Product Note

SACE Tmax XT - Installation tips

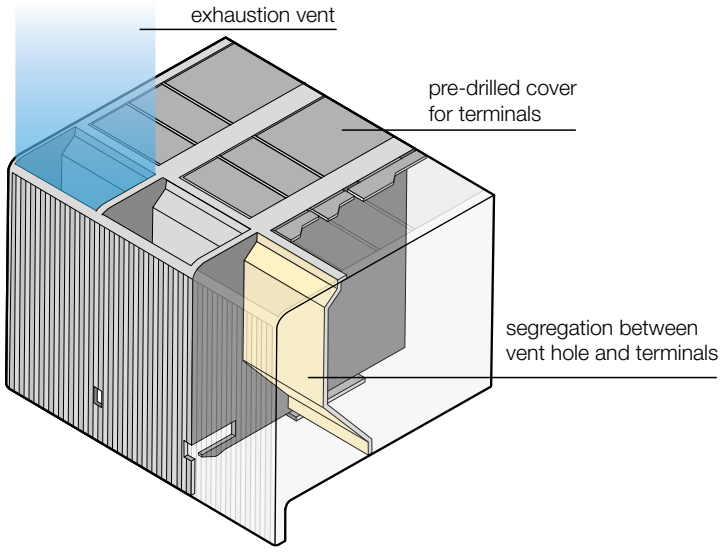
For the moulded-case circuit-breakers ABB SACE Tmax XT, this document presents some information about the installation of the circuit-breakers in their different executions and configurations (fixed F, plug-in P, or withdrawable W; side by side, superimposed, or in cubicle) and about the use of relevant terminal covers or phase separators.
The suggestions for the installation mainly relate to the overload and short-circuit conditions in alternating current. This document does not take into consideration the phenomena connected with temperature rise and overheating. Before proceeding with the installation of the circuit-breakers and their accessories, please read carefully the information and instructions given in the relevant instruction manuals.

Terminal covers and phase separators

The terminal covers* (available as standard with some types of terminals, such as for example the external terminals for FCCuAl cables, or multicable terminals MC) assure:

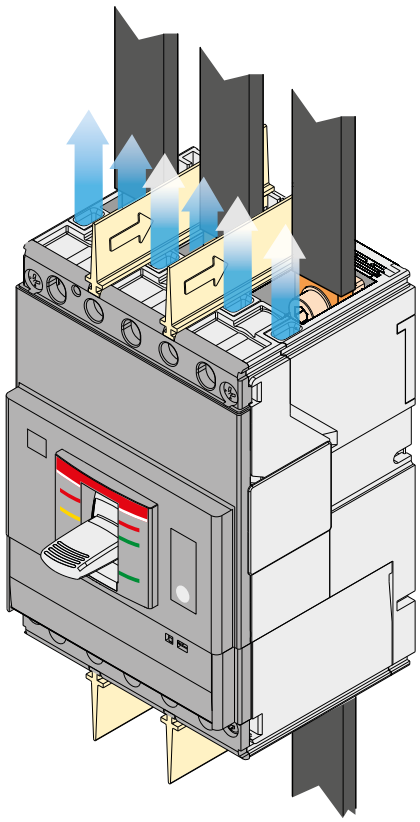
- adequate insulation between phases;
- safe channeling of the discharged ionized gases due to the arc interruption; flowing out of the evacuating holes on the circuit-breaker, these gases are turned away, far from the live part, thus avoiding arc ignition;
- increase in the degree of protection in the terminal zone.

(*) For further information about the compatibility of the types of terminals with the terminal covers see Chapter 3 of the Technical Catalogue “SACE Tmax XT New low voltage moulded-case circuit-breakers up to 250 A”.



The phase separators* (compulsory and available as standard with some types of terminals, such as for example front F – front extended EF – front extended spread ES terminals) fundamentally assure adequate insulation between the phases and leave the vents of the circuit-breaker, for the evacuation of the ionized gases, free.

(*) For further information about the compatibility of the types of terminals with the phase separators see Chapter 3 of the Technical Catalogue “SACE Tmax XT New low voltage moulded-case circuit-breakers up to 250 A”.



