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# Installation Manual

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Digital Panoramic Radiograph

## Bel-Cypher Pro

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### Notice

**★Read this installation Manual thoroughly before Installation.**

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The classification is shown as follows

- According to the type of protection against electric shock. : Class I
- According to the degree of protection against electric shock. : Type B applied part

**TAKARA BELMONT CORPORATION.**



## CAUTION

This manual provides information and instruction for the installation, assembly, and certification procedures for the "Bel-Cypher Pro" X-Ray.

The instructions contained in this book should be thoroughly read and understood before attempting to install the "Bel-Cypher Pro" unit. After the installation is completed, file this manual and refer back to it when performing periodic maintenance.

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## 1. Introduction

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1. Observe "Warning" and "Prohibition" matters in this Installation Manual.
2. Read this Installation Manual thoroughly to prevent an accident or trouble.
3. If you have any unclear matters in installation, reconfirm it by reading this Installation Manual.
4. After installation, read Operation Manual to understand operation procedures.
5. Discharge  
Be sure to observe Installation Manual. If accidents or troubles of the equipment happen due to improper installation, we cannot be responsible for those accidents or troubles.
6. Repair and repair parts supply  
Repair and repair parts supply is available for 10 years from discontinued date.
7.  mark means "Attention, consult accompanying documents".

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## 2. Warning

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### **WARNING**

Always conform to the safety work standards to assure safety for workers and other people concerned. Repair work for internal parts of the equipment involves high risk. This should be strictly conducted by an authorized service personnel only.



### **NOTE**

The warning messages in this Installation Manual are defined and classified as follows:



### **DANGER**

Indicates an imminently hazardous situation, which, if not avoided, may result in death, serious injury and/or property damage such as total loss of equipment and fire when the instructions are not followed.



### **WARNING**

Indicates a potentially hazardous situation, which, if not avoided, could result in death, serious injury and/or property damage such as total loss of equipment and fire when the instructions are not followed.



### **CAUTION**

Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury, and/or partial damage to property and loss of computer data when the instructions are not followed.



### **NOTE**

Indicates information helpful for use of the equipment.

 **WARNING**

Precautions on use (and safety and hazard prevention) of medical electric/electronic equipment

**1. DO NOT allow the person without expertise to use the equipment.**

**2. Pay attention to the following when installing the equipment.**

- (1) Install the equipment to avoid splashing water.
- (2) Do not install the equipment to the place harmful to it due to atmospheric pressure, temperature, humidity, airflow, direct sunlight, dust, salinity and air including sulfur.
- (3) Pay attention to the safety conditions such as inclination, vibration and impact (including those in transportation).
- (4) Do not install the equipment to the place where chemicals are stored or gas generates.
- (5) Pay attention to commercial frequency of power, its voltage and allowable current (or power consumption).
- (6) Connect the equipment to the ground properly.

**3. Check the following before using the equipment.**

- (1) Check contact of switches, polarity, dial settings and indicators. Check that the equipment operates normally.
- (2) Check that the equipment is connected to the ground perfectly.
- (3) Check that all cords are connected properly and perfectly.
- (4) Pay attention to parallel use with other equipment as it may cause erroneous diagnosis or danger.
- (5) Recheck the external circuit connected directly to a patient.
- (6) Check the battery power.

**4. Pay attention to the following when using the equipment.**

- (1) Avoid exceeding the time and the radiation dose rate necessary for diagnosis.
- (2) Always monitor no abnormality in all equipments in use and the condition of a patient.
- (3) When any abnormality is observed in the equipment or the patient, take appropriate action such as to stop the equipment in the condition safe for the patient.
- (4) Do not allow a patient to touch the equipment.

**5. Pay attention to the following after using the equipment.**

- (1) After returning operation switches and dials to their original position before use in accordance with predetermined procedure, turn off the power.
- (2) Do not pull cords when removing them from the equipment.
- (3) Be careful for the following items for storage.
  - I) Store the equipment where water is not splashed on it.
  - II) Do not store the equipment to the place harmful to it due to atmospheric pressure, temperature, humidity, airflow, direct sunlight, dust, salinity and air including sulfur.
  - III) Pay attention to the safety condition such as inclination, vibration and impact (including those in transportation).
  - IV) Do not store the equipment to the place where chemicals are stored or gas generates.
- (4) After cleaning accessories, cords, and terminals, put them in order.
- (5) Keep the equipment clean for the next use.

**6. When the equipment fails, DO NOT attempt to repair it by yourself.**

**Indicate that the equipment is in failure and consign its repair to special engineer.**

**7. DO NOT modify the equipment.**

**8. Maintenance and inspection**

- (1) Be sure to perform regular inspection of equipment and its accessories.
- (2) When resuming to use the equipment that was not used for a long time, be sure to check that the equipment operates normally and safely before use.

 **DANGER**

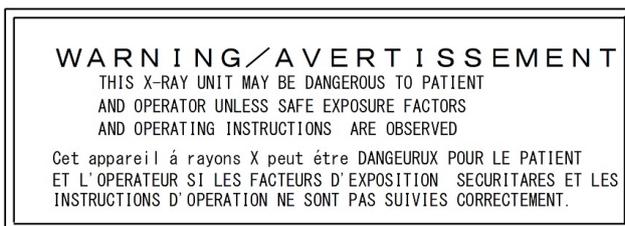
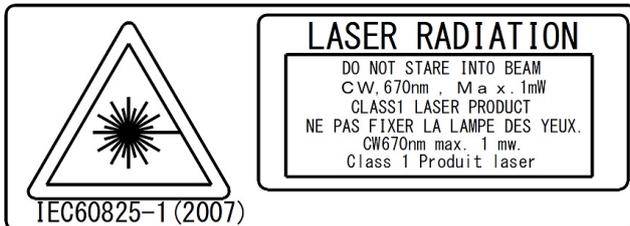
This equipment is an electrical instrument. Avoid contact with water, which may cause electric shock and damage to the equipment.

This equipment is an electrical instrument incorporating high voltage circuits. Removing the equipment cover in the installation work may cause electric shock. Before opening the cover, ensure to turn OFF the power, and remove the electrical power plug from the outlet.

Installation work can contain hazardous works; allow only qualified engineers with suitable education and training to perform installation work.

Installation work can contain hazardous works; the installation engineer should instruct any other person not to enter into a scope of installation work.

 <b>WARNING</b>
This X-ray Unit may be dangerous to patient and operator unless safe exposure factors and operating instructions are observed.
Follow the local zoning authority's regulations regarding X-ray room that you are going to install Bel-Cypher Pro.
The floor should have strength of $650\text{N}/100\text{cm}^2$ and should be rigid.
This equipment has units which are more than 20kg. Heavy units should be brought up by more than 2 people.
Do not put things in area where equipment functions.
In order to avoid influence by other electric equipment, use separated power source from the other electric equipment.
Those who install X-ray apparatus should wear X-ray protector apron.
Pay attention when Sliding Unit is moves up and down.
<b>LASER RADIATION, DO NOT STARE INTO A BEAM, CLASS 1 LASER PRODUCT</b> 1. Laser Beam is applied. For safety, instruct patient not to look at the laser beam. 2. Before the beam is lightened, lower Frankfurt Plane Beam to bottom. 3. Do not set the beam to patient's eyes.



 <b>CAUTION</b>
Do not turn the Arm unit by hand. It might cause a trouble of the equipment.

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 **WARNING**

**Environmental Conditions of EMC (Electromagnetic Compatibility)**

The equipment satisfies the EMC(Electromagnetic Compatibility) standard below:  
IEC 60601-1-2:2007

Classification of EMI in Accordance with IEC 60601-1-2:2007  
Group 1,Class B

1. The medical electrical equipment needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in the Operation manual.
  2. The portable and mobile RF communications equipment can affect medical electrical equipment.
  3. The use of accessories, transducers and cables other than those specified, with the exception of transducers and cables sold by the manufacturer of the equipment as replacement parts for internal components, may result in increased emissions or decreased immunity of the equipment.
  4. The cable that suits EN60601-1-2:2007 of standards emission and the requirement of the immunity are recorded below.
    - 1) Power cable (4.5m)
    - 2) Exposure Switch cable (10m)
    - 3) LAN cable(type braided shield) for connection with personal computer (10m)
  5. The equipment should not be used adjacent to or stacked with other equipment.
  6. The equipment should be used only in the specified type of shielded location.
  7. Please use the LAN Cable specified by EC representative.
  8. Essential performance
    - 1) Accuracy of x-ray tube loading factor.
    - 2) Reproducibility of radiation output.
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**WARNING**

<b>Guidance and manufacturer's declaration – electromagnetic emissions</b>		
<p>The model Bel-Cypher Pro is intended for use in the electromagnetic environment specified below. The customer or the user of the model Bel-Cypher Pro should assure that it is used in such an environment.</p>		
Emission test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The model Bel-Cypher Pro uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The model Bel-Cypher Pro is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC61000-3-2	Not Applicable	
Voltage fluctuations/ Flicker emissions IEC61000-3-3	Not Applicable	

**WARNING**

<b>Guidance and manufacturer's declaration – electromagnetic immunity</b>			
The model Bel-Cypher Pro is intended for use in the electromagnetic environment specified below. The customer or the user of the model Bel-Cypher Pro should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC61000-4-2	±6 kV contact ±8kV air	±6 kV contact ±8kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC61000-4-5	±1kV differential mode ±2kV common mode	±1kV differential mode ±2kV common mode	Mains power quality should be that of a typical commercial or hospital environment
Voltage dips, short interruptions and voltage variations on power supply input lines IEC61000-4-11	<5% Ut (>95% dip in Ut) for 0.5 cycle 40% Ut (60% dip in Ut) for 5 cycles 70% Ut (30% dip in Ut) for 25 cycles <5% Ut (>95% dip in Ut) for 5 sec	<5% Ut (>95% dip in Ut) for 0.5 cycle 40% Ut (60% dip in Ut) for 5 cycles 70% Ut (30% dip in Ut) for 25 cycles <5% Ut (>95% dip in Ut) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment
Power frequency (50/60Hz) magnetic field IEC61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment
NOTE Ut is the a.c. mains voltage prior to application of the test level.			



**WARNING**

<b>Guidance and manufacturer's declaration – electromagnetic immunity</b>			
The model Bel-Cypher Pro is intended for use in the electromagnetic environment specified below. The customer or the user of the Bel-Cypher Pro should assure that it is used in such an environment.			
<b>Immunity test</b>	<b>IEC 60601 test level</b>	<b>Compliance level</b>	<b>Electromagnetic environment - guidance</b>
<p>Conducted RF IEC61000-4-6</p> <p>Radiated RF IEC61000-4-3</p>	<p>3 Vrms 150kHz to 80MHz</p> <p>3 V/m 80MHz to 2.5 GHz</p>	<p>3 Vrms</p> <p>3 V/m</p>	<p>Portable and mobile RF communications equipment should be used no closer to any part of the Bel-Cypher Pro, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.</p> <p><b>Recommended separation distance</b></p> <p><math>d = 1,2 \sqrt{P}</math></p> <p><math>d = 1,2 \sqrt{P}</math> 80 MHz to 800 MHz</p> <p><math>d = 2,3 \sqrt{P}</math> 800 MHz to 2.5 GHz</p> <p>where P is the maximum output power rating of the transmitter in watts(W) according to the transmitter manufacturer and d is the recommended separation distance in metres(m).</p> <p>Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, <sup>a</sup>should be less than the compliance level in each frequency range.<sup>b</sup></p> <p>Interference may occur in the vicinity of equipment marked with the following symbol:</p> 
<p>NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.</p> <p>NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.</p>			
<p><sup>a</sup> Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Bel-Cypher Pro is used exceeds the applicable RF compliance level above, the Bel-Cypher Pro should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the Bel-Cypher Pro.</p>			
<p><sup>b</sup> Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.</p>			

 **WARNING**

<b>Recommended separation distances between portable and mobile RF communications equipment and the Bel-Cypher Pro</b>			
<p>The Bel-Cypher Pro is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Bel-Cypher Pro can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Bel-Cypher Pro as recommended below, according to the maximum output power of the communications equipment.</p>			
Rated maximum output power of transmitter  <b>W</b>	Separation distance according to frequency of transmitter <b>m</b>		
	150 kHz to 80 MHz $d=1,2 \sqrt{P}$	80 MHz to 800 MHz $d=1,2 \sqrt{P}$	800 MHz to 2.5 GHz $d=2,3 \sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.72
1	1.20	1.20	2.30
10	3.79	3.79	7.27
100	12.00	12.00	23.00
<p>For transmitters rated at a maximum output power not listed above, the recommended separation distance <math>d</math> in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where <math>P</math> is the maximum output power rating of the transmitter in watts(W) according to the transmitter manufacturer.</p> <p>NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.</p> <p>NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.</p>			

### 3. Pre-Installation Instructions

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#### 1. Manuals

- 1) Installation Manual of Bel-Cypher Pro
- 2) Operation Manual of Bel-Cypher Pro

#### 2. Measuring instruments and tools

##### 2-1. Measuring instruments

- 1) Digital Multi Meter with an accuracy of 1%, capable of measuring 150VAC and 20mA DC, and capable of indicating true RMS value within one second
- 2) Fluorescent Screen

##### 2-2. Tools

- 1) Philips Head Screwdrivers (Small and Big)
- 2) Slotted Head Screwdrivers (Small, Anti-Static type)
- 3) Nut Drivers (M6, M5, M4 and M3)
- 4) Ratchet wrench
- 5) Allen keys
- 6) Cutting Nippers
- 7) Long nose nippers
- 8) Hammer
- 9) Electric power drill (for making a hole on the wall and the floor)
- 10) Drill bit 8.5mm = 21/64" (which can drill in wall and a floor) (Driving core bar typed)
- 11) Drill bit 12.5mm = 31/64" (which can drill in wall and a floor) (Driving anchor)
- 12) Blower or dust separator

##### 2-3. Others

- 1) Alcohol for disinfection
- 2) A rag
- 3) Cleaning solution

#### 3. User supplied Network Card (NIC) and PC.

**NOTE:** IN GENERAL, MAJOR STRUCTURAL MODIFICATIONS ARE NOT REQUIRED, HOWEVER THE FLOOR ON WHICH Bel-Cypher Pro IS PLACED SHOULD BE ABLE TO SUPPORT 600 lbs. DEAD LOAD.

### 3 Electrical Requirements

#### 1) Power Supply

Bel-Cypher Pro X-Ray operates on a power supply of 120 VAC. A three wire GROUNDED circuit, separately connected to the central distribution panel with an over current protection device rated for 15 amperes. Recommended wire size is 12 AWG. But if the wire run distance is to exceed 50 feet, 10 AWG is required. For wire run distance in excess of 75 feet, up to 125 feet, 8 AWG is required.

2) All connections, workmanship and materials used must comply with the national Electric Code and local codes.

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## 4. Specifications

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General name	Digital Panoramic Radiograph
Model	Bel-Cypher Pro
Power Voltage	120Vac 60Hz 1 $\phi$ Acceptable voltage regulation: $\pm 10\%$
Power Capacity	9A (80kV 8mA)
High Tension Generator	High Tension Generator (100kHz)
X-ray Tube Voltage	60kV to 80kV (1kV step) Tolerance 54kV~88Kv( $\pm 10\%$ of 60kV~80kV)
X-ray Tube Current	2 to 8mA (1mA step) Tolerance 1.6mA~9.6mA( $\pm 20\%$ of 2mA~8mA)
Exposure method	Manual
X-ray Tube	D-052SB (Toshiba)
X-ray Tube Focal Spot	0.5 mm
Total Filtration	2.5mmAl (minimum)
Radiographic Mode	Panorama: (Adult, Child), Panoramic Bitewing (Adult, Child) TMJ:
Exposure Time	Panorama: 10 sec. Panoramic Bitewing:4.6 sec. TMJ: 2.5 sec. (x 4)
Magnification Ratio	Panorama: 1.2 to 1.3, Panoramic Bitewing: 1.2 to 1.3 TMJ: 1.2
Image receiver	Digital Sensor
Beam for patient positioning	3 beams
Dimension	W:850mm x D:1,135mm x H:2,275mm
Weight	Approximately 231 lb(105 kg)

### Environmental condition for Operation

Temperature : 41~95F (5~35°C)

Humidity : 30~85%

Pressure : 700~1060 hpa

### Environmental condition for Storage

Temperature : 14~140F (-10~60°C)

Humidity : 10~95%

Pressure : 700~1060 hpa

### Environmental condition for Transportation

Temperature : 14~140F (-10~60°C)

Humidity : 10~95%

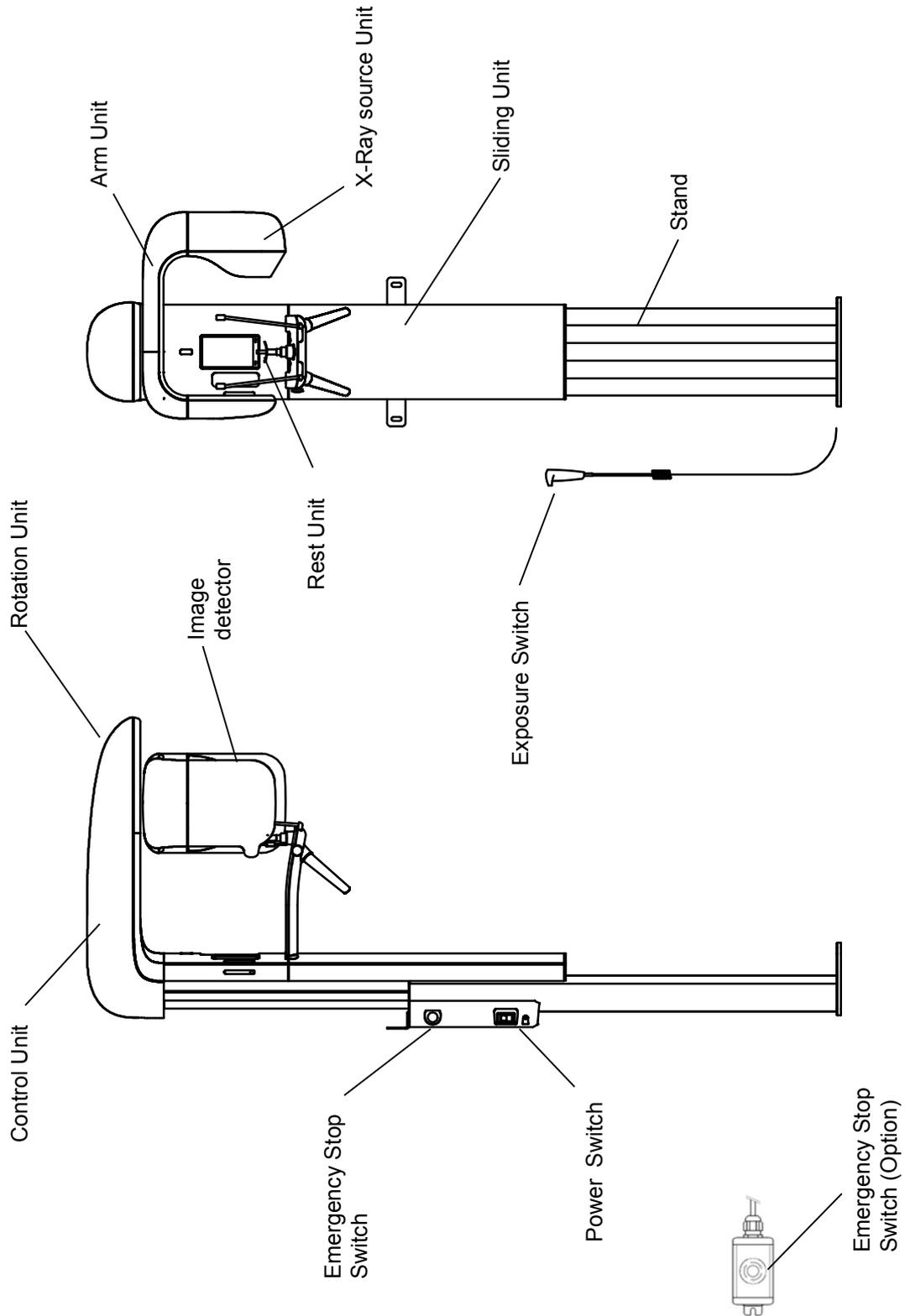
Pressure : 700~1060 hpa

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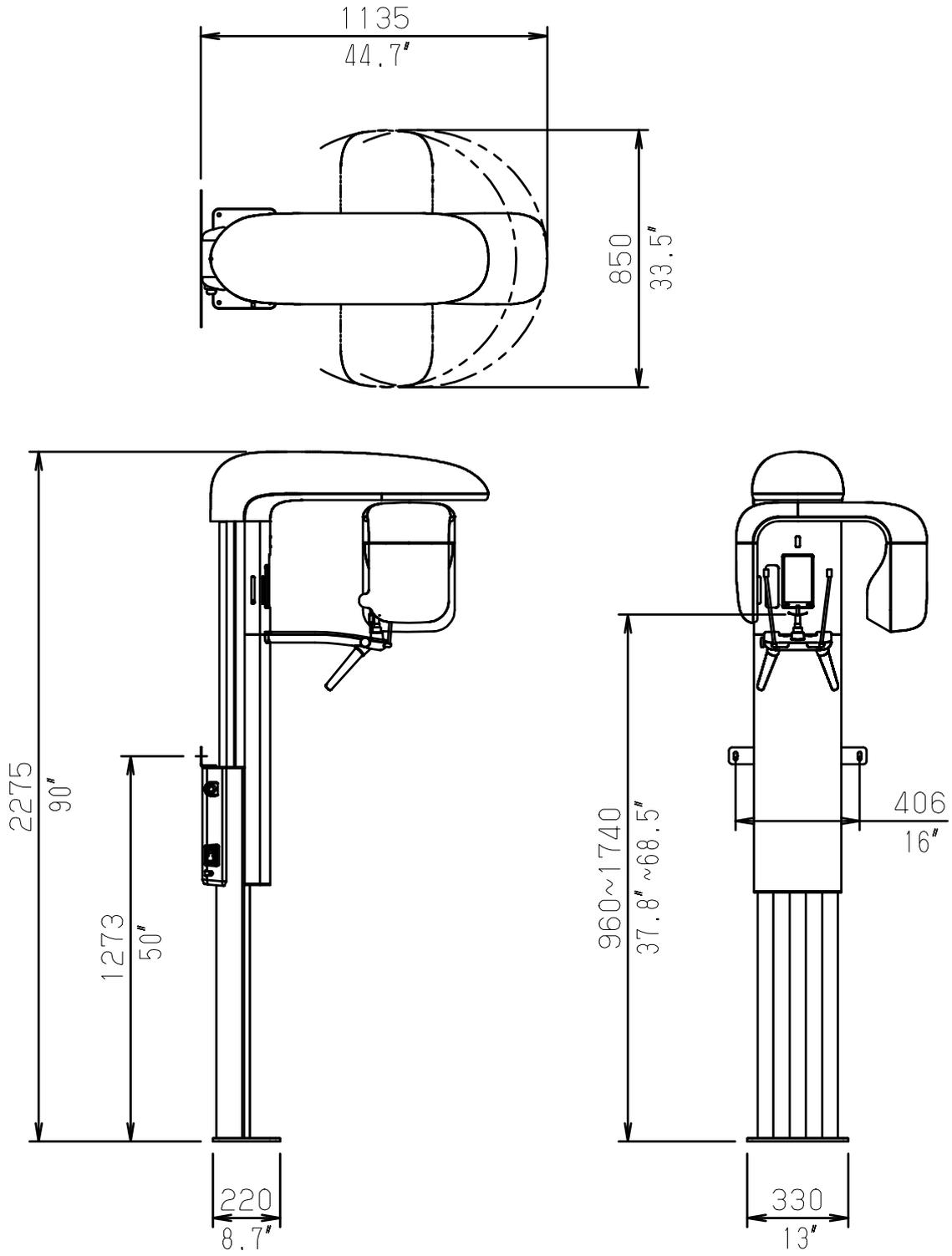
## 5. Name of each part and Dimensions of equipment

