

Ceiling Type X-ray Tube Support

CH-200M




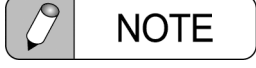


Operation Manual

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

CE 0197

About the Symbols Appearing in this Operation Manual

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

Mark	Description
	Indicates an imminently hazardous situation which, if not avoided, will result in serious injury or death.
	Indicates a potentially hazardous situation which, if not avoided, could result in serious injury or possibly death.
	Indicates a potentially hazardous situation which, if not avoided, may result in minor to moderate injury or equipment damage.
	Emphasizes additional information that is provided to ensure the proper use of this product.
	Provides useful information about operation of this system. Please read the description when required.
	Indicates reference sections and pages.

Revision History

Revision	Date	Changes
First Edition	Oct. 2003	
R	Mar. 2019	Changed the Bucky description.
T	Sep. 2 2022	Compliant with Standards.
U	2024-03-01	Compliant with Standards.
V	2025-10-31	<ul style="list-style-type: none"> • Changed "Warning and Caution Labels". • Changed "1.6 Operator Profile". • Changed "2.2 Operation panel". • Changed "5.3 Periodical Inspection". • Changed "6.5 Labeling".
W	2025-12-10	<ul style="list-style-type: none"> • Changed "5.3 Periodical Inspection". • Changed "5.4 Maintenance Parts List".

Preface

Thank you for purchasing the "CEILING TYPE X-RAY TUBE SUPPORT CH-200M" (hereafter referred to as "equipment").

This operation manual contains information for ensuring proper use of the equipment. Read this manual thoroughly before using the equipment and operate the equipment in accordance with the instructions in this manual. If the precautions in this manual are disregarded, there is risk of damage to equipment or injury to operators and patients. However, it is not possible to foresee all risks and provide precautions for each of them. Therefore, when using the equipment in ways not described in this manual or when any question arises in the manual description, please contact the place of purchase or a sales representative listed at the end of this manual.

This manual should be kept available for future reference. If the user or usage location changes, ensure that this operation manual is always kept together with the equipment. Periodically check to be sure that the operation manual and the warning labels are not missing or damaged. If they are, contact your Shimadzu service representative for replacement.

Original version is approved in English.

Notice

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Operating Precautions

"Operating Precaution (for Both the Safety and the Prevention of Danger) in the Use of Electric Medical Equipment"

1. Nobody without the following experience and knowledge should use the equipment.

- (1) Medical (radiographic) training (if particular qualifications are required in the country concerned, those qualifications must be held).
- (2) The capacity to read and understand the operation manual.

2. When installing the equipment, pay attention to the following items:

- (1) Do NOT install it near water faucet or similar equipment.
- (2) Install it away from potential sources of problems such as abnormal pressure, temperature or humidity, drafts, direct sunlight, dust, chlorine or sulphur gas.
- (3) During transportation and operation of the equipment, avoid tilting, vibration and sharp impact against it.
- (4) Keep the equipment away from the areas where chemicals or gases are stored.
- (5) Use only the correct electrical power source with matching frequency, voltage and current (or wattage).
- (6) Check the conditions of the battery power source (power and polarity) before operating the equipment.
- (7) Properly ground the equipment.

3. Before operating the equipment, pay attention to the following items:

- (1) Check the conditions of switch contacts, polarity, dial settings, and meters, and make sure the equipment performs correctly.
- (2) Confirm that the ground is connected properly.
- (3) Check all wiring for proper and correct connections.
- (4) Check the condition of the external electric circuit, which will be directly connected to a patient.
- (5) Check the condition of the battery power source.

4. While operating the equipment, pay attention to the following items:

- (1) Do NOT over-exceed time or the amount of equipment use needed for diagnosis or therapy.
- (2) Observe the equipment and patient continuously for early detection of problems.
- (3) When a problem is detected with the equipment or patient, take proper action to stop the equipment without harming the patient.
- (4) Do NOT let the equipment touch the patient unless necessary.

5. After operating the equipment, pay attention to the following items:

- (1) Turn off the switches and return the dial to their original before use in the prescribed order. Then, turn off the main power switch.
- (2) Do NOT pull the power cable forcibly from the outlet.
- (3) When storing the equipment, pay attention to the following items:
 - (i) Keep it away from the water.
 - (ii) Store it away from the potential causes of problems such as abnormal pressure, temperature and humidity, draft, direct sunlight, dust, chlorine or sulphur gas.
 - (iii) During transportation and storage of the equipment, avoid tilting, vibration and sharp impact against it.
 - (iv) Store the equipment away from areas where chemicals and gases are stored.
- (4) Clean all attachments, cables and contacts, and store them in one place.
- (5) Keep the equipment clean to avoid problems during the next use.

6. When the equipment is found to be out of order, do NOT try to repair it.

Display an appropriate sign to indicate that the equipment is out of order, and contact your Shimadzu service representative for repair.

7. Do NOT modify any part of the equipment.

8. Preventive maintenance

- (1) The equipment and its parts should be periodically checked.
- (2) If the equipment has not been in operation for an extended period of time, test it prior to actual operation to make sure it works correctly and safely.

9. Concerning other items, operate properly according to the operation manual.

Precautions in Usage

When using this equipment, please observe the following precautions for the safety of the operator and patient.



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

This equipment is restricted to use by, or under supervision of, a diagnostic radiology technician or a person with a certificate indicating equal proficiency. Repair and inspection of the inside of the equipment is dangerous. Be sure to contact your Shimadzu service representative for repair and inspection.



Never modify the equipment.

In general, modifications are strictly prohibited by the Regulatory requirements of the law of the country where the device is installed. Please contact your Shimadzu service representative if it is necessary to modify the equipment.



Perform periodic inspection.

Preventive maintenance is required to maintain long-term safety and performance of the equipment.

The "[5 Maintenance](#)" chapter in this manual gives detailed descriptions of daily and periodic maintenance and inspection that a user should perform.

As for the maintenance and inspection that only specially trained experts can perform, utilize the maintenance agreement program offered by Shimadzu.



Repair and maintenance of the inside of the equipment can only be performed by engineers assigned by Shimadzu.

Maintenance must be assigned to specially trained experts. Contact your Shimadzu service representative for repair and maintenance.



Connect this equipment only to SHIMADZU certificated devices or devices that are proven to be safe and show no performance degradation in any combination including connecting system.



If the operator has no experience in operating the equipment, be sure that he or she receives instruction on how to operate it from Shimadzu service personnel or someone who has adequate experience in using the equipment.

In order to operate the equipment safely, an explanation of the operation needs to be given. When installing the equipment, Shimadzu service personnel explain the operating procedure using this operation manual. Follow their directions and operate the equipment correctly.

 ["1.6 Operator Profile" P.8](#)



Federal law restricts this equipment to sale by or on the order of physician. (This caution is the prescription language required by Federal Regulations in U.S.A)

Be Sure to Read the Following to Prevent Explosion, Electric Shock, or Injury



Do NOT use a power supply other than the single phase AC100 V, 0.7 kVA, 50/60 Hz.

Using a power supply other than the one specified above may cause serious accidents such as fires, smoke emissions or explosions.



Do NOT use any potentially flammable or explosive gas, such as disinfectant sprays, near the equipment.

Use of such gas may cause an explosion.



Check the condition of the patient before conducting a study.

If equipment usage is deemed to put the patient at risk due to the his or her condition, refrain from conducting the study or treatment.



Do NOT use the equipment in places where liquid may enter.

The equipment is not designed to be waterproof. Invasion of any liquid should cause electric shock, system failure or malfunction.



Do NOT spill any liquid, such as contrast medium, saline, or disinfectant, onto the equipment.

Should such liquid drip on equipment surfaces, wipe it off immediately. Any such liquid entering into system electronics may cause failure or malfunction.

Should liquid drip on the equipment or enter the covers, immediately turn off the power and contact your Shimadzu service representative.



If an abnormality occurs during operation, or if an unusual odor or smoke is emitted during operation, stop using the equipment immediately and contact your Shimadzu service representative.

Continued use may damage the equipment and cause injury.



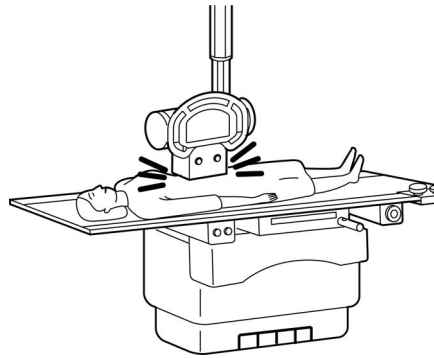
Do NOT open the covers of the equipment.

Otherwise, electric shock may result. When opening the covers for maintenance, contact your Shimadzu service representative.



Always be very careful when moving the equipment to avoid contact with the patient or operator and to ensure that the patient or operator does not become caught between the equipment and any neighboring devices.

Otherwise, it may cause injury.



Do NOT use in a location where metal fragments may enter the equipment.

This can result in electric shocks.



Do NOT perform any maintenance work of the equipment during study.

The patient may be injured.


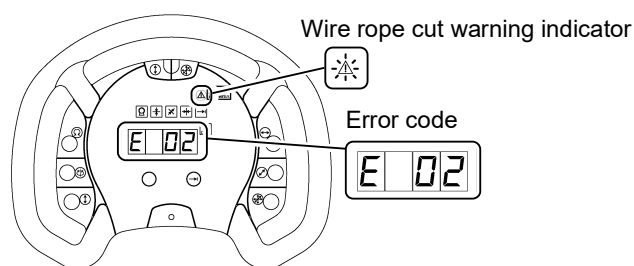


Check that the equipment is functioning correctly and all system components and attachments are securely fastened before conducting a study.

 **WARNING**

If a wire rope cut warning indicator and error code [E 02] are displayed on the operation panel, stop using the device and immediately contact your Shimadzu service representative.

- The equipment is suspended by two wire ropes. If either of these ropes break, radiography is disabled.
- A buzzer sounds continuously when the warning message is displayed as an error code on the operation panel. Any continued use of the equipment in this state may result in serious injury to the patient or operator.

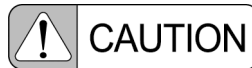
 **NOTE**

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

Cautions on Environmental Conditions

 **WARNING**

Do NOT use the equipment in an oxygen-rich environment.
The use in an oxygen-rich environment may cause fatal or serious injuries or damage to the equipment due to easy ignition.



Be sure to use the equipment under the specified environmental conditions:

The installation of a dedicated air-conditioner in the examination room is recommended if the building air-conditioner cannot meet the necessary environmental conditions.

 ["1.4 Environmental Conditions" P.4](#)

Note also that there must be no sudden change in temperature or humidity. This causes condensation, which can lead to equipment failure.

Cautions on Radiography



Restrict all persons other than the patient from accessing the equipment in accordance with local regulations.

To avoid unnecessary exposure, acceptable distances (maximum access values) to the equipment by any person other than the patient are defined for each region.



The equipment can be operated only by qualified personnel, such as radiology technicians or those with equivalent qualifications.



No person but the patient is allowed to stay in the examination room during X-ray irradiation.

If the equipment is not used correctly, the operator, the patient, and other persons may receive a greater dose of radiation than necessary.

* During radiography, the radiography indicator illuminates and the buzzer sounds an audible warning.



Perform X-ray irradiation carefully and according to the doctor's directions when using the equipment with expectant mothers, women who suspect they are pregnant, lactating women, or children.

Particular ways of using the equipment may increase the scatter dose absorbed into the patient, which may cause a radiation hazard.



Always check the X-ray exposure region using the collimator lamp.

Irradiating a patient with X-rays outside the required region risks exposure of the patient to unnecessary radiation.



During X-ray irradiation, ensure that the X-rays irradiate the necessary region only.

To avoid unnecessary exposure, narrow down the collimator and take protection measures, such as wearing a protective apron.



Do NOT place any unnecessary object in the location within the X-ray exposure region.

Doing so may result in unnecessary radiation exposure to the patient.



Be sure to carry out a warm-up (running-in operation of the X-ray tube unit) before taking an X-ray radiograph.

Follow the warm-up procedure described in the X-ray high voltage generator operation manual.



Perform the warm-up if an arc occurs.

Suddenly using the X-ray tube unit near the nominal X-ray tube voltage (above 100 kV) after using the unit at a relatively low tube voltage (80 kV max.) for a prolonged period may result in arc. This arc occurs due to loss of the warm-up effect at high tube voltage after the X-ray tube unit is used at a relatively low tube voltage for a prolonged period.

In this case, warm-up the X-ray tube unit by referring to the procedure described in the X-ray high voltage generator operation manual.



Do NOT perform unnecessary standby operations.

If standby status continues after the radiography preparation button is pressed, wire disconnection or withstand voltage failure may result owing to the evaporation of the X-ray tube filament.



In order to minimize the radiation dose on the patient, make the distance between the focus and the patient's body surface as long as possible (Minimum 45 cm).

The shorter the distance becomes, the greater the amount of scatter dose absorbed into the patient, which may cause a radiation hazard.



Pay extra attention when irradiating X-rays for a long time or repeatedly.
It may cause a radiation hazard.

Cautions on Cleaning and Disinfection



Be sure to turn the equipment power OFF before cleaning and disinfecting the equipment.

Otherwise, a malfunction may occur in the equipment, or the equipment may operate in an unintended way.

Also, Thoroughly ventilate the room before turning ON the power after disinfection work is complete.



Be sure to clean and disinfect the equipment periodically.

Cleaning and disinfection is very important to ensure that the equipment can be used hygienically and safely. Strictly follow the methods prescribed.



Be sure to clean the equipment frequently and after each patient use.

While doing so, do NOT directly apply or spray any disinfectant, cleaner, or water onto the equipment. Wipe down all contact surfaces using a cloth moistened with an appropriate disinfectant or cleaner. Make sure the cloth is NOT too wet. If it is, liquid may enter into system electronics, causing failure or malfunction.



Use the following disinfectants:

- Chlorine disinfectants
 - Sodium dichloroisocyanurate solution (1 % maximum)
 - Sodium hypochlorite solution (1 % maximum)
- Alcohol disinfectants
 - Commercially available isopropyl alcohol solution (Up to 99 wt% can be used)
 - Rubbing alcohol (76.9 - 81.4 vol% Ethanol, Isopropyl alcohol as an additive)



Do NOT use the following disinfectants:

If any of the following disinfectants are applied, the equipment performance and safety cannot be guaranteed.

- Disinfectants that corrode metals, plastics, rubber, or paint
- Disinfectants unsuitable for metals, plastics, rubber, or paint
- Spray-gas type disinfectants
- Volatile disinfectants
- Disinfectants that may enter the equipment



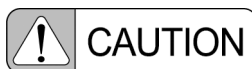
Use disinfectants at a minimum.

Repeated disinfection over a long time may lead to discoloring and cracking on the equipment surface, and deterioration of rubber and plastic. If any abnormality is found on the equipment after disinfection, stop using the equipment immediately. Contact your Shimadzu service representative for repair.



Do NOT use an organic solvent.

Organic solvents may change the surface color. If an organic solvent adheres to the surface, wipe it off immediately.



When disinfecting unpainted metals, do NOT use chlorine-based disinfectants.

Chlorine-based disinfectants may corrode the surface of the equipment. If chlorine-based disinfectants adhere to the surface, wipe them off immediately.



When disinfecting resin parts such as reticule of the collimator and the dose area product meter, do NOT use rubbing alcohol.

Rubbing alcohol may lead to deformation or crack of resin parts such as reticule of the collimator. Wipe it off immediately if it adheres to the resin parts.

On completing the work, check the following points before switching the power ON again.

- There must be no water or disinfectant adhering to the equipment.
- The tools used in cleaning and disinfecting work must be tidied away.

 ["3.1 Power ON/OFF" P.24](#)



When turning the power ON after cleaning, make sure the examination room is properly ventilated.

Turning the power ON while any flammable gas remains in the examination room could lead to fire, smoke, explosion or electrocution.

Cautions on Emergency Stops



Turn OFF the power supply of the X-ray high-voltage generator connected to the equipment to perform an emergency stop.

This will turn off the power supply.

Cautions Relating to Cellular Telephones



Do NOT bring any cellular telephones or related devices into the examination room with their power ON.

Such devices can exceed the EMC standard limitations, and under some conditions this can impair the proper functioning of the equipment. In the worst case, this can cause serious injuries or clinical errors.

Cautions on Electromagnetic Compatibility (EMC)



This equipment needs special precautions regarding EMC.

Install and use the equipment according to the EMC information provided in this operation manual.

 ["6.1 Environmental Conditions of EMC \(Electromagnetic Compatibility\)"](#)
P.76



Make sure that electromagnetic compatibility is obtained.

All peripheral devices must satisfy EMC standards regarding emission of electromagnetic energy and susceptibility to electromagnetic environment.

Devices that do not satisfy these standards may disturb the correct functioning of the equipment. In the worst case, this can cause serious injuries or clinical errors.

 ["6.1 Environmental Conditions of EMC \(Electromagnetic Compatibility\)"](#)
P.76



Do NOT use this equipment adjacent to, or stacked with, other equipment.

If adjacent or stacked use is necessary, check to be sure that this equipment works properly in the environment

 ["6.1 Environmental Conditions of EMC \(Electromagnetic Compatibility\)"](#)
P.76



Do not use accessories, transducers and cables other than those specified or provided by Shimadzu.

The use of accessories, transducers and cables other than those specified or provided by Shimadzu could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation.



Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the CH-200M, including cables specified by the manufacturer.

Otherwise, degradation of the performance of this equipment could result.



Portable RF communications equipment (including peripherals such as antenna cables and external antennas) using TETRA (TERrestrial Trunked RAdio) should not be used no closer than 50 cm to any part of the CH-200M, including cables specified by the manufacturer.

Otherwise, degradation of the performance of this equipment could result.



Portable RF communications equipment (including peripherals such as antenna cables and external antennas) using Bluetooth, Wireless LAN (2.4 GHz), RFID, LTE (Band7) should not be used no closer than 45 cm to any part of the CH-200M, including cables specified by the manufacturer.

Otherwise, degradation of the performance of this equipment could result.



Portable RF communications equipment (including peripherals such as antenna cables and external antennas) using GSM 180, CDMA 1900, GSM 1900, DECT, LTE Band 1,3,4,25, UMTS should not be used no closer than 45 cm to any part of the CH-200M, including cables specified by the manufacturer.

Otherwise, degradation of the performance of this equipment could result.

Cautions When Irradiating Consecutive Pulse X-rays



Observe the following precautions when irradiating consecutive pulse X-rays:

- Conducting studies involving irradiating consecutive pulse X-rays onto the region where an implantable pacemaker or defibrillator is implanted may cause these devices to malfunction.
- Refer to the "Important General Cautions," "Interactions," or other relevant sections in the accompanying documentation of the implantable pacemaker or defibrillator and take the prescribed measures before irradiating the implanted region of these devices with consecutive pulse X-rays.

Fluoroscopy or radiography performed by irradiating consecutive pulse X-rays (such as serial radiography with a few second intervals, pulsed fluoroscopy, digital angiography, DSA, or cineradiography) can adversely affect the CMOS circuit in implantable pacemakers and defibrillators. Such affects may cause oversensing in these devices that can temporarily inhibit pacing pulse output and result in an inappropriate heart rate.

Warranty

The system is warranted to be free from defects in material and workmanship for one year from the date of delivery. If found to be defective, the system must be offered to Shimadzu for inspection and examination. Upon examination, Shimadzu, at its sole option, will repair or replace at no charge, the system or any part found to be defective. Components which wear are not warranted.

This warranty extends to original purchaser or the lessee of the new system only. If the system is to be resold or delivered to a third party, such third party must be provided with a copy of this manual, the installation manual and the technical manual supplied with the system.

This warranty does not apply to the following:

1. Failure or damage due to any installation, relocation, or service not provided by your SHIMADZU service representative or a SHIMADZU designated contractor.
2. Failure or damage caused by the product of other companies (except those purchased from SHIMADZU).
3. Failure or damage due to repairs using non-SHIMADZU certified service parts.
4. Failure or damage due to non-compliance with the notices and procedures set forth in this manual.
5. Failure or damage due to any operating environment deviating from the requirements set forth in this manual.
6. Failure or damage due to natural disasters such as power surge, rain, fire, earthquake, flood, and thunder.
7. Failure or damage due to installation on non-SHIMADZU approved vehicle, ship, aircraft, or others.
8. Failure or damage due to use in non-SHIMADZU certified countries.
9. Failure or damage in case of purchase from entity other than SHIMADZU or Shimadzu service representative.
10. Failure or damage due to impact, drop, or shock.

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

IN NO EVENT SHALL SHIMADZU AND ITS AFFILIATED ENTITIES BE LIABLE TO ANY PERSON OR ENTITY FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES (INCLUDING, WITHOUT LIMITATION, ANY DAMAGES RESULTING FROM LOSS OF USE, BUSINESS INTERRUPTION, LOSS OF PROFITS, LOSS OF SAVINGS, THE COST OF PROCUREMENT OF SUBSTITUTED GOODS, SERVICES OR TECHNOLOGIES OR FOR ANY MATTER ARISING OUT OF OR IN CONNECTION WITH THE USE OR INABILITY TO USE THE SYSTEM. In some jurisdictions, some of the foregoing warranty disclaimers or damage limitations may not apply.

Shimadzu will be indemnified for any claim, liability, or damage arising out of the misuse or non-compliance with this manual by the purchaser or lessee of the system.

Software

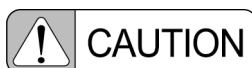
This manual is compatible with the software version 3.0*.

*: Even if the last digit of the software version is different from that above, the descriptions in the manual are valid.

Service Life

The equipment lifetime is 10 years (based on Shimadzu's criteria) assuming the specified maintenance checks are performed.

Disposal Precautions

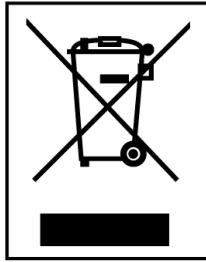


When disposing of the equipment, contact your Shimadzu service representative.

An improper disposal of this equipment may pollute the environment by substances contained in parts.

Action for Environment (WEEE)

To all users of Shimadzu equipment in the European Union:



WEEE Mark

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

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

With your co-operation we are aiming to reduce contamination from waste electronic and electrical equipment and preserve natural resource through re-use and recycling.

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

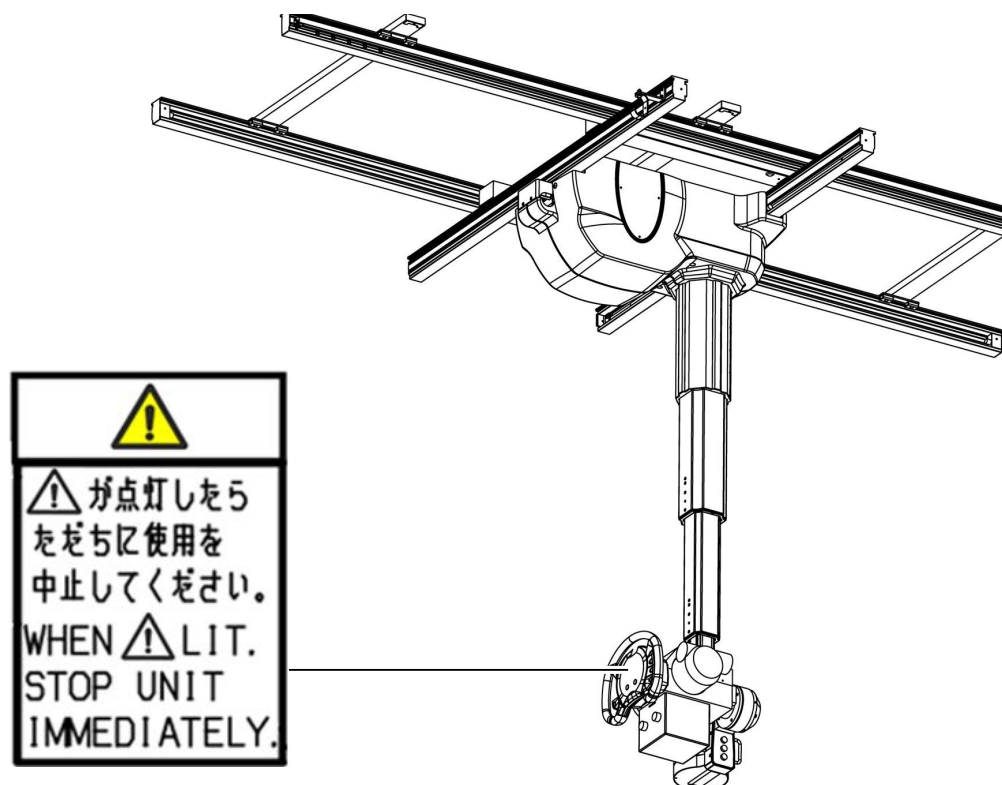
Warning and Caution Labels

The following safety labels, which describe handling precautions, are attached to the equipment. With adequate understanding of the contents on these labels and the warning/caution items in this manual, operate the equipment safely.

