OEM APPLICATION GUIDE

ReliaGear® OEM switchboard

Powering efficiency, safety, and scalability

Reduce costs, simplify installation, and future-proof your power distribution

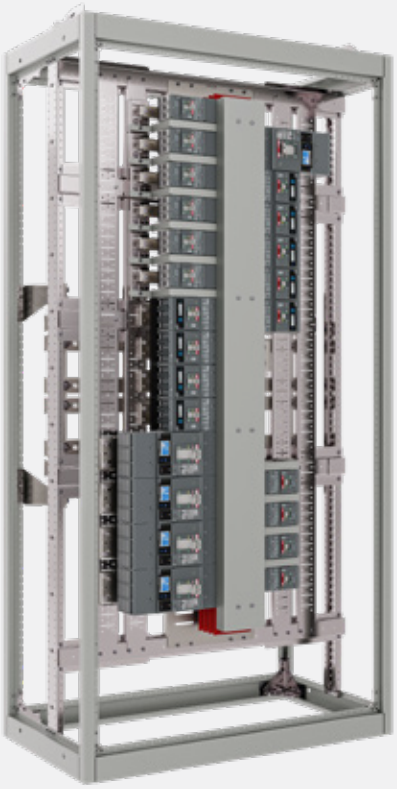


Table of contents

04	**Introduction**
05	**Offering overview**
06	**Glossary**
07–12	**Sizing and dimensions**
13	**Venting requirements**
14–15	**Tier connection X-space requirements**
16–17	**Design guidance — breaker fillers**
18–21	**Application data**
22	**Surge protective devices and main metering**
23	**Installation manuals**

Introduction

OEM switchboard offering
ReliaGear® switchboards are transforming electrical product design by seamlessly combining simplicity with advanced functionality. Engineered for effortless selection, integration and operation, ReliaGear® delivers plug-in and single-tool convenience. Instant access to CAD models and installation guides streamlines project planning, significantly reducing design time.

Built on a **flexible modular framework**, this design minimizes reconfiguration costs and enables future scalability without expensive redesigns, ensuring unmatched adaptability. **Safety remains a top priority**, exemplified by an enhanced finger-safe bus stack that meets **IP20 standards**, preventing accidental contact and reducing workplace injury risks while ensuring regulatory compliance.

By leveraging **cutting-edge technology**, ReliaGear® enables **faster, tool-free installation**, saving time and labor costs while accelerating project timelines. This **holistic approach** optimizes efficiency, lowers expenses and delivers a future-proof solution for electrical system design. Additionally, expert design guidance ensures seamless integration of **ABB circuit breakers** in OEM switchboard applications, reducing rework while enhancing quality, reliability and cost-effectiveness.

Main bus stack features:
- **High short-circuit ratings** enhance system resilience, minimizing the risk of failures and costly downtime.
  - Fully rated **up to 200 kAIC at 480 V** and **100 kAIC at 600 V AC**
  - Available in **1200 A to 4000 A** configurations
  - **Group-mounted plug-in MCCBs** ranging from **15 A to 1200 A**
- **Scalable design** adapts to evolving power demands:
  - Modular **X-heights (32X, 40X, and 48X)** for seamless expansion
- **Configurable mounting options** maximize space efficiency:
  - **Single-sided or two-sided** breaker mounting for optimized power distribution layouts
- **Flexible feed orientations** accommodate diverse installation needs:
  - **Bottom, top or center feed** options

For a comprehensive understanding of ReliaGear® OEM **low voltage switchboards and power distribution panels**, refer to the product catalogs. Documentation references are available in the **installation manual section** of this document.

Offering overview

Offering overview

This document describes the OEM application requirements of bus stack interiors and their related interior frame structure, along with the molded case circuit breakers (MCCBs):

- As branch feeders in group-mounted option for OEM switchboard applications.

Each of the variations referenced are covered in UL File E466042, Volume 2 Section 1.

These stacks are built to the highest industry safety standards in compliance with UL 67 and UL 891 to minimize risk, liability and unexpected failures.

NOTICE

The mounting requirements for single- and double-mounted bus stacks must adhere to ABB standards referenced in this guide.

Tests must be conducted per UL 891 for any variation from the guidelines provided in this document.

The actual short-circuit current rating is limited to the lowest short-circuit current rating of any device installed on the switchboard or listed series-rated devices as per document DET-008. All OEM connectors, bus bracing and support add-ons or modifications must comply with UL 891 short-circuit requirements.

Table 1. Group-mounted plug-in breakers

Device usage	Device type	Amperage rating
Feeder	Tmax® XT	15–1200 A
	Record Plus FB	15–100 A (1P and 2P only)
	TEY	15–125 A (1P and 2P only)
	Formula A2	125–250 A (2P only)

Table 2. Voltages

Configuration
208Y/120 3Ø, 4W AC
240D 3Ø, 3W AC
240Y/120 3Ø, 4W AC, B phase high leg
240Y/120 3Ø, 4W AC, C phase high leg
480D 3Ø, 3W AC
480Y/277 3Ø, 4W AC
600D 3Ø, 3W AC
600Y/347 3Ø, 4W AC
125V or 250V, 2 Wires, DC (1)
125/250V, 3 Wires, DC (1)

(1) DC offering can be accomplished using the 3-phase AC bus to an equivalent 2 bus DC offering.

Table 3. Group-mounted bus stack interior

		Group-mounted enclosure section (1)			Branch breaker feeders	Venting
Bus stack rating	Bus stack location	Min. width in inches (ampacity)	Min. height (in.)	Min. depth (in.)	Min. width (in.)	Ref.
1200 A 2000 A 3000 A 4000 A	Center	30 (1200 A–2000 A) 40 (3000–4000 A)	90	25	TEY/FB/A2/XT1/XT2 = 30 XT4 = 35 XT5 = 45	Front and rear venting required
	Offset	40 (1200–4000 A)	90	25	TEY/FB/A2/XT1/XT2/XT4/XT5 = 40 XT6/XT7 = 45	
	One-sided	30 (1200 A–2000 A) 35 (3000–4000 A)	90	25	TEY/FB/A2/XT1/XT2/XT4	
Reference	Table 6	Table 6			Table 6	Table 7

(1) The dimensions in inches specified are minimum recommended values. Any values less than the recommended shall follow UL 891 standard requirements.

Glossary

— Glossary

The following terms are used across this documentation.

OEM — original equipment manufacturer.

RELT — reduced energy let-through.

Bus stack — a prefabricated electrical distribution system that contains busbars, housing and an insulation system, intended to be installed in a switchboard enclosure to become the equivalent of the switchboard section.

Group mount — a method of mounting breakers against each other on a vertical bus, with the load terminals accessible from the front. The total assembly is then mounted in a switchboard combination or distribution section.

Section — a portion of a switchboard where the main or distribution components are located.

Service equipment/entrance — usually consisting of a circuit breaker and its accessories, located near the point of entrance of supply conductors to a building or other structure, or an otherwise defined area, and intended to constitute the main control and means of cutoff of the supply.

Phase arrangements — arrangement of section busbars in a 3-phase switchboard section or interior that is A, B, C from front to back, top to bottom, or left to right as viewed from the front of the switchboard section or interior.

SCCR — the maximum RMS prospective (available) current to which a device can be connected. Expressed in amperes and volts.

Continuous rating — is when the maximum current is expected to continue for three hours or more.

Series connected — means the UL Listed short-circuit rating is equal to the IC rating of the main protective device when properly applied with branch circuit protective device.

Standard (80%) and 100% ratings — circuit breakers are to be applied at 80% of their ratings unless the overcurrent devices and the assemblies in which they are mounted are listed for operation at 100% of their ratings.

XS/1-sided/2-sided — refers to bus stack configuration with breaker mounting options.

X value — is an arbitrary vertical measurement of the usable mounting space on the bus stack for a breaker. X is equal to 1.385 inches. Height of the interior is the sum of the horizontally mounted components.

32X, 40X, 48X — refers to space options in bus stack. 1X = 1.385 inches in height.

30W/35W/40W/45W/50W/55W/60W — refers to various recommended width options for bus stack mounting.

Tier connection — copper connection that interfaces for connecting bus stack terminals to the horizontal main bus of the switchboard.

Fillers/filler plate — a plate intended to close an opening that would otherwise be closed by the subsequent installation of a circuit breaker.

