Energy and Power / Low Voltage

4 Low Voltage Switchboard Partitioning Forms Defined By IEC 61439-2

4 Low Voltage Switchboard Partitioning Levels Defined By IEC 61439-2 (photo credit: rgm.cr.it)

Reasons for partitioning //

There are 4 main reasons for partitioning a switchboard.

1. To protect persons against direct contact with dangerous parts.
   *The minimum degree of protection must be **IPXXB**.*

*The minimum degree of protection must be **IP2X**.*

3. To limit the propagation of an electric arc inside the switchboard by separating the busbars, equipment and connections,
4. To facilitate maintenance operations or switchboard upgrades.

Partitioning rules are defined in standard **IEC 61439-2**. The definition of partitioning depends on conditions of use, maintenance and upgrade of the switchboard. This definition is subject to agreement between the switchboard manufacturer and the end user.

It is based on three essential points:

1. Use products or components that comply with the standard, the various configurations of which have been tried and tested,
2. Comply with rules and guidelines laid down by the various manufacturer documents especially pertaining to choice and protection,
3. Conduct clearance, bonding continuity with a final inspection recorded in a contract document.

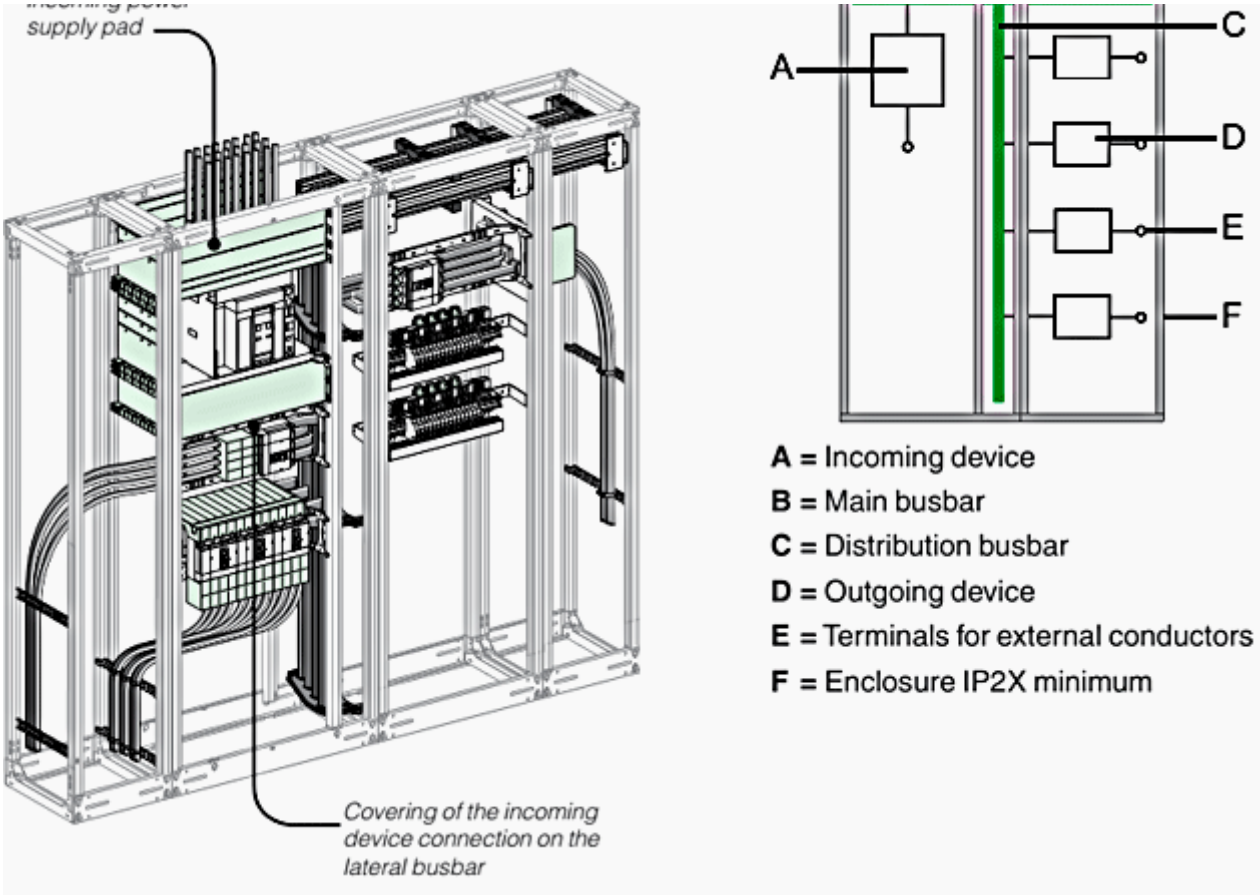
Full compliance with these recommendations can be validated by a compliance certificate.