Inspect the safety labels periodically (once a year).

If any label is peeled or unreadable by stain or scratch, replace it with a new one.

For new labels, contact your Shimadzu service representative.



Abbreviations

The following are the abbreviations used in this manual.

Component	Document Name
SID	Source Image Distance (Radiography distance between X-ray tube focus and X-ray detector)

Options

The "Options" described in this manual may be provided as standard, or may be unavailable, depending on the sales format.

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Contents

Preface

Precautions in Usage	iv
Be Sure to Read the Following to Prevent Explosion, Electric Shock, or Injury	vi
Cautions on Environmental Conditions	ix
Cautions on Radiography	x
Cautions on Cleaning and Disinfection	xiii
Cautions on Emergency Stops	xvi
Cautions Relating to Cellular Telephones	xvi
Cautions on Electromagnetic Compatibility (EMC)	xvii
Cautions When Irradiating Consecutive Pulse X-rays	xix
Warranty	xx
Software	xxi
Service Life	xxi
Disposal Precautions	xxi
Action for Environment (WEEE)	xxii
Warning and Caution Labels	xxiii
Abbreviations	xxiii
Options	xxiii

Chapter 1 Outline

1.1 Applications	2
1.2 Features	2
1.3 Principle	3
1.4 Environmental Conditions	4
1.4.1 Operating Environment	4
1.4.2 Transportation and Storage Environment	5
1.4.3 Power Supply	5
1.4.4 Ground	5
1.4.5 Installation Requirements	6
1.5 Classification of Equipment	7
1.6 Operator Profile	8
1.7 Symbols	9

Chapter 2 Configuration

2.1	Configuration	12
2.2	Operation panel	15
2.3	Rear mount type, Low-ceiling type, and Front mount L type	18
2.3.1	Rear mount type	18
2.3.2	Low-ceiling type	20
2.3.3	Front mount L type	21

Chapter 3 Operation

3.1	Power ON/OFF	24
3.1.1	Power ON	24
3.1.2	Power OFF	24
3.2	Moving the X-ray tube assembly	25
3.2.1	Vertical movement	25
3.2.2	Longitudinal movement	28
3.2.3	Transversal movement	29
3.2.4	3-directional movement	30
3.2.5	2-directional movement	31
3.3	Rotating the X-ray tube assembly	34
3.3.1	Rotation around the vertical axis	34
3.3.2	Rotation around the horizontal axis	35
3.4	Detent mode	37
3.4.1	Moving to the longitudinal/transversal detent positions	37
3.4.2	Stopping at 0°, ±90° and -180° in rotating around the horizontal axis	38
3.5	Lighting the collimator lamp	39
3.5.1	The collimator lamp lights up	39
3.5.2	Adjusting the size of the exposure field (reference)	40
3.6	SID Indication Function (Option)	41
3.6.1	SID indication function (vertical)	41
3.6.2	SID indication function (longitudinal/transversal)	43
3.7	Upward Retraction Function (Option)	47
3.7.1	Retracting upward	47
3.8	Radiography Using Tracking Device (Option)	48
3.8.1	Vertical Tracking Radiography	48
3.8.2	Horizontal Tracking Device	54

Chapter 4 Troubleshooting

4.1	Information about Code Display	58
4.1.1	Error Code List	58
4.1.2	Inspection/Replacement Code Display	59
4.2	Emergency Stop	61
4.3	Operation during a power outage	62

Chapter 5 Maintenance

5.1	Maintenance Check	64
5.2	Daily Inspection (Inspected by the User)	65
5.2.1	Cleaning and Disinfection	66
5.2.2	Inspection for Warning and Caution Labels	68
5.2.3	Check sheet for daily inspection	69
5.3	Periodical Inspection	71
5.4	Maintenance Parts List	73

Chapter 6 Specifications

6.1	Environmental Conditions of EMC (Electromagnetic Compatibility)	76
6.2	Specifications	80
6.2.1	Specification	80
6.2.2	Distance from Spot to Reception Area	82
6.3	Statement of Compliance [For Europe]	83
6.3.1	Regulatory Information	83
6.3.2	Company's Quality System	83
6.3.3	International Standards	84
6.3.4	Protection Against Radiation	84
6.4	Statement of Compliance with Standards	85
6.5	Labeling	86
6.5.1	Package for Transport	88
6.6	Manufacturer Information	89

Appendix

Check List for Trouble	92
Safety Check Registry	93

Index

Dimensions

1

Outline

This chapter describes the applications, features and usage environment of the ceiling tube support CH-200M.

1.1 Applications

■ Intended Use

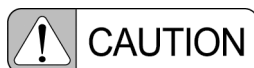
The ceiling type x-ray tube support CH-200M is used to hold the X-ray tube and collimator to position the X-ray tube unit and determine the radiography area after locating the radiography position of patient when combined with an X-ray high voltage generator, an X-ray tube unit, an X-ray collimator, and if necessary, an X-ray radiography stand, an X-ray radiography table, and digital radiography system.

■ Indications for Use

This unit is used for radiographic examinations of whole body except mammography when combined with an X-ray high voltage generator, an X-ray tube unit, an X-ray collimator, and if necessary, an X-ray radiography stand, an X-ray radiography table, and digital radiography system.

This unit must only be operated by qualified personnel, such as radiography technicians or those with equivalent qualifications.

This system is used for total patient population including pediatric examination.



- **Do NOT use the system for any other purpose than indicated above.**
- **Do NOT connect the system to any other equipment, either by electrical or mechanical means, or modify the system.**

1.2 Features

Operation Panel

- The X-ray tube can be positioned by operation from the operation panel.
- Position information such as the angle of rotation are displayed on the operation panel's screen.
- The button arrangement on the operation panel can be modified when installing the equipment.
- The X-ray tube support can be moved and lighted exposure field lamp using the rear operation panel.
(3-directional moving, rotation around the vertical axis lock release functions and exposure field lamps)

Function

- The rotation around the vertical axis of the X-ray tube support can be unlocked with the operation panel enabling even radiography at difficult angles demanded in orthopedic operations. (Radiography with general radiography technique)
- The X-ray tube support can be moved vertically within a 1600 mm range. Without using a footstool, it can perform radiography at a low position, such as the knees, with the patient in a standing position.
- The vertical position of the X-ray tube support is selectable at the time of installation making it suitable even for examination rooms with high ceilings.
- Aluminum rails are standard equipment enabling the quiet and smooth movement of the X-ray tube support. They also enable accurate positioning for conducting radiography.
- The magnetic brakes reduce noises upon locking.

Optional Function

- The tracking switch kit (option) enables the use of the vertical tracking function and the horizontal tracking function in combination with the X-ray radiography stands and tables.

1.3 Principle

By releasing the locks on all system motions and manually operating the X-ray tube in longitudinal motion, transverse motion, vertical motion, horizontal rotation and vertical rotation, you can set the radiography position.

Note also that position information such as the exposure distance and angle of rotation are displayed using a position detection mechanism.

1.4 Environmental Conditions

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

1.4.1 Operating Environment

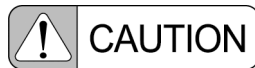
Use the equipment under the environmental conditions listed below:

The installation of a dedicated air-conditioner in the examination room is recommended if the building air-conditioning cannot meet the necessary environmental conditions.



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

The use of the equipment in an oxygen-rich environment may cause fatal or serious injuries or damage to the equipment due to easy ignition.



Even under the prescribed conditions, avoid rapid changes of temperature or humidity.

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

Item	Specifications
Atmosphere	No explosive or corrosive gases
Ambient Temperature	10 °C to 40 °C
Relative Humidity	30 % to 85 % (with no condensation)
Atmospheric Pressure	800 hPa to 1060 hPa
Environment illuminance	150 lx to 500 lx
Ambient Noise Level	Under 70 dB

1.4.2 Transportation and Storage Environment

Item	Specifications
Ambient Temperature	-10 °C to 60 °C
Relative Humidity	10 % to 95 % (with no condensation)
Atmospheric Pressure	700 hPa to 1060 hPa

1.4.3 Power Supply

Item	Specifications
Phase	Single phase AC
Frequency	50/60 Hz
Standard Voltages	100 V
Voltage Fluctuation Range	±10 % of nominal voltage
Supply Capacity	0.7 kVA
Power Supply Impedance	Max. 1.4 Ω
Power Supply	Supplied from X-ray high voltage generator



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

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

1.4.4 Ground

Grounding resistance: less than 100 Ω



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

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

1.4.5 Installation Requirements

■ Ceiling Structure

The ceiling structure must permit anchor bolts to be installed for anchoring the equipment to the examination room ceiling.

Preferably, the ceiling should be at least 50 mm thick.

Make sure the ceiling at the installation site as follows.

- Ceiling levelness: 5/1000 mm max. (measured with a laser marker etc.)

■ Anchoring

The ceiling of the room in which the equipment is installed must have anchor bolts that can support the weight of the equipment. It is necessary to secure 500 kg pull out strength per anchor bolt. Refer to the table below and select anchor bolts. Also, hook anchor bolts onto a foundation rebar in order to attain greater load capacity.

Nominal Dimensions	Collar Dimensions		Boring Depth (mm)	Maximum Pullout Capacity for Concrete Strength of 200 kg/m ²	Maximum Shear Capacity (kg)	Drill Diameter (mm)	Anchor Pitch (cm)
	Outer Diameter	Screw Depth					
W1/4	11	8	30	1,100	800	11.3	9
W5/16	12	10	40	1,400	1,200	12.3	11
W3/8	14.3	11	45	2,200	1,800	14.6	13
W1/2	17.5	16	55	3,200	3,200	18.0	19
W5/8	21.5	20	65	4,500	5,200	22.0	23
W3/4	22.5	26	90	6,800	7,700	26.0	28
W7/8	29.5	30	100	8,100	9,600	29.0	32

The maximum allowable capacity is 40 % of corresponding maximum capacity.

1.5 Classification of Equipment

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

■ Protection Method Against Electric Shock

Class I equipment

■ Classification of Applied Parts

No Applied Parts

■ Operation Mode

Continuous operation

■ Degree of Protection Against Liquid Ingress

Ordinary equipment

■ For Use in an Oxygen-rich Environment



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

The use in an oxygen-rich environment may cause fatal or serious injuries or damage to the equipment due to easy ignition.

■ For Use in Flammable Atmosphere

Not to be used in presence of flammable anaesthetic gas



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

It may cause an explosion.

■ Classification of Installation Type








Permanently installed equipment

1.6 Operator Profile

Item	Details
Age	Age that person can obtain the license of Radiological Technologist or a license equal to it.
Sex	No limitation
Nationality	No limitation
Education	Radiological Technologist or person who has a license equal to it. The capacity to read and understand the operation manual.
Knowledge	Radiological Technologist or person who has a license equal to it.
Language	Can read and understand English.
Experience	Necessary. Every operator needs to take training for operating the equipment before using the equipment.
Permissible impairments	Corrected visibility is over 0.7 in the decimal number. Impaired by 40 % resulting in 60 % of normal hearing at 500 Hz to 2 kHz.

1.7 Symbols

Symbols used on this system are shown and described as follows.

Symbol	Location	Meaning
	On name plate	Alternating current
	On warning and caution labels	Observe described items, or refer to operation manual.
	On name plate	Refer to operation manual.
	On name plate	Refer to operation manual.
	On name plate	Year and month of manufacture
	On name plate	Manufacturer
	On name plate	Serial number
	Next to name plate	Refer to operation manual.

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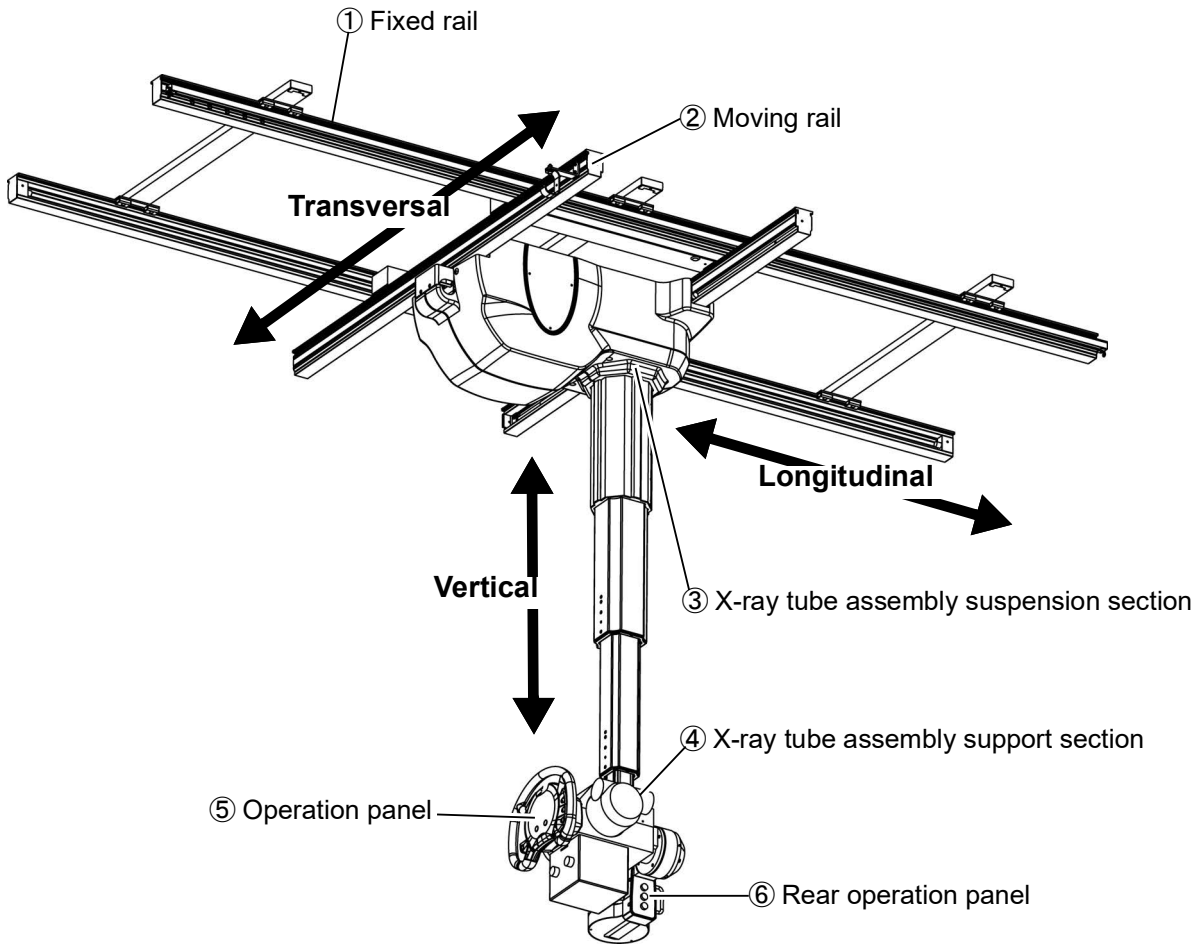
2

Configuration

This chapter describes the configuration and operating panel of the ceiling tube support.

2.1 Configuration

This ceiling tube support consists of the following components.



*: Equipment suitable for use in the patient environment.

Figure 2.1 Configuration

① Fixed rail

This rail is fixed onto the ceiling. The moving rail moves along this rail.

② Moving rail

Rail that moves along the fixed rail. The X-ray tube assembly support section moves along this rail.

③ X-ray tube assembly suspension section

Pull-up the X-ray tube assembly and moves it vertically.

④ X-ray tube assembly support section

Holds the X-ray tube assembly and moves it vertically.

And rotates it around the vertical axis as well as the horizontal axis.

⑤ Operation panel

Used to control the movement of the device.

Equipped with lock release buttons for vertical direction of the X-ray tube assembly, its longitudinal and transversal movement as well as its horizontal and vertical axis rotation, and a collimator lamp button.

It is also equipped with a horizontal axis rotation angle indicator or SID indicator (option) showing the radiography distance for the X-ray tube assembly.

The arrangement for each button controlling movement and rotation can be set at will when installing the device.

⑥ Rear operation panel

Equipped with a 3-directional release button, a vertical axis rotation release button and a lamp button.

■ Other components

- SID detector [vertical/longitudinal/transversal] (option):
Detects the distance between the X-ray tube focus and X-ray radiography table or stand.
- Tracking driver (Option):
Moves the X-ray tube support upward/downward at horizontal/vertical tracking.
- Tracking switch kit (Option):
The switch box is equipped with the tracking start button and the stop switch. Also, it is equipped with the interface for the X-ray radiography stand or the X-ray radiography table.

■ Explanation of terminology:

- Longitudinal: It moves along with the fixed rail.
- Transversal: It moves along with the moving rail.
- Vertical: X-ray tube assembly moves up and down.

■ Attachment position of X-ray tube assembly

The attachment position of X-ray tube assembly can be chosen from the four following places at the time of installation of X-ray tube assembly.

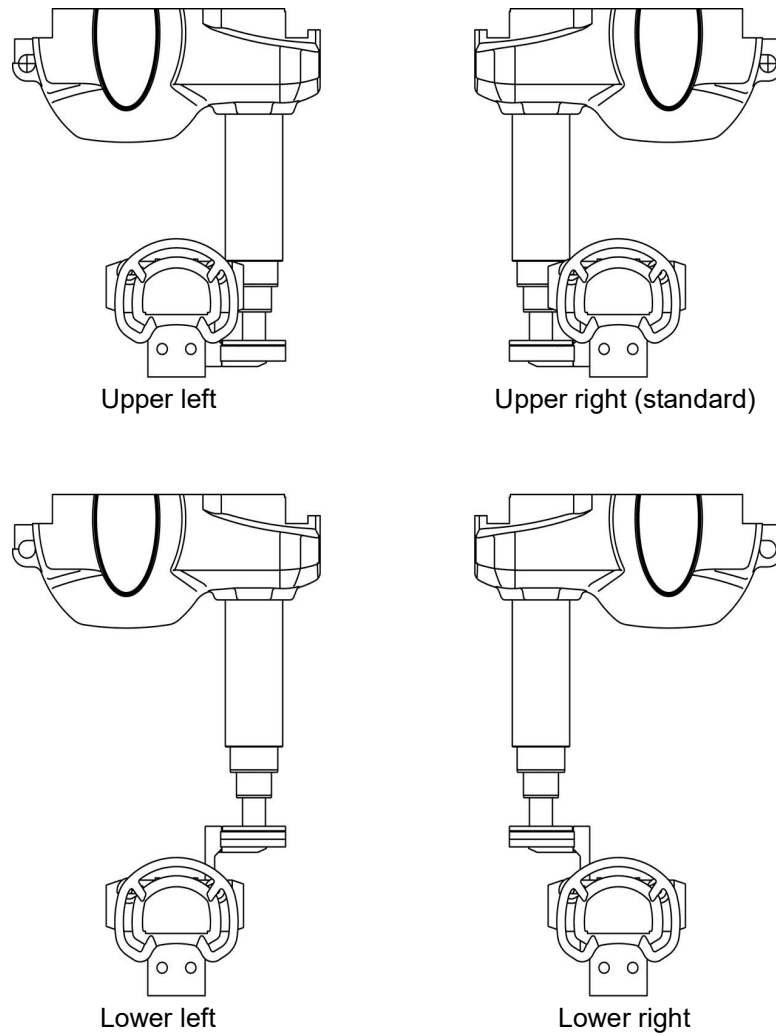


Figure 2.2 Attachment position of X-ray tube assembly

2.2 Operation panel

The function of each button found on the operation panel is explained. The buttons on the rear operation panel located on the back surface of the equipment perform the identical functions.

Their functions are explained as per the standard arrangement.

Arrangement of buttons ① to ⑧ can be changed by installing.

A function of the button ⑨ can be selected.

Should the arrangement be changed, read the explanation with respect to that new arrangement.

To change the arrangement, please contact your Shimadzu service representative.

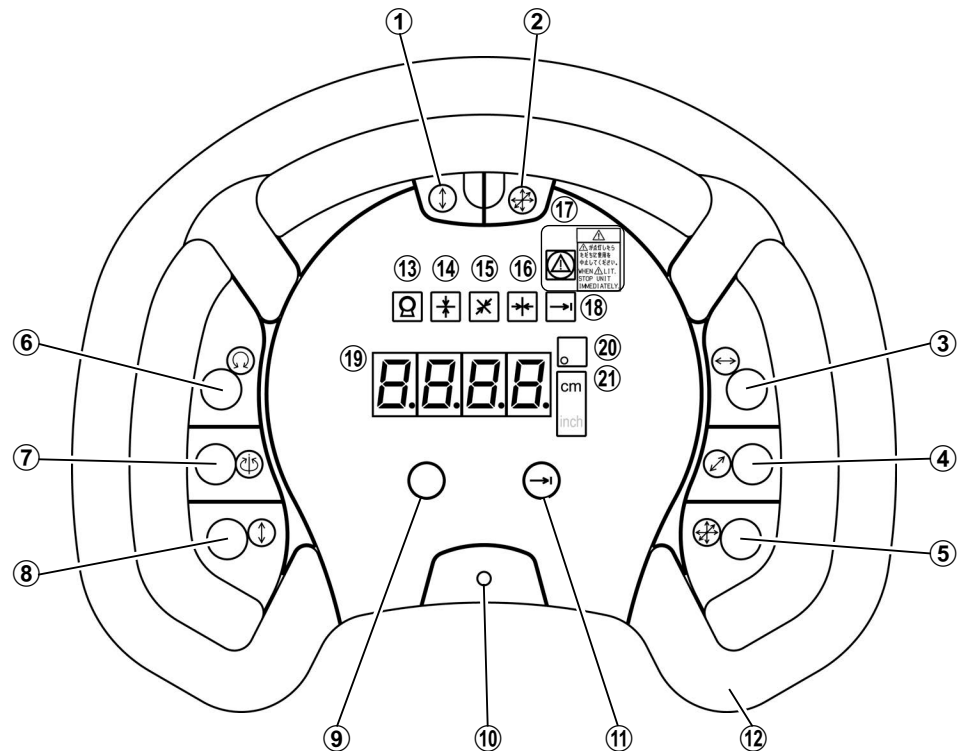


Figure 2.3 Operation panel

①  **[Vertical release] button**

This button releases the lock when moving the X-ray tube assembly vertically.

②  **[3-directional release] button**

This button simultaneously releases the locks for the vertical, longitudinal and transversal directions.

③  **[Longitudinal release] button**

This button is to release the lock when moving the X-ray tube assembly longitudinally.

④  **[Transversal release] button**

This button is to release the lock when moving the X-ray tube assembly transversally.

⑤  **[3-directional release] button**

This button performs the same function as ②.

⑥  **[H-axis rotation release] button**

This button is to release the lock when rotating the X-ray tube assembly around the horizontal axis.

⑦ [V-axis rotation release] button


This button is to release the lock when rotating the X-ray tube assembly around the vertical axis.

⑧ [Vertical release] button

This button performs the same function as ①.

⑨ Spare button

This is a spare button that can be allocated any one of the following functions upon installation:

- Switching the direction of 0° for rotation around the horizontal axis ()
- Turning the light in the examination room ON/OFF
- Turning the vertical tracking function (option) ON/OFF

⑩ [Collimator lamp] button

This button is to turn on the collimator lamp.

⑪ [Detent] button

This button is to turn ON/OFF the preset position stop mode.

The upward retraction function (option) can also be allocated upon installation.

⑫ Grip

Hold this part to move or rotate the X-ray tube assembly.

⑬ X-ray tube selection indicator

Lights up when this device's X-ray tube is selected.

⑭ Vertical position indicator

Lights up when the X-ray tube assembly reaches the vertical setting position.

⑮ Transversal detent position indicator

Lights up when the X-ray tube assembly reaches the transversal detent position.

⑯ Longitudinal detent position indicator

Lights up when the X-ray tube assembly reaches the longitudinal detent position.

⑰ Wire rope cut warning indicator and Warning label

Lights up in the event the wire rope inside the X-ray tube assembly support section is severed.

When the indicator lights, according to the warning label, forbid the use of equipment.

⑱ Detent mode indicator

Lights up when the detent mode is ON.

⑲ Digital indicator

Shows the rotation angle at which the X-ray tube assembly is rotated around the horizontal axis.

When combined with SID detector (option), moving the X-ray tube assembly across to SID, the indicator shows the SID.

When error occurs, error code will be shown.

20 Angle unit indicator

"°" as rotation angle unit is indicated when the X-ray tube assembly is rotated around the horizontal axis.