Blanks — a metallic cover that covers the empty branch breaker space in the bus stack.

Spacers — for future when space and busing is only required for future inclusion of any specified devices.

Sizing and dimensions

Switchboard bus stack sizing considerations
The following rules and arrangements must be considered when sizing and dimensioning ReliaGear® bus stacks in OEM switchboards. The 90-inch switchboard standard height is recommended.

Group-mounted option
Group-mounted circuit breakers can be used as feeders or mains for switchboard sections of 1200 A and below.

Group-mounted circuit breakers are typically standard rated for up to 80% rated amperage for a period of 3 hours or more(1). 100% rated are available in Tmax® XT4, XT5 and XT7 with some limitations. Refer to the application notes section of this document.

In addition to circuit breakers, surge protective devices (SPDs), reduced energy let-through (RELT), metering and protection accessories are available for use in group-mounted sections. Breakers can be accessorized with mechanical/electrical accessories with additional X-spaces. Refer to the circuit breaker catalog for more information.

Table 4. Mounting space requirements

Frame	Max. ampacity (A)	Poles	X-spaces
Single XT1	125	3	3
Two XT1	125	3	5
Five XT1	125	3	11
XT2	125	3	3
XT4	250	3	3
XT5	600	3	4
XT6	800	3	6
XT7	1200	3	6
FB	100	1	1
FB	100	2	2
TEY	70	1	1
TEY	125	2	2
A2	250	2	2
SPD	–	–	10
RELT	–	–	3
Main metering	–	–	4

(1) NEC — Article 100 — Definition for continuous loads.

Sizing

Sizing

Group-mounted breakers are sized by X-space requirements, where X = 1.385 inches in height. Small frame breakers require less X spacing than larger circuit breakers. See Table 6 for information on allowable placement of circuit breakers in various width for OEM switchboard. There are three possible bus stack configurations: center, offset and one-sided/two-sided. Refer to Fig. 01 below for reference.

The section width will determine the largest amperage circuit breaker that can be placed in a group-mounted section. Table 6 shows the minimum associated section widths for the breakers.

The center configuration has the vertically mounted bus stack centered from left to right, allowing for the same sized circuit breakers to be placed on each side of the bus.

The offset configuration is manufactured with the bus stack offset slightly to the right of center, allowing for larger circuit breakers to be placed to the left of it. The bus stack can also be rotated by 180°, allowing for larger circuit breakers to be placed to the right side of it.

1200 A and 2000 A bus stacks have a single tier connection per phase to the switchboard busing. 3000 A and 4000 A bus stacks have either one- or two-tier connection per phase depending on the bus configuration. Please refer to Tables 10, 11 and 12 — X-space and tier connection.

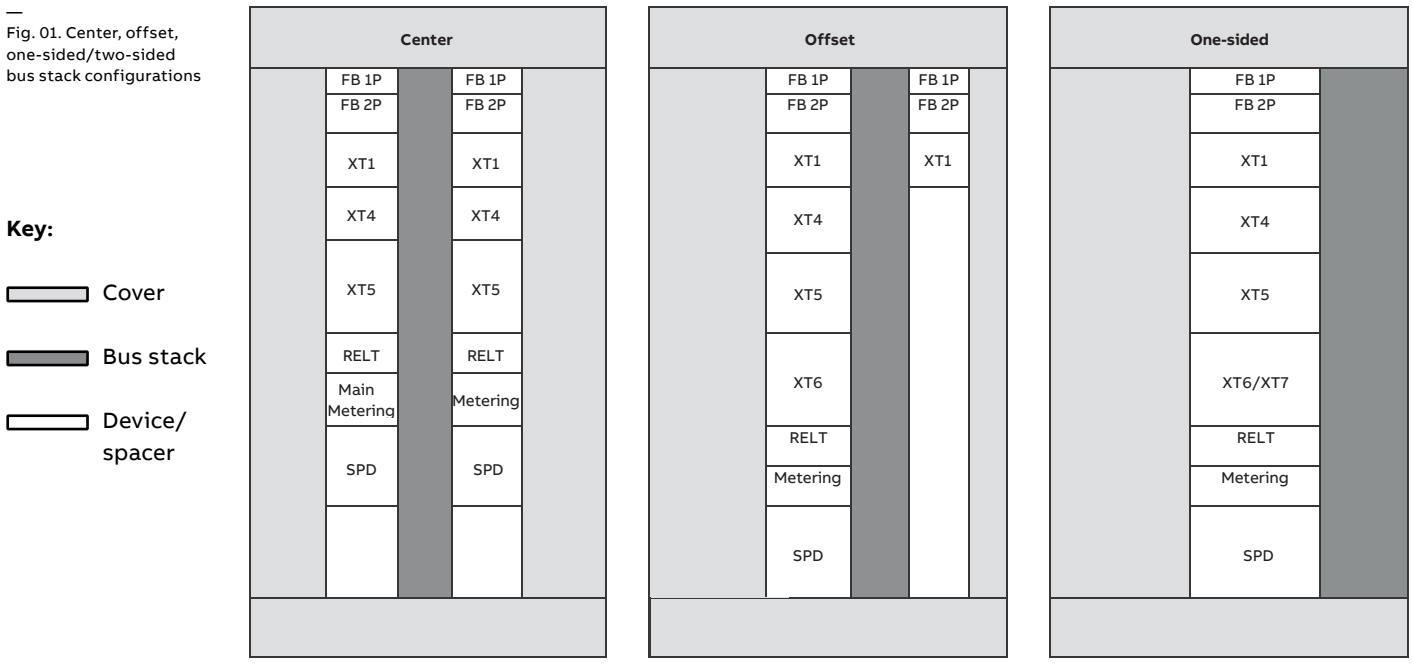
The one-sided configuration has the bus stack on the right side of the bus stack. Devices can only be mounted on the left side of the bus stack in a one-side configuration. Alternatively, the bus stack can also be rotated[(1)] by 180°, allowing for breakers to be mounted only on the right side of the bus stack. Either way, this can greatly help to reduce the overall width of the section.

NOTICE

After rotation, breaker terminals phase marking must meet UL Standard 891, 12th edition, Clause 8.8.1.2.2 requirements.

One-sided configurations with ratings up to 2000 A have a single connection per phase to the OEM switchboard busing, which does not affect device mounting space. OEM switchboard ratings for 3000 A and 4000 A have one or two connections per phase to the busing.

Fig. 01. Center, offset, one-sided/two-sided bus stack configurations



NOTICE

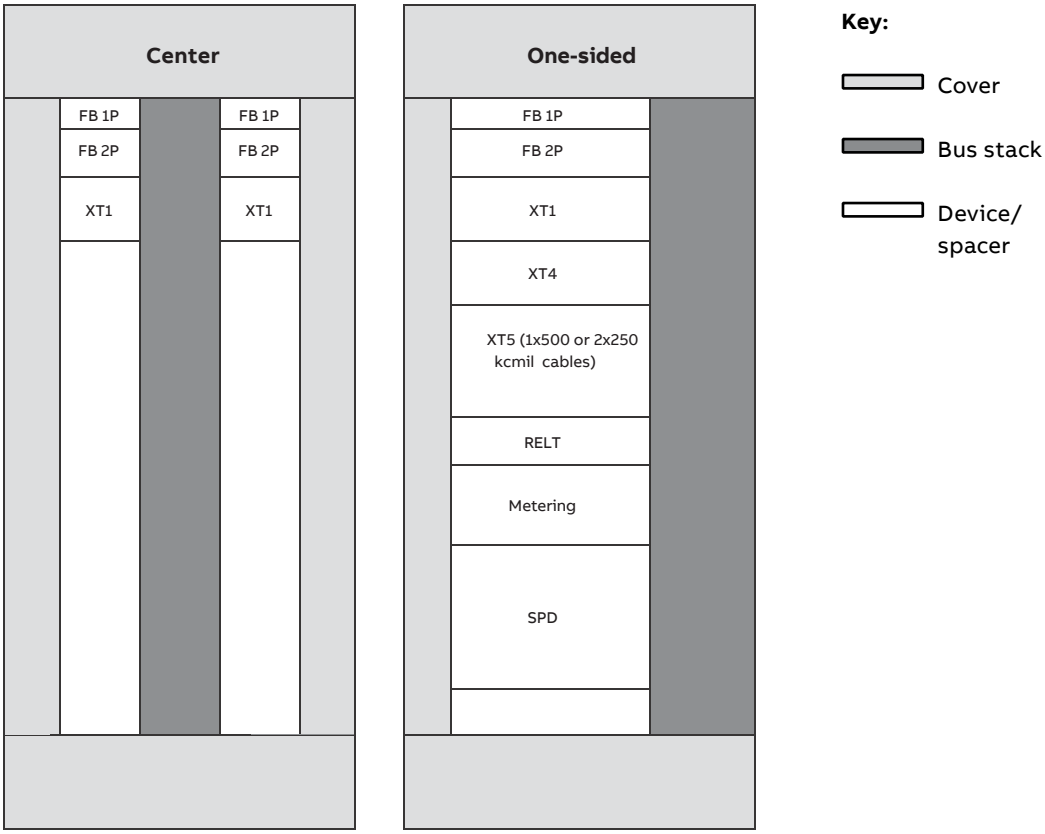
Devices shown do not represent all configurations.
These are typical representations for guidance purposes.

