5.1. GENERAL RULES FOR FORMING ACCORDING TO IEC 61439-2

Standard IEC 61439-2 defines the separations inside an assembly according to 4 types of form, each form being divided into two groups, “a” and “b”. These internal separations are created using barriers or screens made of metal or insulating material.

Their purpose is to divide the panel into closed protected areas to provide:

- Protection against direct contact with dangerous parts of neighbouring functional units. The degree of protection must be at least IP XXB.
- Protection against the entry of solid objects. The degree of protection must be at least IP 2X (which covers IP XXB).

The main purpose is to maintain the availability of the power supply in the event of a fault or if work is being carried out on the panel.

Separations also limit the propagation of an electric arc and the risk of sparkover.

However, they limit the natural ventilation of the panel and can thus cause temperature rises. It is therefore advisable to check the thermal equilibrium. Separations will inevitably increase the size of the panel and its cost, both in terms of labour and components.

Functional Unit

Part of an ASSEMBLY comprising all the electrical and mechanical elements including switching devices that contribute to the fulfilment of the same function.

Conductors which are connected to a functional unit but which are external to its compartment or enclosed protected space (e.g. auxiliary cables connected to a common compartment) are not considered to form part of the functional unit”Comprises all parts necessary to form a complete incoming or outgoing circuit. It includes the load current carrying device(s) and associated equipment, cable terminals, and control devices within the assembly, that are necessary to form the complete circuit. It excludes the connections from the unit to the busbars (busbar connections) and any insulation or shrouding with which they may be provided. It may consist of more than one compartment or enclosed protected space.

Separation

Separation must be protected with IPXXB (Please see at Section C 5. Degree of protection)

Seperation can be done insulated or metallic material. In case of metallic material using , penetration of live conductors from the separator , the air clearences must be kept in safety distances with the metallic parts.(Please see at Section C 2. Conductors sizing, rigidty and insulation)

Neutral and Earthing

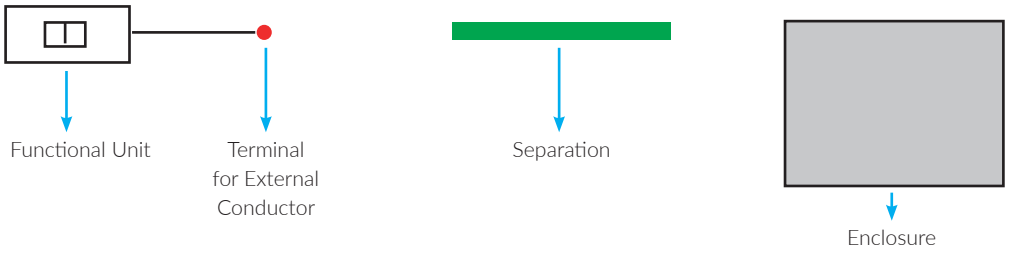
Main phases L1,L2,L3 must be kept into saperation compartments. In case of using 4 pole applications ,Neutral pole must be kept into seperation compartment too.

In case of 3 pole (L1,L2,L3) applications, Neutral connections do not necessary to kept into seperation compartments.

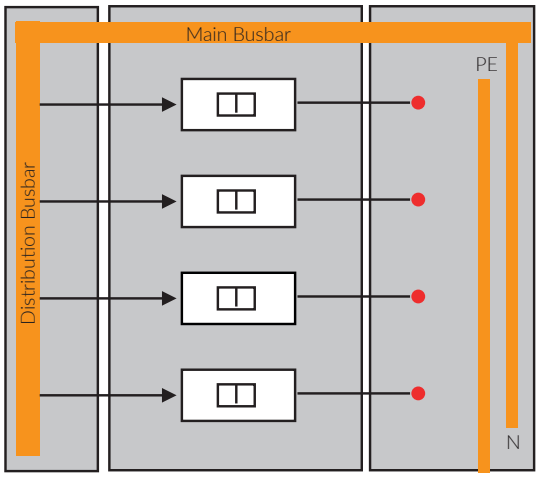
Incomer Breakers

PDS suggest to the user and partner to apply minimum Form 2b application for all incomers into the Switchgear which incoming terminals are live while the breaker shut down.