21 cm/inch unit indicator (option)

When combined with SID detector (option), moving the X-ray tube assembly across to SID, either cm or inch unit for SID is indicated.

As the optional setting, buttons to release the lock of movement of X-ray tube assembly simultaneously in two directions can be assigned by installing.

●  **[Vertical/longitudinal release] button**

This button is to release the lock of vertical movement and longitudinal movement at the same time.

●  **[Vertical/transversal release] button**

This button is to release the lock of vertical movement and transversal movement at the same time.

●  **[Longitudinal/transversal release] button**

This button is to release the lock of longitudinal movement and transversal movement at the same time.

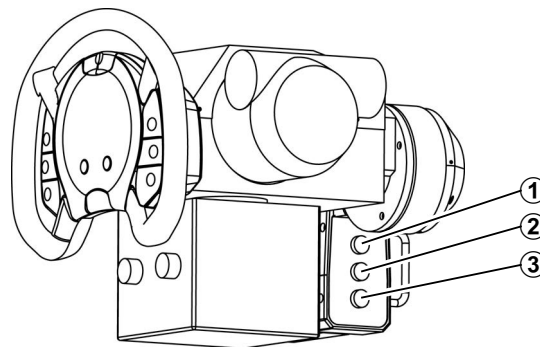
■ Rear Operation Panel

Figure 2.4 Rear operation panel

①  **[V-axis rotation release] button**

This button is to release the lock when rotating the X-ray tube assembly around the vertical axis.

②  **[Collimator lamp] button**

This button is to turn on the collimator lamp.

③  **[3-directional release] button**

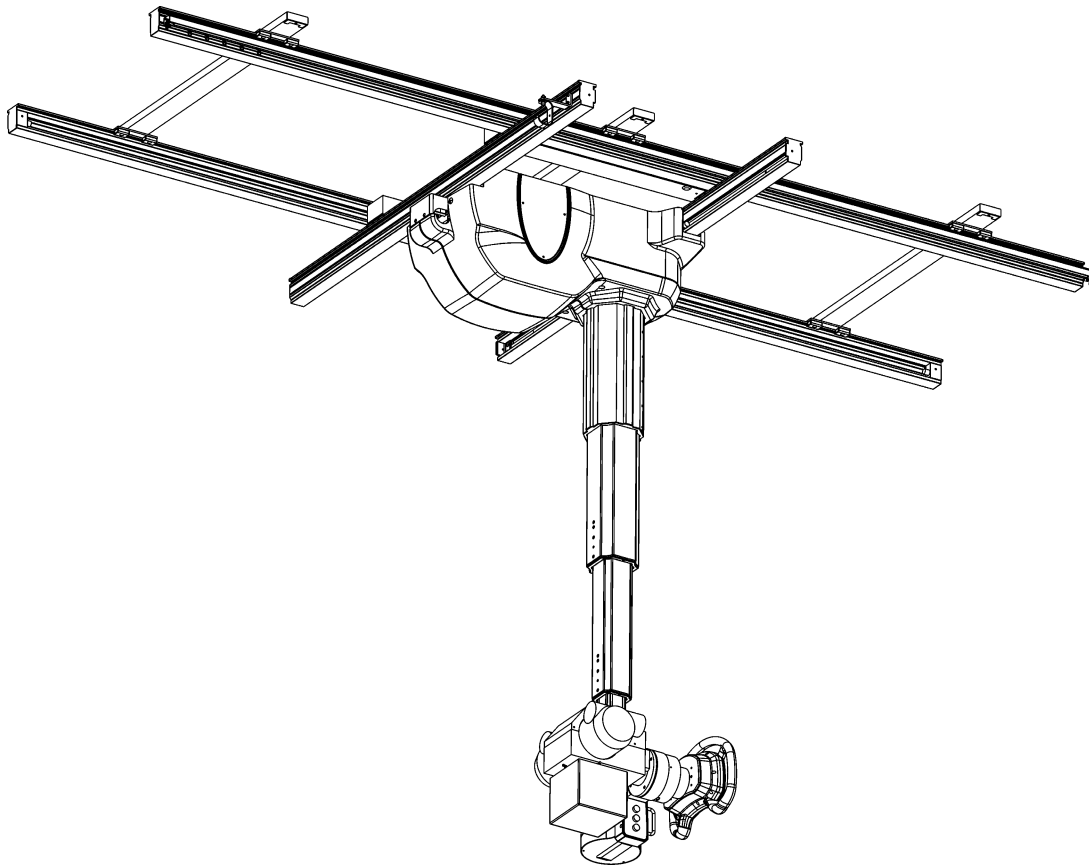
This button simultaneously releases the locks for the vertical, longitudinal and transversal directions.

2.3 Rear mount type, Low-ceiling type, and Front mount L type

There are three other types of the X-ray tube support in addition to the standard type: Rear mount type, Low-ceiling type, and Front mount L type, which hold the X-ray tube assembly in different ways.

2.3.1 Rear mount type

Rear mount type is available for the operation of the X-ray tube support installed by walls in examination rooms.



■ Attachment position of X-ray tube assembly

The X-ray tube assembly with Rear mount type can be attached to one of four positions shown below when installing the assembly.

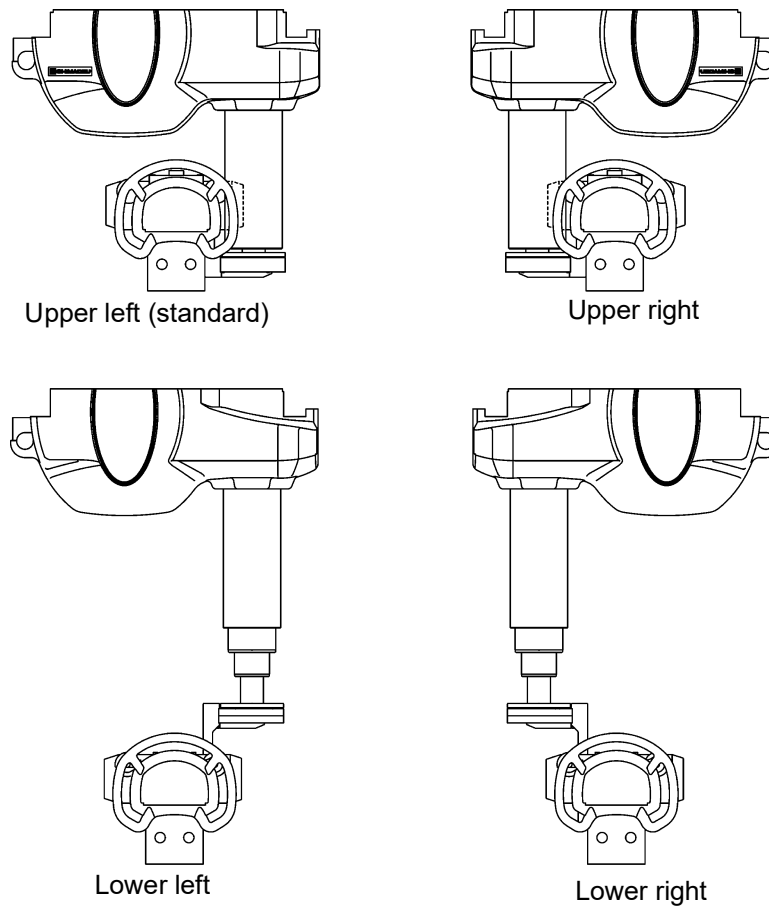
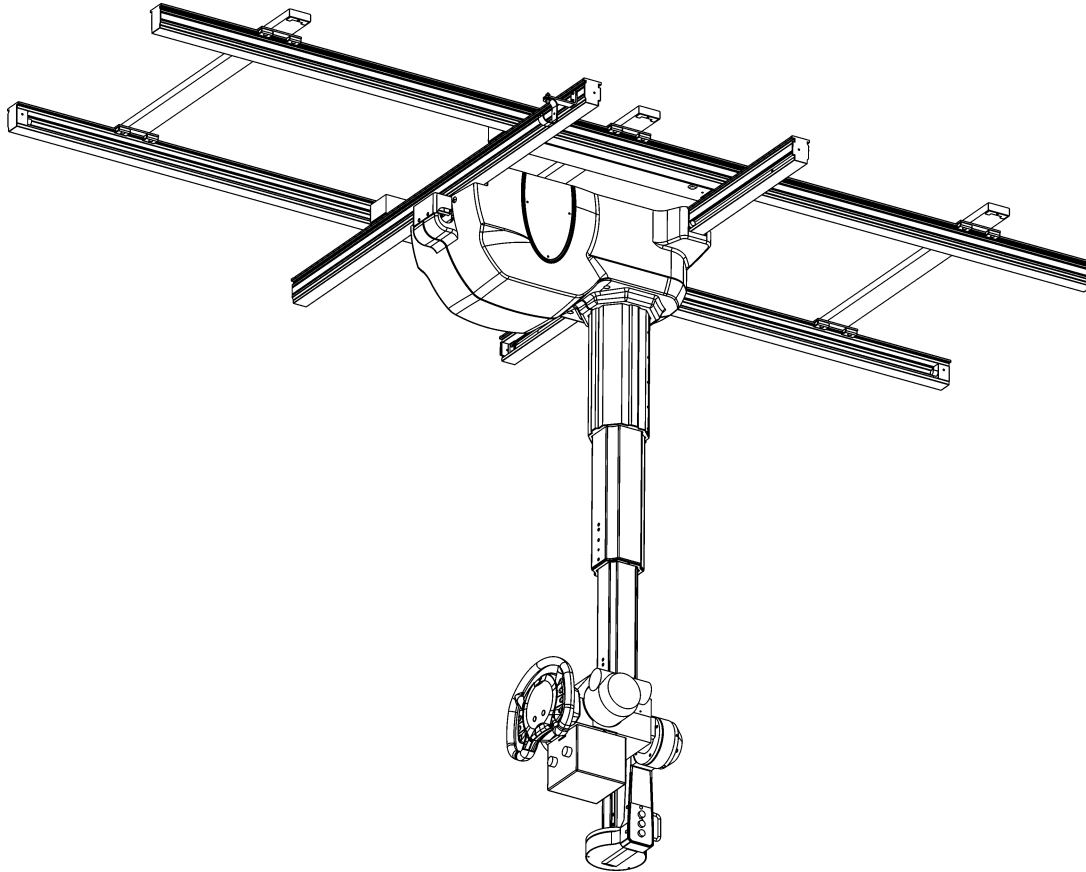


Figure 2.5 Attachment position of X-ray tube assembly

2.3.2 Low-ceiling type

Low-ceiling type holds the X-ray tube assembly at a position higher than the standard type. This is to keep the distance between the X-ray tube focus and a radiography table (1 m as standard) in examination rooms with low ceilings.



■ Difference of the specification from that of the standard type

The X-ray tube assembly position :15 cm higher

The rotation angle around the vertical axis :-90° to +30°

■ Attachment position of X-ray tube assembly

The X-ray tube assembly with Low-ceiling type can be attached to one of four positions shown below when installing the assembly.

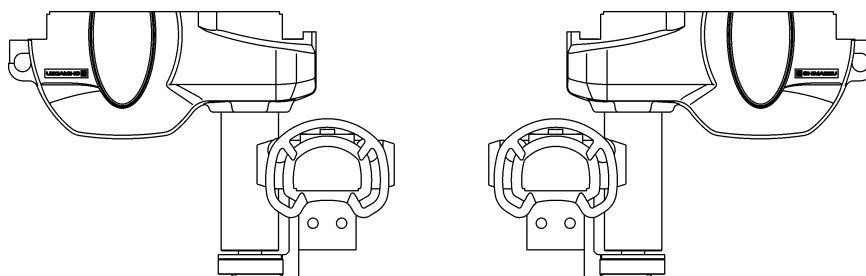
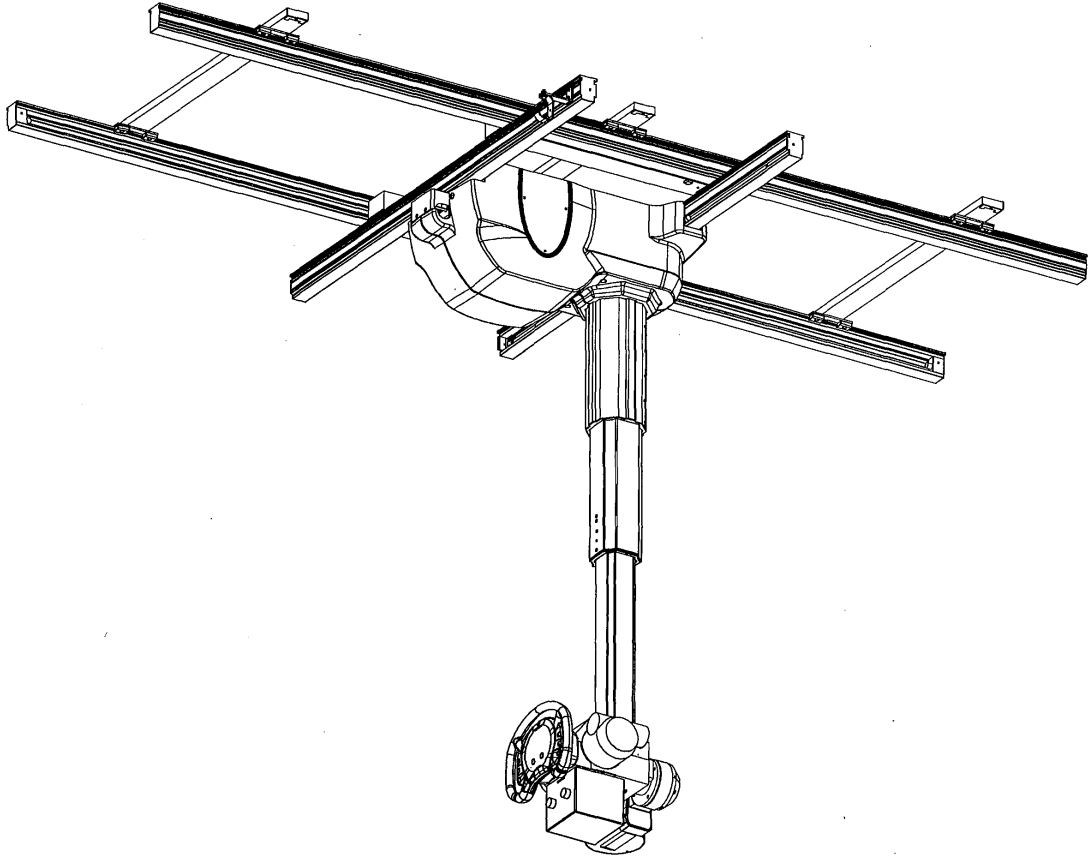


Figure 2.6 Attachment position of X-ray tube assembly

2.3.3 Front mount L type

Front mount type holds the X-ray tube assembly at a position 80 mm lower than the standard type. Eases positioning by preventing interference between the lower edge of the tube support and the tabletop during lateral radiography using the radiography table.

2



■ Difference of the specification from that of the standard type

The X-ray tube assembly position : 8 cm lower

■ Attachment position of X-ray tube assembly

The X-ray tube assembly with Front mount type can be attached to one of four positions shown below when installing the assembly.

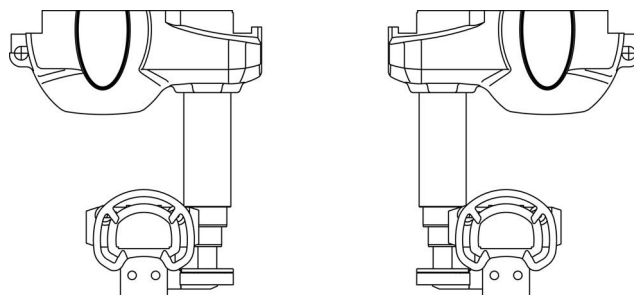


Figure 2.7 Attachment position of X-ray tube assembly

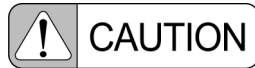
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3

Operation



This chapter describes how to move or rotate the ceiling tube support as well as how to light the collimator lamp (reference).

3.1 Power ON/OFF





When turning the power supply ON/OFF, follow the instructions appearing in the separate operation manual for the X-ray high-voltage generator.

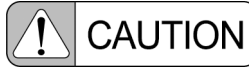
3.1.1 Power ON

When turning the power supply of the ceiling tube support ON, the power supply of the X-ray high-voltage generator, connected to the ceiling tube support, is also turned ON (press to light up  or ).

3.1.2 Power OFF

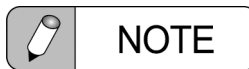
When turning the CH-200M's power supply of the ceiling tube support OFF, the power supply of the X-ray high-voltage generator, connected to the ceiling tube support, is also turned OFF (press  or .

3.2 Moving the X-ray tube assembly



When moving the X-ray tube assembly, take ample precautions to prevent the device from contacting with other devices in the surrounding area.

3

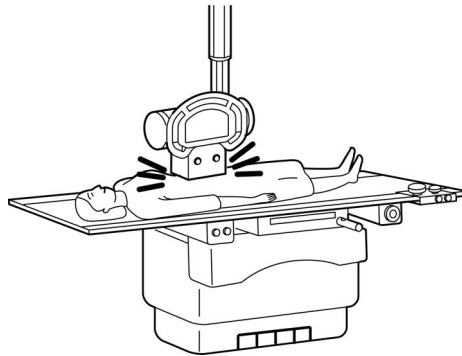


The distance indication plates of the longitudinal, transversal, and vertical movement are attached on the fixed rail, moving rail, and column. When moving the X-ray tube support, align the X-ray tube support with reference to those plates.

3.2.1 Vertical movement



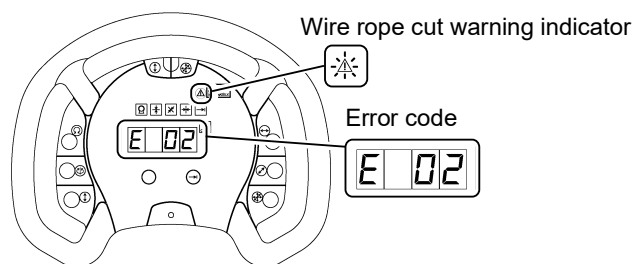
Make sure to confirm the safety of the patient when moving down the X-ray tube assembly. Otherwise, the patient may be caught between the table top and the assembly.



 **WARNING**

If a wire rope cut warning indicator and error code [E 02] are displayed on the operation panel, stop using the device and immediately contact your Shimadzu service representative.

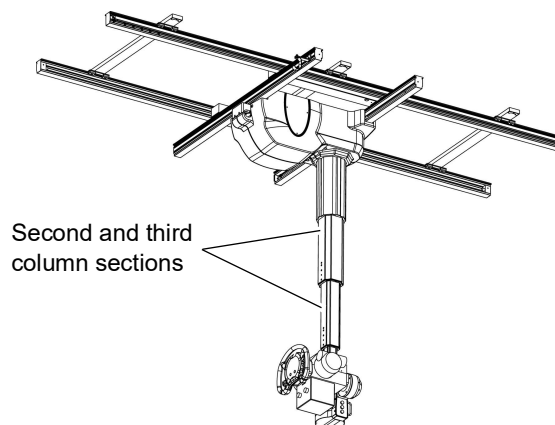
- The equipment is suspended by two wire ropes. If either of these ropes break, radiography is disabled.
- A buzzer sounds continuously when the warning message is displayed as an error code on the operation panel. Any continued use of the equipment in this state may result in serious injury to the patient or operator.




 **CAUTION**


Do not raise the second and third sections of the column.


Raising these sections may cause a problem to occur within the column. In the event that a problem occurs when operating the column, stop using the equipment and contact your Shimadzu service representative.



Moves the X-ray tube assembly vertically.

The lock is released only while the  (Vertical release) button is pressed. Lifting your finger off the button will enable the lock.

- 1 While pressing the  button on the operation panel, hold the grip and move the X-ray tube assembly vertically.

Or just press the  button and lift your finger off; the lock is released only for 5 seconds.

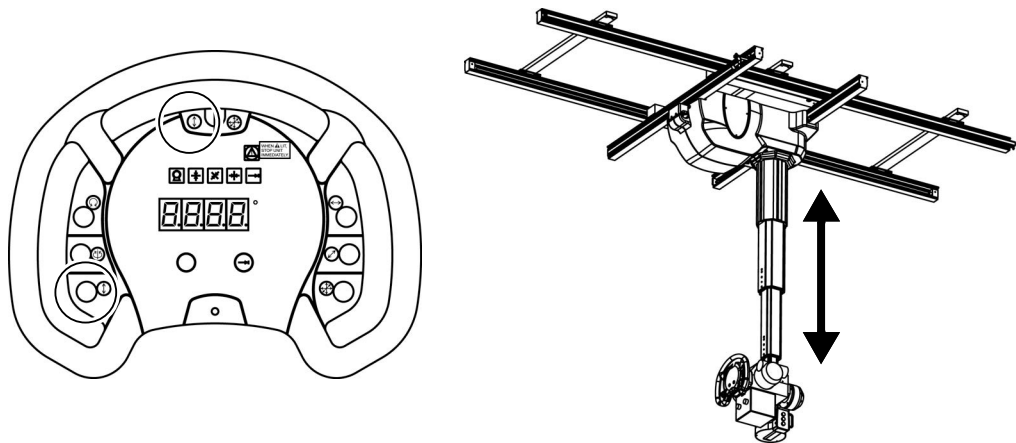

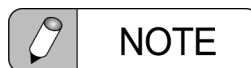


Figure 3.1 Vertical movement

- 2 When reaching the intended vertical position, lift your finger from the  button.


This will lock the X-ray tube assembly.




The function to release the lock for 5 seconds can be nullified by installing. Please contact your Shimadzu service representative.

3.2.2 Longitudinal movement

Moves the X-ray tube assembly longitudinally.

The lock is released only when  (Longitudinal release) button is pressed. Lifting your finger off the button will enable the lock.

To stop the assembly at a longitudinal setting position, refer to "3.4.1 Moving to the longitudinal/transversal detent positions".

- 1 While pressing the  button on the operation panel, hold the grip and move the X-ray tube assembly longitudinally.

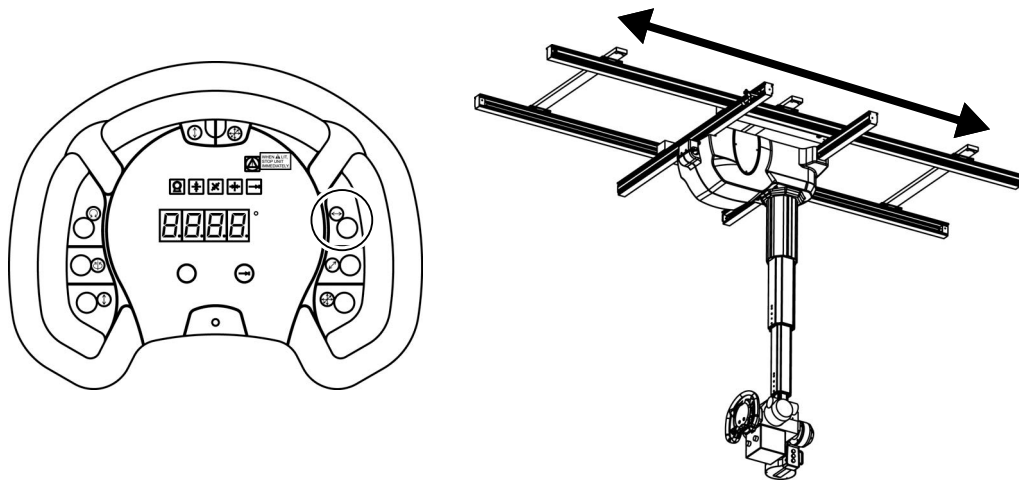

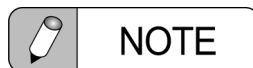



Figure 3.2 Longitudinal movement


- 2 When reaching the intended longitudinal position, lift your finger from the  button.

This will lock the X-ray tube assembly.




NOTE

When  button is kept pressed for more than 60 seconds, X-ray tube assembly will switch to the same situation with detent mode automatically and stop at the detent position. (Refer to the "3.4 Detent mode".)


To operate again, lift your finger off the  button once and press again.

3.2.3 Transversal movement

Moves the X-ray tube assembly transversally.

The lock is released only while the  (Transversal release) button is pressed. Lifting your finger will lock the assembly.

To stop the assembly at a transversal setting position, refer to "3.4.1 Moving to the longitudinal/transversal detent positions".

- 1 While pressing the  button on the operation panel, hold the grip and move the X-ray tube assembly transversally.