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### 1. Names of each parts of equipment

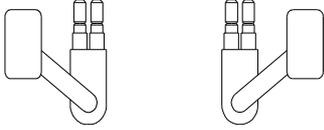
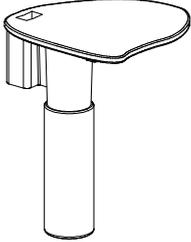
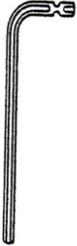
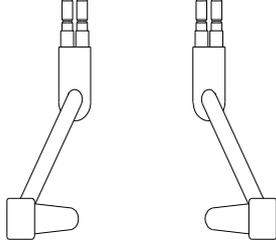


## 2. Dimensions of equipment



## 6. Parts and Accessories for equipment

No.	Parts	Number	
1	Stand + Sliding Unit	1 set.	
2	Wall bracket	1 pce.	
3	Fixing screw for Wall bracket	Hexagon socket head cap screw with spring and flat washer M6×12	2 pcs.
		Metal washer d7×D22×t1.6	2 pcs.
		Metal washer d9×D26×t2.3	2 pcs.
4	Rotation Unit	1 set.	
5	Fixing bolt for Rotation Unit	Hexagon head bolt (grade 10.9) M8×25	4 pcs.
		Flat washer φ8	4 pcs.
		Spring washer φ8	4 pcs.
		Taper pin with thread	2 pcs.
6	Rest Unit	1 set.	
7	Fixing screw for Rest Unit	Hexagon socket head cap screw with spring and flat washer M5×12	4 pcs.
		Taper pin with thread	2 pcs.
8	Rotation Unit Cover	Rotation Unit Cover A	1 pce.
		Rotation Unit Cover B	1 pce.
		Rotation Unit Cover C	1 pce.
9	Fixing Screw for Rotation Unit Cover	Cross recessed head screw with captive washer M3×10	6 pcs.
		Binding head screw (White) M3×8	4 pcs.
10	Sliding Unit Cover	Sliding Unit Cover A	1 pce.
		Sliding Unit Cover B	1 pce.
11	Fixing Screw for Sliding Unit Cover A	Cross recessed head screw with captive washer M3×20	2 pcs.
12	Exposure Switch		1 pce.
13	Exposure Switch Cable		1 pce.
14	LAN Cable		1 pce.
15	Emergency Stop Switch (Option)		1 pce.
16	Anchor (Driving anchor)	(A) GA-8M	4 pcs.
17	Anchor (Driving core bar typed)	(B) Wall : C8-50	2 pcs.
		Floor : C8-50	4 pcs.
18	Coach screw	(C) Wall : φ8×40	2 pcs.
		Floor : φ8×65	4 pcs.
19	Spacialized rod for Driving anchor	GA-25H	1 pce.
20	Collar(B-1)		4 pcs.
21	Bolt to use with Driving anchor	Hexagon socket countersunk head screw M8×23	4 pcs.
22	Cover Cap for hexagon head bolt	Wall : Plastic Cap	2 pcs.
		Floor : Plastic Cap	4 pcs.
23	Sponge(S-1)		1 pce.
24	Steel spacer (Hexagonal)	BSF-328E	2 pce.

No.	Accessories	Number	
1	Temporal support(Left and right)		1 pair
2	Chinrest		1 pce.
3	Bite Block		2 pcs.
4	Ear Rods(Left and right)		1 pair
5	CD containing TWAIN Driver		1 pce.

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## 7. Installation Procedure

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There are some hole/screw hole on this device, because of sharing some parts with other device. Describe about hole/screw hole which uses in this device below.

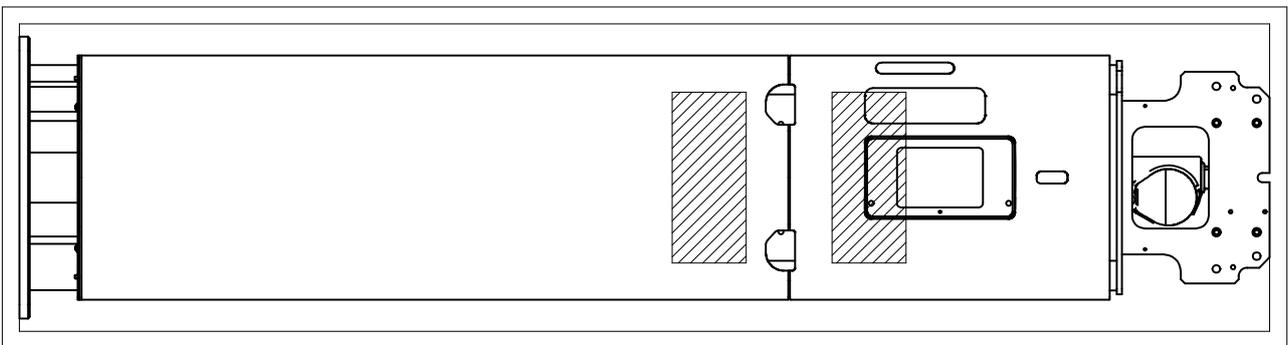
### 1. Remove packing material cover for Pillar, then remove pillows shown in below drawing they are used for pillars at installation.

(Two pillows)

Put vinyl in the packing or waste cloth on the pillow for protecting scratch of Pillar.  
Then, put the Pillar on the pillows (Sliding Unit is down side).

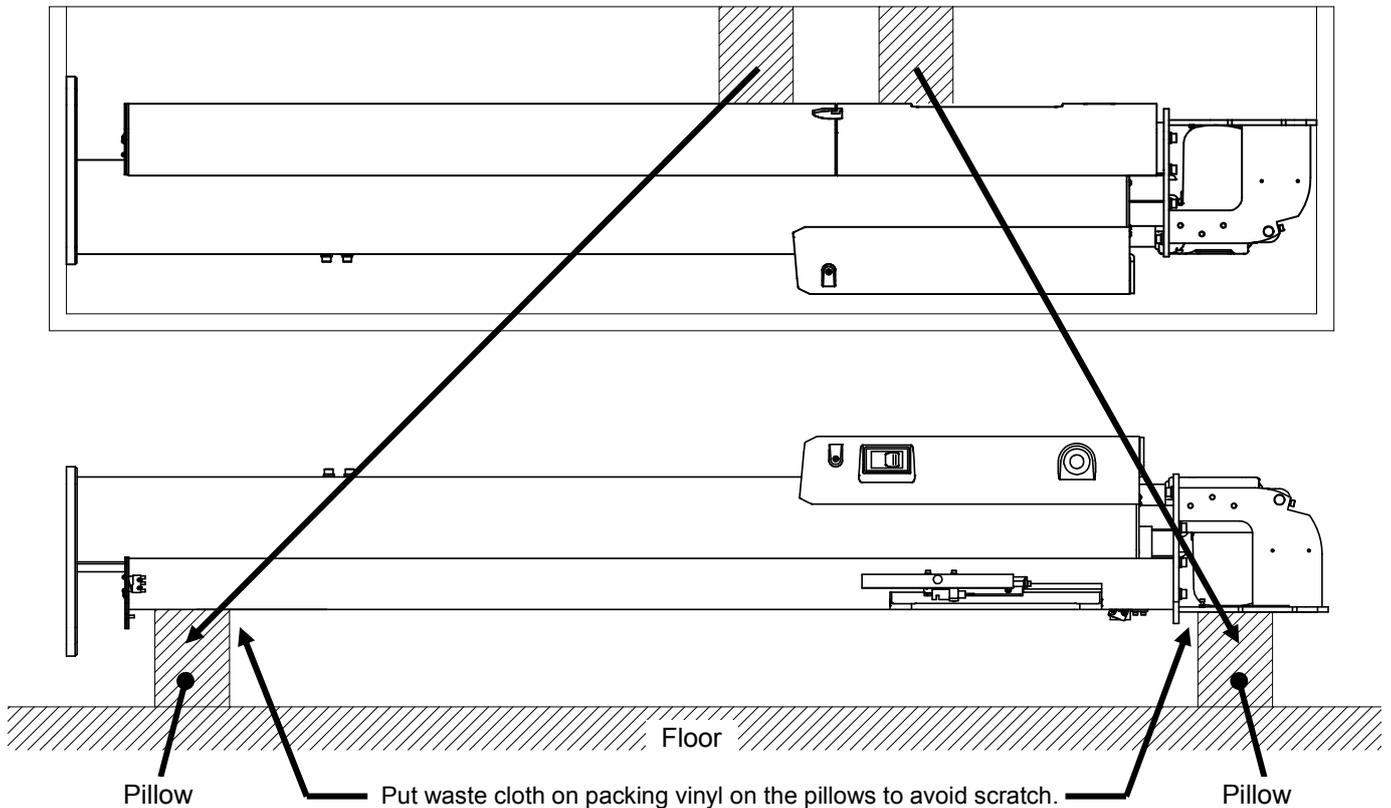
Pillar without upper cover is shown.

Top view



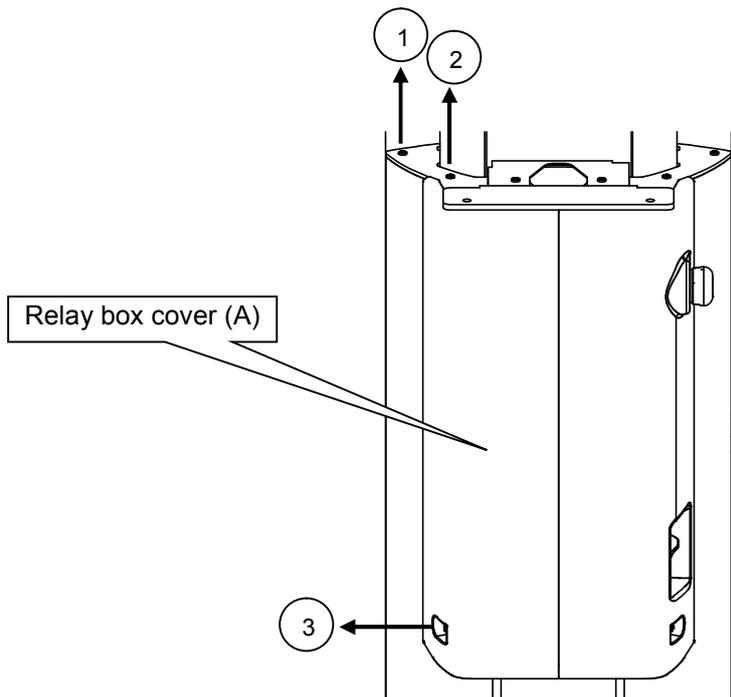
Side view

Take out pillows and put them on the floor as shown below.

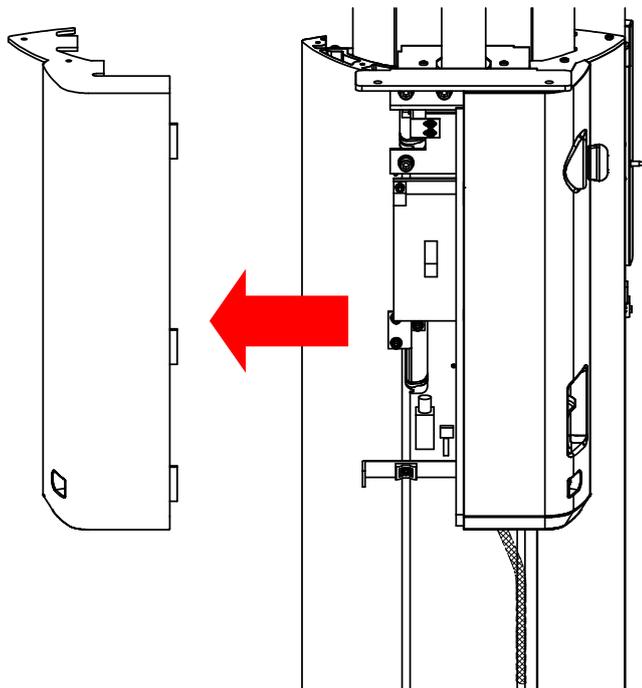


### 2. Wire power cable, X-ray Exposure Switch and LAN Cable between relay box and PC.

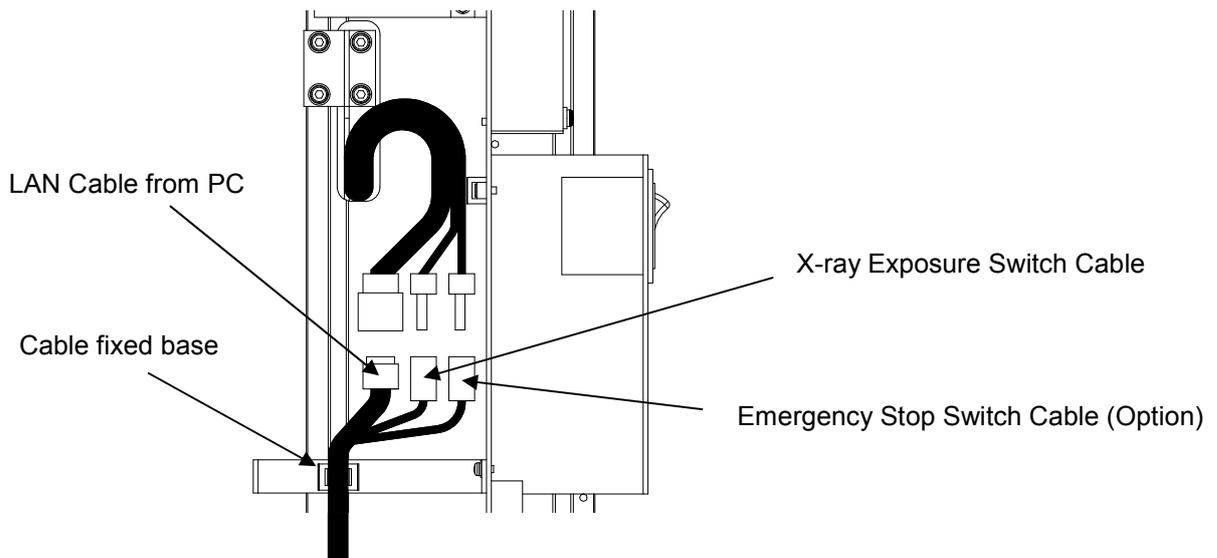
- 2.1. Remove the cover (A) of relay box.  
Remove biding head screws (white) which fixed the cover.



- 2.2. Remove covers in left.



2.3. Connect X-ray Exposure Switch Cable and LAN Cable.

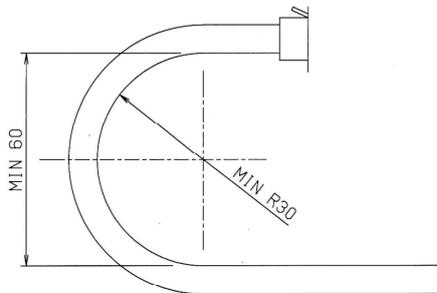


Please make sure to fix a cable to cable fixed base with a cable tie after connecting X-ray Exposure Switch and LAN Cable, so the cable don't come off.

2.4. Attach relay box by using biding head screws (white).

 <b>CAUTION</b>
Please pay attention to attach a cover when connecting the cable.

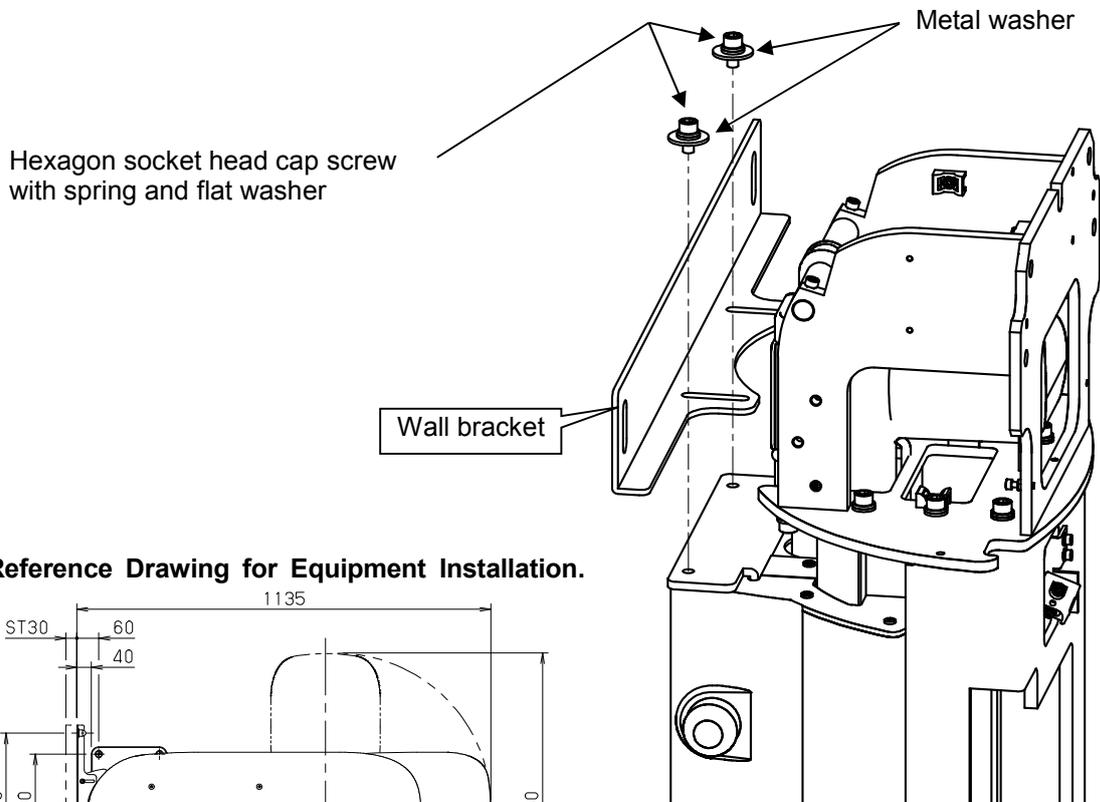
Minimum bending radius of LAN Cable is 30mm.



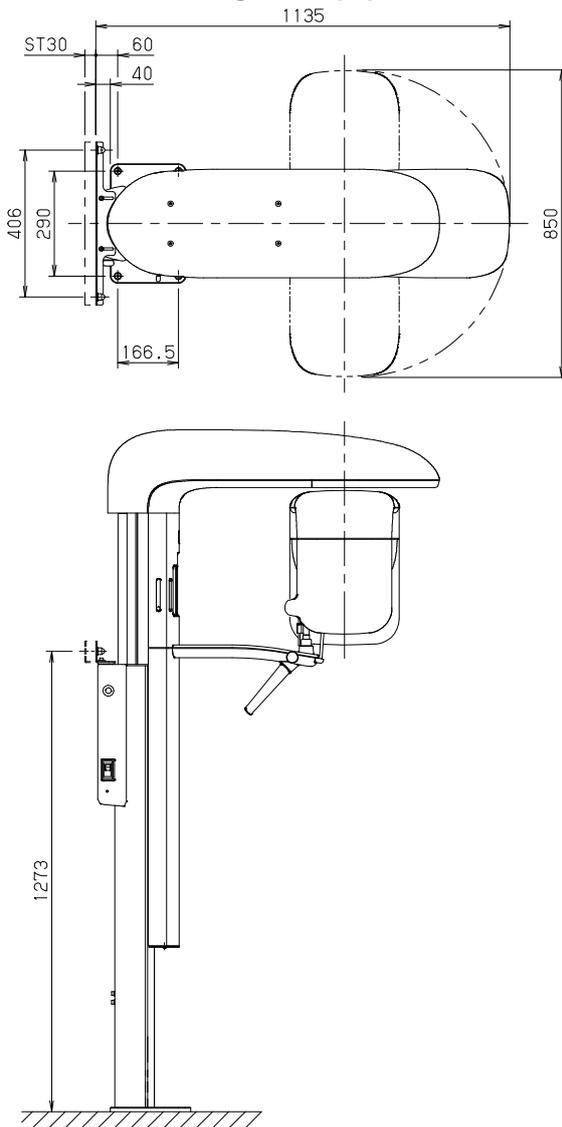
 <b>CAUTION</b>
Please make Bending radius of LAN Cable longer than 30mm In case of Bending radius is shorter than 30mm, it will be the cause for damage of LAN Cable and failure loose connection.

**3. Attach wall bracket to the stand.**

Hexagon socket head cap screw with spring and flat washer M6 x 12 : 2 pcs.  
Metal washer d7 x D22 x t1.6 : 2 pcs.