Table 6. Section widths and associated circuit breakers

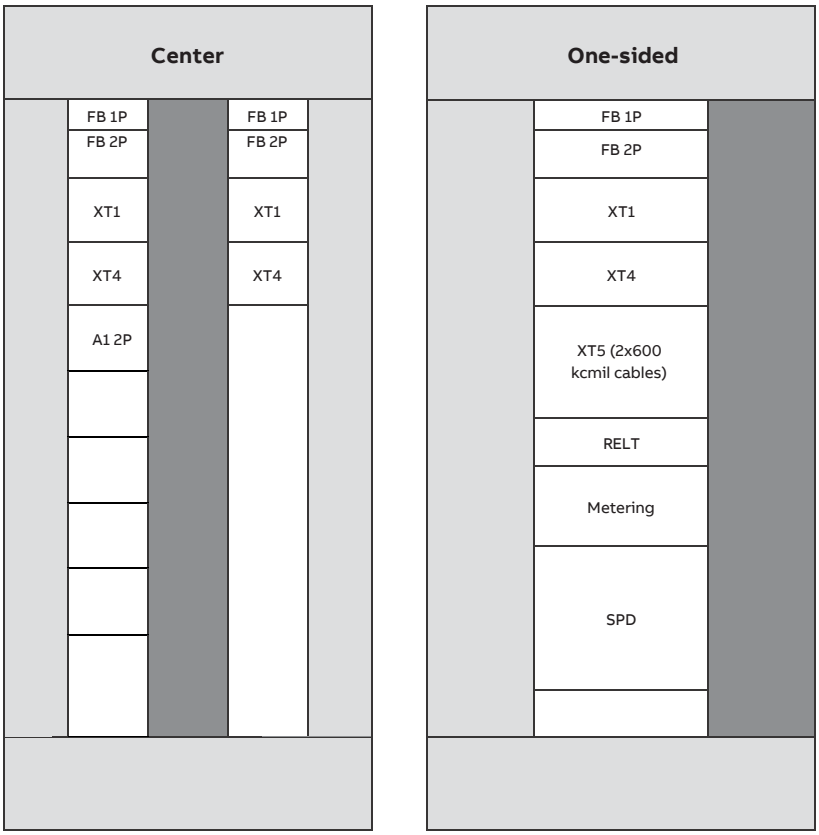
		Recommended min. widths[8] (in.)						
Bus stack location	**Circuit breaker**	**(in.) 30–34**	**35–39**	**40–44**	**45–49**	**50–54**	**55–59**	**>60**
Center	FB, TEY, A1, A2	←→	←→	←→	←→	←→		
	Tmax XT1, XT2	←→	←→	←→	←→	←→		
	Tmax XT4		←→	←→	←→	←→		
	Tmax XT5				←→[1]	←→[4]		
Offset	FB, TEY, A1, A2			←→	←→	←→	←→	←→
	Tmax XT1, XT2			←→	←→	←→	←→	←→
	Tmax XT4			←→[3]	←	←→	←→	←→
	Tmax XT5			←[4]	←	←	←→[5]	←→[6]
	Tmax XT6				←	←	←	←
	Tmax XT7				←[2]	←	←[2]	←
One-sided (can only mount on left of one-sided bus stack)	FB, TEY, A1, A2	←	←	←	←			
	Tmax XT1, XT2	←	←	←	←			
	Tmax XT4	←	←	←	←			
	Tmax XT5*	←[1]	←[7]	←	←			
	Tmax XT6			←	←			
	Tmax XT7			←[2]	←			

← Circuit breakers can be added to the left of the bus stack
→ Circuit breakers can be added to the right of the bus stack
[1] Limited to 1–500 kcmil cable or 2–250 kcmil cables
[2] Limited to 4–500kcmil cables
[3] Max 300 kcmil cables on right side
[4] Limited to 2–500 kcmil cables
[5] Limited to 2–500 kcmil cables on right side
[6] Limited to 2–600 kcmil cables on right side
[7] Limited to 2–600 kcmil cables
[8] Values are based on ABB Interior frame/bus stack location. Any variations made by OEM construction should follow UL 891, clause 8.8.3.2 wire bending space requirements.

