ----- 108
  - 9.6 Installation Check Sheet ----- 109
  - 9.7 User Information ----- 110
  - 9.8 Process Schedule ----- 111

## 1. INTRODUCTION

### 1.1 Scope of Application

This manual describes the site planning requirements and procedures for the diagnostic X-ray system Precision 600FP (DREX-KL80).

### 1.2 Outline

This manual describes the system layout requirements and provides other information related to planning for the installation of the Precision 600FP (DREX-KL80). This manual is intended for use by engineers in charge of installation planning at overseas subsidiaries and distributors.

Refer to the installation manual for detailed information.

X-RAY DIAGNOSTIC TABLE (DUA-450F) : 5756082-1EN (GEHC)  
2C332-505EN (CMSC)

DIAGNOSTIC X-RAY HIGH-VOLTAGE GENERATOR (KXO-80XD) : 5756083-1EN (GEHC)  
2C314-506EN (CMSC)

IMAGE PROCESSOR (HDR-08A),  
FLAT PANEL DETECTOR (TFP-1700FL) : 5756084-1EN (GEHC)  
2C305-862EN (CMSC)

CEILING-SUSPENDED TUBE SUPPORT (DST-100S) : 5756085-1EN (GEHC)  
2C340-505EN (CMSC)

DIAGNOSTIC X-RAY BEAM LIMITING DEVICE (BLR-1000A) : 5836530-1EN (GEHC)  
2C356-510EN (CMSC)

DIAGNOSTIC X-RAY BEAM LIMITING DEVICE (BLR-1000A) : 5836530-1EN (GEHC)  
2C356-510EN (CMSC)

VERTICAL RADIOGRAPHY STAND (VFRS-3000A) : 5797959-1EN (GEHC)  
2C338-027EN (CMSC)

## 2. CONFIGURATION

### 2.1 Standard Configuration and Accessories

- (1) X-ray diagnostic table DUA-450F  
(including X-ray beam limiting device)
  - (a) X-ray diagnostic table : 1
  - (b) Footrest : 1
  - (c) Handgrips : 1 set
  - (d) Shoulder rests : 1 set
  - (e) Compression bands : 1 set
- (2) X-ray high-voltage generator KXO-80XD
  - (a) Cabinet : 1
  - (b) Console : 1
  - (c) Accessories  
(including power cable) : 1 set
- (3) Digital interface XKIF-80XM (installed in  
X-ray high-voltage generator cabinet) : 1 set
- (4) Sub panel unit XKDC-80XD  
(installed in X-ray diagnostic table) : 1 set
- (5) Pulsed fluoroscopy control unit  
XKGC-80XM : 1
- (6) X-ray tube assembly DRX-6634GD : 1
- (7) High-voltage cable HC-150MCS : 1 set
- (8) Flat panel detector TFP-1700FL : 1
- (9) FPD mounting kit AUA-17FH : 1 set
- (10) Image processor HDR-08A : 1 set
- (11) TV monitor (system monitor) : 1
- (12) TV monitor (live monitor) : 1
- (13) SNRF kit NSP-100A : 1 set
- (14) Dose meter kit AUA-M4KDK : 1 set
- (15) FDCF kit HDRK-FDCF : 1
- (16) MPPS service kit HDRK-MPPS : 1
- (17) DAP interface kit HDRK-DAP : 1 set

- (18) OTC (Overhead Tube Conveyor) system
  - (a) Ceiling-suspended tube support DST-100S : 1 set
  - (b) X-ray tube assembly DRX-3724HD : 1
  - (c) High-voltage cable HC-150DC : 1 set
  - (d) Automatic center stop XGST102A : 1 set
  - (e) X-ray beam limiting device BLR-1000A : 1 set
  - (f) Rotation tray XART-001A : 1 set

## 2.2 Options

- (1) Monitor Cart : XAMC-100L
- (2) TV monitor (live monitor)
- (3) DICOM storage commitment service kit : HDRK-COMMIT
- (4) Media storage service kit : HDRK-DCMDIR
- (5) LFH package : HDRK-FMEM
- (6) FPD high-rate acquisition kit : HDRK-HSFPD
- (7) Raw data backup kit : HDRK-DATABK
- (8) Reference monitor support kit : HDRK-REF
- (9) Lateral cassette holder : XACH100A
- (10) Knee support : XBUA-KNEE
- (11) Compression cone : XACC-001A
- (12) Footswitch : FSW-20K
- (13) Angle Support Arm : XGST-104A
- (14) Column Extension : XGST-105A
- (15) Ceiling Adaptor : XGST-106B
- (16) Ceiling Adaptor pipe : XGST-202B
- (17) Mechanical Center Stop : XGST-103B
- (18) Vertical radiography stand : VFRS-3000A

### 3. REQUIRED SPACE FOR THE SYSTEM LAYOUT

#### 3.1 Required Space for the System Layout

##### (1) X-ray TV room (examination) room

###### (a) Recommended room size

Width (W) = 6000 mm (236.2")

Length (L) = 4500 mm (177.2")

Height (H) = 2880 to 2950 mm (113.4" to 116.1")

###### (b) Minimum room size (w/standard configuration)

Width (W) = 5700 mm (224.4")

Length (L) = 4000 mm (157.5")

Height (H) = 2880 mm (113.4")

###### (c) Minimum room size (w/OTC rails cut and movement restriction)\*

Width (W) = 5000 mm (196.9")

Length (L) = 3700 mm (145.7")

Height (H) = 2630 mm (103.5")

###### (d) Minimum room size (w/OTC rails cut and movement restriction, and vertical radiography stand)\*

Width (W) = 5000 mm (196.9")

Length (L) = 3700 mm (145.7")

Height (H) = 2700 mm (106.3")

\* It is necessary to cut the longitudinal rails by a length of at least 400 mm (15.7") and the lateral rails by a length of at least 300 mm (11.8").

\* The OTC stroke is approximately 450 mm (17.7") shorter in the longitudinal direction and 300 mm (11.8") shorter in the lateral direction.

\* When the table is tilted, tabletop up/down movement may be restricted, depending on the ceiling height. (Refer to subsection 4.6.1.)

For X-ray diagnostic table

- On the side away from the operator

The edges of the table base should be 900 mm or more from the walls of the room.

In the imaging device park position, the edges of the table base should be 580 mm or more from the walls of the room in order to prevent interference between the edges of the imaging device and the walls of the room.

- On the operator side

If the edges of the table base are 1300 mm or more from the walls of the room, the tabletop frame can be ejected to the operator side.

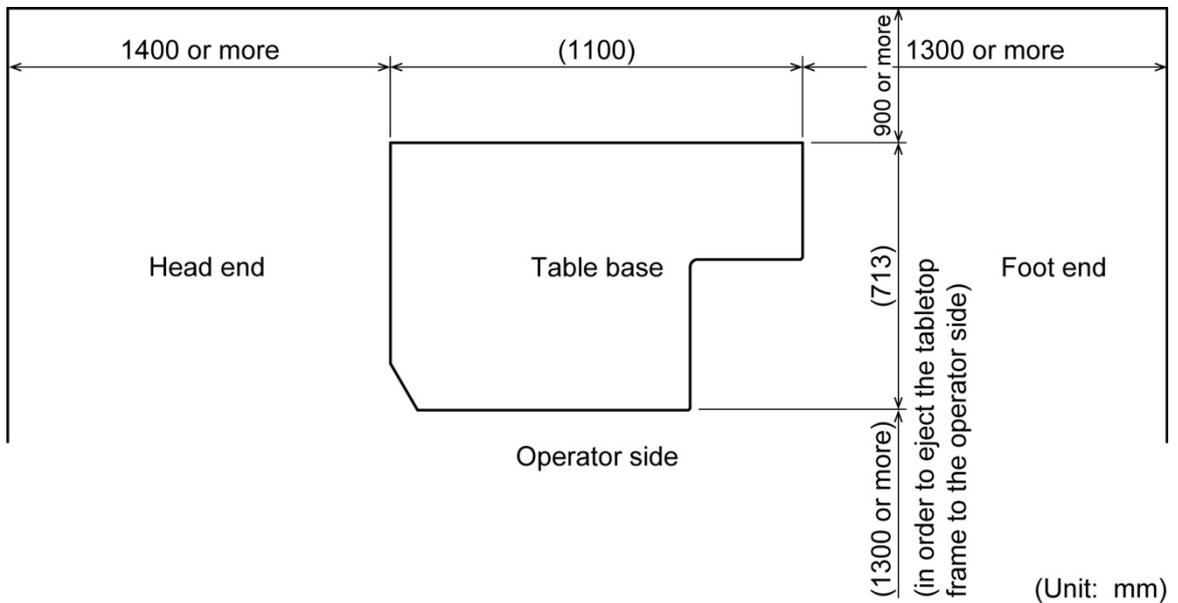
**NOTE:** If a stretcher is to be used for patient transfer, a clearance of 1 m or more is required on the operator side. In this case, the distance from the edge of the table base to the wall should be 1600 mm or more. Consult with the user regarding the use of a stretcher.

- On the foot end of the table

The edges of the table base should be 1300 mm or more from the walls of the room in order to prevent interference between the tabletop and the walls of the room.

- On the head end of the table

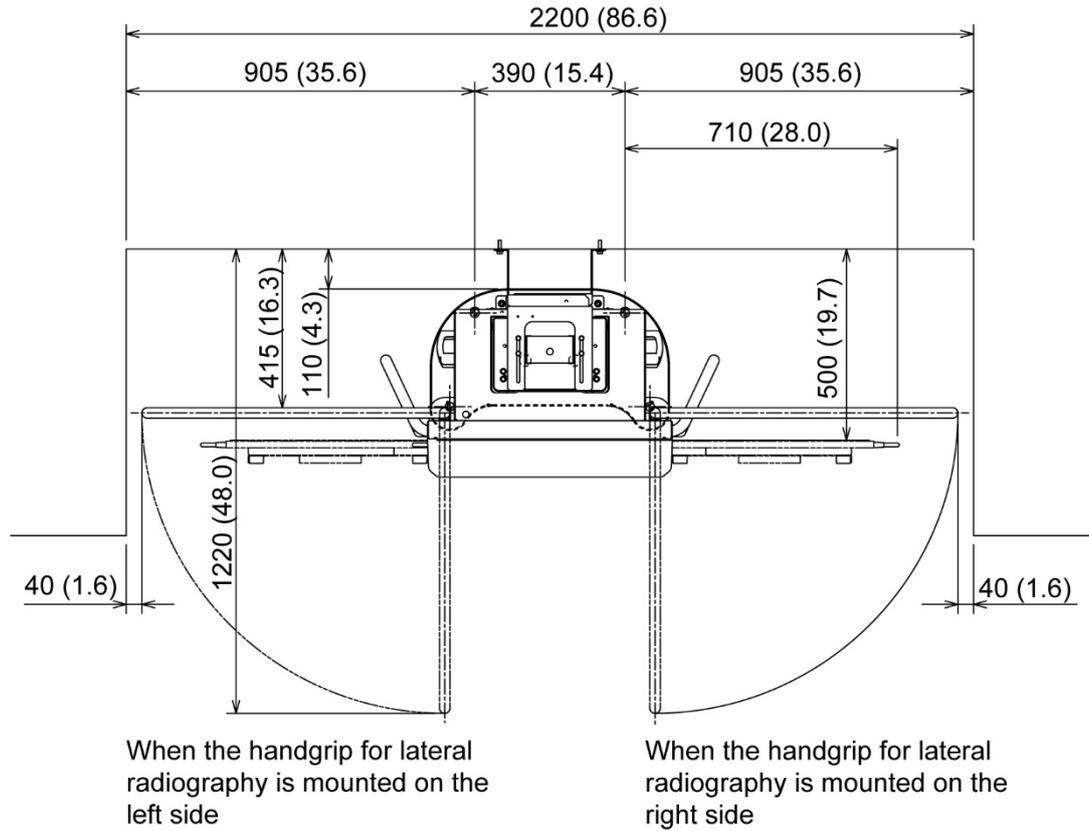
The edges of the table base should be 1400 mm or more from the walls of the room in order to prevent interference between the tabletop and the walls of the room.



For vertical radiography stand

- Minimum floor space required

2200 mm (width) × 1300 mm (length), 2.86 m<sup>2</sup> (86.6 in (width) × 51.2 in (length), 4433.9 in<sup>2</sup>) (installed system dimensions: 900 mm × 500 mm (35.4 in × 19.7 in))



Unit: mm (in)

**CAUTION:** When the vertical radiography stand with the handgrip for lateral radiography is installed, ensure that there is sufficient clearance so that the handgrip does not come into contact with the wall when the handgrip is rotated.

## (2) Control room (As a sample)

Width (W) = 2000 mm (78.7")

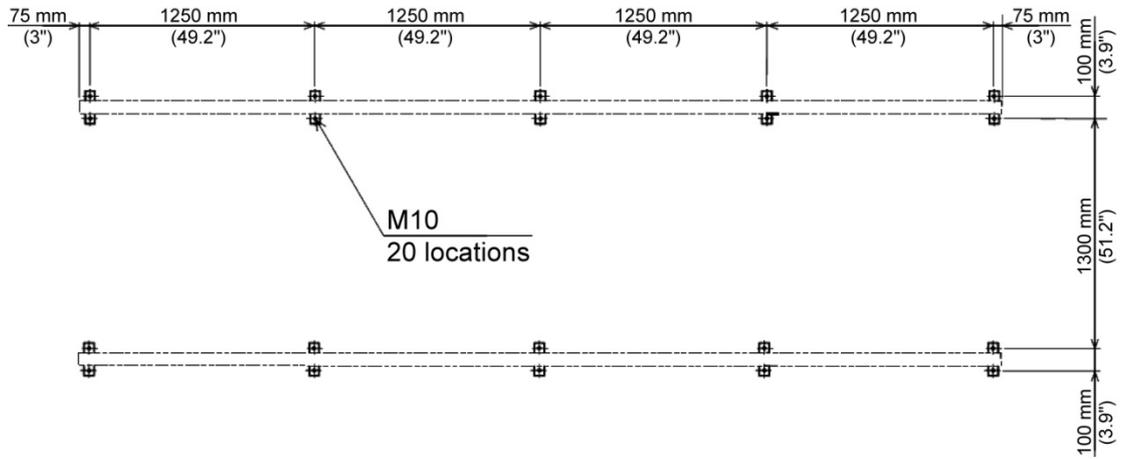
Length (L) = 3000 mm (118.1")

Height (H) = 2400 mm (94.5")

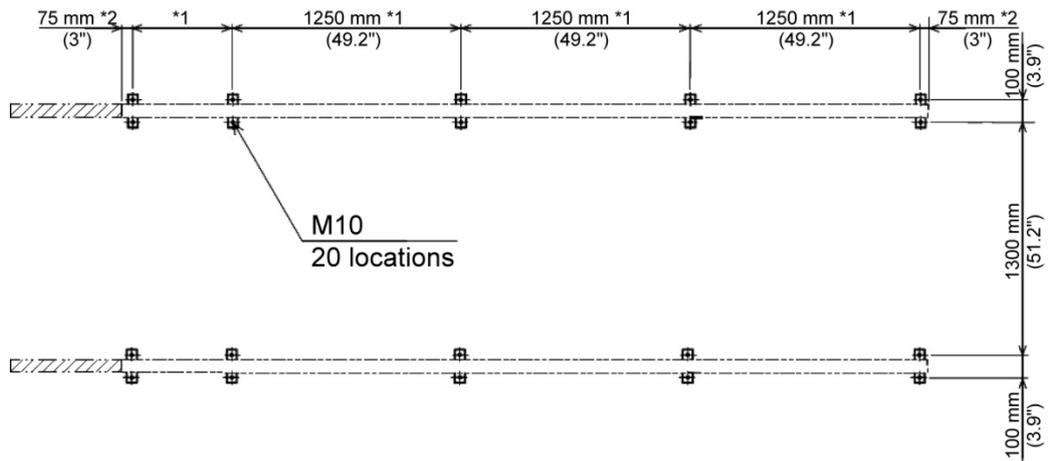
- CAUTION:**
1. When the room is small, system movement may be restricted, depending on the room size, layout, installation environment, etc.  
Consult with the user in order to determine the installation environment, including restrictions on system movement.
  2. For the longitudinal rails (standard length: 5150 mm [202.8"]), up to 1250 mm (49.2") can be cut (the remaining rail length is 3900 mm [153.5"]).
  3. Keep the following points in mind.
    - The rail should be cut at one end only.
    - The band steel attached to the main roller traveling surface should also be cut at one end only.
- <Cutting tolerances of the longitudinal rails and band steel>
- The longitudinal rails should be cut with an accuracy of  $\pm 2.5$  mm.  
The perpendicularity of the cut surface should be within 2 mm.
  - The band steel should be cut so that the length obtained by multiplying the length of the longitudinal rail remaining after cutting by  $+5/0$  mm is ensured.  
Note that the securing block should not protrude from the rail on either end.
- <Information concerning brake plate cutting length>
- If it is necessary to cut the brake plate, the cutting length should be minimized.  
Specifically, cut the plate at the position at which the distance from the mounting hole to the edge is 50 mm or less. Alternatively, process the mounting hole at the position at which the distance from the cut position is 50 mm or less.
- <Cutting tolerance of the lateral rail>
- Error in the length of the left and right rails should be within the recommended tolerance of 2 mm (or 4 mm in the worst case).  
The perpendicularity of the cut surface should be within 2 mm.
- <Precautions concerning the cutting plane>
- The cut surfaces of the rail, band steel, and brake plate should be free from gaps or burrs.
  - The course of the cut surface should be equivalent to Ra25  $\mu\text{m}$ .

3.2 Rail Cut Condition

(1) Longitudinal rail



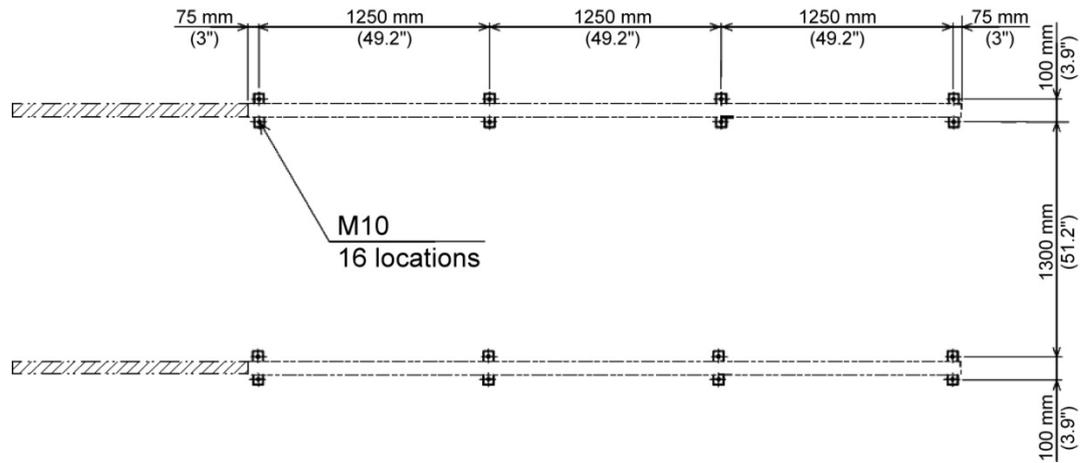
Standard installation dimensions



When the rails are cut

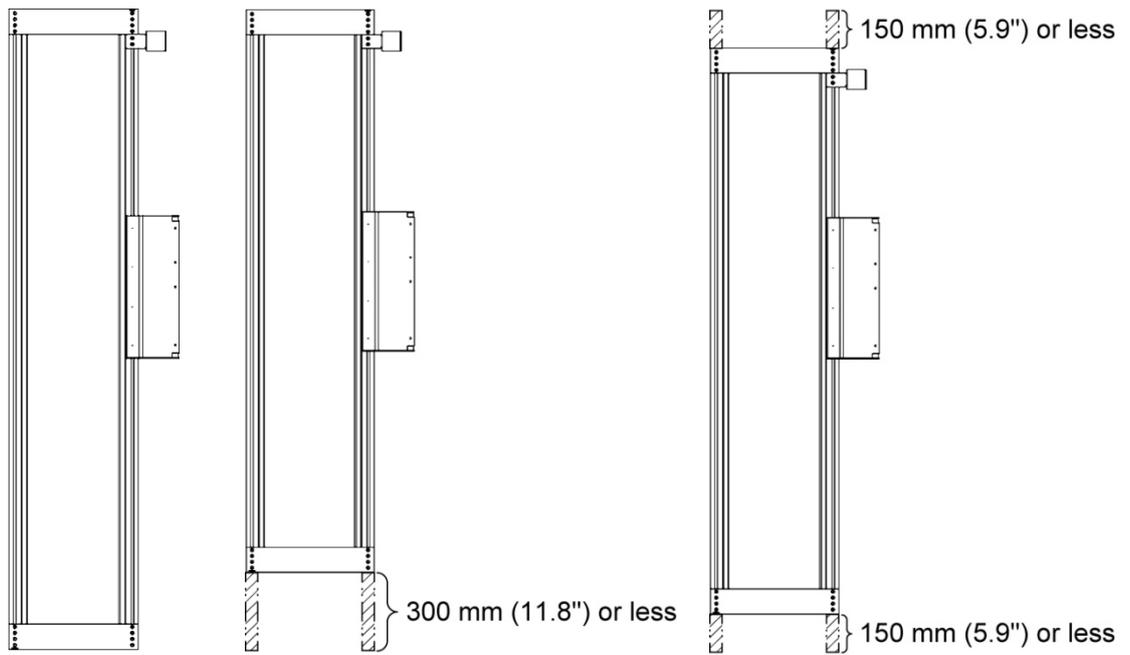
\*1: Place blocks so that this length is 1250 mm or less.

\*2: Place blocks so that this length is 75 mm or less.



When the rail length is shortest

(2) Lateral rail



Standard rails

It is possible to cut up to 300 mm (11.8") of the rails at the front end.

When the rails are to be cut at both ends, up to 150 mm (5.9") can be cut at each end.

4. MAIN SYSTEM SPECIFICATIONS RELATED TO INSTALLATION PLANNING

4.1 Classification

- (1) Type of protection against electric shock : Class I equipment
- (2) Degree of protection against electric shock : Type B applied part
- (3) Classification of the system : Permanently installed equipment

4.2 Grounding

Grounding must be provided in accordance with all applicable legal requirements for medically used electrical equipment.

4.3 Operating Environmental Conditions

The operating environmental conditions for this system are shown below.

(1) Examination room/Machine room

To maintain the environmental conditions specified below, install an air-conditioner, dehumidifier, etc. with appropriate performance ratings for the examination room size.

Ambient temperature	10°C to 35°C
Relative humidity	30% to 85% (No condensation)
Atmospheric pressure	700 hPa to 1060 hPa
Illuminance	1000 lx or less
Atmosphere	<p>Do not install the system in a location where the operating environmental conditions specified above are not satisfied. Also, do not install the system in a location where it may be exposed to the following:</p> <ul style="list-style-type: none"> <li>• Flammable gases</li> <li>• Corrosive gases</li> <li>• Steam</li> <li>• Dripping water</li> <li>• Excessive dust</li> <li>• Salty air</li> <li>• Direct sunlight</li> <li>• Excessive shock or vibration</li> <li>• Excessive line voltage fluctuation</li> </ul>

#### 4.4 Installation Conditions

Installed location: Group 1 according to IEC 60364-7-710

- NOTE:**
1. Group 1 requirement is described in IEC 60364-7-710.
  2. The title of IEC 60364-7-710 is "Electrical installations of buildings - Part 7-710: Requirements for special installations or locations - Medical locations".
  3. The definition of Group 1 is "Medical location where applied parts are intended to be used as follows:
    - externally;
    - invasively to any part of the body, except where 710.3.7 applies".

#### 4.5 Installation Position

##### 4.5.1 Selection of the installation position

When selecting the installation position, refer to the following figures.

- Figure 7-8 : Securing the gantry
- Figures 9-1 to 9-16 : Outline drawing
- Figures 9-17 to 9-20 : System layout
- Figure 9-21 : Interference diagram
- Figures 9-22, 9-23 : Clear zone

If other units are installed in the examination room, plan the installation carefully to ensure that interference does not occur.

#### 4.6 Ceiling Conditions

##### 4.6.1 Ceiling height of the room

Recommended ceiling height : 2880 mm (9'.5.5")

For details, refer to table 4-1.

Table 4-1 Specifications for limitation due to ceiling height

	Room Length, L	Room Width, W	Ceiling Height, h	Ceiling Height Adapter Kit (GE Catalog Item)	Max Tabletop Extension at 90°	Standing Knee Min	Installation Notices
Recommended Room Size	6000 mm (19' 8")	4500 mm (14' 8")	2880 mm (9' 5.5")	-	-	-	Standard DSR-242B rails: 5150 mm (16' 11")
MINIMUM ROOM SIZE	L ≥5700 mm (L ≥18.7')	W >4000 mm (13.1')	9.63' <h ≤10.0' (2935 mm <h ≤3048 mm)	w/o S0915RO w/ S0915RO	19.69" (500 mm)	23.76" (603.4 mm) 15.88" (403.4 mm)	None
			9.45' <h ≤9.63' (2880 mm <h ≤2935 mm)	w/o S0915RO w/ S0915RO	19.69" (500 mm)	21.63" (549.3 mm) 13.75" (349.3 mm)	None
			9.16' <h ≤9.45' (2792 mm <h ≤2880 mm)	None	15.75" (400 mm)	18.25" (463.6 mm)	None
			9.12' <h ≤9.16' (2780 mm <h ≤2792 mm)	None	15.75" (400 mm)	17.69" (449.3 mm)	None
			8.79' <h ≤9.12' (2679 mm <h ≤2780 mm)	w/o S0915RN w/ S0915RN	11.81" (300 mm)	13.75" (349.3 mm) 18.69" (474.3 mm)	See Notes 1-2, 9
			8.63' <h ≤8.79' (2630 mm <h ≤2679 mm)	w/o S0915RN w/ S0915RN	9.84" (250 mm)	11.83" (300.5 mm) 16.75" (425.5 mm)	See Notes 1-2, 9
MINIMUM ROOM SIZE, WITH INSTALL REQUIREMENTS	5300 ≤L <5700 mm (17.4' ≤L <18.7')	4000 mm (13.1')	9.63' <h ≤10.0' (2935 mm <h ≤3048 mm)	w/o S0915RO w/ S0915RO	19.69" (500 mm)	23.76" (603.4 mm) 15.88" (403.4 mm)	See Note 5
			9.45' <h ≤9.63' (2880 mm <h ≤2935 mm)	w/o S0915RO w/ S0915RO	19.69" (500 mm)	21.63" (549.3 mm) 13.75" (349.3 mm)	See Note 5
			9.16' <h ≤9.45' (2792 mm <h ≤2880 mm)	None	15.75" (400 mm)	18.25" (463.6 mm)	See Note 5
			9.12' <h ≤9.16' (2780 mm <h ≤2792 mm)	None	15.75" (400 mm)	17.69" (449.3 mm)	See Note 5
			8.79' <h ≤9.12' (2679 mm <h ≤2780 mm)	w/o S0915RN w/ S0915RN	11.81" (300 mm)	13.75" (349.3 mm) 18.69" (474.3 mm)	See Notes 1-2, 5, 9
			8.63' <h ≤8.79' (2630 mm <h ≤2679 mm)	w/o S0915RN w/ S0915RN	9.84" (250 mm)	11.83" (300.5 mm) 16.75" (425.5 mm)	See Notes 1-2, 5, 9
MINIMUM ROOM SIZE, WITH RESTRICTIONS	5000 ≤L <5300 mm (16.4' ≤L <17.4')	4000 mm (13.1')	9.63' <h ≤10.0' (2935 mm <h ≤3048 mm)	w/o S0915RO w/ S0915RO	19.69" (500 mm)	23.76" (603.4 mm) 15.88" (403.4 mm)	See Notes 3-4, 6-8
			9.45' <h ≤9.63' (2880 mm <h ≤2935 mm)	w/o S0915RO w/ S0915RO	19.69" (500 mm)	21.63" (549.3 mm) 13.75" (349.3 mm)	See Notes 3-4, 6-8
			9.16' <h ≤9.45' (2792 mm <h ≤2880 mm)	None	15.75" (400 mm)	18.25" (463.6 mm)	See Notes 3-4, 6-8
			9.12' <h ≤9.16' (2780 mm <h ≤2792 mm)	None	15.75" (400 mm)	17.69" (449.3 mm)	See Notes 3-4, 6-8
			8.79' <h ≤9.12' (2679 mm <h ≤2780 mm)	w/o S0915RN w/ S0915RN	11.81" (300 mm)	13.75" (349.3 mm) 18.69" (474.3 mm)	See Notes 1-4, 6-9
			8.63' <h ≤8.79' (2630 mm <h ≤2679 mm)	w/o S0915RN w/ S0915RN	9.84" (250 mm)	11.83" (300.5 mm) 16.75" (425.5 mm)	See Notes 1-4, 6-9

INSTALLATION NOTICES	
1	S0915RN Ceiling Adapter kit shifts XR Source 200 mm (7.9") towards head end of table
2	Table must be installed centered below longitudinal rails to prevent interference during rotation with tabletop extended (2720 mm ≥ ceiling height)
3	Wallstand cannot be installed along centerline of table; must be offset
4	Suspended Monitor arms may cause significant interference, Monitor Cart S0915RG recommended
5	Install Longitudinal rails ≥50 mm from head-end wall; ≥100 mm from foot-end wall; Move the stroke end stopper to center by wall space.
6	Install Longitudinal rails ≥50 mm from head-end wall; ≥200 mm from foot-end wall; Move the stroke end stopper to center by wall space.
7	Longitudinal rails (DSR-242B) can be cut, up to 1250 mm can be removed
8	Lateral Bridge (DSR-242B) can be cut, up to 300 mm can be removed.
9	To use the vertical radiography stand (VFRS-3000A), the ceiling height must be 2700 mm (106.3") or more.

## 4.6.2 Ceiling conditions for OTC system

## Ceiling improvement with foundation bolts

The foundation bolts for the ceiling rail are not included. Prepare foundation bolts and materials to suit the installation room and perform the ceiling improvement work.

- Longitudinal rail fixing tap length : Effective screw length 12 mm or more
- Longitudinal rail fixing tap tensile strength : 37.2 kN (3800 kgf) or more per tap
- Longitudinal rail fixing surface levelness : Within  $\pm 2$  mm of the reference level surface in ceiling construction work.  
However, deviation from the reference level surface will be adjusted during installation of the ceiling rail to within  $\pm 0.5$  mm using spacers.
- Longitudinal cable routing rail ceiling strength : 0.59 kN (60 kgf) or more per tap
- OTC unit installed in the examination room

No.	Unit name	Width × Height × Depth (mm)	Mass (kg)
1	DST-100S/UG	600 × 800 × 800	160
2	DSR-242B	5150 × 3176 × 194	215
3	DRX-3724HD	496 × 210 × 200	24
4	BLR-1000A/UG	220 × 238 × 252	8

#### 4.7 Floor Conditions

(1) Concrete strength (only for the examination room)

Concrete with a strength of 1760 N/cm<sup>2</sup> or more must be used for the entire floor.

(2) Floor strength

The floor strength for each room must be sufficient to support the total mass of the units to be installed.

If additional units, other than the units included in the system configuration, are used in combination, the floor must be strong enough to support the total mass (including the mass of the additional units).

Example: Floor strength in the examination room

The floor must be strong enough to support the total mass of the units shown below.

- Units installed in the examination room

No.	Unit name	Width × Height × Depth (mm)	Mass (kg)
1	DUA-450F (including the X-ray tube, FPD, human body, etc.)	Refer to subsection 9.4 "Clear Zone"	1950
2	KXO-80XD cabinet	1115 × 1900 × 400	405
3	XKGC-80XM	670 × 1900 × 400	100
4	System cabinet	570 × 1900 × 450	240
5	Table control cabinet	450 × 1250 × 240	60
6	VFRS-3000A	2200 × 2700 × 1220	215

(3) Levelness/flatness of the floor (only for the examination room)

Work for the base plate section of the DUA-450F must have been performed so that the requirements for the floor levelness/flatness given in the section related to floor work are satisfied.

