

# WavePro-II Compact Busway

Installation and Maintenance Manual



GE imagination at work



# Warnings, cautions and notices used in this manual

## Warning



Warning notices are used in this publication to emphasize that hazardous voltages, currents, or other conditions that could cause personal injury are present in this equipment or may be associated with its use

Warning notices are also used for situations in which inattention or lack of equipment knowledge could cause either personal injury or damage to equipment.



## Caution

Caution notices are used for situations in which equipment might be damaged if care is not taken.



## Note

Notes call attention to information that is especially significant to understanding and operating the equipment.

This document is based on information available at the time of its publication. While efforts have been made to ensure accuracy, the information contained herein does not cover all details or variations in hardware, nor does it provide for every possible contingency in connection with installation, operation, and maintenance. Features may be described herein that are not present in all busway systems. GE Industrial Solutions assumes no obligation of notice to holders of this document with respect to changes subsequently made.

For any questions during the installation process, please contact GE at (86) 800 820 8206

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## Warning

WavePro-II busway must be installed by qualified personnel in accordance with the Installation Manual. The installer should have been trained for electrical product installation, have the relevant installation qualification, and should wear appropriate safety equipment when operating.

## Storage precautions

- Prior to storage, check the busway for any damages caused during shipping and handling. Please notify the carrier immediately if any damages are found.
- The storage area must be kept clean and dry, preferably close to the installation place. Do not remove the package materials before installation.
- The busway should not be stored outdoors, instead, it should be stored in a clean, dry room away from the dust, smoke, water and chemical corrosion, and avoid sun exposure. And preventive measures should be taken against potential factors that could cause quality problems of busway (such as leakage, seepage or other harmful media, etc.)
- The busway storage site should be locked and managed by a special person
- Improper storage and transport will cause serious damages to the busway and thus void the warranty



### Note

No busway, even IP65 product, is waterproof before complete and proper installation.

## Transportation and handling precautions

- Use appropriate handling equipment (such as crane, forklift, flatbed, etc.)for loading and unloading in order to avoid damage to the product
- Load, unload and handle the busway in a place as close to the storage site as possible. Do not load, unload and handle the busway outdoors in rainy, snow or adverse weather.
- During loading, unloading and handling, do not drop the busway and its accessories to the ground or damage its package materials
- Hold both ends of the busway when handling. Do not make either end of the busway as the standpoint to handle. Do not drag the busbar on the ground or between the busway sections.
- Refer to the trending diagram when storing the busway. The busways of different trends should be placed separately with reasonable spacing reserved.
- When stacking busways, place appropriate wooden supports of same cross-section and same volume under each layer of busways. The wooden supports should ensure the stress on the busway is balanced. No more than 4 layers of single-channel busbars and no more than 3 layers of dual-channel busbars can be stacked.

# Pre-installation procedure

- Busway installer

Installation, operation and maintenance of busway must be conducted by a qualified installer. The busway installer must meet the following requirements:

- Familiar with busway construction, operation and installation.
- Familiar with the basic installation knowledge of electrical equipment, have high safety awareness, wear complete installation protective equipment (helmets, overalls, installation gloves, etc.).
- Busway installation, testing and lifting equipment: scaffolding, herringbone ladder, manual hoist; field fabrication equipment: temporary power supply, impact drill, cutting machine, welding machine, etc. Locking equipment: level meter, measuring tape, hanging thread, 1000V megger.
- Installation environment should meet the technical conditions of busway application, with particular attention to protecting the busway from sewage and other contamination during installation. See IEC61439-6:2012 for the use environmental requirements
- Prepare installation accessories and installation infrastructure
- If possible, try to transport the busway to the installation place before unpacking
- Each carton or large wooden box should be attached with the label indicating the items it contains
- Each section of busway housing should be affixed with a digital label. Be sure to install all the busways according to design drawings, unless engineers will give instruction on-site



## Caution

Check each section of busway for any potential damage or contamination. Keep the contact surface clean, but do not try to polish the contact surface which is not glossy. Check the insulator at the connection to ensure that it's no damaged or broken, and is fixed in place.



## Note

Please test the insulation resistance of each section of busway before installing.

# Busway Installation

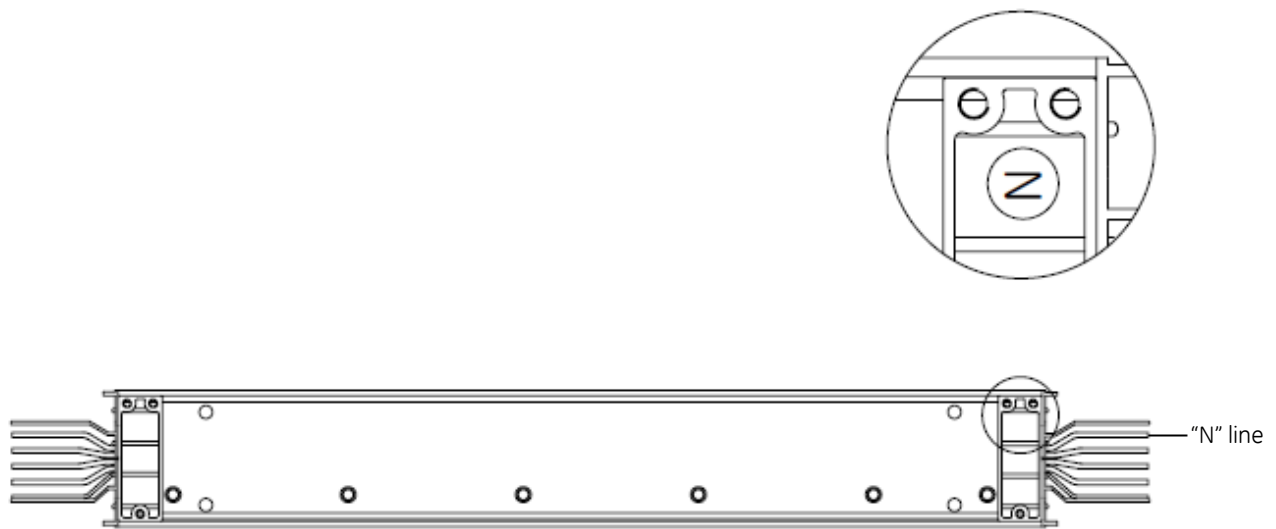
## Busway and joint installation

### Identify Structural characteristics

Pay attention to "N" line direction consistency of busway and joint when installing!

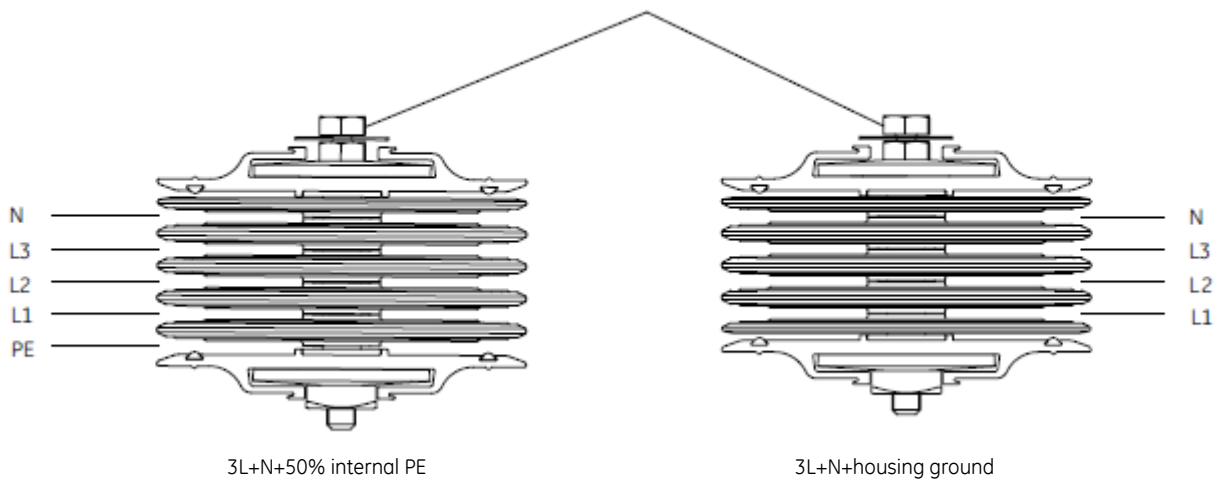
### Identify busway N line

The busway "N" line is on the side of two holes of the end connecting piece, i.e. the side marked  $\bigcirc$  N