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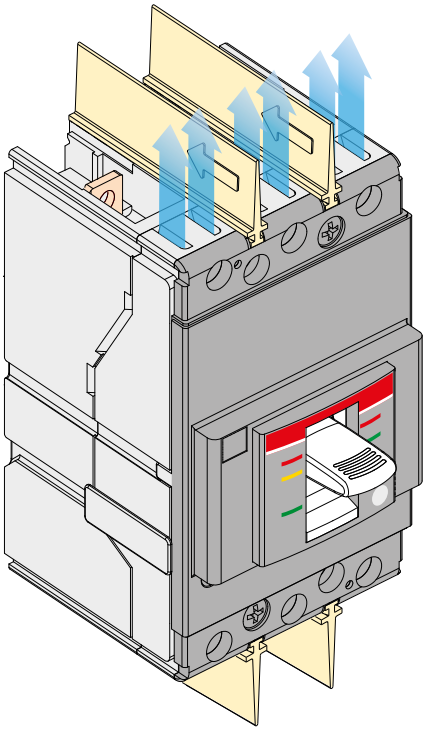
The evacuating holes for arc chamber gases

The main vent holes of SACE Tmax XT circuit-breakers are positioned, according to the type of circuit-breaker, on the top and/or bottom part of the circuit-breaker, as shown in the following pictures and summarized in Table 1.

Table 1:

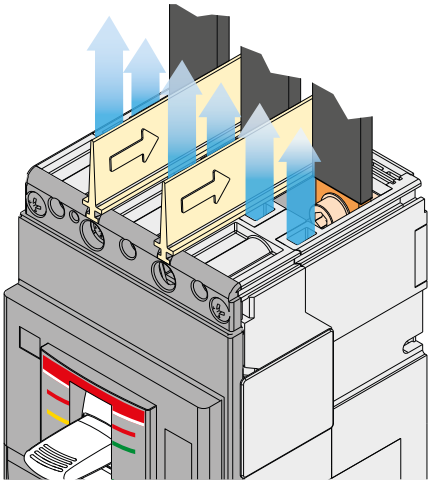
SACE Tmax XT	Positioning of evacuating holes on the top	Positioning of evacuating holes on the bottom (trip unit side)
XT1	Yes	No
XT2	Yes	Yes
XT3	Yes	No
XT4	Yes	Yes

SACE XT1 and XT3: Evacuating holes only on the top

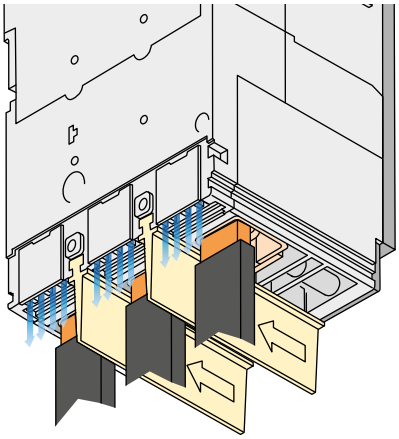


SACE XT2 and XT4: Evacuating holes on the top and on the bottom (trip unit side)

Top view



Bottom view (trip unit side)



The purpose of the evacuating vents is channeling the ionized gases and the metal vapors originated during the interruption of the fault current by turning them away from the live parts; in no way the vents must be obstructed by the installation modalities (either in assembly or drawer-installed), or by positioning of devices or barriers (such as segregation barriers or panels), whose function, in the panel builders' opinion, can be considered as comparable to phase separators or terminal covers.

With reference to the above considerations, the installation modalities recommended by ABB prescribe the use of phase separators or terminal covers and the usage of insulated bars and cables for circuit-breaker connection.
The alternative solutions must be verified through tests carried

out by the installer. However, the following general rules cannot be disregarded:

1. do not obstruct the vents
2. do not channel the ionized gases in the direction of the circuit-breaker terminals or towards not-insulated bars
3. observe the clearances from metal parts as detailed below (see “Clearances for installation in metallic cubicles”)
4. do not restrict the volume of the cell in the evacuation zone of gases from the circuit-breaker vents.