(4) Cable pits (all rooms)

Cable pits are required since all the system cables are routed under the floor. Confirm that work for the cable pits has been performed so that the cable pit specifications given in the section related to floor work are satisfied.

#### 4.8 Wall Conditions

If it is necessary to take measures to prevent the cabinets from falling during earthquakes or other emergencies, the walls must meet the following structural and strength requirements.

(1) Concrete strength (only for the examination room)

The compression strength of the concrete must be  $F_c = 1.8 \text{ kN/cm}^2$  (180 kgf/cm<sup>2</sup>) or more. (An effective anchoring depth must be secured for the anchors.)

**NOTE:** This work is not required if it is not necessary to take anti-earthquake measures.

4.9 Radiation Protection

Examination room: Appropriate work must be performed for the walls, ceiling, floor, observation window, and doors of the room to ensure radiation protection in compliance with all legal requirements for medical equipment.

**⚠ CAUTION: The X-ray diagnostic table must be installed in an X-ray shielded room.**

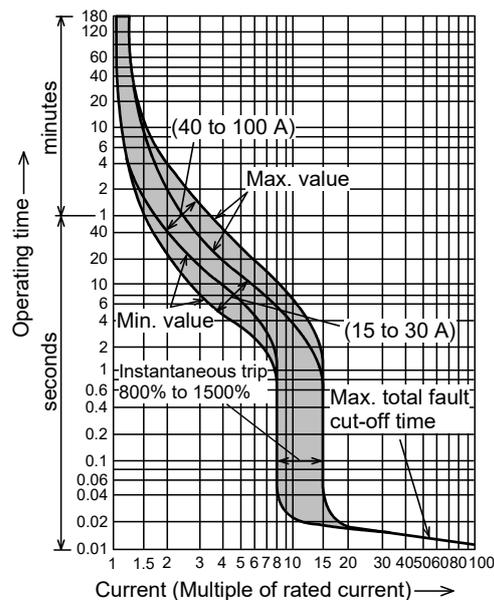
4.10 Interference Conditions

For this system, it is not possible to limit the stroke in advance or to limit the stroke after detecting the object that is causing the interference. Refer to figure 9-21.

4.11 Power Facility Requirements

(1) Driving power for the X-ray diagnostic table

Line voltage	Single-phase 200/220/230/380/400/415/440/480 VAC (Selectable)
Frequency	50/60 Hz $\pm$ 1 Hz
Line capacity	Approx. 6.3 kVA (Including TV monitor) (approx. 3.5 kVA for the table section only)
Line voltage fluctuation	$\pm$ 10% or less
Circuit breaker rating	Be sure to place a circuit breaker model SA100RAUL (Fuji Electric) or equivalent (rated voltage of 600 VAC, rated current of 40 A, and trip capacity of 14 kA; refer to the breaker performance characteristic curve below) in the line of the power distribution board of the building.



Breaker performance characteristic curve

(2) Driving power for the X-ray high-voltage generator

(a) Power specifications

- Method : Three-phase AC
- Nominal line voltage : 200/220/380/400/415/440/480 V
- Line frequency : 50/60 Hz
- Permissible line voltage fluctuation range : Nominal line voltage  $\pm 10\%$
- Permissible impedance Equivalent to JIS Z4702 IRF-800-150 :

200/220 V	: 0.054 $\Omega$ or less
380 V	: 0.10 $\Omega$ or less
400 V	: 0.11 $\Omega$ or less
415 V	: 0.12 $\Omega$ or less
440 V	: 0.14 $\Omega$ or less
480 V	: 0.16 $\Omega$ or less

(b) Specifications of the distribution transformer

- Power capacity : 110 kVA or more
- Recommended capacity of the power transformer : 75 kVA or more (continuous rating)

**⚠ CAUTION:** The line current of the KXO-80XD under short-term maximum load is 180 A for a 400 V power line. This corresponds to 110 kVA, assuming a line load fluctuation of 5%. Since the rated capacity of the distribution transformer is a continuous rating, the short-term maximum load is different from that shown above.

(c) Specifications for the power distribution board

1) Rating of cable routing interrupter (three-phase 200-V system)

- Rated current : 200/220 V 100 A
- Cut-off characteristics : Must not trip at 400 A for 1 second.  
Must not trip at 600 A for 0.1 second.  
Must not trip at 800 A for 0.01 second  
(assuming an inrush current when the power is turned ON).
- Recommended non-fuse interrupter : NF100-SEP-3P-100A produced by Mitsubishi Electric Corp. (INST set to 16 times).
- Recommended circuit breaker for leakage current : NV100-SEP-3P-100A produced by Mitsubishi Electric Corp. (INST set to 16 times).

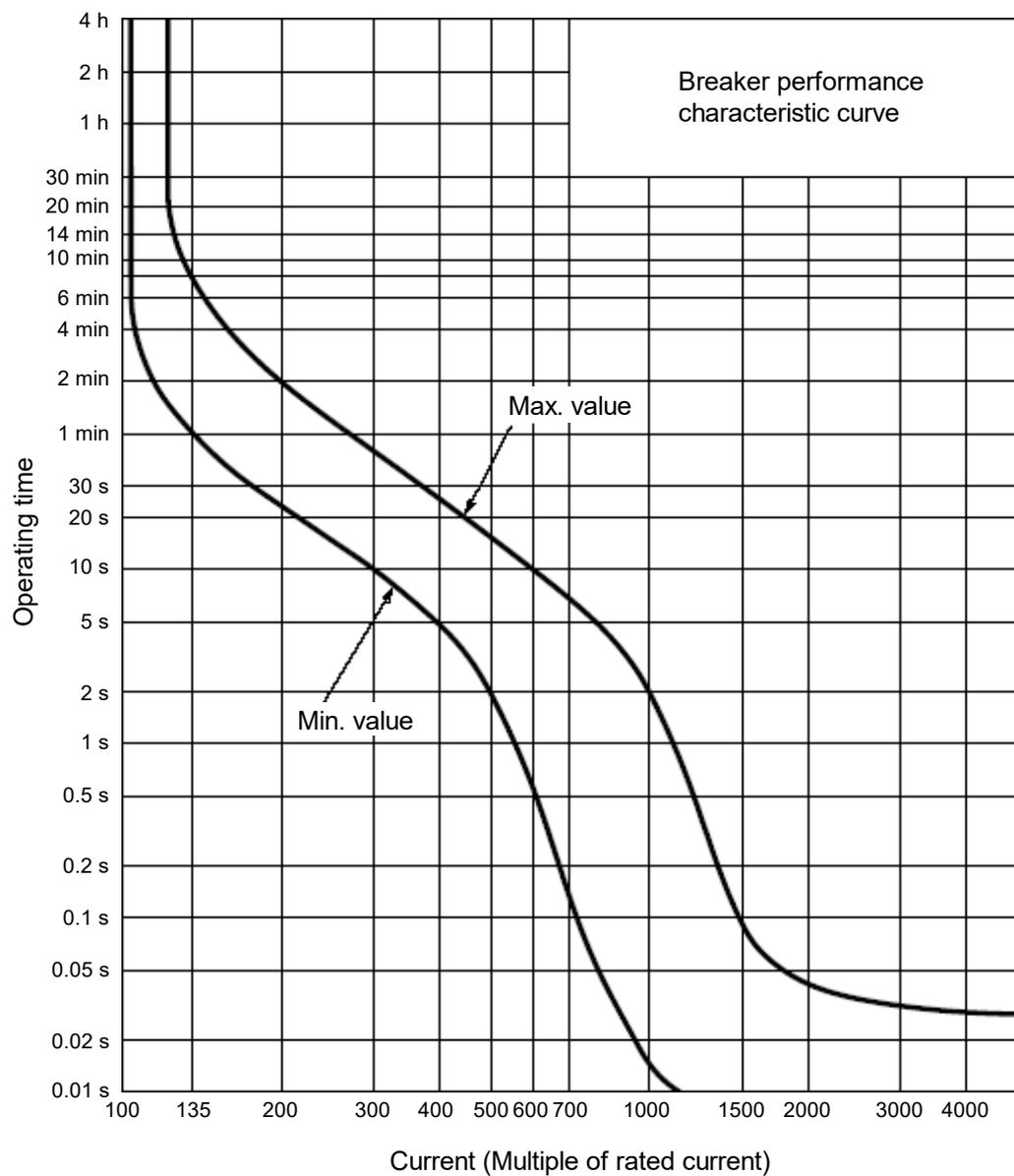
## 2) Rating of cable routing interrupter (three-phase 400-V system)

- Rated current : 380/400/415/440/480 V 75 A
- Cut-off characteristics : Must not trip at 200 A for 1 second.  
Must not trip at 300 A for 0.1 second.  
Must not trip at 400 A for 0.01 second  
(assuming an inrush current when the power is turned ON).
- Recommended non-fuse interrupter : NF100-SEP-3P-75A produced by Mitsubishi Electric Corp. (I<sub>INST</sub> set to 16 times).
- Recommended circuit breaker for leakage current : NF100-SEP-3P-75A produced by Mitsubishi Electric Corp. (I<sub>INST</sub> set to 16 times).
- Relay for leakage current : NV-ZH (relay for leakage current) produced by Mitsubishi Electric Corp.

**⚠ CAUTION:** A circuit breaker for leakage current, if used, should have a leakage sensitivity of 100 mA (to prevent electric shock or fire due to current leakage).  
In addition, to prevent excessive tripping due to high-frequency leakage currents which are not a safety risk, use a high-frequency-support type (inverter-support type).  
When a circuit breaker for leakage current and a relay for leakage current from existing equipment are to be used, confirm in advance that they are high-frequency-support types. If they are not, replace them with the recommended kits.

(3) Driving power for the image processor

Line voltage	Single-phase 200/220/230 VAC (Selectable)
Frequency	50/60 Hz $\pm$ 1 Hz
Line capacity	Approx. 1.5 kVA (HDR-08A)
Line voltage fluctuation	$\pm$ 10% or less
Circuit breaker rating	Be sure to place a circuit breaker model NF50-SWU-2P-20A (Mitsubishi Electric Corp.) or equivalent (rated voltage of 240 VAC, rated current of 20 A, refer to the breaker performance characteristic curve below) in the line of the power distribution board of the building.



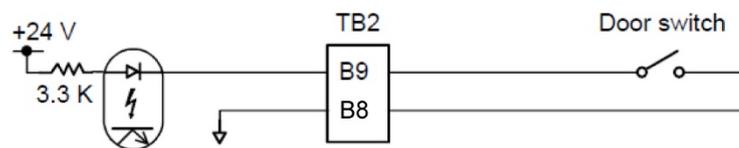
- CAUTION:** 1. If there is a possibility that power fluctuation, momentary power failure, or noise may occur, use an uninterrupted power supply.
2. For systems with an FPD used in combination, the power must be turned ON for 24 hours to ensure stable FPD operation.

#### (4) Grounding

Grounding must be provided in accordance with all applicable legal requirements for medically used electrical equipment.

#### 4.12 Door Interlock

The door switch must be connected between B9 and B8 of TB2 (M3 solderless terminal).



The cables of the door switch must be connected so that the door switch is actuated when the door is closed.

When the door switch is closed, the voltage between terminals B9 and B8 of TB2 must be 1 V or less.

The ratings of the contact in the door switch are shown below.

Maximum voltage : 50 VDC or more

Maximum current : 0.1 A or more

#### 4.13 Air-Conditioning Requirements

Air-conditioning facilities must be provided to ensure that the ambient temperature and relative humidity are maintained within the operating environmental conditions.

For details regarding the heat generation of each unit and the air-conditioning work, refer to the section related to air-conditioning work.

5. OUTLINE AND RANGE OF WORK

5.1 Work To Be Performed by the User

The user is normally responsible for performing the items listed in the following table.

Construction work	<ul style="list-style-type: none"> <li>A. Construction of a new building/extension work/reconstruction work</li> <li>B. Radiation protection work in the examination room Radiation protection work for the ceiling and walls Radiation protection work for the entrance door Radiation protection work for the observation window and window frame</li> <li>C. Reinforcement work related to the floor load</li> <li>D. Construction of the cable pits and ducts</li> <li>E. Interior work for the facility</li> </ul>
Electrical facility work	<ul style="list-style-type: none"> <li>A. Work for the power-supply facility</li> <li>B. Mounting of the power distribution board</li> <li>C. Grounding work</li> <li>D. Mounting of the "IN USE" indicator (which lights during X-ray generation) and cabling work</li> <li>E. Work for interior illumination and dimming</li> </ul>
Air conditioning and plumbing work	<ul style="list-style-type: none"> <li>A. Air conditioning (cooling/heating and ventilation) work</li> <li>B. Plumbing work (facilities such as sinks, washrooms, etc.)</li> <li>C. Installation of gas outlets for medical applications</li> </ul>

5.2 Work To Be Performed by Our Company

- (1) Bringing-in the system, installation, and adjustment
- (2) Interunit cabling and connection for the units in the system configuration and connection between the units in the system configuration and the facilities prepared by the user

**CAUTION:**

- 1. Before starting the work to be performed by our company, be sure to check the details of the work contents by referring to all the installation manuals for the units in the system configuration.
- 2. The engineers in charge must examine and check the details of the work to be performed at the site.
- 3. For the interior wiring, work must be performed in accordance with the technical standards for electrical facilities.

6. WORK TO BE PERFORMED BY THE USER

6.1 Facility Work

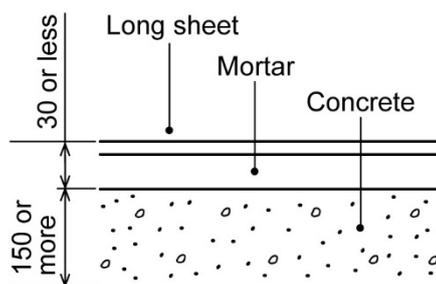
(1) Floor work

(a) Requirements

- Concrete strength : 1760 N/cm<sup>2</sup> or more (over the entire floor)
- Depth of the concrete : 150 mm or more (without the surface finish)
- Depth of the surface finish  
(not including the concrete) : 30 mm or less
- Levelness of the floor : Longitudinal direction of the table:  
Slope of less than 1 mm/1100 mm  
Lateral direction of the table:  
Slope of less than 1 mm/713 mm
- Evenness of the floor : Entire floor under the base:  
Unevenness of less than 1 mm

**CAUTION:** The requirements for the levelness and evenness shown above must be satisfied so that spacer adjustment between the base and the floor is less than 1 mm.

Note that relatively thick spacers placed on a floor with a slope or unevenness outside the specified range may cause vibration and noise that cannot be rectified after installation.  
If the existing floor does not satisfy the above specifications, apply mortar to make it even. The mortar layer must be thin enough for the anchor bolts to be effective. The thickness of the mortar should be less than 30 mm.



(Unit: mm)

Figure 6-1 Concrete floor

(b) Floor requirements for vertical radiography stand VFRS-3000A

The floor must be made of concrete and satisfy the following requirements. If necessary, perform floor work to ensure that the requirements are satisfied.

- Levelness : Deviation of within 5 mm/1000 mm (0.2 in/40 in)
- Flatness : Deviation of within 5 mm (0.2 in) for the entire surface for installing the system
- Floor concrete compression strength :  $2.0 \times 10^7$  N/m<sup>2</sup> (2900 lbf/in<sup>2</sup>) or more
- Embedding depth of the floor anchor bolts: 35 mm (1.4 in) or more (concrete section)
- Allowable thickness of the floor finishing coat (low-strength material) : The low-strength finishing coat (such as mortar or tile) on the concrete surface must be less than 20 mm (0.8 in) thick.

(2) Pit work

All the system cables are to be routed under the floor. Therefore, cable pits are required.

(a) Inspection

Basically, the cables of the DUA-450F are to be routed under the floor from the cable stand for the table. Therefore, the pits should be made when the floor work is performed.

After setting the system installation position and power outlet position, check the pit positions.

- Base plate and pit positions

For the base plate and the cable stand positions, see figure 6-2.

See figure 7-13 for positioning of the anchor bolts.

Refer to subsection 9.2 of this manual for information about the installation position.

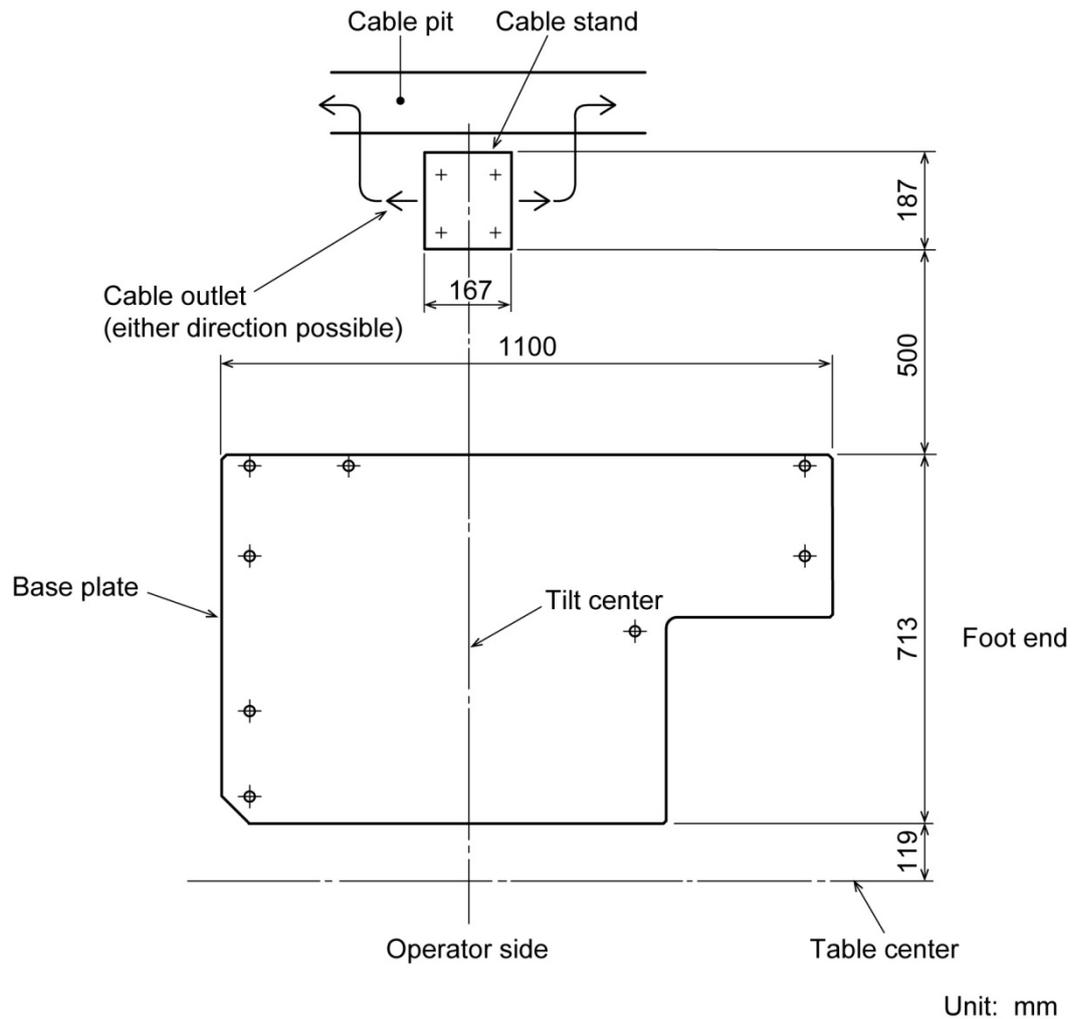


Figure 6-2

(b) Pit specifications

- Pits

The figure below shows an example of work.

- Size: 120 mm (width) × 100 mm (depth)

- Points to be noted

- 1): Shield the entire interior of the pit using a metal plate such as an iron plate that has been bent to fit the pit.
- 2): Perform the required work to prevent the ingress of water into the pit.

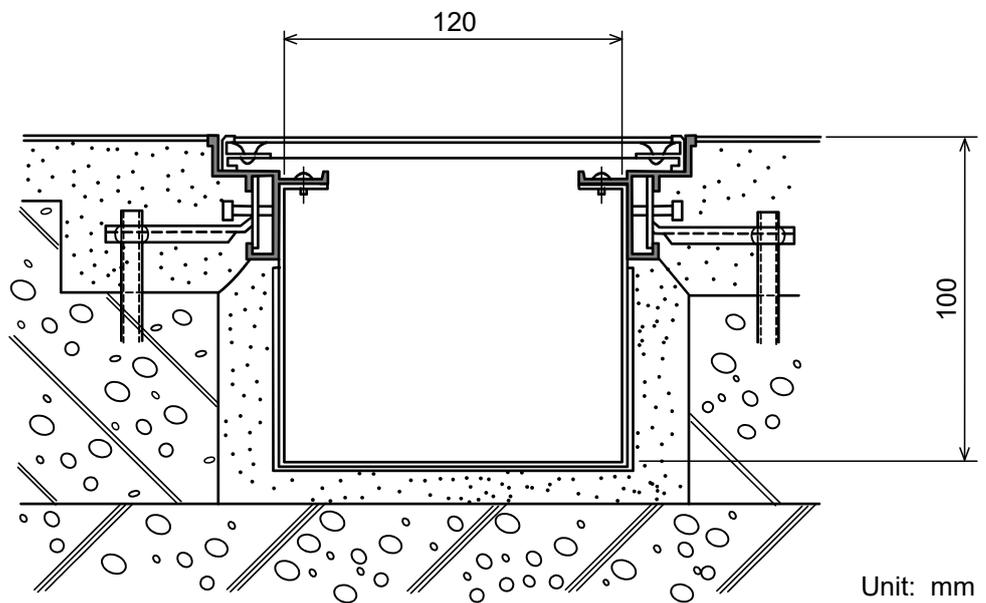


Figure 6-3

- System cable pits

The pit size is determined by the cross-sectional dimensions of the cables, the number of cables, and the clearance between cables.

To reduce the effects of inverter noise and starter noise on the TV imaging system, install a metal plate satisfying the following specifications to separate the signal and power cables in the duct. The figure below shows an example of a cable pit.

- Size: 120 mm (width) × 100 mm (depth) (Representative values)

- Points to be noted:
  - 1): Shield the entire interior of the pit using a metal plate such as a bent iron plate.
  - 2): Protect the pit from the ingress of water.
  - 3): Install a metal separation plate at the center of the pit as shown in the figure below.
  - 4): Connect the metal section of the pit to the grounding point of the distribution board using the grounding wire to make the grounding level for all the metal in the pit the same.
  - 5): Do not install the pit directly beneath the cabinet because anchor bolts are to be mounted on the floor.

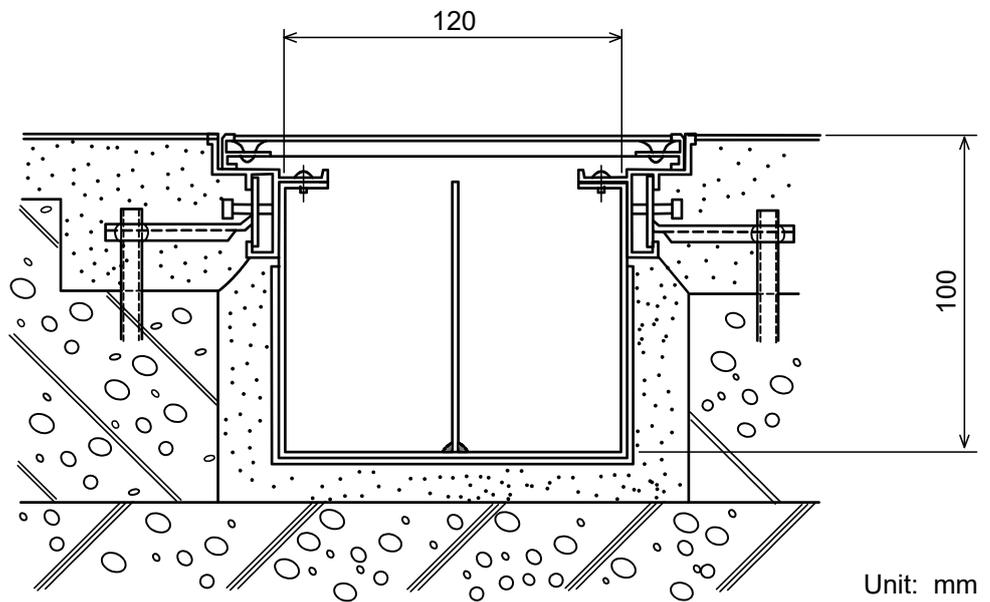


Figure 6-4

(c) On floors with clearance

Make a hole 100 to 130 mm dia. below the cable outlet of the control unit and feed the cables under the floor as shown below:

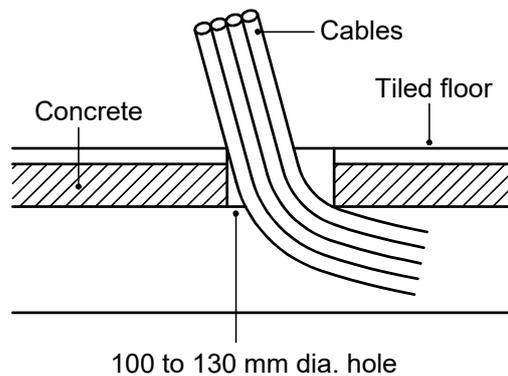


Figure 6-5

(d) When the cables must be laid on the floor

In this case, place a cover over cables to protect them from damage. Use a steel cover at least 1.5 mm thick so that it does not easily deform even if stepped on.

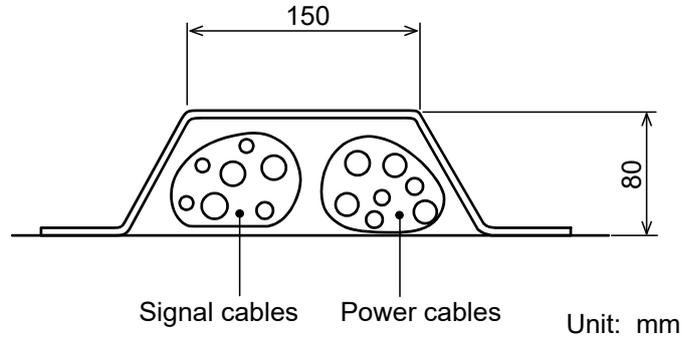


Figure 6-6

(3) OTC

No.	Cable name	Connection (from – to)	Length
<1>	High-voltage cable +	X-ray tube – X-ray generator	
<2>	High-voltage cable -	X-ray tube – X-ray generator	
<3>	Control cable of the X-ray tube	X-ray tube – X-ray generator	
<4>	Grounding cable of the X-ray tube	X-ray tube – X-ray generator	
<5>	Lamp cable of the X-ray beam limiting device	X-ray tube – main unit	5 m
<6>	Control cable of the operating box	Operating box – main unit	5.3 m
<7>	Grounding cable of the operating box	Operating box – main unit	5.3 m
<8>	Power cable	Main unit – X-ray control unit	20 m
<9>	Grounding cable of the main unit	Main unit – grounding provided in the building	20 m
<10>	Magnet cable for longitudinal movement	Main unit – roller unit	4 m
<11>	Grounding cable for longitudinal movement	Main unit – roller unit	5.5 m

(4) Wall work

(a) Examination room

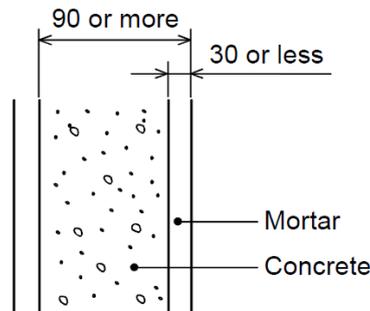
The cabinet will be fixed to the wall in order to prevent it from falling in the case of an emergency such as an earthquake. If it is necessary to take measures against earthquakes, the wall must meet the following structural and strength requirements.

1) Wall structure : Refer to figure 6-7.

The wall must be reinforced concrete (RC).

2) Wall requirements

- The cabinet is fixed to the wall using the supplied anchor bolts. The concrete compression strength must be  $F_c = 1.8 \text{ kN/cm}^2$  (180 kgf/cm<sup>2</sup>) or more.
- The wall finishing mortar must not exceed 30 mm in thickness (to ensure that the anchor bolts can be firmly embedded in the underlying concrete).



(Unit: mm)

Figure 6-7 Concrete wall (RC)

**NOTE:** This work is not required if it is not necessary to take anti-earthquake measures.

(b) Examination room for vertical radiography stand VFERS-3000A

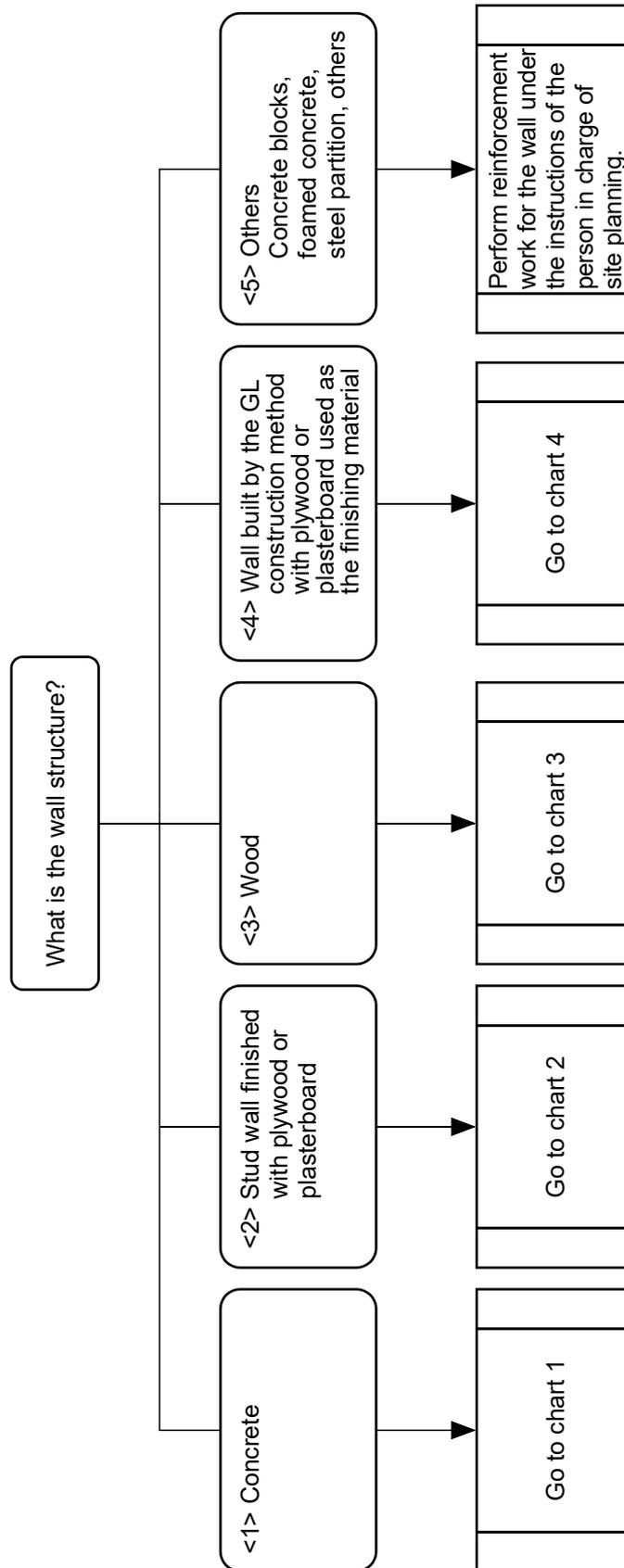
Perform the wall work before installation. It is not necessary to perform the wall work if the floor strength is sufficient to secure the vertical radiography stand to the floor using only the anchor bolts.

