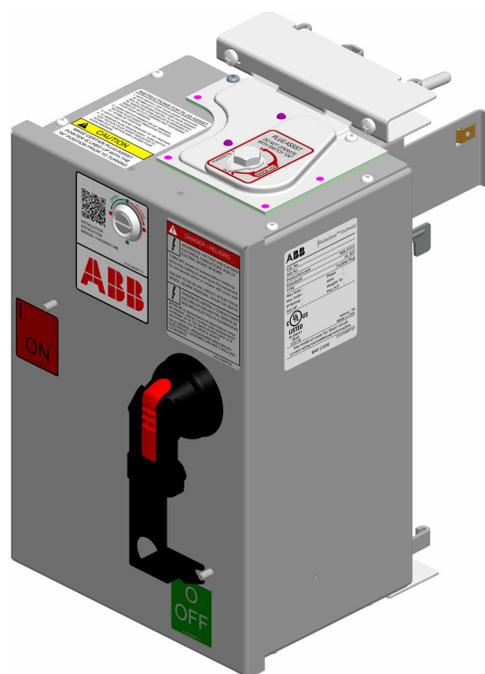
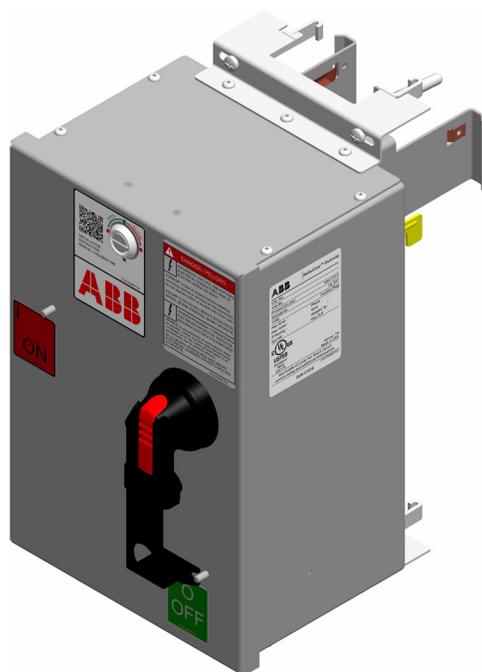


INSTALLATION, OPERATIONS AND MAINTENANCE MANUAL

# ReliaGear™ busway

## Busway plug-in units



## **NOTICE**

This document contains information about one or more ABB products and may include a description of or a reference to one or more standards that may be generally relevant to the ABB products. The presence of any such description of a standard or reference to a standard is not a representation that all of the ABB products referenced in this document support all of the features of the described or referenced standard. In order to determine the specific features supported by a particular ABB product, the reader should consult the product specifications for the particular ABB product.

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Products described or referenced in this document are designed to be connected and to communicate information and data through network interfaces, which should be connected to a secure network. It is the sole responsibility of the system/product owner to provide and continuously ensure a secure connection between the product and the system network and/or any other networks that may be connected.

The system/product owners must establish and maintain appropriate measures, including, but not limited to, the installation of firewalls, application of authentication measures, encryption of data, installation of antivirus programs, and so on, to protect these products, the network, its system, and interfaces against security breaches, unauthorized access, interference, intrusion, leakage, and/or theft of data or information.

ABB performs functionality testing on the products and updates that we release. However, system/product owners are ultimately responsible for ensuring that any product updates or other major system updates (to include but not limited to code changes, configuration file changes, third-party software updates or patches, hardware change out, and so on) are compatible with the security measures implemented. The system/ product owners must verify that the system and associated products function as expected in the environment in which they are deployed.

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## **TRADEMARKS**

ReliaGear™ busway is a trademark of ABB.

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# Safety measures and classifications

Read the following hazard classifications carefully, and fully inspect the equipment for any identifiable hazards prior to installation, operation, or maintenance.

The following classifications listed below will appear throughout this document or on labels located on the equipment. These are standard symbols defined by ANSI Z535.4-2011 which were established for recognition of potential hazards which pose risk to life and property. The classification is based on the probability and severity of injury if the hazard is not avoided. Please follow instructions, warnings, labels, and codes for proper installation, operation, and maintenance of equipment and devices. Only Qualified Persons, as defined by NFPA 70, should provide installation, operation, and maintenance on this equipment and devices.

## Danger symbol/Warning symbol

The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists that will result in personal injury if the instructions are not followed.



This is the **safety alert symbol**. It is used to alert you to potential physical injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



**Danger** indicates a hazardous situation which, if not avoided, will result in death or serious injury.



**Warning** indicates a hazardous situation which, if not avoided, could result in death or serious injury.



**Caution** indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



**Notice** is used to address practices not related to physical injury.

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 and software, 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 hardware and software systems. ABB assumes no obligation of notice to holders of this document with respect to changes subsequently made.

ABB makes no representation or warranty, expressed, implied, or statutory, with respect to, and assumes no responsibility for the accuracy, completeness, sufficiency, or usefulness of the information contained herein. No warranties of merchantability or fitness for purpose shall apply.

# Receiving, handling and storage

## Receiving

Prior to shipment, the plug-in units are given a final inspection and packaged using precautions to minimize the possibility of shipping damage. The plug-in units may be divided into sections and shipped on multiple skids. Upon receiving the plug-in units, remove all packaging and check the packing list against the equipment received to validate a complete shipment. Additionally, all equipment should be thoroughly inspected for any damage sustained in transit. If damage is noted or if indication of rough handling is visible, file a claim for damage with the carrier immediately. Information about damaged parts, including the part number, case number, and purchase order number should accompany the claim.

Regarding claims for damaged shipments, shortages, or incorrect material, the following is an excerpt from the published Supplemental Terms and Conditions of Sale for products of ABB: "Title and risk of loss shall pass upon delivery of the products to the carrier at the f.o.b. point and invoices shall be payable without deduction for losses in shipment. It is the Purchaser's responsibility to file claims with the carrier for loss or damage in transit. "Claims for shortages or incorrect material must be made in writing within 30 days after receipt of the shipment by the Purchaser, and the failure to give the Company such written notice within the 30-day period shall be unqualified acceptance of the products and a waiver by the Purchaser of all claims for shortages or incorrect material."