Typical device fitting per configuration and section width

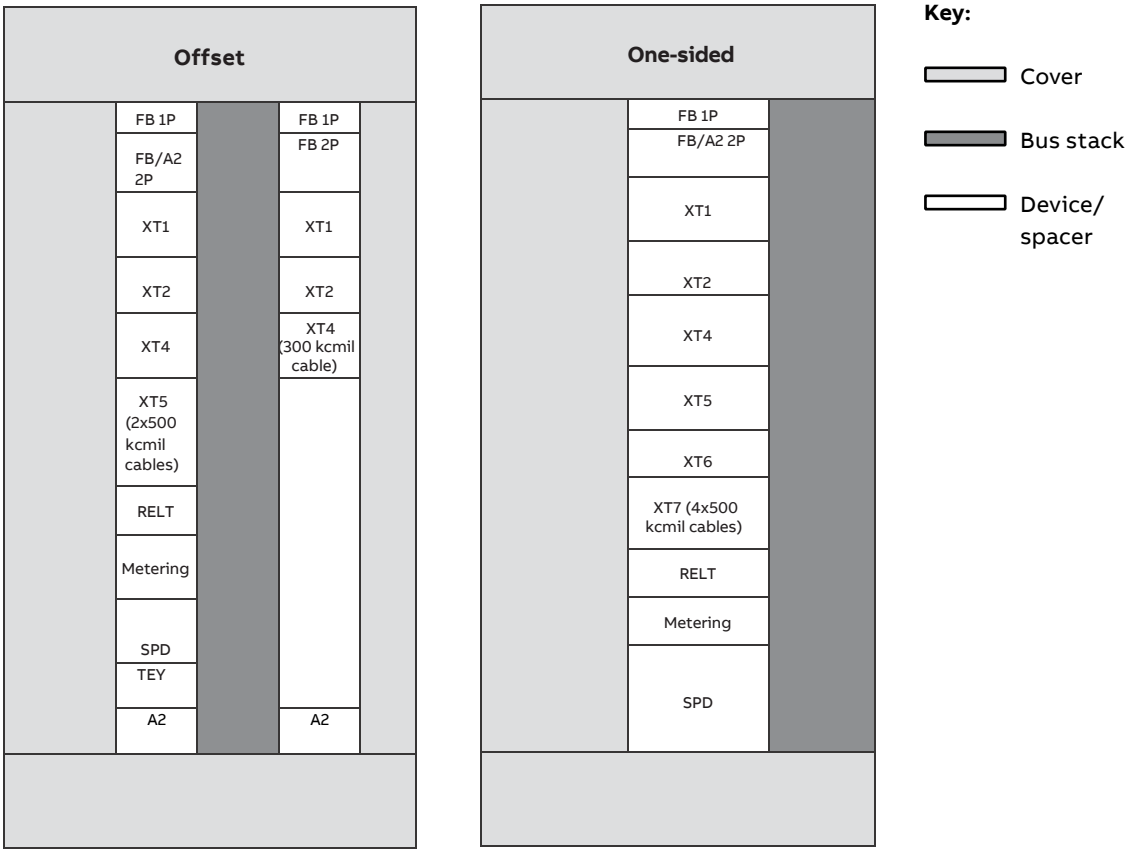


—
Fig. 02 Typical section width and circuit breaker options 30W

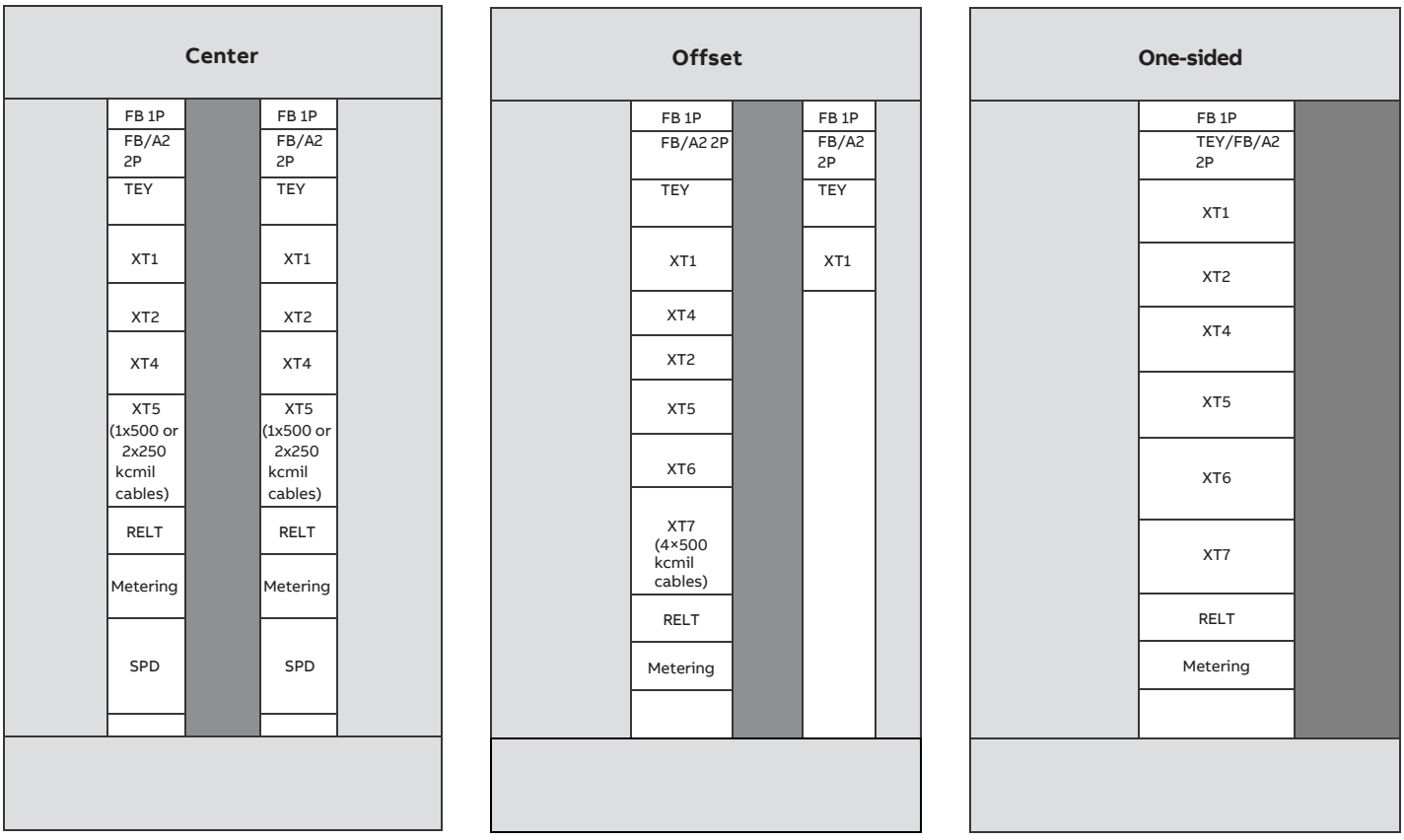


—
Fig. 03 Typical section width and circuit breaker options 35W

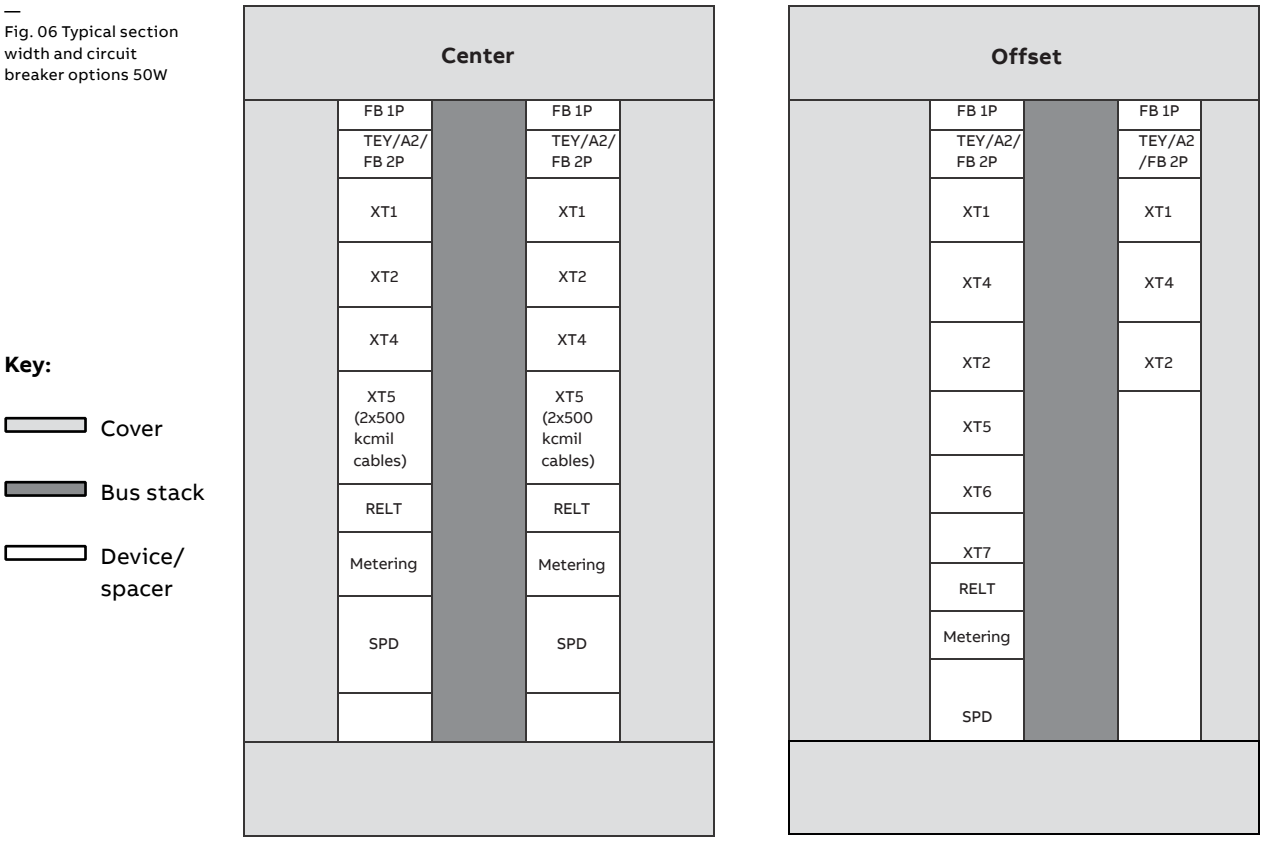
—
Fig. 04 Typical section width and circuit breaker options 40W