1) Wall requirements

- Verticality : 90°
- Flatness : Deviation of within 5 mm (0.2 in) or less over the entire surface for installing the vertical radiography stand
- Wall concrete compression strength :  $2.0 \times 10^7 \text{ N/m}^2$  (2900 lbf/in<sup>2</sup>) or more
- Embedding depth of the wall anchor bolts for installing the vertical radiography stand : 35 mm (1.4 in)
- Allowable thickness of the wall finishing coat (low-strength material) : 15 mm (0.6 in) or less

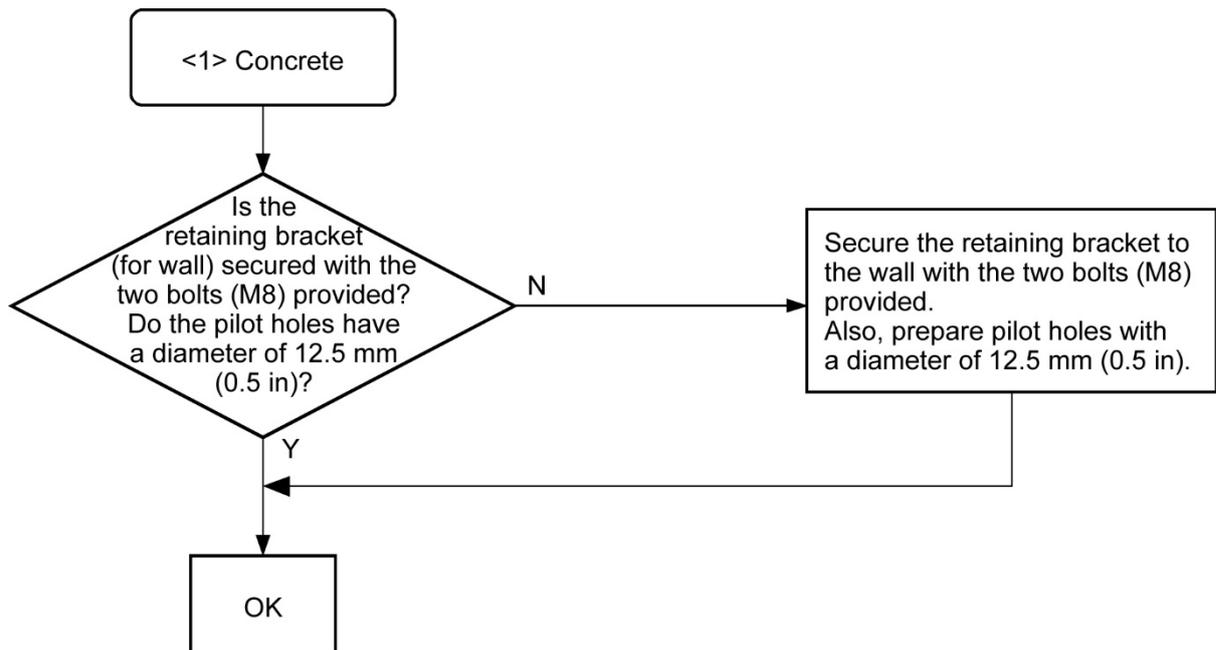
2) Flowchart for checking the wall work

Flowchart for checking the wall work for the VFRS-3000A



**⚠ WARNING:** Confirm that the retaining bracket (for wall) is mounted securely to the wall, ensuring that the vertical radiography stand does not fall. Use the above flowchart to determine the confirmation procedure.

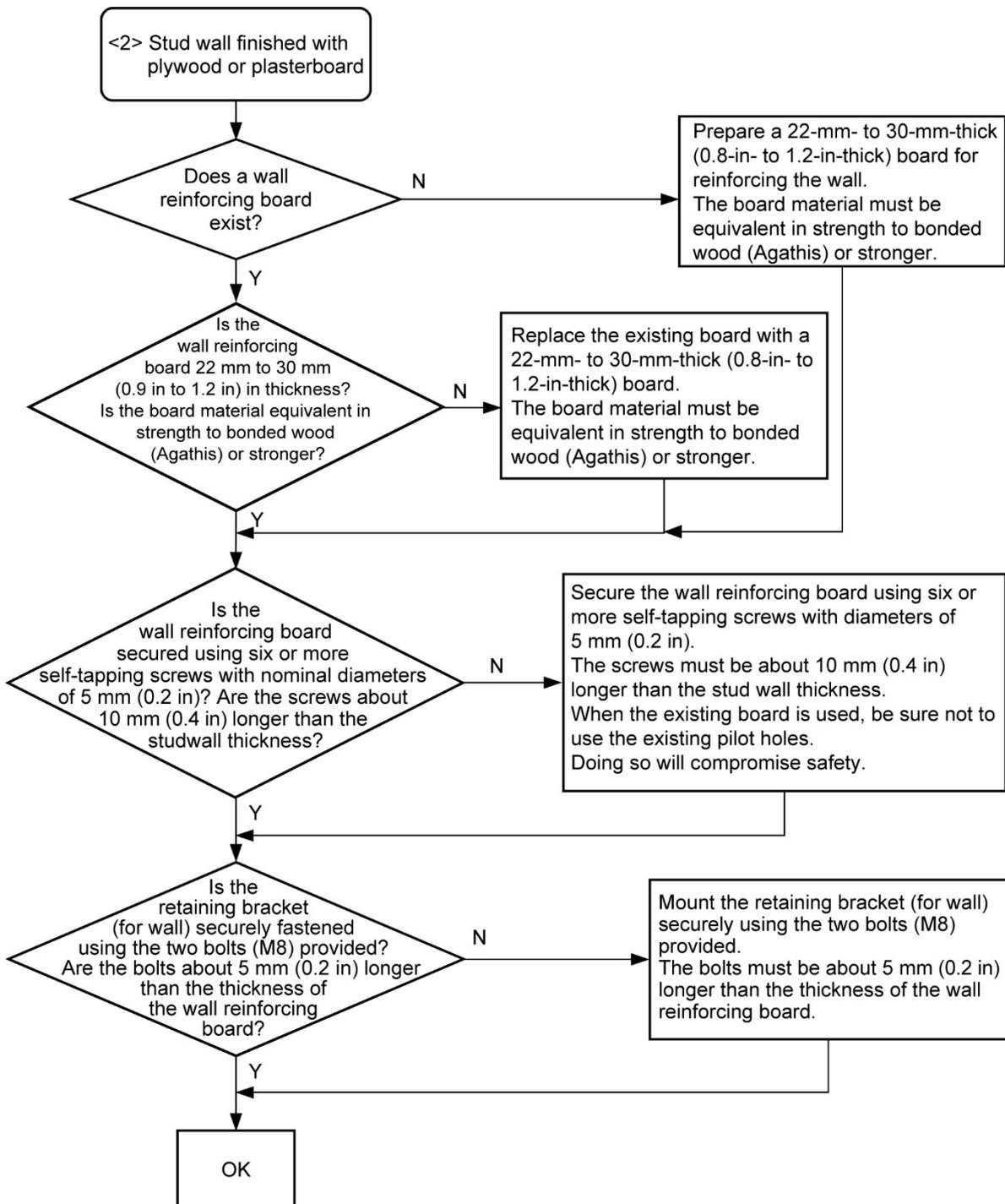
Chart 1



**⚠ WARNING:**

1. Prepare the wall so that the wall concrete compression strength is  $2.0 \times 10^7 \text{N/m}^2$  (2845 lbf/in<sup>2</sup>) or more.
2. If the wall concrete compression strength is insufficient, consult with the person in charge of site planning and perform reinforcement work for the wall.
3. Do not use curled plugs because they have insufficient strength.

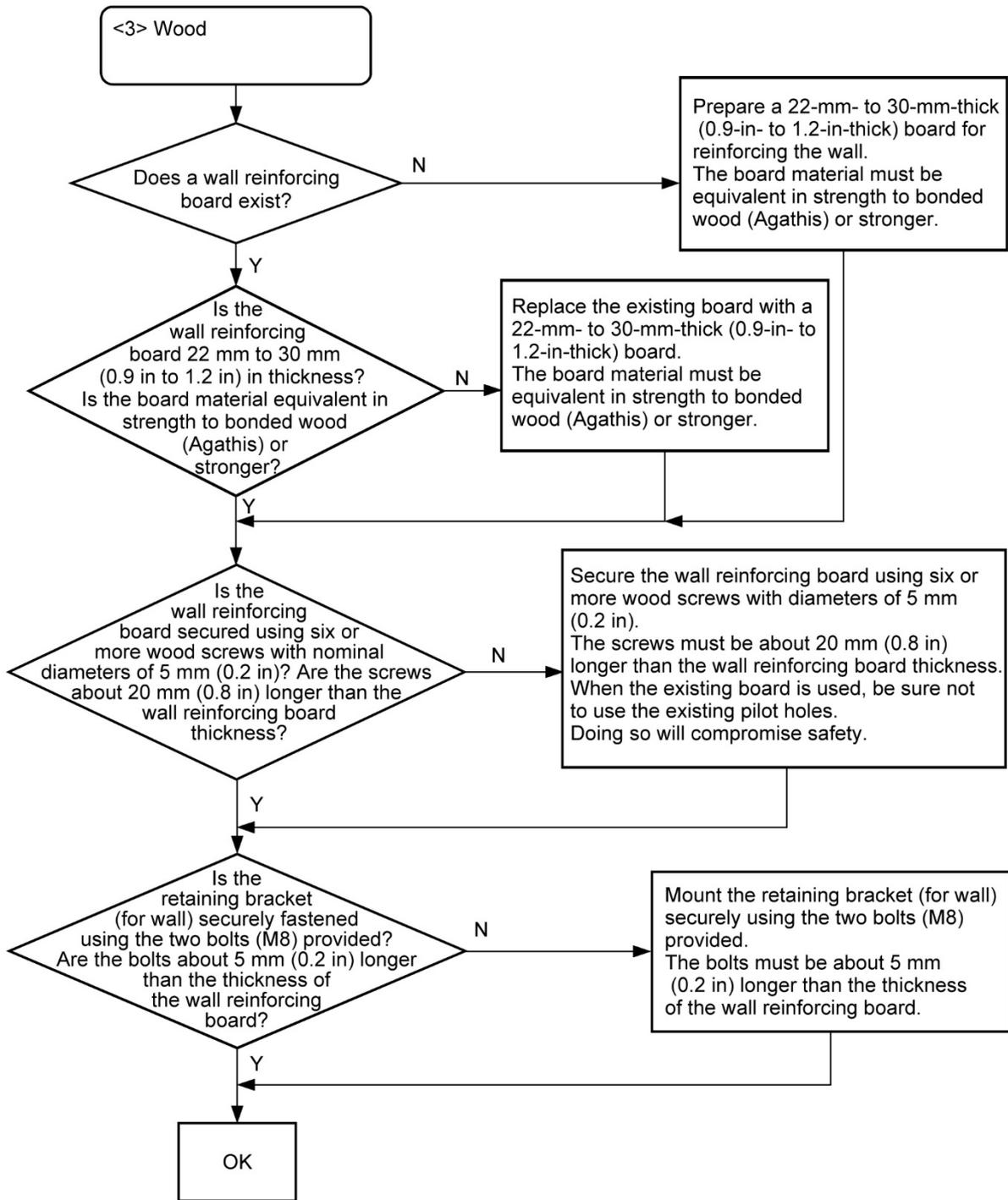
Chart 2



**⚠ WARNING:**

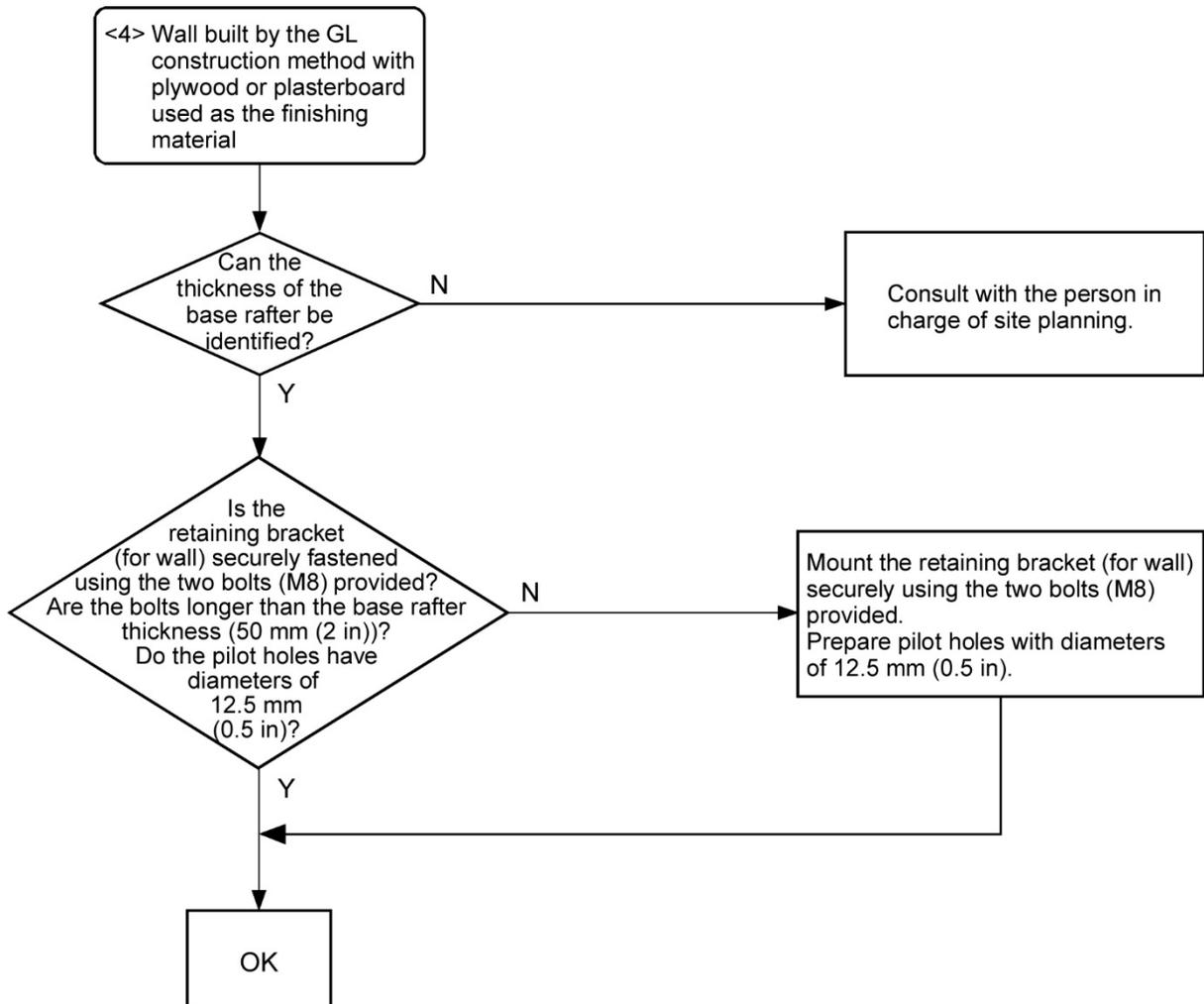
1. The thickness of the studs must be 0.6 mm (0.02 in) or more, in order to ensure sufficient securing strength of the self-tapping screws.
2. In order to ensure sufficient mounting strength of the retaining bracket, do not mount the retaining bracket (for wall) directly to a stud.

Chart 3



**⚠ WARNING:** In order to ensure sufficient mounting strength of the wall reinforcing board, do not mount the wall reinforcing board with nails.

Chart 4



**⚠ WARNING:** The bolt must pass through the base rafter and reach the concrete wall. Otherwise, the main unit may fall.

## 3) Performing wall work

- For a solid reinforced concrete wall

Prepare the wall so that the wall concrete compression strength is  $2.0 \times 10^7 \text{ N/m}^2$  (2845 lbf/in<sup>2</sup>) or more.

The pilot holes must have diameters of 12.5 mm (0.5 in).

If the wall concrete compression strength is insufficient, consult with the person in charge of site planning and perform reinforcement work for the wall.

- For walls other than a solid reinforced concrete wall

Mount the wall reinforcement board for mounting the retaining bracket (for wall).

For a stud wall, mount the wall reinforcement board using self-tapping screws with diameters of 5 mm (0.2 in). The screws must be about 10 mm (0.4 in) longer than the stud thickness.

For a stud wall, the stud thickness must be 0.6 mm (0.02 in) or more and the pilot holes prepared for the 5-mm self-tapping screws. Six or more screws must be used to ensure sufficient securing strength.

For a wood wall, mount the wall reinforcement board using steel wood screws with a diameter of 5 mm (0.2 in). The screws must be about 20 mm (0.8 in) longer than the thickness of the wall reinforcement board.

For a wood wall, six or more screws must be used to ensure sufficient strength.

Use ISO R1478 (JIS B1115) self-tapping screws with a nominal diameter of 5 mm (0.2 in).

The material and dimensions of the wall reinforcement board are specified below.

Material : Any material equivalent in strength to Lauan wood or bonded wood (Agathis) or stronger

Dimensions : Length      Standard 400 mm (16 in)  
                  Width        200 mm to 300 mm (8 in to 12 in)  
                  Thickness    22 mm to 30 mm (0.9 in to 1.2 in)

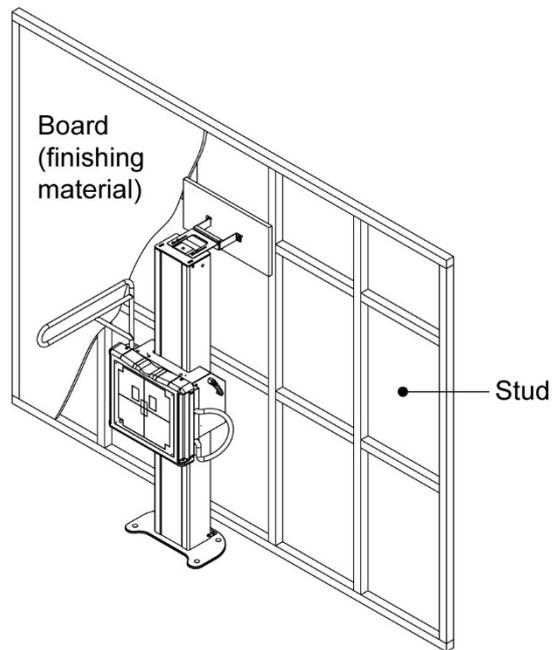


Figure 6-8 Stud wall

- ⚠ WARNING:**
1. The thickness of the studs must be 0.6 mm (0.02 in) or more in order to ensure sufficient securing strength of the self-tapping screws.
  2. In order to ensure sufficient mounting strength of the retaining bracket, do not mount the retaining bracket (for wall) directly to a stud.
  3. Be sure to use ISO R1478 self-tapping screws with nominal diameters of 5 mm (0.2 in).
  4. The 5-mm (0.2-in) self-tapping screws must be about 10 mm (0.4 in) longer than the stud thickness to ensure sufficient securing strength.

- For a wall built by the GL construction method

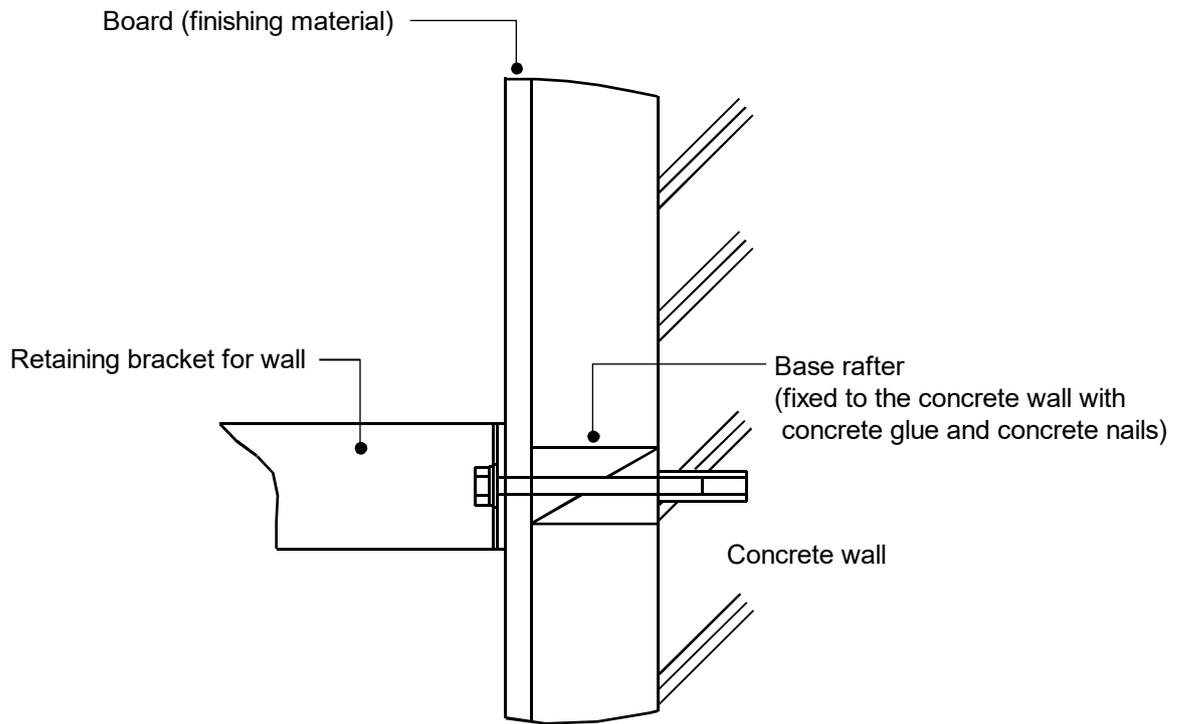


Figure 6-9

**⚠ WARNING:** The bolt must pass through the base rafter and reach the concrete wall. Otherwise, the main unit may fall.

(c) Control room

The console will be fixed to the wall.

1) Wall structure

The wall type must be one of the three types below.

2) Wall requirements

- Concrete wall that is the same as in the examination room. (Refer to figure 6-7.)
- Wood wall more than 30 mm in thickness.
- Hollow wall more than 9 mm but not more than 30 mm in thickness.

(5) Ceiling work for OTC

(a) Ceiling improvement with foundation bolts

The foundation bolts for the ceiling rail are not included. Prepare foundation bolts and materials to suit the installation room and perform the ceiling improvement work.

- Longitudinal rail fixing taps : M10 (ISO 96512)
- Longitudinal rail fixing tap length: Effective screw length 12 mm or more
- Longitudinal rail fixing tap tensile strength : 37.2 kN (3800 kgf) or more per tap
- Longitudinal rail fixing tap positions : Refer to subsection 3.2.
- Longitudinal rail fixing surface levelness : Within  $\pm 2$  mm of the reference level surface in ceiling construction work. However, deviation from the reference level surface will be adjusted during installation of the ceiling rail to within  $\pm 0.5$  mm using spacers.
- Longitudinal cable routing rail ceiling strength : 0.59 kN (60 kgf) or more per tap

## (6) Radiation protection work

Examination room: Appropriate work must be performed for the walls, ceiling, floor, observation window, and doors of the room to ensure radiation protection in compliance with all legal requirements for medical equipment.

**⚠ CAUTION:** The X-ray diagnostic table must be installed in an X-ray shielded room.

## (7) Power facility work

## (a) Power requirements of the X-ray diagnostic table

Line voltage : Single-phase (200/220/230/380/400/415/440/480 VAC)  
 Frequency : 50/60 Hz  $\pm$ 1 Hz  
 Line capacity : Approx. 6.3 kVA  
 Line voltage fluctuation :  $\pm$ 10% or less

## (b) Power facility requirements of the X-ray high-voltage generator

## 1) Power specifications

- Method : Three-phase AC
- Nominal line voltage : 200/220/380/400/415/440/480 V
- Line frequency : 50/60 Hz
- Permissible line voltage fluctuation range : Nominal line voltage  $\pm$  10%

## 2) Specifications for the power transformer

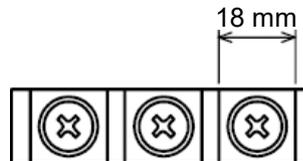
- Power capacity : 110 kVA or more
- Recommended capacity of the power transformer : 75 kVA or more (continuous rating)

**⚠ CAUTION:** The line current of the KXO-80XD under short-term maximum load is 180 A for a 400 V power line. This corresponds to 110 kVA, assuming a line load fluctuation of 5%. Since the rated capacity of the distribution transformer is a continuous rating, the short-term maximum load is different from that shown above.

### 3) Connection

The terminal of the power cable provided with the unit is an M8 crimp terminal at the distribution board end.

The size of the terminal board at the side of the distribution board must be 18 mm or more.



### 4) High-frequency information

- Rated capacity : 75 kVA
- Number of phases : 3 $\phi$ , three-phase bridge (capacitor smoothing) without reactor
- Maximum equipment operation ratio (refer to \*1) : 3.9%
- Maximum operating capacity (refer to \*1) : Radiography 110 kVA, fluoroscopy 3.7 kVA
- Capacity other than that at maximum operating capacity (refer to \*1) : 2 kVA
- Operation time (radiography/fluoroscopy time) (refer to \*1) : Radiography 6 seconds, fluoroscopy 10 minutes

(\*1) Maximum equipment operation ratio (%) =  $((P1 \cdot t + P2 \cdot (30 - t)) / P \cdot 30) \cdot 100$

P1 : Maximum operating capacity (kVA)

P2 : Capacity other than at maximum operating capacity (kVA)

P : Rated capacity (kVA)

t : Operation time (radiography/fluoroscopy time) (minutes)

Source : JIRA TR-007 "Guidelines for operation ratio policies for high-frequency restrictions" in Japan.

**⚠ CAUTION:** It is necessary to install a breaker for the power facility so that the power supply to all units in the system configuration except the image processor can be cut.

5) Power supply system

A separate power supply system must be provided for each X-ray high-voltage generator.

6) Low-voltage line

If conduit cable routing is to be employed, the nominal cross-sectional area of the wires used in the low-voltage line from the power transformer to the distribution board must meet the requirements shown in the tables below. The values in the tables are the minimum permissible cross-sectional areas.

For three-phase 200 V (unit: mm<sup>2</sup> Cu)

One-way wire length (unit: m)									
10 or less	20 or less	30 or less	40 or less	50 or less	60 or less	70 or less	80 or less	90 or less	100 or less
14	22	38	38	60	60	60	100	100	100

For three-phase 415 V (unit: mm<sup>2</sup> Cu)

One-way wire length (unit: m)									
10 or less	20 or less	30 or less	40 or less	50 or less	60 or less	70 or less	80 or less	90 or less	100 or less
5.5	5.5	5.5	5.5	8	8	14	14	14	22

(c) Power requirements of the image processor

- Line voltage : Single-phase (200/220/230 VAC)
- Frequency : 50/60 Hz ±1 Hz
- Line capacity : Approx. 1.5 kVA (HDR-08A)
- Line voltage fluctuation : ±10% or less

(8) Air-conditioning work

To ensure that the specified operating environmental conditions and storage environmental conditions are satisfied, air-conditioning facilities are required in the room in which the system is installed.

In this manual, only the heat generation of the X-ray diagnostic table and the X-ray high-voltage generator is shown. However, when planning air-conditioning work, the heat generation for the other units used in combination must also be considered.

Note that the data shown below are standard values, and the actual values may differ depending on the operating conditions.

(a) Heat generation of the system

- The X-ray diagnostic table

System name	Heat generation [Unit: kWh] In parenthesis: kJ	Power consumption [Unit: kW] (During standby)
DUA-450F	0.363 (1307)	0.027

(1 kWh = 3600 kJ)

- The X-ray high-voltage generator

Heat generation : 2.22 kW (1.22 kW for continuous fluoroscopy only)

During stand-by status : Approximately 0.8 kW

During fluoroscopy : Approximately 2.1 kW (1.1 kW for continuous fluoroscopy only)

(b) Calculated value of the heat generation

The heat generation is calculated using the following formula based on actual measurements and standard performance conditions (operation parameters). Note that the power consumption during standby must be considered.

It is assumed that part of the mechanical power consumption is lost as heat, according to the specified heat-loss ratio. It is also assumed that the power consumption during standby is fully lost as heat.

In this system, the operation parameters are set as shown below.

Symbol	Description	Parameter value	Unit
A	Operating time per day	4	time/day
B	Number of patients per day	20	persons/day
D1	Table operating time for each position	0.3	minutes
D2	Number of table positioning operations per patient	20	times/patient
E	Heat-loss ratio Table	0.3	———
F	Power consumption during standby	Measurement values	kW
H	Maximum power consumption during table movement		kW

Based on the operation parameters, the heat generation of this system is calculated as follows.

Heat generation:  $(F \times A + H \times E \times D1 \times D2 \times B/60)/A$  (kW)

7. WORK TO BE PERFORMED BY OUR COMPANY

7.1 Determining the Bringing-In Method

After the system layout has been decided, the bringing-in alternatives must be studied carefully to determine the bringing-in method.

7.1.1 Standard packed state

The X-ray diagnostic table and the X-ray high-voltage generator are normally shipped in the following standard packed state.

This state is called the "standard disassembly" state.

Table 7-1a Standard disassembly (The X-ray diagnostic table)

No.	Packed unit	Mass
1	Gantry, Body, Imaging device, Beam limiting device	Approx. 1650 kg (3637.6 lb)
2	Control cabinet	Approx. 60 kg (132.3 lb)
3	System cabinet	Approx. 190 kg (418.9 lb)
4	Covers, cables	Approx. 160 kg (352.7 lb)
5	Accessories	

Table 7-1b Standard disassembly (The X-ray high-voltage generator)

No.	Packed unit	Mass
1	X-ray high-voltage generator cabinet	Approx. 450 kg (992.1 lb)
2	Console, cables	Approx. 100 kg (220.5 lb)
3	Pulsed fluoroscopy control unit	Approx. 185 kg (407.9 lb)
4	Accessories	

## 7.1.1.1 Bringing-in requirements for standard packing

The bringing-in route for the units shipped in the standard disassembly state must satisfy certain requirements. An inspection of the available routes must be conducted in advance to check which route satisfies these requirements.

- Requirements

(1) The bringing-in route must satisfy the following requirements.

(a) Width of corridor : 1600 mm or more

(b) Width of entrance : 1250 mm or more

If these requirements (a) and (b) are not met, additional disassembly is required to the X-ray diagnostic table.

(c) Height : 2000 mm or more (The X-ray high-voltage generator)

(2) When the front cover, patient step, and Bucky handle are excluded from the standard packing of the X-ray diagnostic table, delivery conditions are as follows:

The table width can be narrowed by setting the tabletop away from the operator side, setting the fluoroscopic carriage toward the operator side, and parking the imaging device at the position as shown in figure 7-1 View B.

When a corridor, entrance, or entrance of an elevator are wider than the required width by 70 mm, delivery can be performed with the front cover, patient step, and Bucky handle attached.