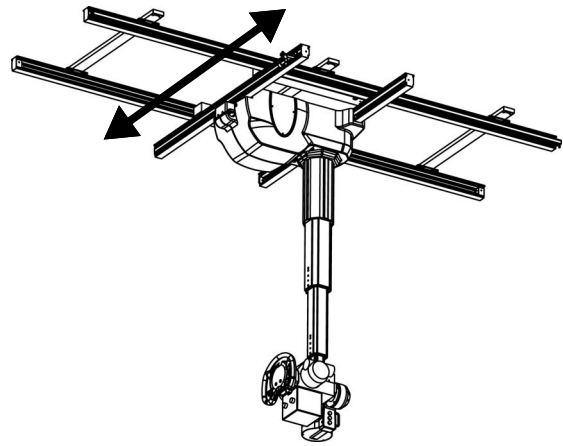





Figure 3.3 Transversal movement

- 2 When reaching the intended transversal position, lift your finger from the  button.

This will lock the X-ray tube assembly.





NOTE

When  button is kept pressed for more than 60 seconds, X-ray tube assembly will switch to the same situation with detent mode automatically and stop at the detent position. (Refer to the "3.4 Detent mode".)
To operate again, lift your finger off the  button once and press again.

3.2.4 3-directional movement

This function simultaneously enables the vertical, longitudinal, and transversal movement of the X-ray tube assembly.

The lock is released only while pressing the  (3-directional release) button. Lifting your finger will lock the assembly.

- 1 While pressing the  button on the operation panel, hold the grip and move the X-ray tube assembly vertically, longitudinally and transversally.

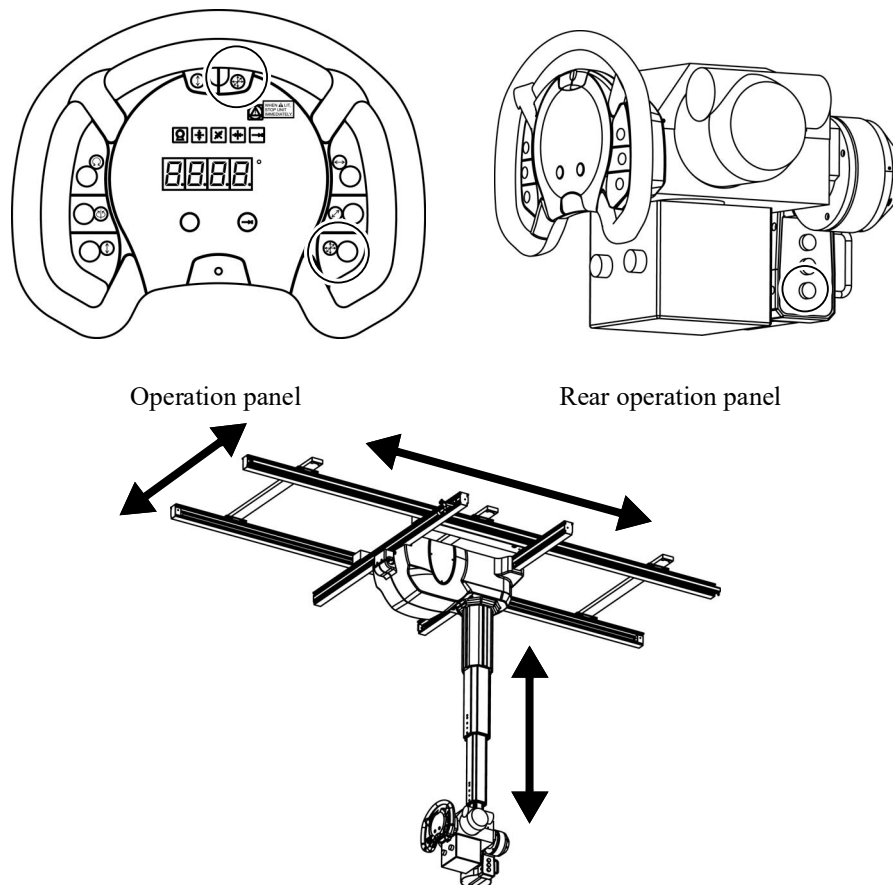






Figure 3.4 3-directional movement

- 2 When reaching the intended position, release your finger from the  button. This will lock the X-ray tube assembly.

 **NOTE**


When  button is kept pressed for more than 60 seconds, X-ray tube assembly will switch to the same situation with detent mode in longitudinal and transversal direction automatically and stop at the detent position. (Refer to the "3.4 Detent mode".)


To operate again, lift your finger off the  button once and press again.

3.2.5 2-directional movement

X-ray tube assembly can move 2-direction simultaneously. This function can be set by installing. Please contact your Shimadzu service representative.

■ Vertical/longitudinal movement

The lock is released only while pressing the  (vertical/longitudinal release) button. Lift your finger to lock the assembly.

- 1 While pressing the  button on the operation panel, hold the grip and move the X-ray tube assembly vertically and longitudinally.

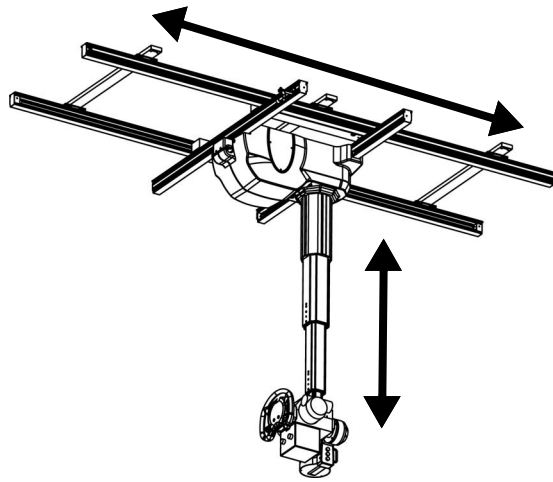

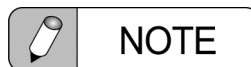



Figure 3.5 Vertical/longitudinal movement


- 2 When reaching the intended position, release your finger from the  button.

This will lock the X-ray tube assembly.





NOTE

When  button is kept pressed for more than 60 seconds, X-ray tube assembly will switch to the same situation with detent mode in longitudinal direction automatically and stop at the detent position. (Refer to the "3.4 Detent mode".)

To operate again, lift your finger off the  button once and press again.

■ Vertical/transversal movement

The lock is released only while pressing the  (vertical/transversal release) button. Lift your finger to lock the assembly.

- 1 While pressing the  button on the operation panel, hold the grip and move the X-ray tube assembly vertically and transversally.

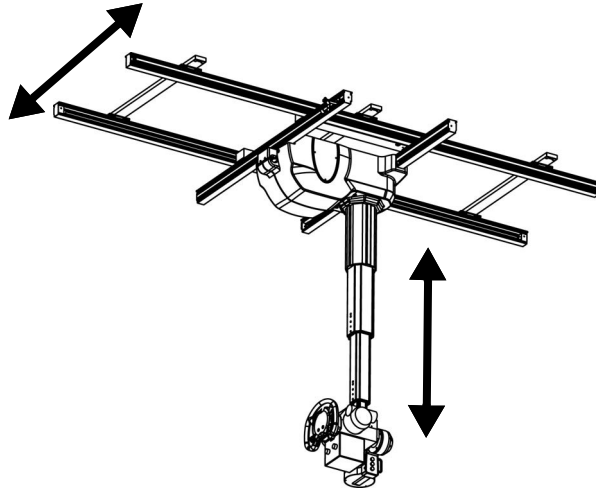





Figure 3.6 Vertical/transversal movement

- 2 When reaching the intended position, release your finger from the  button.


This will lock the X-ray tube assembly.


NOTE

When  button is kept pressed for more than 60 seconds, X-ray tube assembly will switch to the same situation with detent mode in transversal direction automatically and stop at the detent position. (Refer to the "3.4 Detent mode".)

To operate again, lift your finger off the  button once and press again.

■ Longitudinal/transversal movement

The lock is released only while pressing the  (longitudinal/transversal release) button. Lift your finger to lock the assembly.

- 1 While pressing the  button on the operation panel, hold the grip and move the X-ray tube assembly longitudinally and transversally.

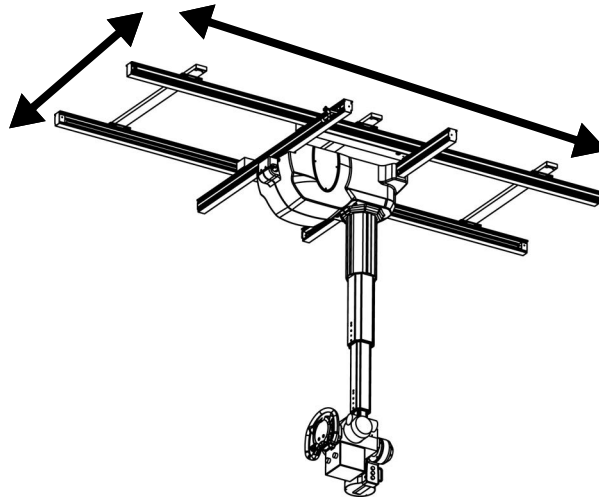

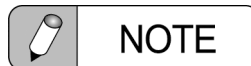




Figure 3.7 Longitudinal/transversal movement

- 2 When reaching the intended position, release your finger from the  button.

This will lock the X-ray tube assembly.




When  button is kept pressed for more than 60 seconds, X-ray tube assembly will switch to the same situation with detent mode automatically and stop at the detent position. (Refer to the "3.4 Detent mode".)


To operate again, lift your finger off the  button once and press again.


3.3 Rotating the X-ray tube assembly



3.3.1 Rotation around the vertical axis

Rotates the X-ray tube assembly around the vertical axis.

The lock is released only while the  (V-axis rotation release) button is pressed. Lifting your finger will lock the X-ray tube assembly.

- 1 While pressing the  button on the operation panel, hold the grip and rotate the X-ray tube assembly around the vertical axis.

The assembly will temporarily stop at the 0° , $\pm 90^\circ$ and -180° positions. To move the assembly again, lift your finger from the  button once, press it again and rotate the assembly.

If the assembly is difficult to move while pressing the  button, press the  button and quickly remove your finger. The lock will be released for only 5 seconds.

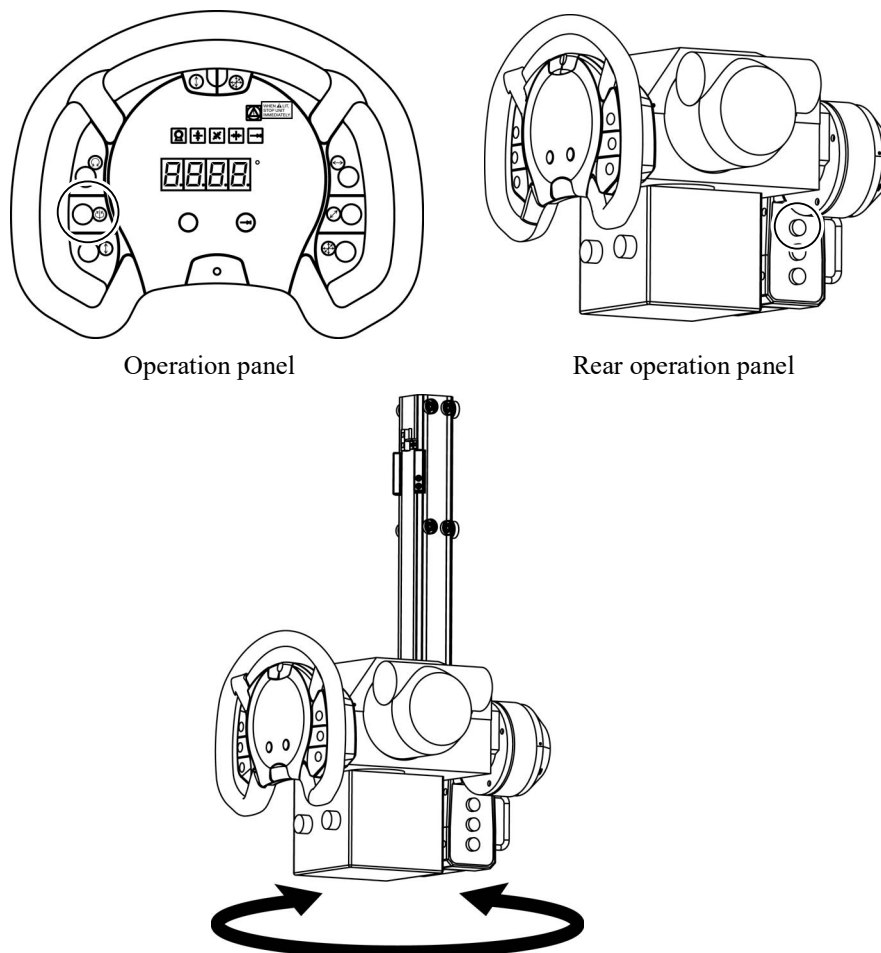



Figure 3.8 Rotation around vertical axis

- 2 When reaching the intended position, lift your finger from the  button. This will lock the X-ray tube assembly.

3.3.2 Rotation around the horizontal axis

Rotates the X-ray tube assembly around the horizontal axis.

The lock is released only while the (H-axis rotation release) button is pressed. Lifting your finger will lock the assembly.

The X-ray tube assembly stops at 0°, ±90° and -180°. To rotate again, lift your finger off the (H-axis rotation release) button once and press again.

- 1 While pressing the (H-axis rotation release) button on the operation panel, hold the grip and rotate the X-ray tube assembly around the horizontal axis.

The digital indicator will show the angle at which the assembly is positioned.

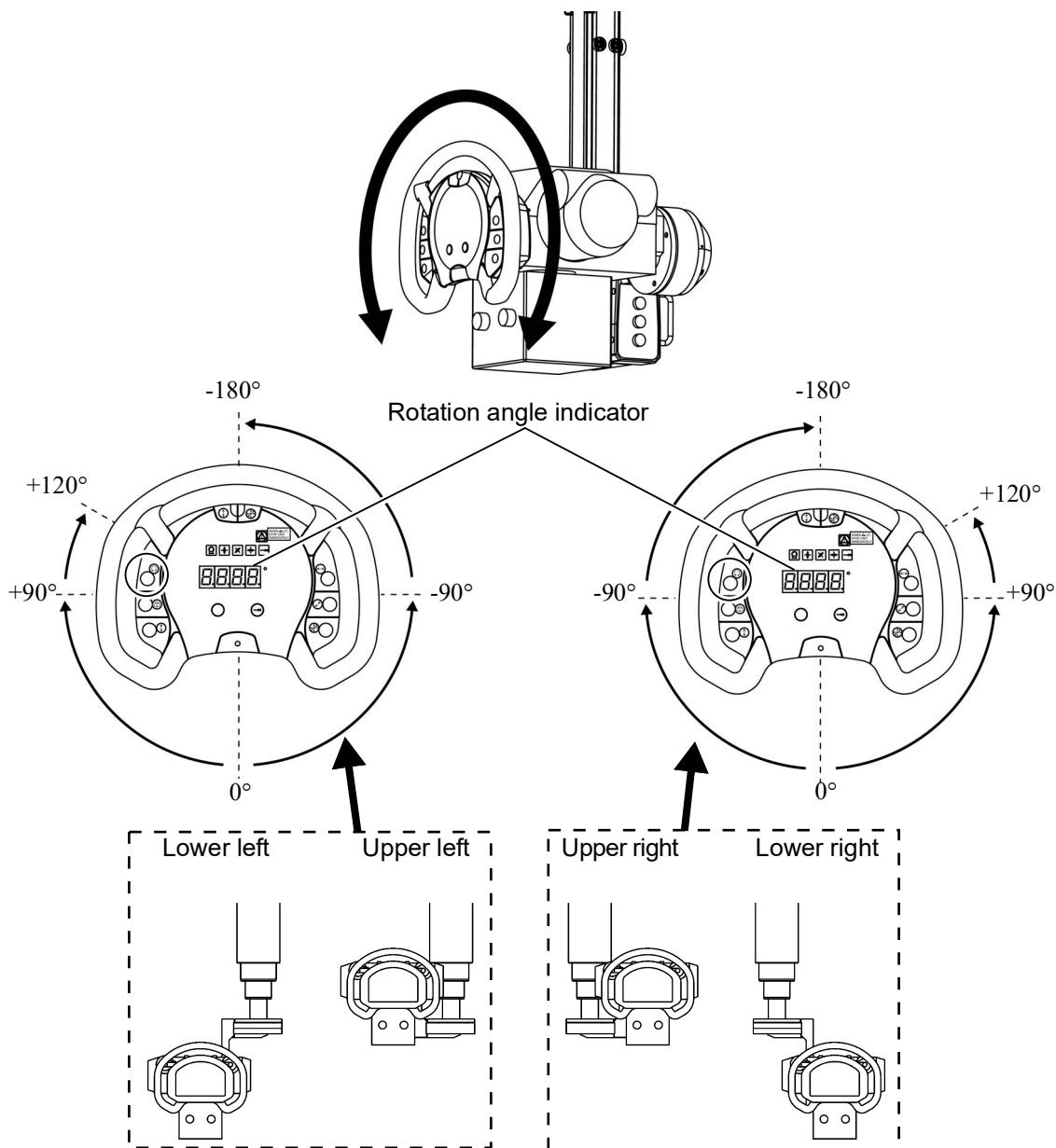



Figure 3.9 Rotation around horizontal axis

The rotation direction of "+" and "-" turns into one another, depending on where to attach the X-ray tube assembly as shown above.


- 2** When reaching the intended position, lift your finger from the  button.
This will lock the X-ray tube assembly.



NOTE

Following settings are available by installation.

Please contact your Shimadzu service representative, if required.

- Standard direction of 0° can be changed from the vertical axis direction to the horizontal axis direction by installing.
- "-" mark for angle (ex. -90°) can be omitted from showing by installing.
- A function to switch the direction of 0° in V-axis direction or H-axis direction () can be assigned to the spare button by installing.
- A function to stop at 0° , $\pm 90^\circ$ and -180° only in detent mode can be set by installing.


3.4 Detent mode


This function is to stop the X-ray tube assembly at the detent position in longitudinal/transversal direction. Detent position should be set by installing.

Also, a function to stop at 0° , $\pm 90^\circ$ and -180° only in detent mode can be set by installing.

3.4.1 Moving to the longitudinal/transversal detent positions

3




Press the  (detent) button to operate.


- 1 Press the  button on the operation panel.


 light up and the detent mode will be activated.



Figure 3.10 Detent button

- 2 While pressing the , , or  button on the operation panel, hold the grip and move the X-ray tube assembly.

When the X-ray tube assembly reached the longitudinal detent position,  lights up and the assembly stops.


When the X-ray tube assembly reached the transversal detent position,  lights up and the assembly stops.

To move the assembly from the detent position, lift your finger off the release buttons once and press again to release the lock.




The assembly may pass the detent position when it moves too fast. In such case, try the operation slowly again.

- 3 Press  button.

Detent mode is deactivated, and  lights off.

3.4.2 Stopping at 0°, ±90° and -180° in rotating around the horizontal axis

When this function is set by installing, the X-ray tube assembly stops at 0°, ±90° and -180° only in detent mode.

- 1 Press the  button on the operation panel.




 will light up and the detent mode will be activated.




Figure 3.11 Detent button

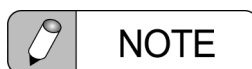
- 2 While pressing the  button, hold the grip and move the X-ray tube assembly.

The X-ray tube assembly will be locked at the 0°, ±90° and -180°.


To move the assembly from 0°, ±90° and -180°, lift your finger off the  button once and press again to release the lock.

- 3 Press  button.

Detent mode is deactivated, and  lights off.



NOTE

When  button is kept pressed for more than 60 seconds in detent mode deactivated, X-ray tube assembly will switch to the same situation with detent mode automatically and stop at 0°, ±90° and -180°.

3.5 Lighting the collimator lamp

3.5.1 The collimator lamp lights up

Pressing the collimator lamp button on the operation panel will light up the collimator lamp for roughly 30 seconds.

The collimator lamp turns off after pressing the collimator lamp button for roughly 1 second while it is ON.

Another lamp button is located on the collimator. (Figure 3.12)

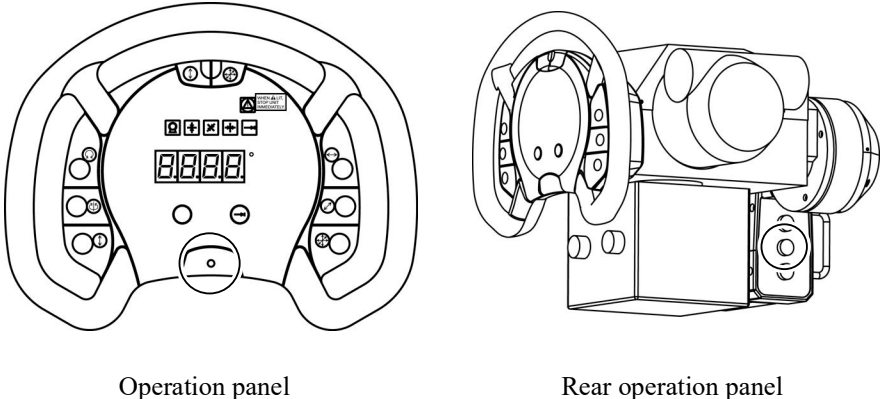


Figure 3.12 Lamp button

3.5.2 Adjusting the size of the exposure field (reference)



For details on operating the collimator, refer to its separate operation manual.

Adjust the exposure field by turning the dials on either side of the collimator.
The dial is equipped with an gauge showing the size of the exposure field measured at the 1, 1.5 or 2m SID. SID can be measured by tape measure.

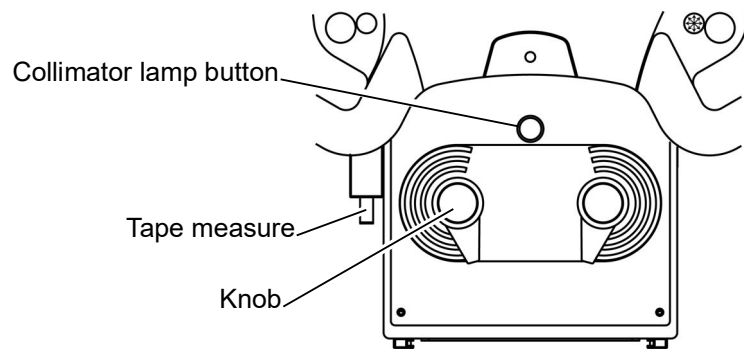


Figure 3.13 Adjusting the size of the exposure field

3.6 SID Indication Function (Option)

Combined the vertical/longitudinal/transversal SID detector (option) to X-ray tube assembly, the SID shows in compliance with X-ray tube angle as follows:

- Vertical direction SID
- Longitudinal/transversal direction SID



NOTE

The X-ray tube support is provided with vertical/longitudinal SID detector or vertical/transversal SID detector.
The longitudinal SID detector and the transversal SID detector can not be combined all together.




NOTE

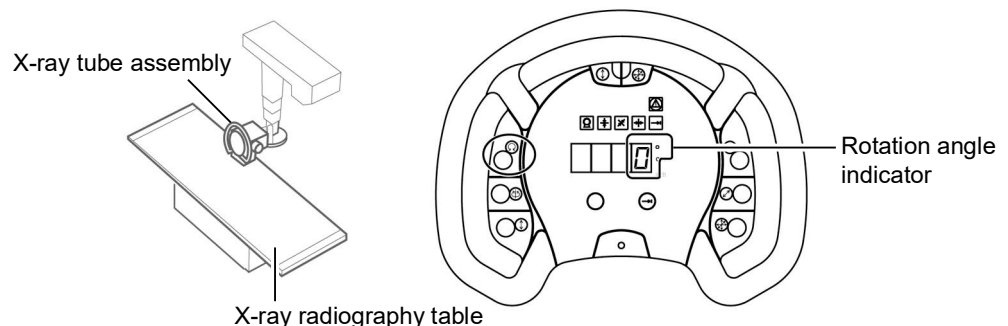
The SID shows cm unit.
This indicator can be changed to inch unit when installing. Please contact your Shimadzu service representative.



3.6.1 SID indication function (vertical)

SID indication function (vertical) shows the digital display on the operation panel for the distance between X-ray tube focus and film surface of X-ray radiography table.