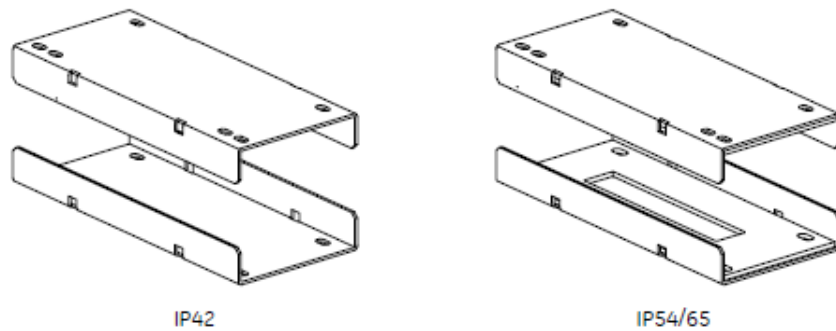


### Identify joint N line

"N" line of the joint is on one side of the two-head torque hexagon head



## Identify joint cover plate



## Installation tools

Tape measure, megger,  $\phi 19$  socket wrench, 12 # wrench (hexagonal spanner), etc.

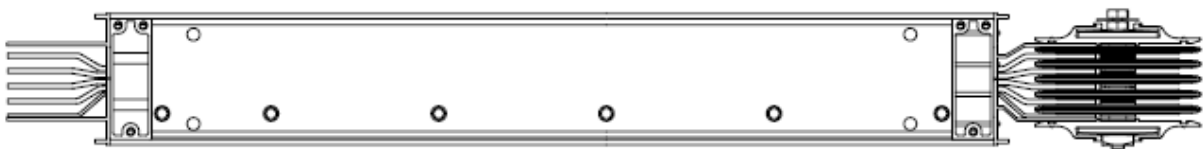
## Installation steps

### (1) Pre-installation procedure

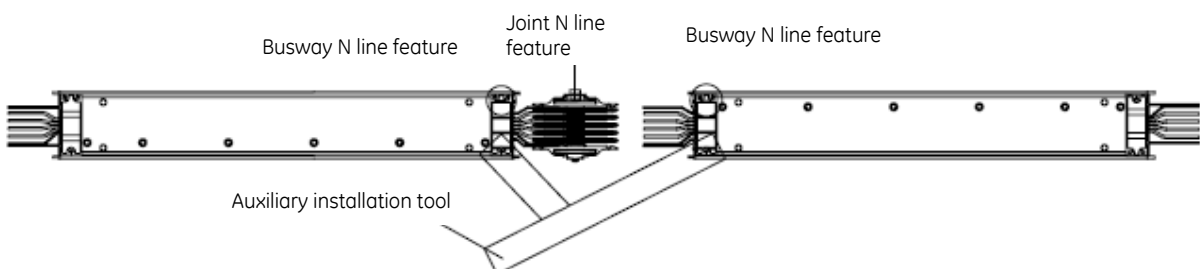
- Identify the busways and joints to be installed according to the installation documents
- Check that the busways and joints to be installed are in good condition
- Megger the busways to be installed. Normally the insulation resistance should be greater than 50M $\Omega$
- Ready to Install

### (2) Start the installation

- Place the busway on a preset mounting bracket
- Loosen the double-headed torque bolt of the joint (please note the joint may come off after the screw is too loose)
- Follow the principle that N lines should be on the same side when installing the joint on the busway



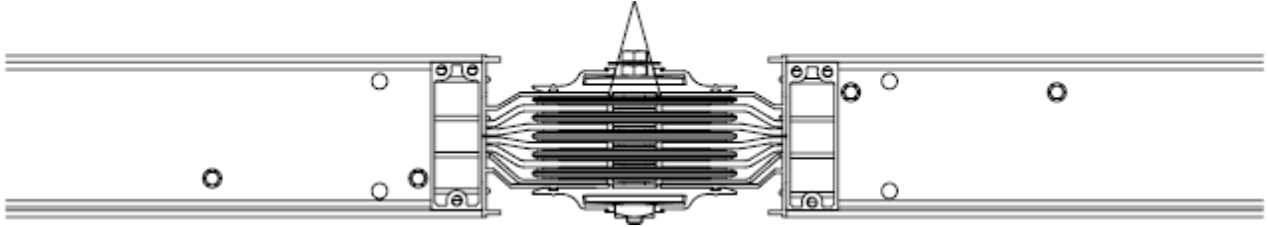
(3) Install the next section of busway on the other side of the joint (if it's hard to install, you can use the auxiliary installation tool. Pls contact GE about the tool)



