Main switches in accordance with European standard directives

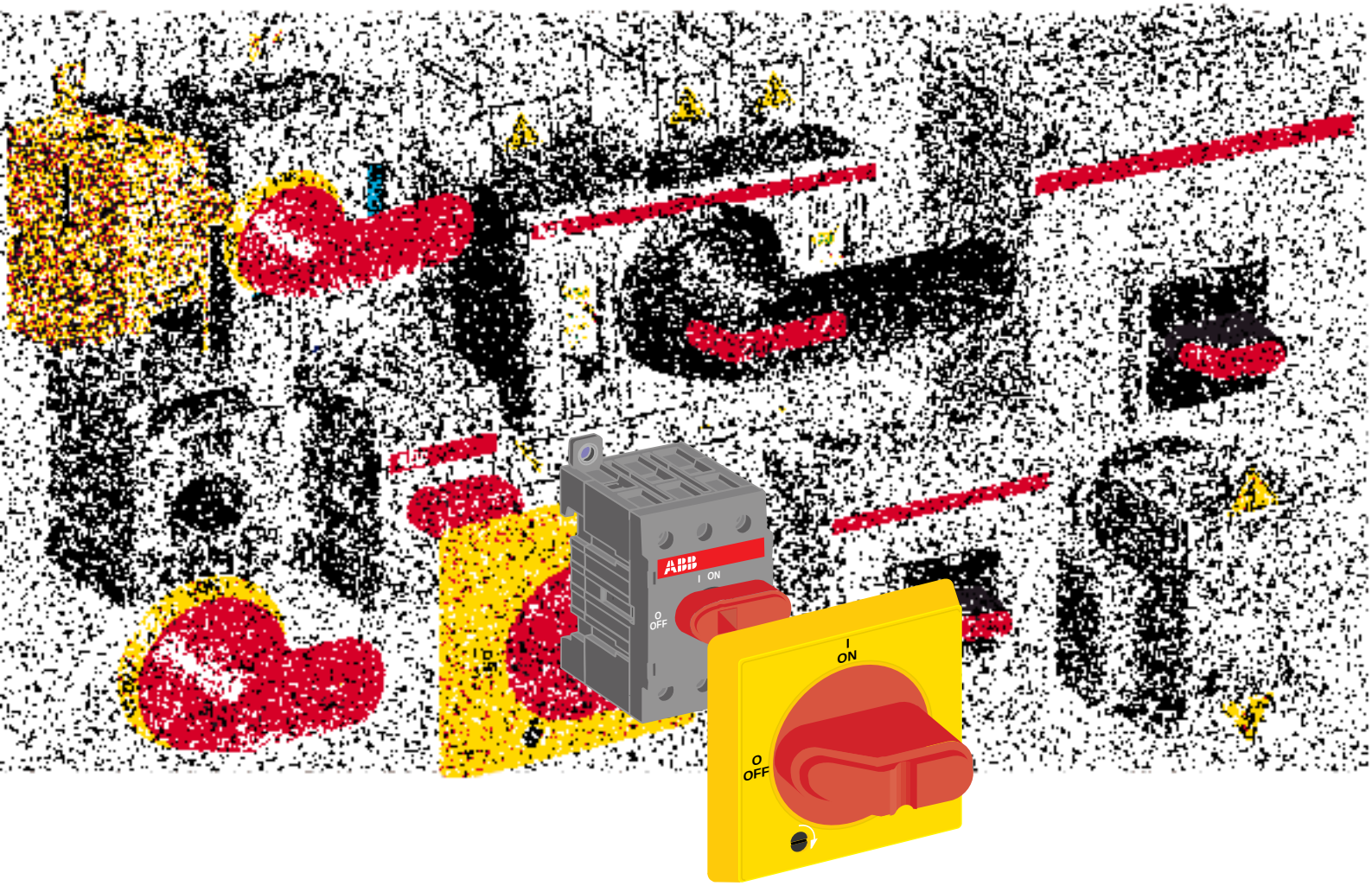


ABB Oy

Safety of machinery - Electrical

New concept

In order to dismantle technical barriers in commerce, the Council of the European Union released at the suggestion of the European Commission EU-standard directives based on article 100 of the Uniform Acts.

The European Commission formulates these standard directives in accordance with the so-called ”New concept”. Up to now the EU-standard directives included only requirements of a general nature. To fulfil these rather general essential requirements the European Commission shall assign to the European Standardization Organizations CEN, CENELEC and ETSI a task of stipulating the European standard directives, which shall be considered as ”harmonized” standard directives.