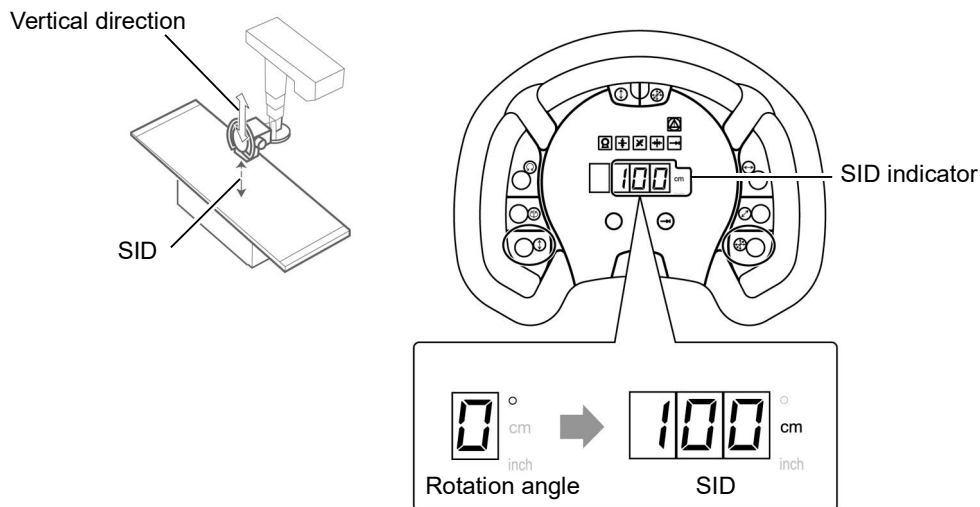
- 1 While pressing the  button on the operation panel, hold the grip and move the X-ray tube assembly facing to X-ray radiography table so that the X-ray tube assembly stops at 0°.

This indicator shows the rotation angle.




- 2** While pressing the  or the  button on the operation panel, hold the grip and move the X-ray tube assembly vertically.

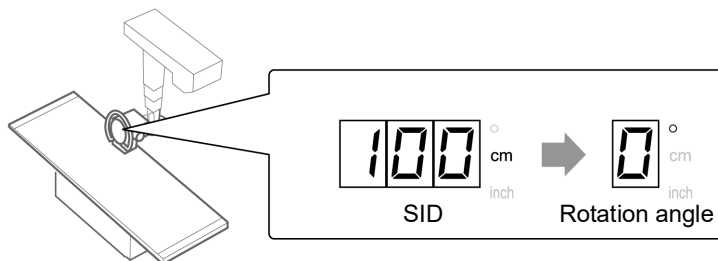
The indicator changes from rotation angle to SID, and then that SID is displayed.




Even if during the X-ray tube assembly is kept moving vertically or after the button is released, the indication holds to show SID indication.

- 3** While pressing the  button on the operation panel, hold the grip and rotate the X-ray tube assembly around the horizontal axis.

The indicator changes from SID to rotation angle.



 **NOTE**


The SID indication shows the distance between X-ray tube focus and the fixed position. If combined with X-ray radiography table, which tabletop can be moved up and down, the SID indication may differ from actual SID.

3.6.2 SID indication function (longitudinal/transversal)

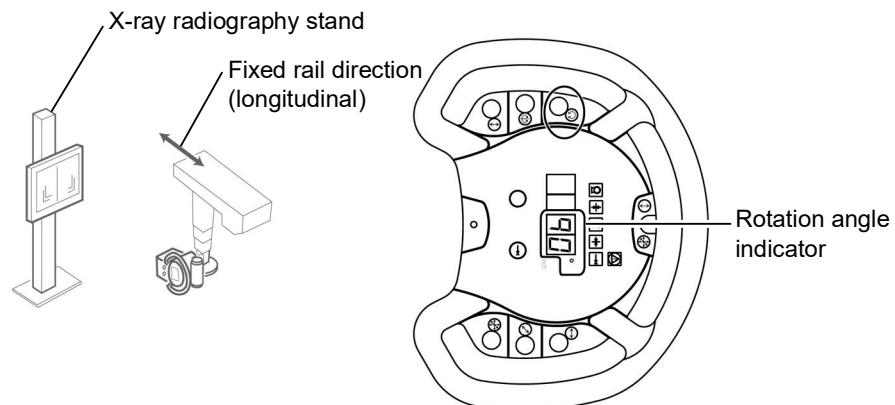
- SID indication function (longitudinal) shows the digital display on the operation panel for the distance between X-ray tube focus and film surface of X-ray radiography stand when the X-ray radiography stand is installed directed to the fixed rail of X-ray tube support.
When the SID indication function (longitudinal) is installed, transversal SID indication is nonfunctional.
- SID indication function (transversal) shows the digital display on the operation panel for the distance between X-ray tube focus and film surface of X-ray radiography stand when the X-ray radiography stand is installed directed to the moving rail of X-ray tube support.
When the SID indication function (transversal) is installed, longitudinal SID indication is nonfunctional.



3

■ Longitudinal operation

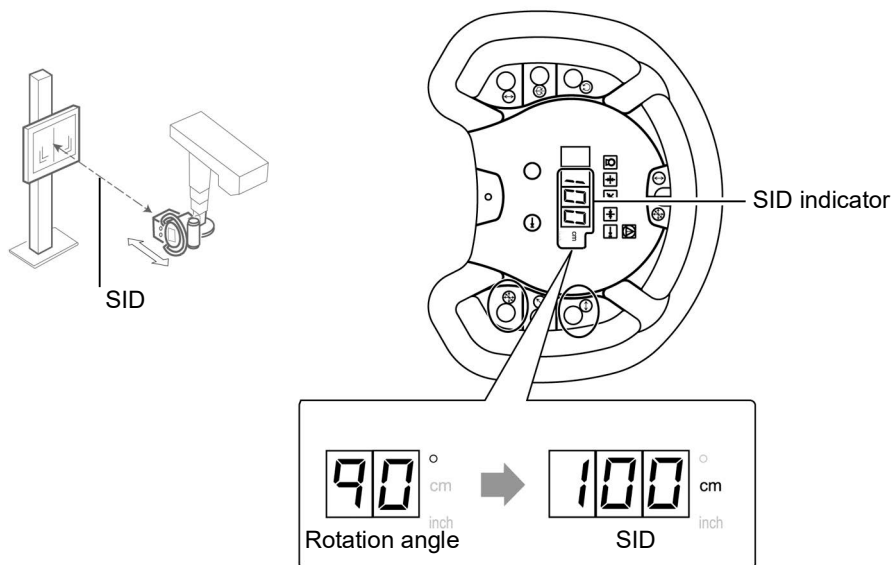
- 1 While pressing the  button on the operation panel, hold the grip and rotates the X-ray tube assembly around the horizontal axis, so that the X-ray tube assembly stops at $\pm 90^\circ$ (lock position).

This indicator shows the rotation angle.




- 2** While pressing the  or the  button on the operation panel, hold the grip and move the X-ray tube assembly longitudinally.

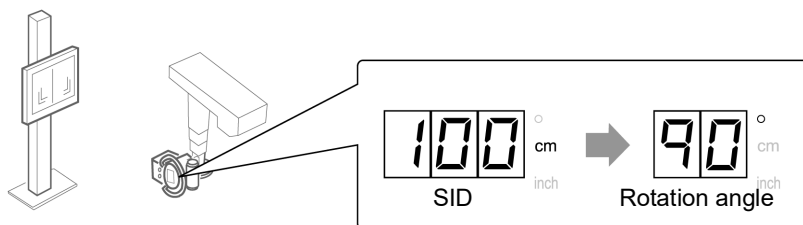
The indicator changes from rotation angle to SID, and then that SID is displayed.




Even if during the X-ray tube assembly is kept moving longitudinally or after the button is released, the indication holds to show SID indication.

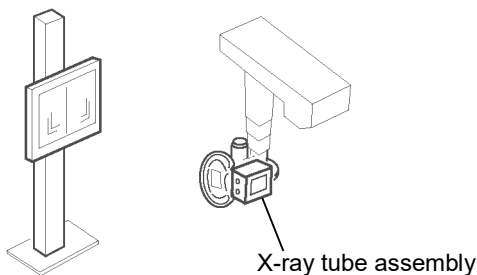
- 3** While pressing the  button on the operation panel, hold the grip and rotate the X-ray tube assembly around the horizontal axis.

The indicator changes from SID to rotation angle.




 **NOTE**

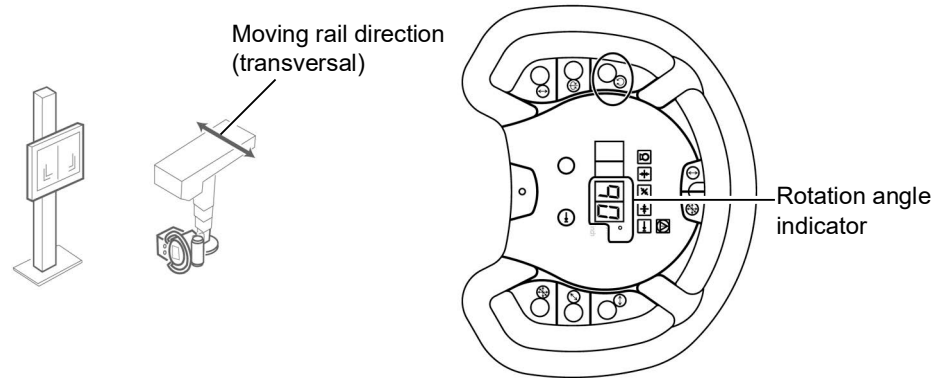
When the X-ray tube assembly faces to the X-ray radiography stand in reverse direction, the SID indication is not displayed. The rotation angle indication is kept displaying.





■ Transversal operation

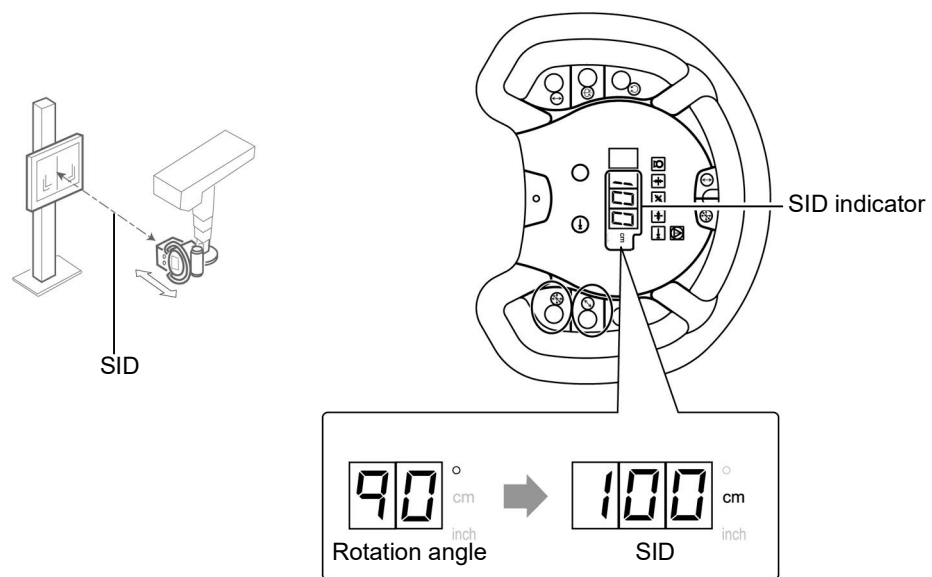
- 1 While pressing the  button on the operation panel, hold the grip and rotates the X-ray tube assembly around the horizontal axis, so that the X-ray tube assembly stops at $\pm 90^\circ$ (lock position).

This indicator shows the rotation angle.




- 2 While pressing the  or the  button on the operation panel, hold the grip and move the X-ray tube assembly transversally.

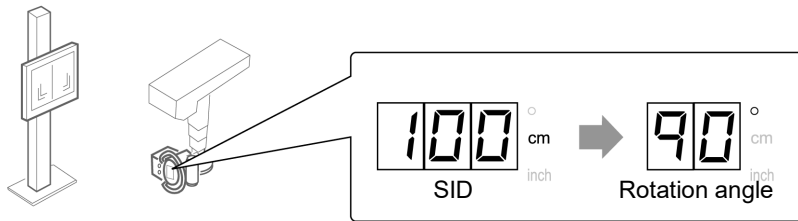
The indicator changes from rotation angle to SID, and then that SID is displayed.




Even if during the X-ray tube assembly is kept moving transversally or after the button is released, the indication holds to show SID indication.

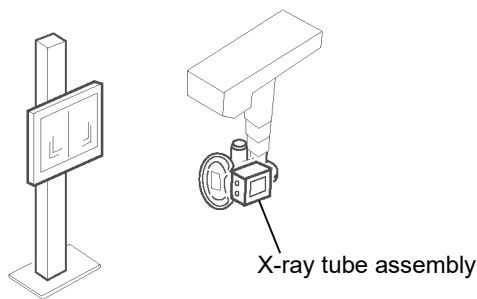
- 3** While pressing the  button on the operation panel, hold the grip and rotate the X-ray tube assembly around the horizontal axis.

The indicator changes from SID to rotation angle.



 **NOTE**

When the X-ray tube assembly faces to the X-ray radiography stand in reverse direction, the SID indication is not displayed. The rotation angle indication is kept displaying.



3.7 Upward Retraction Function (Option)



Always be very careful when using the upward retraction function to avoid contact with the patient or operator and to ensure that the patient or operator does not become caught between the equipment and any neighboring devices.
Otherwise, it may cause injury.


3

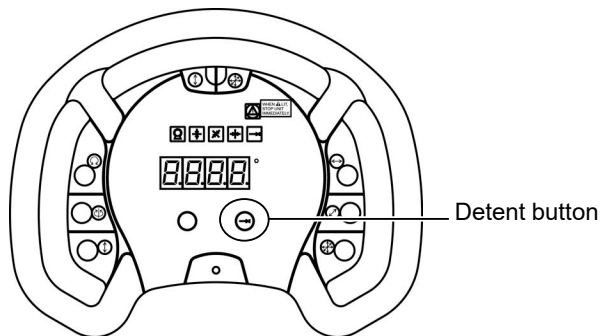
3.7.1 Retracting upward

This function retracts the unit upward.



Tracking driver (option) is necessary to set the upward retraction function at installation. If you require this function, please contact your Shimadzu service representative.


- 1 Press and hold the  (detent) button for more than 1 second.
The unit is retracted upward.



The retraction height can be set at installation.



If an emergency situation occurs with the movement, immediately stop the equipment.

 For details, refer to "4.2 Emergency Stop".



The unit stops movement when a button on the operation panel is pressed.

3.8 Radiography Using Tracking Device (Option)

The radiography using tracking device (option) is the vertical tracking radiography or the horizontal tracking radiography.



When an emergency has occurred due to failure in switches, etc., perform an emergency stop.

 For details on emergency stop, refer to "4.2 Emergency Stop".

■ Vertical Tracking Radiography

The vertical tracking radiography is available for the vertical Bucky radiography.

- In the vertical Bucky radiography, the X-ray tube's radiography height tracks in accordance with the height of the cassette loaded in the X-ray radiography stand's Bucky.

■ Horizontal Tracking Radiography

The horizontal tracking radiography is available for the horizontal Bucky radiography.

- In the horizontal Bucky radiography, tracking is performed so as to maintain a constant distance between the X-ray tube and the cassette loaded in the X-ray radiography table's Bucky.

3.8.1 Vertical Tracking Radiography


- 1** Operate the X-ray tube support.
- 2** Load a cassette into the X-ray radiography stand's Bucky.
Insert the grid or remove it, if required.

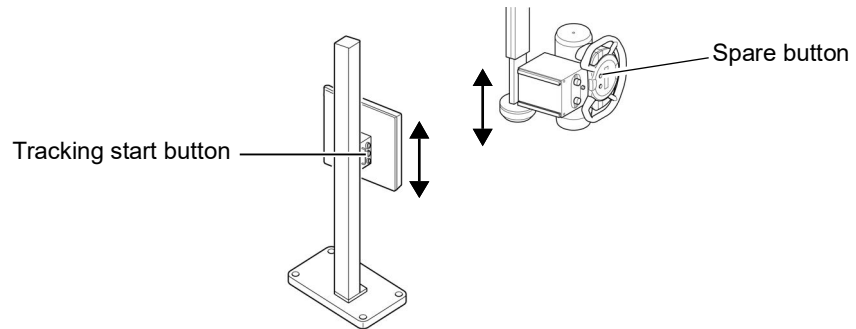




When inserting the grid into the Bucky, be sure to confirm the grid type or the status of insertion.

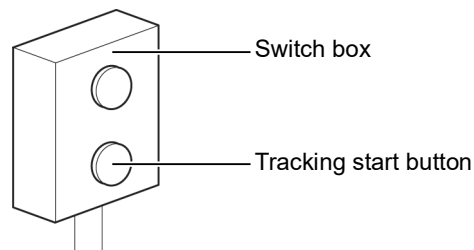
In case that the grid is incorrectly inserted, or the status of insertion or grid type differ from radiography condition, appropriate radiography images may not be acquired.

- 3** Decide the patient's standing position.


- 4 Press the  (tracking start) button on the X-ray radiography stand or the spare button on the operation panel of the X-ray tube support, and move the Bucky of the X-ray radiography device vertically.




-  If the tracking switch kit is incorporated, the  (tracking start) button is on the switch box.



This starts tracking operation based on the operating method set at installation.

During tracking operation,  (vertical position indicator) flashes.

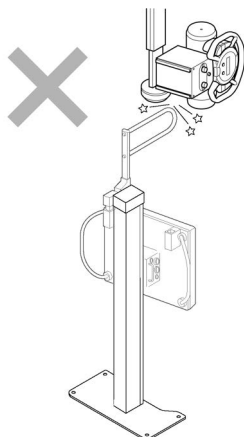
When the X-ray tube support is aligned with the stipulated position,  (vertical position indicator) becomes continuously lit.



Ensure that there is no patient at the position where the X-ray tube support is to be lowered before starting tracking operations.
Contact with the X-ray tube support could result in injuries.

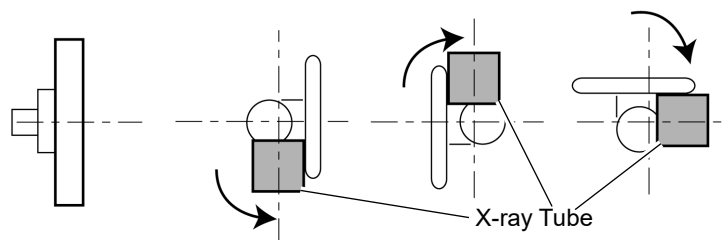
! WARNING

To prevent damage to other equipment, confirm that nothing is blocking the X-ray tube support when moving it.



! WARNING


Verify that the X-ray tube is facing toward the proper direction, and perform radiography.



Even when rotating the X-ray tube around vertical axis and stopping at each 90°, you can perform radiography.

 NOTE

- If there is a possibility that the X-ray tube support contacts the X-ray radiography stand, it once stops and continuous beep sounds (Approx. 2 seconds).
If the spare button is pressed again, discontinuous beep sounds and the X-ray tube support descends at a low speed. The X-ray tube support continues to descend until the tracking operation is cancelled by pressing (releasing when the hold function is turned on) the spare button. So, position the X-ray tube unit in contact with X-ray radiography stand with care.
The tabletop of the X-ray radiography table cannot move up even if it is a Shimadzu X-ray radiography table.
- It is not a malfunction that the X-ray tube support once goes beyond too far and returns to the predetermined position for alignment.

 NOTE

Press a button on the operation panel of the X-ray tube support during tracking to stop movement.

- 5** Adjust the irradiation field with the collimator while pressing the collimator lamp button to light the collimator lamp.
- 6** Operate the X-ray high-voltage generator and perform radiography.

■ About Vertical Tracking


There are three types of tracking operation: full auto, semi auto, and hold.



NOTE

At installation you select one of the functions, full auto, semi auto, or hold. For details on this setting please contact your Shimadzu service representative.

Full Auto


Press the  (tracking) switch on the X-ray radiography stand or the spare button on the operation panel of the X-ray tube support, or move the X-ray radiography stand vertically.

The tracking start button will flash, and the X-ray tube support will track by moving vertically.



- Even if you don't press the spare button, if you move the X-ray radiography stand vertically the X-ray tube support will track it by moving vertically.
- There is no need to keep the spare button (tracking start button) held down during tracking.
- Pressing the spare button (tracking start button) while tracking operation is in progress stops the tracking operation, but it can be restarted by pressing the tracking start button (tracking start button) again, or by moving the X-ray radiography stand's Bucky vertically.

Semi Auto


Press the X-ray radiography stand's  (tracking) switch or the spare button on the operation panel of the X-ray tube support.

The tracking start button will flash, and the X-ray tube support will track by moving vertically.



- If you move the X-ray radiography stand vertically after tracking operation has started the X-ray tube support moves vertically to track this motion.
- There is no need to keep the spare button (tracking start button) held down during tracking.
- Pressing the spare button (tracking start button) while tracking operation is in progress stops the tracking operation, but it can be restarted by pressing the tracking start button (tracking start button) again.

Hold

Hold down the X-ray radiography stand's  (tracking) switch or the spare button on the operation panel of the X-ray tube support.

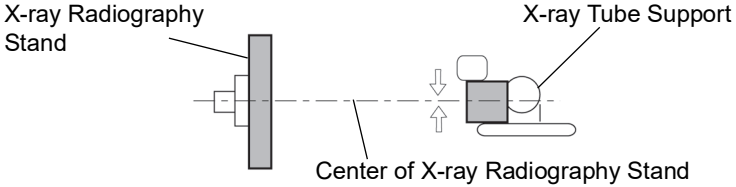
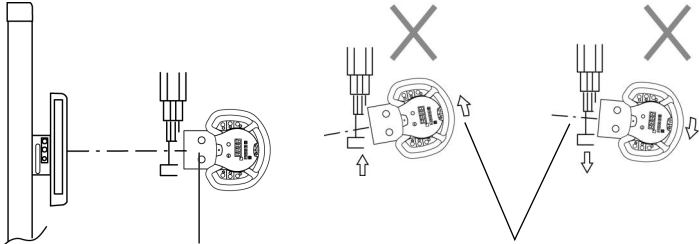
The tracking start button will flash, and the X-ray tube support will track by moving vertically.



Releasing the spare button (tracking start button) while tracking operation is in progress stops the tracking operation.

■ Necessary Conditions for Vertical Tracking

The X-ray radiography stand and the X-ray tube support can work together under the following condition:

Condition	Description
Position of X-ray Tube Support	<p>At the center of the X-ray radiography stand</p> 
	<p>Horizontal toward X-ray radiography stand</p>  <p>Horizontal Direction Otherwise tracking function is not available.</p>

3.8.2 Horizontal Tracking Device

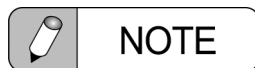
- 1 Operate the X-ray tube support.
- 2 Check whether the X-ray radiography table's Bucky and the X-ray tube focus are directly opposing each other.
- 3 Load a cassette into the Bucky.
Insert the grid or remove it, if required.
When inserting the grid, be sure to confirm the grid type or the status of insertion.




When inserting the grid into the Bucky, be sure to confirm the grid type or the status of insertion.

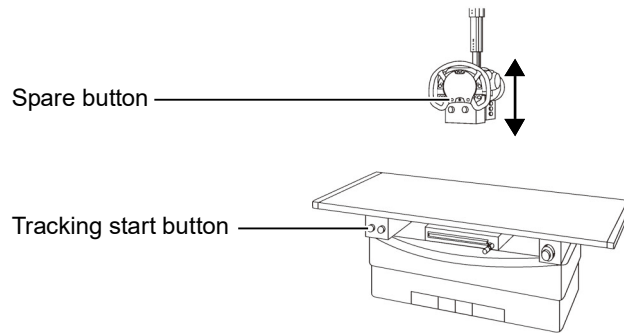
In case that the grid is incorrectly inserted, or the status of insertion or grid type differ from radiography condition, appropriate radiography images may not be acquired.



- 4 Decide the patient's horizontal position.
- 5 If the X-ray radiography table is equipped with the tabletop elevating function, adjust the tabletop to the appropriate height by depressing the (\checkmark) or (\wedge) footswitch.

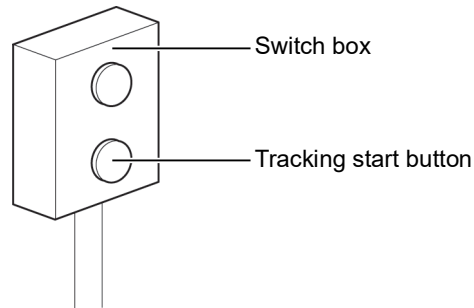



If the radiography distance of X-ray tube unit reaches the preset distance while the tabletop rises, it will keep tracking the preset distance. At the time of tabletop descent, the X-ray tube unit will not descend but the tabletop descends. The radiography distance can be preset within the range between 90 cm and 150 cm in increments of 5 cm at the time of installation.