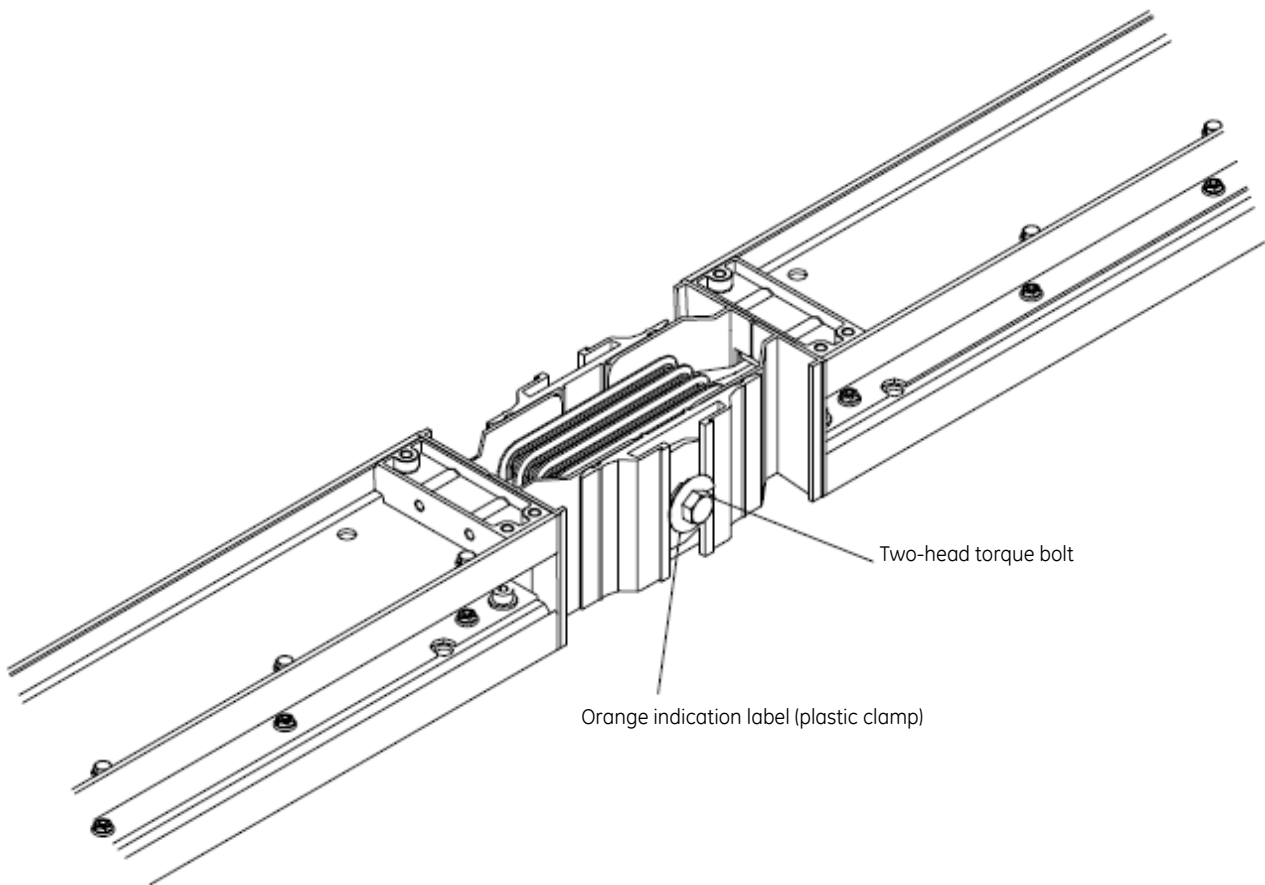


(4) Adjust the busway and joint to make the connection in place, meanwhile ensure two sections of busway are aligned.

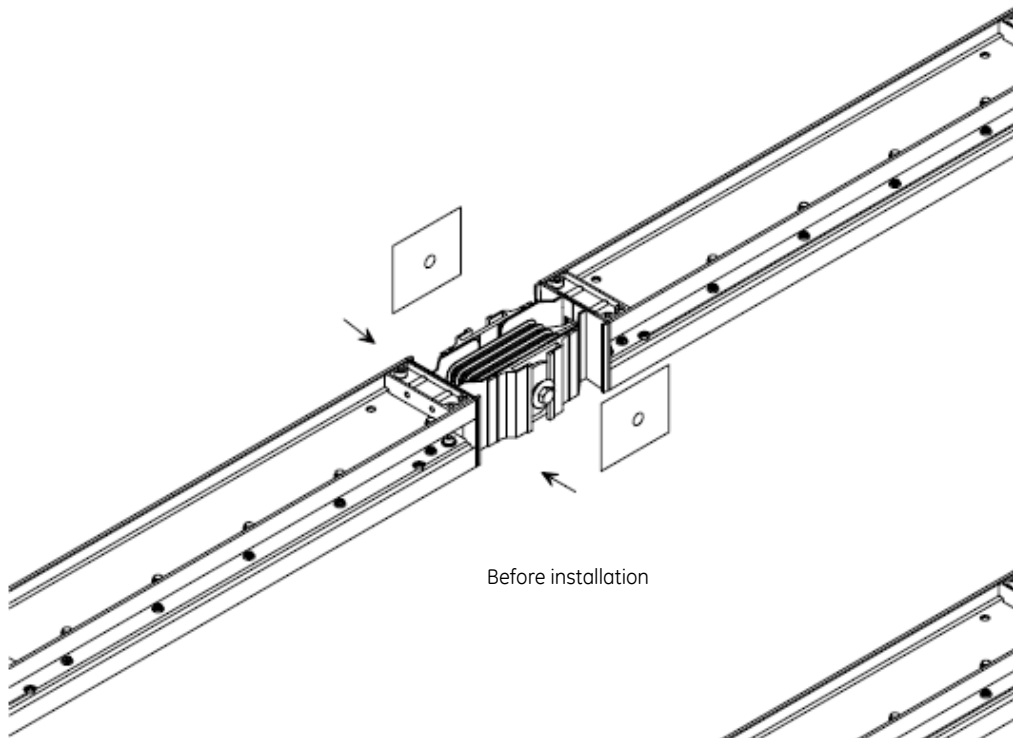
The busway is connected in place when this area gets close



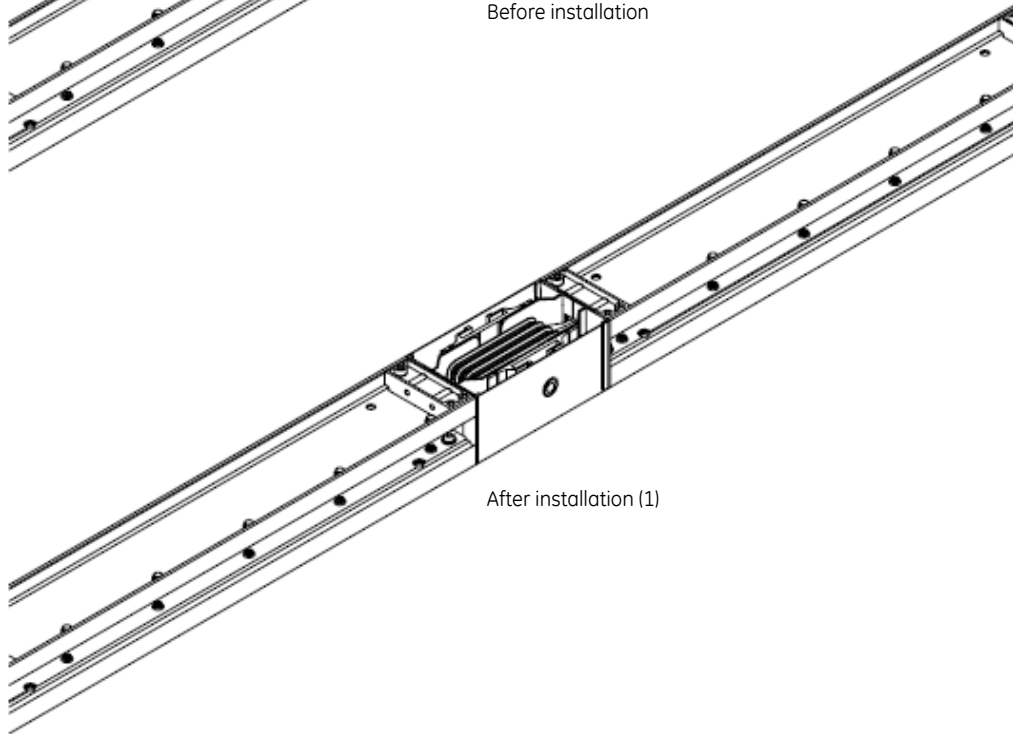
(5) Tighten the first bolt head of the two-headed torque bolt with a wrench until it's broken. At this moment, the orange label (plastic clip) will come off, indicating that the connector is tightened (in this case the bolt tightening torque is  $70 \pm 10\text{Nm}$ ).



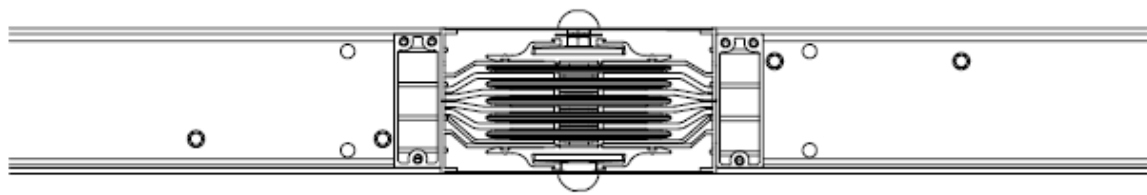
(6) If the protection grade is IP54 or IP65, install side seal plates at joint