Advantages for manufacturer

The usage of harmonized standards give the manufacturer the advantage of assumption reaction, which means that the product can be assumed to fulfil the essential requirements of the EU-standard directive. If the manufacturer doesn't use any harmonized standard e.g. concerning low-voltage, he must prove by technical demonstration that the requirements are fulfilled.

Harmonized standards in accordance with the EU - standard directives

The European Committee for Electrotechnical Standardization (CENELEC) has stipulated the following European norms (EN), harmonized documents (HD) and European Magnetic Compability directives (EMC) for switches. They are valid in their area of use as acknowledged European technical rules uniform throughout all CENELEC member countries, which means the European economic region. They have a status of a national standard. Conflicting national standards shall be withdrawn.

Safety standards for machinery

Safety of machinery referring to the status of a harmonized standard can be subdivided into the following cases:

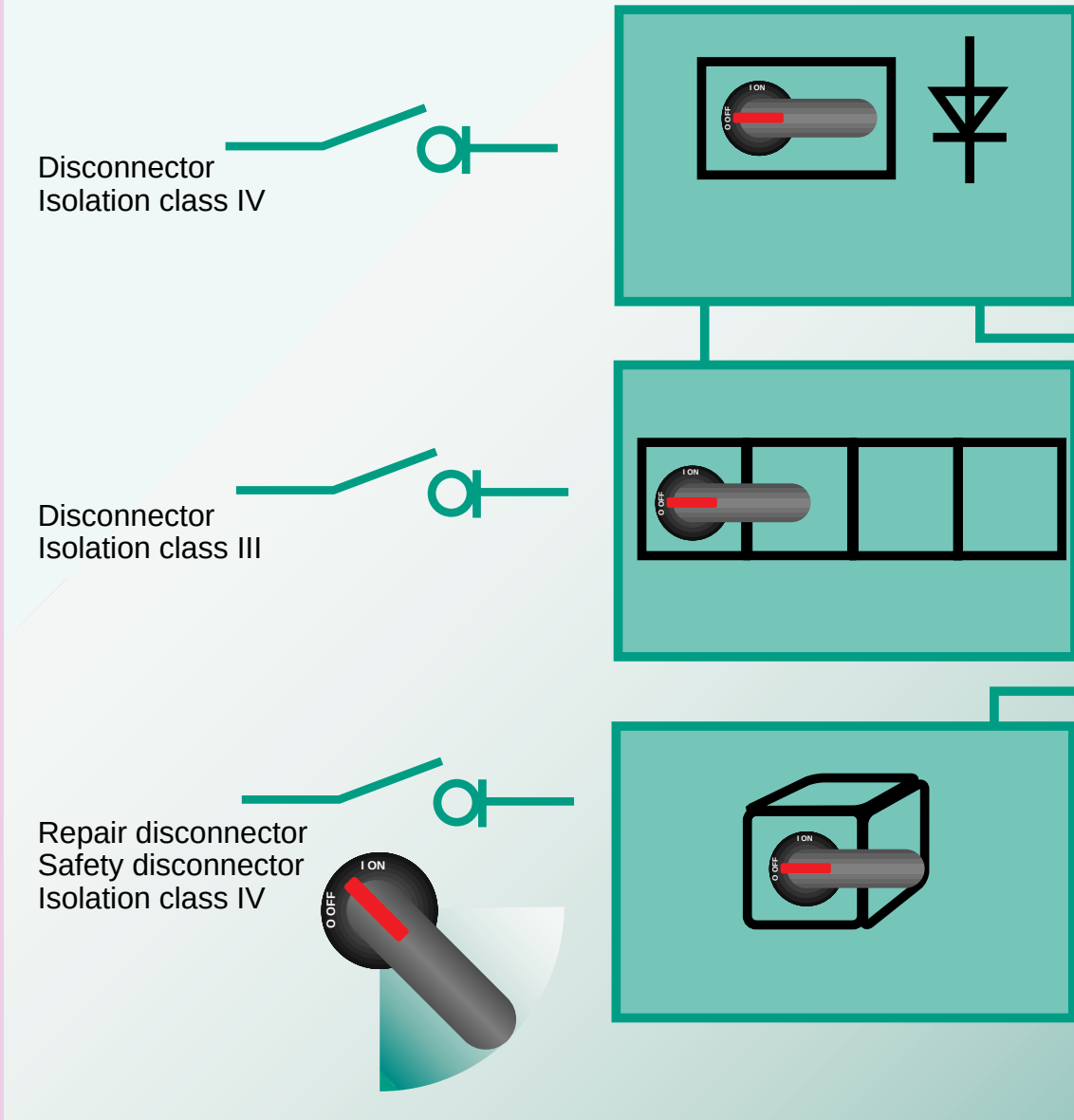
1. Harmonized general standards under the EU-standard directives in accordance with the new concept covering e.g. EMC-directives and the standard of machinery.
2. Harmonized standards under the Low Voltage