To guide the customer to the correct installation of Tmax XT circuit-breakers, ABB SACE gives the necessary information about the minimum clearances to be observed between side by side and superimposed circuit-breakers, or with respect to the generic structure around the circuit-breaker, by referring the clearances to a metal cubicle around it.
As regards the circuit-breaker family ABB SACE Tmax XT (XT1-XT4), detailed information about the different installation modalities are summarized in the following sections, according to the different operating voltage up to 690Vac.

Clearances for installation in metallic cubicles

This section gives the clearances to comply with for the installation of the circuit-breaker inside a metal cubicle. The cubicle simulates the metallic parts of the switchgear assembly adjacent to the circuit-breaker and it is used as a reference to define the clearances to be observed in order to permit the free evacuation of the ionized gases and metal vapors and to prevent adjacent parts from being ignited. The clearances refer to the tests carried out in compliance with the Std. IEC 60947-2. The installation modality in relation to the type of circuit-breaker is summarized in the following table.

SACE Tmax XT1 -XT4

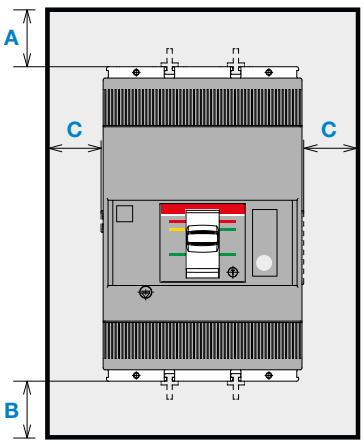
Circuit-breaker	Voltage a.c. [V]	Rear insulating plate	Phase separators (***)	A (**) [mm]	B (**) [mm]	C [mm]	D for execution W only [mm]
XT1	Ue ≤ 690	no	Yes	25	20	20	-
XT2	Ue < 440	no	Yes	30	25	10	0
	440 ≤ Ue ≤ 690	yes (*)	Yes	50	45	20	0
XT3	Ue ≤ 690	no	Yes	50	20	20	-
XT4	Ue < 440	no	Yes	30	25	20	0
	440 ≤ Ue ≤ 690	yes (*)	Yes	50	45	20	0

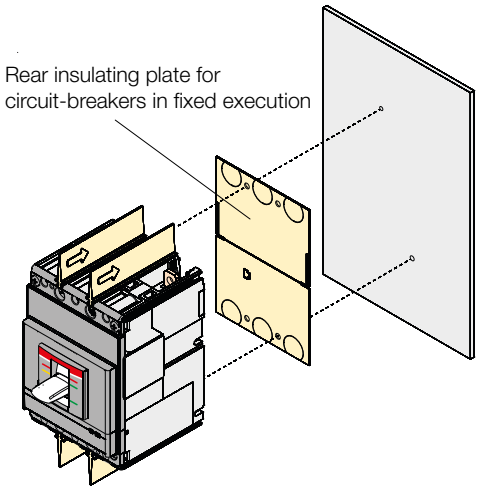
(*) for circuit-breakers in fixed execution F only

(**) - For XT2 and XT4 W/P: with EF terminals, A=B=50mm starting from the upper outline of the terminal and for each voltage Ue.
- For XT2 and XT4: In case of circuit-breakers with high terminal covers HTC A = B = 25mm (the clearance is given to guarantee a vent exit for the gas pressure).
- For XT1 and XT3 P: with EF terminals, A=50mm B= 20mm starting from the upper outline of the terminal.
- For XT1 and XT3: In case of circuit-breakers with high terminal covers HTC A = 25mm (the clearance is given to guarantee a vent exit for the gas pressure).
- For XT1 and XT3: In case of circuit-breakers with rear terminals and cubicle with insulated base, B = 0

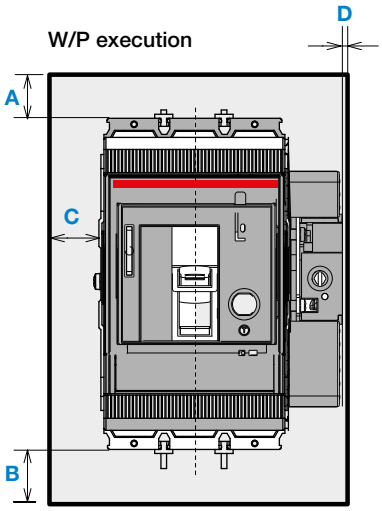
(***) For further information about the compatibility of the types of terminals with the phase separators see Chapter 3 of the Technical Catalogue “SACE Tmax XT New low voltage moulded-case circuit-breakers up to 250 A”. With the circuit-breaker in W or P execution, the low terminal covers LTC must be positioned on the moving part and the phase separators on the fixed part.

