

Forms of Separation

BS EN 61439-2

Objective

The principle reason for separating an assembly is to facilitate access to a part of the assembly whilst other parts may remain energised and in service. Whilst, in general separation does not improve the electrical performance of the assembly it does provide:

- Protection against contact with live parts belonging to adjacent functional units
- Protection against the passage of solid foreign bodies from one unit of an assembly to an adjacent unit.

Legal Obligations

In the UK the standards do not take precedence over legal obligations in particular the Low Voltage Directive (LVD) and the Electricity at work Act (EWA).

When working within a partially energised assembly, there is no allowance for tolerable risk. If an assembly can reasonably be isolated prior to any covers being removed, it must be.

Where it is impractical to totally isolate an assembly the degree of separation, and the way in which the separation is achieved within the assembly should be considered in a risk assessment by the Duty Holder. This risk assessment will consider all relevant factors including:

- Work to be carried out
- Mechanical protection afforded by any insulation and separation
- Possibility of initiating a flashover
- Likelihood of an electric shock

BS EN 61439-2 stipulates:

Power Switchgear and Controlgear assemblies can be divided to meet one or both of the following conditions between functional units, separate compartments or enclosed protected spaces.

1. Protection against contact with hazardous parts. The degree of protection shall be at least IPXXB
2. Protection against the passage of solid foreign bodies. The degree of protection shall be at least IP2X

The form of separation shall be the subject of an agreement between manufacturer and the end user.

BS EN 61439-2 includes four main categories of separation (1,2,3,4)

The annex offers a guide to the various types of construction. It identifies a total of 18 variants with the introduction of two sub categories 'Compartmentalised' and 'Group Mounted'.

Installation criteria	Recommended form
Isolation available for all operations (except changing fuse links)	Form 1 or 2
Adjust settings, limited maintenance, while adjacent circuits live	Form 3
Connect / disconnect cables, adjust settings, limited maintenance, while adjacent circuits live	Form 4

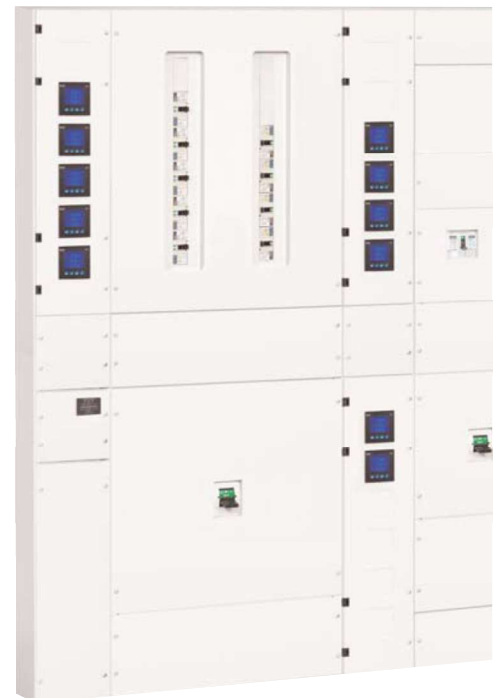
The Law

Electricity at work act

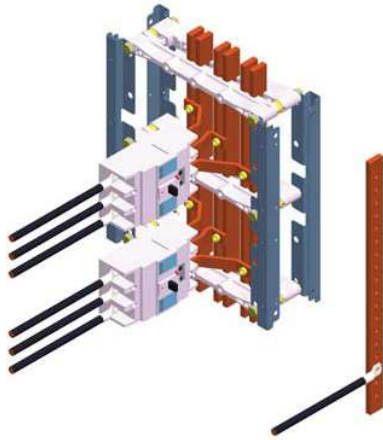
Regulation 14

"No person shall be engaged in any work activity on or near any live conductor (other than on suitably covered with insulating material so as to prevent danger) that danger may arise unless:

- it is unreasonable in all the circumstances for it to be dead; and
- it is reasonable in all the circumstances for him to be at work on or near it while it is live; and
- suitable precautions (including where necessary the provision of suitable protective equipment) are taken to prevent injury.