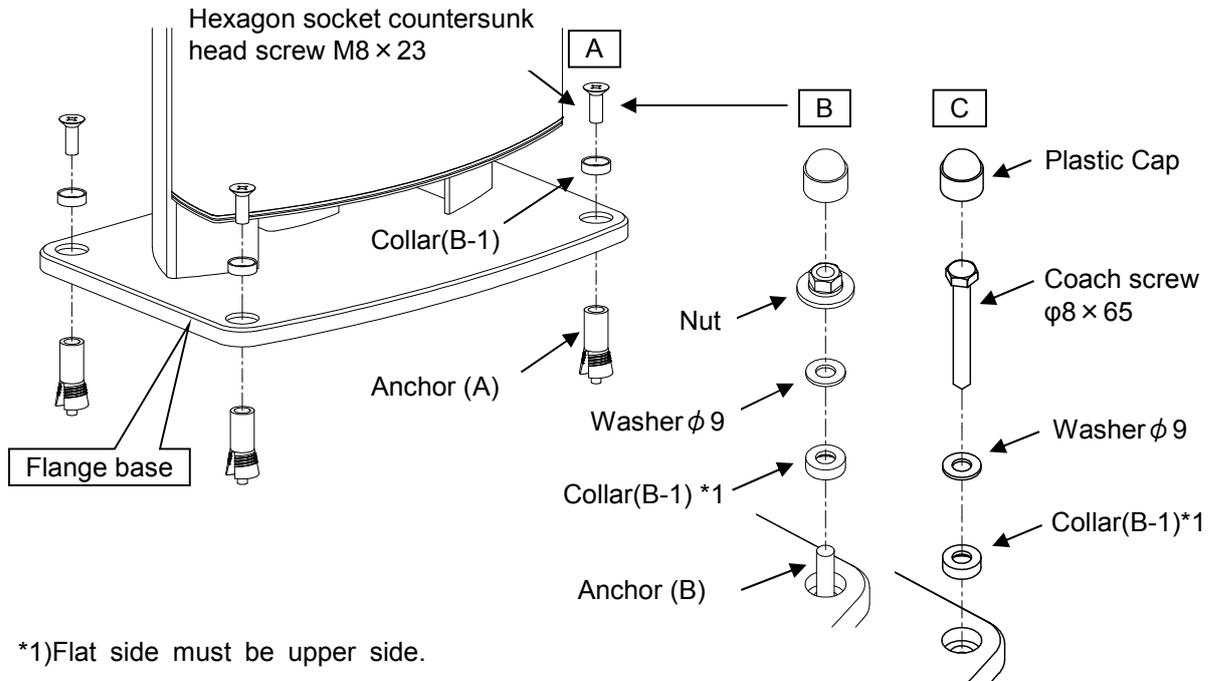
**4. Reference Drawing for Equipment Installation.**



**5. Please go to provision 6, if you have not free-standing base.  
Please go to provision 7, if you have free-standing base.**

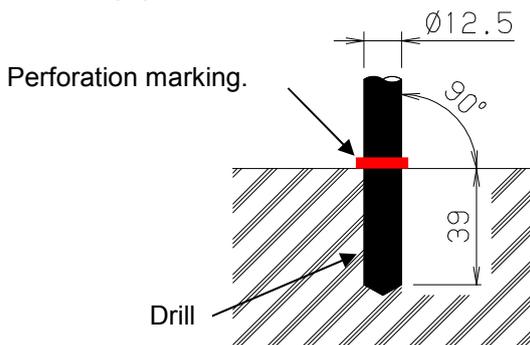
**6. In case of installing by not using free-standing base.**

- 6.1. Put the stand on the installation position.
- 6.2. To fix the flange base to the floor with an anchor (Driving anchor) (A) or anchor (Driving core bar typed) (B) or coach screw (C).

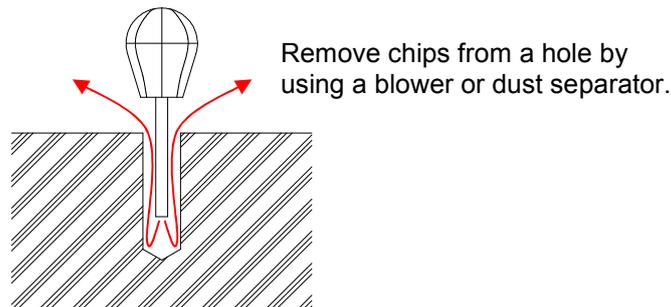


[Construction case, an example of using Anchor (Driving anchor) (A).]

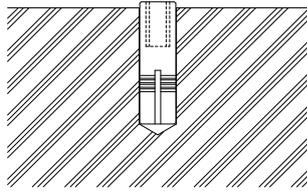
- (1). Make a hole of drilling depth (39mm) by using a drill which is  $\phi 12.5$  at the position for fixing an equipment.



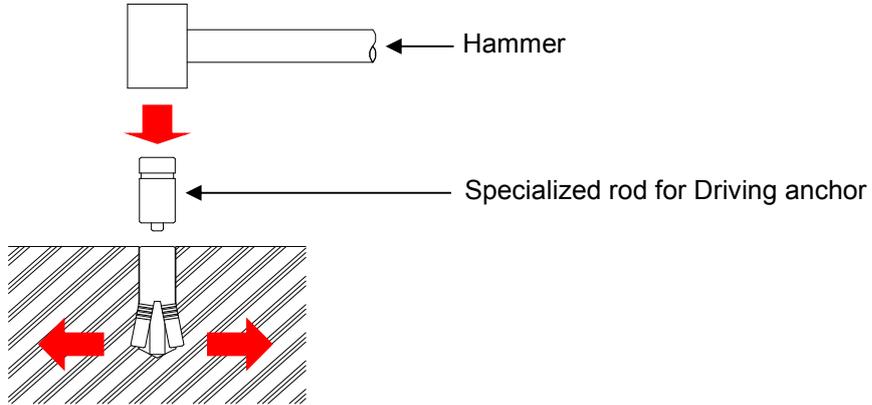
- (2). Clean up inside of the hole.



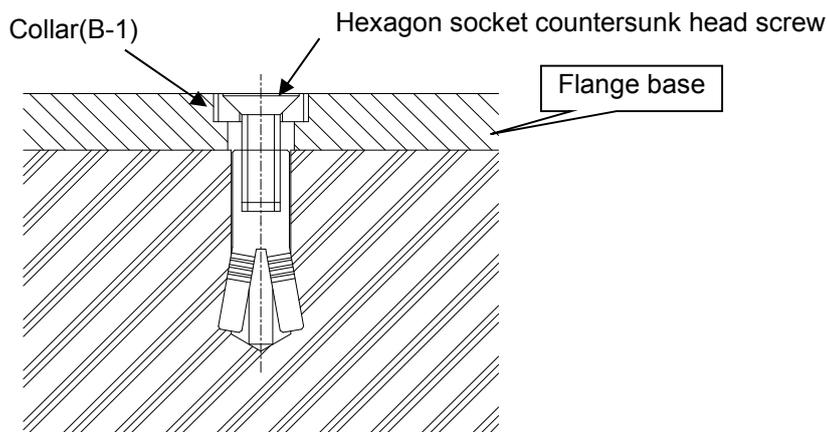
(3). Insert an Anchor (Driving anchor) (A).



(4). Drive an anchor into the ground by using the specialized driving rod.

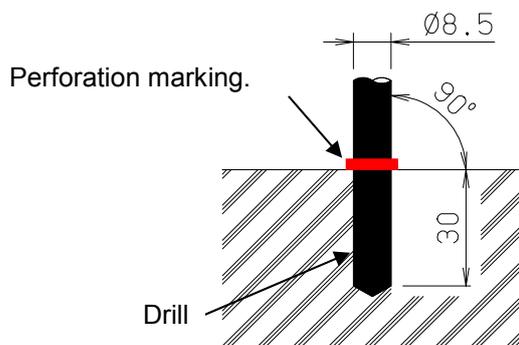


(5). Fix flange base with hexagon socket countersunk head screw.

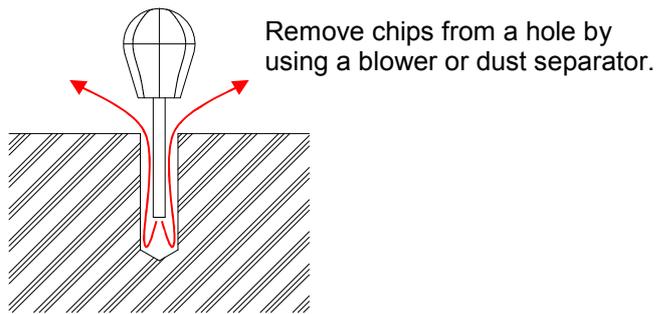


[Construction case, an example of using Anchor (Driving core bar typed) (B).]

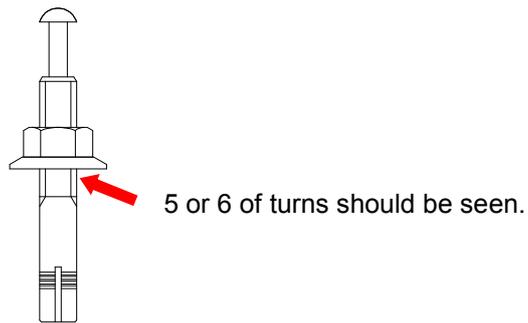
(1). Make a hole of 30mm deep at the position for fixing equipment with a drill of  $\phi 8.5$ .



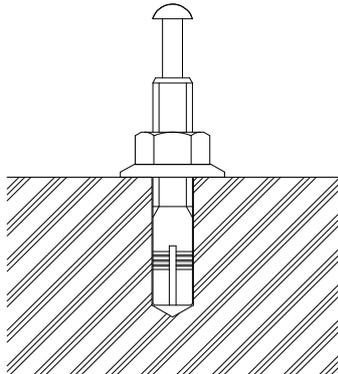
(2). Clean up inside of the hole.



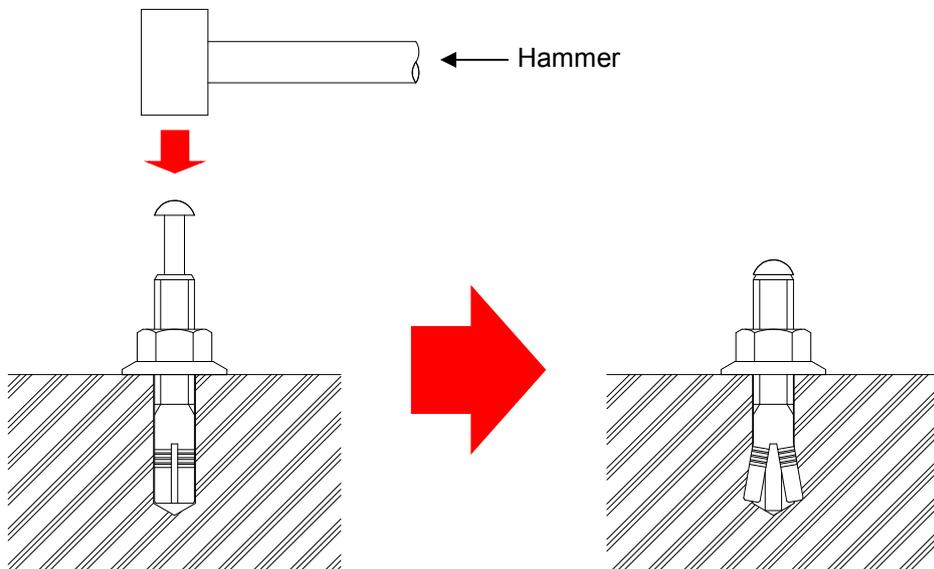
(3). Attach a nut (M8) to a screw of Anchor (B).



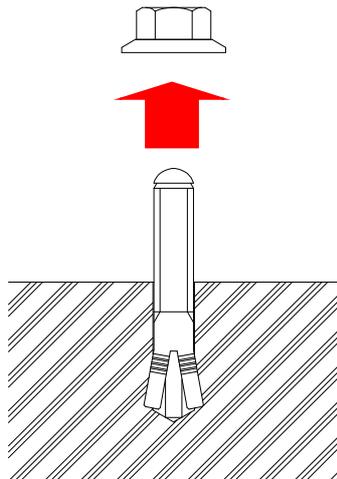
(4). Insert until nut of Anchor (B) has reached the floor.



(5). Drive pin in until the edge of it has reached the edge of screw.



(6). Remove a nut.



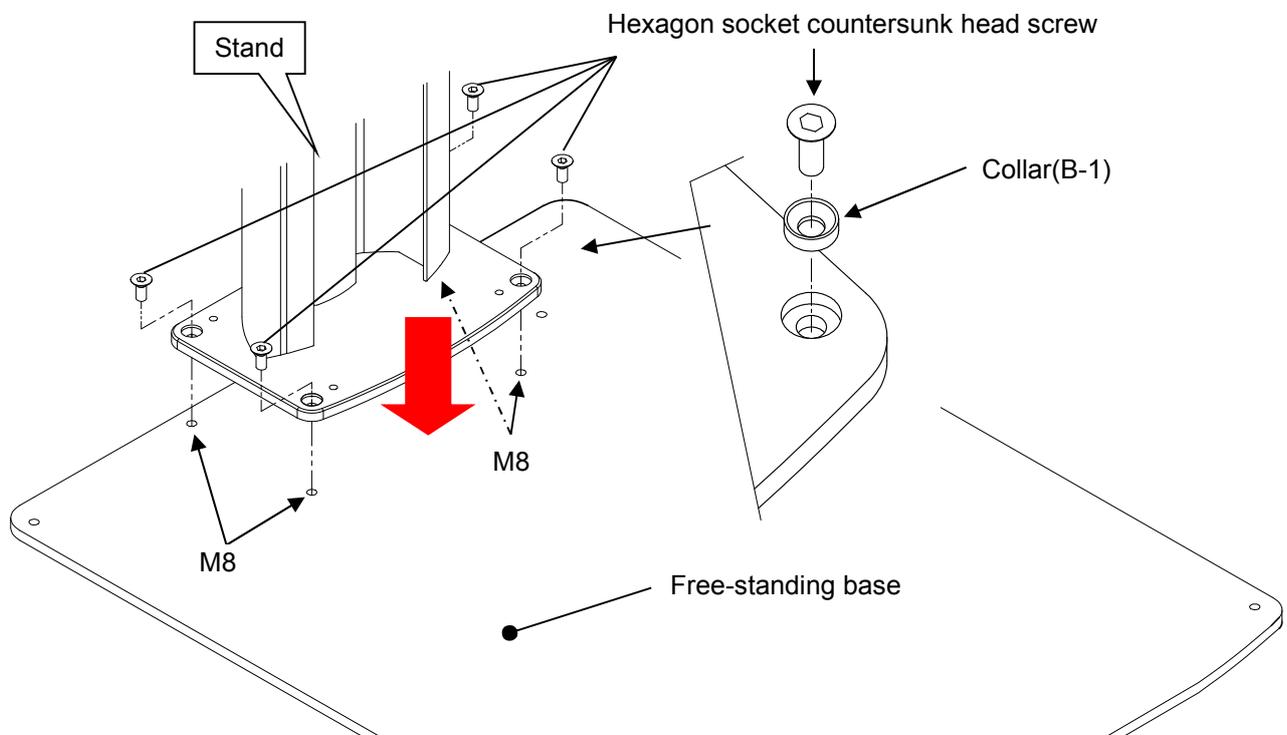
[Construction case, an example of using coach screw.]

After making a pilot hole with a drill which is smaller than  $\phi 4$ , fix it with coach screw.

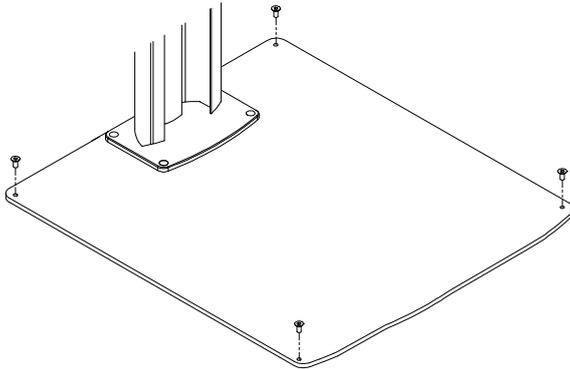
**7. In case of installing by using free-standing base.**

7.1. Put stand on the free-standing base, then fix it by using 4 pieces of flat head bolts.

Hexagon socket countersunk head screw M8 x 23 : 4psc.

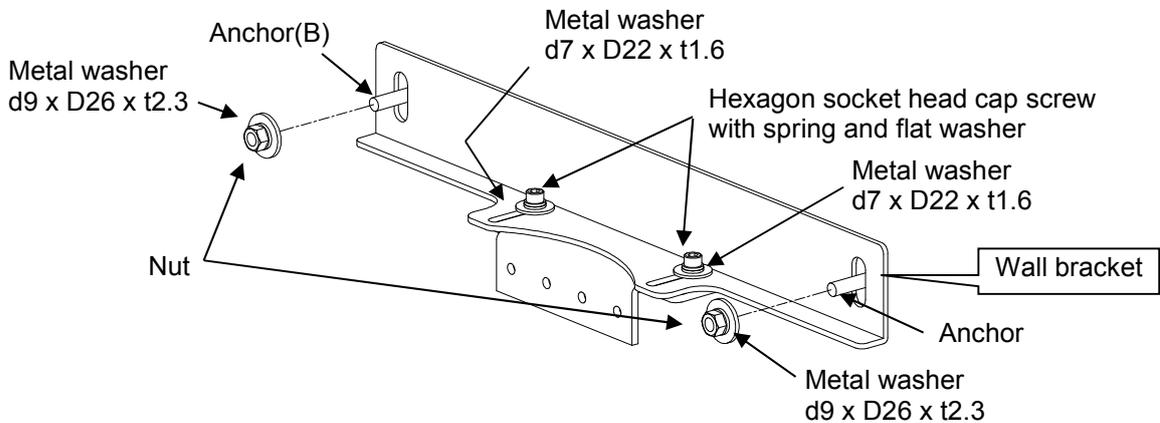


- 7.2. Move free-standing base to installing position, then fix it at 4 locations with anchor or coach screw.  
Please refer to provision 4 about construction of the floor.

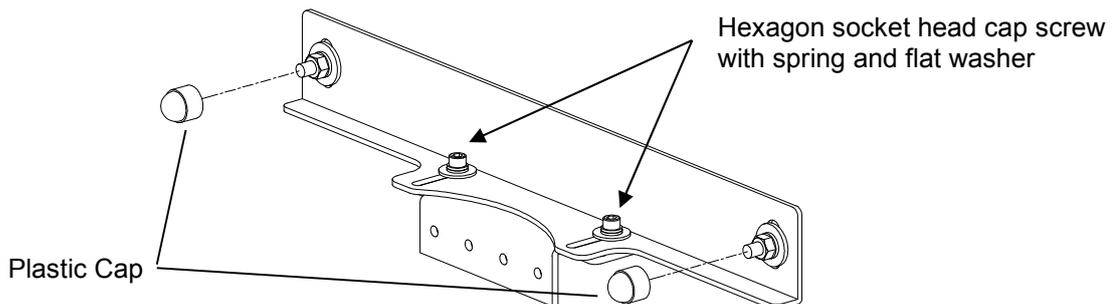


**8. Adjust installation position for an equipment and fixing position (the distance between The stand and a wall) for a wall bracket.**

- 8.1. In case of fixing wall bracket with Anchor (B).  
 8.1.1 Loosen a hexagon socket head cap screw with spring and flat washer for adjusting fixing position for a wall bracket.  
 8.1.2 Put a wall bracket on the wall, and then have 2 hexagon socket head cap screws with spring and flat washer tightened temporarily. (not final tightening)  
 8.1.3 Drive Anchor (B) in  
 Please refer to the provision 6 [Construction case, an example of using Anchor (B)].  
 8.1.4 Fix a wall bracket with a nut.



- 8.1.5 Attach a Plastic Cap to a nut.  
 8.1.6 Tighten a hexagon socket head cap screw with spring and flat washer.



8.2. In case of fixing a wall bracket with Coach screw.

8.2.1 Loosen a hexagon socket head cap screw with spring and flat washer for adjusting fixing position for a wall bracket.

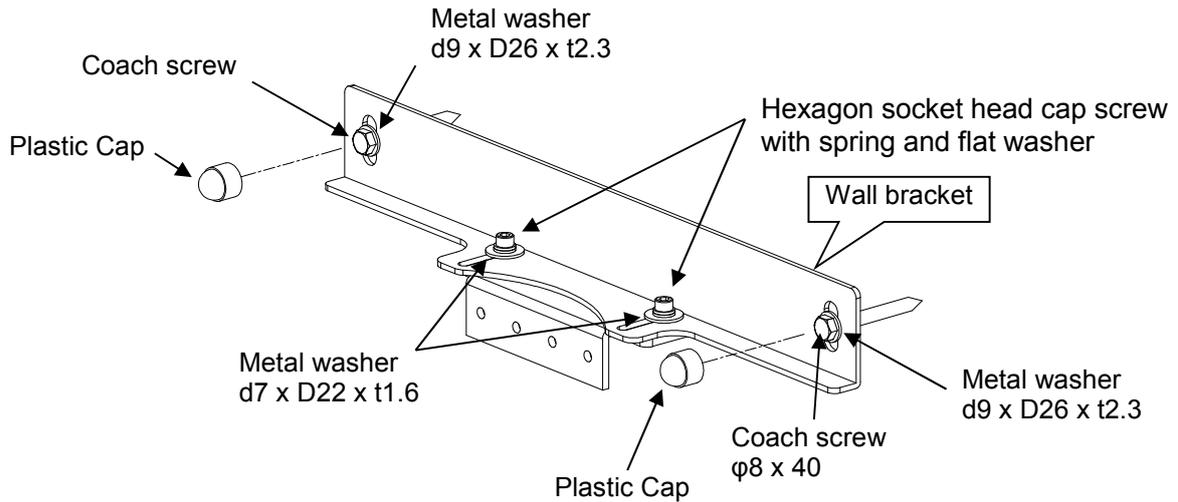
8.2.2 Put a wall bracket on the wall, and then have 2 hexagon socket head cap screws with spring and flat washer tightened temporarily.(not final tightening)

8.2.3 Fix a wall bracket with a Coach screw.

Please refer to the provision 6 [Construction case, an example of using Coach screw].