Before installation

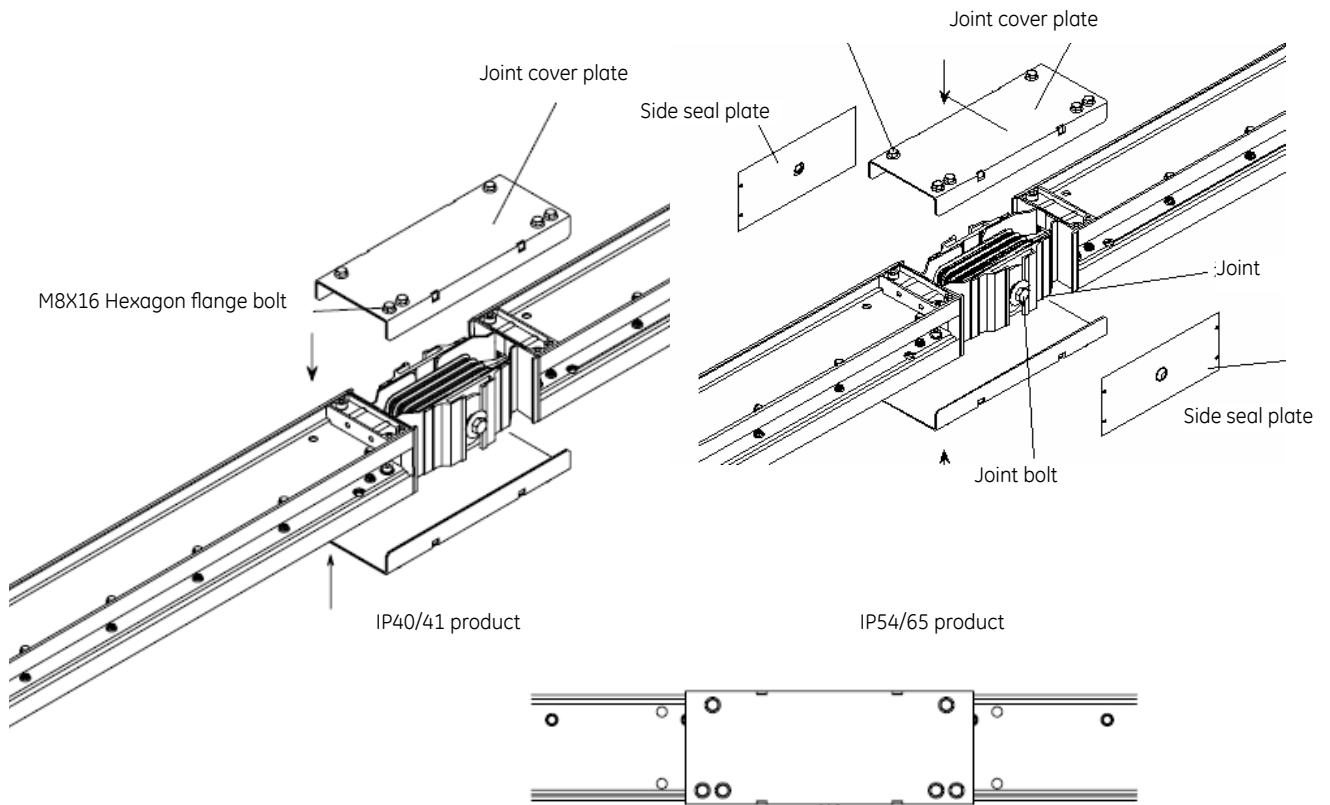


After installation (1)



After installation (2)

(7) Install upper and lower joint cover plates according to the diagram below, and tighten the bolts.



(8) Megger the installed busway after joint cover plates are installed. Insulation resistance of the busway run shall not be less than 0.4  $\Omega$ .

(9) After installation, make sure the busway vertically and horizontally straight (Not exceed 10mm on the straight line with the linear distance of 10m).

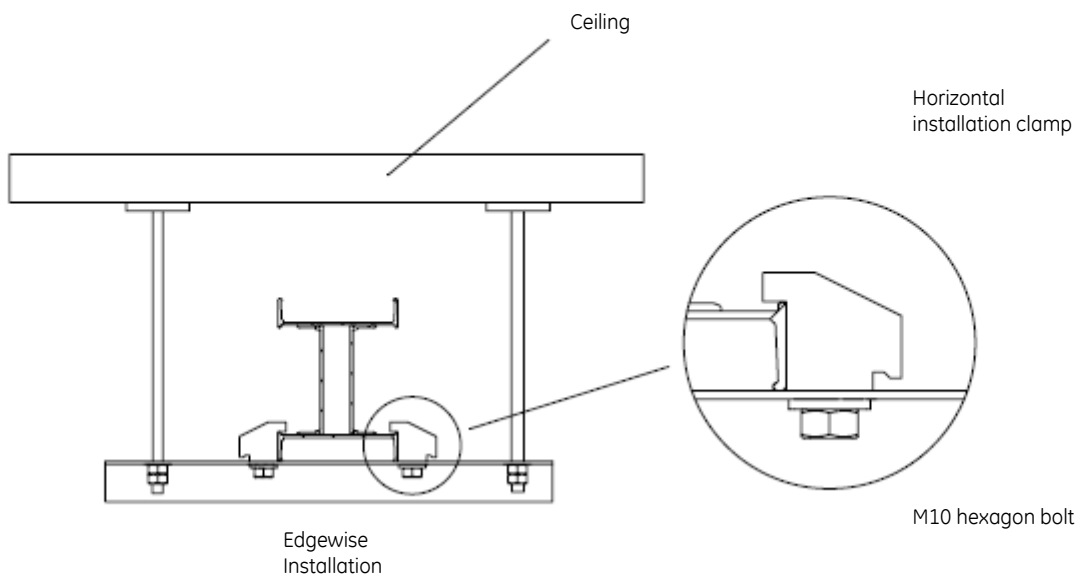
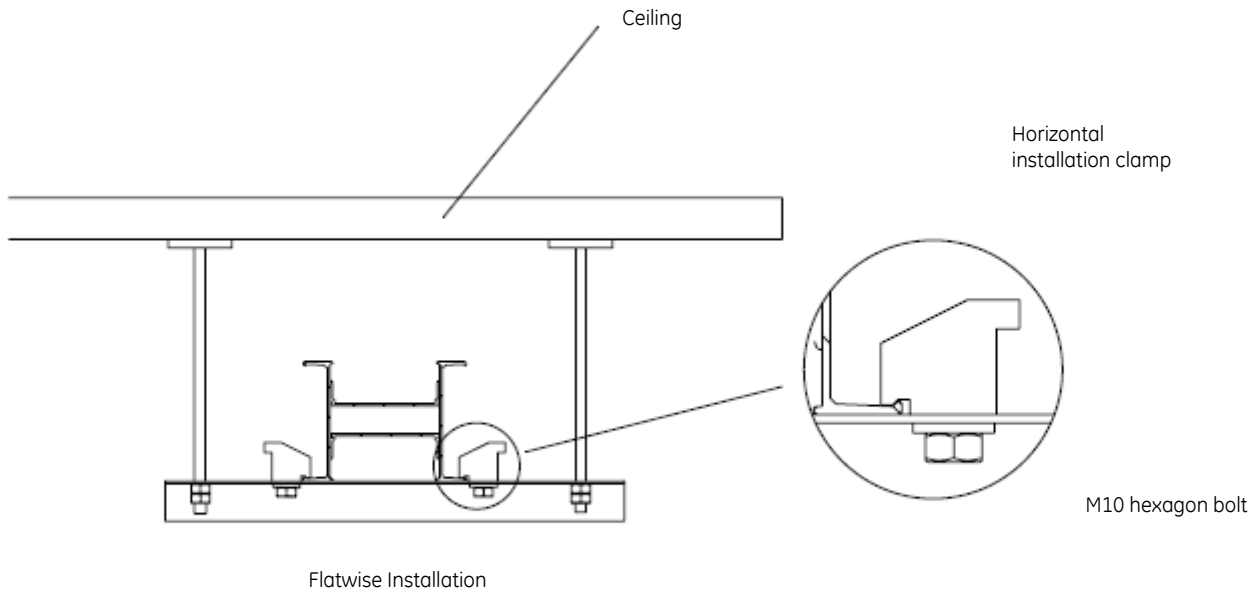
# Horizontal busway installation