F execution





W/P execution

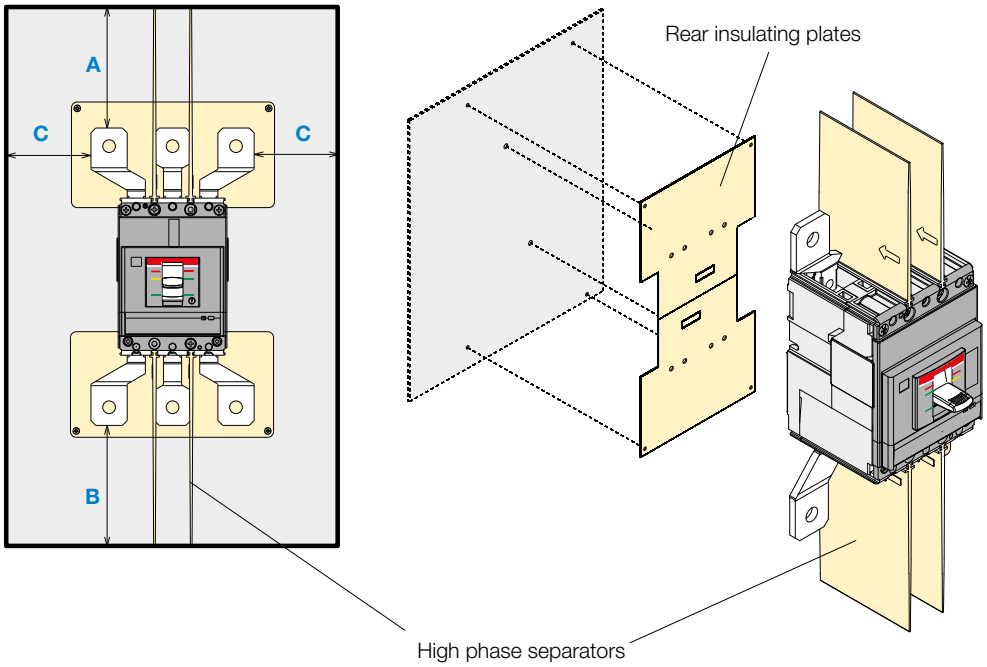


Installation of SACE Tmax XT

SACE Tmax XT1-XT4 with front extended spread terminals ES

Circuit-breaker F-W-P	Voltage a.c. [V]	Rear insulating plates (*)	High phase separators	A [mm]	B [mm]	C [mm]
XT1-XT3	Ue ≤ 690	no	yes	100	25	20
XT2 - XT4	Ue < 440	no	yes	100	100	70
	440 ≤ Ue ≤ 690	yes	yes	100	100	70

(*) there are two rear plates to be positioned behind the upper and lower terminals.



Minimum clearance between two side by side circuit-breakers

This section gives the clearances to be observed for side by side installation of SACE Tmax XT circuit-breakers in plants with voltage up to 690V ac.
If the installation requirements demand side by side mounting, this is possible for SACE Tmax XT circuit-breakers, size from XT1 to XT4, with a clearance D = 0 mm when they are not equipped with the terminals ES (front extended spread) and when:

- they have high terminal covers HTC (*)

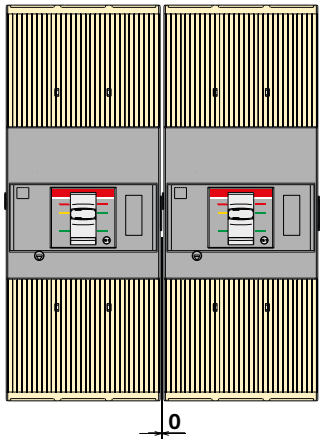
or

- a phase separator is inserted (both above as well as below) in the slot formed when placing side by side the two fixed circuit-breakers or the two fixed parts of a plug-in or withdrawable circuit-breaker. According to the type of terminals, the customer shall order a further set of phase separators to be used for side by side installation (**).