## Handling

**Caution:** Use extreme care in handling. The larger plug-in units may be heavy. These guidelines are provided to help reduce the risk of personal injury and equipment damage during handling, as well as to facilitate moving the plug-in units at the job site. plug-in units are shipped in corrugated cartons. Do not drop or perforate the cartons.



Rough handling may cause damage to the electrical components. Handle plug-in units with care to avoid damage to internal components and the enclosure or its finish. Avoid subjecting plug-in units to impact and, in general, rough handling. Do not use ON/OFF handle, stab finger ends for lifting plug-in units' fittings. If using a forklift, position the plug-in unit on the forks to distribute the weight properly. Take care not to damage the metal housing. Avoid using objects with sharp edges to lift the plug-in unit. Never drag the plug-in unit.

## Storage

### NOTICE

**Notice:** Failure to follow these instructions can result in equipment damage.

Plug-in units should be stored in a dry, clean location. Protect this equipment from contaminants such as water, salts, concrete, and corrosive environments and physical damage. Plug-in units should not be stored outdoors. However, if it must be stored outdoors, cover it securely to provide protection from weather and dirt. Outdoor plug-in units should be treated the same as indoor plug-in units until after it is installed. It is not weather resistant until completely and properly installed. If the plug-in unit is not going to be installed and energized immediately, store it indoors in a clean, dry place with a uniform temperature.

For additional handling and storage information, refer to NEMA BU 1.1.

# Pre-installation testing of the plug-in unit

- Before installing the plug-in unit onto the busway, ensure the plug-in unit door is closed and latched
- Turn the plug-in unit handle to the ON (I) position (see Figure 1)
- Use a continuity tester to verify phase-to-phase, phase-to-neutral, and ground isolation

## NOTICE

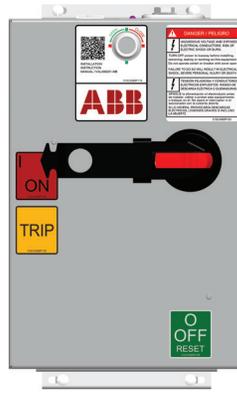
**Notice:** Return the plug-in unit handle to the OFF (O) position (see Figure 3)

—  
01  
Fusible Plug-In Unit (ON)



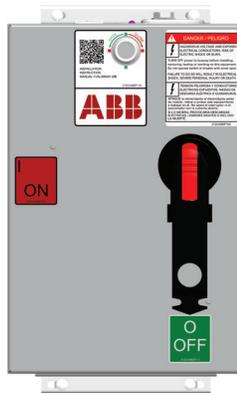
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01

—  
02  
Breaker Plug-In Unit (ON)



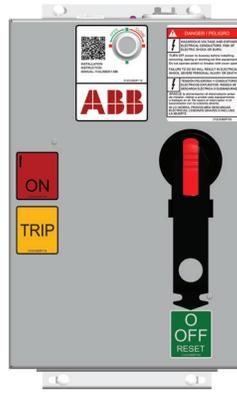
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02

—  
03  
Fusible Plug-In Unit (OFF)



—  
03

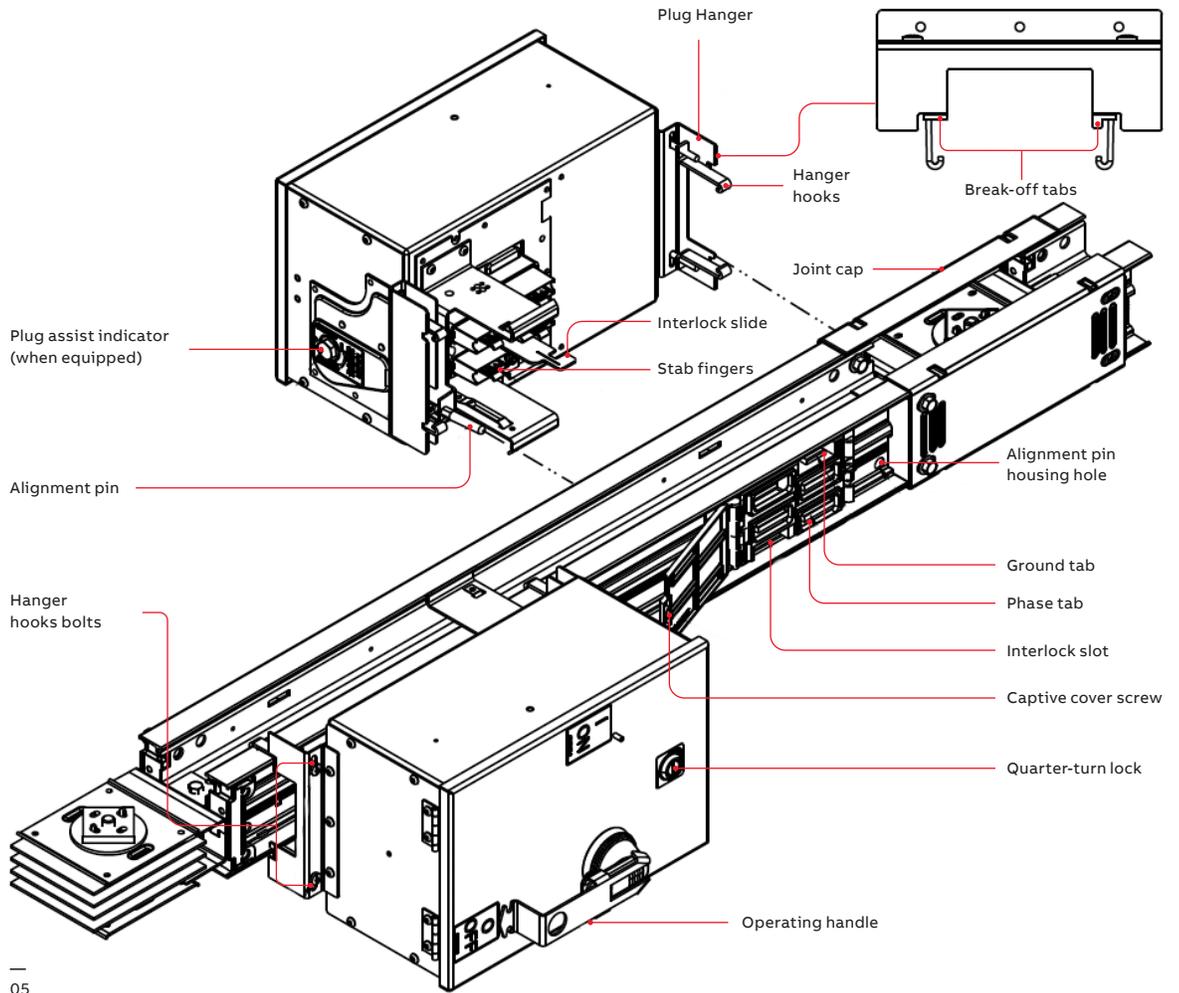
—  
04  
Breaker Plug-In Unit (OFF)