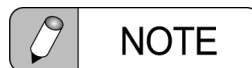
- 6** Hold down the X-ray radiography table's  (tracking start) button or the spare button on the operation panel of the X-ray tube support.



-  If the tracking switch kit is incorporated, the  (tracking start) button is on the switch box.





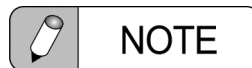
Motion continues until the X-ray tube support is at the X-ray radiography table's radiography height (radiography distance). Keep holding down the X-ray radiography table's  (tracking start) switch or spare button on the operation panel of the X-ray tube support until motion stops and a "pip pip pip" sound is heard.



NOTE

The radiography distance can be set in 5 cm increments within the range 90 cm to 150 cm at installation.

During tracking operation,  (vertical position indicator) on the X-ray tube support's touch panel flashes. When the X-ray tube support is aligned with the stipulated position,  (vertical position indicator) becomes continuously lit.



NOTE

Press a button on the operation panel of the X-ray tube support during tracking to stop movement.

- 7** Operate the X-ray tube support.
The X-ray irradiation position is automatically adjusted.

3 Operation

- 8** Adjust the irradiation field with the collimator while pressing the collimator lamp button to light the collimator lamp.
- 9** Operate the X-ray high-voltage generator and perform radiography.

4

Troubleshooting

This chapter describes error information list and operation during a Power Outage.

4.1 Information about Code Display

4.1.1 Error Code List

In the following status, an error code is displayed on the digital indicator of the operation panel.

If an error code is actually displayed, take the necessary action by referring to the following list. If the same error code is displayed again after the corresponding action below has been taken, take note of the error code and contact your Shimadzu service representative.



NOTE

- When [E 01] is displayed, the X-ray tube assembly cannot be operated.
- When [E 02] is displayed, radiography is disabled.
- When [E 03] to [E 11] is displayed, the vertical tracking function and upward retraction function are disabled.

Code	Meaning	Solution
E 01	The X-ray tube assembly suspension section cannot be operated correctly.	Turn the X-ray high-voltage generator off and turn it back on.
E 02	The wire rope is disconnected.	Stop using the equipment and contact your Shimadzu service representative.
E 03	An alert is detected at the vertical movement motor.	Turn the X-ray high-voltage generator off and turn it back on. Then use the vertical tracking function (for the radiography stand or table).
E 04, E 05, E 06	Position detection error of the X-ray tube support	Turn the X-ray high-voltage generator off and turn it back on. Then use the vertical tracking function (for the radiography table).
E 07	Position detection error in horizontal tracking	Turn the X-ray high-voltage generator off and turn it back on. Then use the vertical tracking function (for the radiography stand).
E 08, E 09, E 10	Position detection error in vertical tracking	Turn the X-ray high-voltage generator off and turn it back on. Then use the vertical tracking function (for the radiography stand).

Code	Meaning	Solution
E 11	A system error is detected.	If the same code is displayed repeatedly, contact your Shimadzu service representative.

4.1.2 Inspection/Replacement Code Display

In the following status, a code is displayed on the digital indicator of the operation panel.

If a code is displayed, take note of the code, and contact your Shimadzu service representative.

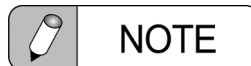
Code	Meaning
U 01	The wire rope needs replacing.
U 02	The wire rope needs inspecting.
U 03	The memory battery needs replacing.

■ Clearing the Inspection/Replacement Code Display Temporarily

The code display of [U 01] to [U 03] can be cleared temporarily.




Contact your Shimadzu service representative when the display is cleared temporarily.
Do not continue using the equipment by repeatedly clearing the code display temporarily.

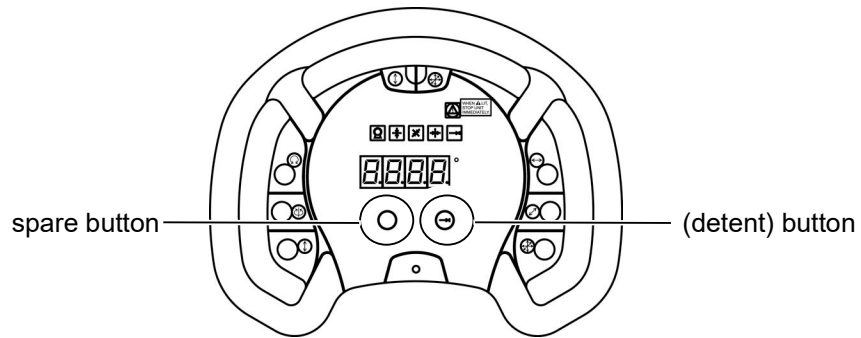


When [U 01] to [U 03] is displayed, the rotation angle and SID are not indicated on the operation panel.

4 Troubleshooting

- 1 Press and hold the  (detent) button and the spare button at the same time for more than 3 seconds.


The code display is cleared temporarily.




The time period available for clearing the code display temporarily differs depending on the code.

Code	Time Period Available for Clearing the Inspection/Replacement Code Display Temporarily
U 01	1 week
U 02	1 week
U 03	1 day

4.2 Emergency Stop


When an emergency has occurred in the movement of the unit due to failure in switches, etc., press the  (stop) switch provided on Shimadzu X-ray radiography table or Shimadzu X-ray radiography stand or press the power OFF button provided on the X-ray high-voltage generator. The vertical movement will be stopped.



When the tracking switch kit is incorporated, the  (stop) switch is on the switch box.


A buzzer sounds when the emergency stop procedure is used or when the tracking switch is pressed in a state of an emergency stop.

To recover from the emergency stop, follow the steps below.

- Turn the  (stop) switch clockwise.



WARNING

Make sure that the equipment does not move abnormally when the  (stop) switch is turned clockwise to recover from the emergency stop.

If the equipment moves abnormally again, stop the equipment immediately using the emergency stop procedure.

4.3 Operation during a power outage

During a power outage, pressing the lock release button will not disengage the lock.

For the safety of the patient as well as other individuals, apply a 15 to 20kg force on the device vertically to move the X-ray tube assembly. This enables X-ray tube assembly to move vertically contrary to the lock.

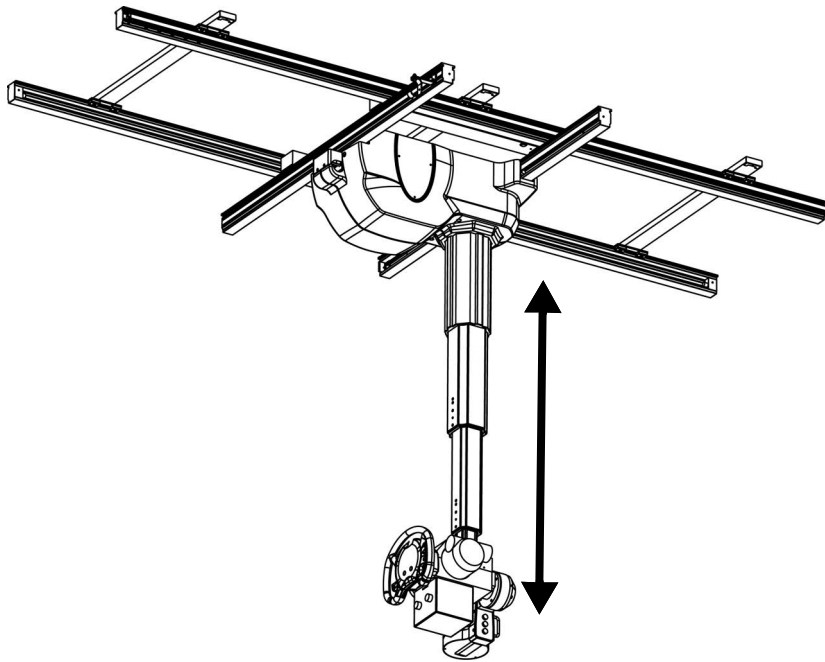


Figure 4.1 Operating during a power outage

5

Maintenance

This chapter describes point for daily and periodic inspections as well as consumable parts.

5.1 Maintenance Check

- The Ceiling Type X-ray Tube Support CH-200M, a precision medical device, requires periodical maintenance checks as well as daily checks before and after the use of the device in order to keep its life as long as possible.
- Daily and periodical checks would prevent the device from various possible troubles, including freeze of the application, and support the proper and safe operation of the device.
- Daily and periodical checks including wire ropes check are necessary to maintain safety and high-performance of the device. If no check is performed, the equipment life may decrease, or the equipment may be severely damaged or pose a serious health risk to human body.
- The maintenance check not only includes daily and periodical checks, but also covers replacement of consumable parts and periodic replacement of parts.
- A part of the periodical checks and the replacement of parts require knowledge and skills sufficient to use special tools or deal with dangerous situations in the process.
- For more information on periodical checks and periodic replacement of parts, contact your Shimadzu service representative.



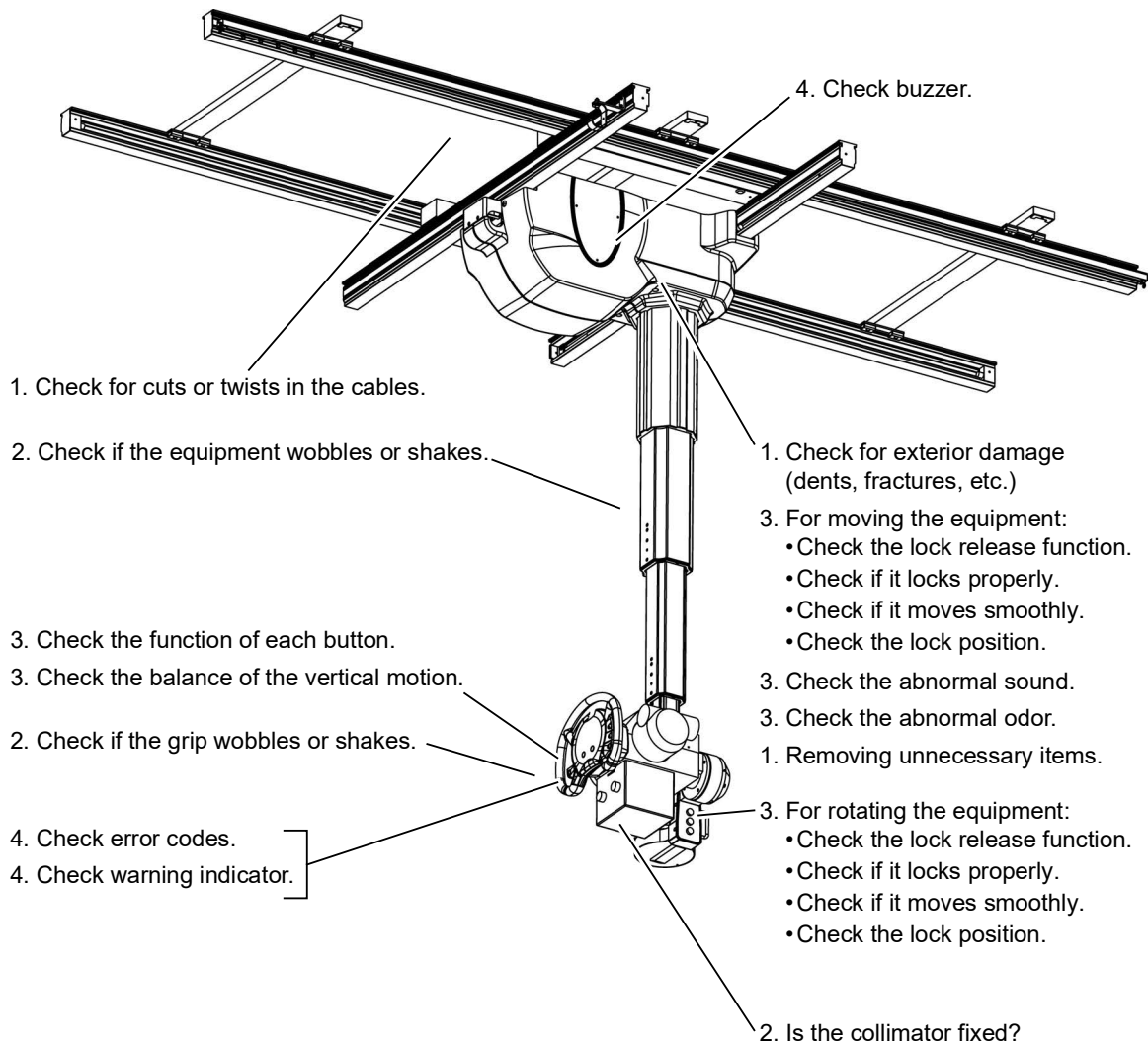
If any abnormality is found during the maintenance check, stop using the equipment and contact your Shimadzu service representative.

When a user performs the maintenance check for himself or herself, please keep in mind his or her own safety.

Shimadzu shall not be liable for any damage resulting from the checks other than those by Shimadzu or Shimadzu representative.

5.2 Daily Inspection (Inspected by the User)

To maintain safety and performance of the device, inspect the following items before operating the device. Write the inspection results in the copy of check sheet for daily inspection and store them. If any abnormal points are observed on inspection, contact your Shimadzu service representative.

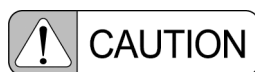


5.2.1 Cleaning and Disinfection



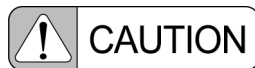
Be sure to clean and disinfect the equipment periodically.

Cleaning and disinfection is very important to ensure that the equipment can be used hygienically and safely. Strictly follow the methods prescribed.



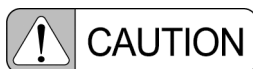
Be sure to clean the equipment frequently and after each patient use.

While doing so, do NOT directly apply or spray any disinfectant, cleaner, or water onto the equipment. Wipe down all contact surfaces using a cloth moistened with an appropriate disinfectant or cleaner. Make sure the cloth is NOT too wet. If it is, liquid may enter into system electronics, causing failure or malfunction.



Use the following disinfectants (intermediate level disinfectant):

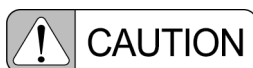
- Chlorine disinfectants
 - Sodium dichloroisocyanurate solution (1 % maximum)
 - Sodium hypochlorite solution (1 % maximum)
- Alcohol disinfectants
 - Commercially available isopropyl alcohol solution (Up to 99 wt% can be used)
- Rubbing alcohol
 - (76.9 - 81.4 vol% Ethanol, Isopropyl alcohol as an additive)



Do NOT use the following disinfectants:

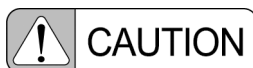
If any of the following disinfectants are applied, the equipment performance and safety cannot be guaranteed.

- Disinfectants that corrode metals, plastics, rubber, or paint
- Disinfectants unsuitable for metals, plastics, rubber, or paint
- Spray-gas type disinfectants
- Volatile disinfectants
- Disinfectants that may enter the equipment



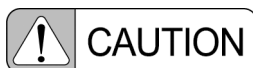
Use disinfectants at a minimum.

Repeated disinfection over a long time may lead to discoloring and cracking on the equipment surface, and deterioration of rubber and plastic. If any abnormality is found on the equipment after disinfection, stop using the equipment immediately. Contact your Shimadzu service representative for repair.



Do NOT use an organic solvent.

Organic solvents may change the surface color. If an organic solvent adheres to the surface, wipe it off immediately.



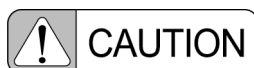
When disinfecting unpainted metals, do NOT use chlorine-based disinfectants.

Chlorine-based disinfectants may corrode the surface of the equipment. If chlorine-based disinfectants adhere to the surface, wipe them off immediately.



When disinfecting resin parts such as reticule of the collimator, do NOT use rubbing alcohol.

Rubbing alcohol may lead to deformation or crack of resin parts such as reticule of the collimator. Wipe it off immediately if it adheres to the reticule of the collimator.



When cleaning resin parts such as reticule of the collimator, use cloth lightly moistened, not soaked, with cold or warm water mixed with neutral detergent that does not include organic solvent.

Rubbing alcohol, organic solvents or non-neutral detergents may lead to deformation or crack of resin parts such as reticule of the collimator. Wipe them off immediately if they adhere to the reticule of the collimator.

On completing the work, check the following points before switching the power ON again.

- There must be no water or disinfectant adhering to the equipment.
- The tools used in cleaning and disinfecting work must be tidied away.

 ["3.1 Power ON/OFF" P.24](#)



When turning the power ON after cleaning, make sure the examination room is properly ventilated.

Turning the power ON while any flammable gas remains in the examination room could lead to fire, smoke, explosion or electrocution.

5.2.2 Inspection for Warning and Caution Labels

Periodically (once a year) inspect the labels attached on the equipment.

If any label is peeled or unreadable by stain or scratch, contact your Shimadzu service representative for replacement of a new one.

 [" Warning and Caution Labels" P. xxiii](#)

5.2.3 Check sheet for daily inspection

Date of inspection: _____

Inspected by: _____

- 1** Check the following points visually and perform the appropriate procedure in case of any problems.

Verification points	Procedure
<input type="checkbox"/> Are all unnecessary objects removed from the vicinity of the device?	Remove
<input type="checkbox"/> Are the cables free of pinches, twists and scrapes?	Fix the cables
<input type="checkbox"/> Any breakage (dents, fractures, etc.) on the cover?	Contact your Shimadzu service representative

- 2** Check the following points by hand and perform the appropriate procedure in case of any problems.

Verification points	Procedure
<input type="checkbox"/> Is the collimator fixed	Affix
<input type="checkbox"/> Does the grip wobble or shake?	Contact your Shimadzu service representative

- 3** Turn ON the power supply and check the following points. Perform the appropriate procedure in case of any problems.

Verification points	Procedure
<input type="checkbox"/> Does the equipment make any noise when moving, rotating and stopping?	Contact your Shimadzu service representative
<input type="checkbox"/> Check for any abnormal odors.	
<input type="checkbox"/> Is the lock released for moving or rotating the device?	
<input type="checkbox"/> Is the lock engaged for moving or rotating the device?	
<input type="checkbox"/> The lock position is suitable for moving/rotating the equipment.	
<input type="checkbox"/> Does the equipment move smoothly?	
<input type="checkbox"/> Are the buttons on the operation panel in good working order?	
<input type="checkbox"/> Is the vertical motion of the equipment in balance?	

4 Check error codes, warning indicator and buzzer.

■ Error Codes

Error codes are shown on the digital indicator of the operation panel.

Error Codes	Situation	Procedure
E 01	X-ray tube assembly suspension section cannot be operated correctly.	Turn the X-ray high-voltage generator off and turn it back on.
E 02	Wire rope is disconnected.	Terminate the operation immediately and contact promptly your Shimadzu service representative

■ Warning Indicator

Warning	Situation	Procedure
Wire rope cut warning indicator is lighting up.	Wire rope is disconnected.	Terminate the operation immediately and contact promptly your Shimadzu service representative

■ Buzzer

Buzzer	Situation	Procedure
Beep sounds for 10 seconds.	X-ray tube assembly suspension section cannot be operated correctly.	Contact your Shimadzu service representative
Beeps keep sounding.	Wire rope is disconnected.	Terminate the operation immediately and contact promptly your Shimadzu service representative

5.3 Periodical Inspection

Even without any problem in daily inspection, the following items should be inspected periodically.



Be sure to perform periodic inspection (yearly).

Failure to do this may cause serious accidents or significantly shorten the lifetime of the equipment.

Periodic inspections mainly check the equipment performance and the internal mechanisms. The inspections require good knowledge of the internal mechanisms and can also be dangerous. Contact your Shimadzu service representative to request a periodic inspection. It is recommended to conduct periodic inspections yearly. A fee is charged for periodic inspections after expiry of the warranty periods.

The maintenance work involves dangerous tasks. Be sure to request your Shimadzu service representative to perform the periodic inspection.



NOTE

If necessary, service engineers will contact the manufacturer of the equipment to get information about repairing.

- Periodical inspection

Item		Inspection points
Bolts fixing, ceiling rail, X-ray tube assembly support, X-ray tube, collimator, and roller of each part		Is the fixing bolt loosened?
Remove the cover and check	Wire rope	<ul style="list-style-type: none"> • Is the wire rope severed? • Is the wire rope scratched or snagged? • Is the wire rope corroded? • Is the wire pulley scratched? • Are there any scratches or obstructions around the rail or in the wheels? • Check whether the wire cut detection switch and the operation panel's wire rope cut warning indicator are activated properly. • Was wire rope spread the specified oil over? (Wire rope should be spread oil each time of inspection.)
	Shafts and stoppers (pins, screws, etc.) for pulleys and sprockets	Is it worn, deformed, bent, loose or dropped?
	Bearings	Is it worn, rusted or needs oiling?
	Power supply	Is input/Output voltage appropriate?
	Ceiling rails (Fixed rail and moving rail)	Are there any damage or dirt on the rail?
	Magnet	Are there any damage or dirt on the magnet surface?
	Lock pin mechanism	Check the jolt or misaligned mechanism.
Check by actual operation	Tracking movement (Vertical, Horizontal) (Option)	Is the accuracy in stop operation properly?
	Movement (Vertical, Longitudinal, and Transversal)	Is the force of each operation properly?

5.4 Maintenance Parts List

To maintain the performance of the system, the following parts need replacing at regular intervals. When replacing them, use the genuine parts and contact your Shimadzu service representative.

- Maintenance parts list

Item	Name	Required quantity	Replacement cycle	Implemented by
Parts for periodical inspection	Main wire rope ^{*3}	2	8 years ^{*1}	Shimadzu service representative
Consumable parts	Fuse, 313007 (250VAC, 7A, SLOWBLOW)	2	2 years	
	Fuse, 313010 (32VAC, 10A, SLOWBLOW)	1	2 years	
	Memory battery ^{*2} Lithium, CR2450, 3 V, 600 mAh	1	2 years	

*1: Depending on the condition of the wire rope, replacement may be necessary at shorter intervals.

*2: In case the equipment is not used for 1 year or more contact your Shimadzu service representative and make them remove the battery.

*3: The recommended replacement unit is column ASSY (wire rope incl.)



NOTE

If the proper maintenance has not been scheduled, the wire cable will wear with use quickly, and be broken in some cases. In the case where the wire cables were broken concurrently, it is concerned that severe incident may occur. It is recommended that an engineer properly trained by the official Shimadzu Group maintain the system.

Scheduled maintenance policy

- Inspect the condition of wire cables every 1 year after installation of the system is highly recommended. In the case where worn of cables is found, immediately replacement of cables is needed.
- In the case where notification on the display screen is indicated after installation, inspection by authorized engineer for maintenance service is needed.
- Even if the above alert is displayed, but no damage to the wire cables is observed as a result of the inspection, continue use of the system is possible, but 1 year inspection is highly recommended.



NOTE

When the wire rope reaches the replacement time, a pop-up window will appear and display a message. The message will be repeatedly displayed until the wire ropes are replaced.

Prepare some locking mechanism to keep a off status of Molded Case Circuit Breaker. When replacing the part, service engineer isolates from the supply mains.

6

Specifications

This chapter describes specifications.

6.1 Environmental Conditions of EMC (Electromagnetic Compatibility)

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

IEC 60601-1-2:2014+A1:2020



The equipment is suitable for installing at a professional healthcare facility environment except below:

- Medical treatment areas with high-powered medical electrical equipment (High frequency surgical equipment, short-wave therapy equipment)
- Inside the radio frequency shielded room of an MRI.

■ Classification of EMI in Accordance with IEC 60601-1-2:2014+A1:2020

Group 1, Class A

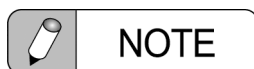
The system uses radio-frequency energy only for its internal function and is not intended to deliver energy to the patient. But little leakage radio-frequency energy does harm to high-sensitive equipment.

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



For replacement parts of internal components, make sure to apply the cables supplied by Shimadzu.

The use of non-cable devices, accessories, or cables other than those sold by Shimadzu as replacement parts for the internal components may result in increased emissions or decreased immunity of the equipment.



The emissions characteristics of the system make it suitable for use in industrial areas and hospitals (CISPR 11 class A).

If it is used in a residential environment (for which CISPR 11 class B is normally required) the system might not offer adequate protection to radio-frequency communication services.

The user might need to take mitigation measures, such as relocating or re-orienting the system.

Performance to Be EMC Immunity Tested (Essential Performance)

Essential performances of this equipment are as followings:

- Positioning of X-ray irradiation field
- Holding the X-ray tube unit

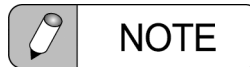
If an essential performance of this equipment is degraded or lost due to electromagnetic disturbances, the following may occur.

- Operations for positioning the X-ray irradiation field cannot be performed.
- The X-ray tube unit moves during X-ray exposure.