7.1.1.2 External view for the standard disassembly state of the X-ray diagnostic table

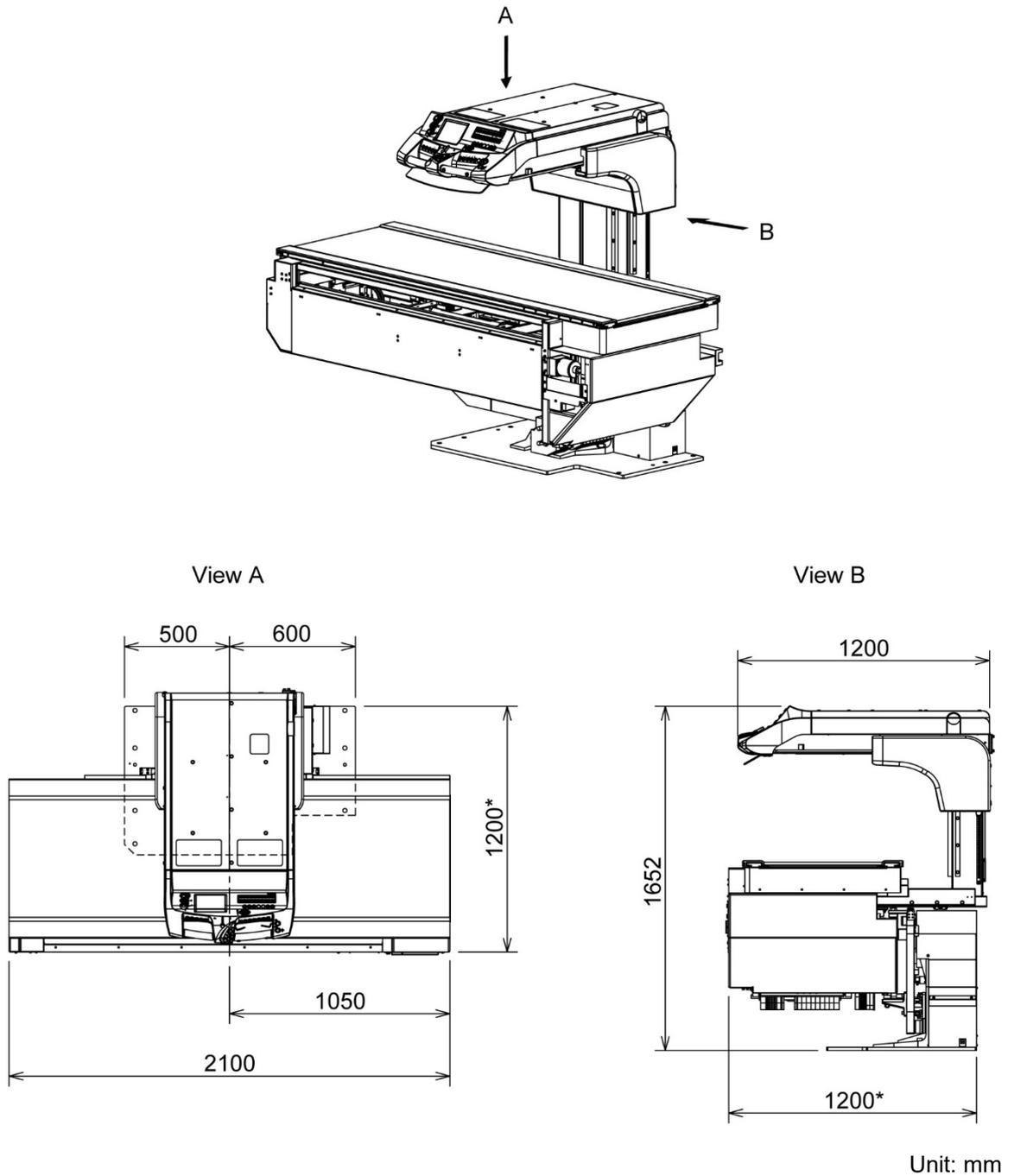


Table with the front cover and patient step excluded

\* Length with screws and front cover mounting bracket installed.

Figure 7-1 External view for the standard disassembly state of the X-ray diagnostic table

7.1.1.3 Bringing-in for the standard packed state of the X-ray diagnostic table

Restrictions

In order to bring in the X-ray diagnostic table described in figure 7-1, all the conditions below must be satisfied; otherwise bringing-in with the standard packing is not possible.

- (a) If using the elevator, the entrance width should be 1250 mm or more and the depth should be 2200 mm or more.
- (b) If turning the unit with the gantry facing the outside, the corridor width should be 1600 mm or more and the entrance width should be 1250 mm. (Figure 7-2)
- (c) If turning the unit with the gantry facing the inside, the corridor width should be 1600 mm or more and the entrance width should be 1600 mm. (Figure 7-3)

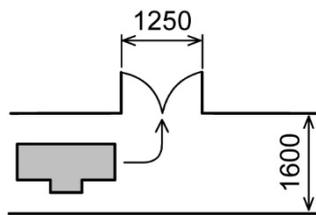


Figure 7-2

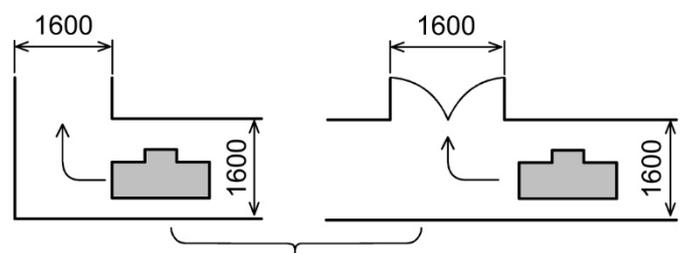


Figure 7-3

- (d) If the corridor width is 1250 mm, the shape of the corridor should be straight. (Figure 7-4)  
(There should be no 50 mm or more ledges at or below a height of 1000 mm)

In this case, if turning the unit with the gantry facing the outside, the bringing-in entrance width should be 1600 mm or more. (Figure 7-5)

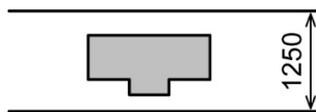


Figure 7-4

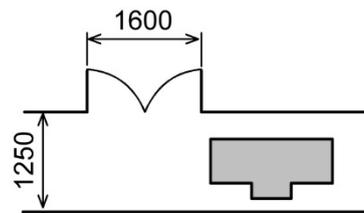


Figure 7-5

7.1.2 OTC system packed state

Refer to this subsection when the OTC system is used in combination with the system.

Table 7-3 Packaging (OTC system)

No.	Packed unit	Mass
1	Main unit (DST-100S)	Approx. 250 kg
2	Rails	

7.1.2.1 Bringing-in requirements for the OTC system

Required dimensions at the corners of the carrying-in route (refer to figure 7-12A)

Route dimensions (A × B)	Possible or not possible		
	Main unit	Longitudinal rail (DSR-242B)	
		Method 1	Method 2
1.2 × 1.6	○	×	×
1.6 × 1.6	○	×	×
1.6 × 1.8	○	×	×
1.8 × 1.8	○	×	○
1.8 × 2.0	○	×	○
2.0 × 2.0	○	○	○
2.1 × 2.1	○	○	○
2.2 × 2.2	○	○	○

Method 1 : When the rails are carried in horizontally

Method 2 : When the rails are carried in with one end of the rails 1.8 m higher than the other end.

If the rails are to be carried in using another method, carefully evaluate the method referring to figure 7-12B "Projection drawing of the longitudinal rails".

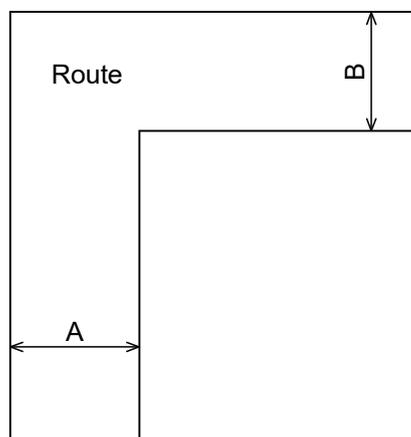


Figure 7-6A Required dimensions at the corners of the carrying-in route

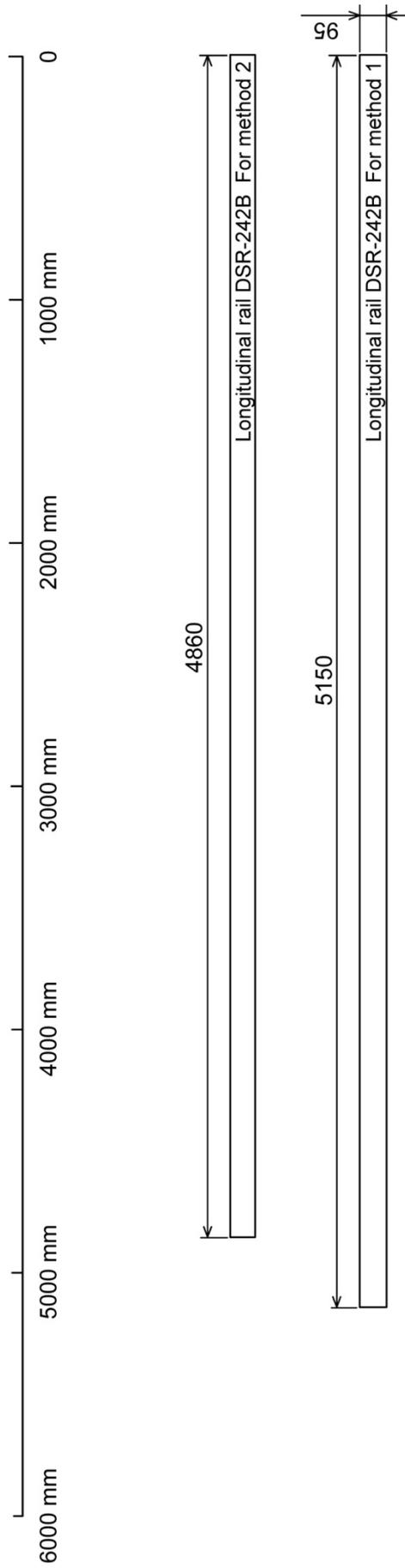


Figure 7-6B Projection drawing of the longitudinal rails

7.1.3 Vertical radiography stand packed state

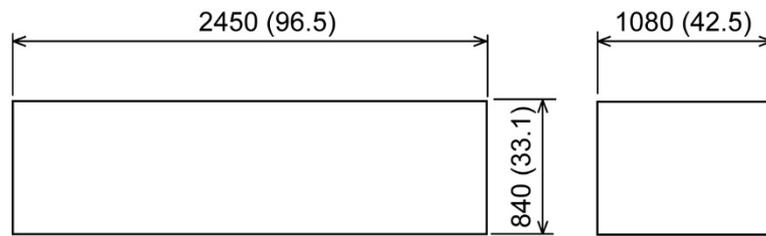
Carry in the equipment in the packed state and unpack it at the installation location.

(1) Packaging

Unit	Package type
Main unit	Wooden crate with one corrugated cardboard box containing accessories

Packaging status	External dimensions and mass of the package
In standard packaging	2450 mm (width) × 1080 mm (depth) × 840 mm (height), approx. 280 kg (96.5 in (width) × 42.5 in (depth) × 33.1 in (height), approx. 617.3 lb)
Unpacked	880 mm (width) × 500 mm (depth) × 2110 mm (height), approx. 215 kg (34.6 in (width) × 19.7 in (depth) × 83.1 in (height), approx. 474 lb)

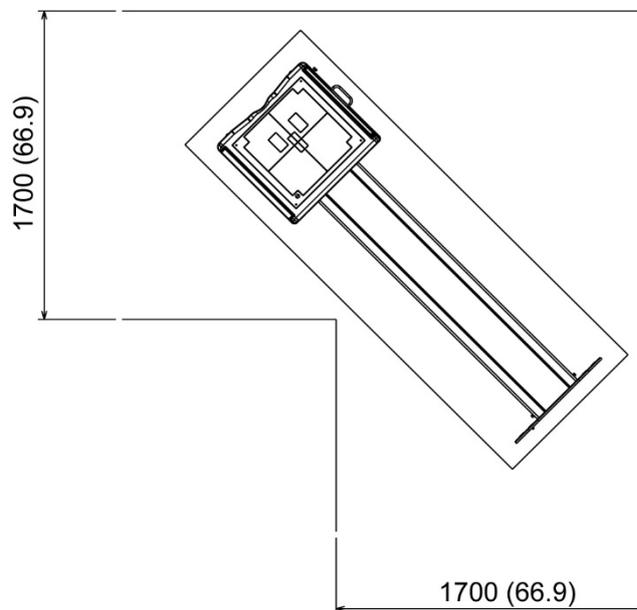
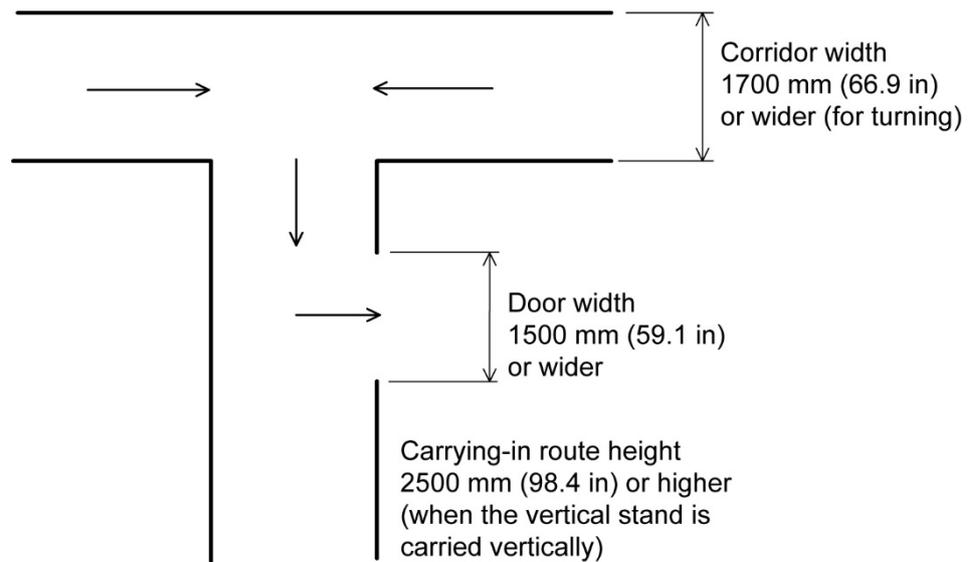


Unit: mm (in)

7.1.3.1 Carrying-In Route and Entrance

(1) Required dimensions for the carrying-in route and entrance

- <1> Effective width of the route : 1700 mm (66.9 in) or more (when there is a corner in the carry-in route)
- <2> Effective width of the entrance : 1500 mm (59.1 in) or more
- <3> Height of the route and entrance : 2500 mm (98.4 in) or more (when the vertical radiography stand is carried in upright)



Unit: mm (in)

Figure 7-7

7.2 Securing the Gantry, the Cable Stand, the Cabinet, and the Vertical Radiography Stand

- (1) Be sure to secure the gantry and the cable stand using anchor bolts.

The anchor bolt mounting locations are shown in figure 7-8.  
For the positions from a wall, refer to subsection 3.1.

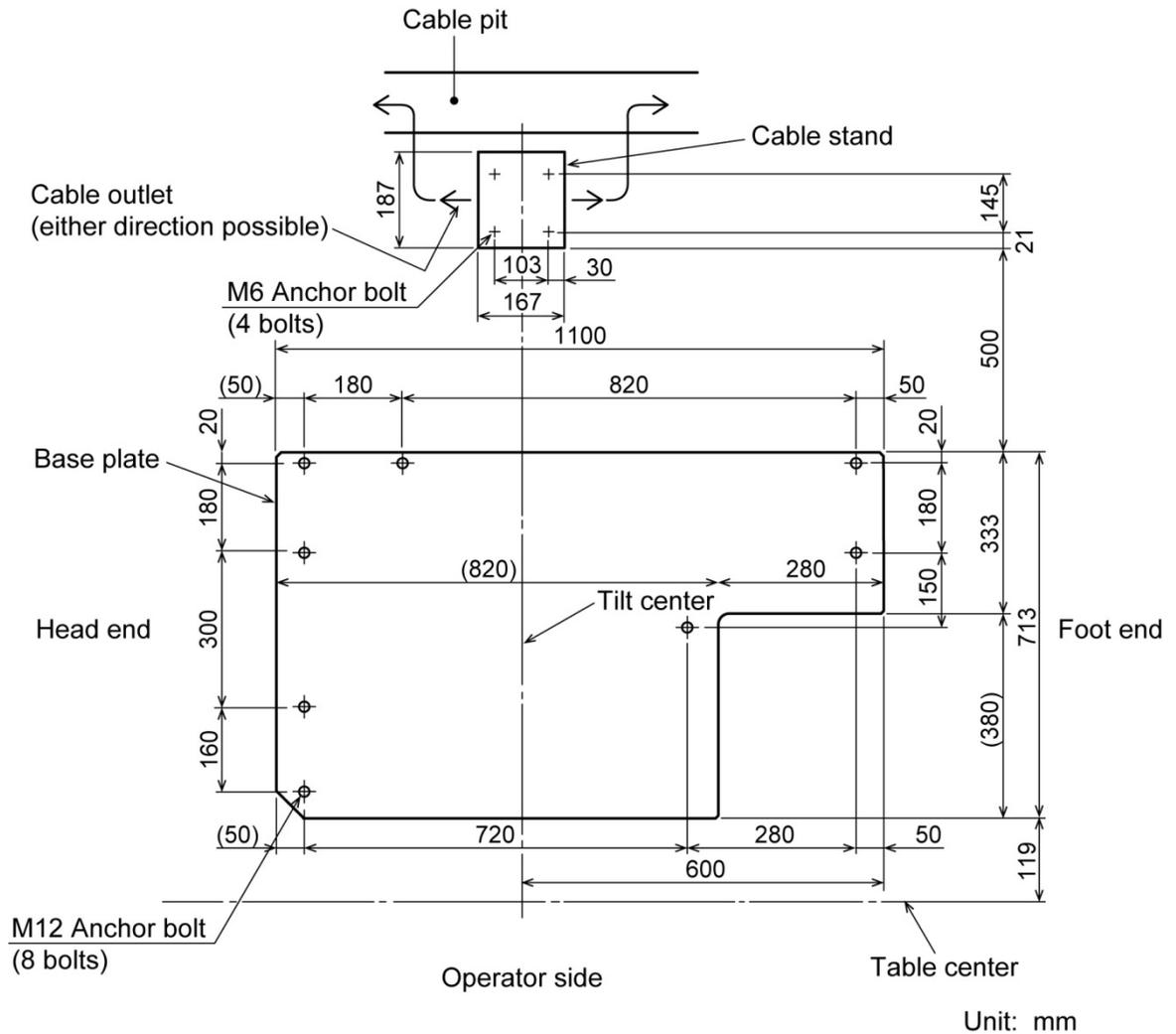
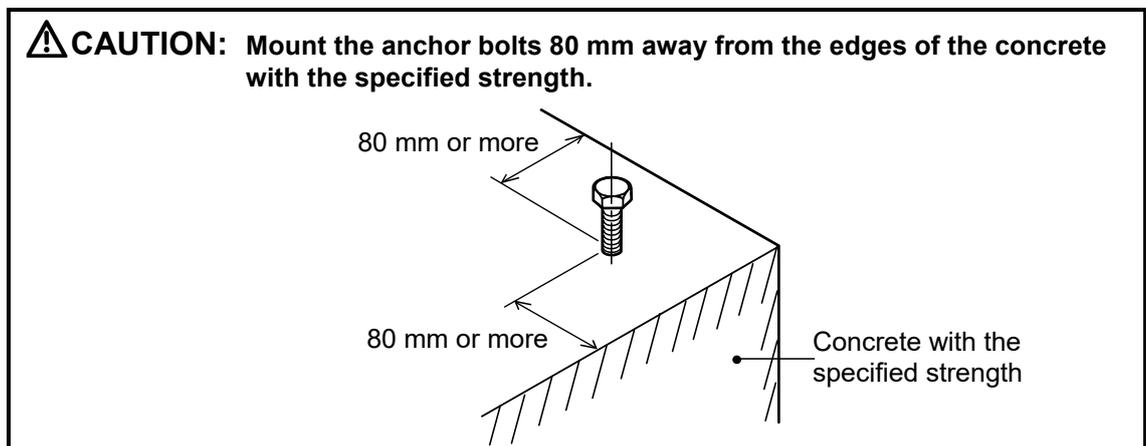
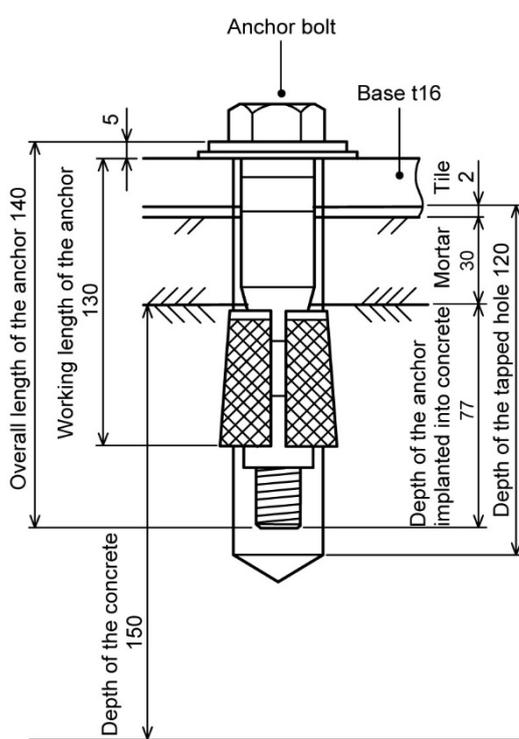


Figure 7-8



For mounting anchors, the floor conditions shown below are assumed in this manual.



Overall length of the anchor	140 mm
Working length of the anchor	130 mm (including the 5 mm thickness of the washer)
Table base	16 mm
Tile	2 mm
Mortar	30 mm or less
Concrete section	
Implanting depth of the anchor	77 mm
Depth of the tapped hole	120 mm
Removal force for anchors	12 kN
Depth of the concrete	150 mm or more

Unit: mm

12 kN is required for removing each anchor with an implanting depth into the concrete of 77 mm (lightweight concrete, force (Fc): 1.8 kN/cm<sup>2</sup>, Young's modulus (Ec): 1.1 × 10<sup>10</sup> Pa).

Even if the specified anchor bolts cannot be used because of the particular circumstances of the building (for example, the mortar is too thin), select M12 anchors so that the implanting depth into the concrete is at least 77 mm.

Recommended anchors : SANKO Techno NSB-1225  
The overall length is 115.  
Depth of the tapped hole is 95 (Drawing No.: AAB016-01).

If sufficient implantation depth of the anchor into the concrete cannot be obtained, work on the floor using M16 bolts to secure the assembly to the floor.

In this case the removal force for the bolts should be at least 12 kN.

Recommended bolts : M16 hexagonal bolts with a strength rating of 4.8, with a spring washer and a flat washer.

If the above instructions cannot be performed, additional tip-resistant work is required.

Floor anchor bolts for the cable stand

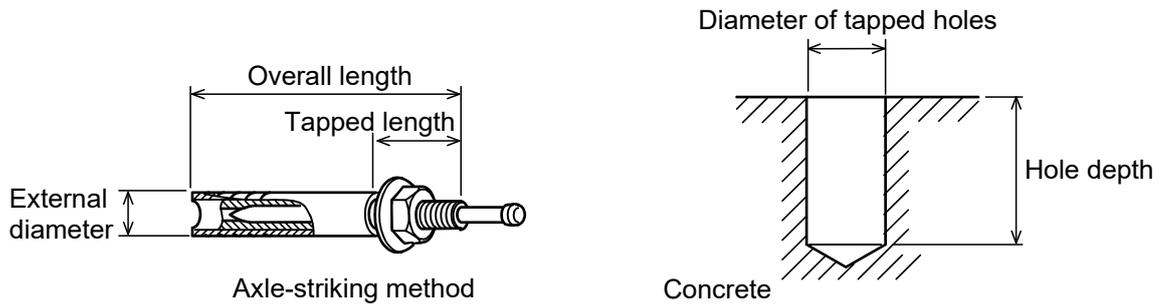


Figure 7-9

Make tapped holes using a masonry drill.

Diameter :  $\phi 6.4$  mm

Depth :  $45^{+10}_0$  mm

Nominal size	Model (Sanko Techno)	Anchor bolt size (mm)		
		External diameter	Overall length	Tapped length
M6	C-645	6	45	15

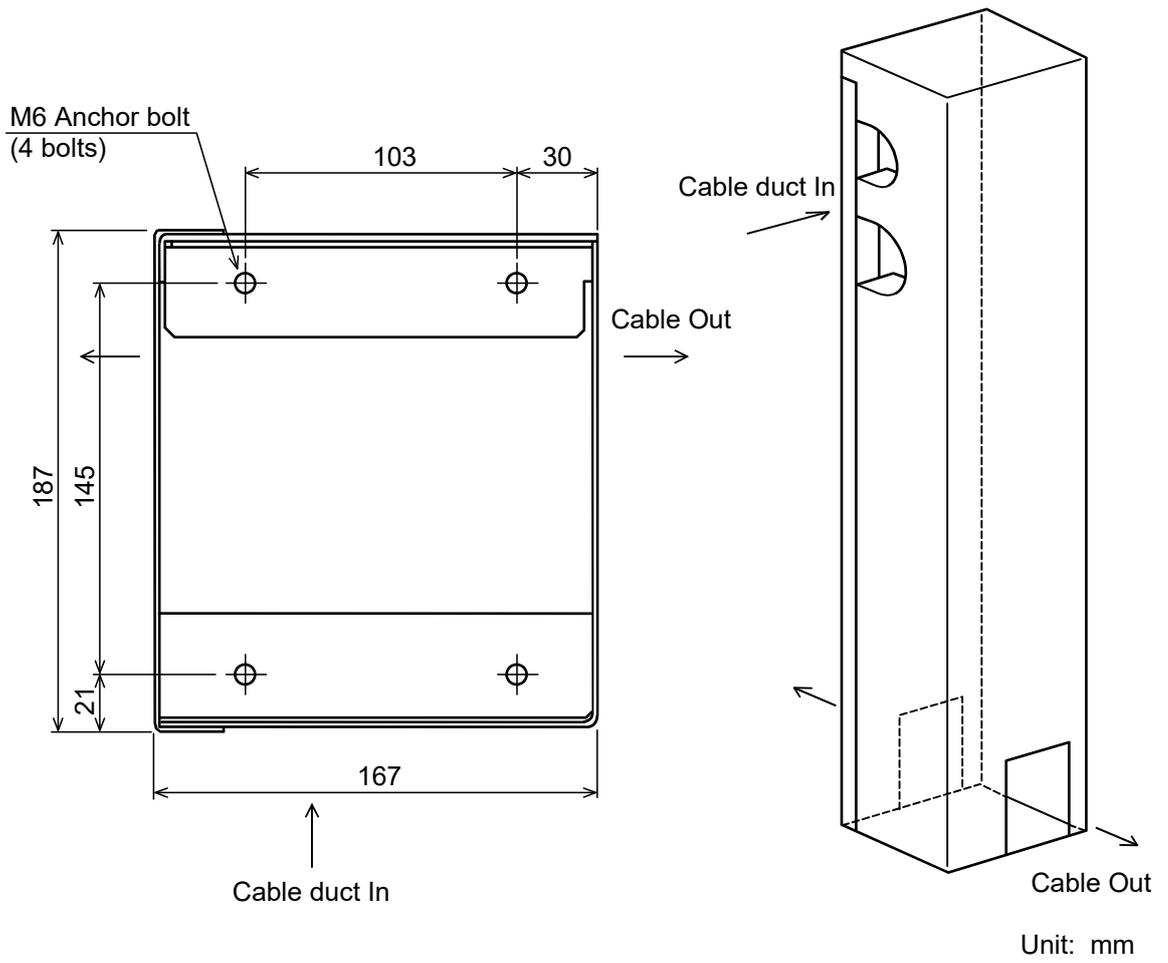


Figure 7-10

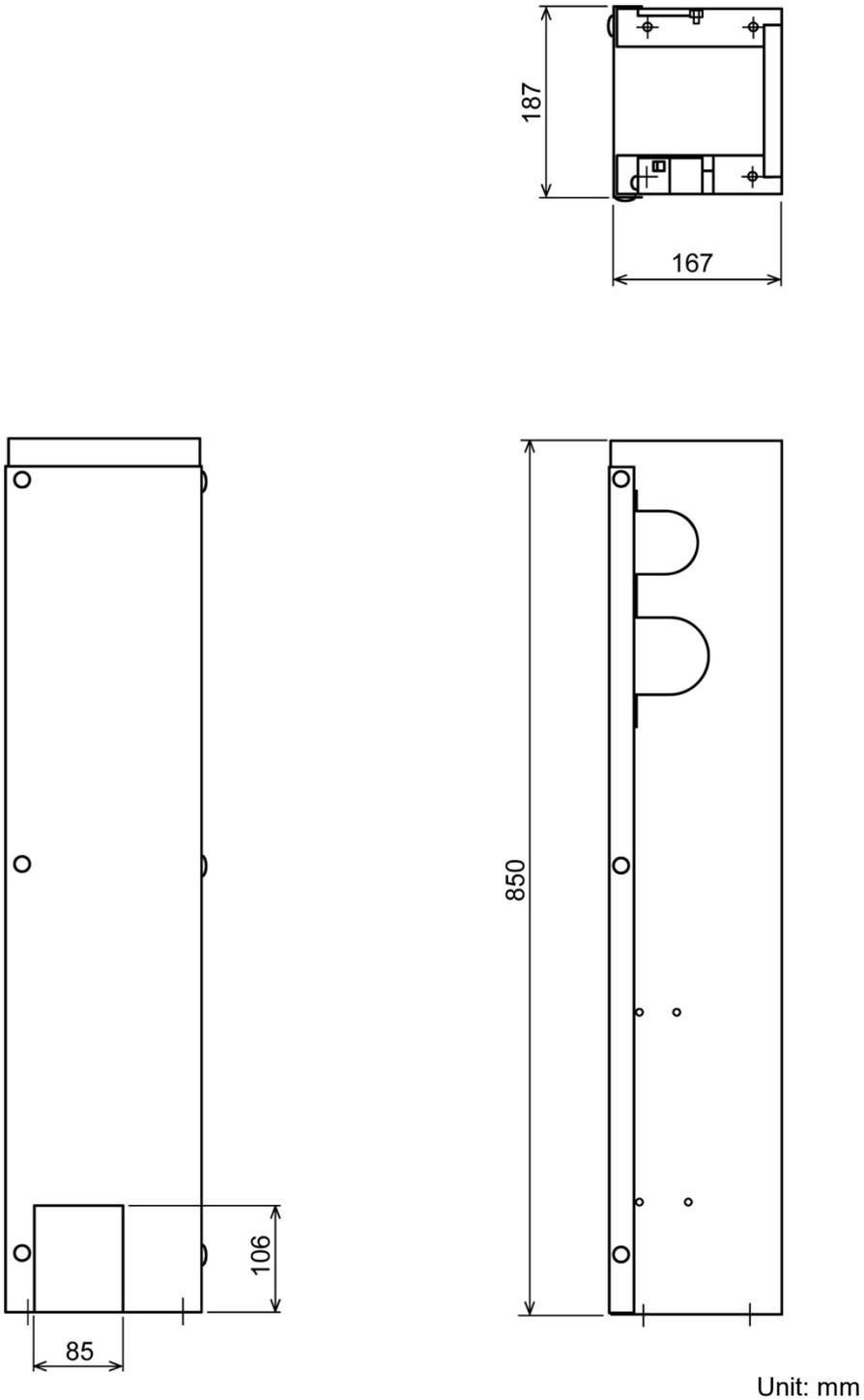


Figure 7-11 Cable stand

- (2) Control cabinet of the X-ray diagnostic table and system cabinet
  - (a) Control cabinet of the X-ray diagnostic table