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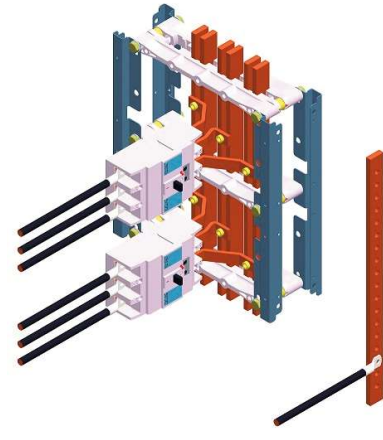
Form 1

No Internal Separation.

Form 1

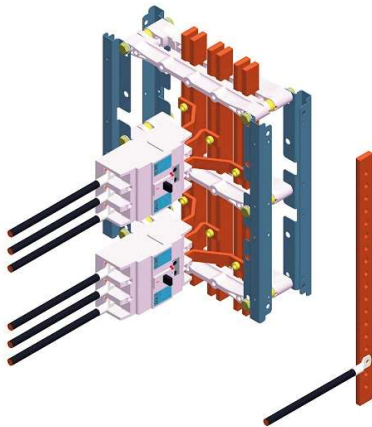
Form 1 or 2

Isolation available for all operations (except changing fuse links).



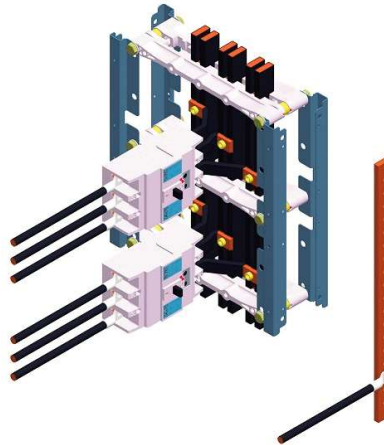
Form 2a

Separation of busbars from functional units, the housing of the device is the means of separation.



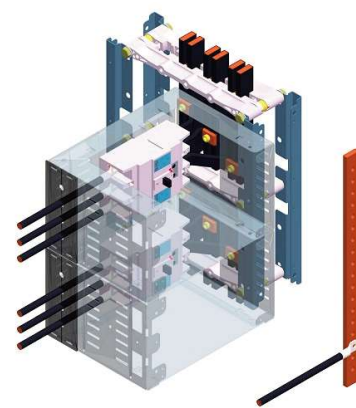
Form 3a Group Mounted

Separation of busbars from functional units and separation of functional units from each other. Terminals are separated from functional units but not from each other. The housing of the device is the means of separation.



Form 3b type 1 Group Mounted

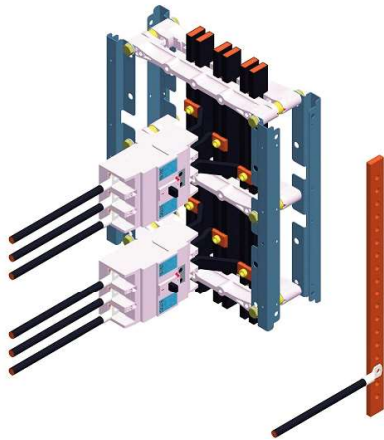
Separation of busbars from functional units and separation of functional units from each other. Terminals are separated from functional units but not from each other.



Form 3b type 1 Compartmentalised

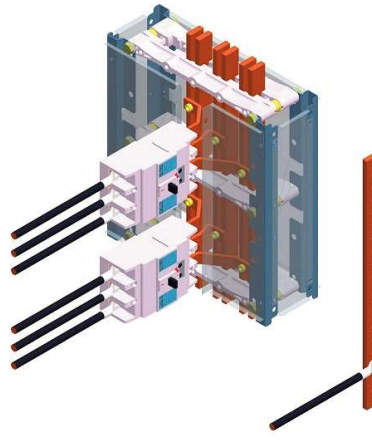
Separation of busbars from functional units and separation of functional units from each other. Terminals are separated from functional units but not from each other.