## Horizontal installation with hanger



### Note

It's forbidden to fixed the Installation clamp and the installation bracket by welding (high temperature produced during welding will damage the busbar insulation)

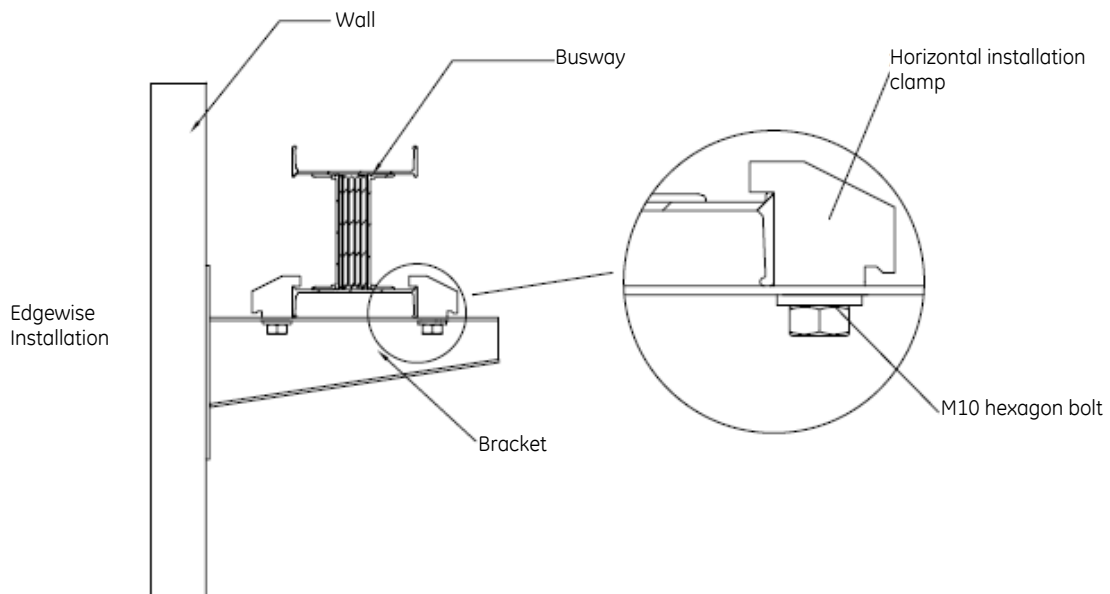
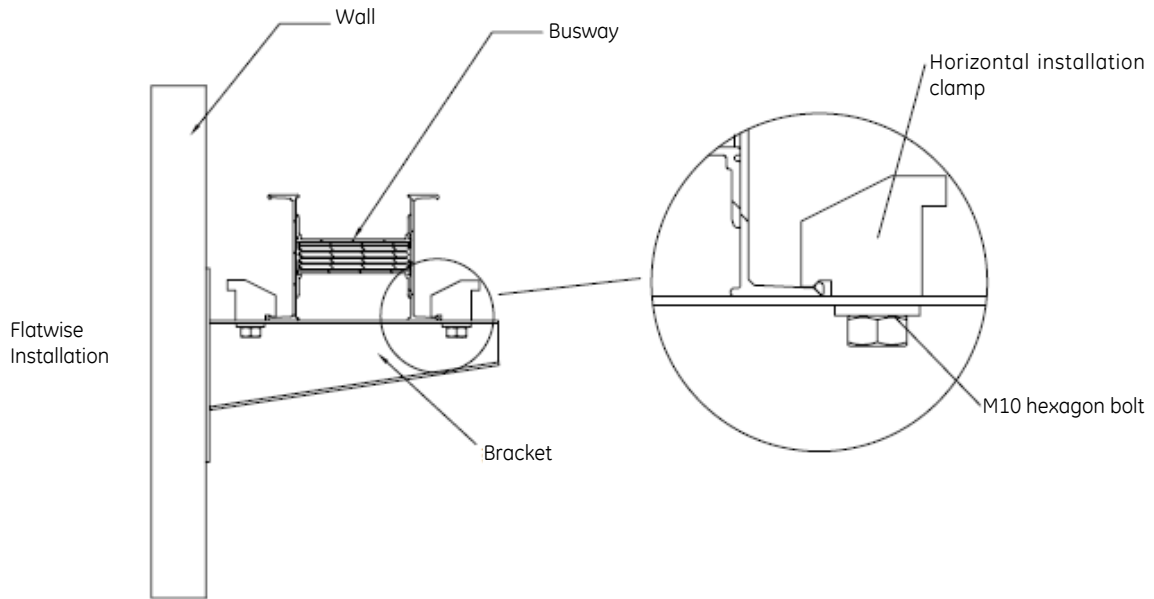


## Horizontal installation with bracket



### Note

It's forbidden to fixed the Installation clamp and the installation bracket by welding (high temperature produced during welding will damage the busbar insulation)



### Note:

- The installation spacing of spring hanger or bracket should not be greater than 2m when flatwise and edgewise installation.

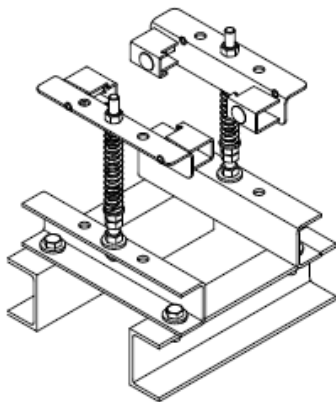
# Vertical busway installation

## Installation with spring hanger

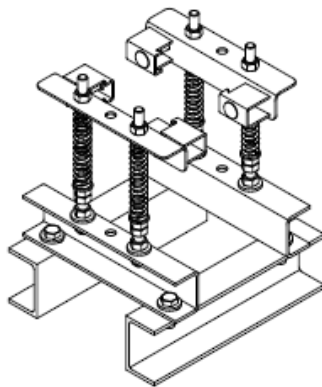


### Note

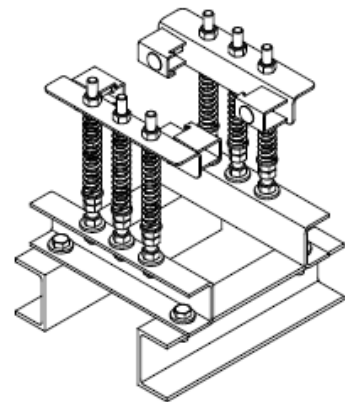
It's forbidden to fixed the Installation clamp and the installation bracket by welding (high temperature produced during welding will damage the busbar insulation)



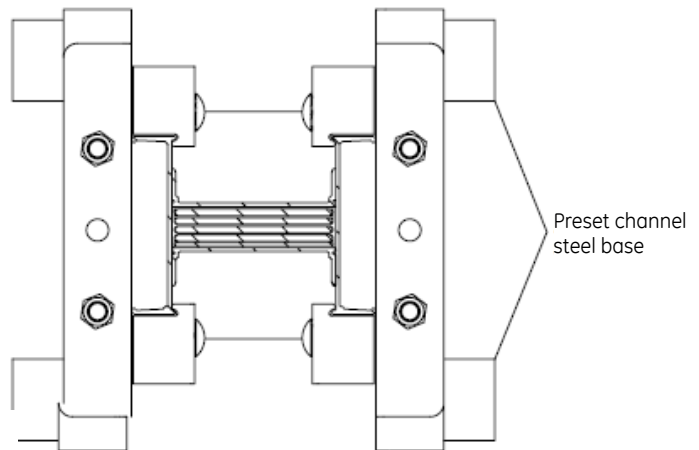
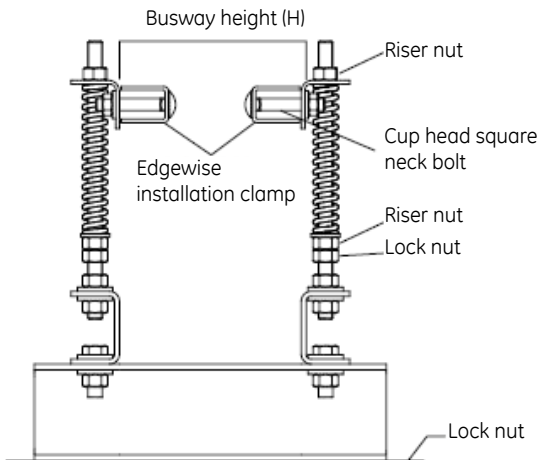
(A)



(B)



(C)



(1) Structural characteristics of spring bracket: (see picture above)

(2) Installation tools: 17# hexagonal open end wrench, 19# hexagonal open end wrench, etc.