8.2.4 Attach a Plastic Cap to the Coach screw.

8.2.5 Tighten a hexagon socket head cap screw with spring and flat washer.

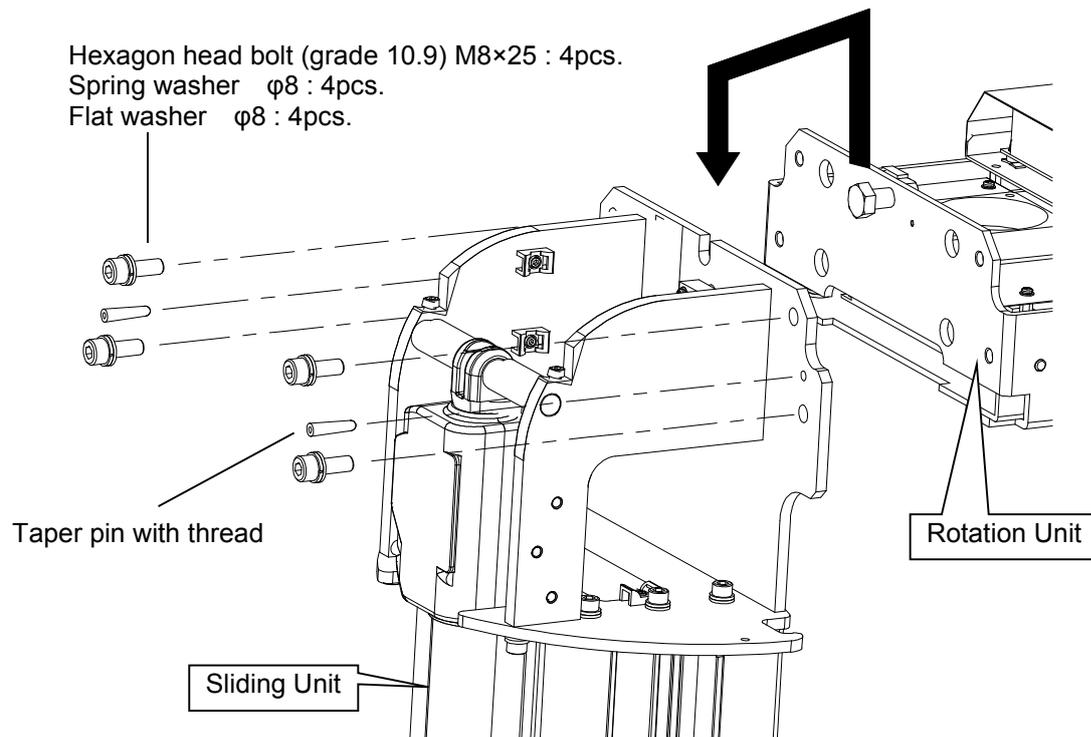


## 9. Mounting Rotation Unit on Sliding Unit

9.1. Hook to the U-notch at Sliding Unit.

9.2. Insert taper pins with thread with a hammer.

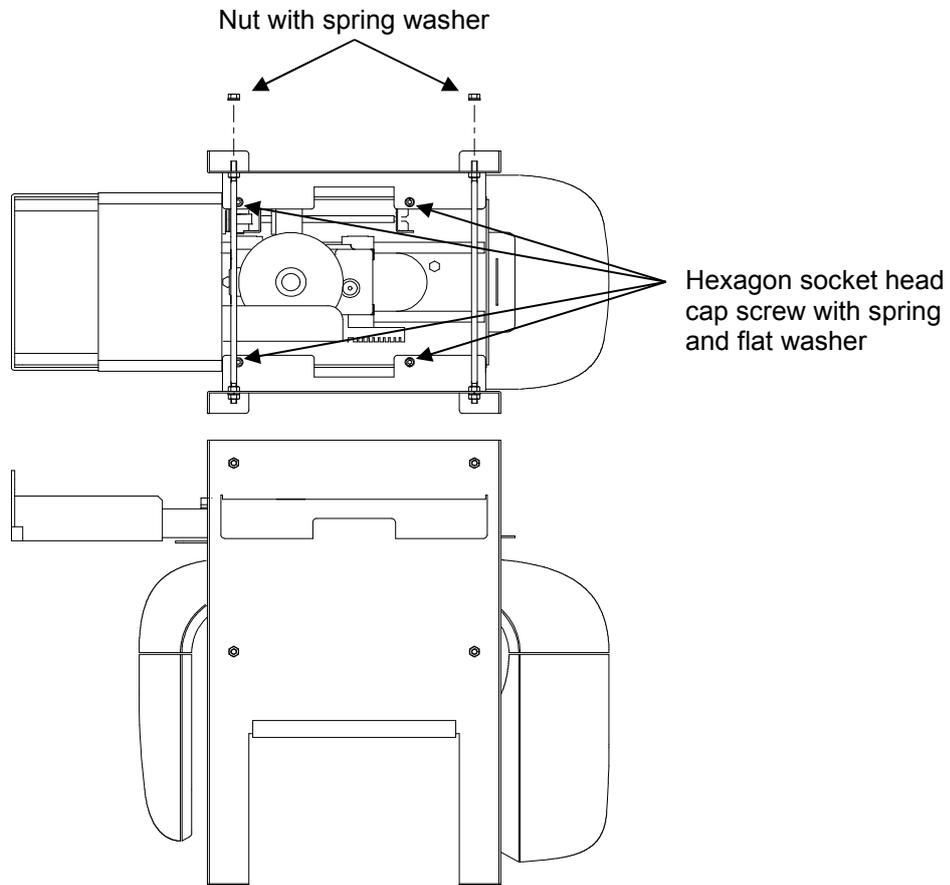
9.3. Tighten and Fix hexagon head bolts (grade 10.9).



## 10. Remove Carriage Holder from Rotation Unit

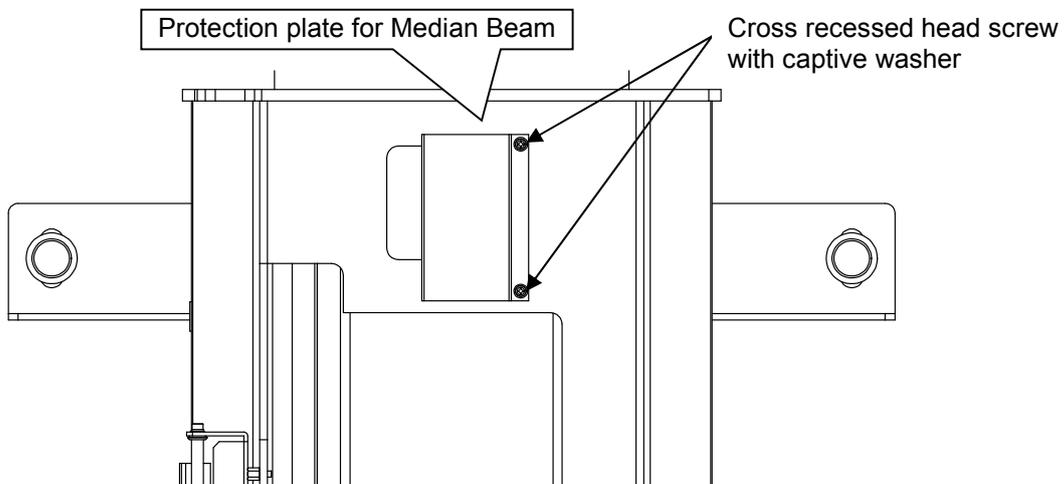
10.1. Take the carriage holder off the Rotation Unit.

Nut with spring washer  $\phi 8$  : 4pcs.  
Hexagon socket head cap screw with spring and flat washer M6 x 12 : 4pcs.



11. Remove the protection plate for Median Beam

Cross recessed head screw with captive washer M3 x 6 : 2pcs.



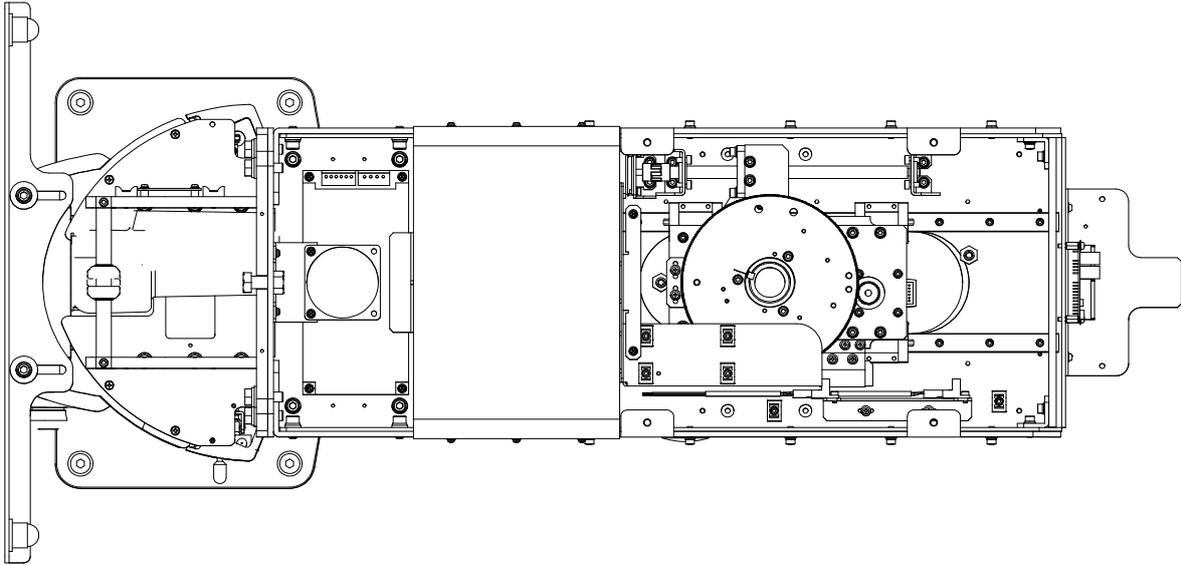
**12. Connect relay connector in Rotation Unit to the Connector in Sliding Unit.  
Please make sure to check mark of connector and then connect it.**

12.1. Relay connector in Rotation Unit.

Mark of connector : · CN1 · CNUM · CNPSHB · CN5\_6\_7  
· CN5\_6\_7 · CN11

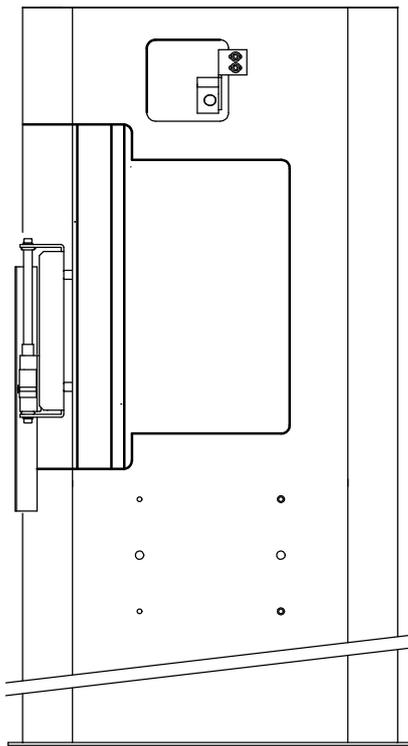
Switching HUB

Mark of connector : · CNLAN1 · FPD CN18



12.2. Relay connector in Sliding Unit.

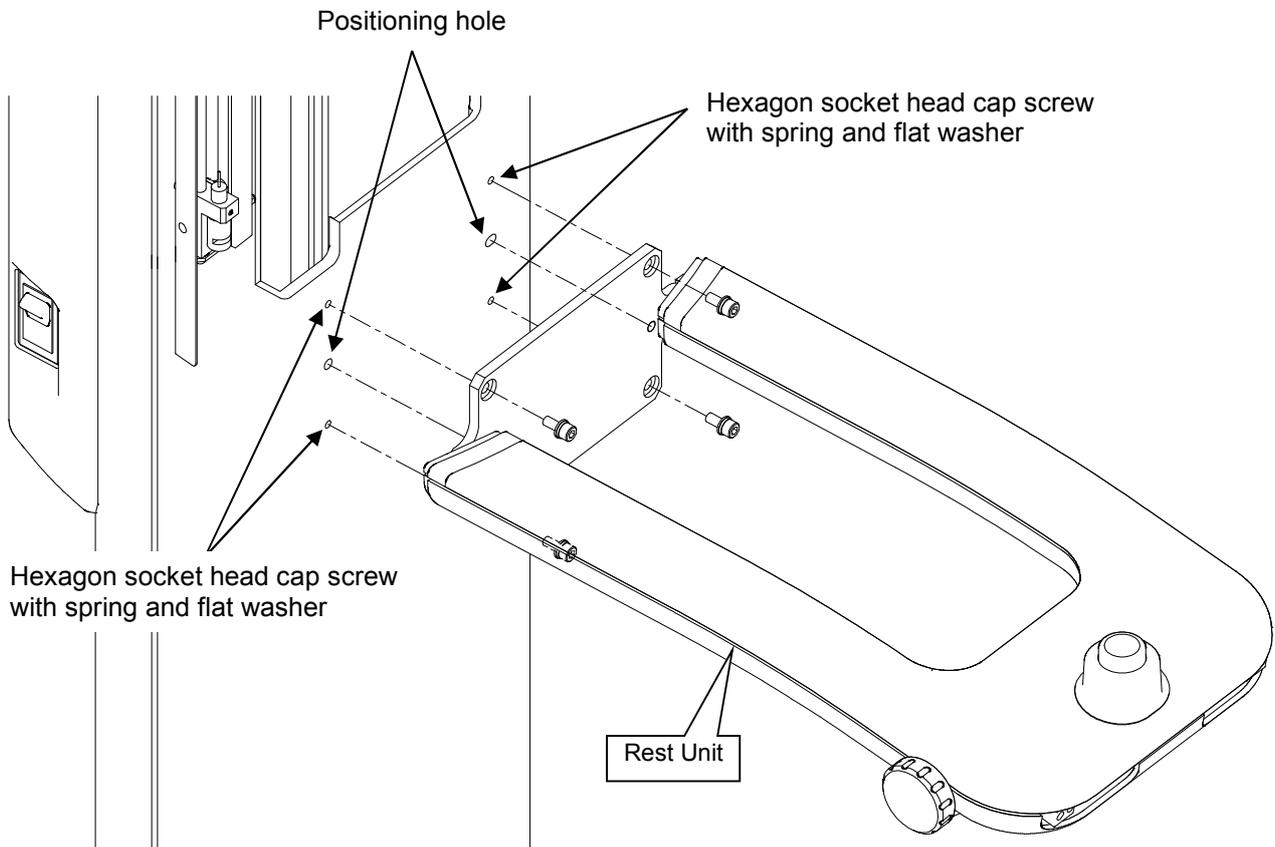
Mark of connector : · CNS5 · CN13 · CN14



### 13. Attach Rest Unit of Sliding Unit.

- 13.1. Align positioning pins of Rest Unit ASSY to positioning holes of Sliding Unit.
- 13.2. Attach Chinrest Unit by hexagon socket head cap screw with spring and flat washer.

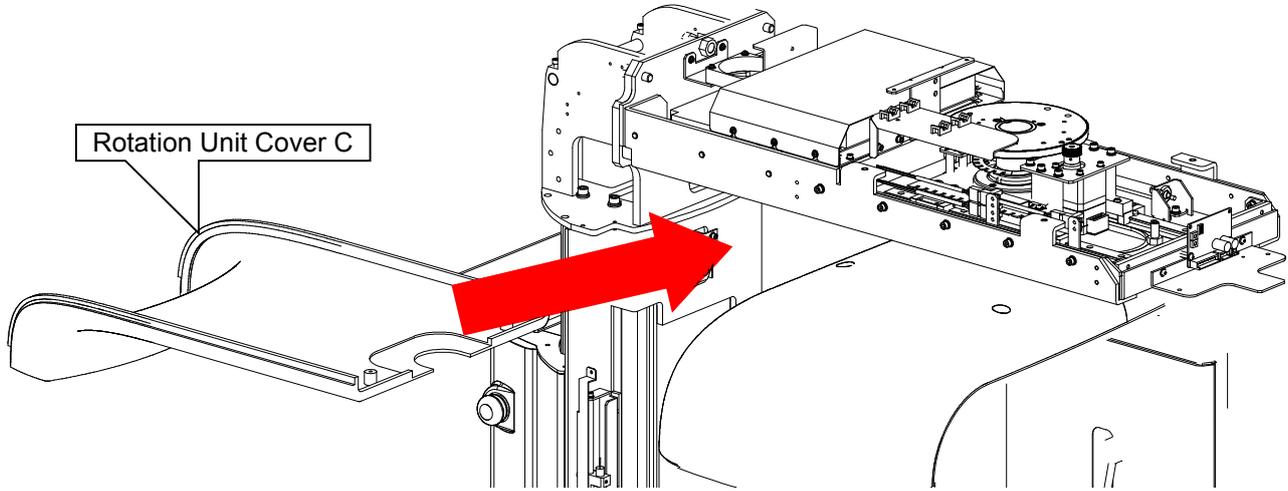
Hexagon socket head cap screw with spring and flat washer M5 x 12 : 4pcs.



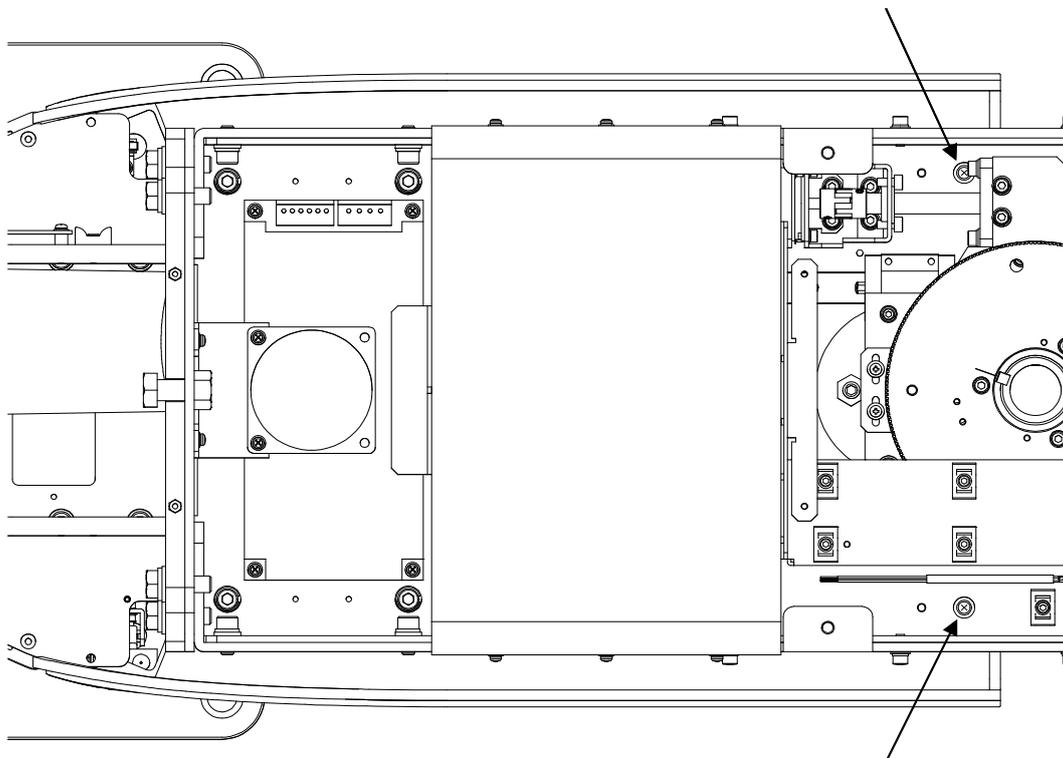
### 14. Attach Rotation Unit Cover C of Rotation Unit.

14.1. Slowly rotate arm to 90 degrees position.

Cross recessed head screw with captive washer M3 x 10 : 2pcs.



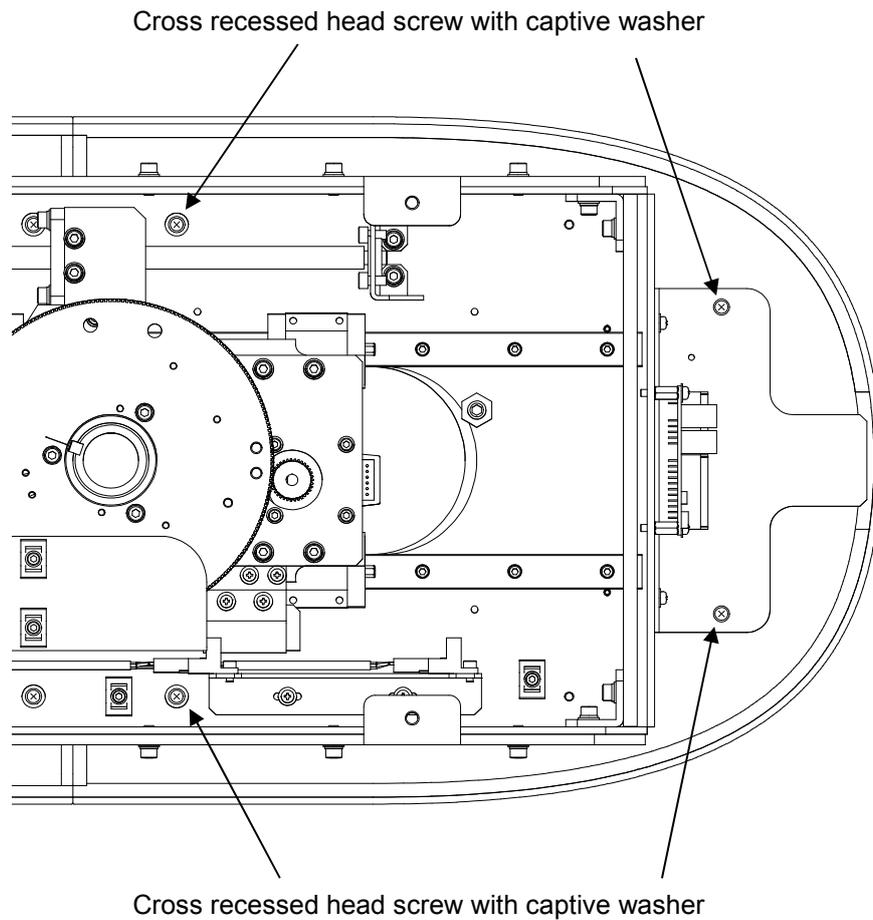
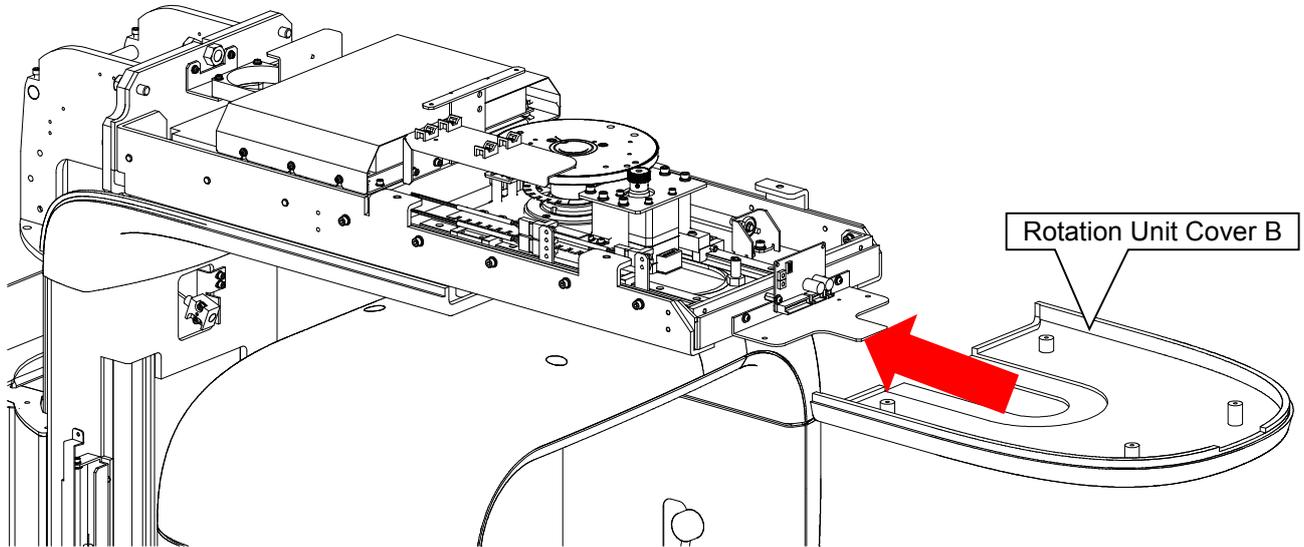
Cross recessed head screw with captive washer



Cross recessed head screw with captive washer

### 15. Attach Rotation Unit Cover B of Rotation Unit.

Cross recessed head screw with captive washer M3 x 10 : 4pcs.