The standards covering the safety of electrical equipment are subdivided into three categories as follows:

A. General safety standards are valid for all machines and devices:
Safety of machinery, EN 292
EMC-directives, EN 50065
Risk assessment, EN 1050

B. Group safety standards orientated to particular aspects of safety and safety-related equipment. PrEN 1047 Protection against restarting is under consideration.

C. Standards for safety of machinery include specified safety requirements for particular machines and groups of machines:
EN 0529 housing classes



equipment of machines-EN 60204

Standard for machinery EN 60204-1

This part of EN 60204 is the first part of a series of standards relating to electrical equipment of machines, and specifies general requirements for the electrical equipment of an individual machine, as well as a group of machines operating in a coordinated manner.
This part of European Standard EN 60204 provides requirements and recommendations relating to electrical equipment of machines in order to promote the following matters:

- safety of persons and property
- control of function capability
- ease of maintenance
- ease of service and repair

Application of switches according to the standard EN 60204-1

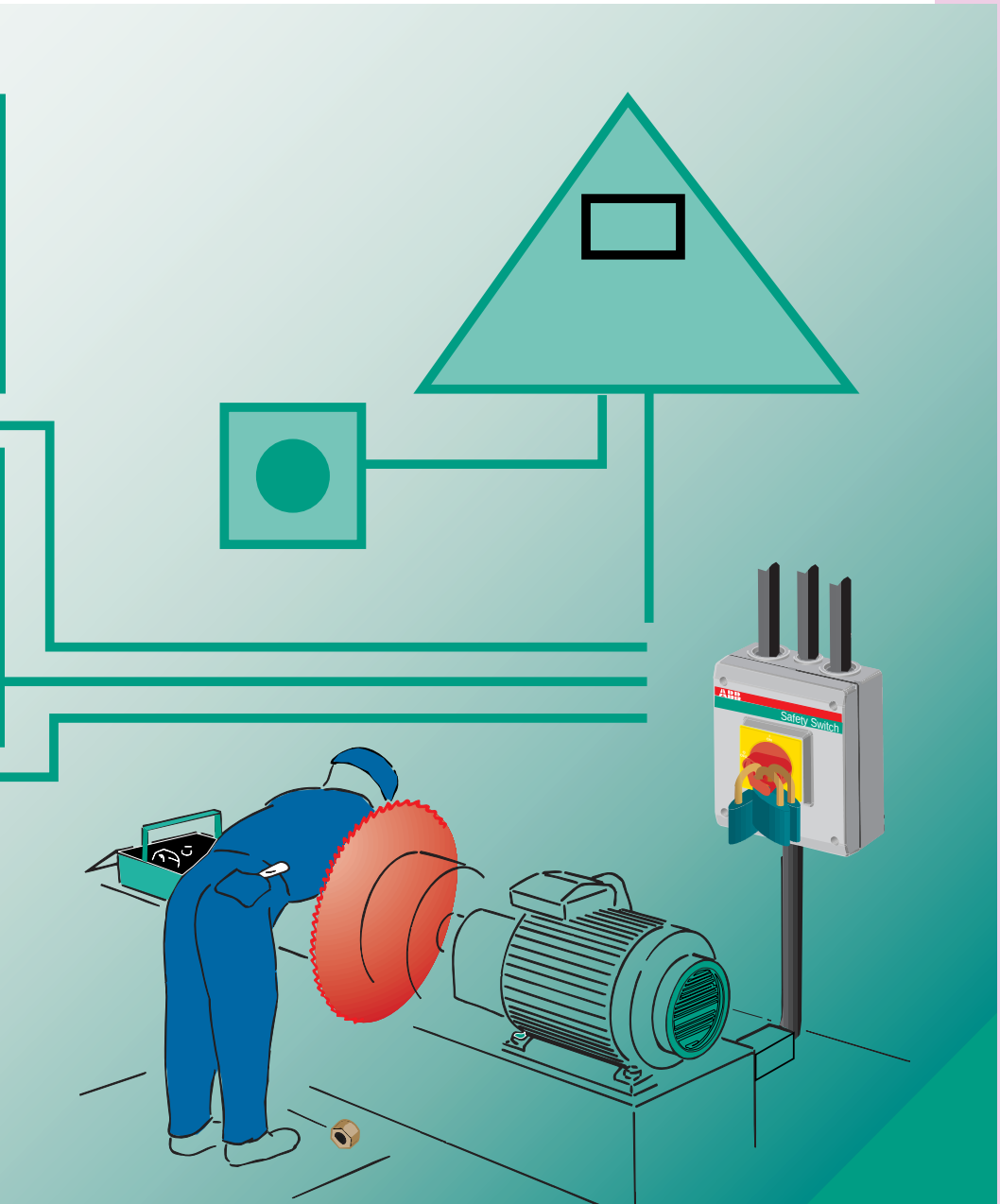
Application area

This standard considers the application of machines under normal conditions. Care must be taken that the break switches correspond with the requirements for warmth, quality and humidity of air.

General considerations

Risks associated with the hazards relevant to electrical equipment shall be assessed as part of the overall requirements for risk assessment of the machine (Paragraph 4.1.) Hazards can include for instance the following:

- failures or faults in control circuits
- disturbances or disruptions in external power sources as well as failures or faults in power circuits resulting in the malfunctioning of the machine
- electrical interferences either from outside the electrical equipment or internally generated