—  
04

# Plug-in unit installation instruction

05  
Plug-in unit installation



05

**WARNING**

**WARNING:** De-energize the busway before inserting or removing plug-in unit. Failure to do so may result in serious injury or death. Authorized personnel only.

**WARNING**

**ADVERTENCIA:** Des energizar el busway antes de insertar o remover enchufes. Haces caso omiso podría resultar en daño severo o la muerte. PERSONAL AUTORIZADO SOLAMENTE.

**CAUTION**

**CAUTION:** Make certain that the plug-in unit is level in all orientations with the busway after all connections are completed. Failure to level the plug-in unit could result in overheating of the plug-in unit connection.

**CAUTION**

**PRECAUCIÓN:** Asegurar que la unidad plug-in esté nivelada en todas las orientaciones con el busway después de completar todas las conexiones. La falta de nivelación podría resultar en sobrecalentamiento de la unidad de conexión plug-in.

### Inspection

- Inspect the plug-in unit for any physical damage before installing on the busway
- Inspect stab fingers have been lubricated with Mobilgrease 28 MIL-PRF-81322 – do not remove the grease

### General installation and operation instructions

- Busway plug-in outlets are made accessible by hinging the outlet cover 180°. A high-friction hinge holds the cover open
- An alignment pin polarizes and locates the plug-in unit in the correct position only
- Plug-in units are interlocked, permitting engagement and disengagement with the busway only when in the OFF position
- To install a plug-in unit where the rear plug-in unit hanger falls on the joint cap, it is necessary to remove the break off tabs as shown in Figure 5
- Drop rod brackets are provided for auxiliary support on larger plug-in units
- All customer installed cable connections should be installed per national and/or local electrical codes
- Lock Out Tag Out (LOTO) – push the red section of the rotary handle up to access the LOTO mechanism.
- Operating handle rotates between ON, OFF and Reset positions
- For additional information refer to NEMA BU 1.1 2010

## NOTICE

**Notice:** These instructions do not cover all details or variations in equipment, nor do they provide for every possible contingency that may be met in connection with installation, operation, or maintenance. Additional information or a particular problem arise not covered sufficiently for the purchaser's purpose then contact ABB at 1-888-437-3765 or 1-804-965-1124 or (731) 439-5765.

### Plug installation

#### Installing a plug-in unit not equipped with plug-assist

1. Make sure the device is in the OFF position
2. Loosen the four bolts on the hanger hooks
3. Select busway plug-in unit location and fully open the outlet cover
4. Insert the plug-in unit alignment pin into the busway housing pin hole
5. Push the stab fingers into full contact with the busway tabs
6. Position the four hanger hooks on the busway rails and tighten the bolts (Torque 5 - 7 ft-lb)

#### Installing a plug-in unit equipped with plug-assist

1. Make sure the device is in the OFF position and the plug-assist indicator is rotated fully toward the stabs-out position
2. Loosen the four bolts on the hanger hooks
3. Select busway plug-in unit location and fully open the outlet cover
4. Insert the plug-in unit alignment pin into the busway housing hole
5. Position the four hanger hooks on the busway rails and tighten the bolts (Torque 5 - 7 ft-lb)
6. Rotate the plug-assist indicator fully toward the stabs-in position
7. Alignment pin should extend  $1\frac{3}{16}'' \pm 1/16''$  from busway housing

## WARNING

**WARNING:** Be sure that the plug-in unit assist pointer is lined up with the IN position before turning the plug-in unit on. Failure to do so may result in serious injury or death



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# Removing a plug-in unit from busway

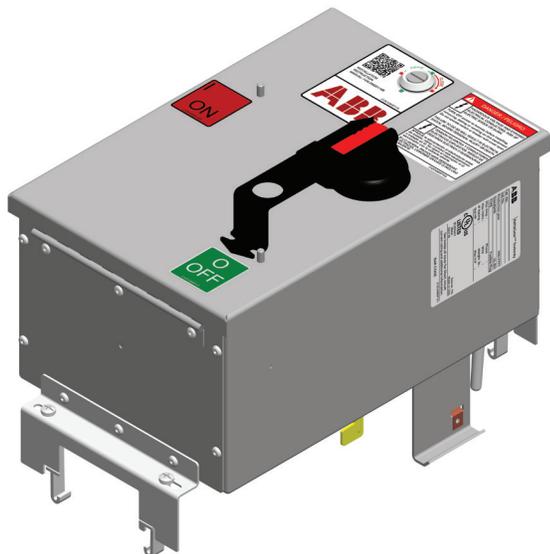
1. Bus plug handle must be in the OFF position.  
See Figures 3 and 4
2. Remove all power cables from receptacles (if so equipped)
3. Loosen the four bolts on the hanger hooks
4. Hold both sides of the bus plug and pull out.  
Then lift the plug-in unit from the busway. Use extra help or crane equipment for larger plug-in units
5. Properly store plug for future use



# OS Fusible (Class J) switch plug-in unit 30 A – 600 A

—  
06  
OS Fusible plug-in unit

—  
07  
Fusible switch



—  
06

**! DANGER**

**Danger:** HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices.
- Unless class J fuses are used, this switch may present a risk of fire and personal injury if installed on circuits capable of delivering not more than 200 kA.
- Failure to follow these instructions will result in death or serious injury.