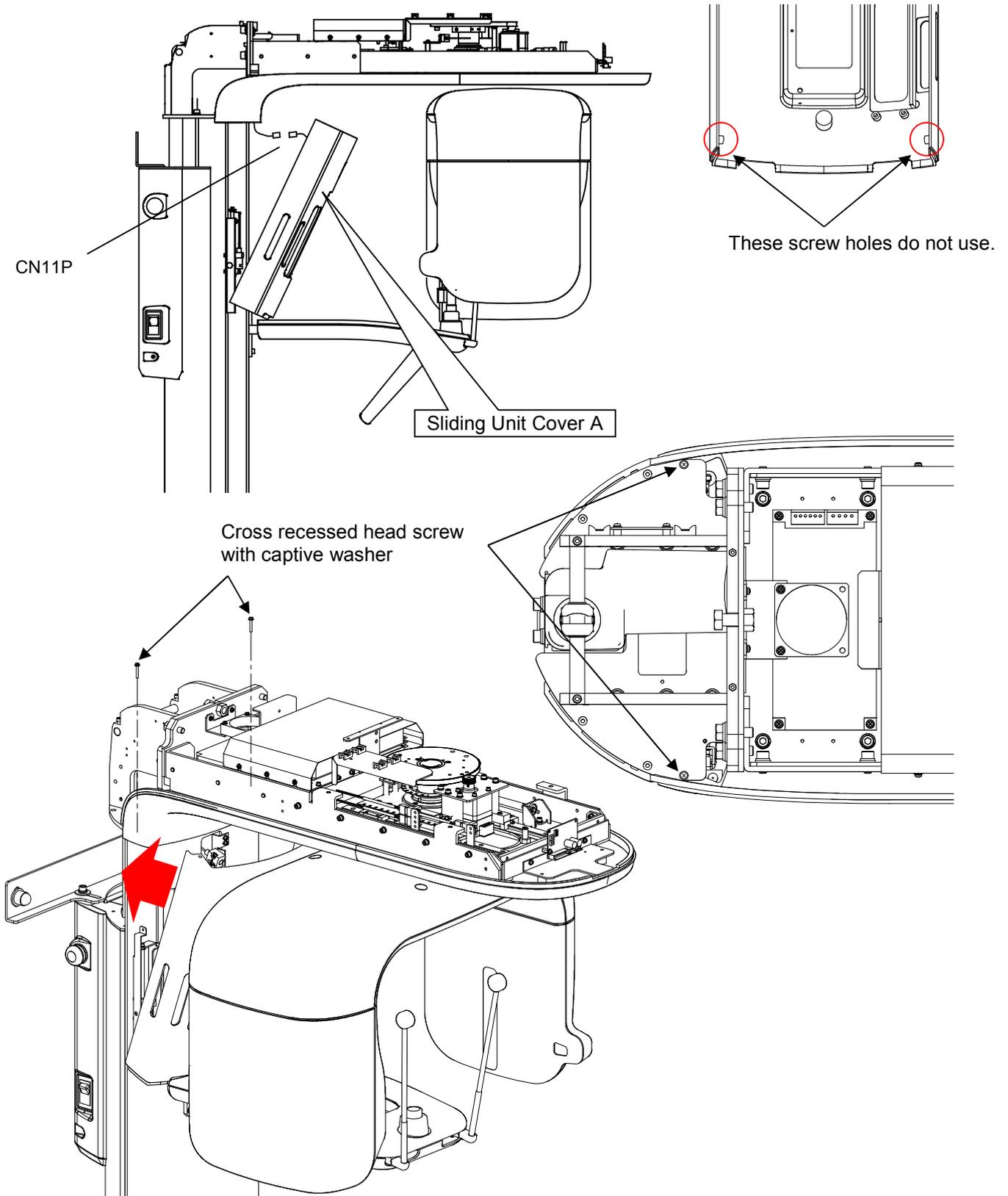
## 16. Attach Sliding Unit Cover A of Sliding Unit.

16.1. Connect relay connector of Sliding Unit Cover A.

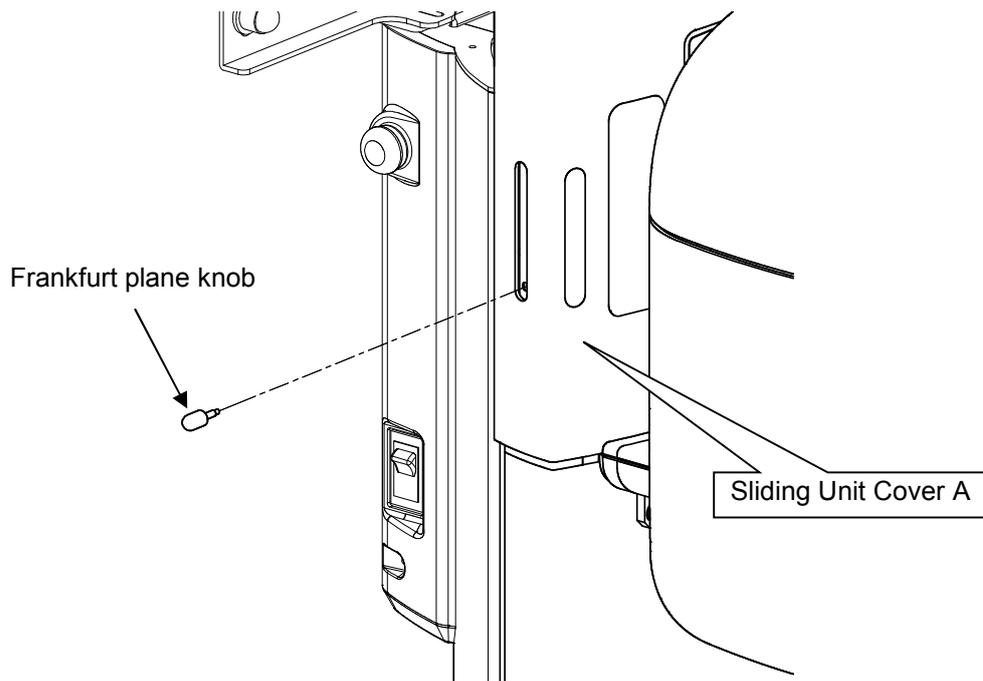
Mark of connector : • CN11P

16.2. Fix cover A of Sliding Unit by cross recessed head screw with captive washer.

Cross recessed head screw with captive washer M3 x 20 : 2pcs.

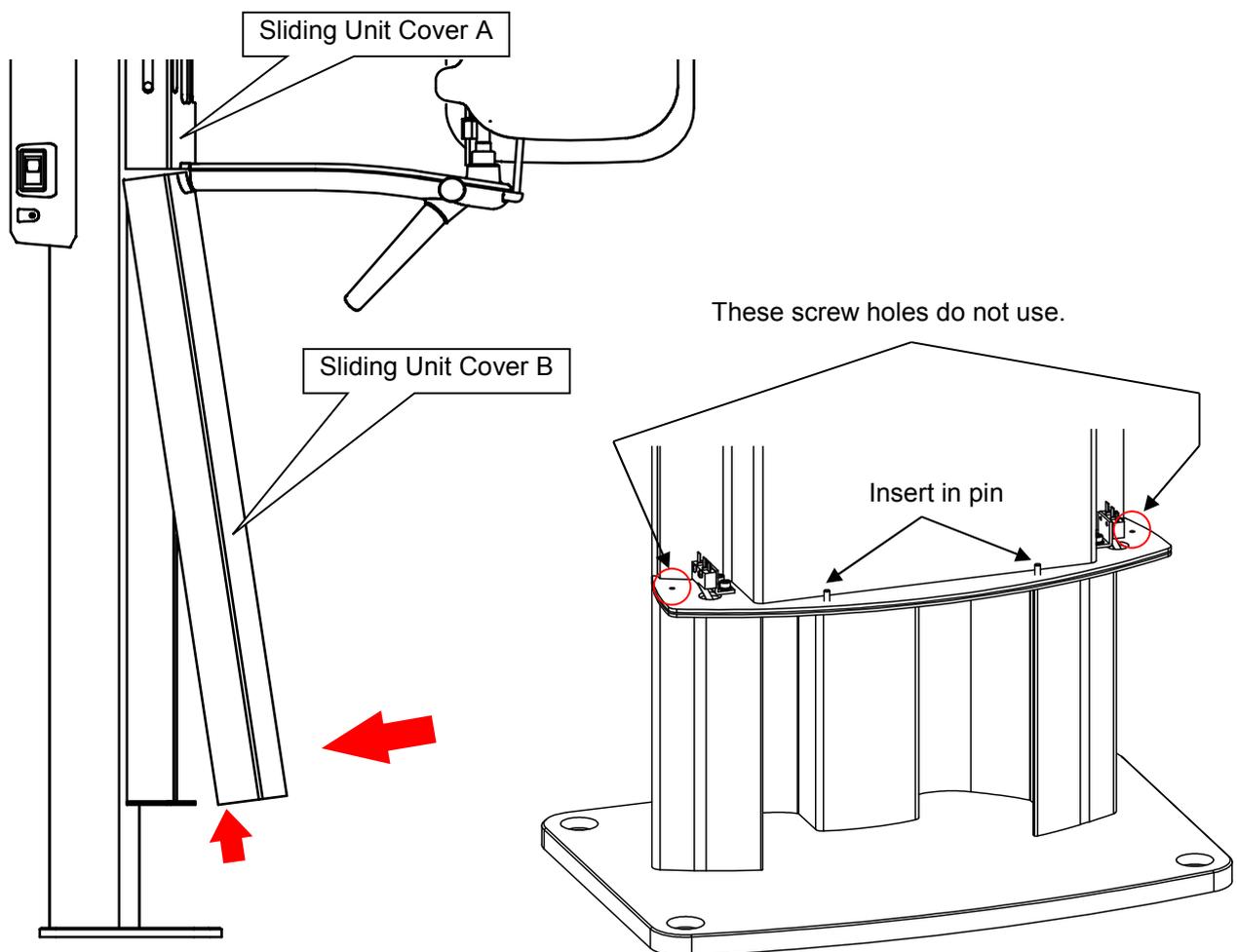


**17. Put Frankfurt plane knob to Sliding Unit.**



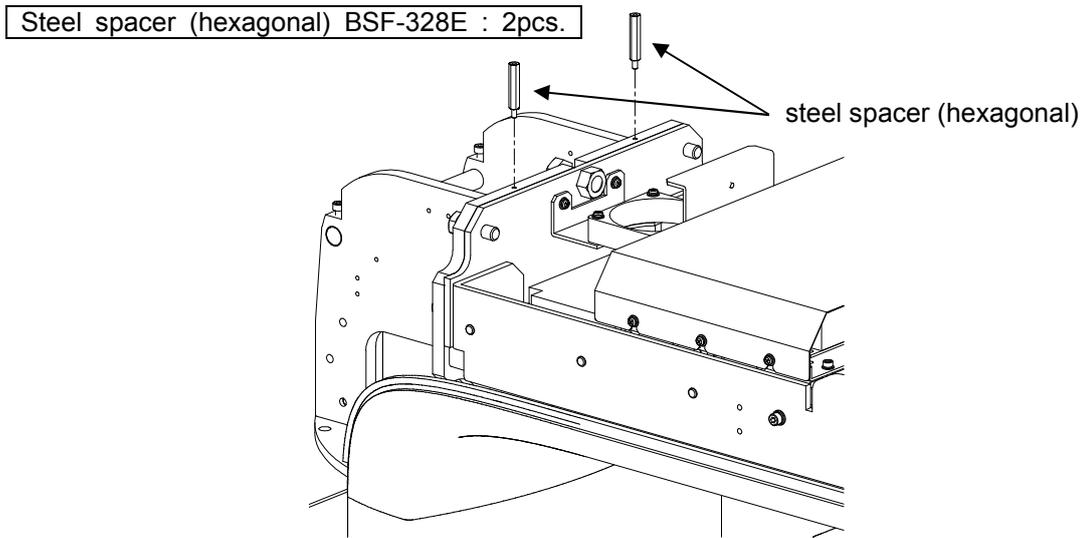
**18. Attach Sliding Unit Cover B of Sliding Unit.**

18.1. Insert the upper side of Sliding Unit Cover B into underside of Sliding Unit Cover A, then the underside of Sliding Unit Cover B will be inserted in pin and fixed.



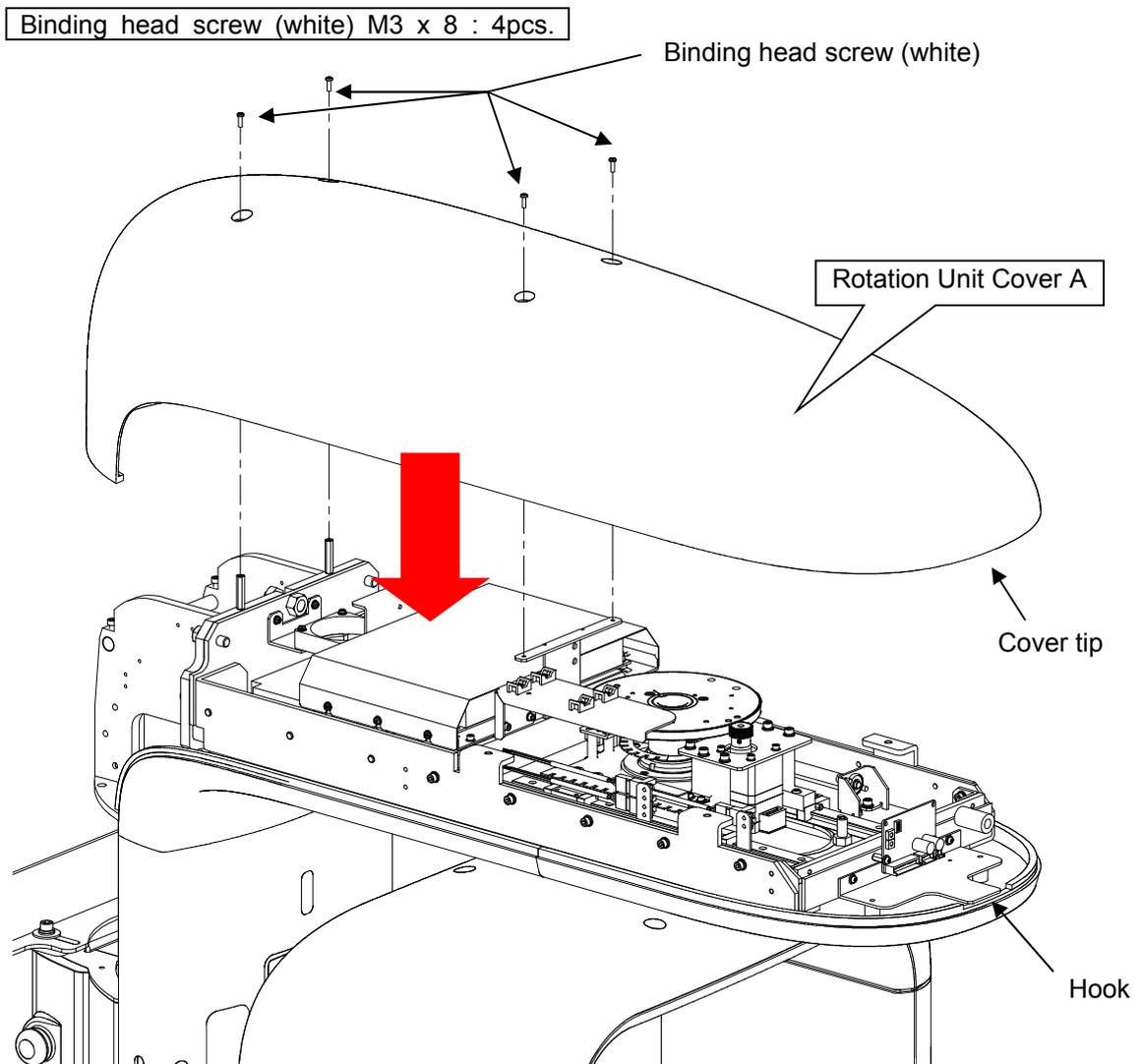
## 19. Put the Rotation Unit Cover A on Rotation Unit.

19.1. Attach steel spacer (hexagonal) on Rotation Unit.



19.2. Hang the tip of the cover at a hook at rotation unit.

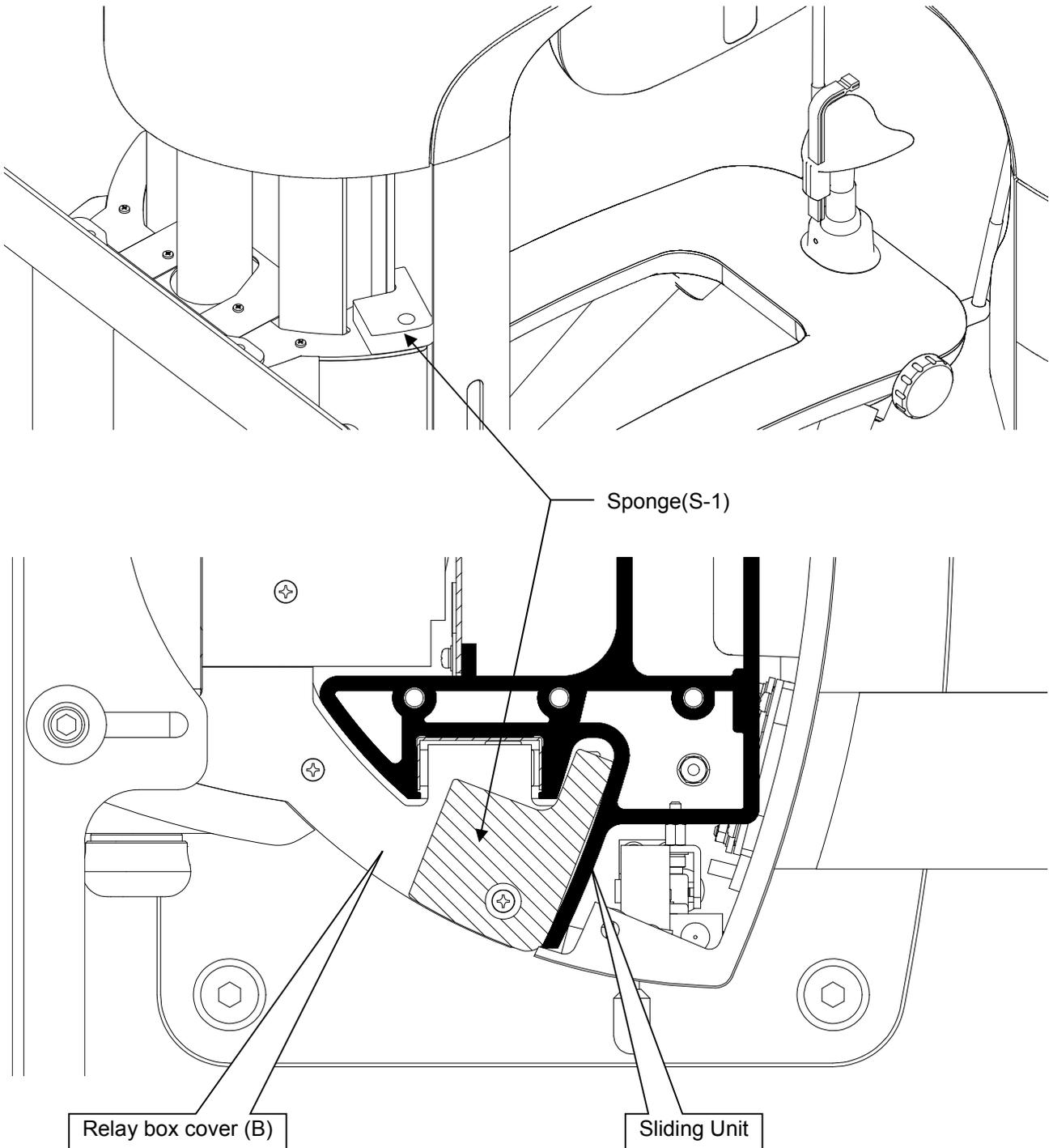
19.3. Fix Rotation Unit Cover A by binding head screws.



**20. Paste sponge(S-1)**

Sponge(S-1) should be pasted on relay Box cover(B) with double sided seal for making less gap from sliding unit as possible.

\*If you hear sound of rubbing sponge when confirming operation check, then paste sponge (S-1) on the position that is not conspicuous sound.