Operating conditions for disconnectors

The standard specifies in paragraph 4.3., Electrical supply, the operating conditions for a disconnector:
Voltage:
0,9..1.1 of nominal voltage
Frequency:
0,99..1.01 of nominal frequency
Harmonics:
harmonic distortion (for the sum of the 2nd through the 5th harmonic) is not allowed to exceed 10% of the total r.m.s. voltage

Voltage impulses:
Max. duration 1,5 ms
Max. peak value 200% of the rated r.m.s. voltage
Voltage interruption:
Supply interrupted at zero voltage for not more than 3 ms. There shall be more than 1 s between successive interruptions.

There must be a switch disconnector! (EN 60201-1)

A hand-operated main switch disconnector shall be provided for each incoming supply.
When two or more main switch disconnectors are provided, protective interlocks shall be used where a hazardous condition or damage to the machine or to the work in progress could occur.

Isolation function - the new way to think

The need for a clear isolating function increases as more and more conductor systems, remote control devices and electric apparatus are introduced.

The main switch is required because it is necessary to have reliable protection against unintentional start-up during cleaning, maintenance and repair, as well as during longer pauses in usage.

The switch-disconnector is also required for prevention of unexpected start-up for example in the case that the start-up of a machine during the work in progress could create a hazard. A main switch disconnector fulfils these functions best.

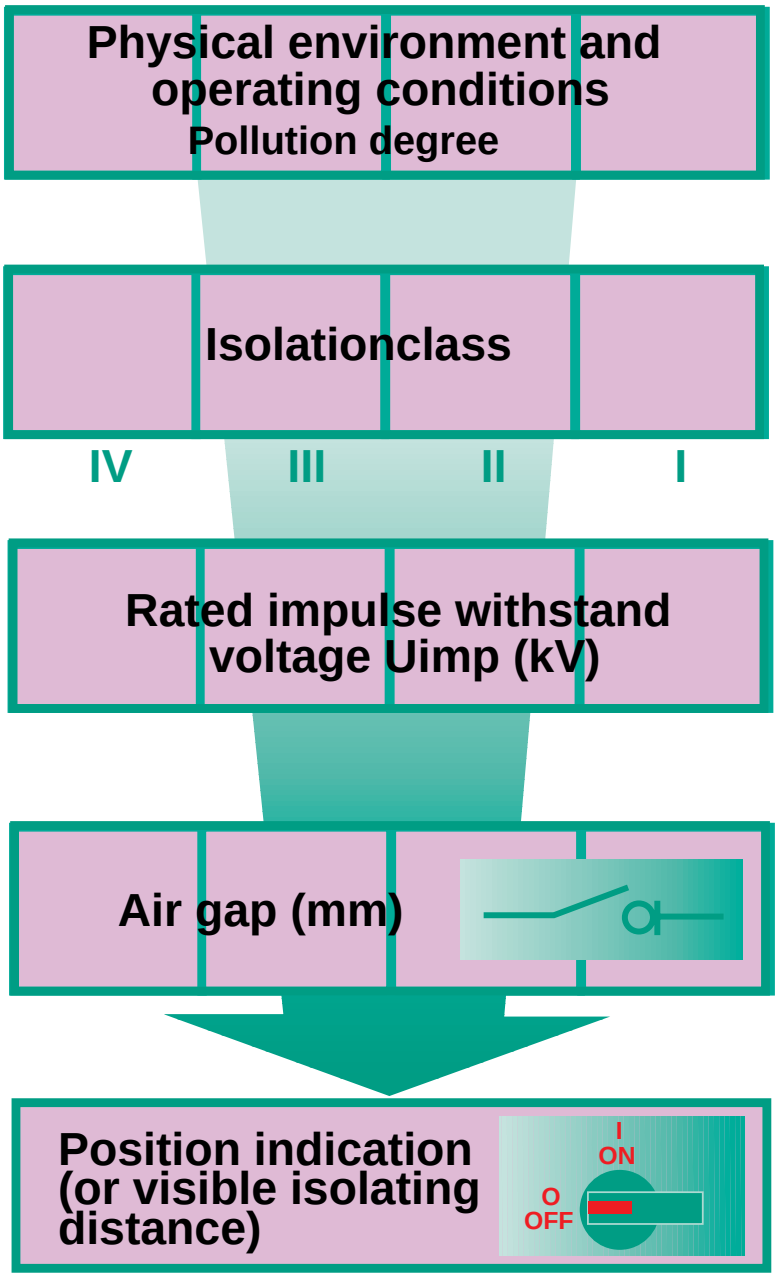
The isolating characteristics are the most important items within a machine standard direction. For the switch disconnectors the standard EN 60947-3 is valid. All live conductors shall be isolated from their electric network. However it is possible in TN-supply-networks to isolate the neutral conductors (IEC364.4).
Precautions shall be taken to prevent unintentional or inadvertent operation of the disconnecting device.