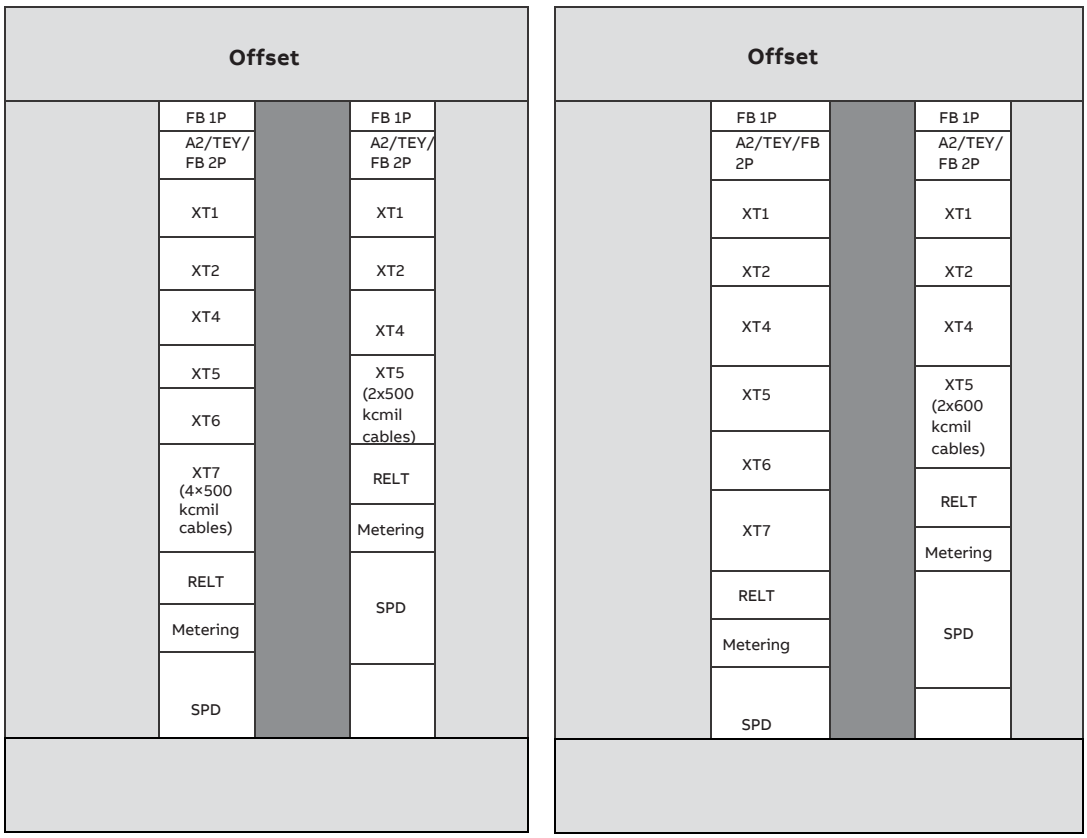
—
Fig. 05 Typical section width and circuit breaker options 45W



—
Fig. 06 Typical section width and circuit breaker options 50W



—
Fig. 07 Typical section width and circuit breaker options 55W



—
Fig. 08 Typical section width and circuit breaker options 60W

Venting requirements

Section venting requirements

The bus stack group-mounted section should adhere to the following minimum width depending on the bus stack mounting location. Any reduction in the minimum width — that is, less than minimum width or 90"H standard height — must be validated with testing requirements as per UL 891.

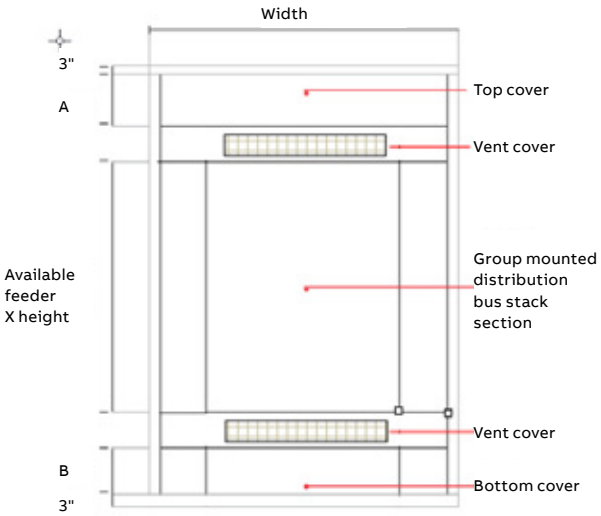
Venting specified in the below Table 7 is required when XT7 breakers are used as feeders. Venting becomes an option if XT7 breakers are used with 90 °C insulation cables on the load side. Also, all bus construction in the section needs to follow density-rated bus requirement as defined in UL 891, 12th edition, Table 23. Ampacity of single or multiple busbars and clamped joints.

Table 7. OEM section venting requirements

Bus stack interior configuration				
Location	Feed orientation	Min. width (in.)	Min. front venting [1] [3] (sq. in. [2])	Min. rear venting [1] [3] (sq. in. [2])
Offset/center	Top/bottom	> 40	143	95
Offset/center	Top/bottom	35	119	79
Offset/center	Top/bottom	30	95	47
Offset/center	Center	>40	95	95
Offset/center	Center	35	79	79
Offset/center	Center	30	47	47
One-sided	All	>40	95	95
One-sided	All	35	79	79
One-sided	All	35	47	47

[1] The minimum area specified is cumulative total venting needs on the front and rear covers. Rear covers having vents needs 5 inches clearance from the wall/obstruction.
[2] Minimum venting values specified here are based on ABB construction and heat-rated bus testing. Any design variations may require additional venting.
[3] Split the venting area between the above and below area of the bus stack. Refer to fig. 09 for details.

Fig. 09 Typical section width showing venting provision



Note: Dimensions “A” and “B” are for reference purpose only and does not signify any dimension.

Tier connection X-space requirements

Tier connection X-space requirements

The tier connection to the switchboard run back requires X-space on the bus stack. The tables below identify the required X-space by bus stack configuration. Switchboard run backs require no X-space for single-sided (1S) bus stacks.

Table 8. Tier connection: top and bottom feed

Bus stack ampacity	2-sided (2S)
1200 A	5X each side
2000 A	5X each side

Table 9. Tier connection: center feed

Bus stack ampacity	2-sided (XS)
1200 A	12X right side
2000 A	12X right side
3000 A	17X right side
4000 A	18X right side

The below table identifies the X-space available for top and bottom feed two-sided (2S) bus stacks.

Table 10. X-space availability for top and bottom tier bus stacks

X height	Tier feed location	Ampacity	X-space above tier connection	X-space below tier connection
32X	Top	1200–2000 A	0X	32X
	Bottom	1200–2000 A	32X	0X
40X	Top	1200–2000 A	0X	40X
	Bottom	1200–2000 A	40X	0X
48X	Top	1200–2000 A	0X	48X
	Bottom	1200–2000 A	48X	0X

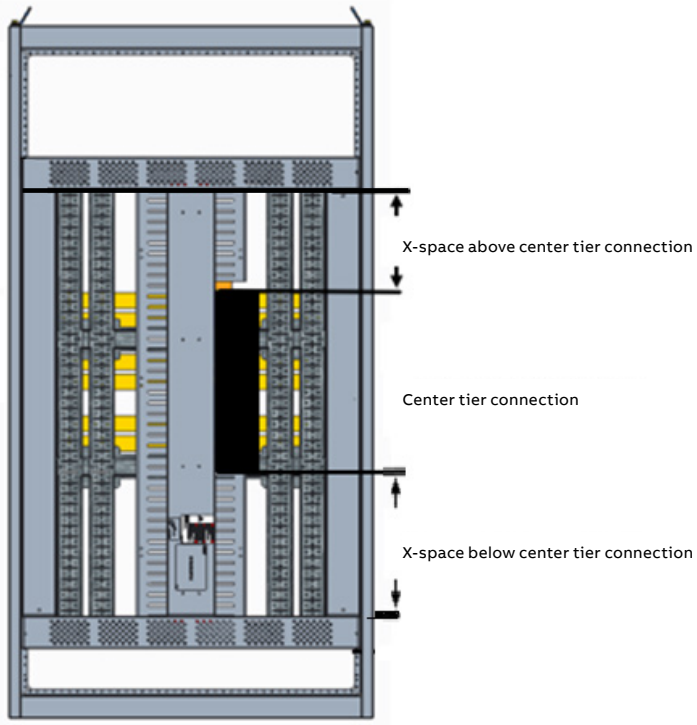
The below table identifies the X-space available above and below the center tier connection on center feed 2-sided (XS) bus stacks. These tables should be read in conjunction with Fig. 10.