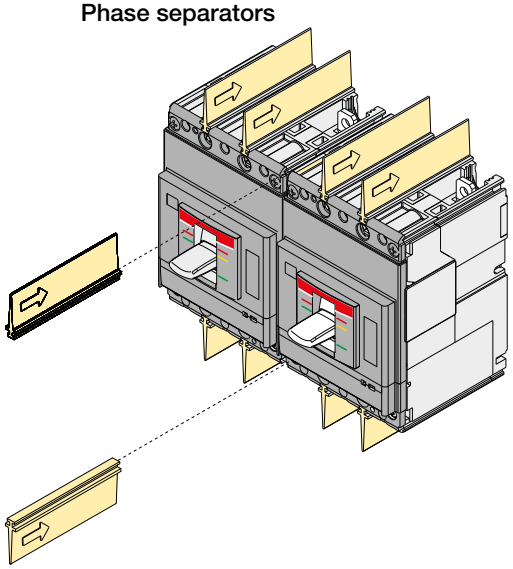
(*) For further information about the compatibility of the types of terminals with the high terminal covers HTC see Chapter 3 of the Technical Catalogue “SACE Tmax XT New low voltage moulded-case circuit-breakers up to 250 A”.

(**) For further information about the compatibility of the types of terminals with the phase separators see Chapter 3 of the Technical Catalogue “SACE Tmax XT New low voltage moulded-case circuit-breakers up to 250 A”.

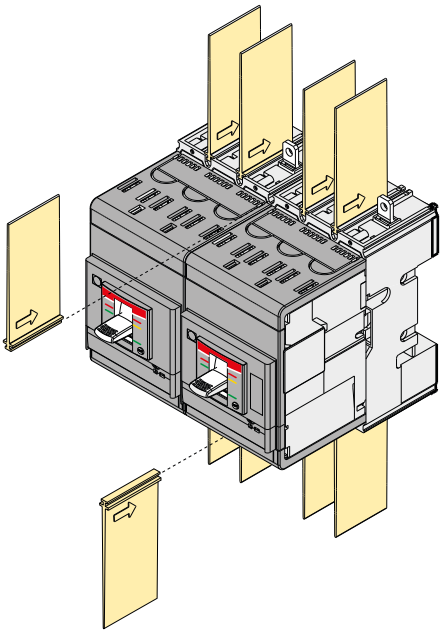
High terminal covers HTC



Phase separators



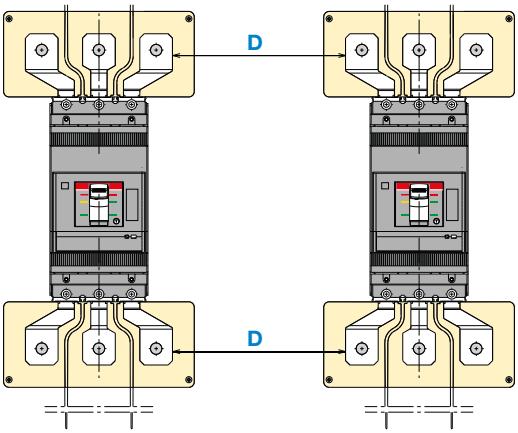
XT2 circuit-breakers, plug-in execution with terminals EF, mounted side by side



If the conditions on page 4 are not complied with, SACE Tmax XT circuit-breakers can be installed side by side with a minimum clearance D as shown in the following table:

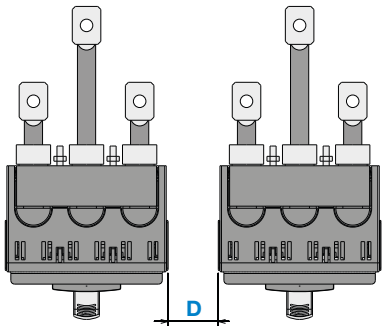
Circuit-breaker	Terminals	D [mm]
XT1-XT3 F-P	ES	35
	EF	35
	Other types of terminals	25
XT2-XT4 F-W-P	ES	120
	EF	35
	Other types of terminals	25