New requirements for main disconnectors

The main switch disconnector shall be a switch disconnector according to EN 60947-3 for application category AC 23B or DC 23B and shall have a breaking capacity sufficient to interrupt the current of all supplies in use at the same time.

The main switch disconnector shall have a breaking capacity sufficient to interrupt the current of the largest motor when stalled, together with the sum of the normal running currents of all other motors and/or loads.

The main switch disconnector shall reliably isolate the electrical equipment from the supply. It shall have one OFF and one ON position only, clearly marked with 0 and I.



The new way to think: definition of isolating function

According to EN 60947, the rated impulse withstand voltage U_{imp} of the main contacts shall exceed the one stipulated for the corresponding installation class of IEC 644.
The standard requires an isolating distance of the contacts corresponding to the isolation class. The old definition of isolating distance as such will not be valid any more. According to EN 60947 the main switch disconnector shall correspond at least to class III of IEC 644.

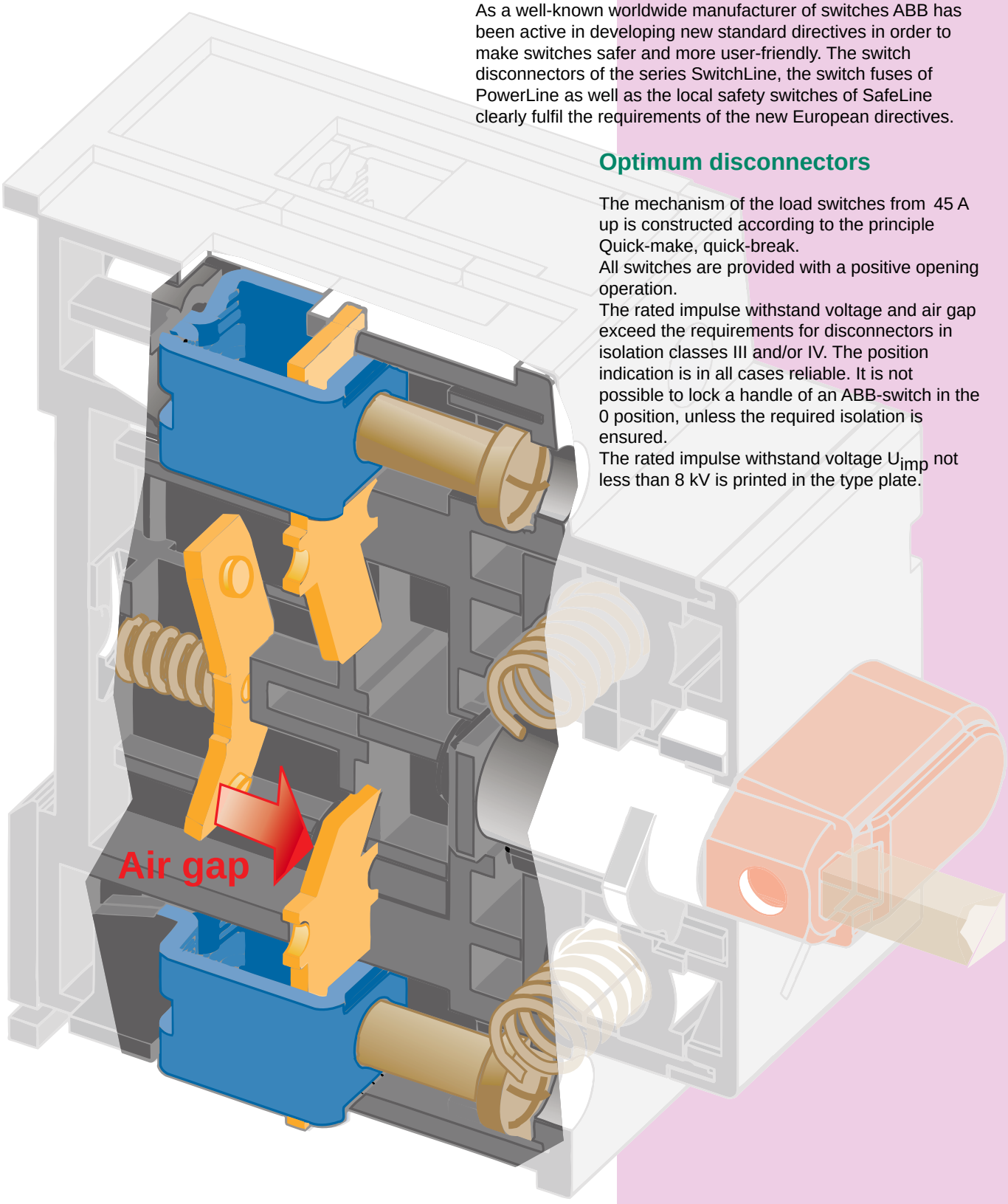
Advantages of the ABB switch disconnectors SwitchLine, PowerLine and SafeLine

The requirements of the standard EN 60947-1&7.1.6 for switch disconnectors