The standard defines **4 partitioning levels (forms)** to ensure the protection of persons against direct contact. The form is a solution provided to an IP protection requirement and a client need (Operation, Maintenance, Upgrade).

- Separation Form 1
- Separation Form 2 (2a, 2b)
- Separation Form 3 (3a, 3b)
- Separation Form 4 (4a, 4b)

Separation Form 1 //

No separation inside the switchboard.



Form 1 partitioning of switchboard

Protection of people and equipment is provided from the onset by:

- The presence of front plates that can only be opened by a specific tool,
- The locking of doors that give access to live parts,
- The systematic installation of terminal covers on the Compact NSX circuit-breakers, as well as on the Interpact INS and INV switches *(NSX, INS and INV are Schneider Electric's devices)*
- The covering of the upstream and downstream pads of the incoming device, to ensure the operator's safety at all points of the switchboard when the device is open.

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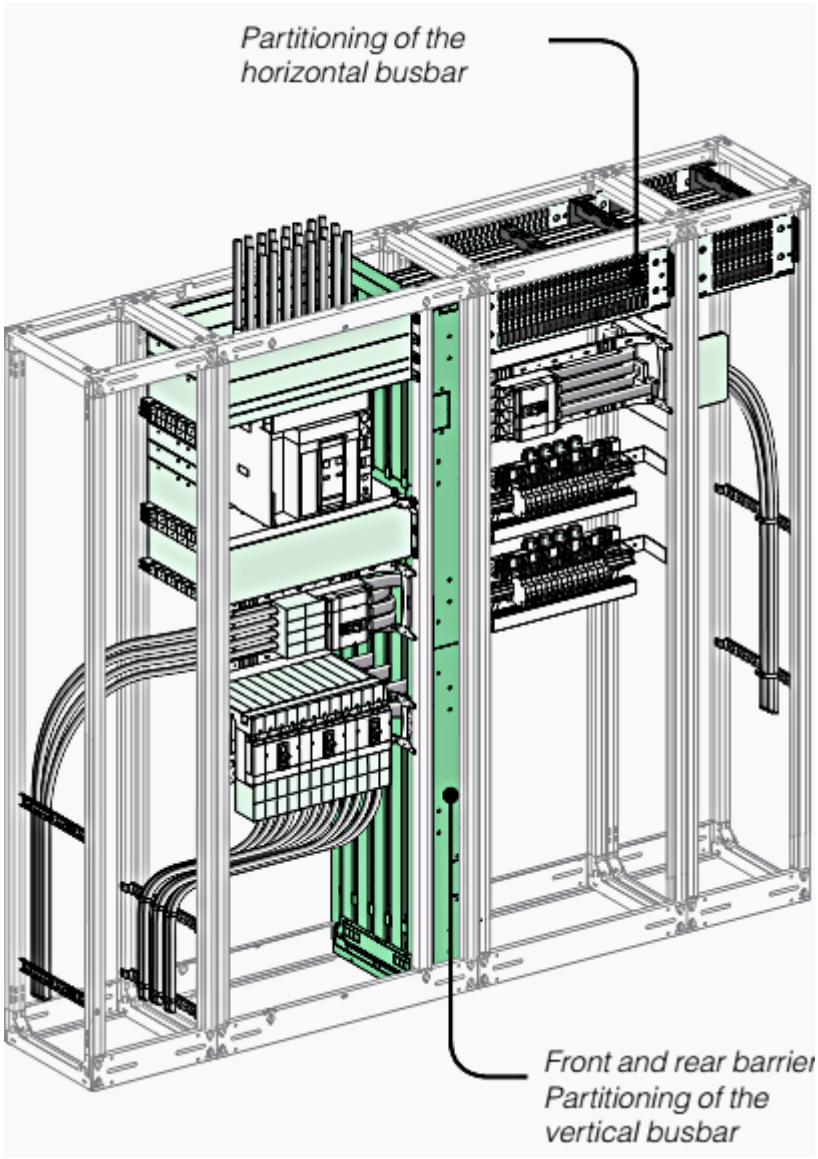
Separation Form 2 //

Separation of busbars and functional units inside the switchboard:

- Protection against ingress of solid foreign bodies.