**This plug-in unit accept Class J fuses only**

When used with Class J fuses, this switch is suitable for use on a circuit capable of delivering Not more than 200 kA at 600 volts (AC) maximum. Short circuit rating of a busway system is limited to lowest short circuit rating of any busway or plug-in unit installed.

**Class J fuse installation as shown in Figures 7, 8, 9 and 10**

Use only appropriately sized and rated fuses for the application.

1. Turn the plug-in unit handle to the “OFF” position. (See Figs. 3 and 4)
2. Turn the interlock latch 90° counterclockwise

3. Open the plug-in unit door
4. Use fuse pullers to insert or remove fuses into the switch
5. Before closing the cover, carefully inspect the switch area for tools and objects left inside this equipment
6. Close the plug-in unit door
7. Turn the interlock latch 90° clockwise

**Table 1: Class J fuse selection and installation**

Plug-in unit Max. Amperage	Max. Voltage	Short circuit rating ka	Fuse class	Fuse installation Reference
30 A	600 Vac	200 kA	J	1SCC311036M0212
60 A	600 Vac	200 kA	J	
100 A	600 Vac	200 kA	J	1SCC311037M0206
200 A	600 Vac	200 kA	J	1SCC311012M0219
400 A	600 Vac	200 kA	J	1SCC311015M0215
600 A	600 Vac	125 kA	J	1SCC311016M0210

Due to UL restrictions it is not possible to give a general fuse selection table. Please contact ABB regarding application issues. Information needed is normal current of the application and catalog number of the fuse. For OS switch technical information, refer to ABB document - 1SCC311013C0201.

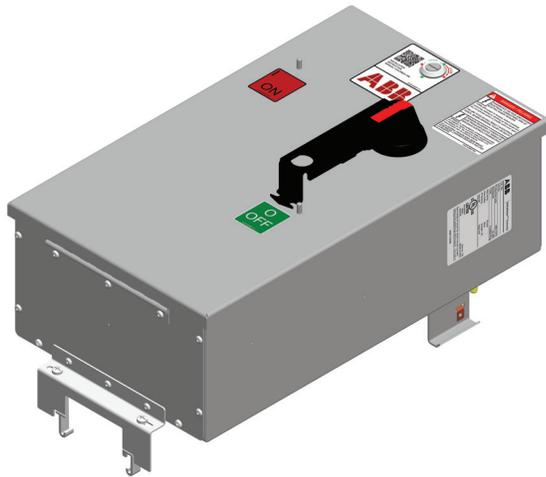


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07



# OT Fusible (Class H or R) switch plug-in units 30 A – 600 A

11  
OT Fusible Plug-In Unit



11



**Danger:** HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices.
- Unless Class H or R fuses are used, this switch may present a risk of fire and personal injury if in installed on circuits capable of delivering not more than 10 kA (Class H), not to exceed 200 kA (Class R).
- Failure to follow these instructions will result in death or serious injury.

**This plug-in unit accepts Class H or R fuses only**

When used with Class H fuses, this switch is suitable for use on a circuit capable of delivering not more than 10 kA at 600 volts (AC) maximum. Short circuit rating of a busway system is limited to lowest short circuit rating of any busway or plug-in unit installed.

When used with Class R fuses, this switch is suitable for use on a circuit capable of delivering not more than 200 kA at 600 volts (AC) maximum. Short circuit rating of a busway system is limited to lowest short circuit rating of any busway or plug-in unit installed.

**Class H or R fuse installation as shown in Figures 12, 13, 14 and 15**

Use only appropriately sized and rated fuses for the application.

1. Turn the plug-in unit handle to the OFF position (See Figs. 3 and 4)
2. Turn the interlock latch 90° counterclockwise
3. Open the plug-in unit door
4. Use fuse pullers to insert or remove fuses into the switch
5. Before closing the cover, carefully inspect the switch area for tools and objects left inside this equipment
6. Close the plug-in unit door
7. Turn the interlock latch 90° clockwise

**Table 2: Class H fuse selection**

Plug-in unit Max. Amperage	Max. Voltage	Max. Voltage	Short circuit rating ka	Fuse class
30 A	250 Vac	600 Vac	10 kA	H
60 A	250 Vac	600 Vac	10 kA	H
100 A	250 Vac	600 Vac	10 kA	H
200 A	250 Vac	600 Vac	10 kA	H
400 A	250 Vac	600 Vac	10 kA	H
600 A	250 Vac	600 Vac	10 kA	H

**Table 3: Class R fuse selection**

Plug-in unit Max. Amperage	Max. Voltage	Max. Voltage	Short circuit rating ka	Fuse class
30 A	250 Vac	600 Vac	200 kA	R
60 A	250 Vac	600 Vac	200 kA	R
100 A	250 Vac	600 Vac	200 kA	R
200 A	250 Vac	600 Vac	200 kA	R
400 A	250 Vac	600 Vac	200 kA	R
600 A	250 Vac	600 Vac	200 kA	R

# Class H or R fuse locations and install links

—  
12  
Plug-in unit 30 A – 60 A

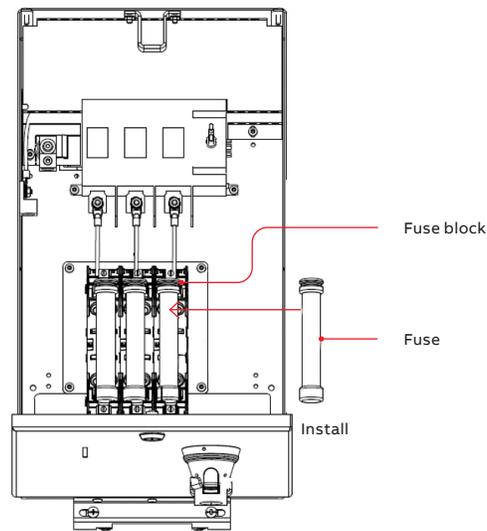
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13  
Plug-in unit 100 A – 200 A