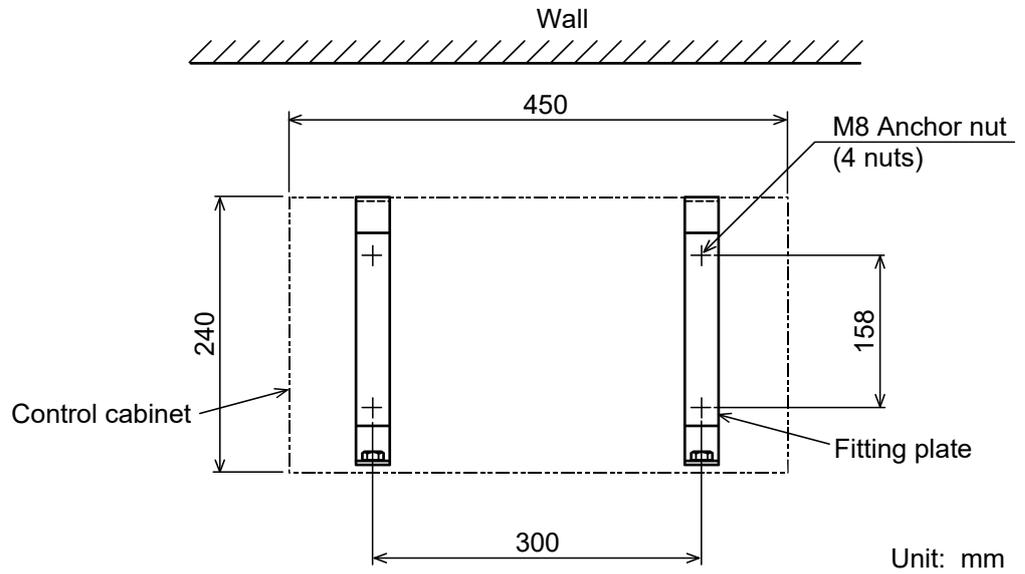


Figure 7-12

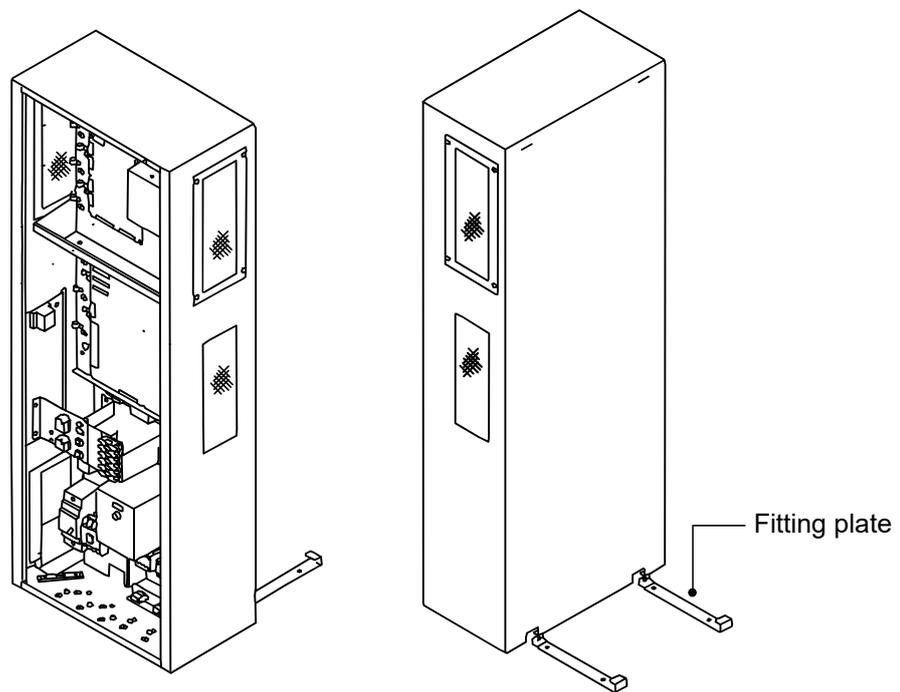
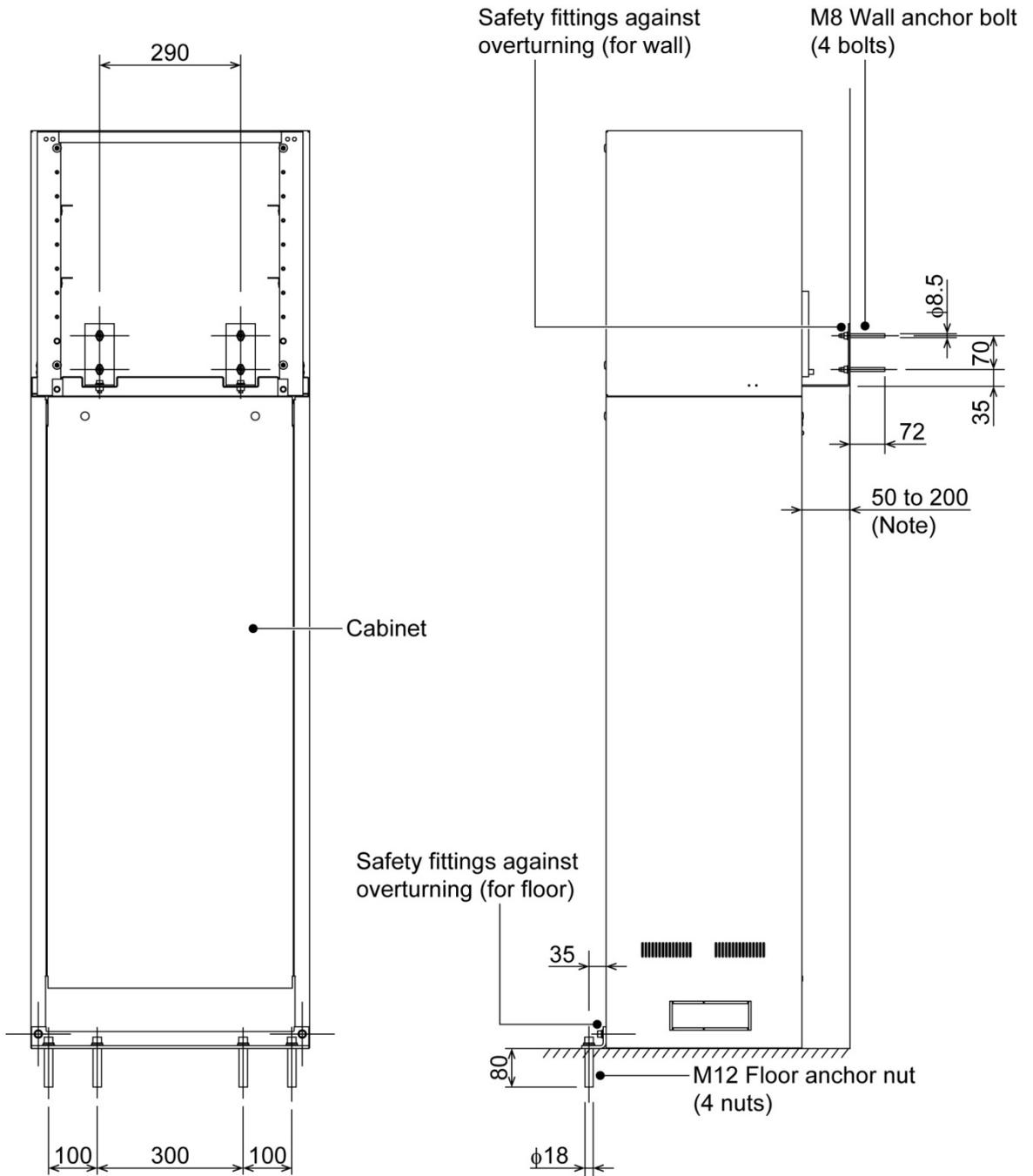


Figure 7-13

(b) System cabinet



Unit: mm

Figure 7-14 Systems with an FPD

Note: It is recommended that the clearance between the rear of the cabinet and the wall should be 125 mm or more for routing the cables of the PU.

(c) Floor anchor nuts for the cabinets

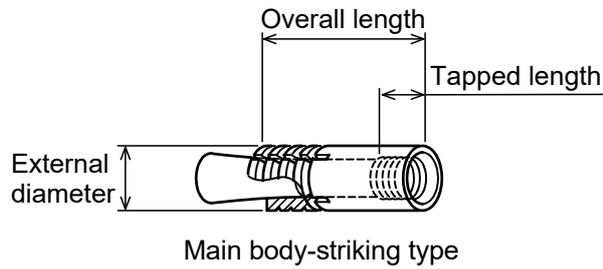


Figure 7-15

Make tapped holes using a masonry drill.

	Control cabinet M8	System cabinet M12
Diameter (mm)	φ12.5	φ18
Depth (mm)	40 <sup>+5</sup> <sub>0</sub>	85

	Nominal size	Model (Sanko Techno)	Anchor nut size (mm)		
			External diameter	Overall length	Tapped length
Control cabinet	M8	HGA-8M	12.0	35	13
System cabinet	M12	HGA-12ML	17.3	80	25

(d) Wall anchor bolts for the system cabinet

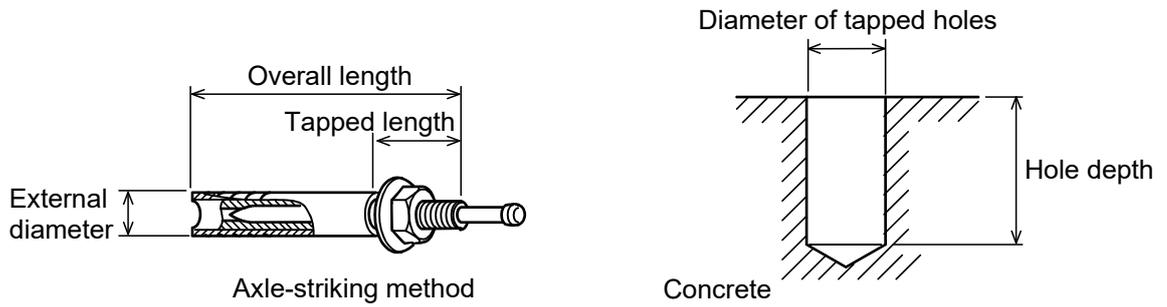


Figure 7-16

Make tapped holes using a masonry drill.

Diameter :  $\phi 8.5$  mm

Depth :  $80^{+10}_0$  mm

Nominal size	Model (Sanko Techno)	Anchor bolt size (mm)		
		External diameter	Overall length	Tapped length
M8	C-890	8	90	25

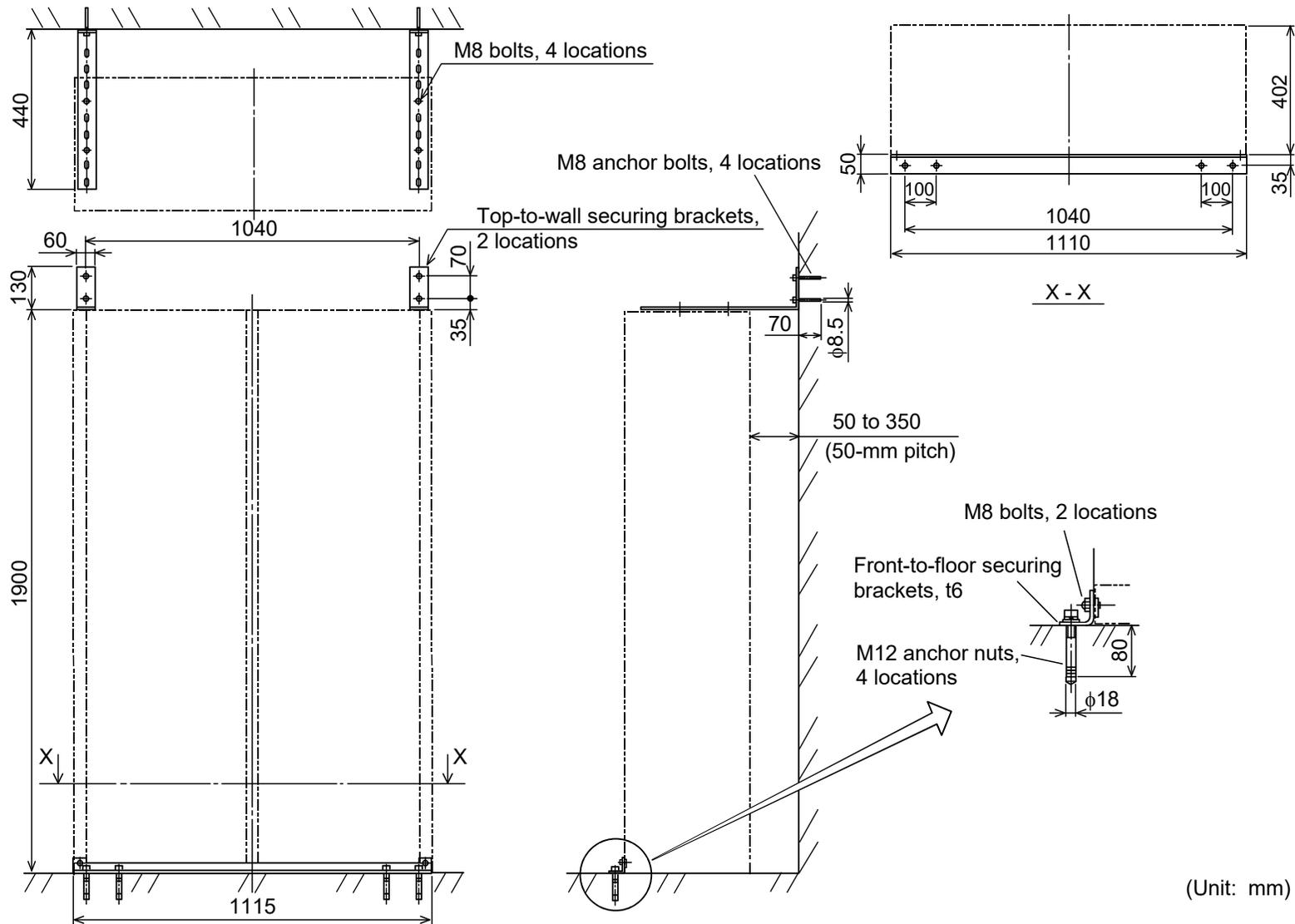


Figure 7-17 Installation of the control cabinet of the X-ray high-voltage generator

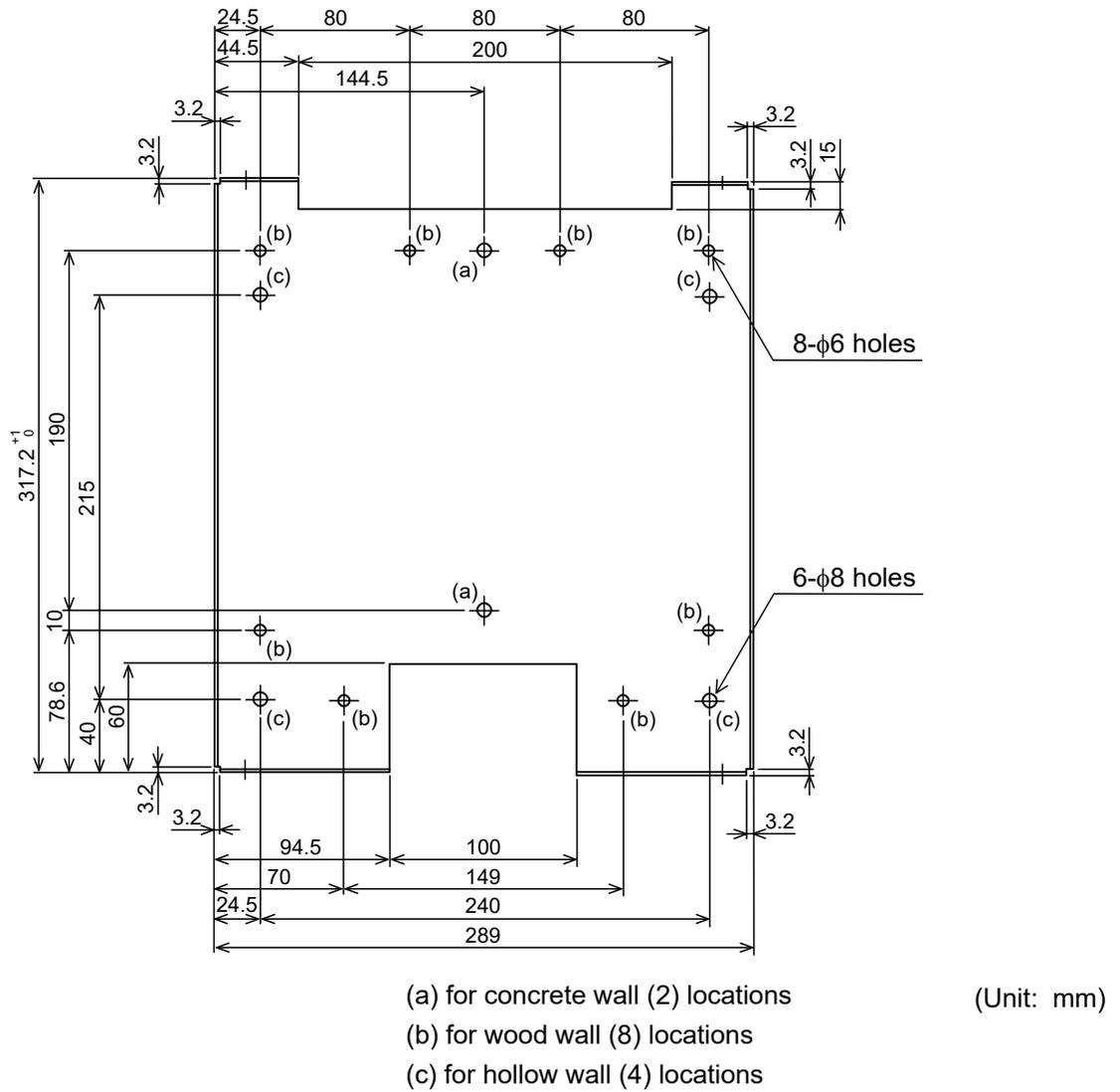


Figure 7-18 Wall-fixing plate for console of the X-ray high-voltage generator

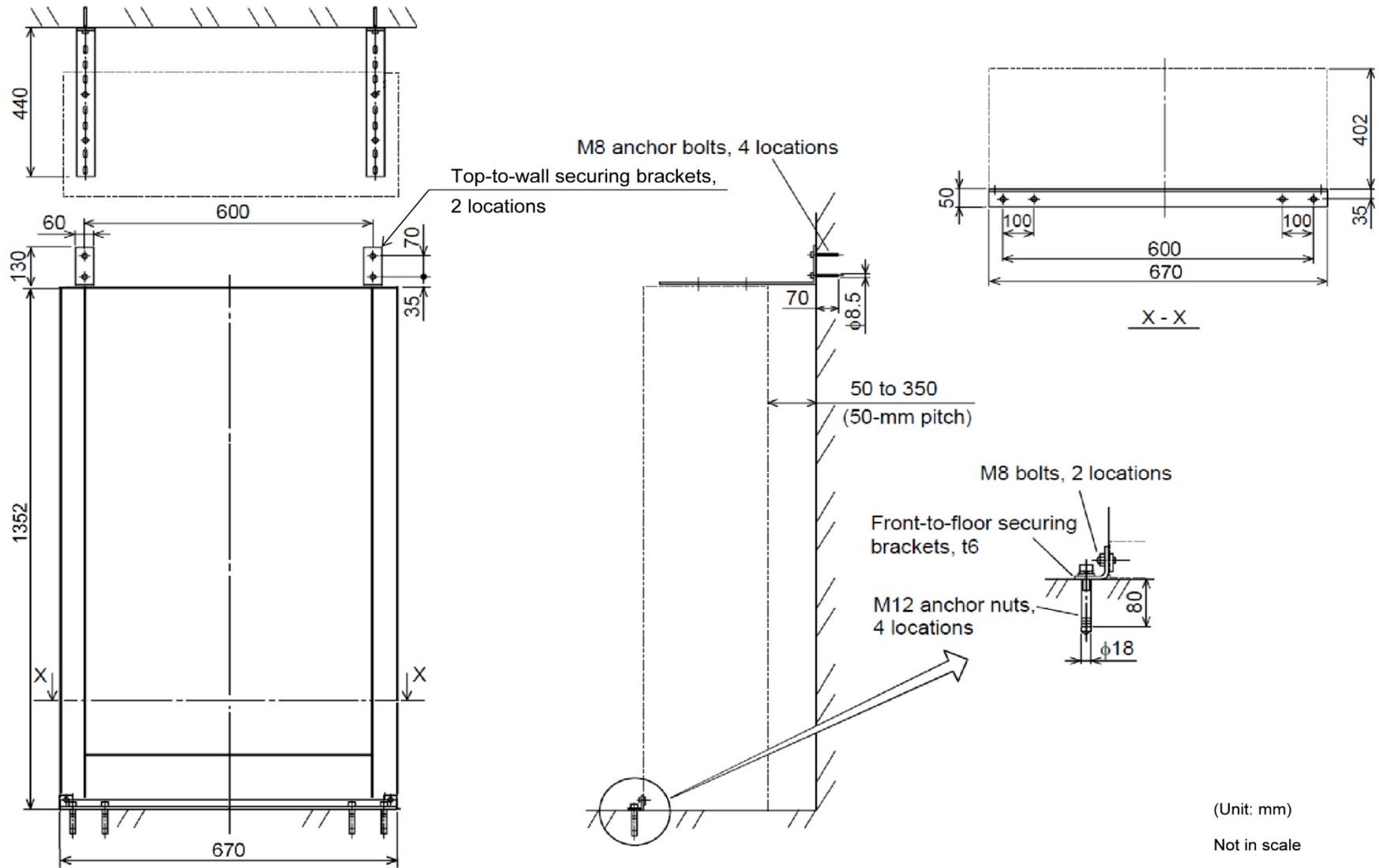
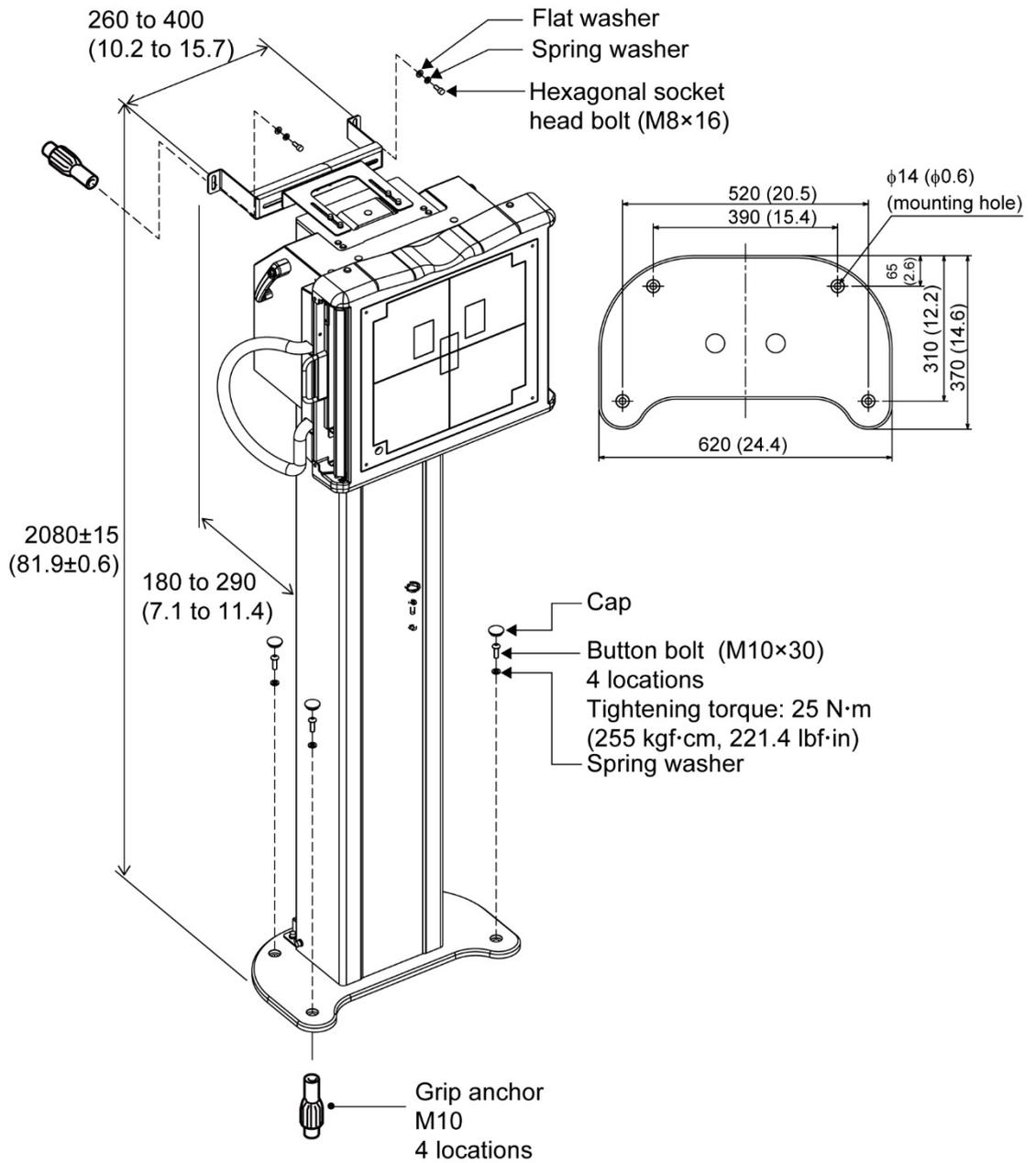


Figure 7-19 Installation of the cabinet of the pulsed fluoroscopy control unit





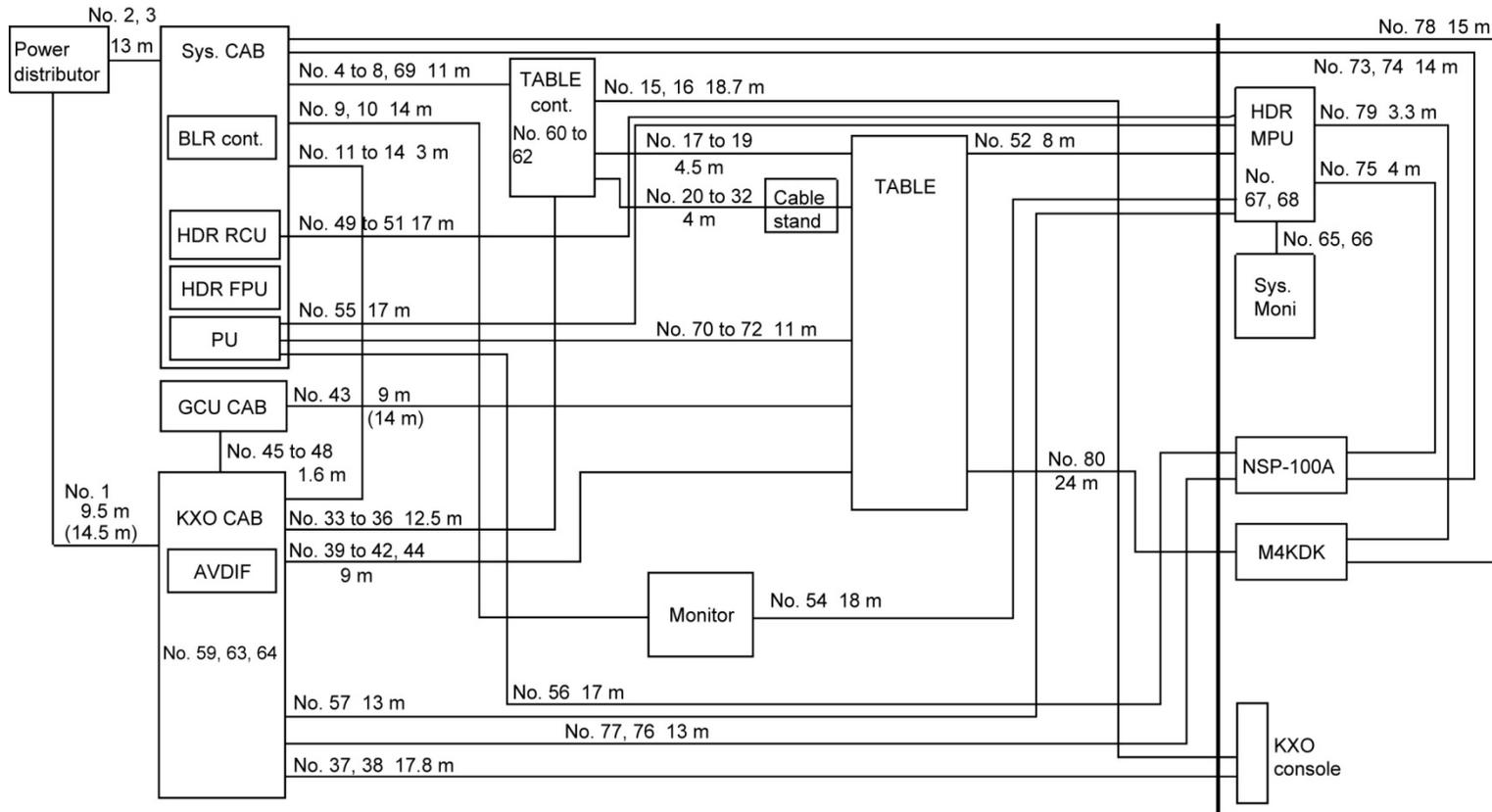
Unit: mm (in)

Figure 7-21 Securing the stand to the floor

7.3 Interunit Cable Connection

7.3.1 Interunit cable lengths (connection diagram)

(1) X-ray diagnostic table movement range



No.	Cable connection				Cable length (m)			Cable specs.	Required quantity	Unit supplied with cable	Remarks
	FROM		TO								
	Unit	Subunit Connection point	Unit	Subunit Connection point	Drawing No.	Standard	Special order				
1	MAIN POWER DISTRIBUTOR	-	KXO-80XD	KXO-CAB	Drawing No.	CX12-54817 Gr.1			1	KXO-80XD	
				POWER UNIT T1	Length	15					
					Effective length	14.5					
2	MAIN POWER DISTRIBUTOR	-	DUA-450F	SYSTEM CABINET	Drawing No.	4X91-00858-1		AWG 8 3-core φ22.7 mm	1	DUA-450F	400 VAC
				TB1	Length	15.6					
					Effective length	15					
3	MAIN POWER DISTRIBUTOR	-	DUA-450F (HDR-08A)	SYSTEM CABINET	Drawing No.	CX12-48265 Gr.1			1	DUA-450F	
				TB (RCU and FPU POWER IN)	Length	15					
					Effective length	13					
4	DUA-450F	SYSTEM CABINET	DUA-450F	CONTROL BOX	Drawing No.	CX91-00899 Gr.1	-	AWG 10 3-core φ14 mm	1	DUA-450F	200 VAC
				TB2	Length	12	-				
					Effective length	11	-				
5	DUA-450F	SYSTEM CABINET	DUA-450F	CONTROL BOX	Drawing No.	CX91-06772 Gr.1	-	AWG 14 2-core φ9.3 mm	1	DUA-450F	100 VAC
				TB3	Length	12	-				
					Effective length	11	-				
6	DUA-450F	CONTROL BOX TABLE CONT PWB ADR1	HDR-08A	RCU	Drawing No.	CX91-08200 Gr.1	CX91-08200 Gr.2	AWG 28 26-core φ10.0 mm shield	1	DUA-450F	
					Length	15	25				
					Effective length	12	22				
	KXO-80XD	KXO CAB CONTROL UNIT ADR/80XM	PORT A	Drawing No.	-	-	AWG 28 20-core φ9.3 mm shield				
				Length	15	25					
				Effective length	11	21					
7	DUA-450F	CONTROL BOX TABLE CONT PWB ADR2	HDR-08A	RCU	Drawing No.	CX91-08212 Gr.2	CX91-08212 Gr.3	AWG 28 16-core φ8.9 mm shield	1	DUA-450F	
				IOBA	Length	15	25				
					Effective length	12	22				
8	DUA-450F	CONTROL BOX TABLE CONT PWB ADR3	HDR-08A	RCU	Drawing No.	CX91-08211 Gr.1	CX91-08211 Gr.2	AWG 28 16-core φ8.9 mm shield	1	DUA-450F	
				PORT C	Length	15	25				
					Effective length	12	22				