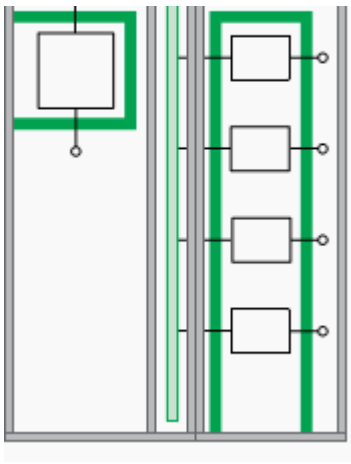


Form 2 partitioning of switchboard

There are two variants of form 2: Form 2b provides more safety than form 2a, since the connection terminals are separated from the busbars.

Form 2a

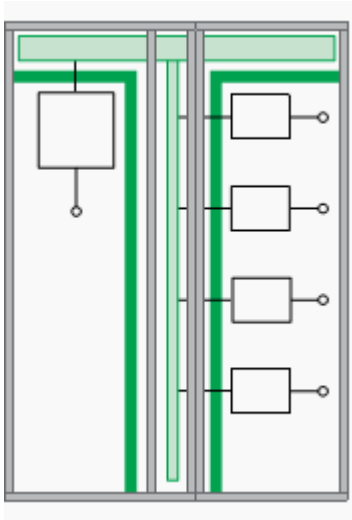
Terminals for external conductors are **not separated** from the busbars.



Form 2a

Form 2b

Terminals for external conductors are **separated** from the busbars.



Form 2b

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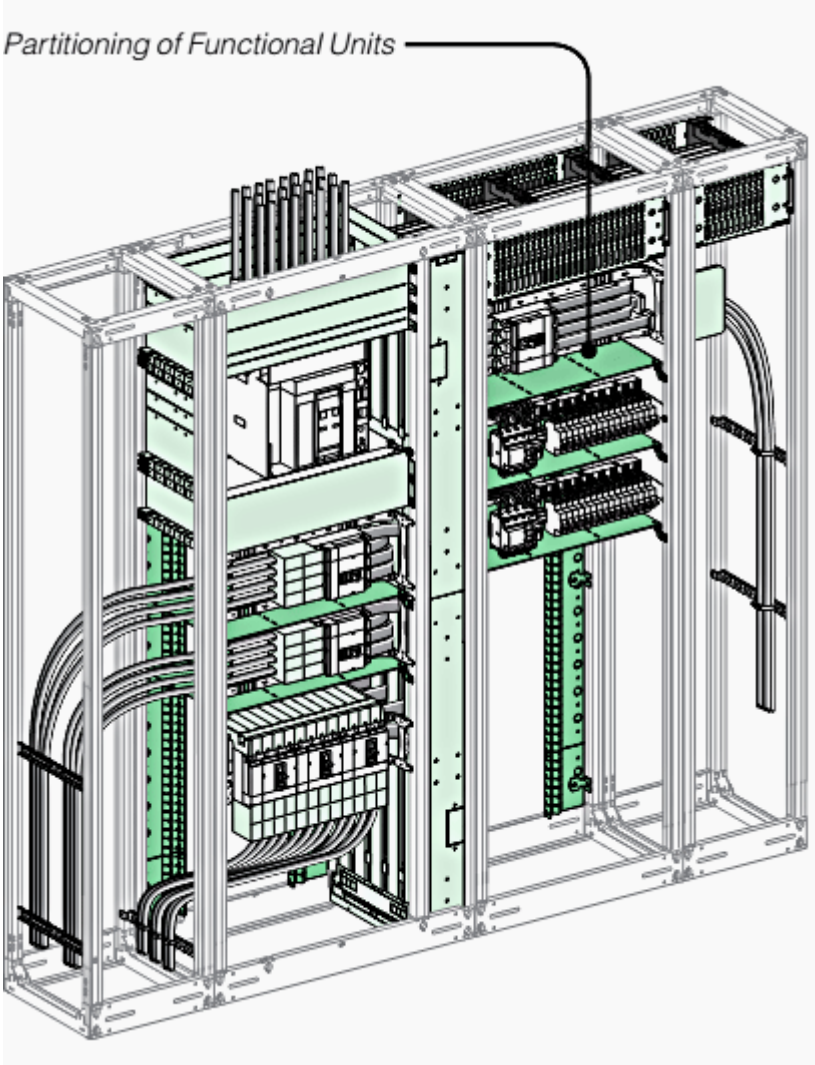
Separation Form 3 //