### (3) Installation steps:

- Check that the spring hanger is in good condition
- Place the busway to be installed in a reasonable position, and ensure its verticality
- Adjust the pressure nut until the spring compression  $X = 20\text{mm}$  approximately
- Loosen the nut of cup head square neck bolt, fix the spring hanger on the busway
- Fix the spring hanger to the preset channel steel base, tighten the cup head square neck bolt
- According to the above steps, install 4-5 layers, adjust the riser nuts of each layer from top to bottom to make the busway reside on the spring bracket naturally
- Tighten the lock nut of the spring bracket, and appropriately release the compression nut

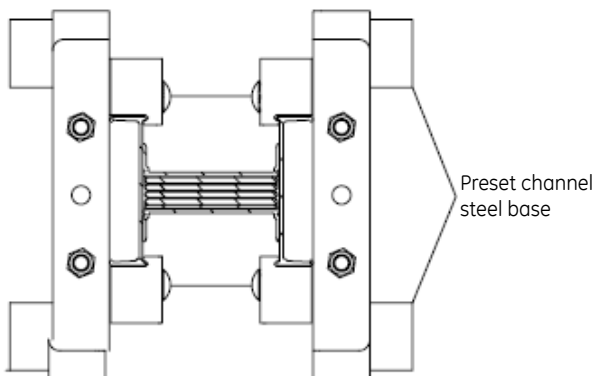
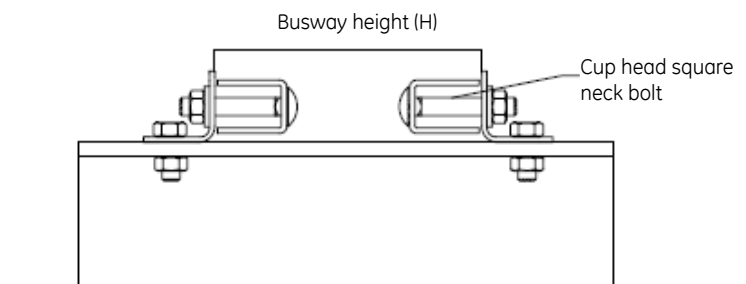
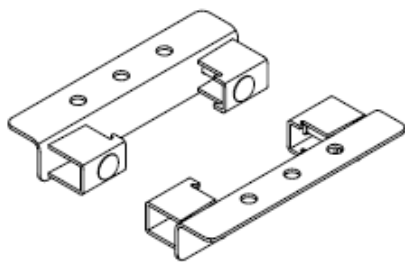


#### Note:

- After installation, make sure the busway bending not greater than 1 degree;
- The installation spacing of spring bracket should not be greater than 4m when vertical installation.

### Installation with spring hanger

Note: It's forbidden to fixed the Installation clamp and the installation bracket by welding (high temperature produced during welding will damage the busbar insulation)



(1) Structural characteristics of fixed bracket: (see picture above)

(2) Installation tools: 17# hexagonal open end wrench, etc.

(3) Installation steps:

- Check that the fixed bracket is good condition;
- Place the busway to be installed in a reasonable position, and ensure its verticality
- Loosen the nut of cup head square neck bolt, fix the fixed bracket on the busway
- Fix the fixed bracket to the preset channel steel base, tighten the cup head square neck bolt



### Note:

- After installation, make sure the busway bending not greater than 1 degree;
- The installation spacing of fixed bracket should not be greater than 4m.

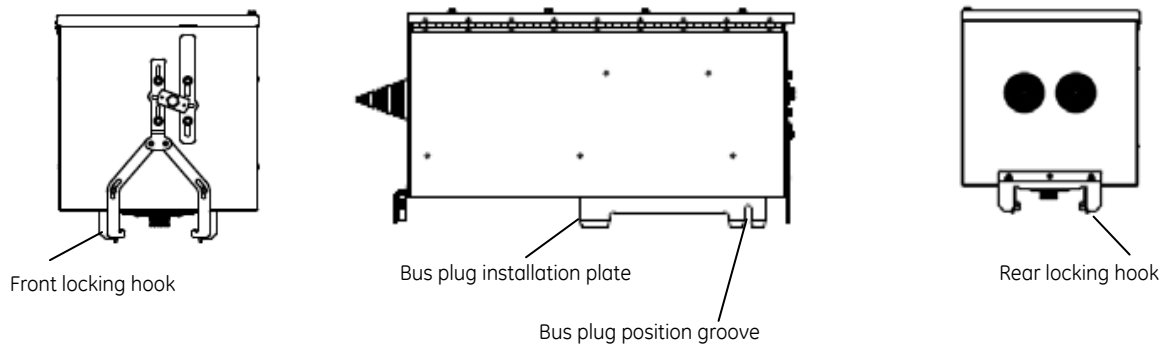
## Bus plug installation



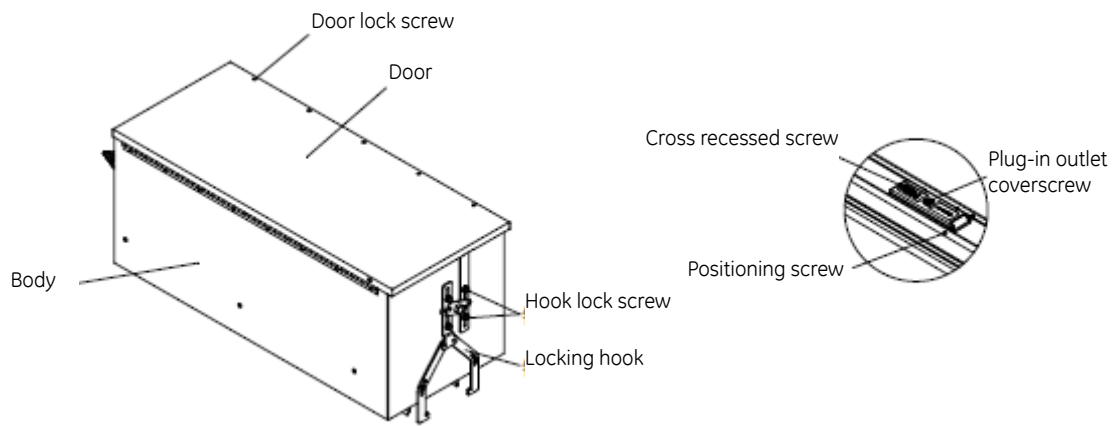
### Warning

The bus plug must be turned off prior to installation or removing from the busway. Failure to do so may cause serious injury or even death. It's a good safety practice to de-energize the power of the busway before inserting or removing the bus plug. Only trained person is allowed to install on or remove the bus plug from the energized busway.

(1) Identify the characteristics of bus plug







## Installation tools

Flathead screwdriver, Phillips screwdriver, 10# wrench (hex open end spanner), etc..