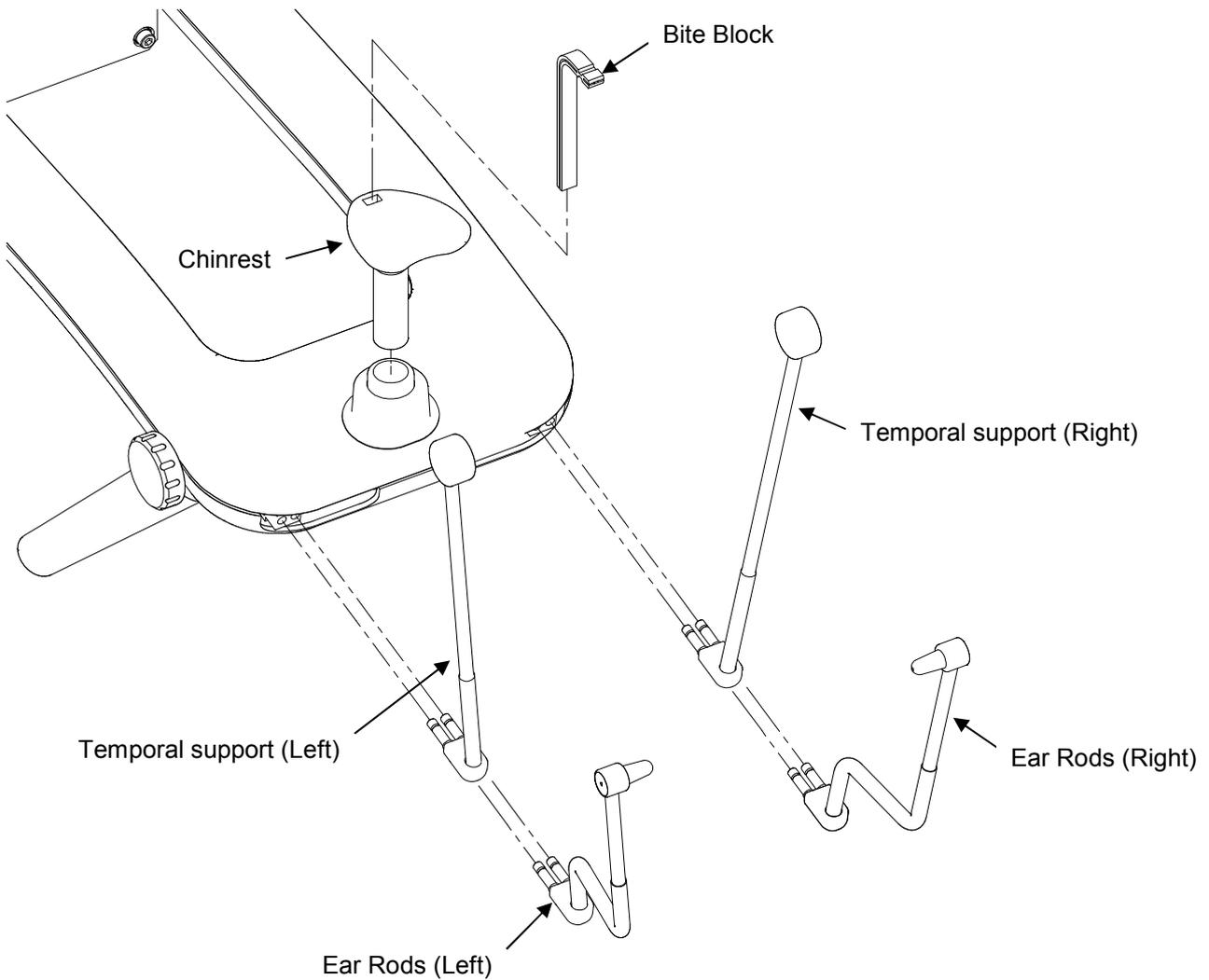


**21. Insert accessories to Rest Unit.**

Confirm if the desorption of accessories is possible smoothly.

Accessories should be attached on each radiographic mode, so please refer to the following table.

Accessories	Radiographic Mode		
	Panorama	Panoramic Bitewing	TMJ
Temporal support	●	●	
Chinrest	●	●	
Bite Block	●	●	
Ear Rods			●



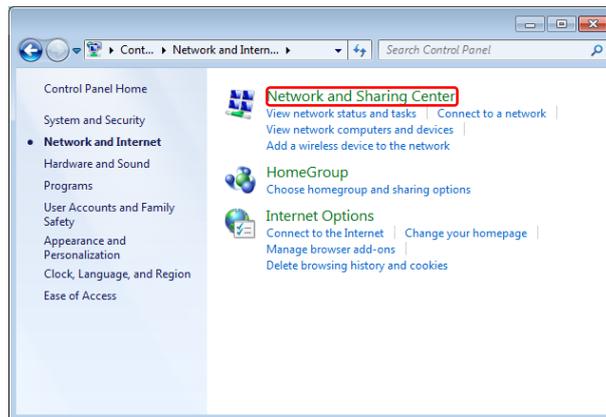
## 8. Procedures to install a TWAIN driver in imaging software

### 1. Set IP address

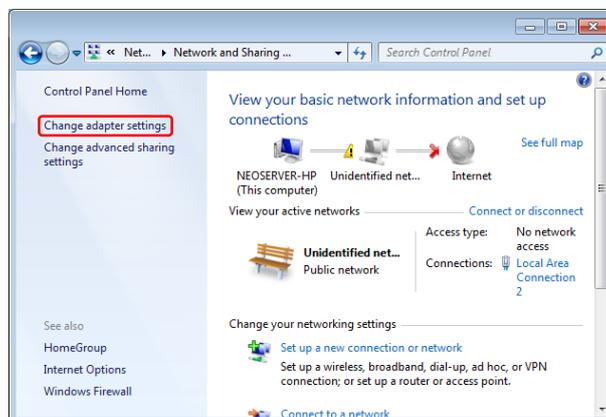
- 1) Open 「Control Panel」
- 2) Choose 「Network and Internet」



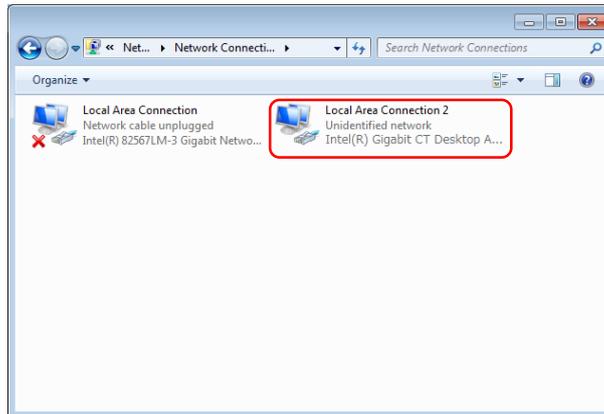
- 3) Choose 「Network and Sharing Center」



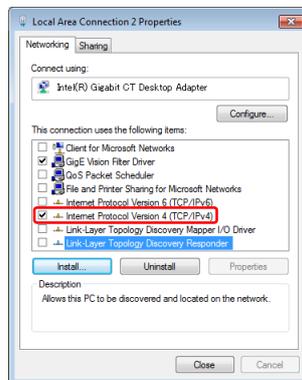
- 4) Choose 「Change adapter settings」



- 5) Right click LAN Connection that is connected to Bel-Cypher Pro. Choose property. If you use the LAN card supplied with Bel-Cypher Pro, open active 「Local Area Connection X」



- 6) Double click 「Internet Protocol Version 4(TCP/IPv4)」 in 「The connection uses the following items:」



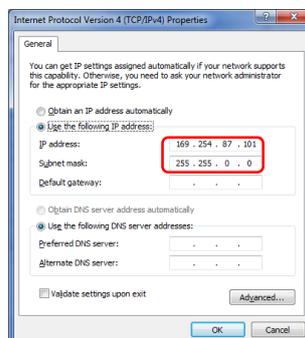
- 7) Choose 「Use the following IP address」

- 8) Set IP address and subnet mask as follows

✳ **You need to set following values first, even though you change IP address later**

IP address : 192.168.2.33

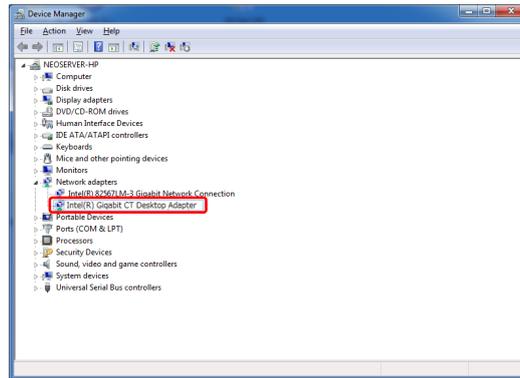
Subnet mask: : 255.255.255.0



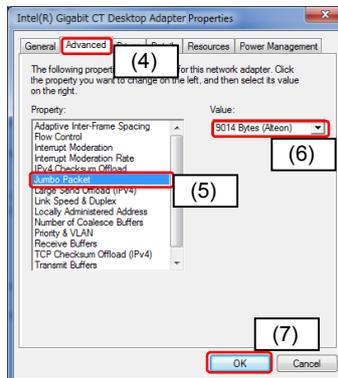
- 9) Enter only IP address and Subnet Mask. Click OK to close all windows

## 2. Set Jumbo Packet

- 1) Go to 「Control Panel」 → 「System and Security」 → 「Device Manager」



- 2) Right click LAN Connection that is connected to Bel-Cypher Pro. Then choose property. If you use the NIC supplied with Bel-Cypher Pro, right click and choose property.
- 3) Property screen of NIC comes up.
- 4) Choose 「Advanced」 tab
- 5) Choose 「Jumbo Packet」 in 「Property」
- 6) Set the value as 「9014 Bytes」



- 7) Click 「OK」 to close property screen and device manager screen

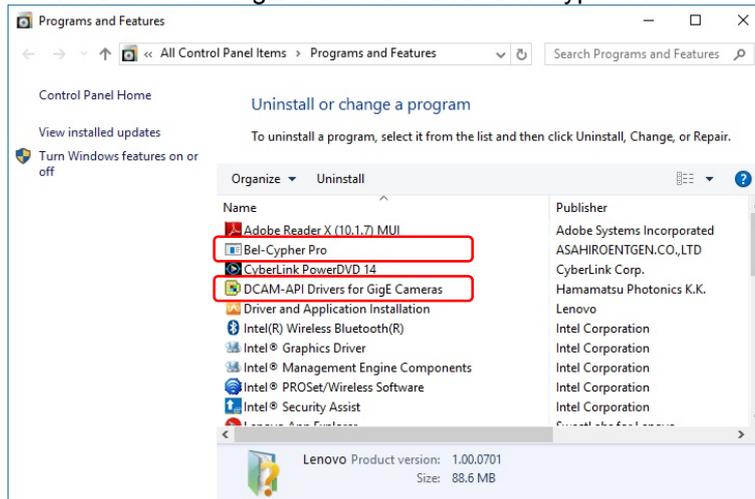
### 3. Uninstall DCAM-API and Twain Driver

If you setup new PC, please go to next section.

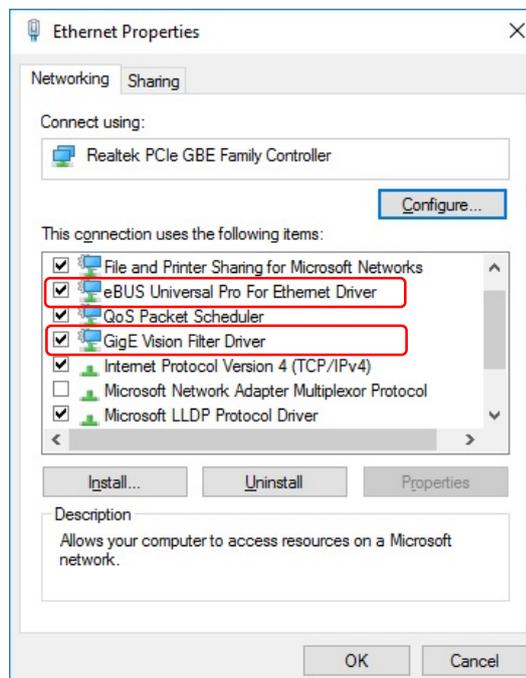
#### 3.1 Bel-Cypher Pro

If you used an old version of DCAM-API and Bel-Cypher Pro Twain Driver in the PC, you have to remove it before installing newer version.

- 1) Open "Control Panel".
- 2) Click "Uninstall a program".
- 3) Uninstall "DCAM-API Driver for GigE Cameras" and "Bel-Cypher Pro".

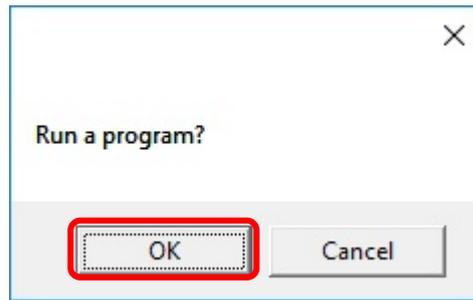


- 4) Open the properties of the network connected to the device.
- 5) If "eBUS Universal Pro For Ethernet Driver" and "GigE Vision Filter Driver" exists, please uninstall it.

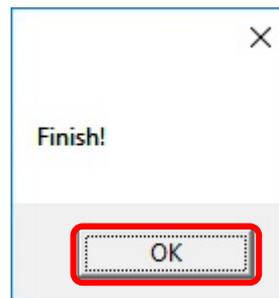


- 6) Execute batch file "deletedDCAMpath.vbs" in install Disc.

- 7) The confirmation message window is displayed. Click “OK”.



- 8) After completion, the message window is displayed. Click “OK”.

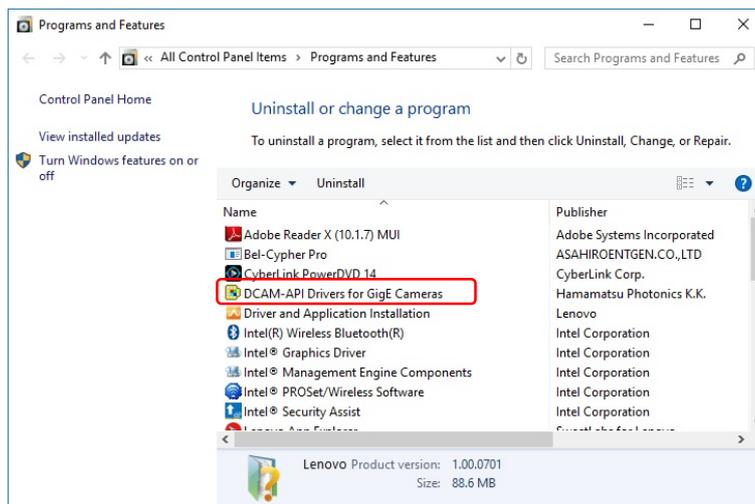


- 9) Restart the PC.

### 3.2 Bel-Cypher N

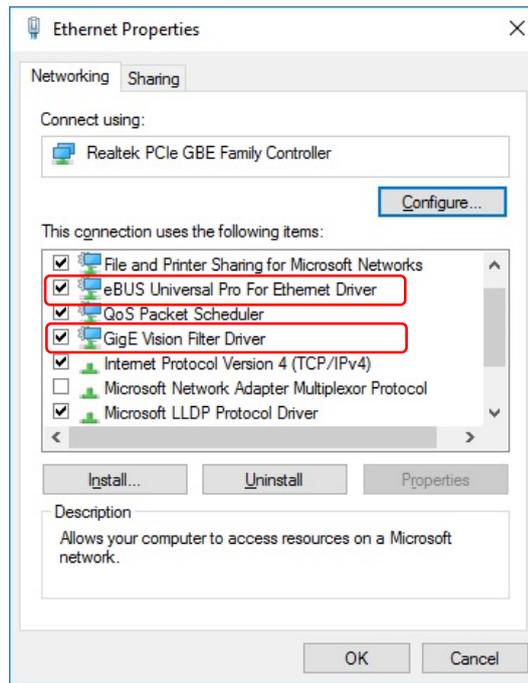
If you used Bel-Cypher N, you have to remove DCAM-API for Bel-Cypher N in the PC, before installing it for Bel-Cypher Pro.

- 1) Open “Control Panel”.
- 2) Click “Uninstall a program”.
- 3) Uninstall “DCAM-API Driver for GigE Cameras”.

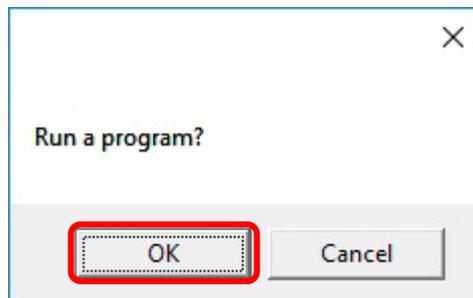


- 4) Open the properties of the network connected to the device.

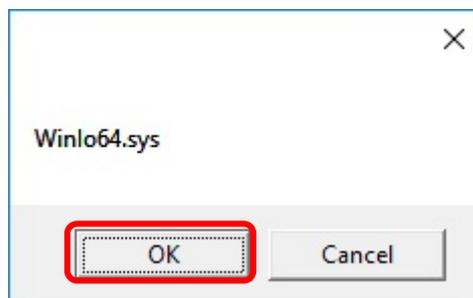
- 5) If “eBUS Universal Pro For Ethernet Driver” and “GigE Vision Filter Driver” exists, please uninstall it.



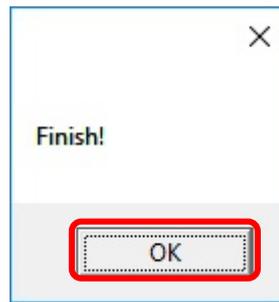
- 6) Execute batch file “deletedDCAMpath.vbs” in install Disc.
- 7) The confirmation message is displayed. Click “OK”.



- 8) If the confirmation message is displayed. Click “OK”.

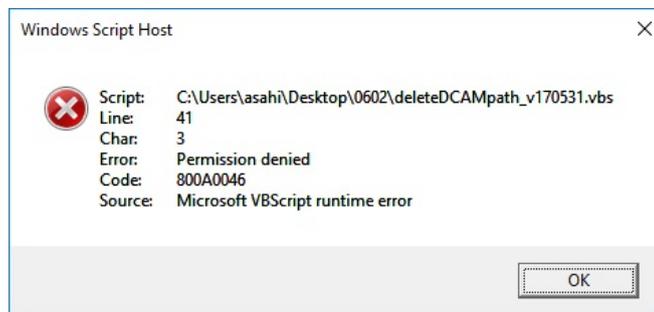


- 9) After completion, the message window is displayed. Click “OK”.

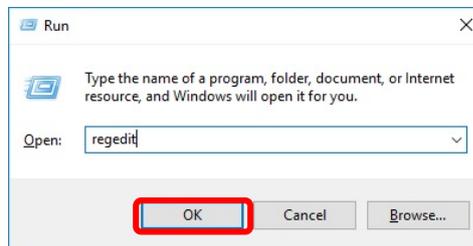


- 10) Restart the PC.

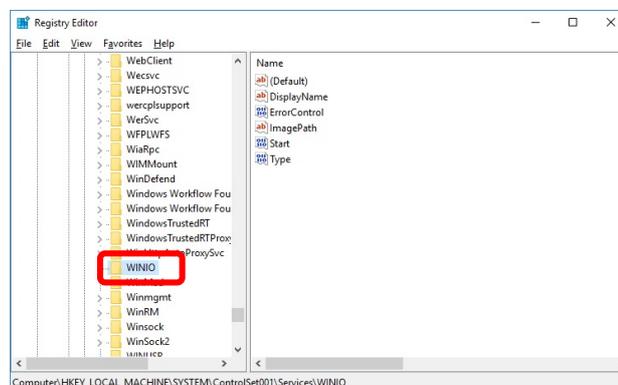
**NOTE :** If error message was displayed during running batch file, please take the following procedure.



- 1) Hold windows key + R. Type “regedit” and click “OK”.



- 2) Open the registry editor.
- 3) Delete “HKEY\_LOCAL\_MACHINE\SYSTEM\ControlSet001\Services\WINIO”.



- 4) Restart PC.
- 5) Execute batch file again.

#### 4. Installation of Bel-Cypher Pro Twain Driver and DCAM-API

1) Turn on PC.

2) Set Bel-Cypher Pro TWAIN Driver of Install Disc.

※If the driver is not installed automatically, then run “Setup.bat” stored in a CD

3) The Visual C++ Runtime Setup screen such like Fig. 4-1 is displayed. Click “Install”

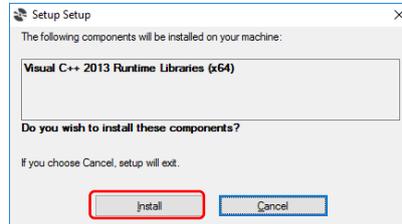


Fig 4-1 Visual C++ Run time Setup screen

4) Check “I agree” and Click “Install” such like Fig. 4-2 is displayed. Click “Install”

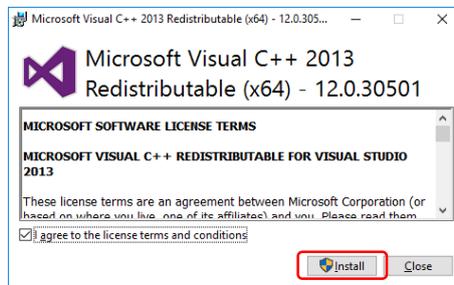


Fig 4-2 Visual C++ Run time Install screen

5) The dialogue such like Fig. 4-3 is displayed. Click “Close”.

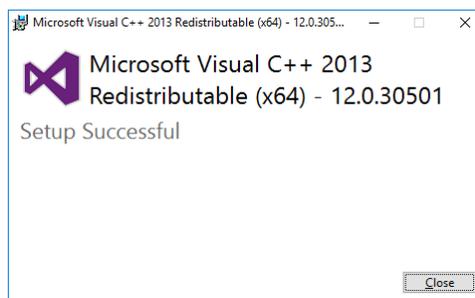


Fig 4-3 Installation Complete screen

6) After the installation was completed, the dialogue such like Fig. 4-4 Bel-Cypher Pro TWAIN Setup Wizard starts. Click “Next”

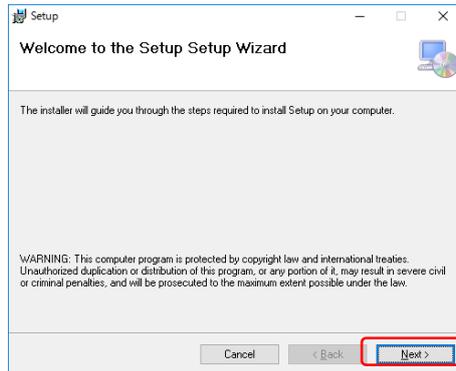


Fig 4-4 Bel-Cypher Pro TWAIN Setup Wizard

7) The “Select install folder” dialogue such like Fig. 4-5 is displayed. Click “Next”

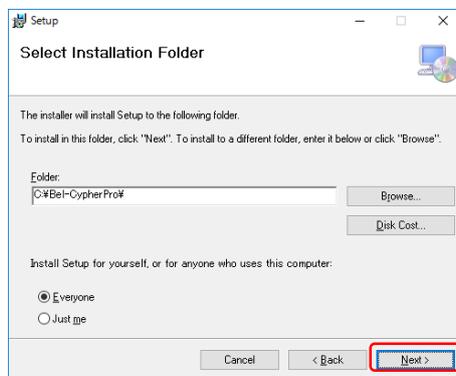


Fig 4-5 “Select Installation Folder” screen

8) The dialogue such like Fig. 4-6 is displayed. Click “Next”

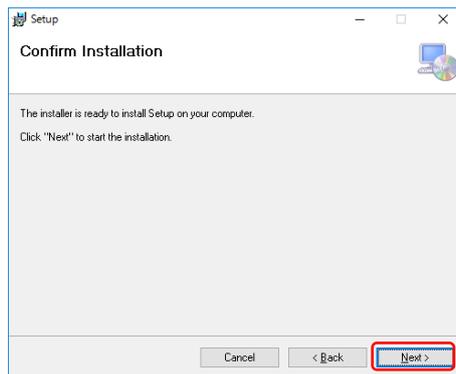


Fig 4-6 Confirm Installation screen

9) The dialogue such like Fig. 4-7 is displayed. Bel-Cypher Pro TWAIN is installed.