As a well-known worldwide manufacturer of switches ABB has been active in developing new standard directives in order to make switches safer and more user-friendly. The switch disconnectors of the series SwitchLine, the switch fuses of PowerLine as well as the local safety switches of SafeLine clearly fulfil the requirements of the new European directives.

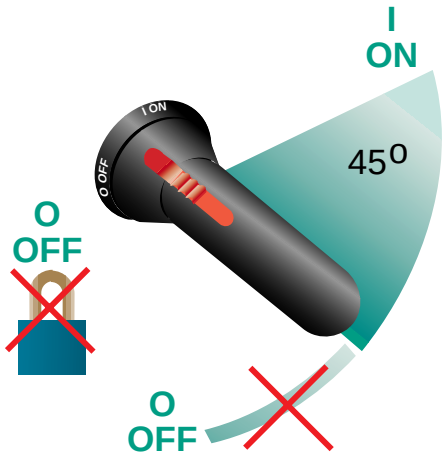
Optimum disconnectors

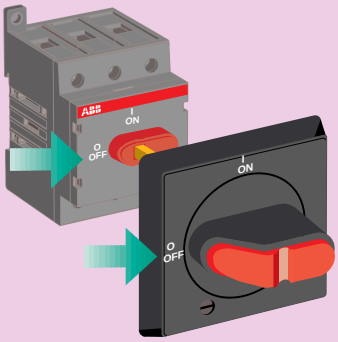
The mechanism of the load switches from 45 A up is constructed according to the principle Quick-make, quick-break.
All switches are provided with a positive opening operation.
The rated impulse withstand voltage and air gap exceed the requirements for disconnectors in isolation classes III and/or IV. The position indication is in all cases reliable. It is not possible to lock a handle of an ABB-switch in the 0 position, unless the required isolation is ensured.
The rated impulse withstand voltage U_{imp} not less than 8 kV is printed in the type plate.

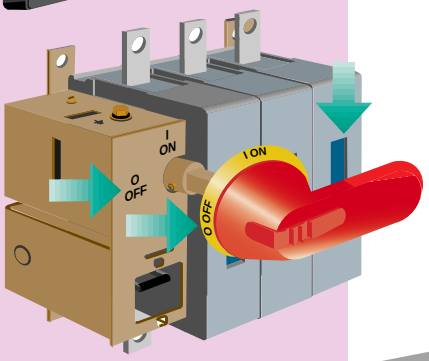


Position indication (definition)

The position indicator cannot display the OFF position, until all contacts are open - also the welded ones - and a sufficient air gap exists between all contacts according to EN 60204. Alternatively, a visible isolating distance may be employed, where practicable.
It is recommended that the colours of an external operating handle are black or grey. Where the disconnector does not also serve as an emergency stop device, its operating handle may not be red.
The handle of the disconnector shall be easily accessible and located between 0,6 m and 1,9 m above the servicing level; a maximum height of 1,7 m is preferred.