Table 11. X-space availability for center tier bus stacks

X height	Center feed location	Ampacity	X-space above tier connection	X-space below tier connection
32X	Center	1200–2000 A	10X	10X
		3000–4000 A	7X	7X
40X	Upper	1200–2000 A	11X	17X
		3000 A	8X	15X
		4000 A	8X	14X
	Lower	1200–2000 A	17X	11X
		3000 A	15X	8X
		4000 A	14X	8X
48X	Upper	1200–2000 A	15X	21X
		3000 A	12X	19X
		4000 A	12X	18X
	Lower	1200–2000 A	21X	15X
		3000 A	19X	12X
		4000 A	18X	12X

Tier connection X-space requirements layout

—
Fig. 10
Tier connection X-space requirements layout



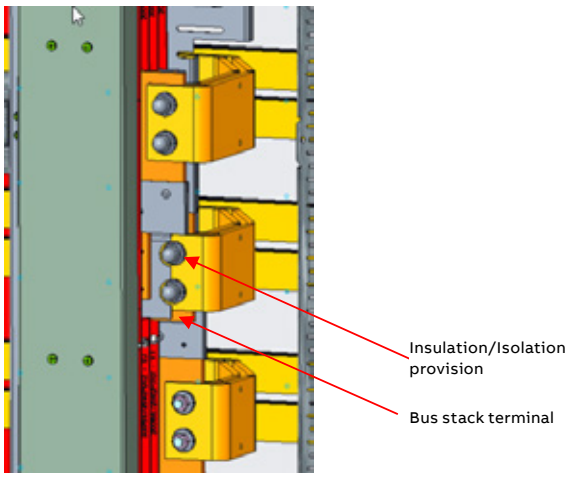
—
Tier connection insulation requirements

NOTICE

Tier connection insulation requirements

Hardware connecting the bus stack terminals to the switchboard main horizontal bus must meet clearance and creepage spacing requirements as dictated within UL 891. Additional insulation/isolation means may be required depending upon the hardware used in this connection and bus stack ampacity. Refer to Fig. 11.

—
Fig. 11
Tier connection X-Space requirements layout



Design guidance for installing feeders and filler plates

The below design guidance is provided to determine the mounting space needs for ABB's Tmax® XT breakers and filler plates in OEM switchboard applications.

1. Locate the bus stack cover (shown as 6-inch-wide part in fig. 12) as point of reference plane, to determine the space requirement.

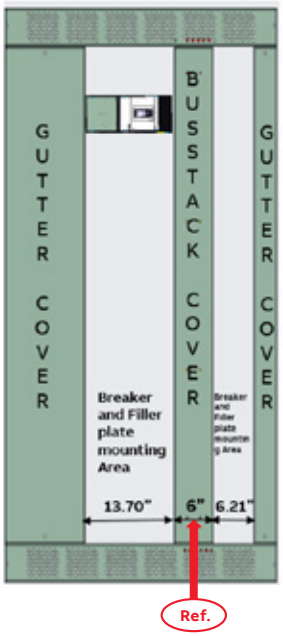
2. Depending on the type of configurations (offset, center-mount, one-sided) with bus stack cover as reference plane, determine the type of breaker and filler plate mounting space needed, i.e., 13.70" wide or 6.21" wide as shown in fig. 12.

3a. For offset and center-mount configuration, breaker and filler plate mounting space, i.e., 13.70" wide, is to be located from the edge of the bus stack cover, i.e., 6" wide. Similarly, space for 6.21" wide is to be located from the edge of opposite side of the bus stack cover.

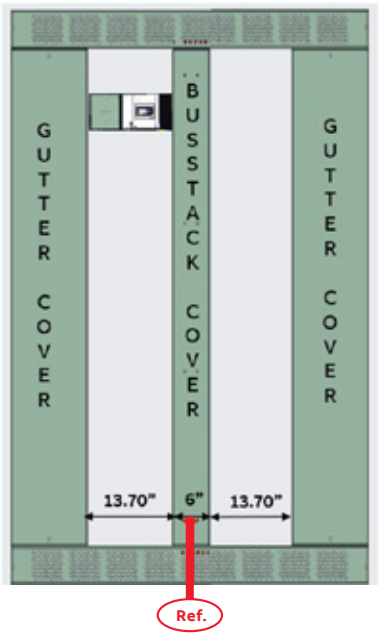
3b. For one-sided configuration, available space can be chosen as option 1 or 2 but not both. If option 1 is chosen, space for breaker and filler plate mounting area, i.e., 13.70" wide, is to be located from the edge of the bus stack cover, i.e., 6" wide, as shown in fig. 12. Similarly, for option 2, space for 6.21" wide is to be located from the same side of the bus stack cover.

4. With configuration type and mounting space defined, gutter cover width can be determined based on the OEM switchboard width design needs.

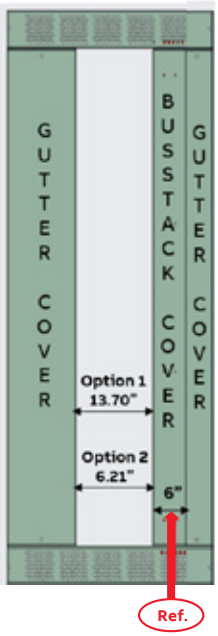
—
Fig.12
Design guidance for installing ABB Tmax XT breakers and filler plates



—
Offset



—
Center-mount

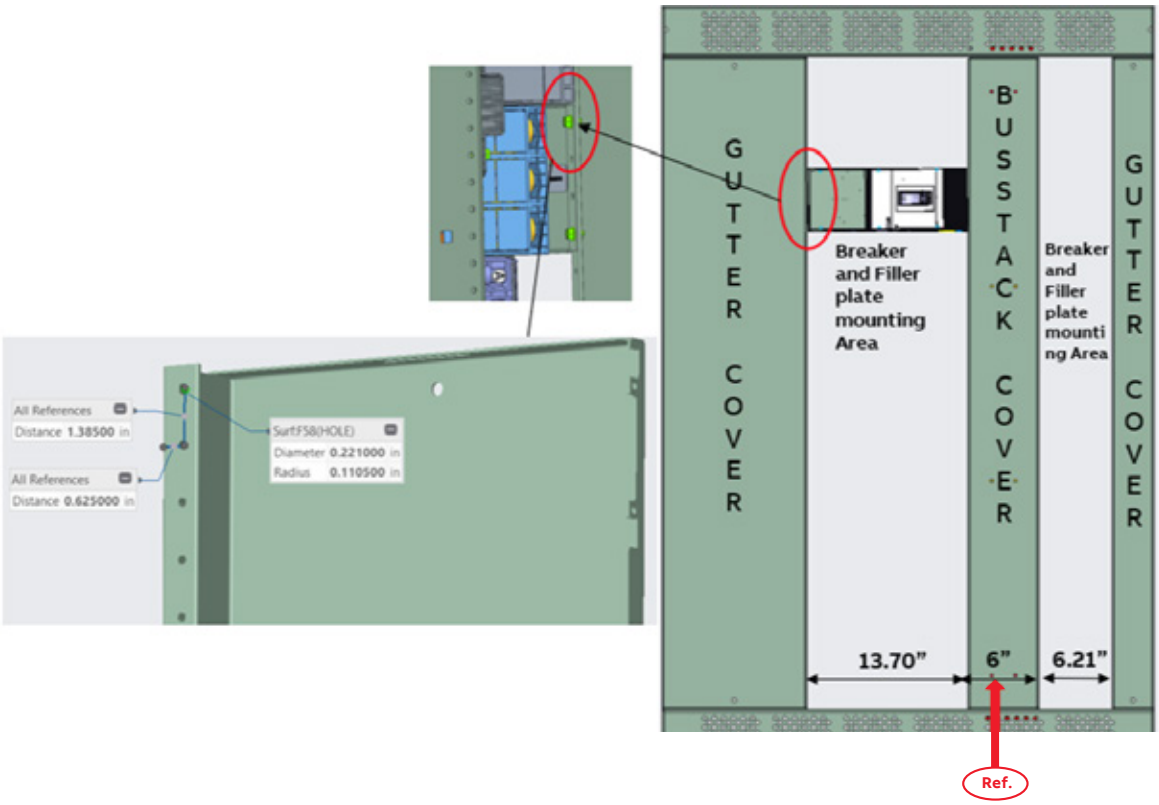


—
One-sided

Locating filler plate mounting holes
For filler plate mounting hole provision in the gutter cover, the following guidelines are recommended.