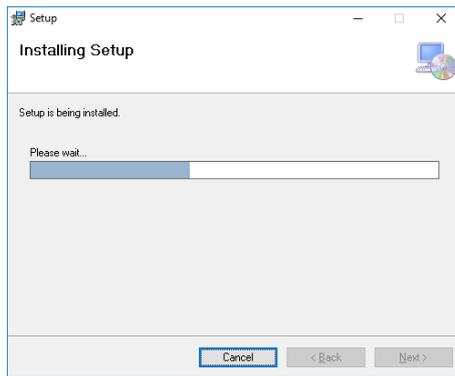


Fig4-7 Installing Bel-Cypher Pro TWAIN screen

10) The dialogue such like Fig. 4-8 is displayed. Click "Close"

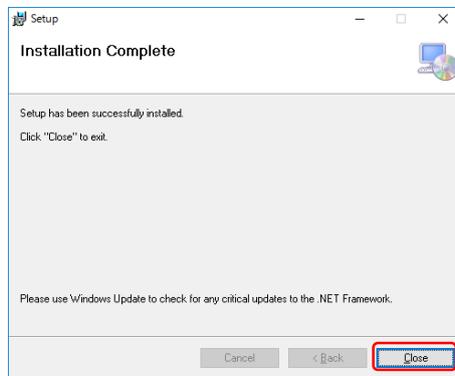
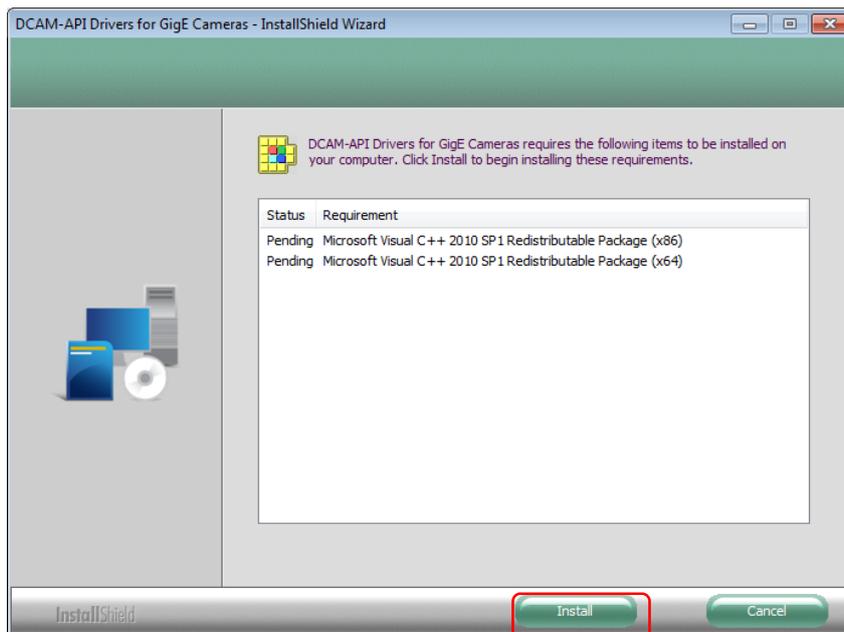
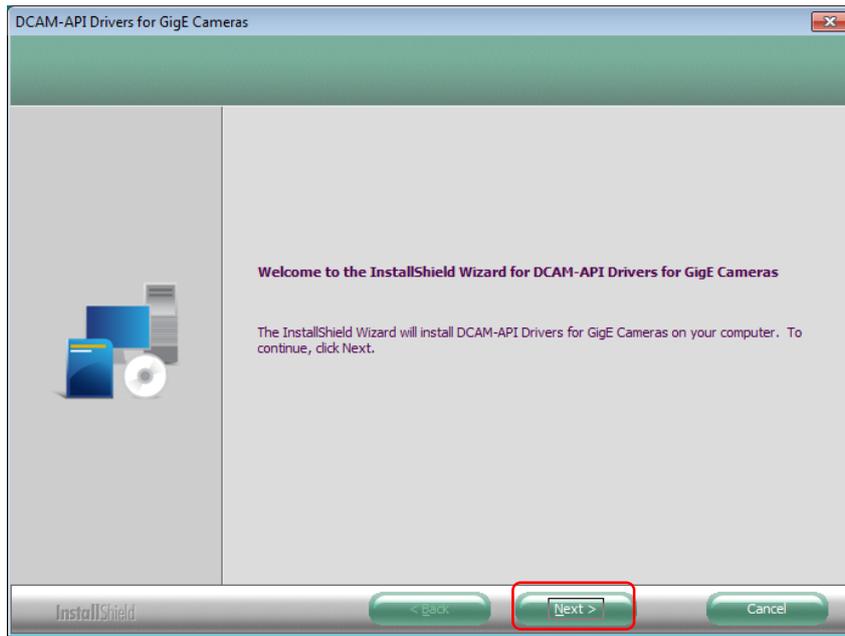


Fig 4-8 Installation Complete screen

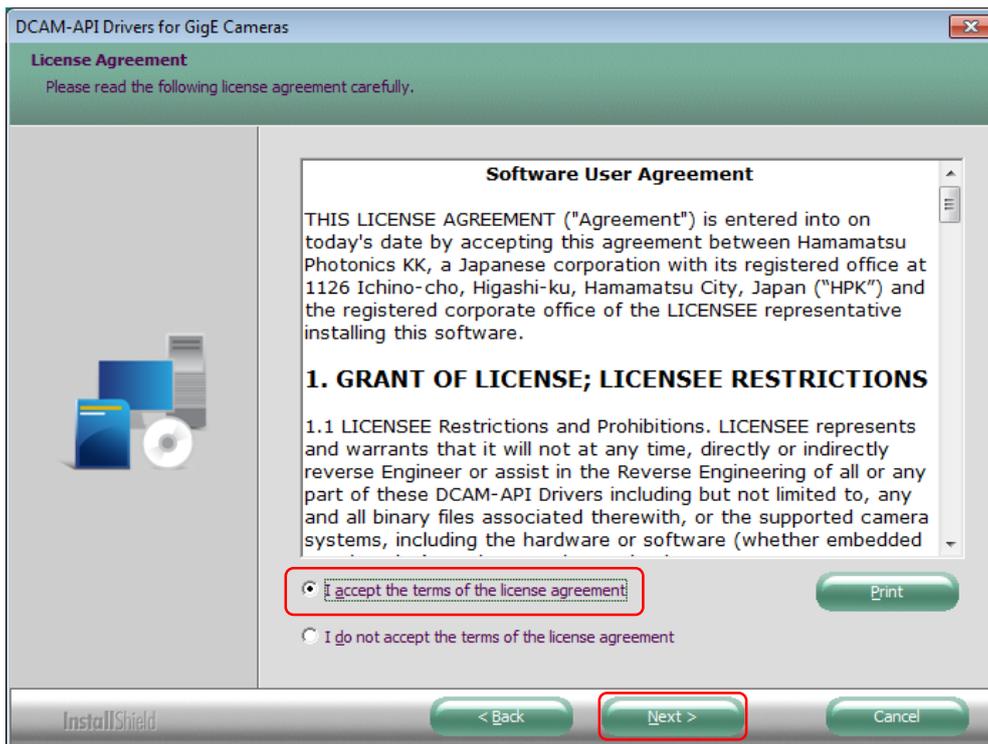
13) Click "Install".



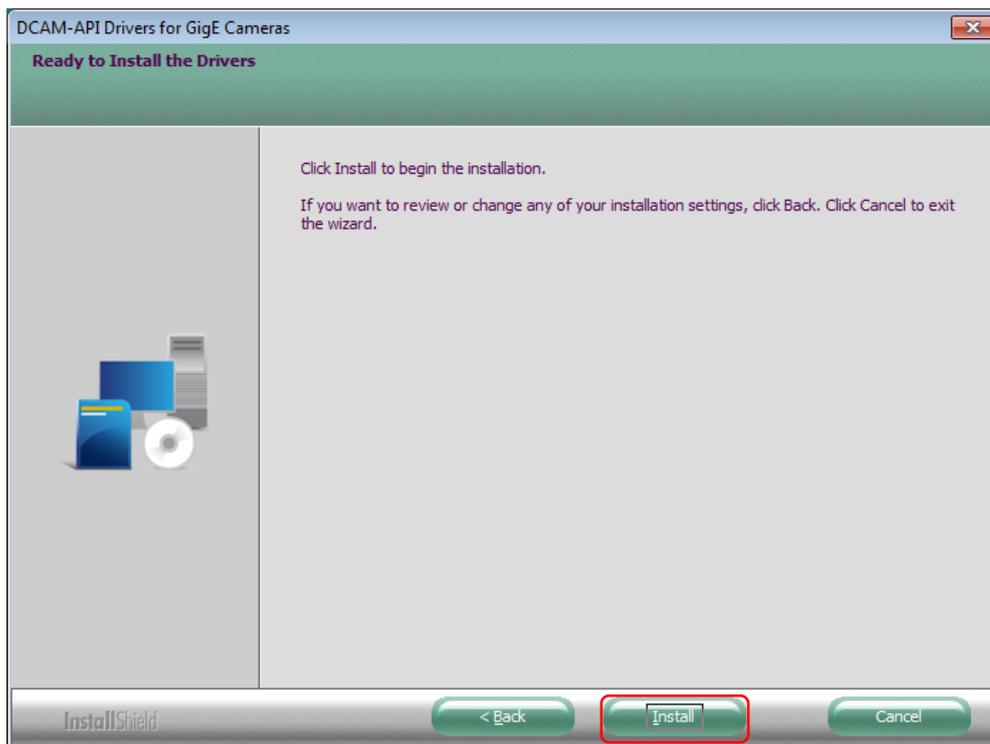
14) Click "Next".



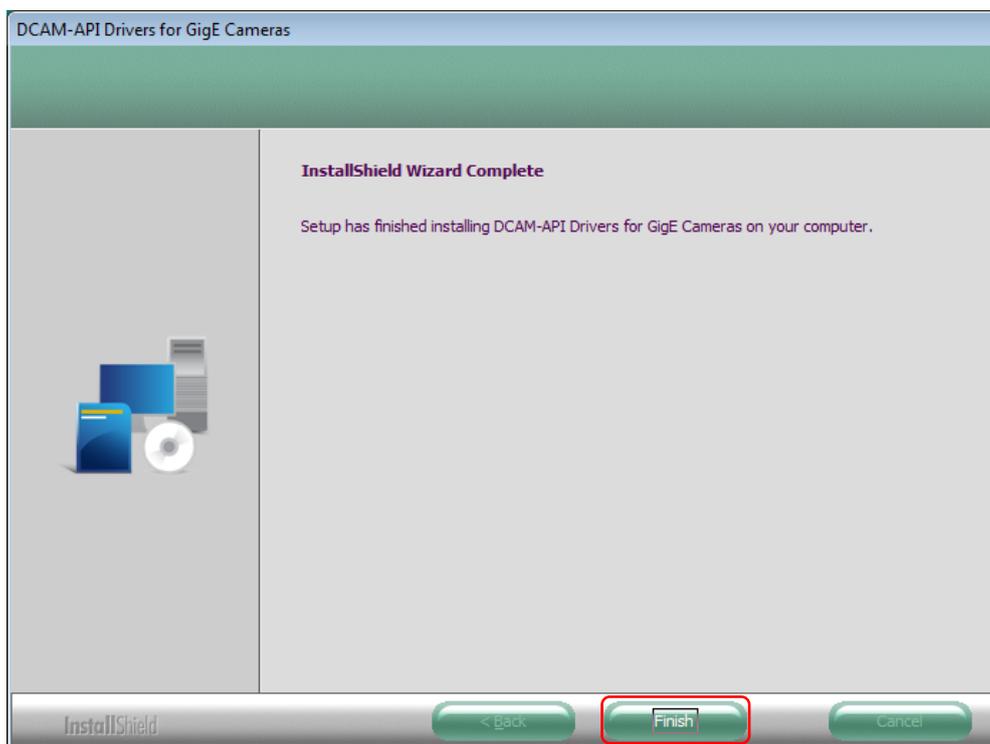
15) Check "I accept..." and click "Next".



16) Click "Install".



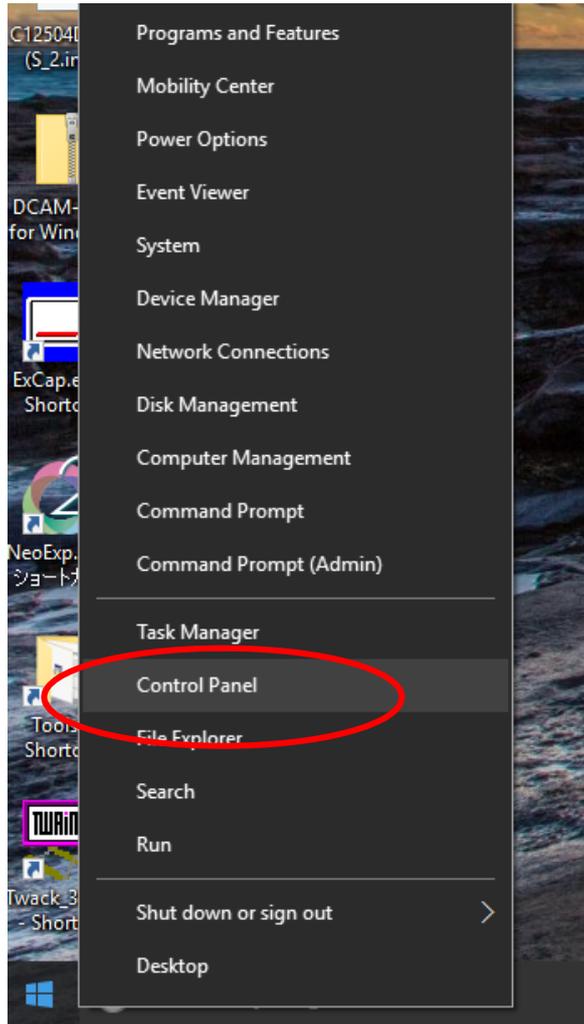
17) Click "Finish"



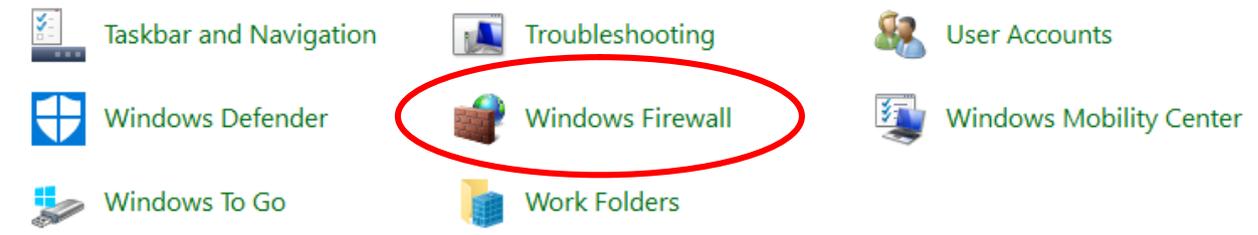
16) Installation is completed

### 5. Setting of Firewall

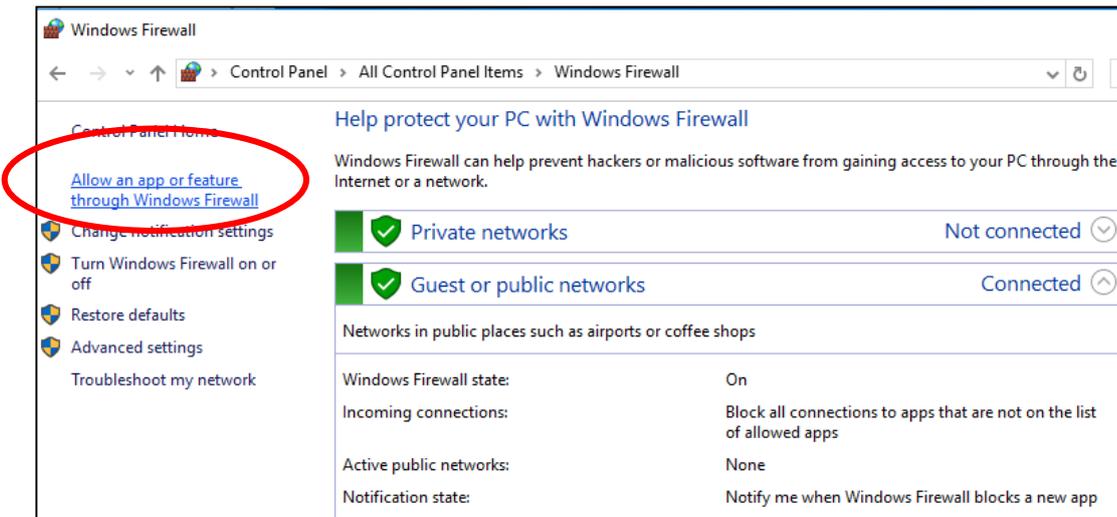
1) Open Control Panel.



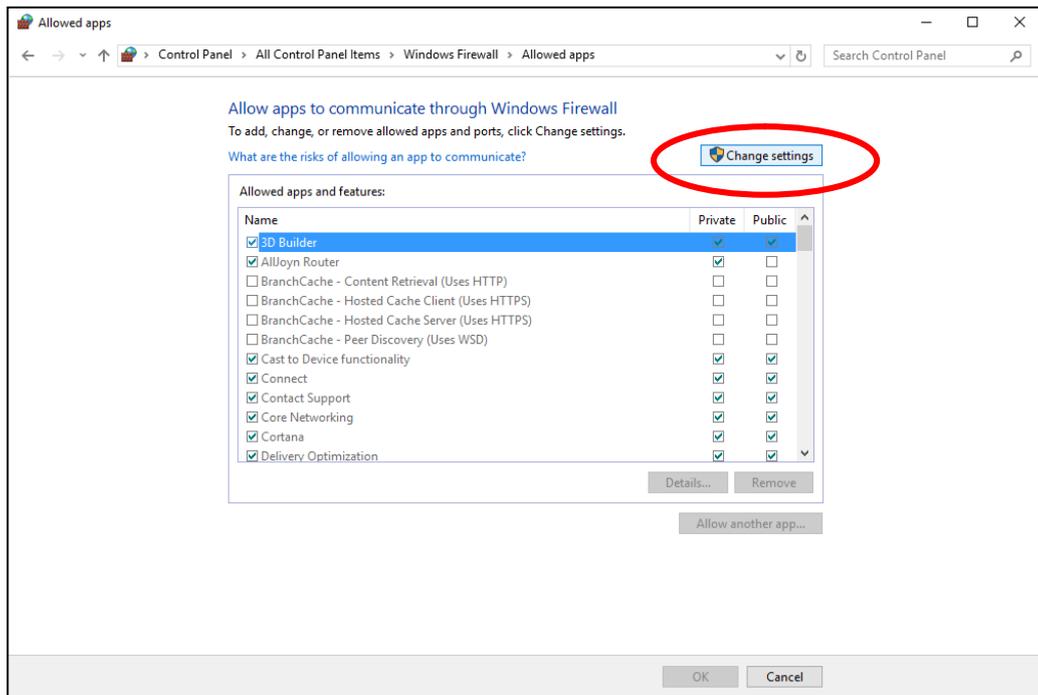
2) Open "Windows Firewall" from Control Panel.



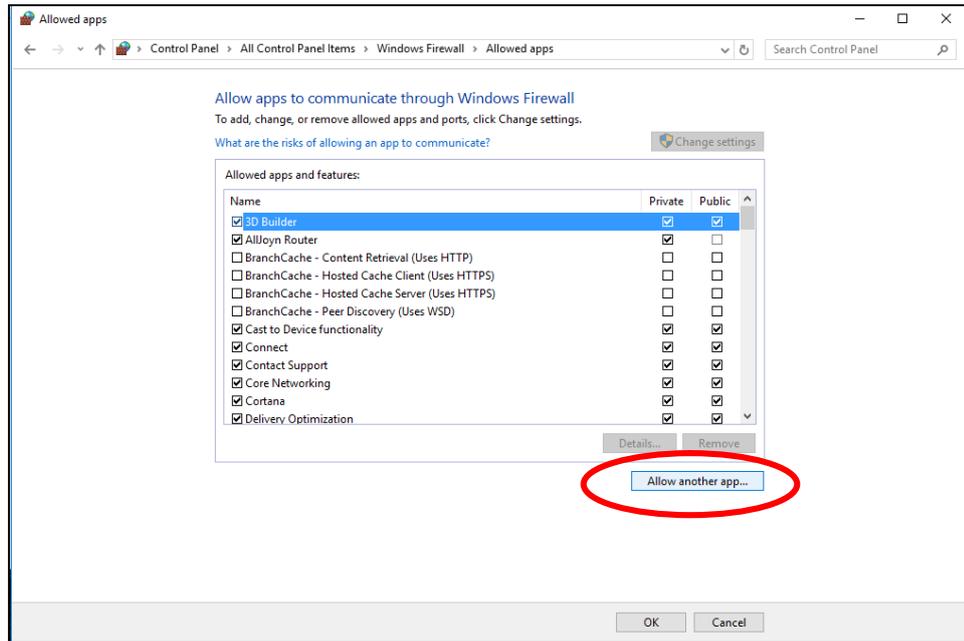
3) Click "Allow a program or feature through Windows Firewall".



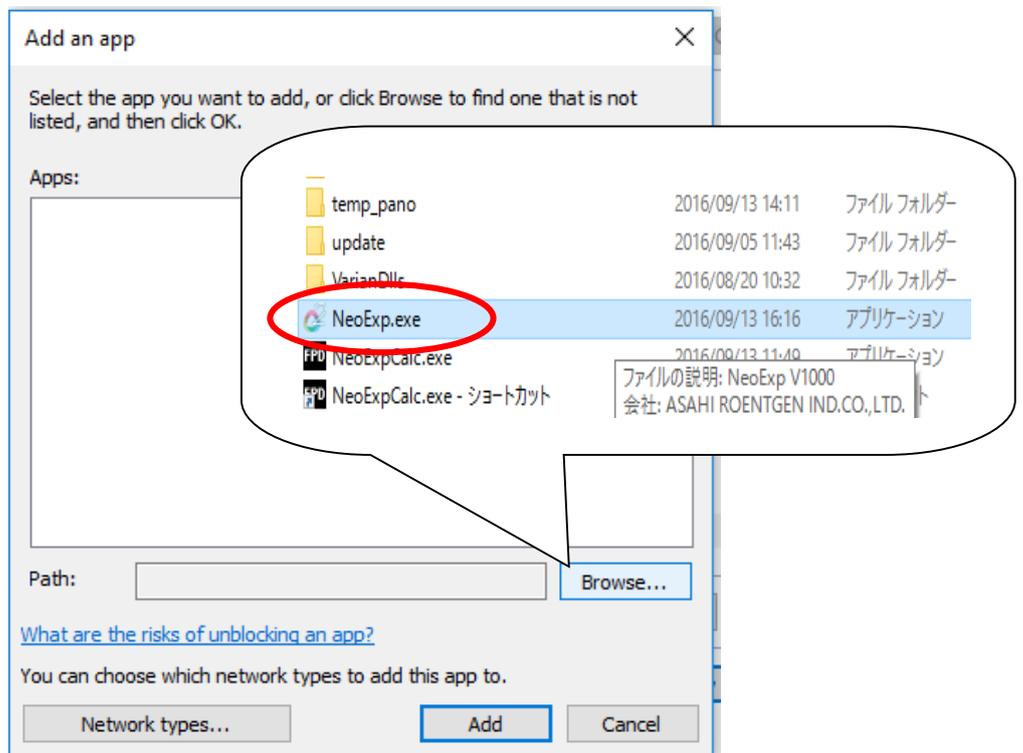
4) Click "Change settings".