Reliable position indication protects the user in the following cases:

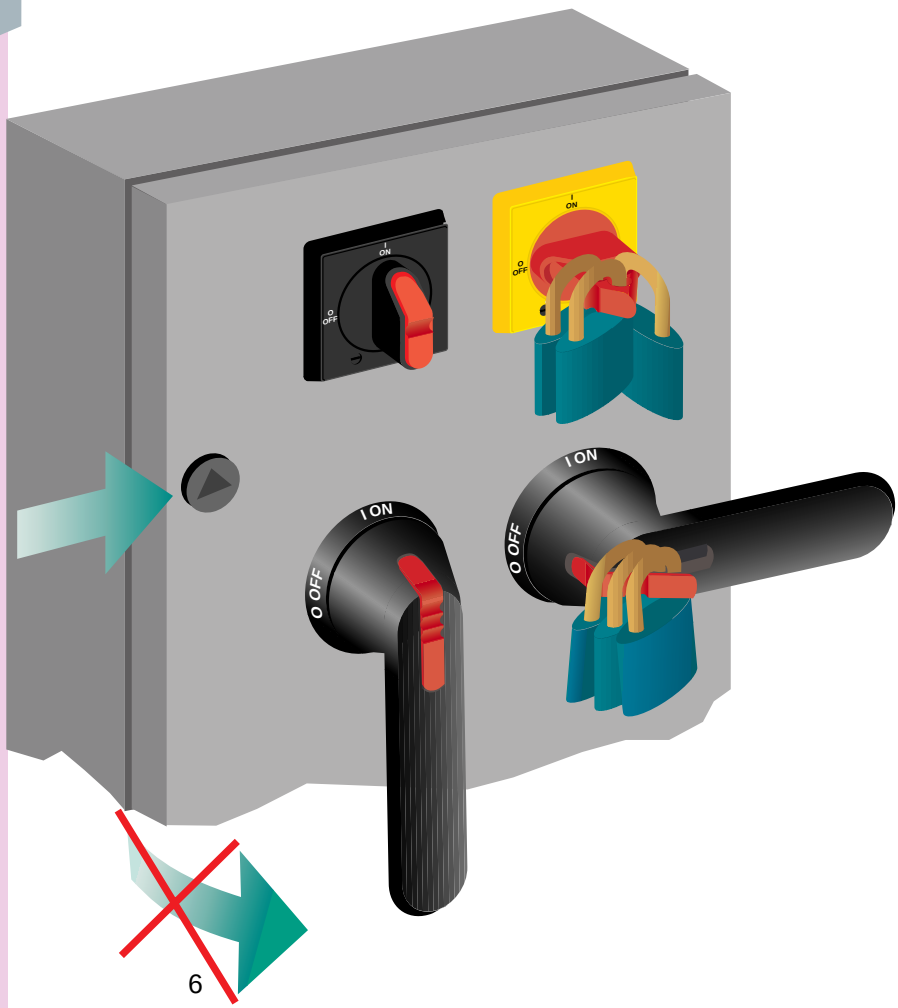
- The position of the handle indicates with complete reliability the exact position of the contacts in all circumstances.
- The position indicator in the switch body ensures the reliable position indication of the contacts in case of an open door.
- The visible isolating distance, where practicable, increases the safety of large switches.
- The position indication is also safe after several switch offs and short circuits.
- The handle can not be padlocked in the 0 position if one of the contacts is not in the OFF position.
- The creepage current between the contacts does not exceed the following values with 10 % overvoltage:

New switches:	0,5 mA
After switch on/switch off tests:	2 mA
Under no circumstances:	6 mA