1. On the rear side of the gutter cover, filler plate mounting holes provision shall be made to mount the filler plate as shown in fig. 13.
2. From the edge of the gutter cover rear side, a hole provision of minimum dia. 0.221" ± 0.005" suitable for ¼" x ⅜" long steel thread rolling screw shall be made at horizontal dim. 0.625" ± 0.005" from the edge as marked in fig. 13.
3. Recommended hole pitch between successive vertical mounting holes dia. 0.221" ± 0.005" holes shall be equal to 1X (dim. 1.385") as shown in fig. 13.

—
Fig.13
Filler plates mounting



Application data

6'7" handle rule

6'7" handle rule

The National Electrical Code (Article 240.24) requires that circuit breakers shall be installed with the center of the operating handle no higher than 6'7" above the floor or working platform, whichever is higher. Housekeeping pads that elevate the switchboard above the standing surface may violate this rule. If housekeeping pads are specified, the pad may have to be extended for the full working space to comply.

Device mounting restrictions due to 6'7" handle rule

Below method can be used to determine if a device can be installed in the desired location in the distribution section and meet the 6'7" handle rule.

Measuring mounting location on physical section

Measure the distance from the floor, or working platform if there is one different than the floor height, to the bottom of the desired mounting location (dimension A). The installation will meet the 6'7" handle rule if the measured dimension does not exceed the value shown in table below.

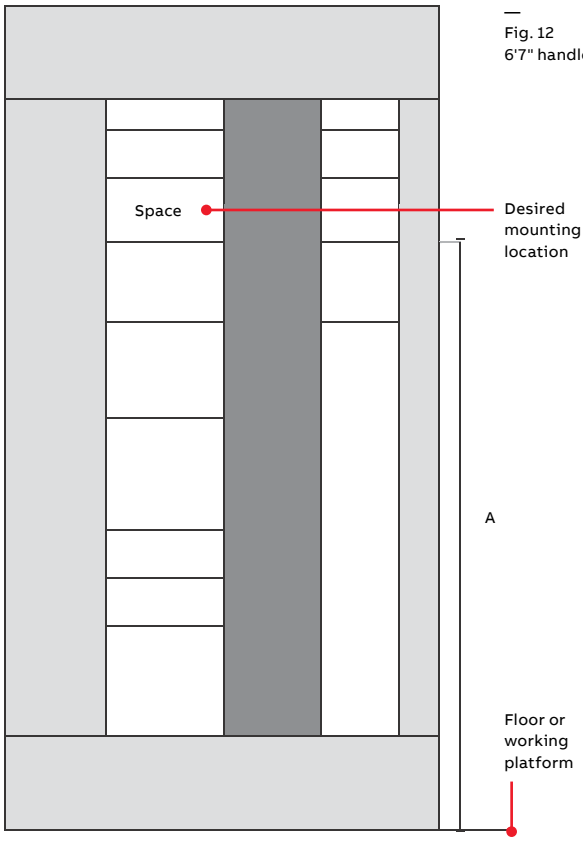


Fig. 12
6'7" handle rule

Table 12. Maximum circuit breaker mounting height in group-mounted switchboards to comply with 6'7" rule

Device type	Dimension A (in.)
FB 1-pole	78⅛
FB 2-pole (mounted on left side)	77
FB 2-pole (mounted on right side)	78¼
XT1, XT2, A1, A2, TEY	77⅛
XT4	76½
XT5	76¼
XT6, XT7	74⅞

Note: Dimensions in this table are measured to the bottom of mounting position.

Estimated weights

Table 13. Estimated interior weights (lbs.)

Mounting space (X = 1.385")	1200 A–2000 A interior weight	3000 A/4000 A interior weight
32	191	194
40	230	234
48	270	275

Switchboard overcurrent device weights

The weight of each individual circuit breaker with line-side connector must be added to determine the overall weight of the switchboard.

Table 14. Switchboard overcurrent device estimated weights

Device	Type	Weight (lbs.)
Molded case circuit breakers	FB 1-pole	3
	FB 2-pole, TEY	5
	XT1	4
	XT2	5
	XT4, A2	7
	XT5	15
	XT6	30
	XT7	43

Service entrance

Service entrance equipment

The National Electric Code has specific rules for the equipment that controls and protects the service or supply of electricity to a building.

The general rule is that a building is to be supplied by only one service. Exceptions include fire pumps, multiple occupancy buildings, high capacity and large areas (NEC 230.2(a)). Each service shall have only one disconnecting means (NEC 230.71). Two to six service disconnecting means are permitted if each service disconnect is located within a vertical switchboard section (NEC 230.71(B)).

The service disconnecting means shall be located either inside only one or outside of a building at a readily accessible location nearest the point of entrance of the service conductors (NEC 230.70).

Switchboards used as service equipment shall be marked “suitable for use as service equipment” and shall provide:

1. A bonding jumper to bond the enclosure and ground bus to the neutral (NEC 250.24(a)).
2. A neutral disconnect link to disconnect neutral from premises wiring (NEC 230.75).
3. A barrier to isolate service busbars and terminals from rest of switchboard.

Ground fault protection shall be provided for solidly grounded wye services with more than 150 volts to ground but not exceeding 600 volts phase-to-phase for each service disconnecting means rated 1000 amperes or more (NEC 230.95).

If the service disconnect is group-mounted, then the appropriate guidelines as per UL 891 – clause 6.2.2 is applicable.

When bus stacks are used in service entrance applications:

- Must be located near the point of entrance of building supply conductors
- Switchboard distribution sections may have up to six operating handles to entirely disconnect switchboards from the source
- Must include connector for bonding and grounding neutral conductor
- A service entrance-type UL label must be factory installed and will be provided on the equipment (when specified).

Switchboard ratings

Switchboards are designed, tested and rated to Underwriters Laboratories Standard 891 for dead-front switchboards and NEMA Standard PB2 for dead-front distribution switchboards.

Current

The continuous current ratings of switchboards are 1200, 2000, 3000 and 4000 amperes.

Switchboard bus stacks are rated on a current density basis — 1000 A per square inch for copper.

Frequency

AC switchboards are rated 60 hertz and may be applied on 50 hertz services without derating. For other ratings, consult factory. Also rated for DC applications.

Insulation level

Switchboards have an insulation level rating at twice the rated voltage plus 1000 volts. The dielectric test for this rating consists of applying a 60 hertz voltage for 1 minute phase-to-phase and phase-to-ground with switching devices closed.

Phase arrangement

Phase arrangement
The phase arrangement on three-phases buses is A, B, C, from top to bottom, front to back or left to right as viewed from the front of the switchboard. On three-phase, four-wire delta-connected systems, the B phase shall have the higher voltage to ground and is marked “Hi-Leg.”

Protective device continuous current ratings
The continuous load supplied by a protective device shall not exceed 80 percent of the device rating unless the switchboard, including the protective device, is UL listed for continuous operation at 100 percent of its rating. The non-continuous load may be 100 percent of the device rating. A continuous load is one that continues for three hours or more.

Standard group-mounted molded case circuit breakers (MCCBs) are 80 percent rated. 100 percent ratings are available with the Tmax XT5 up to 400 A and Tmax XT7 up to 1200 A. 100 percent rated MCCBs require 90 °C rated wire sized at 75 °C to comply with UL. All individually mounted molded case circuit breakers are standard (80 percent) rated only.

Short circuit ratings.

Switchboard short circuit ratings
Switchboards shall be applied on a system having an available short circuit current not greater than the short circuit rating of the switchboard. All switchboards are marked with a short circuit rating. The switchboard will be fully rated or series-connected rated. When fully rated, the short circuit rating of the switchboard is that of the lowest rated device in the switchboard. Series-connected ratings are based on short circuit ratings given to two or more devices connected in series.

The short circuit rating of the switchboard is equal to the lowest rated device installed in the switchboard.

Short circuit rating tests
Switchboard bus stacks are tested and assigned short circuit ratings in accordance with UL Standard 891 and NEMA Standard PB-2. The test current duration is three cycles and the test circuit power factor is 20 percent.

Devices are tested and rated in accordance with the applicable standards.