List of Cables

No.	Cable Name	Cable Length (MAX)	Shield	Manufacturer
1	POWER CABLE A	20 m	S	Shimadzu
2	EARTH CABLE	20 m	U	Shimadzu
3	INTER LOCK CABLE	30 m	S	Shimadzu
4	INTER LOCK JOINT CABLE	30 m	S	Shimadzu
5	CABLE LEAF H/V	25 m	S	Shimadzu

S: Shielded / U: Unshielded



NOTE

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

■ Guidance and Manufacturer's Declaration - Electromagnetic Immunity

Immunity test	EN 60601/IEC 60601 test level	Compliance level
Electrostatic discharge (ESD) EN 61000-4-2/ IEC 61000-4-2	±8 kV Contact ±2 kV, ±4 kV, ±8 kV, ±15 kV Air	±8 kV Contact ±2 kV, ±4 kV, ±8 kV, ±15 kV Air
Electrical fast transient/burst EN 61000-4-4/ IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines
Surge EN 61000-4-5/ IEC 61000-4-5	±0.5 kV, ±1 kV line(s) to line(s) ±0.5 kV, ±1 kV, ±2 kV line(s) to earth	±0.5 kV, ±1 kV line(s) to line(s) ±0.5 kV, ±1 kV, ±2 kV line(s) to earth
Voltage dips, short interruptions and voltage variations on power supply input lines EN 61000-4-11/ IEC 61000-4-11	N/A	N/A
Power frequency (50/60 Hz) magnetic field EN 61000-4-8/ IEC 61000-4-8	30 A/m	30 A/m
Conducted RF EN 61000-4-6/ IEC 61000-4-6	150 kHz to 80 MHz 3 Vrms (outside ISM bands*1) 6 Vrms (in ISM bands) (1 kHz, AM80 %)	150 kHz to 80 MHz 3 Vrms (outside ISM bands) 6 Vrms (in ISM bands) (1 kHz, AM80 %)
Radiated RF EN 61000-4-3/ IEC 61000-4-3	80 MHz to 2.7 GHz 3 V/m (1 kHz, AM80 %) Enclosure port immunity to RF wireless communications equipment Refer to the Table 6.1.	80 MHz to 2.7 GHz 3 V/m (1 kHz, AM80 %) Enclosure port immunity to RF wireless communications equipment Refer to the Table 6.1.
Proximity magnetic fields EN 61000-4-39/ IEC 61000-4-39	134.2 kHz 65 A/m (Pulse modulation 2.1 kHz, 50 % duty cycle square wave signal)	134.2 kHz 65 A/m (Pulse modulation 2.1 kHz, 50 % duty cycle square wave signal)
	13.56 MHz 7.5 A/m (Pulse modulation 50 kHz, 50 % duty cycle square wave signal)	13.56 MHz 7.5 A/m (Pulse modulation 50 kHz, 50 % duty cycle square wave signal)
Note *1: The ISM bands between 150 kHz and 80 MHz are 6.765 to 6.795 MHz; 13.553 MHz to 13.567 MHz; 26.957 MHz to 27.283 MHz; and 40.66 MHz to 40.70 MHz.		

6.1 Environmental Conditions of EMC (Electromagnetic Compatibility)

Table 6.1 Test specifications for ENCLOSURE PORT IMMUNITY to
RF Wireless Communications Equipment

Test frequency (MHz)	Modulation	EN 60601-1/ IEC 60601-1 test level (V/m)	Compliance level (V/m)
385	Pulse modulation: 18 Hz ^{*1}	27	19
450	FM ±5 kHz deviation: 1 kHz sine ^{*2}	28	28
710	Pulse modulation: 217 Hz ^{*1}	9	9
745			
780			
810	Pulse modulation: 18 Hz ^{*1}	28	28
870			
930			
1462	Pulse modulation: 217 Hz ^{*1}	10	10
1720	Pulse modulation: 217 Hz ^{*1}	28	19
1845			
1970			
2450	Pulse modulation: 217 Hz ^{*1}	28	19
5240	Pulse modulation: 217 Hz ^{*1}	9	9
5500			
5785			

*1: The carrier shall be modulated using a 50 % duty cycle square wave signal.

*2: As an alternative to FM modulation, the carrier may be pulse modulated using a 50 % duty cycle square wave signal at 18 Hz. While it does not represent actual modulation, it would be worst case.

6.2 Specifications

6.2.1 Specification

Table 6.2 Specifications

Item		Description	
Max, allowable mass of suspension		39 kg	
Balancing system		Spring-balancing type	
Ceiling fixture	Rail	Fixed rail of 4 m or 5.5 m length	
		Moving rail of 2 m, 2.6 m or 3.3 m length	
	Cabling	Cable hose	Cabling in the longitudinal and transversal directions using cable hoses
		Cable bear (Option)	Cabling in the longitudinal and transversal directions using cable bears
Movement of X-ray tube assembly	Vertical	160 cm	Electro-magnetic lock
	Longitudinal	295 cm ^{*1}	Lock pin mechanism can be skipped when moving at a speed higher than 25 cm/s. ^{*2}
	Transversal	140 cm ^{*1}	
Rotation of X-ray tube assembly	Around vertical axis	$\pm 180^\circ$ ^{*3} Stops at every 90° angle. The equipment can be fixed at an intended angle with the electro-magnetic lock.	
	Around horizontal axis	-180° to +120° Stops at 0°, $\pm 90^\circ$ and -180° The equipment can be fixed at an intended angle with the electro-magnetic lock. Lock pin mechanism can be skipped when rotating at a speed higher than 110°/s.	
Display range	SID (Option)	0 to 999 cm	
	Rotation angle	Ceiling tube support mount position	(Unit: °) (+: clockwise, -: counterclockwise)
		Upper left	0 to +120, 0 to -180
		Lower left	0 to +120, 0 to -180
		Upper right (Standard)	0 to +120, 0 to -180
		Lower right	0 to +120, 0 to -180
Tracking unit (Option)	Vertical tracking	X-ray tube assembly tracks the center of the X-ray field of the Bucky of Shimadzu's stand or other manufacturer's stand. Tracking reference position: Top reference, Center reference	
	Horizontal tracking	X-ray tube assembly moves to keep FFD constant for Shimadzu's table or other manufacturer's table.	

Item		Description
Tracking Switch kit (Option)	Irradiation field	Size types: Inches or cm, vertical and horizontal dimensions interchangeable When the size types are inches 17×17, 17×14, 14×14, 14×11, 12×10, 10×8, 17×7* ⁴ When the size types are cm 43×43, 43×35, 35×35, 40×30, 30×24, 24×18, 43×18* ⁴
	Radiography reference position * ⁴	Top reference, Center reference
	Tracking operation	In conformity with the tracking function
Tube support (option) * ⁵	Front mount	Tube support of standard type with control panel attached to the front of the X-ray tube unit.
	Rear mount	Tube support of type with control panel attached to the opposite side of the X-ray tube unit. Eases operations when the ceiling tube support is installed against the wall of the examination room.
	Low ceiling type	Tube support of front mount type with X-ray tube unit attached 150 mm higher. Maintains SID in supine position radiography in examination rooms with low ceilings.
	Front mount L	Tube support of front mount type with X-ray tube unit attached 80 mm lower. Eases positioning by preventing interference between the lower edge of the tube support and the tabletop during lateral radiography using the radiography table.
Installation requirement	Standard height of ceiling	286 cm * ⁶
	Installation area	A square of 250 cm × 450 cm or more, with door opening of 60 cm width.
	Gross mass	250 kg
	Power supply	Single phase AC100 V, 0.7 kVA, Max. 1.4 Ω, 50/60 Hz (Supplied from X-ray high voltage generator)

*1: In the case of a 4 m fixed rail and a 2 m moving rail. For rails of other dimensions, refer to Table 6.3.

*2: This is available in the longitudinal and transversal directions only when equipped with a position detecting mechanism.

*3: -90° to +30° for Low-ceiling type

*4: Can be set when the equipment is combined with certain X-ray radiography stands only.

*5: Additions and changes to the tube support option offer ways to maintain operability when the layout of the examination room has changed.

*6: The ceiling height of 286 cm satisfies the specification of the CH-200M (The recommended ceiling height for Low-ceiling type is 271 cm.); but the height can be less than this dimension but the vertical travel range may be restricted.

6 Specifications

Table 6.3 Length of the rail and the moving range of device (Unit: m)

Rail		Moving range of device	
Fixed rail	Moving rail	Longitudinal	Transversal
4	2	2.95	1.4
4	2.6	2.95	2.0
4	3.3	2.95	2.7
5.5	2	4.45	1.4
5.5	2.6	4.45	2.0
5.5	3.3	4.45	2.7

6.2.2 Distance from Spot to Reception Area

Distance from spot to reception area varies according to the unit combination.

Unit combination			Distance from spot to reception area (mm)
X-Ray Tube Unit	Collimator	X-Ray Radiography table	
CH-200M (Ceiling height: 2860 mm)	R-20J	BK-12HK	337-1374
		BK-120MK	337-1524
		BK-200	343-1530

6.3 Statement of Compliance [For Europe]

6.3.1 Regulatory Information

For Europe:

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

Product Name: Ceiling Type X-ray Tube Support CH-200M

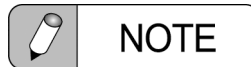
Manufacturer: SHIMADZU CORPORATION Medical Systems Division
1, NISHINOKYO-KUWABARACHO,
NAKAGYO-KU, KYOTO, 604-8511, JAPAN

Authorized Representative Shimadzu Europa GmbH

/ Importer:

Albert-Hahn-Strasse
47269 Duisburg, Germany

6-10,



When any serious incident occurred in relation to the system, report that to your Shimadzu service representative and to the competent authority of the Member State in you are established.

“Serious incident” means any incident that directly or indirectly led, might have led or might lead to any of the following:

- (a) The death of a patient, user or other person
- (b) The temporary or permanent serious deterioration of a patient's, user's or other person's state of health
- (c) A serious public health threat

6.3.2 Company's Quality System

The company's quality management system complies with the requirements of Annex II, excluding Section 4 of the MDD 93/42/EEC, which is certified by TÜV Rheinland LGA Products GmbH (Notified under No.0197)

6.3.3 International Standards

This equipment conforms the following international standards.

- IEC 60601-1:2005+A1:2012+A2:2020 / EN 60601-1:2006+A1:2013+A2:2014+A2:2021
- IEC 60601-1-2:2014+A1:2020 / EN 60601-1-2:2015+A1:2021
- IEC 60601-1-3:2008+A1:2013+A2:2021 / EN 60601-1-3:2008+A2:2021
- IEC 60601-1-6:2010+A1:2013+A2:2020 / EN 60601-1-6:2010+A1:2015+A2:2021
- IEC 60601-2-54:2022 / EN IEC 60601-2-54:2024
- ISO 10993-1:2018 Corrected version / EN ISO 10993-1:2020
- ISO 14971:2019 / EN ISO 14971:2019+A11:2021
- IEC 62304:2006+A1:2015 / EN 62304:2006+A1:2015
- IEC 62366-1:2015+A1:2020 / EN 62366-1:2015+A1:2020
- ISO 15223-1:2021 / EN ISO 15223-1:2021
- EN 1041:2008+A1:2013

6.3.4 Protection Against Radiation

Refer to the standard about the acceptance and performance testing.

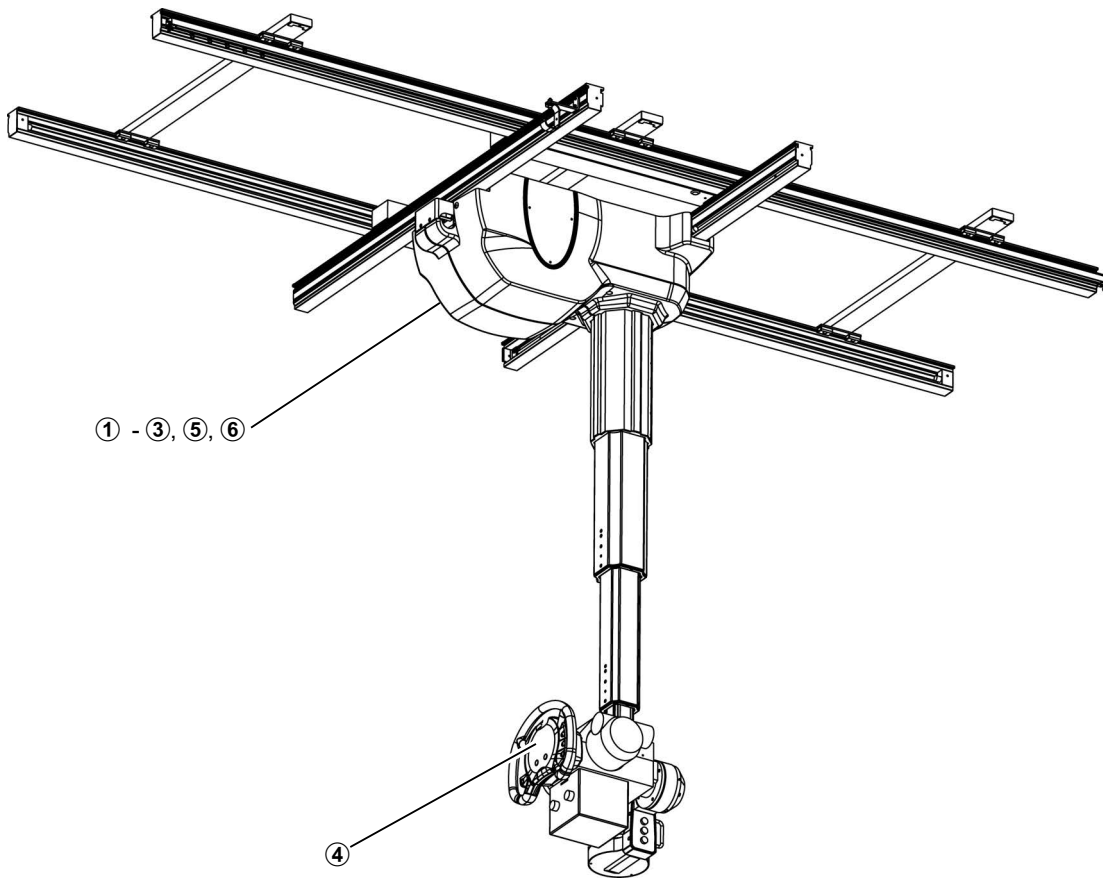
(ex:DIN 6868-150:2013-06)

6.4 Statement of Compliance with Standards

- X-RAY EQUIPMENT for RADIOGRAPHY ...
CEILING TYPE X-RAY TUBE SUPPORT CH-200M
IEC 60601-2-54:2022
- X-RAY EQUIPMENT for RADIOGRAPHY ...
CEILING TYPE X-RAY TUBE SUPPORT CH-200M
EN IEC 60601-2-54:2024


6.5 Labeling

Location where the labels are attached on:



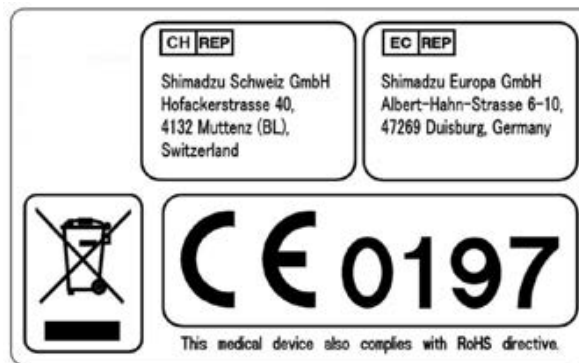
■ Name Plate

① Name Plate

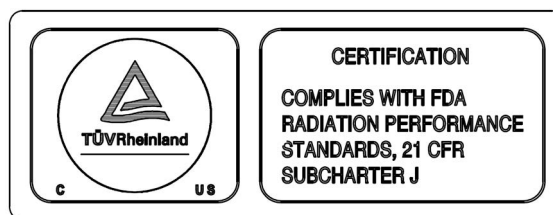
一般的名稱	天井取付け式X線管支持器
MODEL	CEILING TYPE X-RAY TUBE SUPPORT CH-200M
販売名	天井走行式X線管懸垂器CH-200M
医療機器の別	一般医療機器 特管
PN / SN	503-58100 / SN -----
V, Hz, VA	~ 100, 50/60, 0.7k
PROTECTION	CLASS I
MANUFACTURED	Made in Japan
製造販売届出番号	2661X00003000017
	503-59832
 島津製作所 604-8511 京都市中京区西ノ京原町1 SHIMADZU CORPORATION 1, Nishinokyo-Kuwabaracho, Nakagyo-ku, Kyoto 604-8511, Japan	

Other Labels

② Label, CE (For CE)



③ Label, cTÜVus mark (For USA)



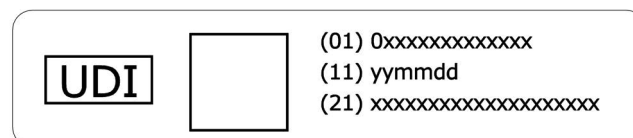
④ Warning Label



⑤ Refer to operation manual Label

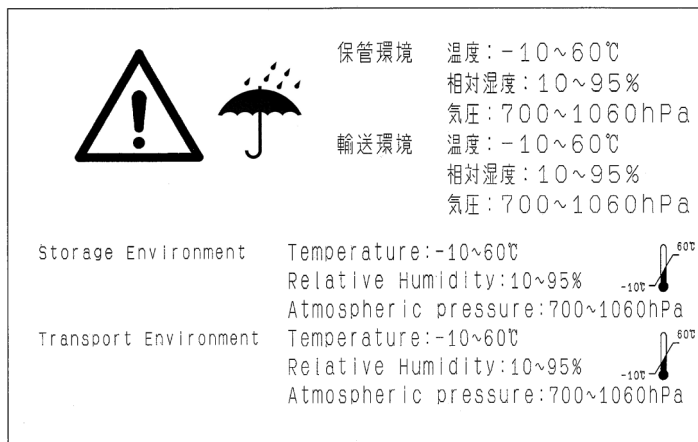



⑥ UDI Label



6.5.1 Package for Transport

The label describing the storage environment and transport environment is shown below.



Symbol	Location	Meaning
	Package	Keep away from rain in case of transport.

6.6 Manufacturer Information

Manufacturer: SHIMADZU CORPORATION
Medical Systems Division

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

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Appendix

Check List for Trouble

Fill following blanks and contact your Shimadzu service representative.

Hospital: _____

Phone: _____

FAX: _____

Serial Number: _____

Date of Installation: _____

Item	Check
<input type="checkbox"/> Someone injured	
<input type="checkbox"/> When is the trouble occurred?	
<input type="checkbox"/> Is there a sign of the trouble?	
<input type="checkbox"/> Is there a power failure or thunderbolt when the trouble is occurred?	
<input type="checkbox"/> The device has been watered?	
<input type="checkbox"/> The device has been given an impact upon?	
<input type="checkbox"/> The number of patients a day with the device?	
<input type="checkbox"/> When is the last periodic inspection?	

Safety Check Registry

Hospital	<input type="checkbox"/> Name	
	<input type="checkbox"/> Phone	
	<input type="checkbox"/> Extension number	
	<input type="checkbox"/> FAX	
	<input type="checkbox"/> Address	
	<input type="checkbox"/> Room number	
Equipment	<input type="checkbox"/> Name	
	<input type="checkbox"/> Serial number	
	<input type="checkbox"/> Date of installation	
Instructor	<input type="checkbox"/> Affiliation	
	<input type="checkbox"/> Phone	
	<input type="checkbox"/> FAX	

Date	Description	This device's maintenance and operation staff	Instructor
		Signature	Signature

- At the time of installation or when changing the designated operator, your Shimadzu service representative will explain this manual's safety description of this device's maintenance to operation staff and record the new information.
- This manual is important. We request all maintenance personnel to keep it in a safe place close to the equipment.

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Index

Numerals

2-directional movement 31
 3-directional movement 30
 3-directional release button 15, 17

A

Angle unit indicator 17
 Applications 2

C

Check List for Trouble 92
 Check sheet for daily inspection 69
 Collimator lamp button 16, 17
 Configuration 12

D

Daily inspection 65
 Detent button 16
 Detent mode 37
 Detent mode indicator 16
 Digital indicator 16

F

Feature 2
 Fixed rail 12, 13
 Front mount L type 21

G

Grip 16

H

H-axis rotation release button 15

L

Length of the rail and the moving range 82
 Lighting the collimator lamp 39
 Longitudinal 13
 Longitudinal detent position indicator 16
 Longitudinal movement 28
 Longitudinal release button 15
 Longitudinal/transversal movement 33
 Longitudinal/transversal release button 17
 Low-ceiling type 20

M

Maintenance Parts List 73
 Moving rail 12, 13

Moving the X-ray tube assembly 25
 Moving to the longitudinal/transversal detent positions 37

N

Name Plate 86

O

Operation during a power outage 62
 Operation panel 12, 13, 15

P

Periodical inspection 71
 Power OFF 24
 Power ON 24

R

Rear mount type 18
 Rear operation panel 12, 13, 17
 Rotating the X-ray tube assembly 34
 Rotation around the horizontal axis 35
 Rotation around the vertical axis 34

S

Safety check registry 93
 Spare button 16
 Specifications 80
 Stopping at 0°, ±90° and -180° in rotating around the horizontal axis 38

T

Transversal 13
 Transversal detent position indicator 16
 Transversal movement 29
 Transversal release button 15

V

V-axis rotation release button 16, 17
 Vertical 13
 Vertical movement 25
 Vertical release button 15
 Vertical/longitudinal movement 31
 Vertical/longitudinal release button 17
 Vertical/transversal movement 32
 Vertical/transversal release button 17

W

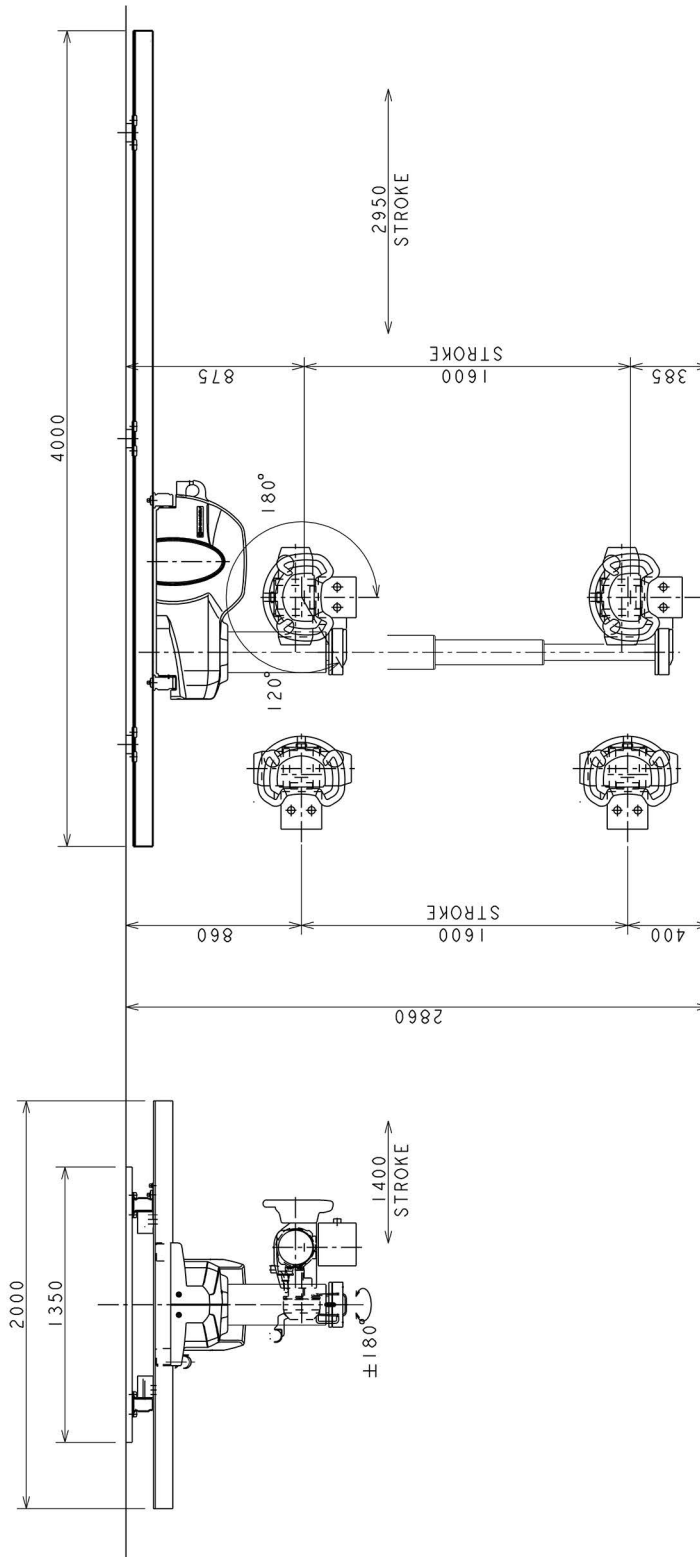
Warning Label	87
Wire rope cut warning indicator	16