Form 2 + Separation inside the switchboard of all functional units:

- Protection of persons against contact with live parts upstream of outgoing devices,

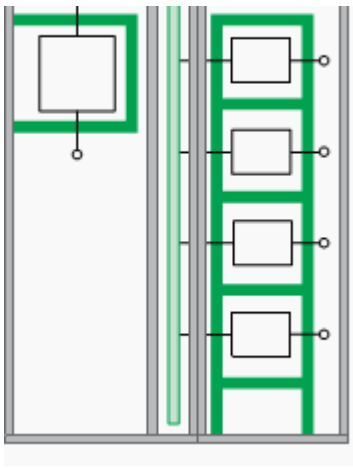


Form 3 partitioning of switchboard

There are two variants of form 3: Form 3b provides more safety than form 3a, since the connection terminals are separated from the busbars.

Form 3a

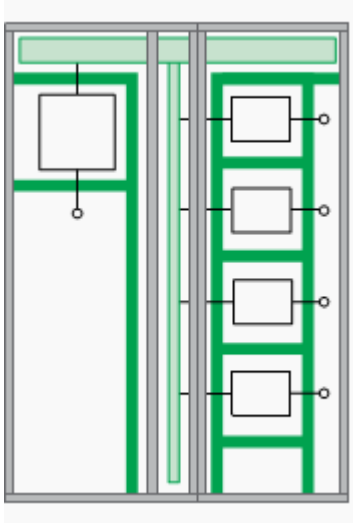
Terminals for external conductors are not separated from the busbars.



Form 3a

Form 3b

Terminals for external conductors are separated from the busbars.



Form 3b

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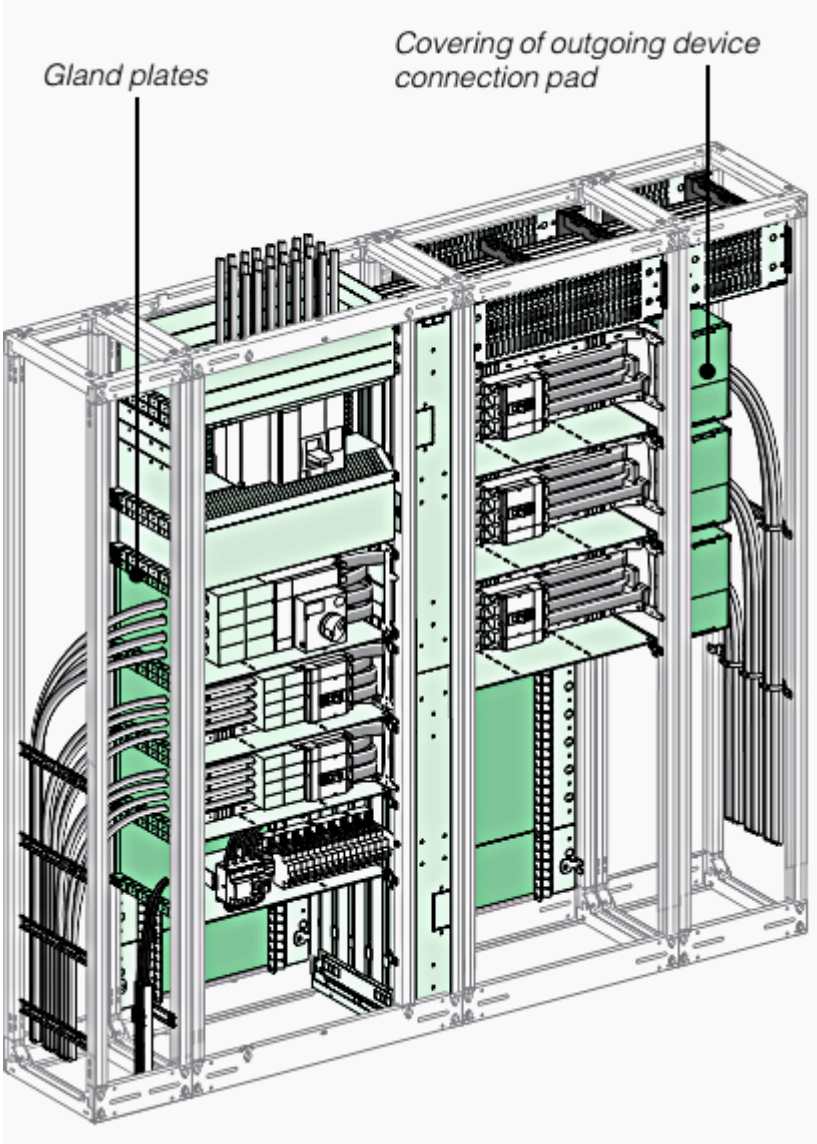
Separation form 4 //