—  
14  
Plug-in unit 400 A

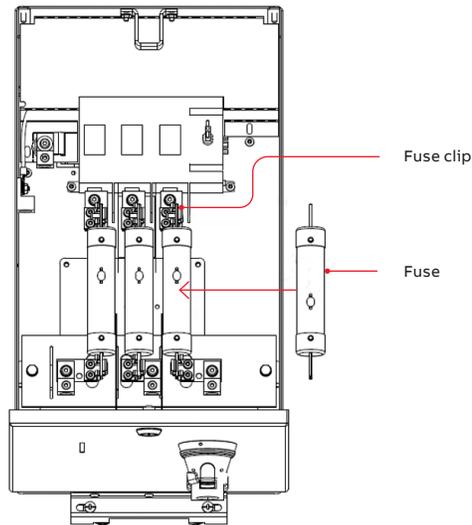
—  
15  
Plug-in unit 600 A

Due to UL restrictions it is not possible to give a general fuse selection table. Contact ABB, regarding application issues. Information needed is normal current of the application and catalog number of the fuse.

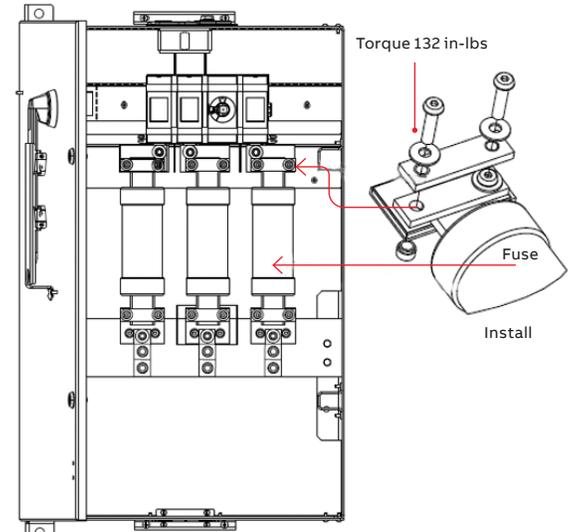
For OT switches technical information refer to ABB document - 1SCC301020C0201



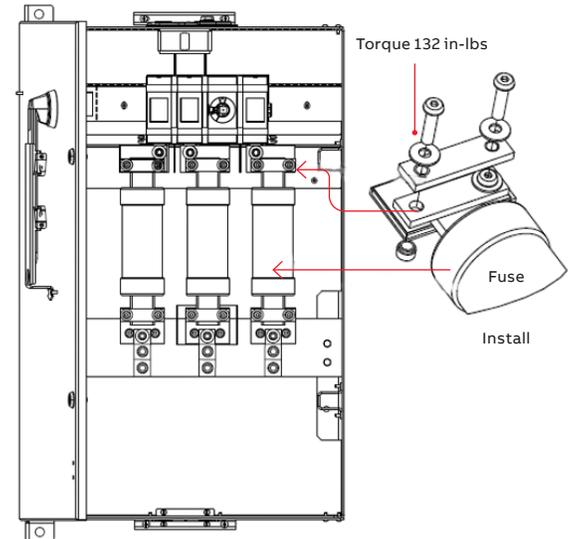
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12



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13



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14

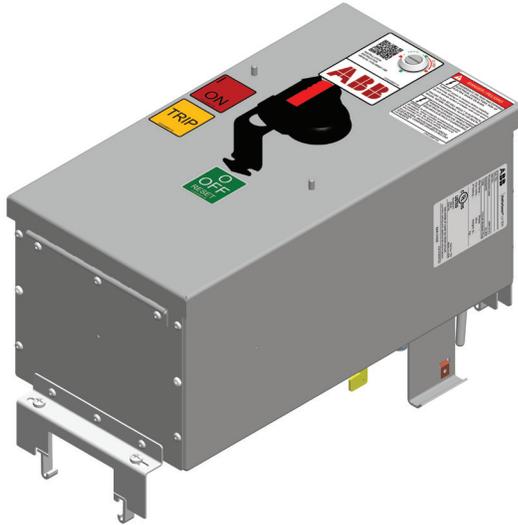


—  
15

# XT circuit breaker plug-in unit

## 15 A – 800 A

16  
XT circuit breaker  
plug-in unit



16

### **⚠ DANGER**

**Danger:** HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices.
- Use only ABB SACE Tmax XT circuit breaker in this plug-in unit.
- Circuit breaker catalog prefix must match the plug-in unit catalog on nameplate.
- Failure to follow these instructions will result in death or serious injury.

### **Ground-fault protection field connection and testing**

When ground-fault protection is provided, all field connections must be made correctly to insure proper functioning of the ground-fault protection system. Observe the following rules when connecting and testing ground-fault protection systems:

- In a service entrance section, bond the neutral conductor to the plug ground bus with a main bonding jumper (ground strap). Locate this grounding point on the neutral conductor on the supply side of any ground-fault sensors involving the neutral conductor. Do not make grounding connections to the neutral conductor on the load side of the service disconnect.

- On load feeders, run all phase conductors (and neutral, if used) through the sensor window(s), with all in the same direction with respect to sensor polarity.
- Do not run equipment ground conductors through ground-fault sensors. Connect them directly to the plug ground bus, not to the neutral bus.
- Connect the service grounding electrode (water pipe, etc.) to the lug provided on the plug ground bus for this purpose.
- Whenever a service is derived from a grounded neutral supply, the grounded neutral conductor must be brought into the service-entrance equipment, even if the grounded conductor is not needed for the load supplied by the service. This is required to provide a low-impedance ground-fault current return path to the neutral to assure operation of the overcurrent device, for safety to personnel and property
- Refer to publication 1VAL106901-HT for instructions on conducting performance test of new installations of ground-fault protection systems.