No.	Cable connection				Cable length (m)			Cable specs.	Required quantity	Unit supplied with cable	Remarks
	FROM		TO		Drawing No.	Standard	Special order				
	Unit	Subunit Connection point	Unit	Subunit Connection point							
9	DUA-450F	SYSTEM CABINET	TV MONITOR (IN ROOM)	-	Drawing No.	BSX21-0320		1		100 VAC	
					Length	15					
					Effective length	14					
10	DUA-450F	SYSTEM CABINET	TV MONITOR (IN ROOM)	-	Drawing No.	CX21-02363 Gr.2		1		100 VAC	
					Length	15					
					Effective length	14					
11	KXO-80XD	KXO CAB	DUA-450F	SYSTEM CABINET	Drawing No.	CX91-00932 Gr.1	CX91-00932 Gr.3	1	DUA-450F	100 VAC	
					Length	5	20				
					Effective length	3	18				
12	KXO-80XD	KXO CAB	HDR-08A	RCU	Drawing No.	CX91-08201 Gr.1	CX91-08201 Gr.2	1	KXO-80XD		
					Length	15	25				
					Effective length	11	21				
13	KXO-80XD	KXO CAB	HDR-08A	RCU	Drawing No.	CX91-08202 Gr.1	CX91-08202 Gr.2	1	KXO-80XD		
					Length	15	25				
					Effective length	12	22				
14	KXO-80XD	KXO CAB	HDR-08A	RCU	Drawing No.	CX91-08203 Gr.1	CX91-08203 Gr.2	1	KXO-80XD		
					Length	15	25				
					Effective length	11	21				
15	KXO-80XD	WALL PANEL	DUA-450F (KXO-80XD)	CONTROL BOX	Drawing No.	CX12-54815 Gr.5		1	KXO-80XD		
					Length	20					
					Effective length	18.7					
16	KXO-80XD	WALL PANEL	DUA-450F (KXO-80XD)	CONTROL BOX	Drawing No.	CX12-54816 Gr.2		1	KXO-80XD		
					Length	20					
					Effective length	18.7					
17	DUA-450F	CONTROL BOX	DUA-450F	TABLE	Drawing No.	CX91-08215 Gr.1	-	1	DUA-450F		
					Length	6.5	-				
					Effective length	4.5	-				

No.	Cable connection				Cable length (m)			Cable specs.	Required quantity	Unit supplied with cable	Remarks
	FROM		TO								
	Unit	Subunit Connection point	Unit	Subunit Connection point	Drawing No.	Standard	Special order				
18	DUA-450F	CONTROL BOX TABLE CONT PWB 1CG	DUA-450F	TABLE GANTRY 1CG	Drawing No.	CX91-08207 Gr.1		AWG 28 20-core φ9.3 mm shield	1	DUA-450F	
					Length	6					
					Effective length	4.5					
19	DUA-450F	CONTROL BOX POWER UNIT EARTH	DUA-450F	TABLE GANTRY EARTH	Drawing No.	CX91-08219 Gr.1		AWG 10 1-core φ5.2 mm	1	DUA-450F	
					Length	5.5					
					Effective length	4.5					
20	DUA-450F	CONTROL BOX POWER UNIT 1PT	DUA-450F	TABLE TOWER 1PT, 2PT	Drawing No.	CX91-06715 Gr.1		AWG 18 6-core φ8.4 mm	1	DUA-450F	
					Length	8.5					
					Effective length	4					
21	DUA-450F	CONTROL BOX TABLE CONT PWB 1CT	DUA-450F	TABLE TABLE I/F PWB 1CT	Drawing No.	CX91-08205 Gr.1		AWG 28 20-core φ9.3 mm shield	1	DUA-450F	
					Length	9					
					Effective length	4					
22	DUA-450F	CONTROL BOX POWER UNIT 1PO	DUA-450F	TABLE OPE I/F PWB 1PO	Drawing No.	CX91-08216 Gr.1		AWG 18 8-core φ9.0 mm	1	DUA-450F	
					Length	9					
					Effective length	4					
23	DUA-450F	CONTROL BOX TABLE CONT PWB 1CO	DUA-450F	TABLE OPE I/F PWB 1CO	Drawing No.	CX91-08204 Gr.1		AWG 28 80-core φ15.6 mm shield	1	DUA-450F	
					Length	9.5					
					Effective length	4					
24	DUA-450F (KXO-80XD)	CONTROL BOX NEAR PC PWB RGB-OUT2	DUA-450F	TABLE OPE PANEL LCD RGB IN	Drawing No.	CX12-47662 Gr.1		COAXIAL 3P3C φ8.0 mm shield	1	XKDC-80XD	
					Length	10					
					Effective length	5.0					
25	DUA-450F (KXO-80XD)	CONTROL BOX NEAR PC PWB CNN65	DUA-450F	TABLE OPE PANEL LCD RS-232C	Drawing No.	CX12-47658 Gr.1		AWG 28 10-core φ6.5 mm shield	1	XKDC-80XD	
					Length	10					
					Effective length	5.0					
26	DUA-450F	CONTROL BOX POWER UNIT 1PB	DUA-450F	TABLE BODY 1PB, 2PB, 4PB	Drawing No.	CX91-06714 Gr.1		AWG 18 12-core φ12.5 mm	1	DUA-450F	
					Length	10					
					Effective length	4					

No.	Cable connection				Cable length (m)			Cable specs.	Required quantity	Unit supplied with cable	Remarks
	FROM		TO								
	Unit	Subunit Connection point	Unit	Subunit Connection point	Drawing No.	Standard	Special order				
27	DUA-450F	CONTROL BOX POWER UNIT 3PB	DUA-450F	TABLE BODY 3PB	Drawing No.	CX91-06723 Gr.1		AWG 14 3-core φ9.4 mm shield	1	DUA-450F	
					Length	11					
					Effective length	4					
28	DUA-450F	CONTROL BOX TABLE CONT PWB 1CB	DUA-450F	TABLE BODY I/F PWB 1CB	Drawing No.	CX91-08206 Gr.1		AWG 28 50-core φ12.3 mm shield	1	DUA-450F	
					Length	10					
					Effective length	4					
29	DUA-450F	CONTROL BOX TABLE CONT PWB 1CN	DUA-450F	TABLE TABLE PANEL PWB 1CN	Drawing No.	CX91-08209 Gr.1		AWG 28 40-core φ11.6 mm shield	1	DUA-450F	
					Length	11					
					Effective length	4					
30	DUA-450F	CONTROL BOX TABLE CONT PWB 2CT	DUA-450F	TABLE TABLE PANEL PWB 2CT	Drawing No.	CX91-08208 Gr.1		AWG 18 2-core φ6.1 mm	1	DUA-450F	
					Length	11					
					Effective length	4					
31	DUA-450F	CONTROL BOX POWER UNIT EARTH	DUA-450F	TABLE CABLE TOWER EARTH	Drawing No.	CX91-08218 Gr.1		AWG 8 1-core φ7.8 mm	1	DUA-450F	
					Length	5					
					Effective length	4					
32	DUA-450F	CONTROL BOX TABLE CONT PWB 1CZ	TF-10M-3	TF-10M-3  C	Drawing No.	CX91-08210 Gr.1		AWG 28 16-core φ8.9 mm shield	1	DUA-450F	
					Length	11					
					Effective length	4					
33	DUA-450F	CONTROL BOX TABLE CONT PWB KXO2	KXO-80XD	KXO-CAB PERIPHERAL X	Drawing No.	CX91-08199 Gr.1	CX91-08199 Gr.2	AWG 28 34-core φ11.0 mm shield	1	DUA-450F	
					Length	15	30				
					Effective length	12.5	27.5				
34	DUA-450F	CONTROL BOX TABLE CONT PWB VD/ADR2	KXO-80XD	KXO-CAB PERIPHERAL VD/DD	Drawing No.	CX91-08198 Gr.1	CX91-08198 Gr.2	AWG 28 10-core φ7.5 mm shield	1	DUA-450F	
					Length	15	25				
					Effective length	12.5	30				

No.	Cable connection				Cable length (m)			Cable specs.	Required quantity	Unit supplied with cable	Remarks
	FROM		TO								
	Unit	Subunit Connection point	Unit	Subunit Connection point	Drawing No.	Standard	Special order				
35	KXO-80XD	KXO CAB PWB, CONTROL CAN-A	DUA-450F (KXO-80XD)	CONTROL BOX GUI PC CAN	Drawing No.	BSX54-0044-5		8-core	1	KXO-80XD	
					Length	15					
					Effective length	12.8					
36	KXO-80XD	KXO CAB POWER UNIT TB3, EARTH	DUA-450F	CONTROL BOX POWER UNIT TB5P	Drawing No.	CX12-47663 Gr.1		AWG 17 2-core φ6.8 mm	1	KXO-80XD	100 VAC
					Length	15					
					Effective length	12.8					
37	KXO-80XD	KXO CAB PWB, CONTROL PNL1	KXO-80XD	WALL PANEL PANEL PWB CN12	Drawing No.	CX12-54811 Gr.2		AWG 28 26-core φ10.5 mm shield	1	KXO-80XD	
					Length	20					
					Effective length	17.8					
38	KXO-80XD	KXO CAB POWER UNIT TB3, EARTH	KXO-80XD	WALL PANEL DC SUPPLY AC IN, EARTH	Drawing No.	CX12-47655 Gr.2		2-core φ8.0 mm	1	KXO-80XD	100 VAC
					Length	20					
					Effective length	17.8					
39	KXO-80XD	KXO CAB PWB, AEC BNC2	DUA-450F (PTF-100S)	FIBER TYPE DETECTOR	Drawing No.	PX91-03558 Gr.3			1	PTF-100S	
					Length	15					
					Effective length	8					
40	KXO-80XD	KXO CAB PWB, AEC HV	DUA-450F (PTF-100S)	FIBER TYPE DETECTOR	Drawing No.	APR011-41	–		1	PTF-100S	
					Length	15					
					Effective length	8					
41	KXO-80XD	KXO CAB POWER PWB	X-RAY TUBE	TB	Drawing No.	–			1	HC-150MCS	
					Length	15	20				
					Effective length	9	14				
42	KXO-80XD	KXO CAB HV TANK	X-RAY TUBE	DUA-450F TABLE HV RECEPTACLE	Drawing No.	–	–		1 set	HC-150MCS	
					Length	15	20				
					Effective length	9	14				

No.	Cable connection				Cable length (m)			Cable specs.	Required quantity	Unit supplied with cable	Remarks
	FROM		TO								
	Unit	Subunit Connection point	Unit	Subunit Connection point		Standard	Special order				
43	XKGC-80XM	HV TANK CATHODE 1	X-RAY TUBE	DUA-450F TABLE	Drawing No.	–	–	1 set	HC-150MCS	Change the connection terminal of No. 47.	
				HV RECEPTACLE	Length	15	20				
					Effective length	9	14				
44	KXO-80XD	KXO CAB EARTH	X-RAY TUBE	EARTH	Drawing No.	–	–	1	HC-150MCS		
					Length	15	20				
					Effective length	9	14				
45	XKGC-80XM	GCU I/F CNN8	KXO-80XD	KXO-CAB PWB, EXIF X36	Drawing No.	CX12-54813 Gr.1		20-core φ10.4 mm	1	XKGC-80XM	
					Length	5					
					Effective length	1.6					
46	XKGC-80XM	GCU I/F TB	KXO-80XD	KXO-CAB TB3	Drawing No.	CX12-46135 Gr.1		2-core φ9.4 mm	1	XKGC-80XM	
					Length	5					
					Effective length	2.0					
47	KXO-80XD	KXO CAB HV TANK	XKGC-80XM	HV TANK GENERATOR SIDE	Drawing No.	PX13-05270 Gr.2		φ19.0 plug	1	XKGC-80XM	High voltage
					Length	5					
					Effective length	2.0					
48	KXO-80XD	KXO CAB EARTH POINT	XKGC-80XM	– EARTH POINT	Drawing No.	CX12-46182 Gr.1		1-core φ5.2 mm	1	XKGC-80XM	Earth
					Length	5					
					Effective length	2.5					
49	HDR-08A	RCU POWER	HDR-08A	MPU POWER IN	Drawing No.	–		1	RCU		
					Length	20					
					Effective length	17					
50	HDR-08A	RCU EARTH POINT	HDR-08A	MPU EARTH POINT	Drawing No.	–		1	RCU		
					Length	20					
					Effective length	17					
51	HDR-08A	RCU RC-I/O	HDR-08A	MPU RC-I/O	Drawing No.	–		1	RCU		
					Length	20					
					Effective length	17					

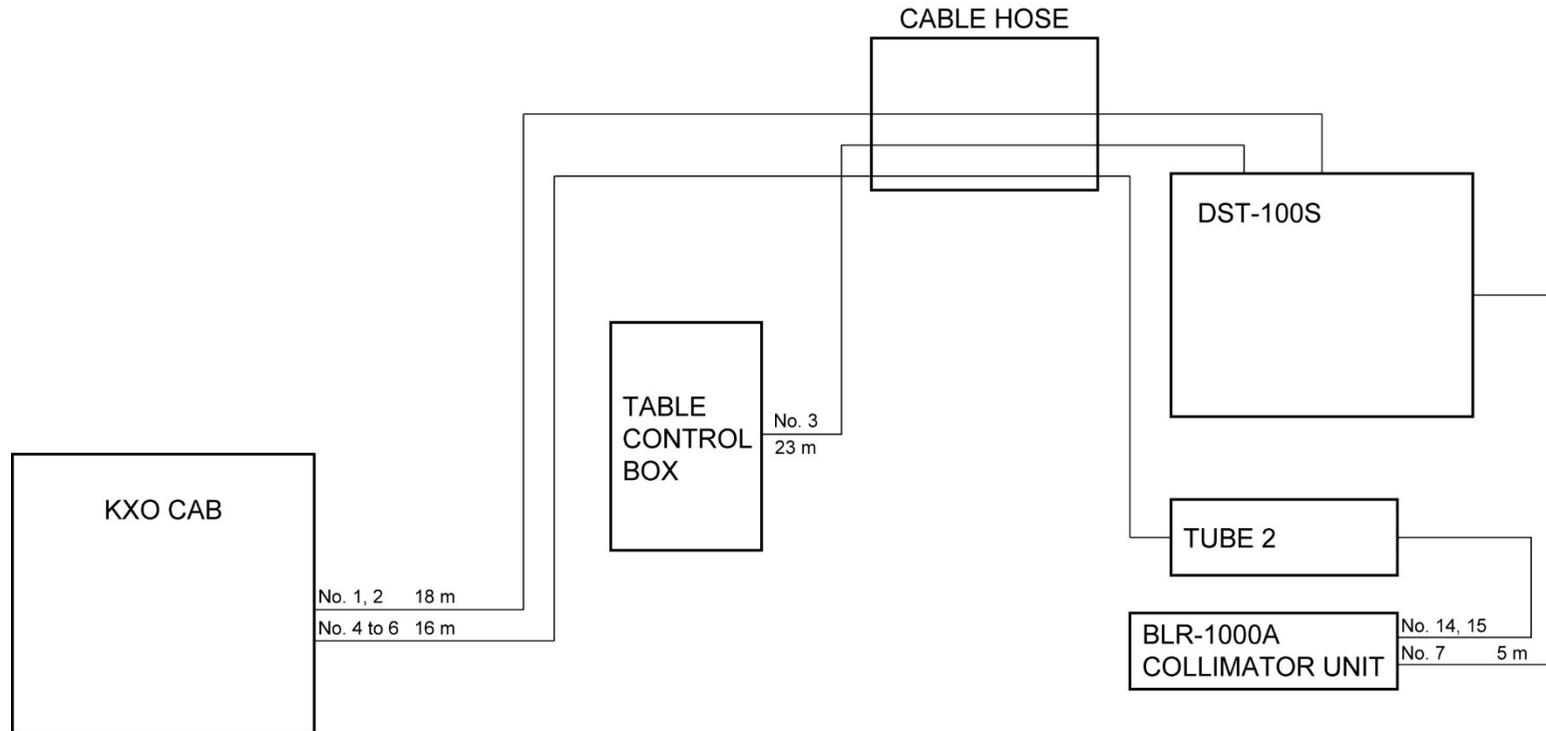
No.	Cable connection				Cable length (m)			Cable specs.	Required quantity	Unit supplied with cable	Remarks
	FROM		TO								
	Unit	Subunit Connection point	Unit	Subunit Connection point	Drawing No.	Standard	Special order				
52	HDR-08A	PC TOWER	DUA-450F (HDR-08A)	OPE. PANEL TABLE IN-ROOM KEYPAD X3	Drawing No.	BSX17-3908E (84AP301189)		1	SYSTEM		
					Length	20					
					Effective length	13					
54	HDR-08A	MPU	TV MONITOR (IN-ROOM)	LIVE MONITOR	Drawing No.	BX21-0239 Gr.3		1	SYSTEM	BNC	
					Length	20					
					Effective length	18					
55	TFPI-FLPU	SYSTEM CABINET	HDR-08A	MPU	Part No.	CX91-07560 Gr.1		1	HDR-08A		
					Length	20	25				
					Effective length	17	22				
56	TFPI-FLPU	SYSTEM CABINET	NSP-100A	BACK PANEL	Part No.	BSX17-3460E (84AP101071)	BSX17-3460E (84AP101171)	1	HDR-08A	SCSI	
					Length	20	25				
					Effective length	17	22				
57	KXO-80XD	KXO CAB PWB, EXIF SER 1	HDR-08A	MPU	Part No.	CX12-54812 Gr.1		1	KXO-80XD		
					Length	20					
					Effective length	18					
59	KXO-80XD	KXO CAB PERIPHERAL PWB VD/CONT	KXO-80XD	KXO-CAB AVDIF VD/CONT	Drawing No.	CX12-54814 Gr.1		1	KXO-80XD	Route to the KXO CAB inner cable.	
					Length	2					
					Effective length	-					

No.	Cable connection				Cable length (m)			Cable specs.	Required quantity	Unit supplied with cable	Remarks
	FROM		TO								
	Unit	Subunit Connection point	Unit	Subunit Connection point	Drawing No.	Standard	Special order				
60	DUA-450F (KXO-80XD)	CONTROL BOX	DUA-450F	CONTROL BOX	Drawing No.	BSX54-0044-01		1	DUA-450F	Route to the CU-BOX inner cable.	
		GUI PC		TABLE CONT PWB	Length	1					
		CAN		CAN	Effective length	-					
61	DUA-450F (KXO-80XD)	CONTROL BOX	DUA-450F	CONTROL BOX	Drawing No.	CX91-06776 Gr.1		1	DUA-450F	Route to the CU-BOX inner cable.	
		NEARPC PWB		TABLE CONT PWB	Length	0.3					
		CN16		KXOIF	Effective length	-					
62	DUA-450F (KXO-80XD)	CONTROL BOX	DUA-450F	CONTROL BOX	Drawing No.	CX91-06777 Gr.1		1	DUA-450F	Route to the CU-BOX inner cable.	
		NEARPC PWB		POWER UNIT	Length	1.2					
		CN-P5		4CP	Effective length	-					
63	KXO-80XD	KXO CAB	KXO-80XD	KXO-CAB	Drawing No.	CX91-08197 Gr.1		1	KXO-80XD	Route to the KXO CAB inner cable.	
		PWB, AEC		AVDIF	Length	2					
		MTV		VD/AEC	Effective length	-					
64	KXO-80XD	KXO CAB	KXO-80XD	KXO-CAB	Drawing No.	CX91-05797 Gr.1		1	KXO-80XD	Route to the KXO CAB inner cable.	
		CONTROL UNIT		CNN5	Length	1					
		TB4			Effective length	-					
65	HDR-08A	MPU	TV MONITOR	SYSTEM MONITOR	Drawing No.			1	TV MONITOR	Route around the desk.	
		DV1		DV1	Length	2					
					Effective length	-					
66	HDR-08A	MPU	TV MONITOR	SYSTEM MONITOR	Drawing No.			1	MPU	Route around the desk.	
		POWER OUT		POWER IN	Length	5					
					Effective length	-					
67	HDR-08A	MPU	HDR-08A		Drawing No.			1	MPU	Route around the desk.	
		MOUSE		MOUSE	Length	5					
					Effective length	-					
68	HDR-08A	MPU	HDR-08A		Drawing No.			1	SYSTEM	Route around the desk.	
		KEY BOARD		KEY BOARD	Length	5					
					Effective length	-					

No.	Cable connection				Cable length (m)			Cable specs.	Required quantity	Unit supplied with cable	Remarks
	FROM		TO								
	Unit	Subunit Connection point	Unit	Subunit Connection point	Drawing No.	Standard	Special order				
69	HDR-08A	RCU	DUA-450F	CONTROL BOX	Length	CX91-08213 Gr.1	AWG 28 10-core φ 7.2 mm shield	1	DUA-450F	For HDRK-FDCF (option)	
				TABLE CONT PWB	Effective length	15					
				DCF		14					
70	HDR-08A	SYSTEM CABINET PU EARTH POINT	DUA-450F (TFP-1700FL)	FLAT PANEL DETECTOR	Length	CX17-41127 Gr.2		1	HDR-08A		
				EARTH POINT	Effective length	25					
						16					
71	HDR-08A	SYSTEM CABINET PU (OPTICAL FIBER)	DUA-450F (TFP-1700FL)	FLAT PANEL DETECTOR	Length	BSX24-0118		1	HDR-08A		
				(OPTICAL FIBER)	Effective length	25					
						16					
72	HDR-08A	SYSTEM CABINET PU DET POWER OUT	DUA-450F (TFP-1700FL)	FLAT PANEL DETECTOR	Length	CX91-07776 Gr.1		1	HDR-08A		
				DET POWER	Effective length	30					
						21					
73	DUA-450F	SYSTEM CABINET TB3, EARTH POINT	NSP-100A	BACK PANEL	Length	CX21-02670 Gr.2		1	NSP-100A		
					Effective length	15					
				AC INLET		14					
74	DUA-450F	SYSTEM CABINET PU EARTH POINT	NSP-100A	BACK PANEL	Length	CX17-47692 Gr.1	AWG 10 1-core φ5.2 mm	1	NSP-100A		
					Effective length	15					
				EARTH POINT		14					
75	HDR-08A	MPU PU IMAGE	NSP-100A	BACK PANEL	Length	CX17-43538 Gr.1	AWG30 34-core φ11.1 mm	1	NSP-100A		
					Effective length	5					
				SCSI68		4					
76	KXO-80XD	PERIPHERAL PWB FDCF	NSP-100A	BACK PANEL	Length	CX17-48834 Gr.1	AWG28 10-core φ5.2 mm Shield	1	NSP-100A		
					Effective length	17					
				KXO		15					
77	KXO-80XD	EXIF PWB CAN-B	NSP-100A	BACK PANEL	Length	CX17-48833 Gr.1	AWG26 8-core φ6.1 mm Shield	1	NSP-100A		
					Effective length	15					
				CAN1A		13					

No.	Cable connection				Cable length (m)			Cable specs.	Required quantity	Unit supplied with cable	Remarks
	FROM		TO		Drawing No.	Standard	Special order				
	Unit	Subunit Connection point	Unit	Subunit Connection point							
78	DUA-450F	SYSTEM CABINET	AUA-M4KDK	–	Length	CX91-08078 Gr.1	15		1	SYSTEM	
		–		Effective length	15						
		AC INLET									
79	HDR-08A	MPU	AUA-M4KDK	–	Length	CX91-07558 Gr.1	3.3	AWG24 10-core φ7.5 mm Shield	1	HDRK-DAP	
		–		Effective length	3.3						
		Serial									
80	DUA-450F	ION CHAMBER	AUA-M4KDK	–	Length	BSX13-0288E	30		2	AUA-M4KDK	
		–		Effective length	24						
		A/B		A/B							

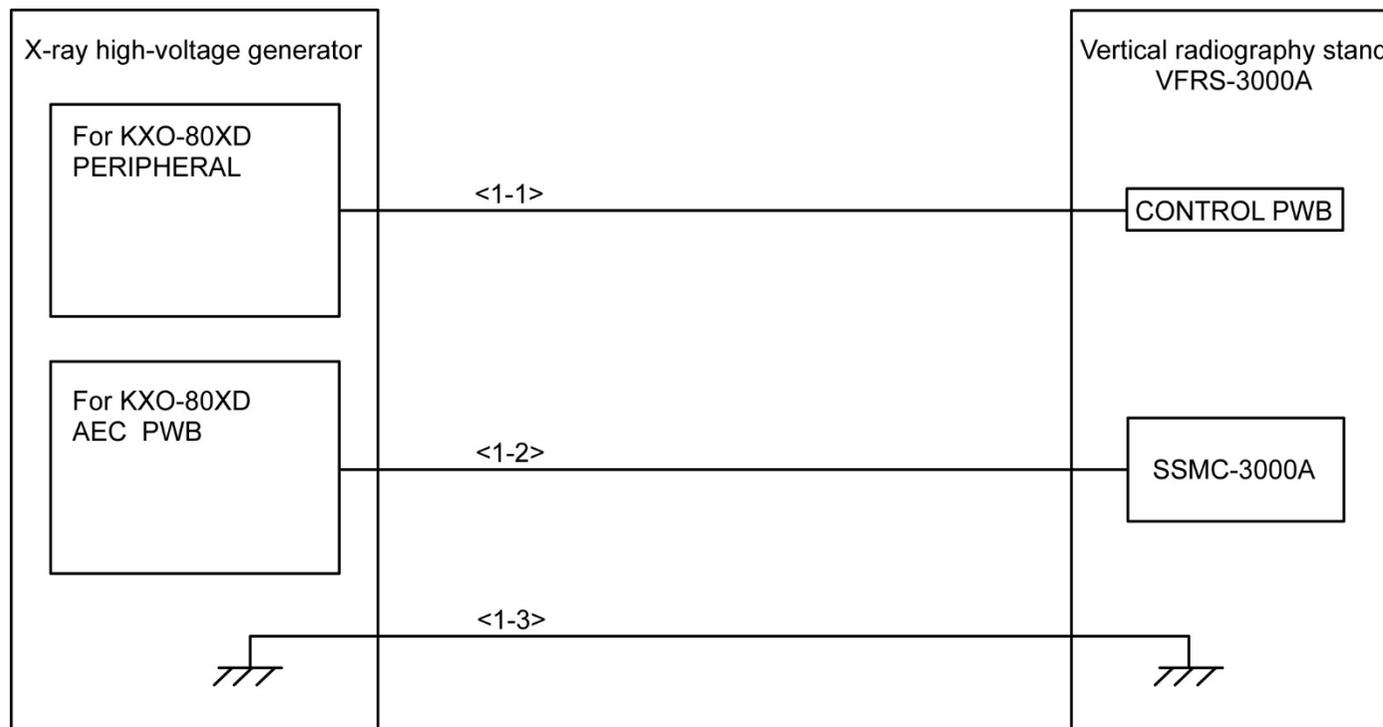
(2) OTC movement range



ROOT	Cable connection				Cable length (m)			Number of required cables	Unit accompanying the cable	Remarks	Remarks
	FROM		TO								
	System name	Unit Internal unit	System name	Unit Internal unit	Part No.	Standard	Special order				
1	DST-100S	MAIN UNIT	KXO-80XD	KXO CAB	Part No.	CX91-08214 Gr.1	1	DST-100S			
		TB1 (POWER)		TB2	Length	20					
					Effective length	18					
2	DST-100S	MAIN UNIT	KXO-80XD	KXO CAB	Part No.	CX91-04203 Gr.1	1	DST-100S			
		EARTH POINT		EARTH POINT	Length	20					
					Effective length	18					
3	DST-100S	MAIN UNIT	DUA-450F	CONTROL BOX	Part No.	4X14-34320-1	1	XGST102A			
		TB1		TABLE CONT PWB OTC	Length	25					
					Effective length	23					
4	X-RAY TUBE DRX-3724HD	DST-100S	KXO-80XD	KXO CAB	Part No.	BSX58-0906	1 set	HC-150DC			
		HV RECEPTACLE		HV TANK	Length	20					
					Effective length	16					
5	X-RAY TUBE DRX-3724HD	DST-100S	KXO-80XD	KXO CAB	Part No.	4X13-03339-4	1	HC-150DC			
		TB		POWER PWB	Length	20					
					Effective length	16					
6	X-RAY TUBE DRX-3724HD	-	KXO-80XD	KXO CAB	Part No.	4X13-03340-4	1	HC-150DC			
		EARTH POINT		EARTH POINT	Length	20					
					Effective length	16					

ROOT	Cable connection				Cable length (m)			Number of required cables	Unit accompanying the cable	Remarks	Remarks
	FROM		TO								
	System name	Unit	System name	Unit	Part No.	Standard	Special order				
		Internal unit		Internal unit							
7	BLR-1000A	COLLIMATOR UNIT (Lamp)	DST-100S	MAIN UNIT			1	DST-100S	13 VAC		
					Length	5					
		TB		TB	Effective length	-					
14	X-RAY TUBE DRX-3724HD	-	BLR-1000A	COLLIMATOR UNIT			1	BLR-1000A			
					Length						
		4.7		BDY	Effective length						
15	X-RAY TUBE DRX-3724XD	-	BLR-1000A	COLLIMATOR UNIT			1	BLR-1000A			
					Length						
		EARTH POINT		EARTH POINT	Effective length						

(3) Vertical radiography stand



No.	Cable name	Connected between		Terminal type		Cable length	Cable diameter
		A	B	A	B		
<1-1>	Power cable	KXO-80XD PERIPHERAL TB1	VFRS-3000A CONTROL PWB TB1	M4 circular terminal	M4 circular terminal	25 m (82 ft)	φ6.5 mm (φ0.26 in)
<1-2>	SSMC cable	KXO-80XD STB2	VFRS-3000A (AEC control unit) CNN	8P connector	14P connector	25 m (82 ft)	φ6.0 mm (φ0.24 in)
<1-3>	Grounding cable	KXO-80XD	VFRS-3000A	M4 circular terminal	M4 circular terminal	25 m (82 ft)	φ8.0 mm (φ0.31 in)

8. TRANSPORTATION BEFORE INSTALLATION AND STORAGE ENVIRONMENTAL CONDITIONS

8.1 Transportation and Storage Environmental Conditions

The conditions specified below should be met during transportation and storage of the system.