Forms of Separation



Form 2b type 1

Separation of busbars from functional units, the housing of the device is the means of separation.

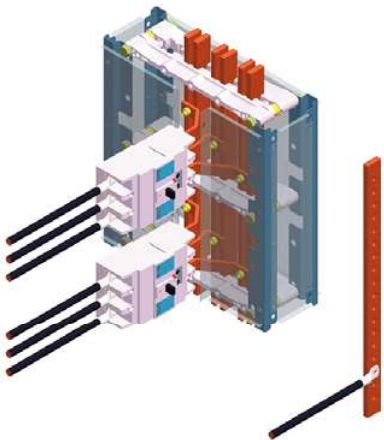


Form 2b type 2

Separation of busbars from functional units.

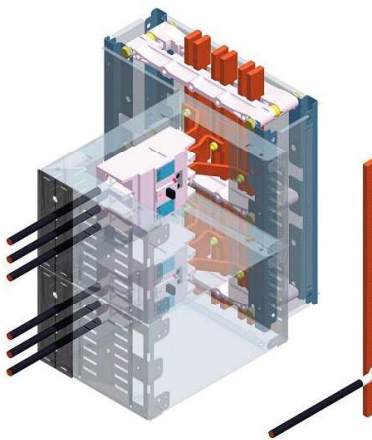
Form 2

Form 1 or 2
Isolation available for all operations (except changing fuse links).



Form 3b type 2 Group Mounted

Separation of busbars from functional units and separation of functional units from each other. Terminals are separated from functional units and busbars but not from each other.

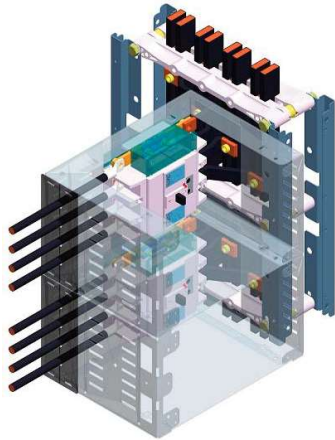


Form 3b type 2 Compartmentalised

Form 3

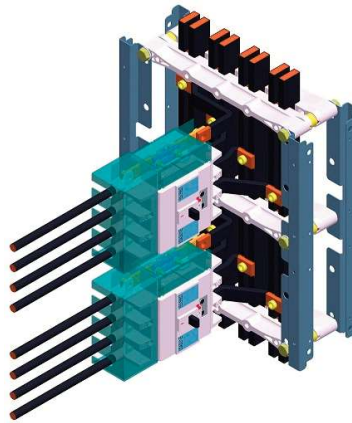
Form 3
Adjust settings and limited maintenance, while adjacent circuits live.

Forms of Separation

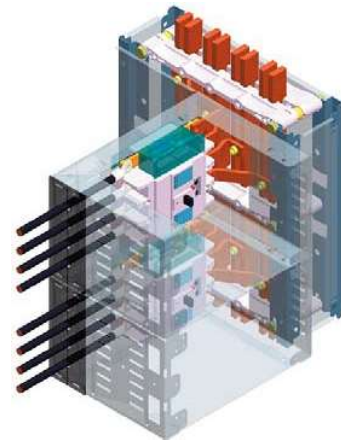


**Form 4a type1
Compartmentalised**

Separation of busbars from functional units and separation of functional units from each other. Terminals are separated from other terminals and from the busbars.