Circuit-breakers with front extended spread terminals ES

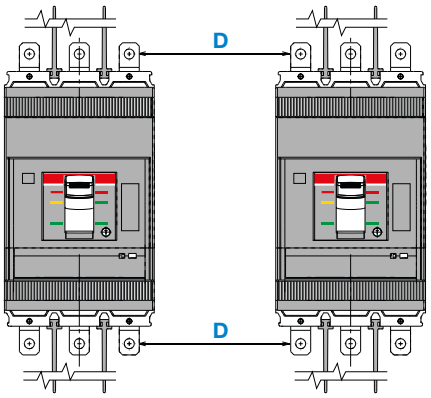


Here are some examples:

Adjustable rear terminals R and low terminal covers LTC



Circuit-breakers with front extended terminals EF



Installation of SACE Tmax XT

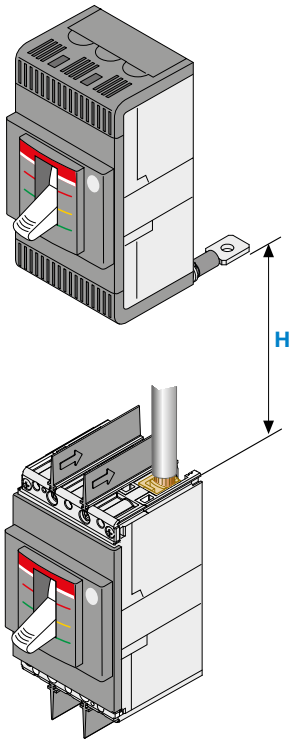
Minimum clearance between two superimposed circuit-breakers

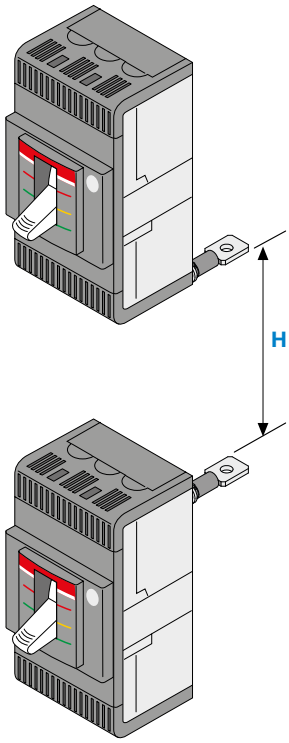
This section gives the clearances H to comply with for superimposed mounting of SACE Tmax XT circuit-breakers in installations with voltage up to 690Vac.
Verify that the bare bars or connection cables do not reduce the recommended clearances.

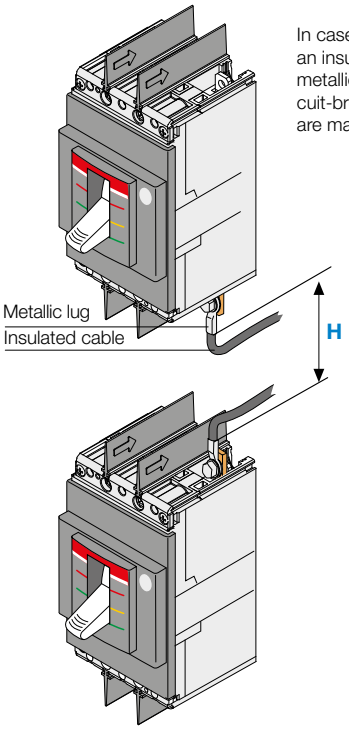
The distances given in the table are referred to the maximum overall dimensions of the circuit-breakers in the different execution (F/W/P), with terminals and, for example, metallic lugs of insulated cables included.

Circuit-breaker	H [mm]
XT1	80
XT2	140
XT3	140
XT4	150

When the superimposed circuit-breakers are different in size (e.g. XT4 and XT2), the reference clearance to be considered is the longer one.