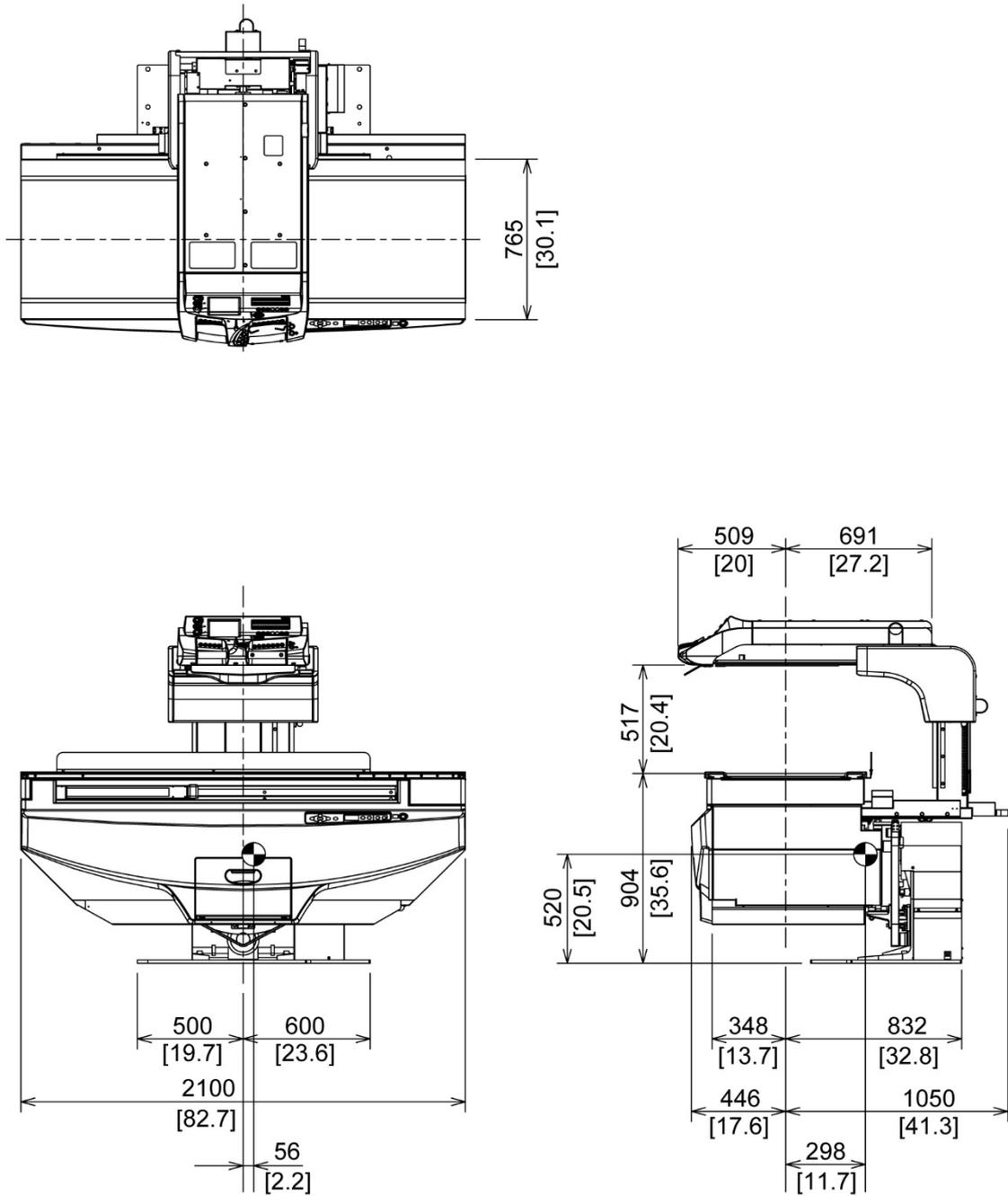
Ambient temperature : -10°C to 60°C (except FPD)  
-10°C to 55°C (FPD)

Relative humidity : 30% to 85% (no condensation)

Atmospheric pressure : 700 hPa to 1060 hPa

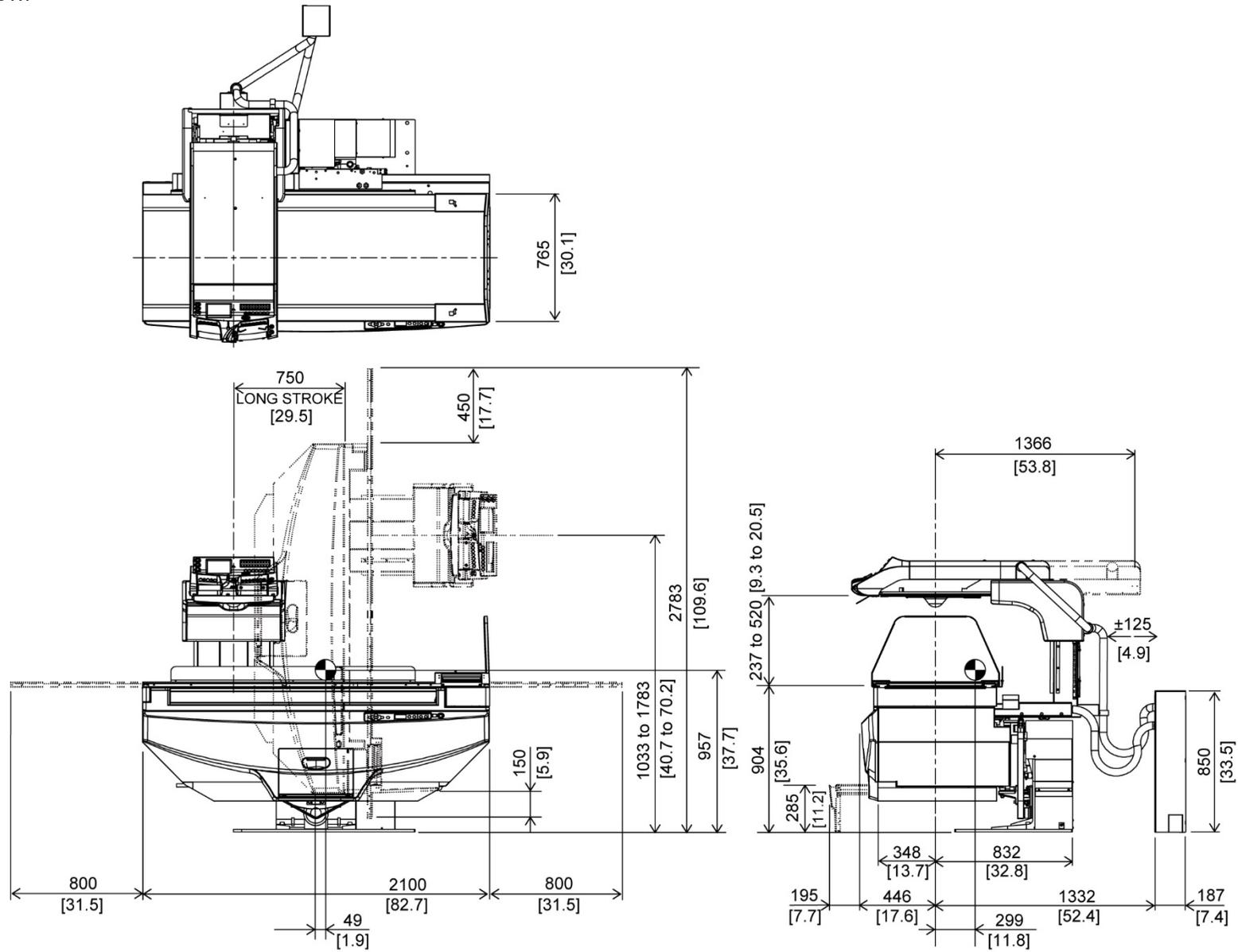
9. APPENDIX

9.1 Outline Drawing



Mass: Approx. 1400 kg [3086 lbs]  
Unit: mm [inch]

Figure 9-1



Unit: mm [inch]

Figure 9-2

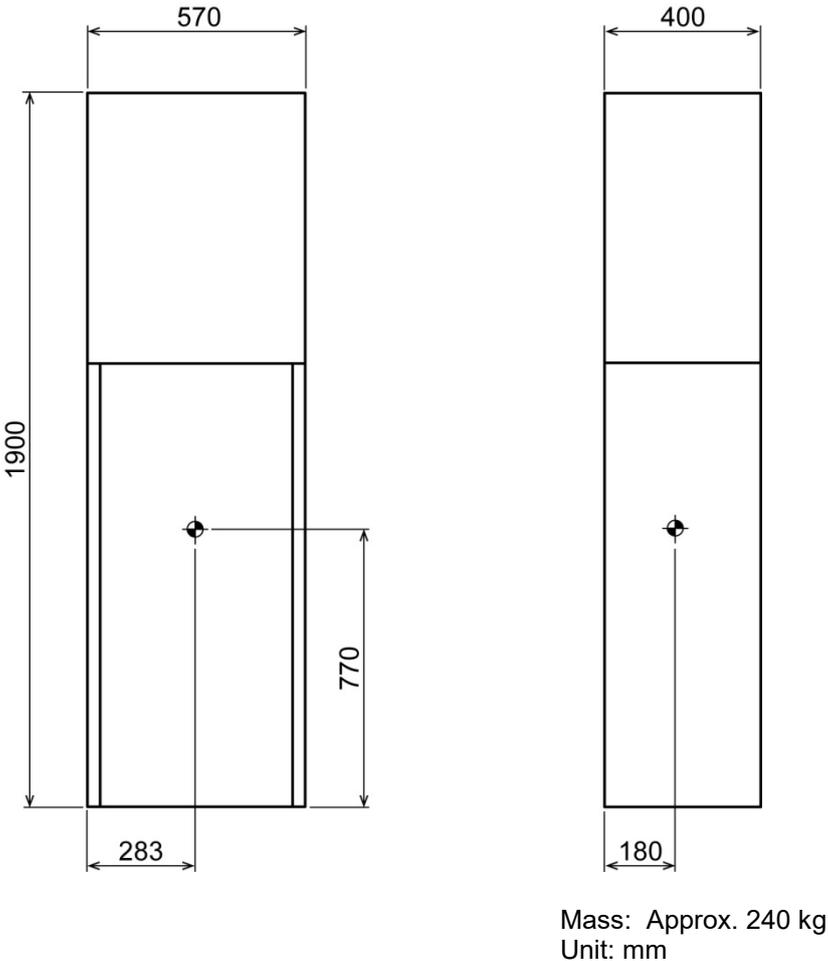


Figure 9-3 System cabinet

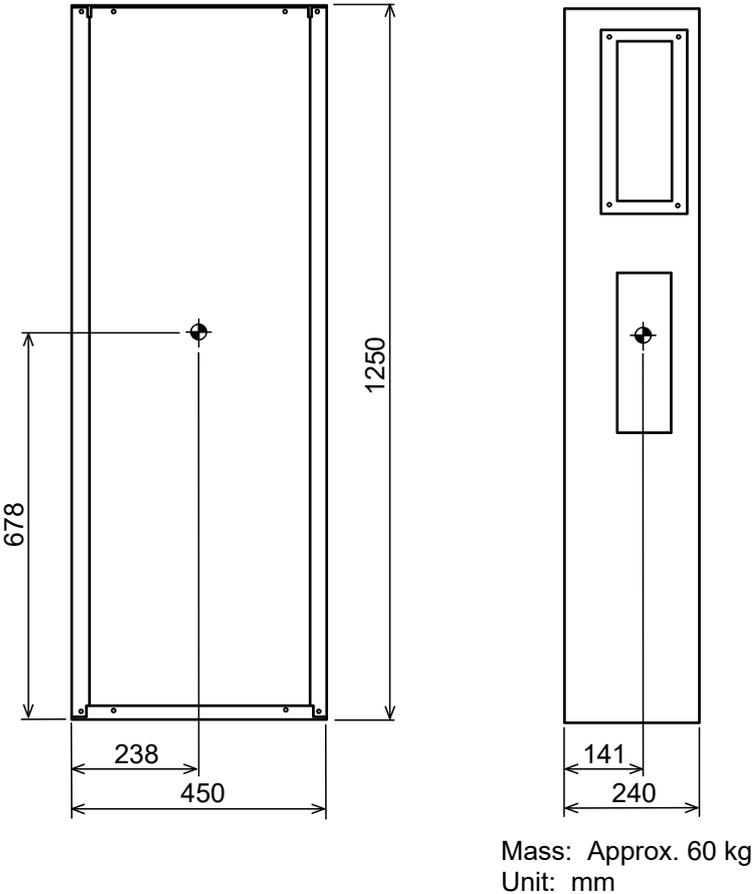


Figure 9-4 Table control cabinet

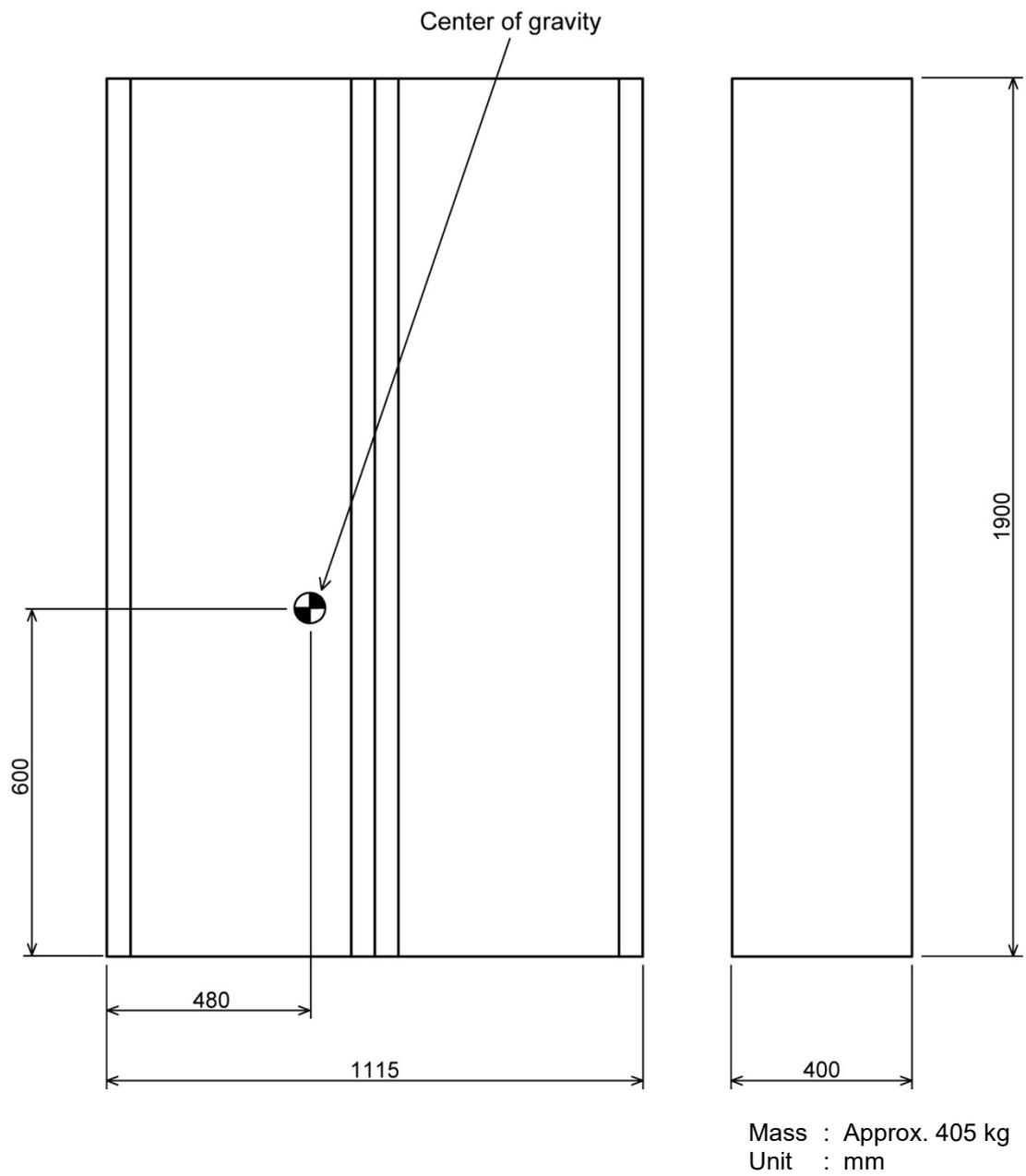
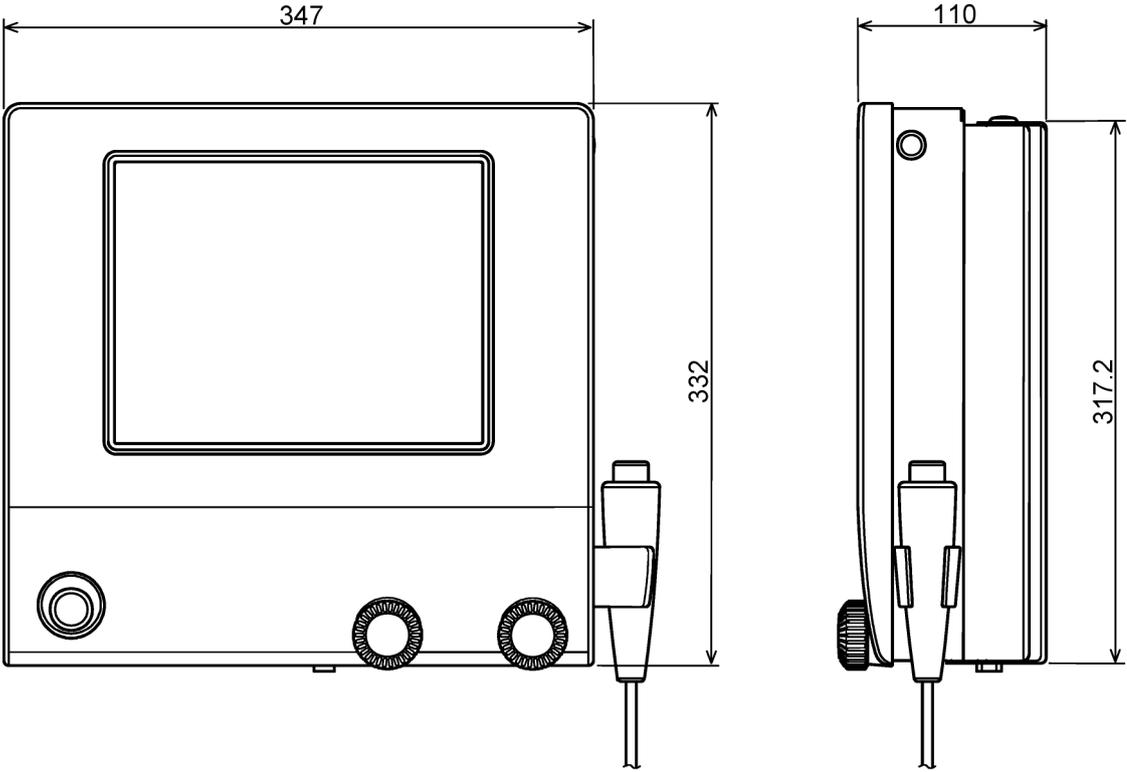


Figure 9-5 Cabinet of the X-ray high-voltage generator



Mass : Approx. 10 kg  
Unit : mm

Figure 9-6 Console of the X-ray high-voltage generator

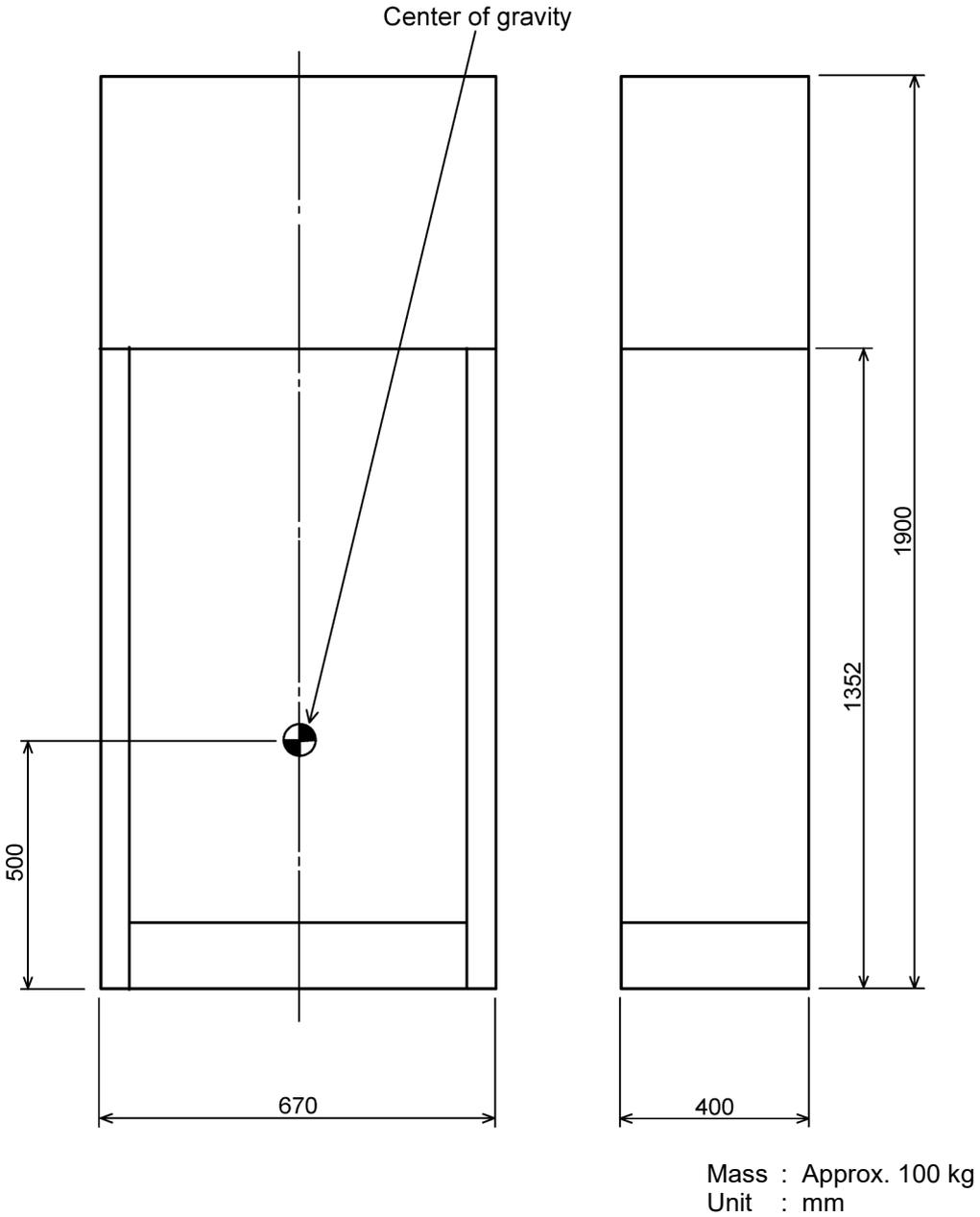
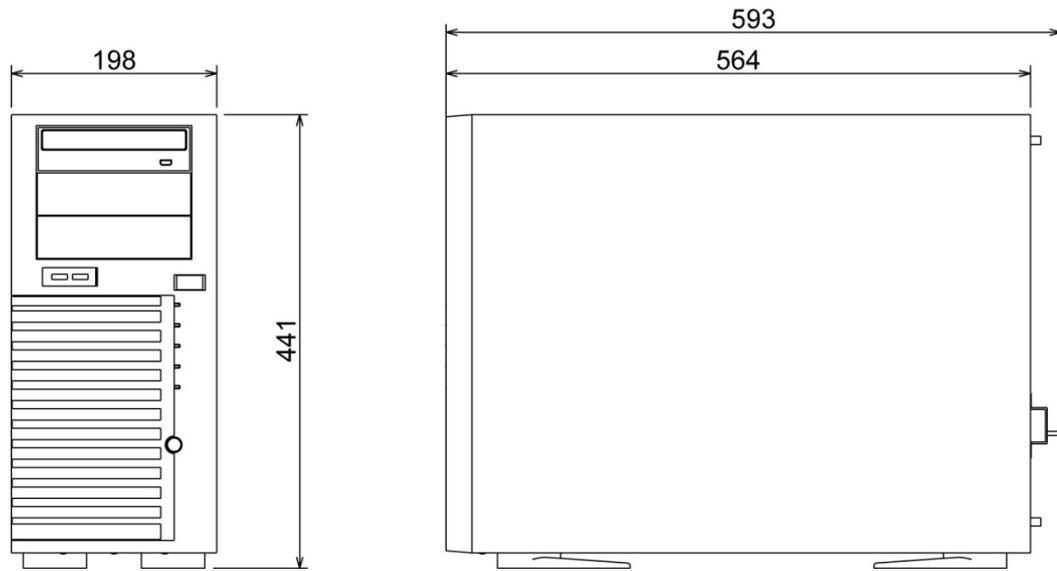
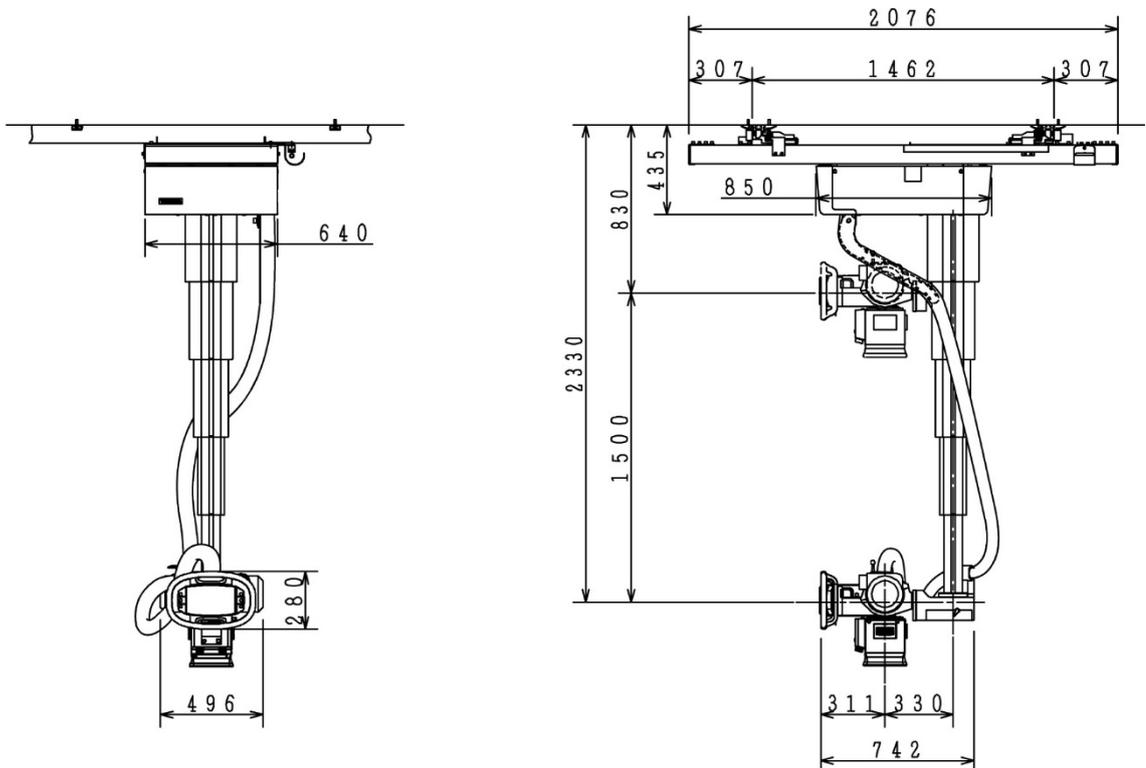


Figure 9-7 Cabinet of the pulsed fluoroscopy control unit XKGC-80XM/G1



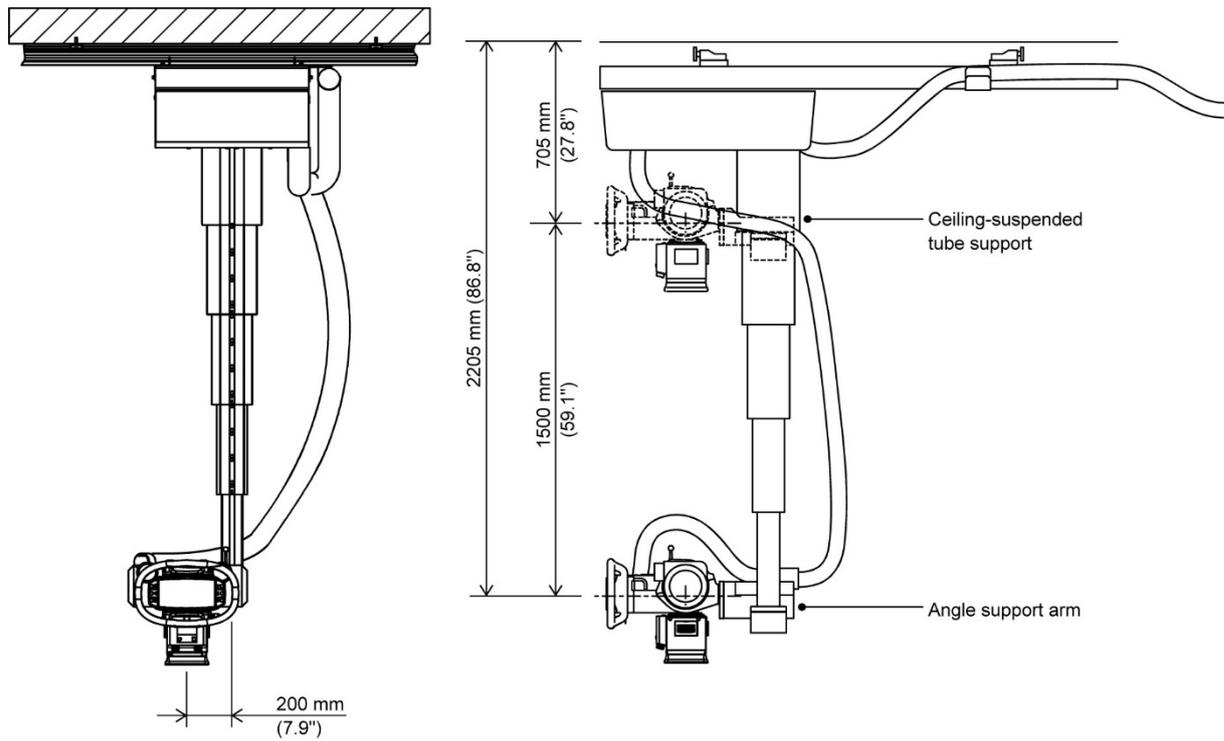
Mass: Approx. 17 kg  
Unit : mm

Figure 9-8 Image processor HDR-08A



Mass: Approx. 340 kg  
Unit : mm

Figure 9-9 Ceiling-suspended tube support



Mass of the angle support arm: Approx. 11 kg

Figure 9-10 External view of the angle support arm

**NOTE:** The X-ray tube focus position is raised by 125 mm relative to the standard position for the DST-100S (it is also moved to the left by 200 mm).