X

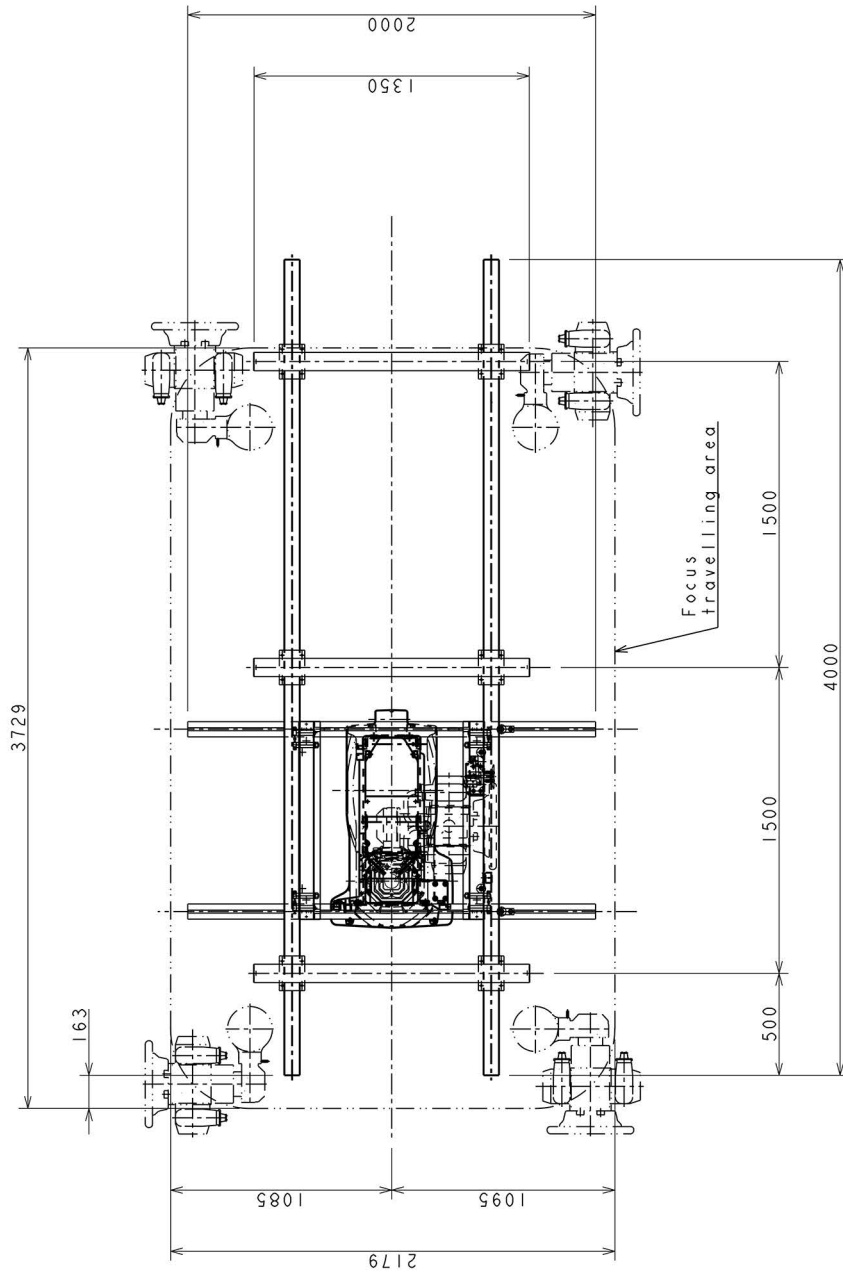
X-ray tube assembly support section	12, 13
X-ray tube assembly suspension section	12, 13
X-ray tube selection indicator	16

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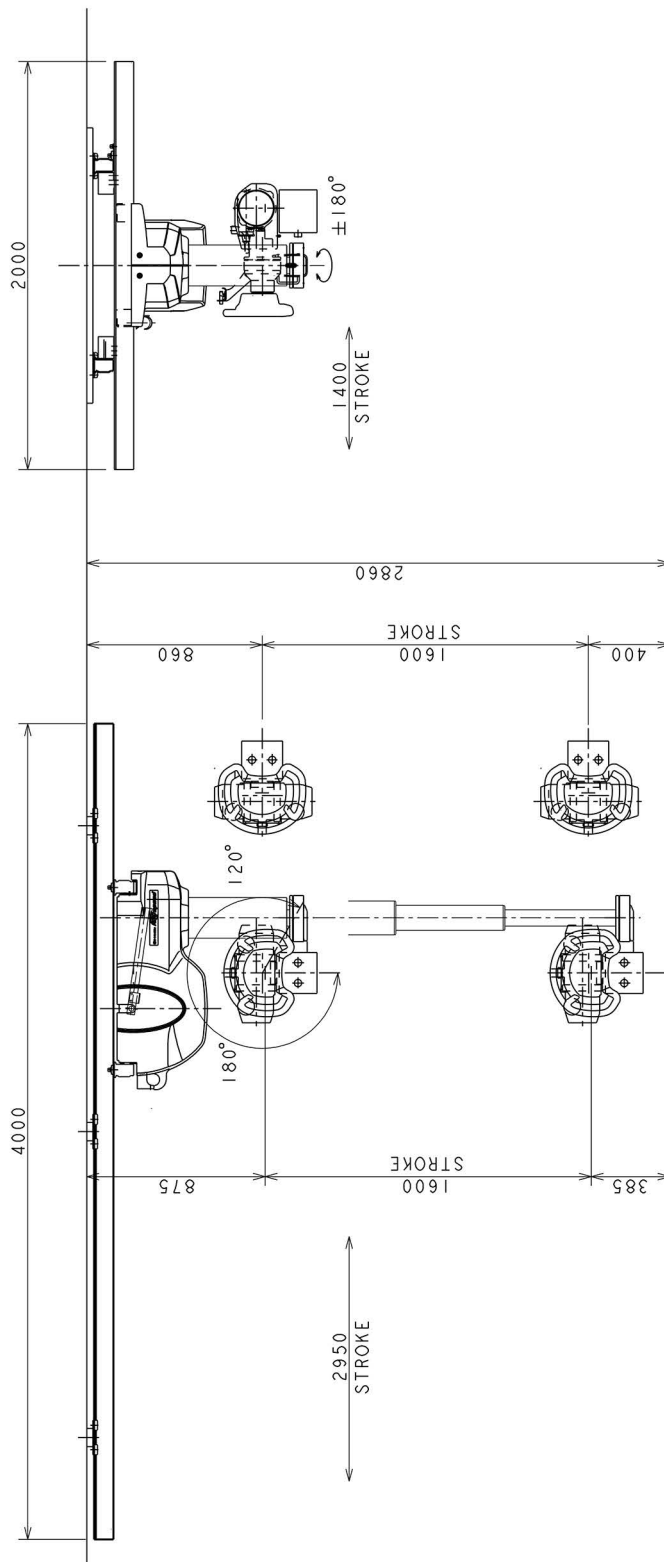
Dimensions



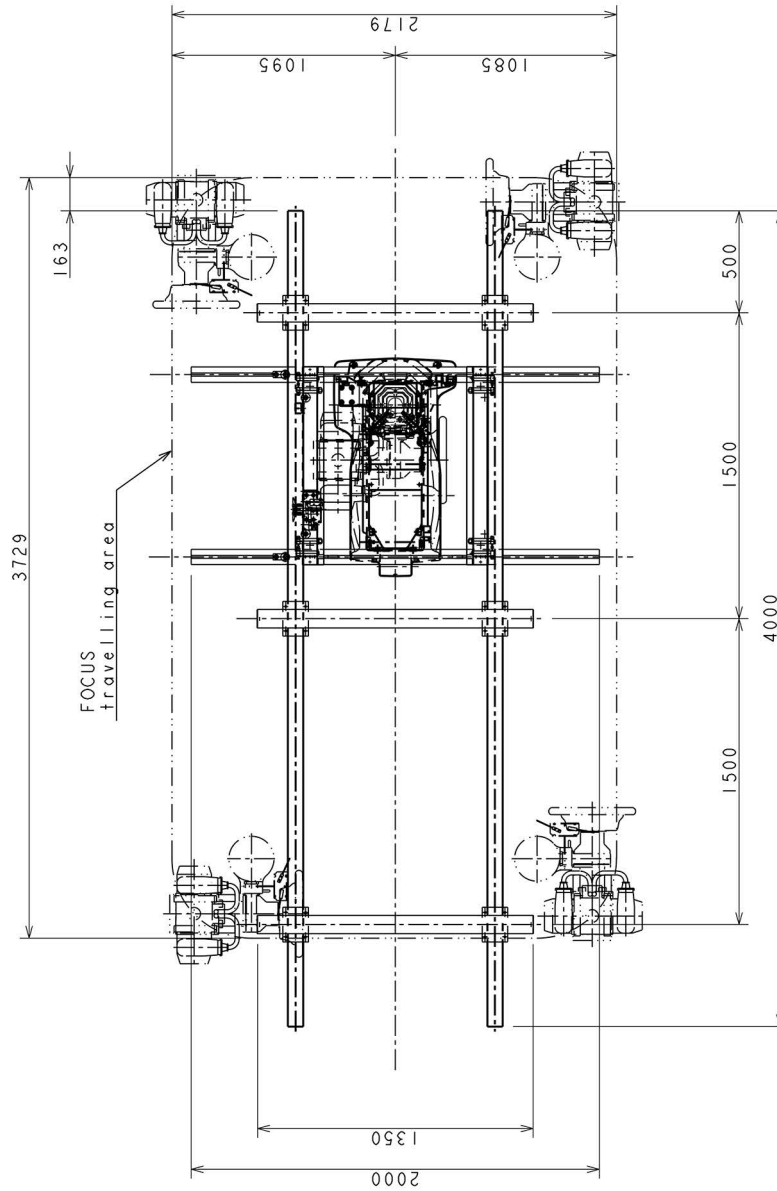
CH-200M
 Fixed rail 4M
 Moving rail 2M



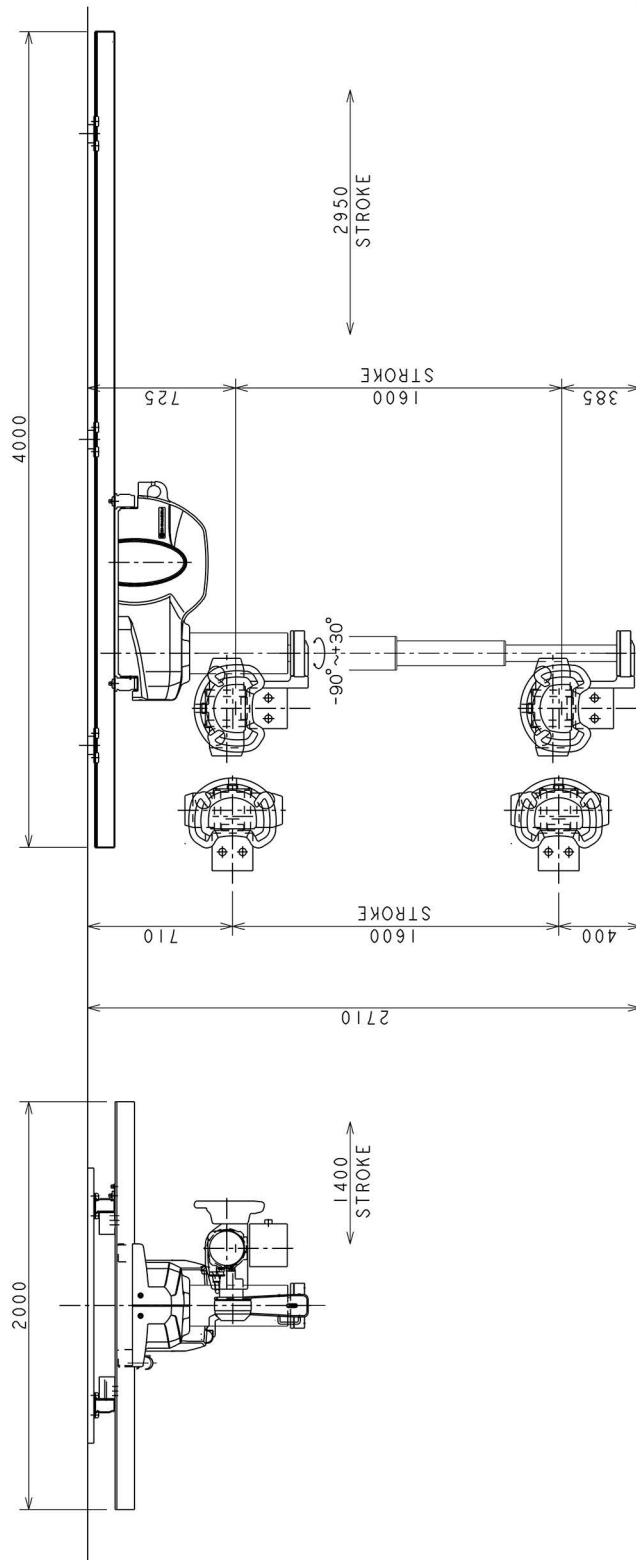
CH-200M (Moving range of device)
 Fixed rail 4M
 Moving rail 2M



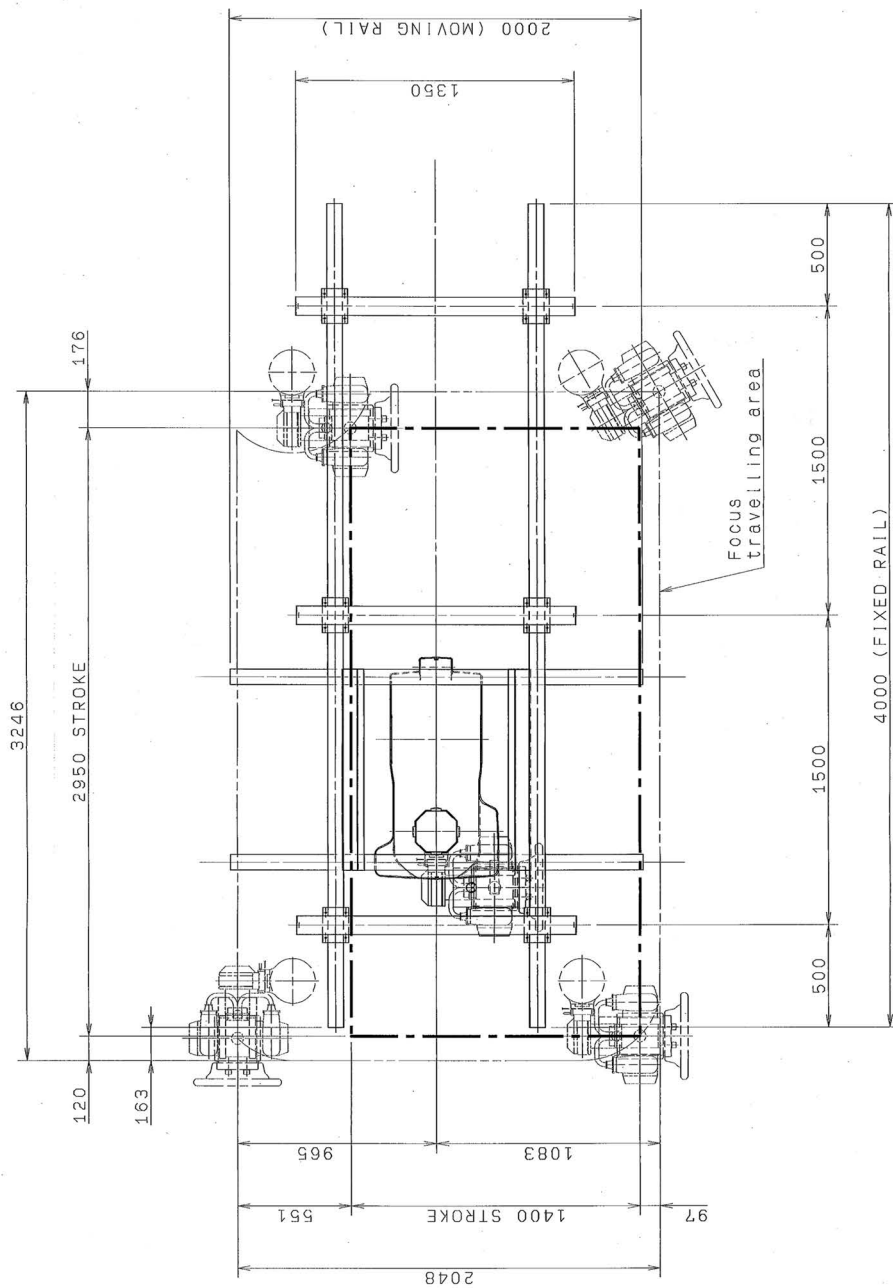
CH-200M (Rear mount type)
 Fixed rail 4M
 Moving rail 2M



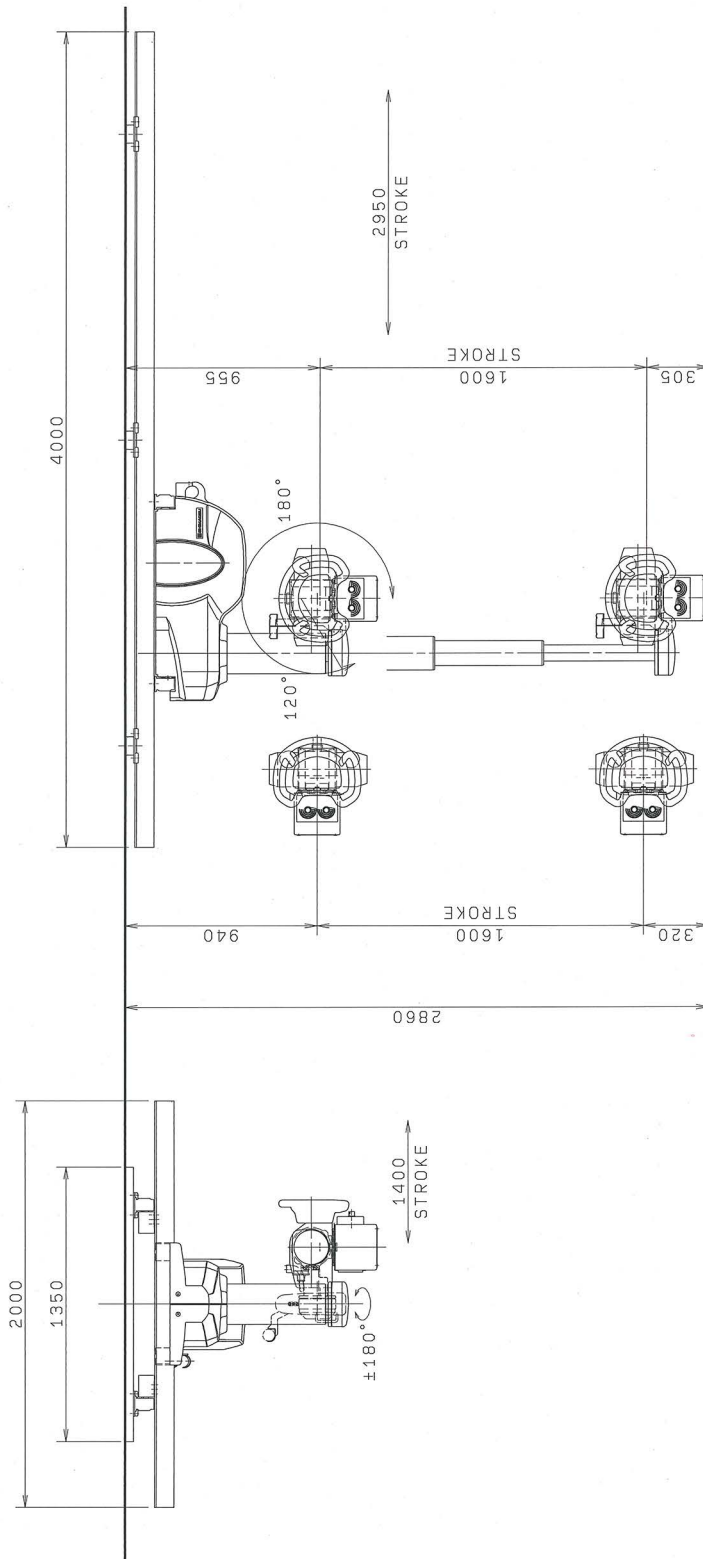
CH-200M (Moving range of rear mount type)
 Fixed rail 4M
 Moving rail 2M



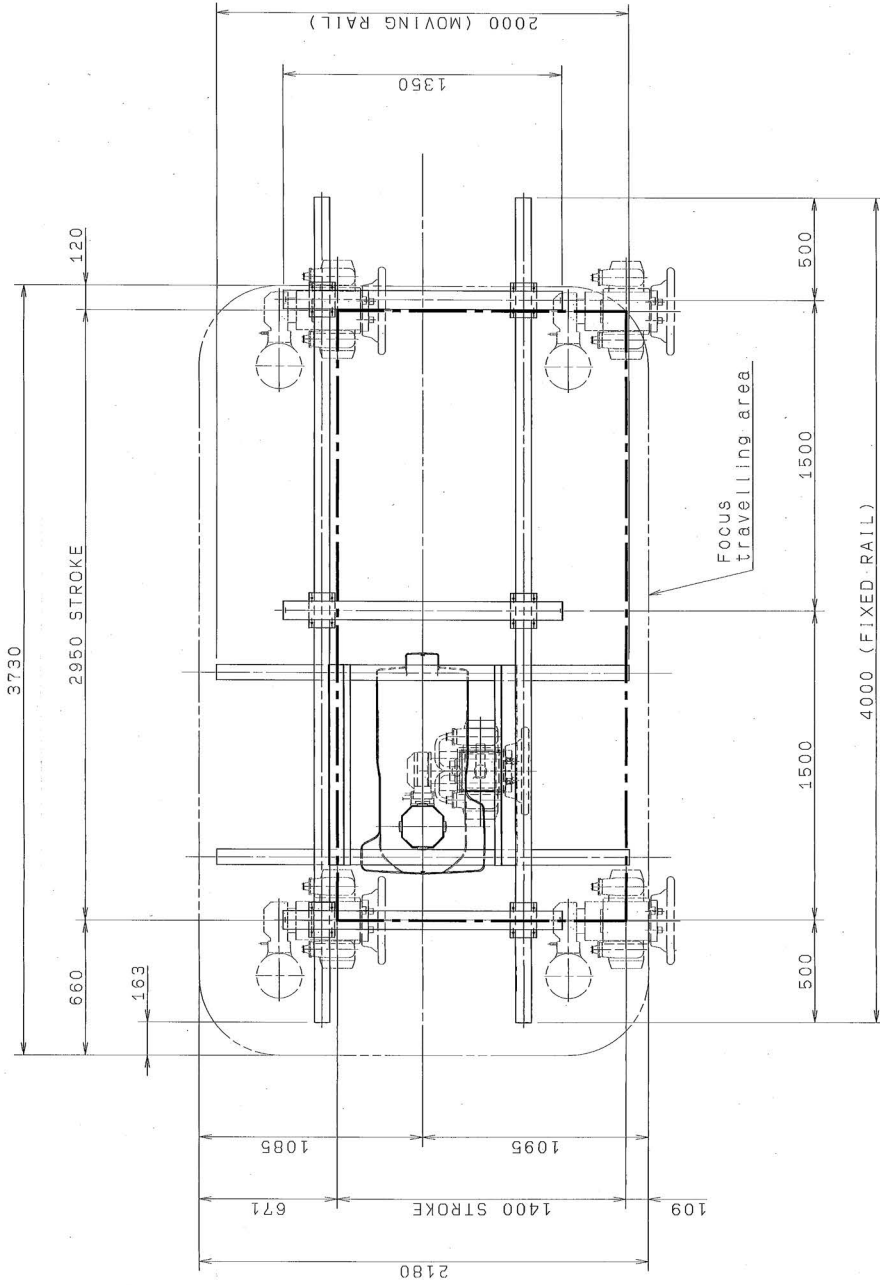
CH-200M (Low-ceiling type)
 Fixed rail 4M
 Moving rail 2M



CH-200M (Moving range of low-ceiling type)
 Fixed rail 4M
 Moving rail 2M



CH-200M (Front L type)
 Fixed rail 4M
 Moving rail 2M



CH-200M (Moving range of front L type)
 Fixed rail 4M
 Moving rail 2M

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