### **Device selection**

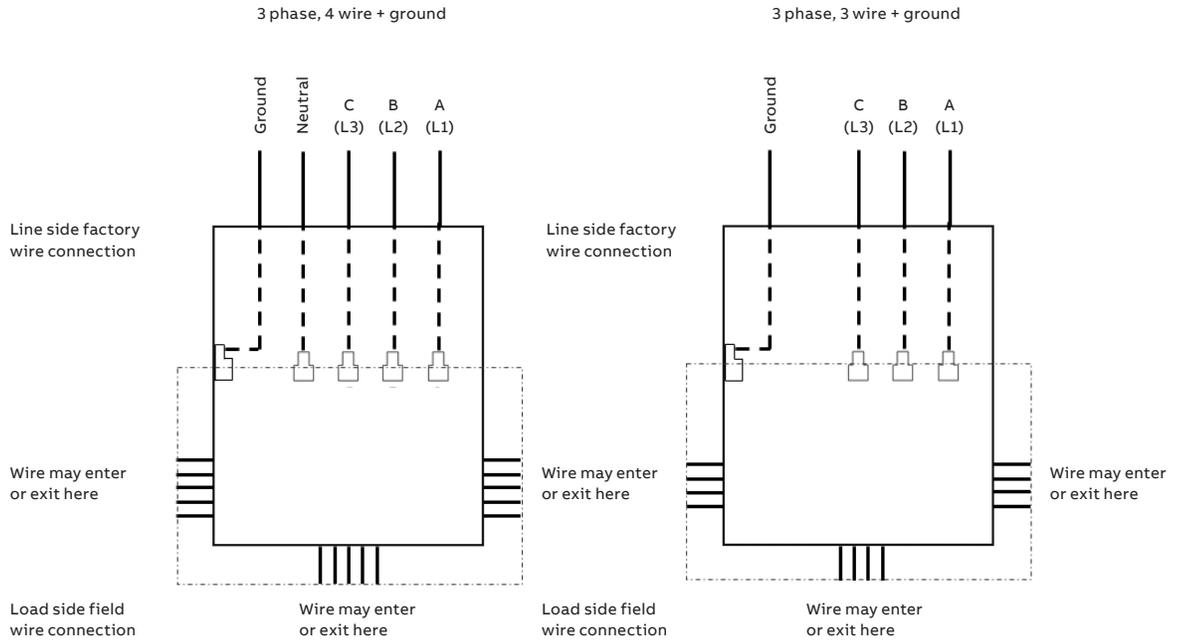
All protective devices should be applied within their ratings-voltage, frequency, current and short circuit, under usual plug-in unit service conditions. Additional device selection considerations may be required if the equipment is part of a system with required selectivity per the NEC. Device selections need to be made carefully to properly fulfill selectivity requirements.

Utilize ABB's Curves Web online tool for all information pertaining to time current curves. The tool can be accessed at <https://partnerhub.connect.abb.com/> If access to this tool is not available, please consult the factory. If any discrepancies are found in the time current curve information from other sources, the ABB's Curves Web online tool takes precedence.

For Tmax XT circuit breaker technical information refer to ABB document - 1SDC210200D0203

# Plug-in unit wiring diagram

17  
Plug-in unit wiring  
diagram



17

## Load side field phase wiring instructions

- Use copper or aluminum wire when switch and Breaker is so marked
- See switch and breaker markings for wire type, wire size, wire rated temperature and terminal torque requirements
- When not marked on the device or component, torque all connectors to the values indicated in Table 4.

## Load side field neutral and ground wiring instructions

Use copper or aluminum wire. For #1 AWG and smaller sizes, use wire rated at 60 °C. For #1/0 AWG and larger sizes, use wire rated at 75 °C.

Table 4: OS and OT fusible plug-in unit - load side field wire torque values

OS and OT plug-in unit	Phase lug wire AWG or Kcmil <sup>1</sup>	Phase wire torque value <sup>1</sup>	Neutral lug wire AWG or Kcmil	Neutral wire torque value	Ground lug wire AWG or Kcmil	Ground wire torque value
30 A	#18 - 8	17 In-lbs.	#18 - 8	17 In-lbs.	#14 - 2/0	120 In-lbs.
60 A	#14 - 4	30-35 In-lbs.	#14 - 4	30-35 In-lbs.	#14 - 2/0	120 In-lbs.
100 A	#14 - 2/0	120 In-lbs.	#14 - 2/0	120 In-lbs.	#14 - 2/0	120 In-lbs.
200 A	#4 - 300	200 In-lbs.	#4 - 300	200 In-lbs.	#6 - 350	275 In-lbs.
400 A	(2) #2-500	375 In-lbs.	(2) #2-500	375 In-lbs.	#6 - 350	275 In-lbs.
600 A	(2) #2-600	500 In-lbs.	(2) #2-600	500 In-lbs.	#6 - 350	275 In-lbs.

<sup>1</sup> Load side wire size and wire tightening torque information refer to ABB document - 1SCC311013C0201

**Table 5: Tmax XT circuit breaker plug-in unit - load side field wire torque values**

XT plug-in unit	Phase lug wire AWG or Kcmil <sup>2</sup>	Phase wire torque value <sup>2</sup>	Neutral lug wire AWG or Kcmil	Neutral wire torque value	Ground lug wire AWG or Kcmil	Ground wire torque value
XT2	#14 - 1/0	62 In-lbs.	#6 - 350	275 In-lbs.	#14 - 2/0	120 In-lbs.
XT4	#4 - 300	200 In-lbs.	#6 - 350	275 In-lbs.	#14 - 2/0	120 In-lbs.
XT5	(2) 2/0 - 500	274 In-lbs.	(2) #2 - 600	500 In-lbs.	#6 - 350	275 In-lbs.
XT7	(4) 4/0 - 500	380 In-lbs.	(4) 4/0 - 500	380 In-lbs.	#6 - 350	275 In-lbs.