## Installation steps

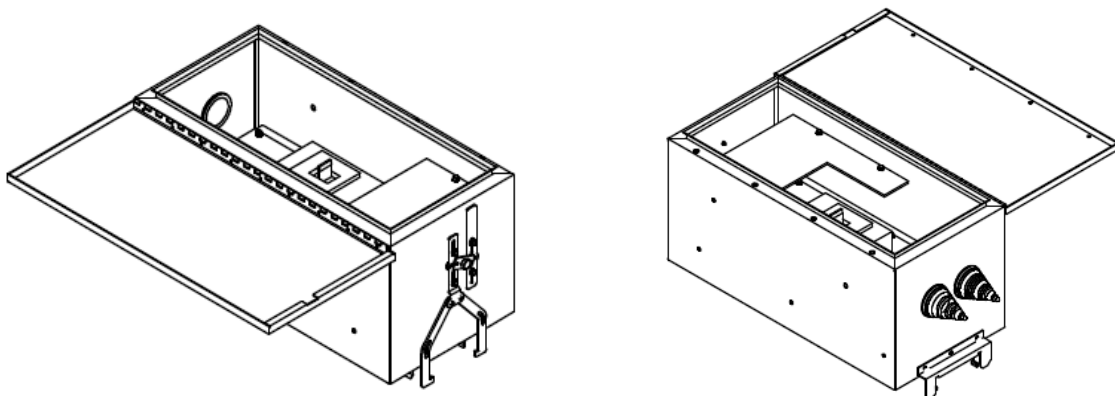
Flathead screwdriver, Phillips screwdriver, 10# wrench (hex open end spanner), etc..

### (1) Pre-installation procedure

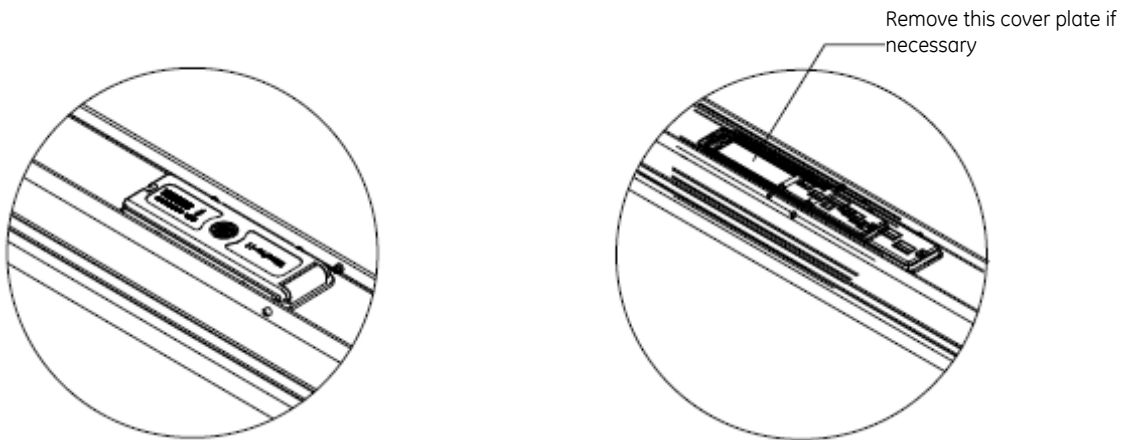
- Identify the bus plug to be installed according to the installation materials
- Check that there is no significant deformation on the bus plug, especially bus plug guide plate, front and rear locking hooks, insertion pin
- Ready to Install

### (2) Loosen the lock screw, open the door

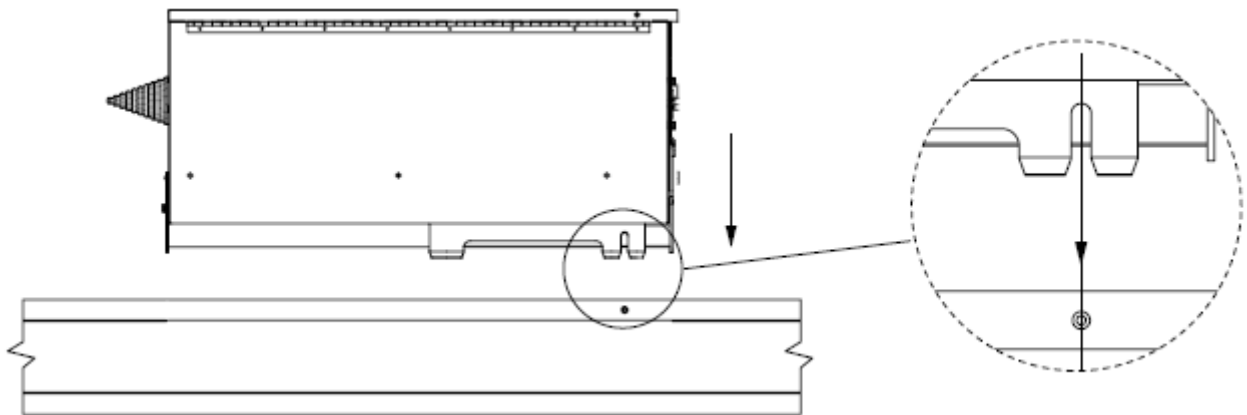
Loosen the foot lock screw, open front and rear locking pins (Note: Loosen the foot lock screw until the locking pin can be screwed).



(3) Loosen the cross recessed screw on the plug-in outlet cover and then open the cover.



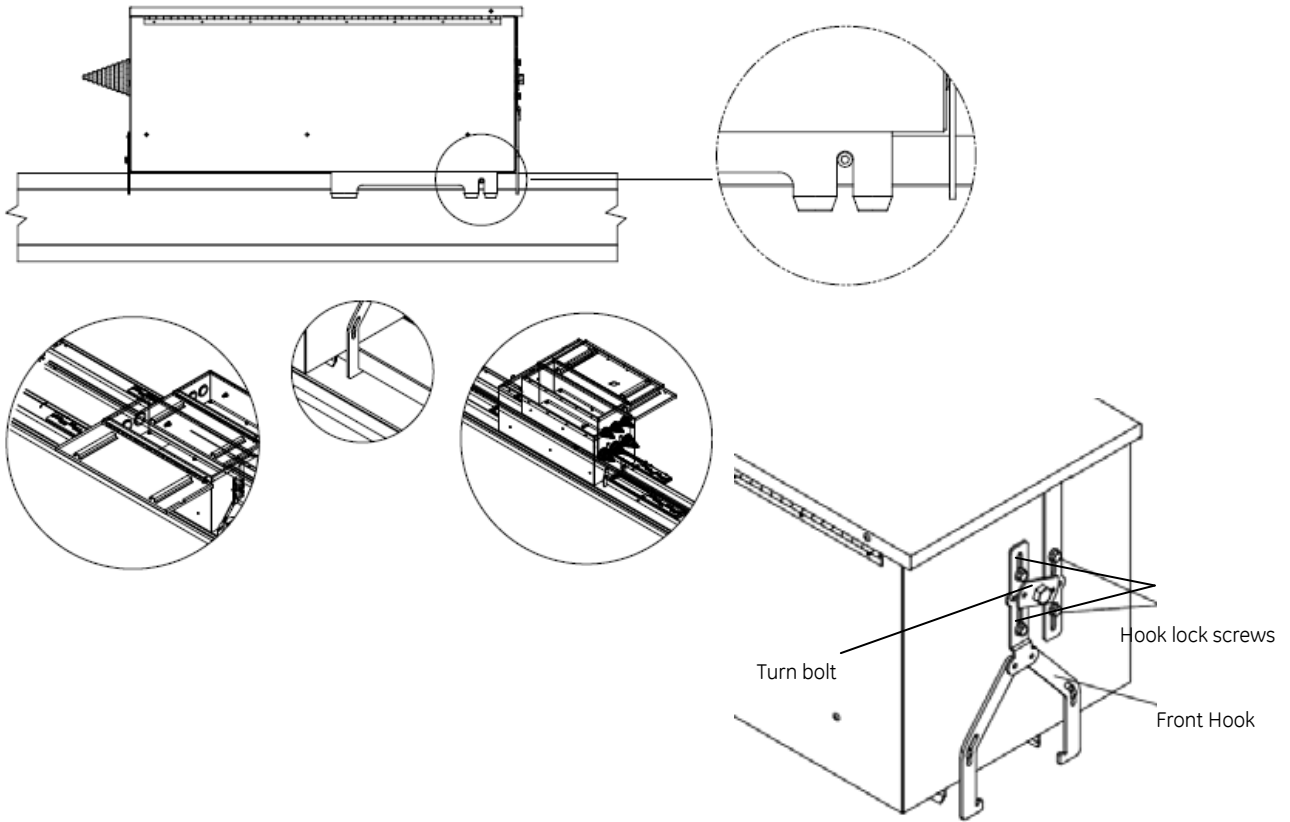
(4) Adjust the positioning groove to the same position as the positioning screw, insert the bus plug.