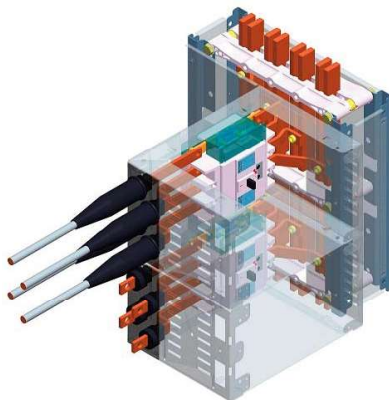


**Form 4a type1
Group mounted**



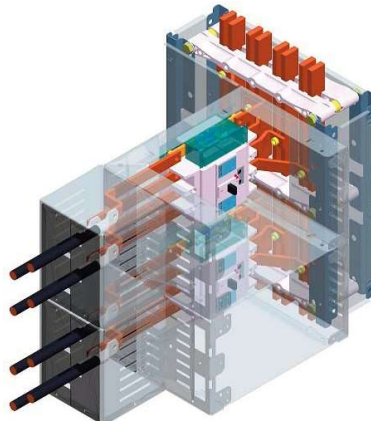
Form 4a type2

Separation of busbars from functional units and separation of functional units from each other. Terminals are separated from other terminals and from the busbars.



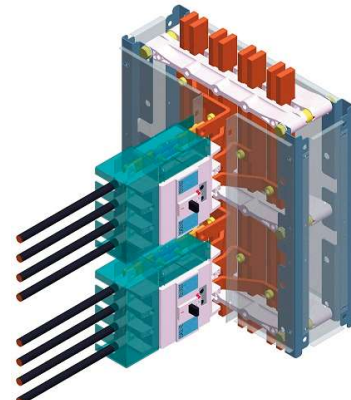
Form 4b type 5

Separation of busbars from functional units and separation of functional units from each other. Terminals are separated from their own functional unit, other terminals and from the busbars. Separation of terminals by insulated coverings.



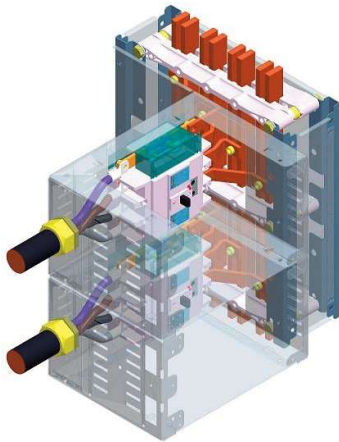
**Form 4b type 6
Compartmentalised**

Separation of busbars from functional units and separation of functional units from each other. Terminals are separated from their own functional unit, other terminals and from the busbars.



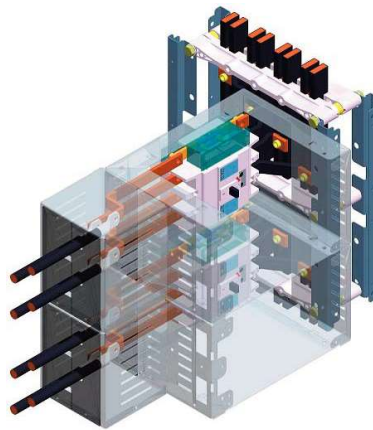
**Form 4b type 6
Group mounted**

Forms of Separation



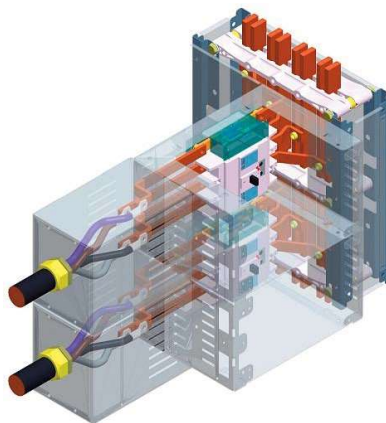
Form 4a type 3

Separation of busbars from functional units and separation of functional units from each other. Terminals are separated from other terminals and from the busbars. Individual, integral glanding for each circuit.



Form 4b type 4

Separation of busbars from functional units and separation of functional units from each other. Terminals are separated from their own functional unit, other terminals and from the busbars.



Form 4b type 7

Separation of busbars from functional units and separation of functional units from each other. Terminals are separated from their own functional unit, other terminals and from the busbars. Individual, integral glanding for each circuit.

Form 4

Form 4

Connect / disconnect cables, adjust settings and limited maintenance, while adjacent circuits live.