<sup>2</sup> Load side wire range and wire tightening where possible, the terminals have a laser marking on the surface indicating the tightening torques for the correct insulation of cables and bars (or) refer to ABB document - 1SDC007406G0201

## NOTICE

**Notice:** OS, OT and XT Plug-in units' mechanical lugs included for cabling to equipment.

# Plug-in unit operation

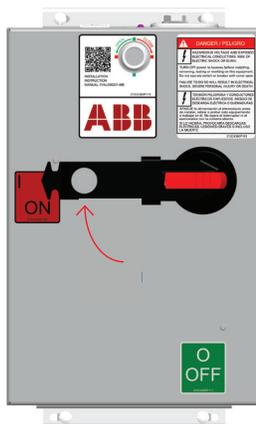
## **DANGER**

**Danger:** HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Before installing, removing or performing any work on or inside the plug: Turn off the plug. Wear protective equipment appropriate for the hazard, including insulated gloves and a face shield.
- Turn off power to the busway before working on the line side of the switch or remove the plug from the busway.
- Turn off the plug-in unit before removing or installing fuses or making load side connections.
- Always use a properly rated voltage sensing device at all line and load side fuse clips to confirm that the plug is off. Never operate the plug-in unit with the door open.

Failure to follow these instructions will result in death or serious injury.

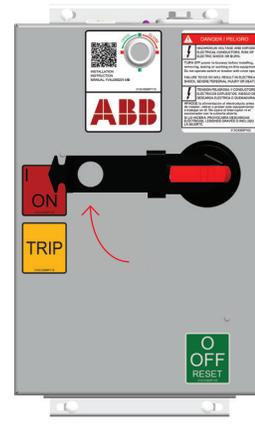
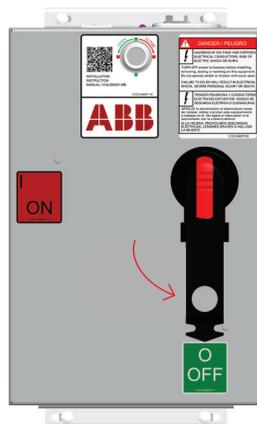
### Turning the plug-in unit ON (I) and OFF (O)



18

Operate the plug-in unit handle with a quick, steady motion (Figures 18 and 19).

To reset the breaker plug-in unit once it has been tripped, set the handle to the OFF (O) position and then back to the ON (I) position.



19

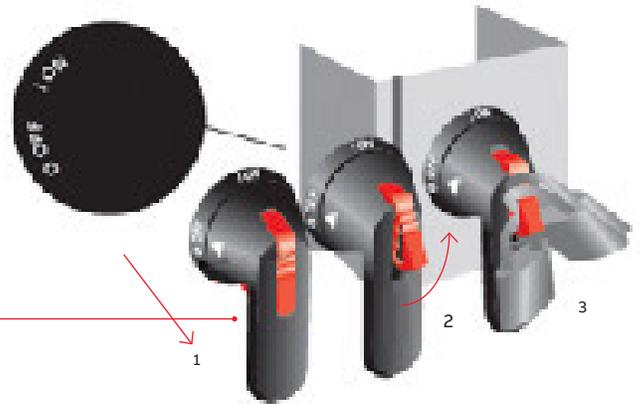
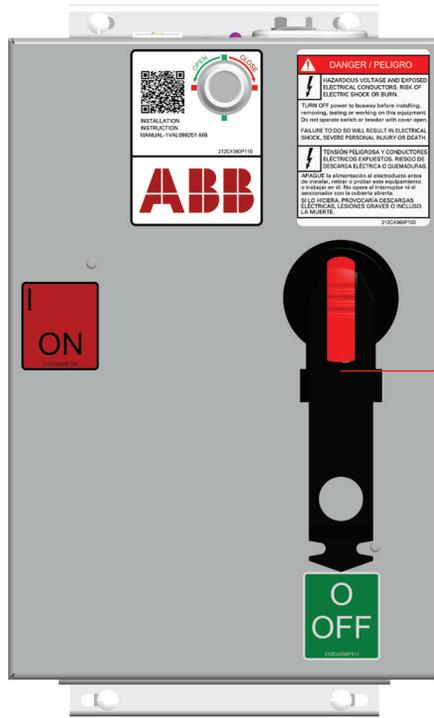
## **NOTICE**

**Notice:** When the plug-in unit is out of reach from ground level, the handle is operated by means of a hook stick.

—  
18  
Fusible plug-in unit

—  
19  
Breaker plug-in unit

20  
Lockout/Tagout (LOTO)



Ø5...10 mm  
0.20...0.39 in



20

**DANGER**

**Danger:** HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E Padlock the plug-in unit handle in the OFF position. Follow all required lock out and tag-out (LOTO) procedures. Always use a properly rated voltage sensing device to confirm that the power is off.

Failure to follow these instructions will result in death or serious injury.

Refer to Figure 20 and steps 1–2 to padlock the plug-in unit handle.

1. Turn the plug-in unit handle to the OFF (O) position.
2. Padlock the plug-in unit handle in the OFF (O) position, insert a single padlock with a maximum 0.2-0.39 in diameter shackle through the red slot opening in the handle.

**NOTICE**

**Notice:** Up to three padlocks with 0.2-0.39 in diameter shackle can be placed through these openings. (See Figure 20).

# Plug-in unit maintenance

## General maintenance procedures

When inspecting and performing maintenance on plug-in units, ensure the plug operating handle is in the Off (O) position and that the power to the busway is turned off. Turn off power to the busway.

- Move the operating handle of the plug-in unit to the Off (O) position
- Use a rated voltage sensing device, open the plug-in unit door and check to ensure there is no voltage present on the line and load side of the device
- For fusible units, check the fuse clip contact pressure and contact
- Check the operation of all mechanical components
- Check for missing or broken parts, rusting, corrosion, dirt, and excessive wear
- Check the line and load wire connections to ensure proper torque
- Operate each switch or circuit breaker several times to ensure proper working order

To obtain the best service from the plug-in units, establish a periodic maintenance schedule. At a minimum, perform an annual check and overall maintenance procedure for the plug-in unit devices and all connections. Equipment subject to highly repetitive operation may require more frequent maintenance.