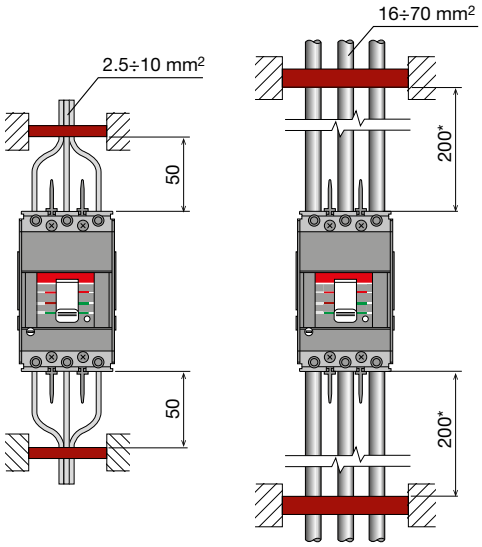


In case of cables with metallic lugs, an insulating screen behind the metallic lugs (on the rear of the circuit-breaker) or high terminal covers are mandatory.

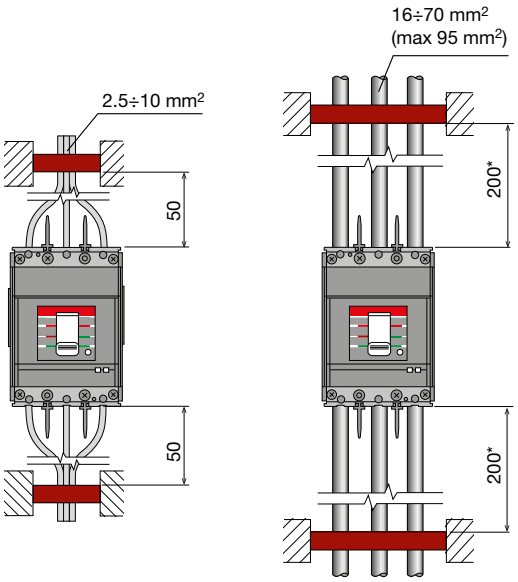
The first insulated anchor

For the moulded-case circuit-breakers SACE Tmax XT1, XT2, XT3 and XT4, the figure below gives an example of the maximum recommended distance (in mm) within which the first insulated anchor shall be positioned according to the highest admissible peak current value of the circuit-breaker and to the cross-sectional area of the cable.
The maximum recommended distance is valid also with busbar connections. For further information and details reference must be made to the circuit-breaker technical catalogues and instruction manuals.

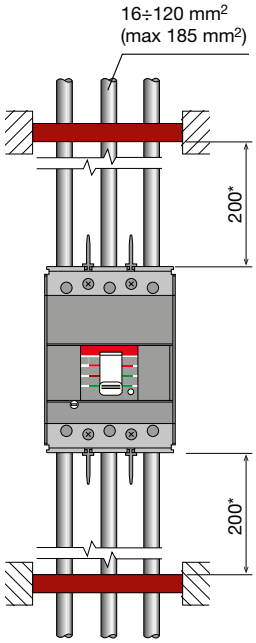
SACE Tmax XT1



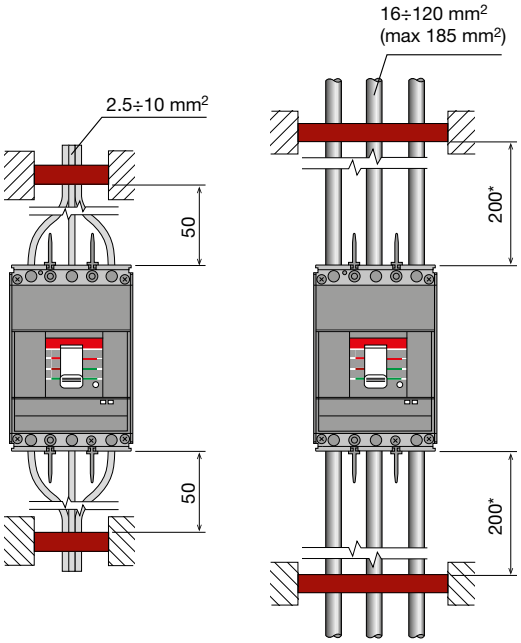
SACE Tmax XT2



SACE Tmax XT3



SACE Tmax XT4



(*) Value valid also with rear terminals

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