All ABB OEM switchboard components installation may refer to the following standards, as applicable to their application:

- UL 489 Thirteenth Edition — Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
- UL 891 Twelfth Edition — Switchboards
- UL 969 Fifth Edition — Standard for Marking and Labeling Systems
- National Electric Code 2020 Edition
- NEMA PB1 2011 Edition — Panelboards
- NEMA PB2 2011 Edition — Deadfront Distribution Switchboards
- CSA C22.2 No. 244:19 Second Edition — Switchboards

NOTICE

Only switchboards containing all UL listed/recognized devices can be UL labeled.

In addition to meeting or exceeding all applicable standards, ReliaGear OEM switchboard components meet ABB’s more stringent internal requirements, offering a greater margin of performance and safety.

The following classifications and limitations of switchboard distribution sections have been established by Underwriters Laboratories and the National Electrical Code.

NOTICE

An overcurrent protective device is a circuit breaker pole or single fuse.

Table 16. Applicable device standards

	Standard		Test circuit power factor (%)
Device	UL	ANSI NEMA	
Molded case circuit breakers	489	AB-1	20

Service conditions

Service conditions

1. Bus stacks are rated for use in a 40 °C ambient per UL 891.
2. Bus stacks can be applied for use in altitudes up to 6600 feet (2000 meters). Above 6600 feet, the derating factors in Table 17 apply.

Table 17. Derating factors

Altitude		Temperature	Voltage
Feet	Meters	derating	derating
6600	2000	1.00	1.00
8500	2600	0.99	0.95
13000	3900	0.93	0.80

3. For unusual service conditions, such as corrosive atmosphere, vibration, pollution, dust or unique equipment arrangements, consult the factory.
4. Select section heaters option if the bus stack is expected to be stored or operated in cold and/or damp environments.
5. Short circuit ratings are not affected by altitude.

Table 18. Device operating temperature

Device	Operating temperature
MCCBs	-20 °C to 40 °C

Protective device ratings

Series-connected ratings

UL permits assigning a short circuit rating to a combination of molded case circuit breakers or fuses and molded case circuit breakers connected in series that is higher than the lowest rated protective device of the combination. This is defined as series-connected ratings. The combination rating cannot exceed the rating of the protective device farthest upstream, although it will exceed the rating of the downstream protector.

The upstream protector can be a molded case circuit breaker or fuse. Device combinations are not limited to those in the same equipment. They can be in different equipment, such as a switchboard feeder or a panelboard main versus panelboard branches. Any distance between devices in different equipment is permitted. Total fault current magnitude must flow through both protectors. Thus, fault current contribution from motors, as well as power source fault current, must flow through upstream and downstream protectors. Molded case circuit breakers may be applied as fully rated or series connected.

In a fully rated system, the short circuit rating of all protective devices is equal to, or exceeds, the circuit short circuit requirement and, if mounted in equipment, the bus short circuit withstand rating and equipment short circuit rating exceeds the circuit available.

In a series-connected system, the short circuit rating of the upstream protector is fully rated, but the downstream protector is not fully rated.

UL permits assigning a short circuit rating to a combination of protective devices that is higher than the lowest rating of the downstream device. This rating of two devices in series is defined as a series rating.

Series ratings can exist for a combination of molded case circuit breakers or a combination of fuses and molded case circuit breakers. The rating of the combination cannot exceed the rating of the upstream device in the combination but can exceed that of the downstream device.

In series or fully rated combinations, both protectors may open on short circuits. Conversely, in selectively coordinated systems, only the device closest to the overcurrent of fault is permitted to open. In these systems, both devices must be fully rated, and the short circuit level to which they are selective must be known.

Examples where selectivity is desirable (and often required) include:

- Buildings with important loads, such as elevators, emergency lighting, critical ventilation, etc.
- Manufacturing facilities where loss of power can result in economic loss due to production downtime or damage to equipment
- Hospitals and medical facilities where life support is critical

Surge protective devices and main metering

Surge protective devices

ReliaGear® OEM switchboard
ABB surge protective devices (SPDs) are the standard offering in ReliaGear OEM switchboards. HE and ME line-ups have been engineered to the highest standards and are designed for rigorous duty and long life, as evidenced by their outstanding minimum repetitive surge current capacity test results. Third-party tested per IEEE C62.62 and NEMA LS-1 for the rated 8x20 µs surge current, per mode with fusing included.

Main metering

Main metering
Electronic meter offered is type RGM40.

Refer to the switchboard technical guide for more information on surge protective devices and power metering devices.

Installation manuals

Installation manuals

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

- ABB Library
- Drawing selector tool
- 1SQC900005M0201 – ReliaGear® neXT – Reduced energy let-through (RELT) unit
- 1SQC900006M0201 – ReliaGear® neXT – Surge protective device (SPD) unit
- 1SQC900010M0201 – ReliaGear® neXT – Service entrance barrier
- 1SDH000719R0003 – SACE® Tmax® XT – Installation instructions XT1
- 1SDH000721R0003 – SACE® Tmax® XT – Installation instructions XT2
- 1SDH000722R0001 – SACE® Tmax® XT – Installation instructions XT4
- 1SDH002011A1002 – SACE® Tmax® XT – Installation instructions XT5
- 1SDH002012A1002 – SACE® Tmax® XT – Installation instructions XT6
- 1SDH002013A1001 – SACE® Tmax® XT7 – XT7M – Installation instructions XT7–XT7M
- 1SDH001821A1002 – SACE® Tmax® XT7 – User manual for use and maintenance of Ekip Touch Trip units for Tmax® XT7 low voltage molded-case circuit breakers
- 1SDH002039A1002 – SACE® Tmax® XT5 – Operation and maintenance manual for Ekip Touch Trip Units
- 1SDH002031A1002 – Tmax® XT2 - XT4 – User manual for use and maintenance of Ekip Touch Trip units for Tmax® XT2 - XT4 low-voltage molded-case circuit breakers
- 1SDH000722R0003 – SACE® Tmax® XT UL – Installation instructions XT4 UL
- 1SDH002013A1606 – SACE® Tmax® XT – KLC-A STI, RONIS 1104, Kirk – XT7
- 1SDH000719R0610 – SACE® Tmax® XT – PLL XT1–XT4 padlock device OP/CL
- 1SDA066592R1 – SACE® Tmax® XT – PLL XT2–XT4 padlock device OP/CL
- 1SDH002013A1604 – SACE® Tmax® XT – PLL padlock device XT7 in open position
- 1SXU210248C0201 – SACE® Tmax® XT UL/CSA – Low voltage molded case circuit breakers UL 489 and CSA CS22.2 standards for the NEMA market
- 1SDH001000R0524 – Ekip Signaling 2K – E1.2-E2.2-E4.2-E6.2-XT2-XT4-XT5-XT7-XT7M
- 1SDC210199D0206 – Tmax® XT UL technical characteristics 4.2021
- 1SDC210400D0201 – 2020.10-SACE® FORMULA DSA UL/CSA Low voltage molded-case circuit breakers up to 250A UL 489 and CSA C22.2 Standards
- DEH41590 Mounting Instructions TEY D/H/L, TEYF
- 1SQC900001C0201 – ReliaGear® neXT UL 67 low-voltage distribution power panelboards
- 1SDC210199D0206 – Tmax® XT UL/CSA technical characteristics LV MCCB
- 11SDC210066D0201 – Guide to instantaneous selectivity
- DET-008 – Series rating
- DET 760 – Selectivity coordination
- 1VAL088301-TG – ReliaGear® SB technical application guide
- 1VAL088301-MB – ReliaGear® SB installation, operations, and maintenance manual
- 1SQC900003N0201 – ReliaGear® neXT spacers (fillers and blanks)

ABB Inc.
305 Gregson Drive
Cary, NC 27511 USA
abb.com/contacts

abb.com/lowvoltage

The information contained in this document is for general information purposes only. While ABB strives to keep the information up to date and correct, it makes no representations or warranties of any kind, express or implied, about the completeness, accuracy, reliability, suitability or availability with respect to the information, products, services, or related graphics contained in the document for any purpose. Any reliance placed on such information is therefore strictly at your own risk. ABB reserves the right to discontinue any product or service at any time.© Copyright 2025 ABB. All rights reserved. Specifications subject to change without notice.

1SQC088001C0201 Rev B 3.2025