Keep a permanent record of all maintenance work. Include a list of periodic checks and tests, the date they were made, the condition of the equipment, and any repairs or adjustments performed. Maintenance employees should follow all recognized safety practices, such as those in the National Electrical Code (NEC), the Canadian Electrical Code (CEC), and in company and other safety regulations.

For specific information about the maintenance of devices, such as circuit breakers and fusible units, refer to the separate manuals provided with each device.

Observe the following important points:

- Periodically inspect the plug-in units while under load to determine if there is any indication of overheating. If overheating or any other unsatisfactory condition is found, completely de-energize the busway and investigate. Look particularly for loose bolts and connections or overloading. Remove any accumulation of dirt or other foreign matter in the enclosure. Do not touch live parts while the plug is energized.
- Plated parts may become dark over time due to oxidation. Do not remove this discoloration, as this will reduce the thickness of the plating.
- Retorque terminal connections and hardware to the values specified in unit to eliminate possible heating points. Transmission of vibrations through the building structure and conduits to the plug-in units may loosen hardware. Turning the load off and on causes expansion and contraction between lugs and cables, which tends to loosen the lug hardware. Do not open sealed circuit breakers or trip units, as this may disturb the calibration.

## Normal operating conditions

- When and where the ambient temperature is within the limits -30°C through +40°C for busway plug-in- units incorporating enclosed switches.
- When and where the ambient temperature is within the limits 0°C through +40°C for busway plug-in-units incorporating molded case circuit breakers.
- Where the altitude does not exceed 6600 feet (2000 meters).
- For applications where the ambient temperature is lower than the minimum limits or at altitude greater than 6600 feet (2000 meters) consult the factory.

**Ambient temperature and circuit loading**

Busway Plug-in units are designed for installation where the average ambient temperature does not exceed 40°C (104°F). For higher temperatures, derating is required. The conductor temperatures within the enclosure may be as high as 90°C (194°F). Some parts of the circuit breakers, switches, and fuses may run hotter. Make sure to follow the load requirements for each device in the Plug-in unit.

**Voltage drop (general)**

Good practice indicates that the voltage drop in feeder circuits up to the final distribution point where the load is divided into individual branch circuits should not exceed 3 percent for power, heating, or lighting loads or combination thereof. Total voltage drop for feeders and individual branch circuits up to the final utilization point should not exceed 5 percent overall. Refer to NEMA BU 1.1 for maintenance instructions. Refer to NEMA BU 1.2 for application instructions.

**Short circuits**

Generally, the overcurrent protective device on the circuit will prevent any electrical damage except at the point of the short circuit. Make a thorough inspection of the entire system after any large fault current to ensure that there has been no mechanical damage to conductors, insulation, or equipment.

In addition, the individual overcurrent protective device or devices that performed the short-circuit interruption must be inspected for possible arcing damage. Do not open sealed devices such as circuit breaker trip units. Replace any device that may have been damaged by the short circuit. For additional details on a device, refer to the applicable instruction manual provided with the device.

**Permissible loading of plug-in units**

The total continuous load current on a busway fusible plug should not exceed 80 percent of the ampere rating of the fuses.

The total continuous load current on other types of plug-in units should not exceed 80 percent of the ampere rating of the plug unless the device is rated to carry 100 percent of its ampere rating. Cycling loads with high inrush currents may require additional consideration when sizing plug-in units. Consult the factory for proper sizing under these conditions.

**Arcing damage to insulation**

Some organic insulating materials carbonize when subjected to the heat of an electrical arc and lose their insulating properties. Any insulation found to be carbon-tracked must be replaced before re-energizing.

**Water-soaked equipment**

Electrical equipment exposed to water can be extremely hazardous if reenergized without performing a proper evaluation and taking necessary actions. Reductions in the integrity of electrical equipment due to moisture can affect the ability of the equipment to perform its intended function.

Damage to electrical equipment can also result from flood waters contaminated with chemicals, sewage, oil, and other debris, which will affect the integrity and performance of the equipment. Ocean water and salt spray can be particularly damaging due to the corrosive and conductive nature of the saltwater residue. Do not energize equipment that is exposed to flood or other contaminated water. Consult ABB Field Services for guidance.

**Spare parts**

The plug-in unit device parts are not field-replaceable. Contact your local ABB representative if replacement is needed. The replacement shall be of the same manufacturer, type designation, short-circuit rating and ampere rating.

# Reference document numbers

## Installation manuals

Additional technical information, instructions and installation manuals can be found in the following documents:

**Table 6: OS Fusible plug-in unit switches**

Device type	Document number	Description
OS30	1SCA108824R1001	OS 30 A switch
OS60	1SCA115866R1001	OS 60 A switch
OS100	1SCA115436R1001	OS 100 A switch
OS200	1SCA022758R8610	OS 200 A switch
OS400	1SCA022755R3070	OS 400 A switch
OS600	1SCA022839R3730	OS 600 A switch

**Table 7: OT Fusible plug-in unit switches**

Device type	Fuse class	Document number	Description
OT30	H & R	1SCA022723R0570	OT 200 A switch
OT60	H & R		
OT100	H & R		
OT200	H		
OT200	R	1SCA022762R6300	OT 400 A switch
OT400	H		
OT400	R	1SCA111494R1001	OT 800 A switch
OT600	H & R		

**Table 8: Tmax XT mold case circuit breakers**

Device type	Document number	Description
XT2	1SDH000721R0003	Tmax XT2 breaker (15A-125A)
XT4	1SDH000722R0001	Tmax XT4 Breaker (70A-250A)
XT5	1SDH002011A1002	Tmax XT5 Breaker (250A-500A)
XT7	1SDH002013A1001	Tmax XT7 Breaker (600A-800A)

For more information visit: <https://electrification.us.abb.com/products/busway>



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