5.2. FORMS OF SEPARATIONS

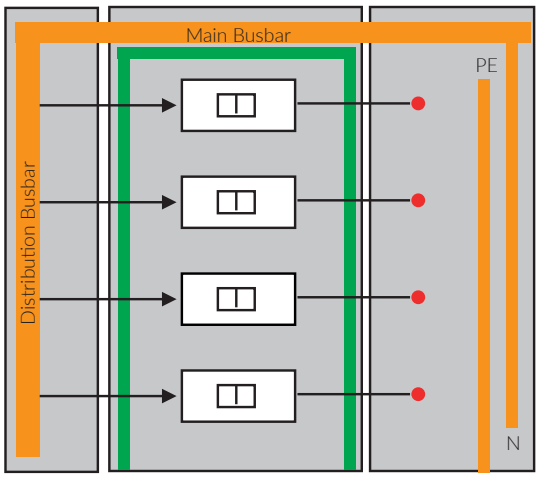


FORM 1



No Seperation

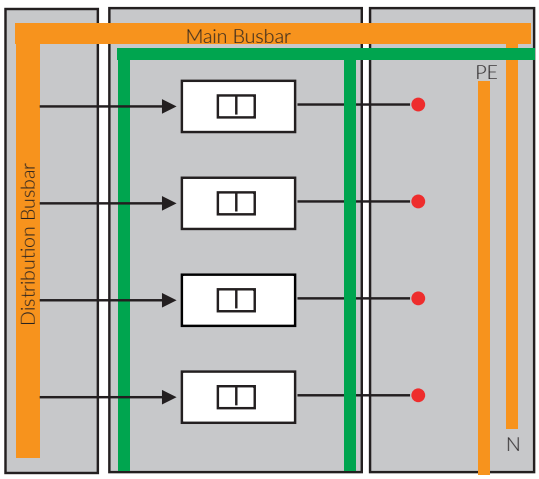
FORM 2a



Separation of busbars from functional units.

Terminals for external conductors do not need to be separated from busbars.

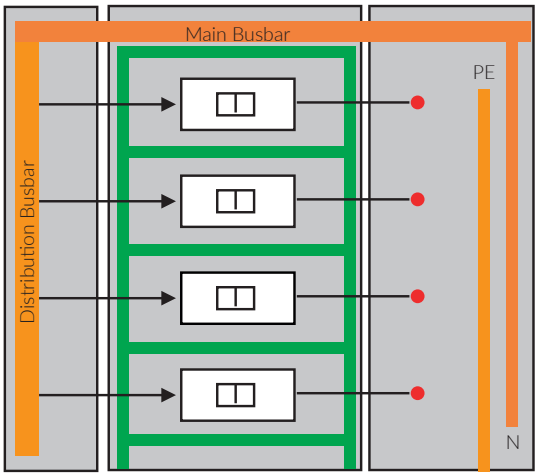
FORM 2b



Separation of busbars from functional units.

Terminals for external conductors are separated from busbars.

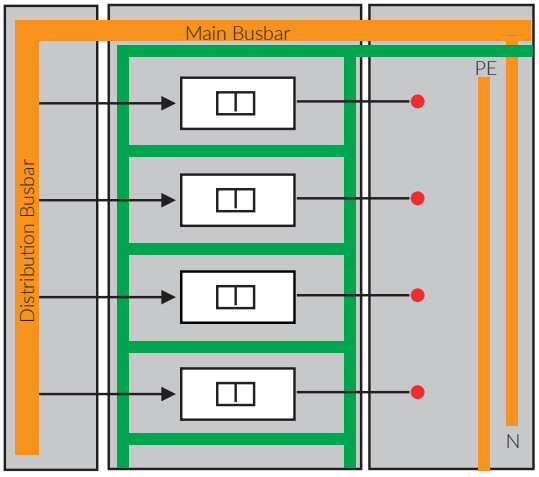
FORM 3a



Separation of busbars from functional units and separation of all functional units from each other.

Terminals for external conductors do not need to be separated from busbars.