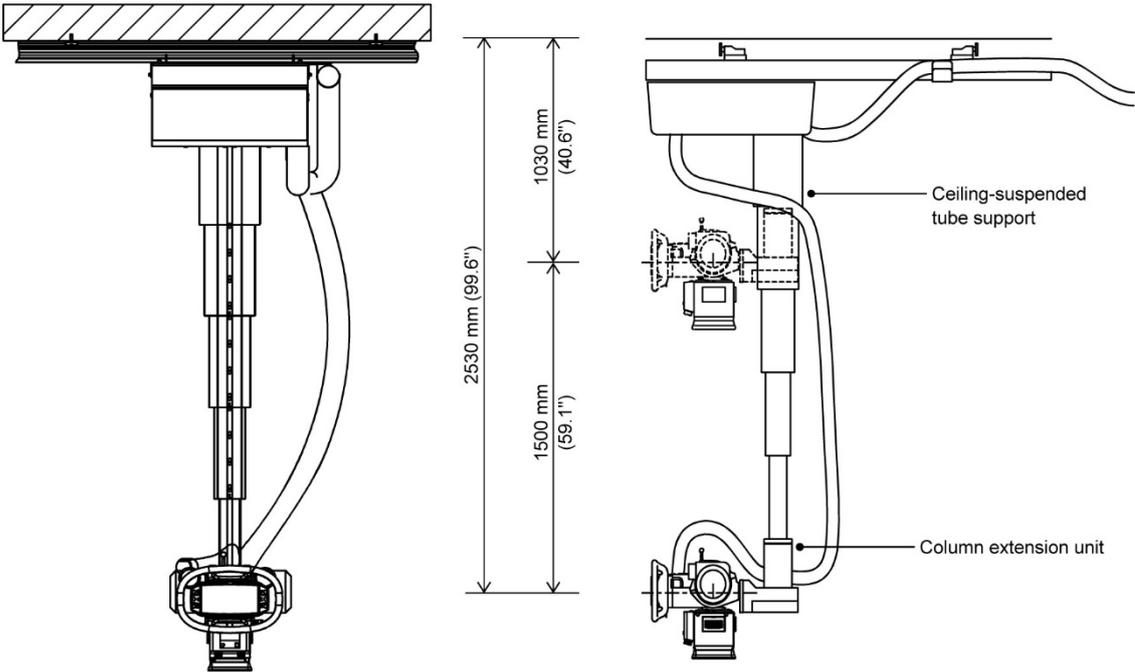
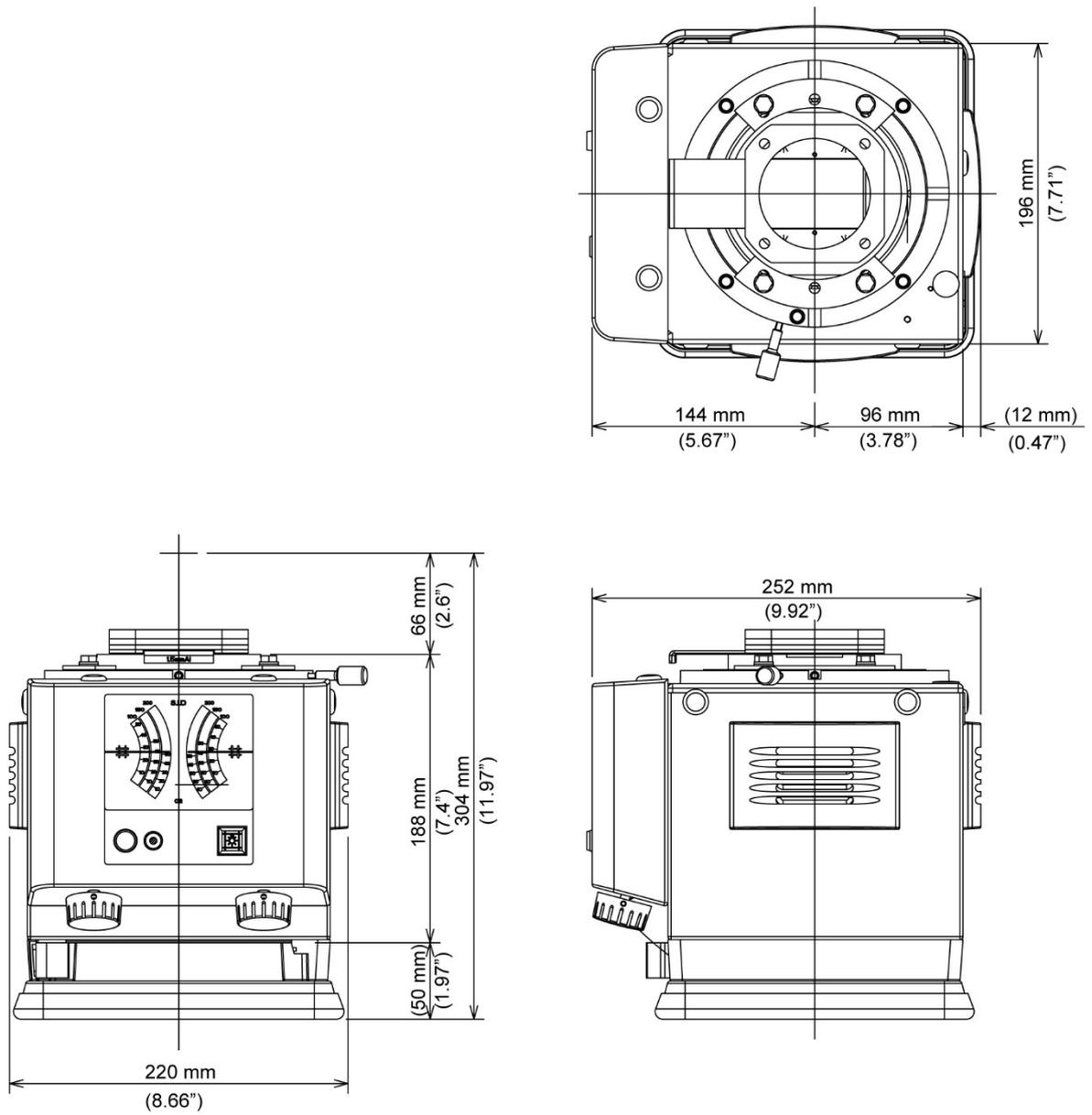


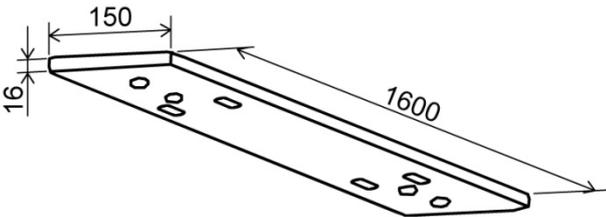
Figure 9-11 External view of the column extension unit

**NOTE:** The X-ray tube focus position is lowered by 200 mm relative to the standard position for the DST-100S.



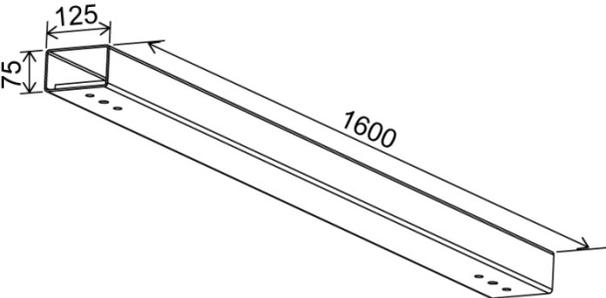
Mass: Approx. 8 kg

Figure 9-12 X-ray beam limiting device



Mass: 30 kg  
Unit : mm

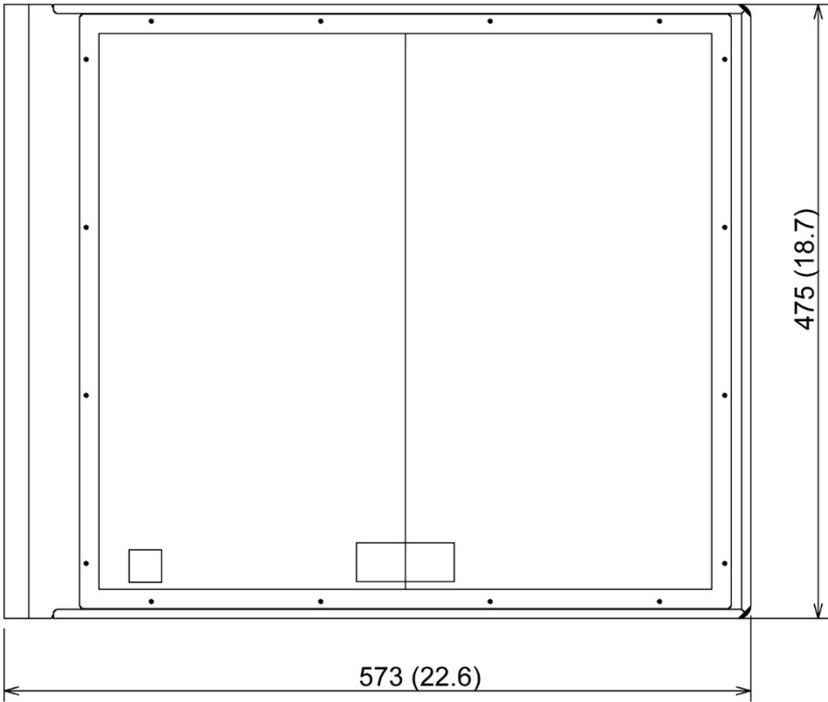
Figure 9-13 Ceiling adapter



Mass: 16 kg  
Unit : mm

Figure 9-14 Ceiling adapter pipe

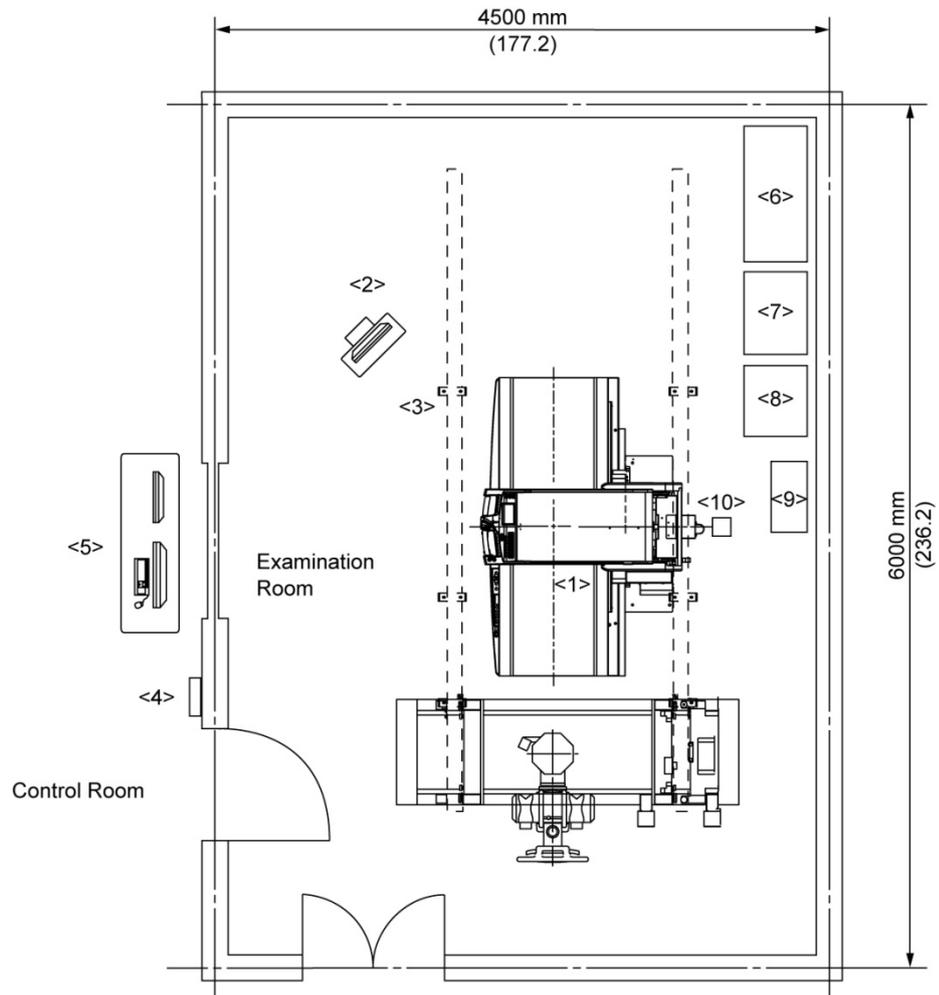




Unit: mm (in)

Figure 9-16 X-ray grid (grid frame) for vertical radiography stand

9.2 System Layout (Recommended room size)



- <1> X-ray diagnostic table (DUA-450F)
- <2> TV monitor and monitor cart
- <3> Ceiling-suspended tube support (DST-100S)
- <4> Sub panel unit (XKDC-80XD)
- <5> Keyboard and system monitor (HDR-08A)
- <6> Control cabinet for X-ray high-voltage generator (KXO-80XD)
- <7> Pulsed fluoroscopy control unit (XKGC-80XM)
- <8> System cabinet
- <9> Table control cabinet
- <10> Cable stand

Figure 9-17

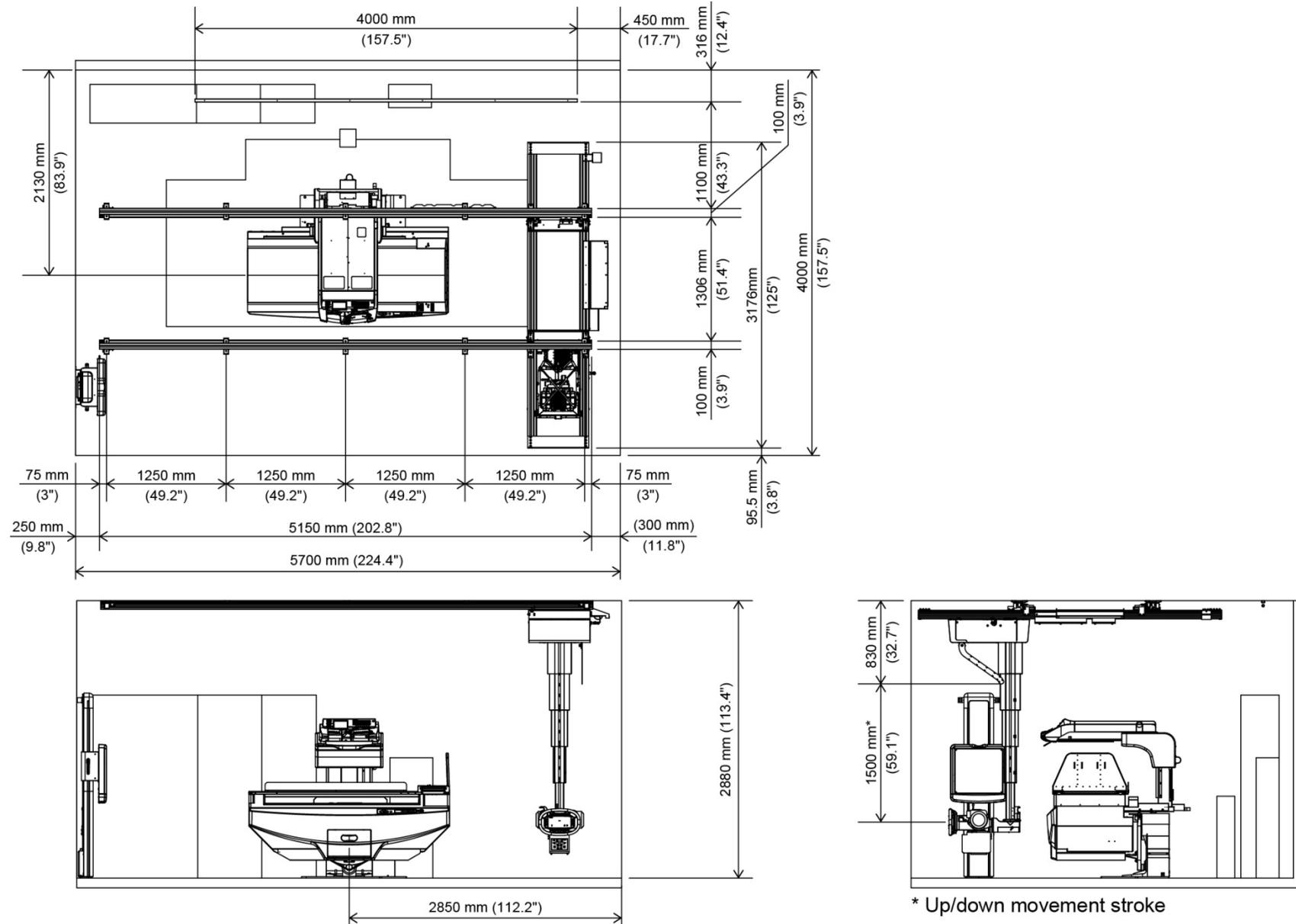


Figure 9-18 Minimum room size for standard configuration

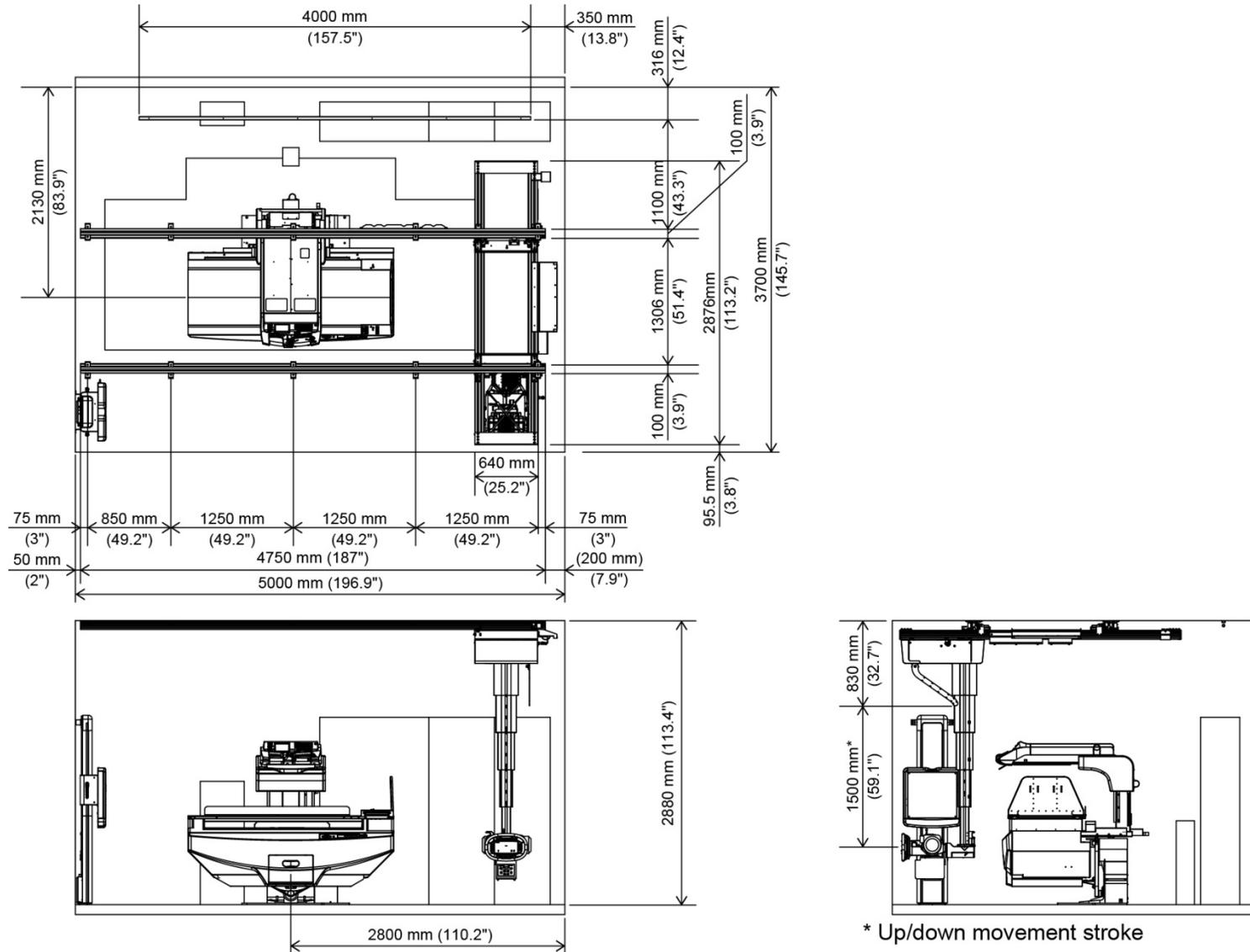
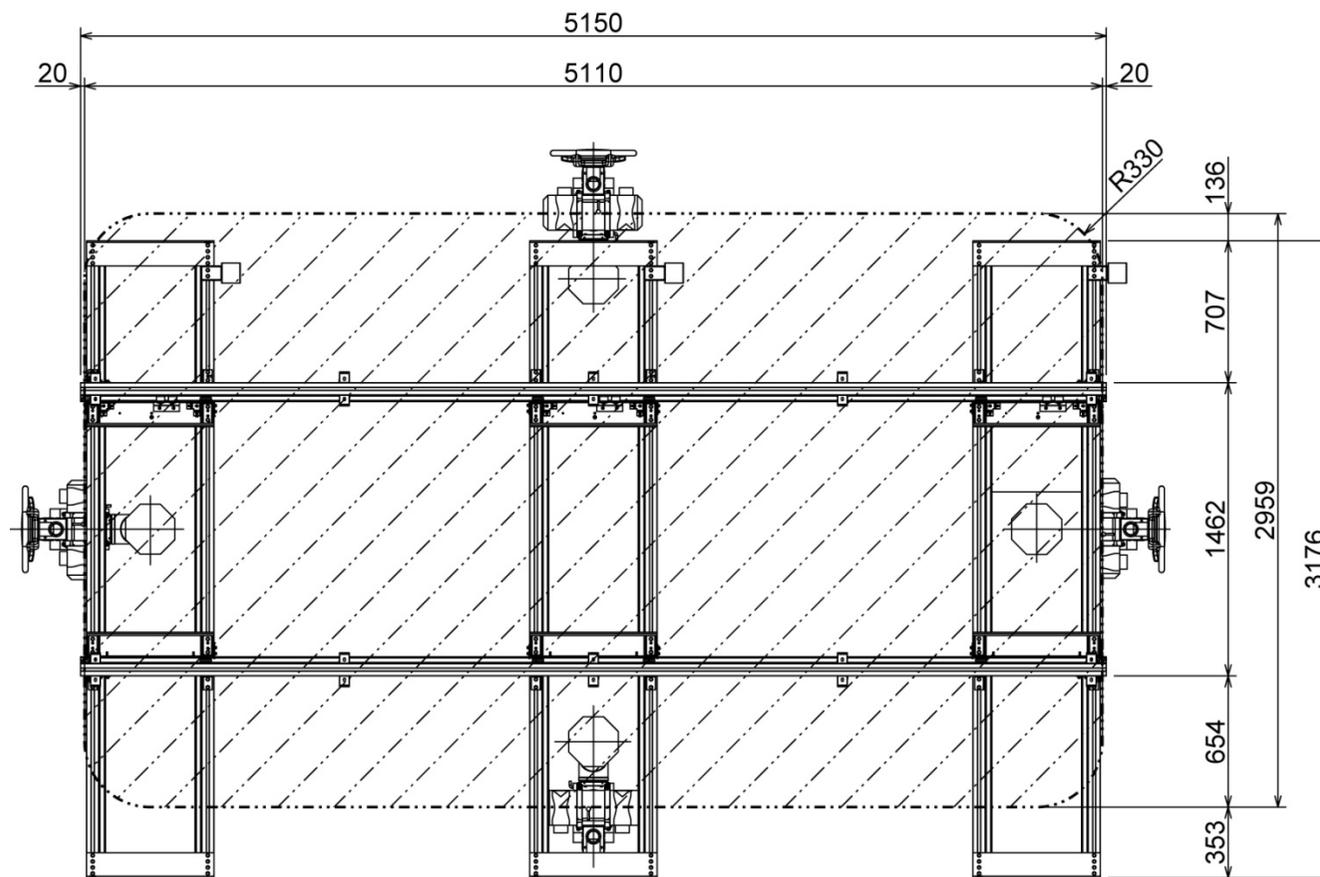


Figure 9-19 Minimum room size with OTC rails cut and movement restriction

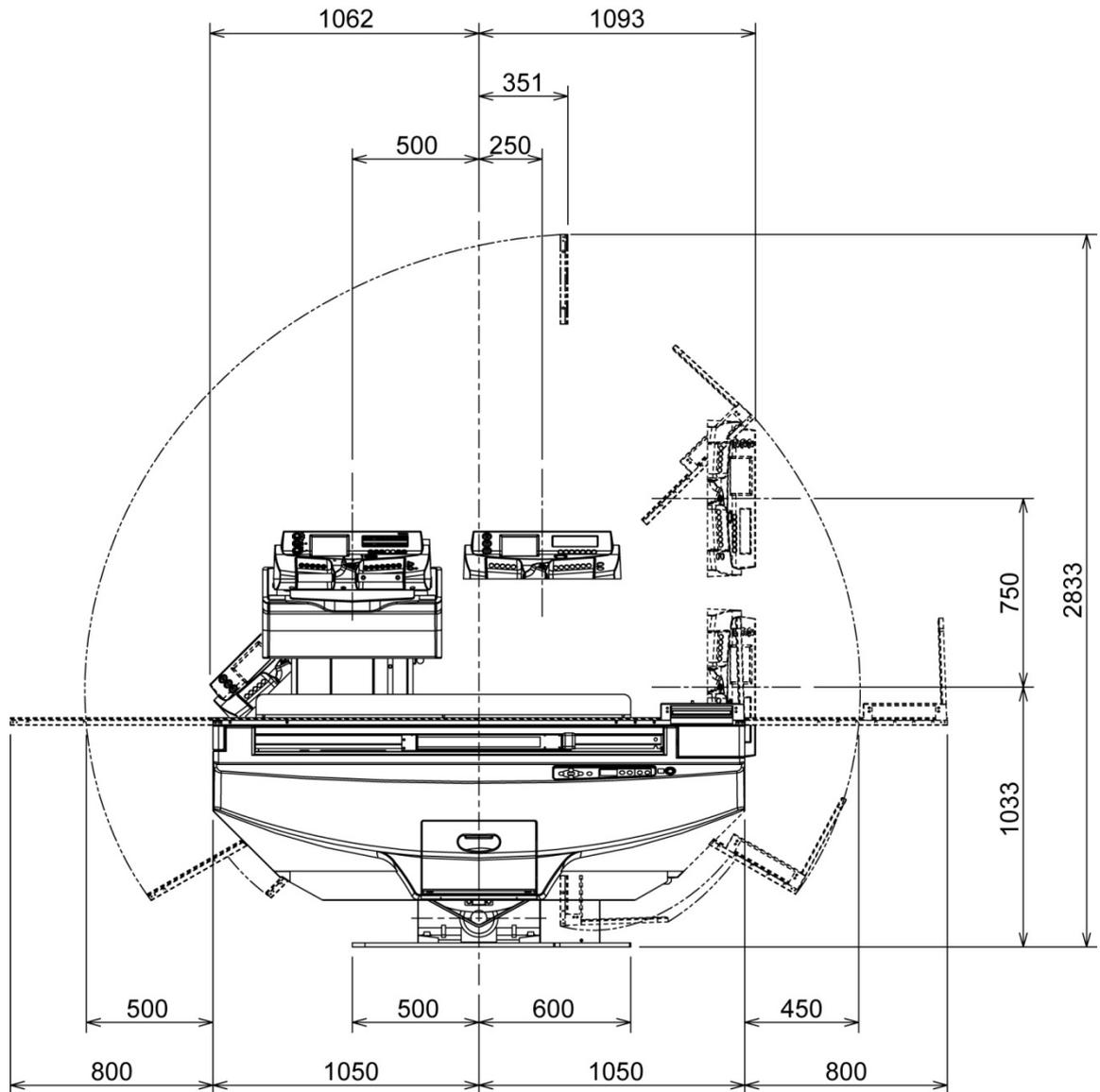


Shaded area: X-ray tube focus movement range

Unit: mm

Figure 9-20 X-ray tube focus movement range (top view)

9.3 Interference Diagram



Unit: mm

Figure 9-21

9.4 Clear Zone

9.4.1 Clear Zone for X-ray diagnostic table

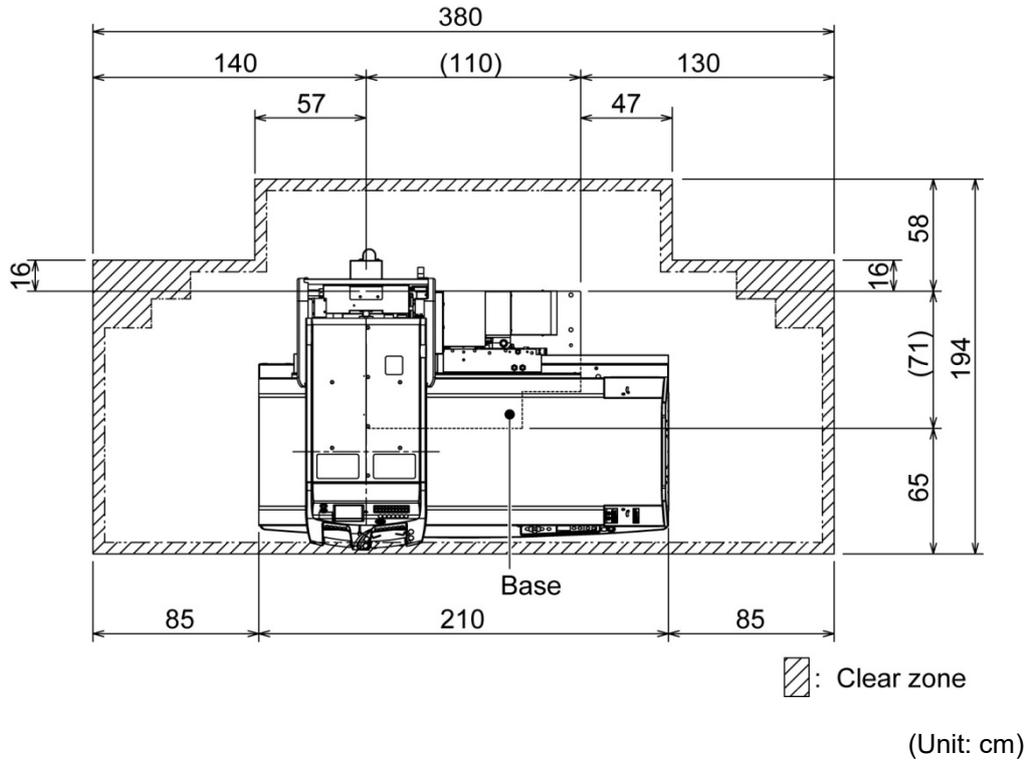
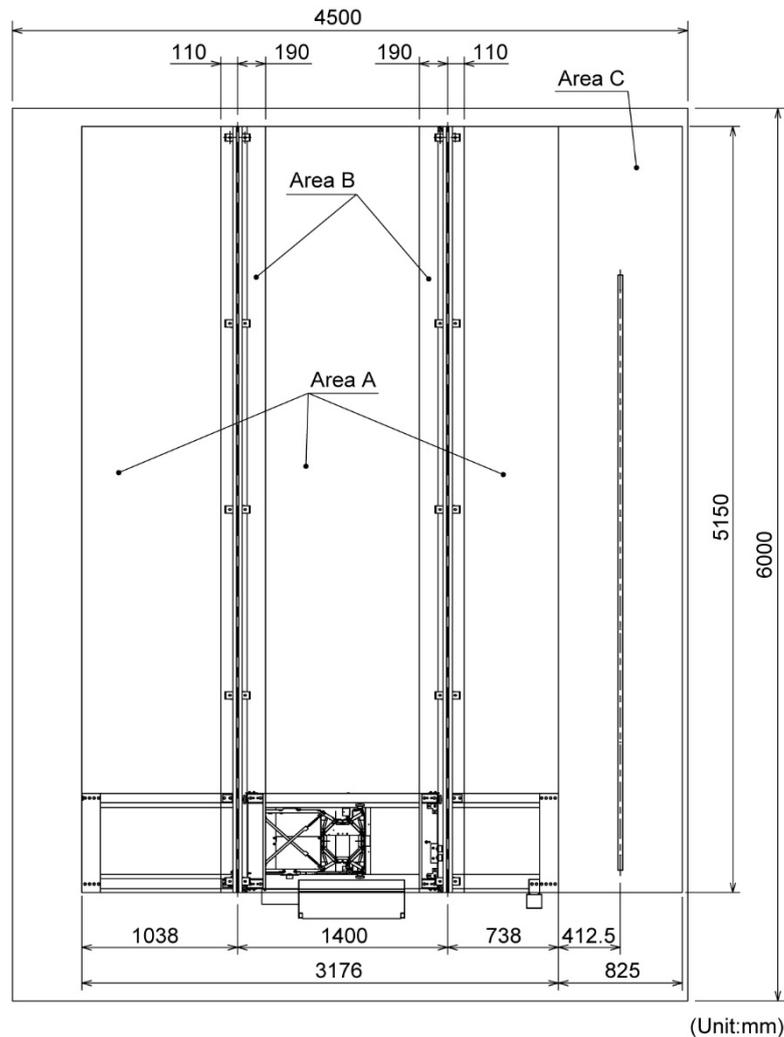


Figure 9-22

9.4.2 Ceiling Clear Zone



Area A - The movement area covered by the lateral bridge assembly along the full length of the longitudinal rails (4750 × 2876 mm).

It is strongly recommended that there are no ceiling protrusions in this area, however, protrusions of 50mm or less may be acceptable.

Any lighting installed in this area must be done with consideration to heat from the lights, and light coverage based on the commonly-used positions of the DST-100S and the lateral carriage assembly.

Area B - Two areas that include the ceiling mountings, plus clearance, for the longitudinal rails (4750 × 200 mm). These two areas must have no ceiling protrusions.

Area C - The area occupied by the cable drape hanger and the drape (4750 × TBD mm).

The width of this area depends on the specific installation.

The allowable ceiling protrusion in this area is site-specific and should be determined through consultation with all affected parties.

Figure 9-23

#### 9.5 Tools Required for Checks

- (1) Scale with light (5 m) (for performing measurements within the ceiling cavity)
- (2) Vernier caliper
- (3) Triangular scale
- (4) Calculator
- (5) Polaroid camera
- (6) Tester
- (7) Plans of the building
- (8) Stud sensor



9.7 User Information

MM/DD/YY \_\_\_\_\_

Person in charge of check \_\_\_\_\_

User name		Address	
System		TEL	

Item	Form		Comments
	Standard	Out of the standard	
Cable lengths		[Factory order/Fabrication on site]	Attachments [Provided/Not provided]
Laser imager			Model (        ) Manufacturer name (        )

Film processor	Model name	Manufacturer name	
Developer		Fixing solution	
Film developing conditions	Ambient temperature (    ) °C, Time (    ) seconds		

Special factory orders

Modifications on site

Other comments



[www.gehealthcare.com](http://www.gehealthcare.com)



GE Healthcare

# SITE-PLANNING MANUAL

Precision 600FP

[www.gehealthcare.com](http://www.gehealthcare.com)



**DREX-KL80**  
SITE-PLANNING MANUAL  
**2A305-690EN\*1**  
**5756081-1EN Rev.7**

© 2016 General Electric Company  
All rights reserved.