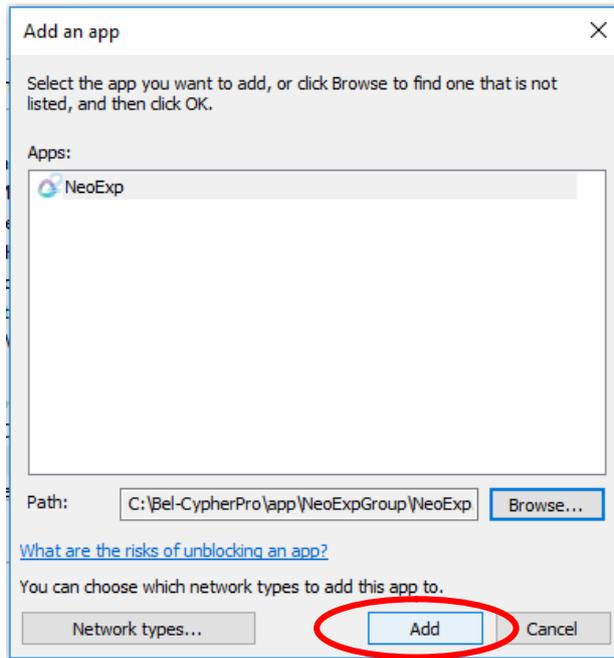
5) Click "Allow another program".



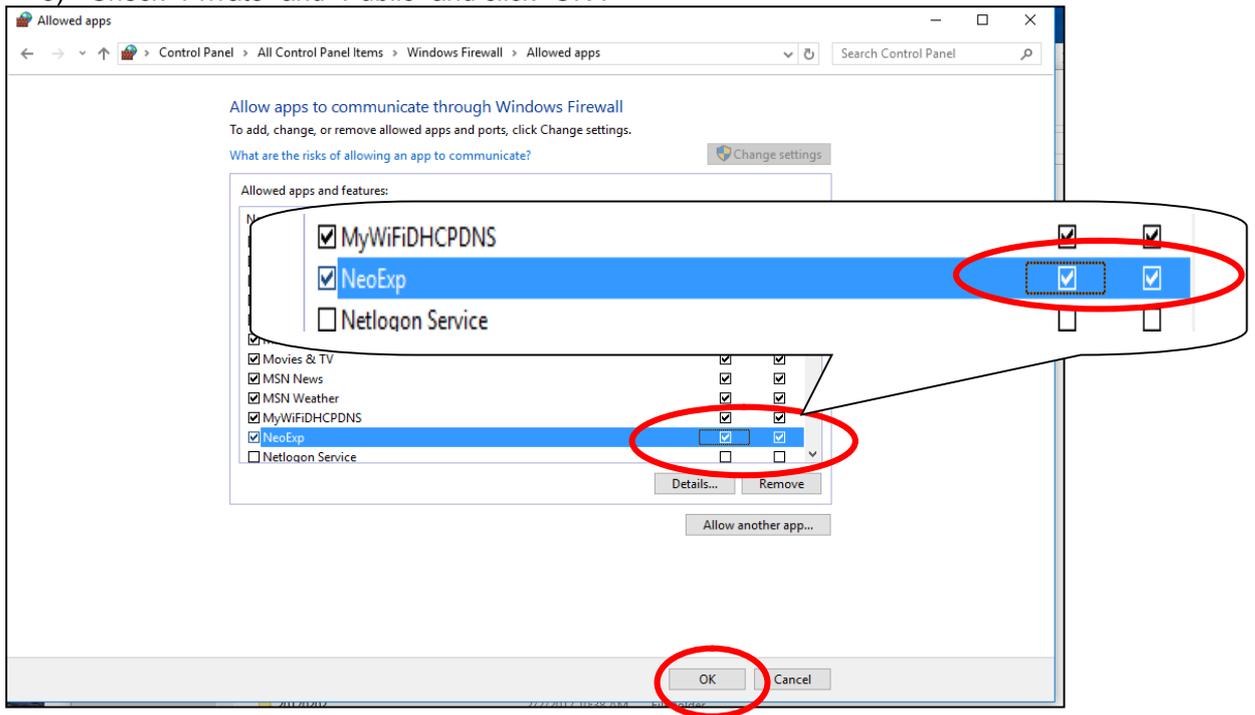
6) Click the "Browse" and select radiograph software (C:\Bel-CypherPro\app\NeoExpGroup\NeoExp.exe).



7) Click "Add".



8) Check "Private" and "Public" and click "OK".



9) Click OK to finish Firewall setting.

**6. Select image processing type.**

- 1) Open "C:\Bel-CypherPro\app\NeoExpGroup\2DRecon\BelCypherPro\PanoramaSetting.ini".
- 2) Select image processing type of the initial image displayed after irradiation.  
0 : Standard    1 : Type1    2 : Type2  
3 : Type3    4 : Type4

```
PanoramaSetting - Notepad
File Edit Format View Help
//0:0"x, 1:90"x, 2:180"x, 3:270"x@Žž(Evšň,è
OrgRotation=2
//0:,È,μ, 1:ã%º, 2:¶%E
OrgInversion=0
ImageType=1
[PANO_N_ADULT]
fpfmf%}_'Êi_-1
//ŽBšeŽžŠ0
ExposureTime=10.0
//Žæ,èž,ÝFPS
Fps=150.0
```

● **example of image processing type**

0 : Standard



1 : Type1



2 : Type2



3 : Type3



4 : Type4



### 7. Install Bel-Cypher Pro and Bel-Cypher N Twain Driver.

You can operate Bel-Cypher Pro and Bel-Cypher N with one PC by changing connection of LAN cable.

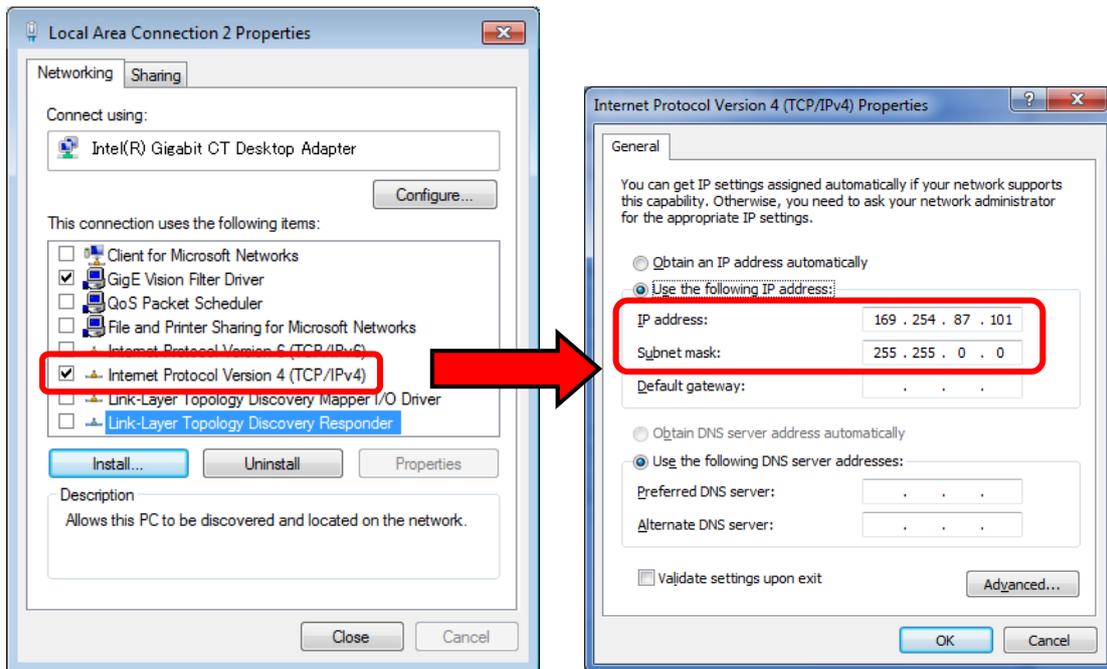
If you use only Bel-Cypher Pro, please skip this procedure.

- 1) Install Bel-Cypher N Twain Driver and DCAM-API. Refer to Installation Manual of Bel-Cypher N.
- 2) Uninstall only DCAM-API for Bel-Cypher N. Refer to section 8.3.2 in this manual.
- 3) Install Bel-Cypher Pro Twain Driver and DCAM-API. Refer to section 8.4-6 in this manual.

**NOTE :** When you change connection of LAN cable to another device, you have to change IP address according to connected device.

Open the properties of the network connected to the device, and change IP address of Internet Protocol Version 4(TCP/IPv4) before you use another device.

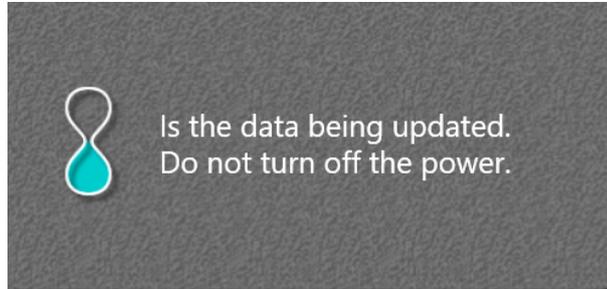
Bel-Cypher Pro :	IP address : 192.168.2.33
	Subnet mask : 255.255.255.0
Bel-Cypher N :	IP address : 169.254.87.101
	Subnet mask : 255.255.0.0



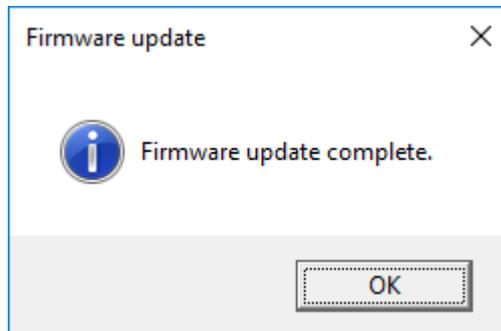
**8. Firmware update of Bel-Cypher Pro.**

**After Bel-Cypher Pro Twain Driver is installed, if installer includes a newer firmware data, firmware will be automatically updated at the first connection with Bel-Cypher Pro.**

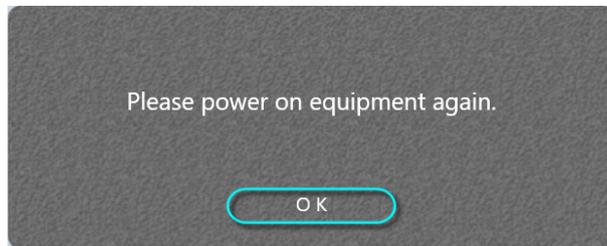
- 1) If there is a newer firmware data, firmware update will automatically start when software is launched for the first time. Please wait while below message is displayed.



- 2) After completion, the message window is displayed. Click "OK".



- 3) After update finished, please restart Bel-Cypher Pro.



Recommended specifications of Personal Computer

Recommended PC specifications

CPU	Intel Core i7-6600U (2.6GHz) or later
Video Controller	NVIDIA GeForce 930M or more, or equivalent
Memory	16GB or more
OS	Windows 7 Professional 64-bit, English Version Windows 8 Professional 64-bit, English Version Windows 10 Professional 64-bit, English Version
Other	Ethernet ×1 (1000BASE-T)

Minimum PC specifications

CPU	Intel Core i5-6300U (2.4GHz) or later
Video Controller	Intel HD Graphics 520 or more, or equivalent
Memory	8GB or more
OS	Windows 7 Professional 64-bit, English Version Windows 8 Professional 64-bit, English Version Windows 10 Professional 64-bit, English Version
Other	Ethernet ×1 (1000BASE-T)

※ Use a LAN cable of Category 5e or better

Recommended specifications of the image display monitor

resolution	1920×1080
Grayscale Tones	256 tones
Display Colors	16.77 million : supported 8-bit

 **CAUTION**

PC and monitor are required to meet the international IEC60950-1 or IEC60601-1 standard.

If you run software that heavily loads the PC, transfer & acquisition of images could be interrupted.  
Please schedule Windows updates or virus scan updates to be performed outside clinic hours.

## 9. Post-Installation Instructions

### 1. Check listed items by referring to the Operation Manual.

1) Measurement of Feedback voltage and tube current

① Make sure the main power is off. Remove covers from Rotation Unit. (Figure 1)

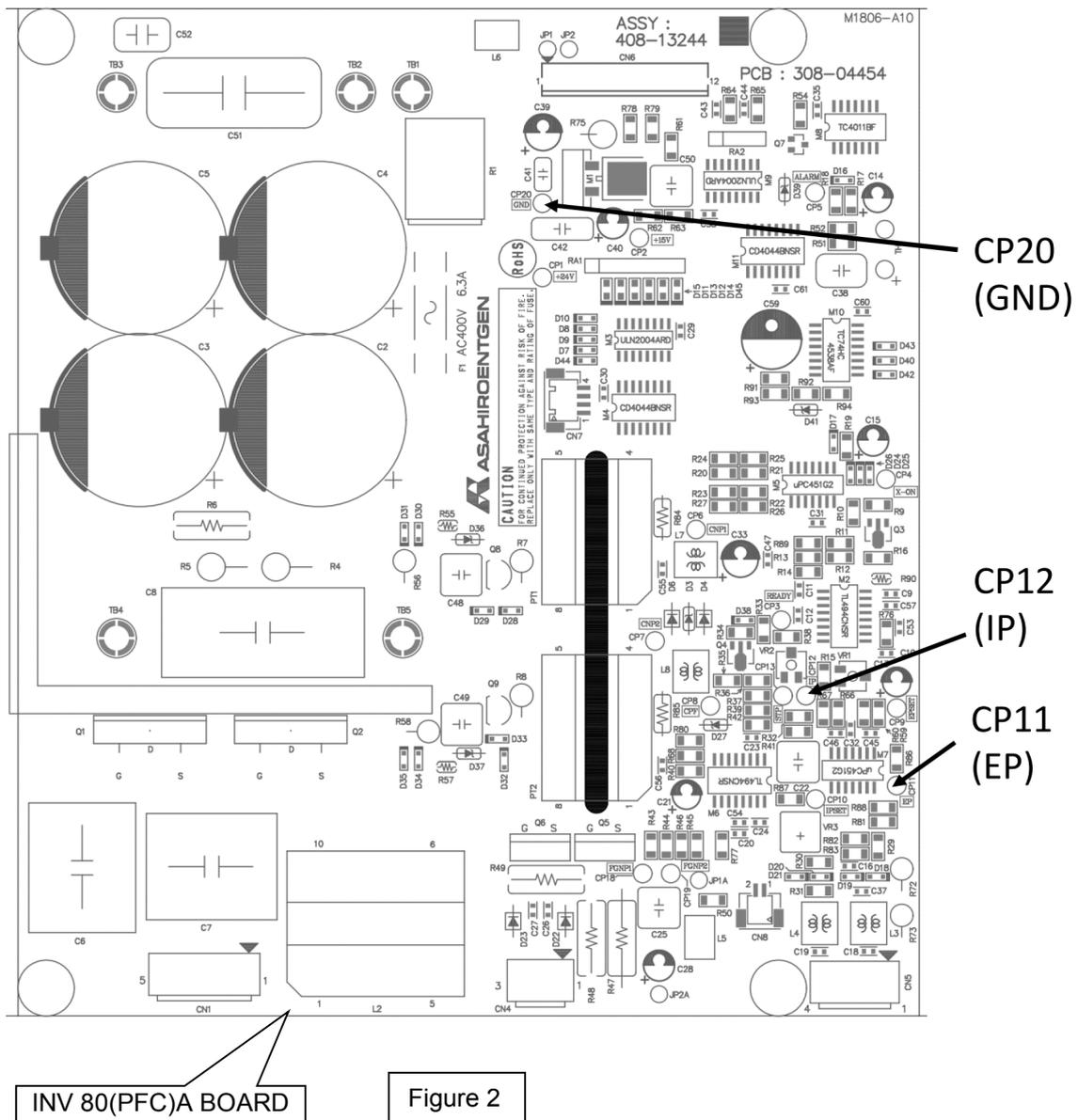
② Cover radiation aperture with lead

③ Turn on the power of PC that is connected to Bel-Cypher Pro. Hit Ctrl + Alt + T simultaneously to get into Test mode.

④ Set exposure condition by referring the Operation Manual.

- 1) Exposure Orbit → Panorama
- 2) Manual Exposure
- 3) Tube Voltage: 70kV
- 4) Tube Current: 8mA

⑤ Irradiate X-ray, then measure the feedback voltage between CP11 & CP20 (Tube voltage), and between CP12 & CP20 (Tube current). (Figure 2)



## **2. Confirmation of movement of X-ray irradiation.**

### **2.1. Check listed items by referring to the Operation Manual.**

#### 2.2. Confirm the operation with X-ray

2.2. 1. Cover radiation aperture with lead.

2.2. 2. Set exposure condition by referring the Operation Manual.

1) Exposure Orbit → Panorama

5) Manual Exposure

6) Tube Voltage: 60kV

7) Tube Current: 2mA

2.2.3. Irradiate X-Ray and confirm the operation.

**3. Check listed items by referring to the Operation Manual**

1. Power

- |    |  |                          |                             |                             |
|----|--|--------------------------|-----------------------------|-----------------------------|
| 1) | Measurement of Input Power                                   | Voltage                  |                             | Vac                         |
| 2) | Does 1) meet the rating description on the Controller plate? | <input type="checkbox"/> | OK                          | <input type="checkbox"/> NG |
| 3) | Rating Values of the Circuit Protector on the Rotation Unit  | Voltage                  |                             | V                           |
|    |  | Current                  |                             | A                           |
| 4) | Are there any problems when the power plug is inserted?      | Heat                     | <input type="checkbox"/> OK | <input type="checkbox"/> NG |
|    |  | Allophone                | <input type="checkbox"/> OK | <input type="checkbox"/> NG |
|    |  | Off-flavor               | <input type="checkbox"/> OK | <input type="checkbox"/> NG |
| 5) | Does the Power Code have a scratch or a crack?               | <input type="checkbox"/> | OK                          | <input type="checkbox"/> NG |

4. Operation

- |       |   |            |                          |    |                          |    |
|-------|---|------------|--------------------------|----|--------------------------|----|
| 1)    | After Power On, does the main body have a problem?  | Heat       | <input type="checkbox"/> | OK | <input type="checkbox"/> | NG |
|       |   | Allophone  | <input type="checkbox"/> | OK | <input type="checkbox"/> | NG |
|       |   | Off-flavor | <input type="checkbox"/> | OK | <input type="checkbox"/> | NG |
| <hr/> |   |            |                          |    |                          |    |
| 2)    | After depressing the "RESET" key, is "READY" displayed?   |            | <input type="checkbox"/> | OK | <input type="checkbox"/> | NG |
| 3)    | Does the main body move with up / down switch?  |            | <input type="checkbox"/> | OK | <input type="checkbox"/> | NG |
| 4)    | Does up / down operation of main body have a problem?   | Allophone  | <input type="checkbox"/> | OK | <input type="checkbox"/> | NG |
| 5)    | Does Sliding Unit stop at the highest and the lowest position?  |            | <input type="checkbox"/> | OK | <input type="checkbox"/> | NG |
| 6)    | Positioning Beams in Panorama   |            |                          |    |                          |    |
|       | 6-1) Are all positioning beams turned on by depressing forward / backward switch of Focus Beam?           |            | <input type="checkbox"/> | OK | <input type="checkbox"/> | NG |
|       | 6-2) Dose Forward / backward operation of Focus Beam on ARM work by depressing forward / backward switch? |            | <input type="checkbox"/> | OK | <input type="checkbox"/> | NG |

- Beams in T.M.J.
- 7) 7-1) Are all positioning beams turned on by depressing forward / backward switch of Focus Beam?  OK  NG
- 7-2) Dose Forward / backward operation of Focus Beam on ARM work by depressing forward / backward switch?  OK  NG
- 8) Are all positioning beams turned off automatically when forward / backward switch of Focus Beam are not depressed for 2 minute?  OK  NG
- 9) Check in Panorama mode
- 9-1) Does equipment work normally with exposure operation at 0kV, 0mA, at Panoramic mode?
- |           |                          |    |                          |    |
|-----------|--------------------------|----|--------------------------|----|
| Allophone | <input type="checkbox"/> | OK | <input type="checkbox"/> | NG |
| Vibration | <input type="checkbox"/> | OK | <input type="checkbox"/> | NG |
- 10) Check in T.M.J.
- 10-1) Does equipment work normally with exposure operation at 0kV, 0mA, at TMJ mode?
- |           |                          |    |                          |    |
|-----------|--------------------------|----|--------------------------|----|
| Allophone | <input type="checkbox"/> | OK | <input type="checkbox"/> | NG |
| Vibration | <input type="checkbox"/> | OK | <input type="checkbox"/> | NG |
- 10-2) After the first exposure, Does Rotation Arm Unit return to start position automatically.  OK  NG
- 10-3) After the second exposure, Does Rotation Arm Unit stop at the end position.  OK  NG
- 5. Externals**
- 1) Are there scratches or cracks?  OK  NG
- 2) Are all covers secured with screws?  OK  NG
- 3) Check in the Save Image dialog.
- 3-1) In case of "PresetButtonEnabled=1" in BEL\_CYPHER\_PRO\_Save.ini, Preset buttons are displayed.  OK  NG
- 3-2) Image becomes dark when you push "Dark" button.  OK  NG
- 3-3) Image becomes normal when you push "Normal" button.  OK  NG
- 3-4) Image become bright when you push "Bright" button.  OK  NG
- 3-5) In case of "PresetButtonEnabled=0" in BEL\_CYPHER\_RRO\_Save.ini, Preset buttons are **NOT** displayed.  OK  NG

## **10. Contacting information**

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### **Belmont Equipment**

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## **11. Revision data of this manual**

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This manual was created on Sept 2016.

Revised in March 2017

Document number : B03-I216E Bel-Cypher Pro