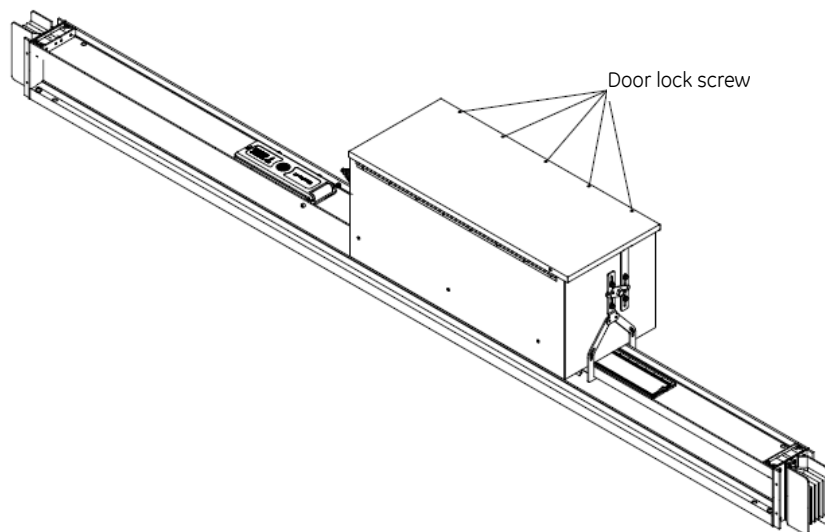
(5) Plug the bus plug to busway till the plug installation plate touched busway housing.

Tighten rear locking hooks.

Use 19# hexagonal wrench to turn bolt to let the hooks clamp on the housing, then tighten the 4 hook locking screws with 10# wrench.



(6) Close the bus plug door, lock the door lock screw. Now the bus plug installation is finished.



# Busway commissioning and maintenance

## Commissioning

- After the entire busway system is installed, the insulation resistance should be greater than 20  $\Omega$ , however, this value will be reduced over time due to the humidity in the installation place. When the busway is operating with connection to the power, the insulation resistance shall be not less than 0.4  $\Omega$ . If the insulation resistance is within 0.1  $\Omega$ ~ 0.4  $\Omega$ , the busway can operate at no load for 4~16 hours and then operate at load. If the insulation resistance is less than 0.1  $\Omega$ , the busway shall not be energized.
- The busway system should be subject to electrical test before being energized. All connection equipment of the system should be associated properly.
- Power transmission to busway
  - The operator must be qualified professional electrical installer. Non-specialized persons should not be allowed to stay on the site
  - During power transmission, the busway should not be at any electrical load, and all the distribution devices should be disconnected

## Maintenance

- The busway should be subject to a small repair after one year of continuous operation. The busways which produce loud noise during operation will be overhauled.
- Maintenance items
  - Check whether the total load current exceeds the design current and the busway's rated current;
  - Check the temperature rise on both sides and the joints of the busway;
  - Check the insulation resistance of busway system and make a complete record;
  - Check that the hanger support is firm;
  - Check whether the busway system components are missing, damaged or corroded, and whether the pressure applied on the spring bracket is appropriate;
  - Check whether there are heat sources affecting the system temperature rise around the busway system.
  - Remove the dust on the busway surface.

# Safety Precautions

- Wear helmets when entering the construction site
- Do not enter the lifting area
- Put a warning tape around the stacked materials to prevent collision or damage
- The material stack height must not exceed 1.8m
- Safety guard should be set to protect the person who is working at high altitude from falling
- No one is allowed to work alone in a dangerous workplace, instead he should work together with others
- It's not allowed to use the copper wire as the fuse during construction
- The power wire terminal should be wrapped. Regular inspection should be conducted to prevent electric leakage
- All circuits should be checked for power transmission and power shortage during construction to prevent accidents
- Always wear leather gloves and goggles when conducting welding work
- Do not spill fluids on the busway, such as water, beverage, etc.
- Do not smoke on the construction site
- Comply with occupational safety and health codes

# Common faults and solutions

## Insulation resistance is low

### Causes:

The busway is exposure to wet environment, or moisture entered inside of busway.

### Solutions:

Keep the operating environment dry, eliminate dangerous sources affecting normal operation of busway. Dry the busway that got damp or return to the factory if the case is serious.

## Over-high temperature

### Reason:

Overload  
Joint connection loose.

### Solutions:

Reduce the current load to within the busway current ratings  
Inspect joints and make sure all joints installed correctly and joint bolts tightened. If abnormal heating is high or last long time, it's recommended to replace internal insulation materials.

## Insulation breakdown

### Reason:

Water ingress in the busway.  
Conductive foreign matters entered inside.  
Insulating material damaged due to wrong operation.

### Solutions:

Eliminate root causes. Replace the busway section.

## Default phase of bus plug

### Reason:

Bus plug not be plugged in completely.  
Busway connection is loose.  
MCCB failure.

### Solutions:

Check whether the bus plug is plugged in busway completely. If need, pls remove the plug and install back again.  
Check the busway trunk and tighten connections if loose.  
Check electrical continuity between MCCB line and load terminals when MCCB is turned on.

# Accessories

## Outer dimensions/Weight per meter/Number of springs of spring hanger

### Copper conductor busbar

Rated Current (A)	W (mm)	H (mm)	Weight (kg / m)		Spring hanger (See page 10)
			Four-wire 100% N	Five-wire 100% N + 50% PE	
400	135	104	10.0	10.8	(A)
630	135	104	11.8	12.9	
800	135	114	13.7	15.1	
1000	135	129	16.6	18.4	
1250	135	149	21.5	23.9	
1600	135	184	27.3	30.5	
2000	135	224	35.1	39.4	(B)
2500	135	274	44.8	50.4	
3200	135	354	53.6	60.1	
4000	135	434	69.2	77.7	(C)
5000	135	534	88.6	99.8	

### Spring compression calculation formula

$$H = 120 - W / (K \times n)$$

H: Final length of spring

W: See the table above for the weight of busways between floors (W = busway weight per meter × floor height + weight of all devices on the busway of that floor)

K: Pressure on spring per mm, K = 3kgf / mm

n: Number of springs on each floor

120: Initial length of spring

### Bolt torque

Except the joint which have special requirements, the tightening torques of the remaining bolts are shown in the table below.

Bolt size		M6	M8	M10	M12	M14	M16	M20
Torque (N.m)	4.8 grade	5	13	20	35	55	85	170
	8.8 grade	9	20	35	60	80	120	250

Note: The allowable torque tolerance should be  $\pm 10\%$

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