Form 3 + Separation inside the switchboard of terminals for external conductors that are an integral part of each functional unit:

- Protection of persons against contact with live parts upstream of outgoing devices,

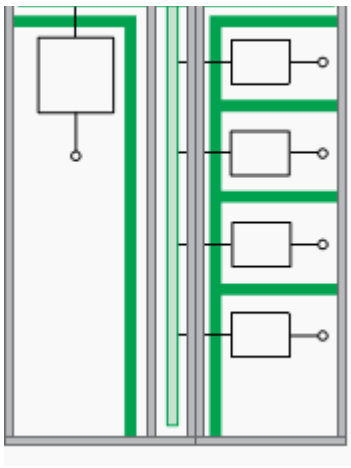


Form 4 partitioning of switchboard

There are two variants of form 4: To fit the cubicle with gland plates to create form 4a or to cover the connection pad of outgoing devices to create a form 4b.

Form 4a

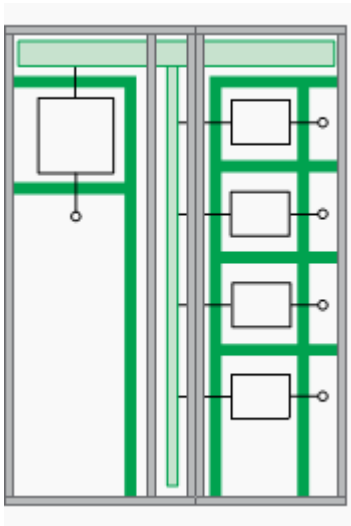
Terminals for external conductors are in the same cubicle as the functional unit with which they are associated.



Form 4a

Form 4b

Terminals for external conductors are not in the same cubicle as the functional unit with which they are associated, but in protected spaces or individual compartments that are separated and closed.



Form 4b

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Good Practice Tips //

Partitioning may be obtained by insulating the live parts:

- By using devices with molded cases.

The entire switchboard must have a degree of protection of **IP2X** in accordance with **IEC 61439-1 and 2**. If using metal barriers, make sure that clearances are complied with.

Putting partitions in a switchboard **reduces heat dissipation of the switchboard**. It is therefore important to take this into account when defining the heat management solution for the switchboard. For example form 4 switchboard dissipates less heat than a form 1 un-partitioned switchboard.

Barriers must be robust enough to ensure that a possible mechanical stress on these components (reduction in clearance distance, or even accidental contact with live parts) does not cause an accident.

Form 2 configuration – the busbars are separated from the devices

to stick a **warning label** (“**do not walk**” and “**electrical hazard**” symbol) on the top of the form.

Warning label (“do not walk” and “electrical hazard” symbol)

***Reference** // How to assemble an electrical switchboard – Technical guide by Schneider Electric (Download guide)*

About Author

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