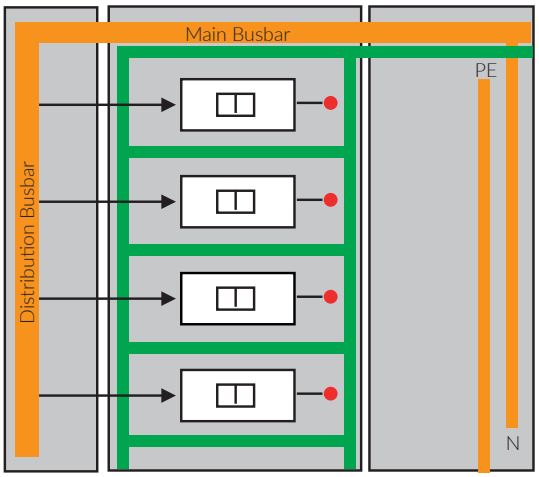
FORM 3b



Separation of busbars from functional units and separation of all functional units from each other.

Separation of terminals for external conductors from functional units but no separation between terminals.

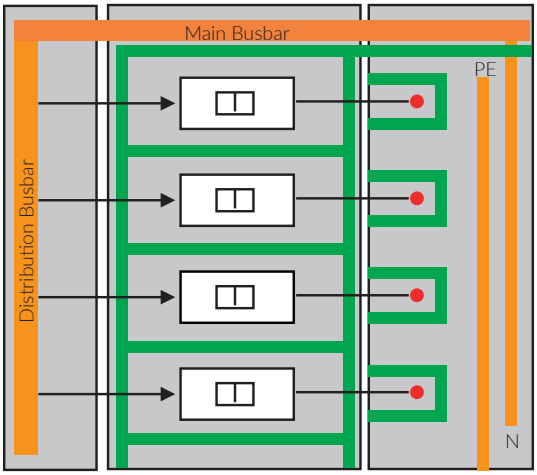
FORM 4a



Separation of busbars from functional units and separation of all functional units from each other, including the terminals for external conductors which are an integral part of the functional unit.

Terminals for external conductors are in the same compartment as the functional unit.

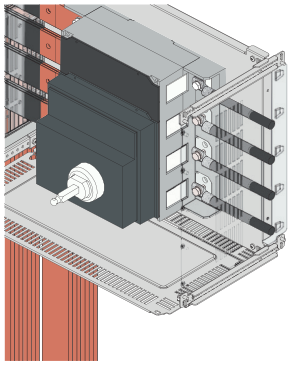
FORM 4b



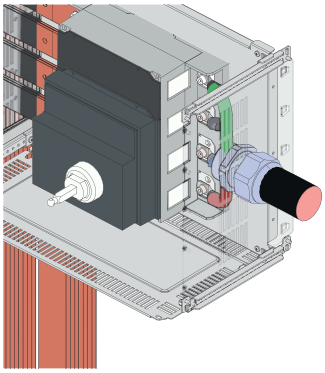
Separation of busbars from functional units and separation of all the functionalunits from each other including terminalsfor external conductors.

Terminals for external conductors are not in the same compartment as the functional unit but in separate individual compartments.

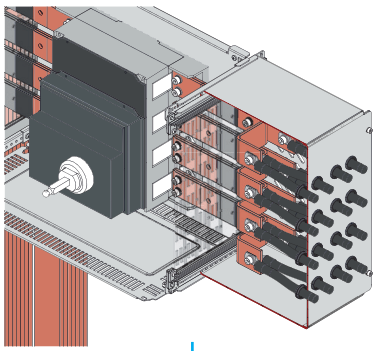
FORM 4a Type 2

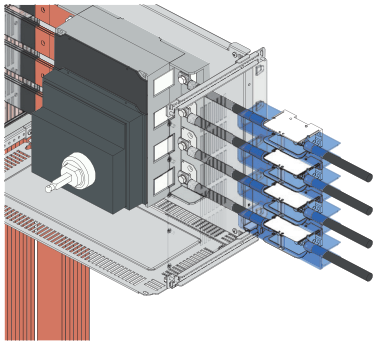


FORM 4a Type 3



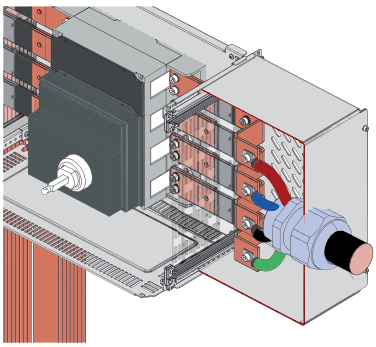
FORM 4b Type 6





IPXXB protected terminal connections are also an alternative instead of 4b metal box.

FORM 4b Type 7



FORM 4b Type 5