Padlocking of the handle

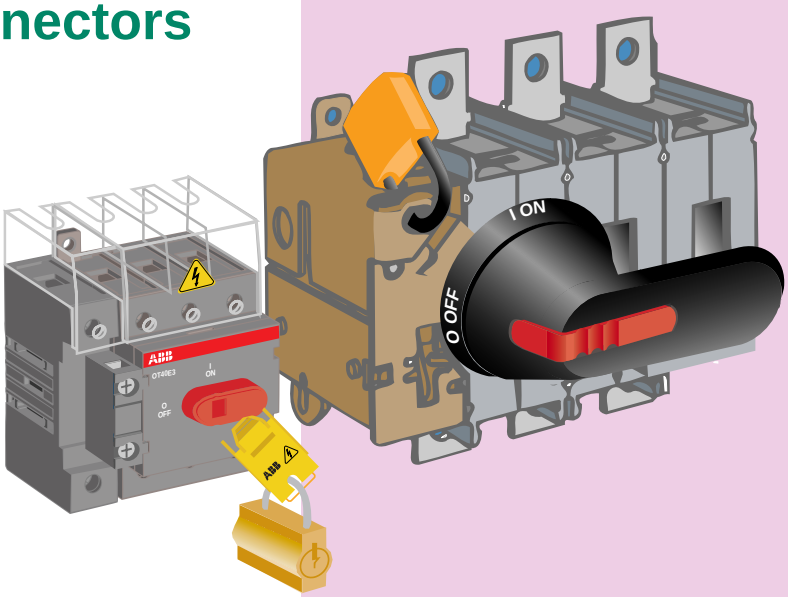
It shall be possible to padlock the handle in the open (OFF) position.

It shall not be possible to lock the handle in the 0 position if one of the contacts is not in the open (OFF) position.



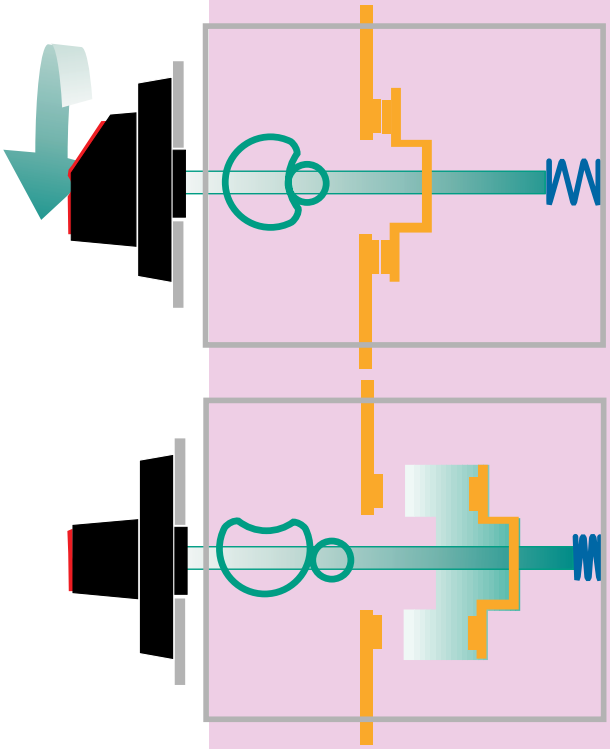
Padlocking of disconnectors

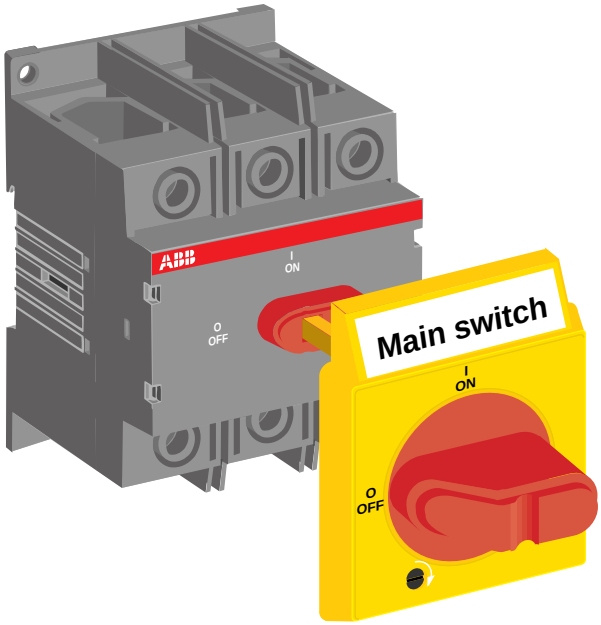
The switch mechanism is constructed so that neither the handle when turned to the OFF position with a moderate power nor the separate position indicator can indicate the switch off position if one of the contacts has been welded together.



Positive opening operation of the contacts

The mechanism of all switches works according to the so-called ”positive opening operation” principle. This means that the contacts do not open by strings but by solid moving bridges.





"Disconnector"

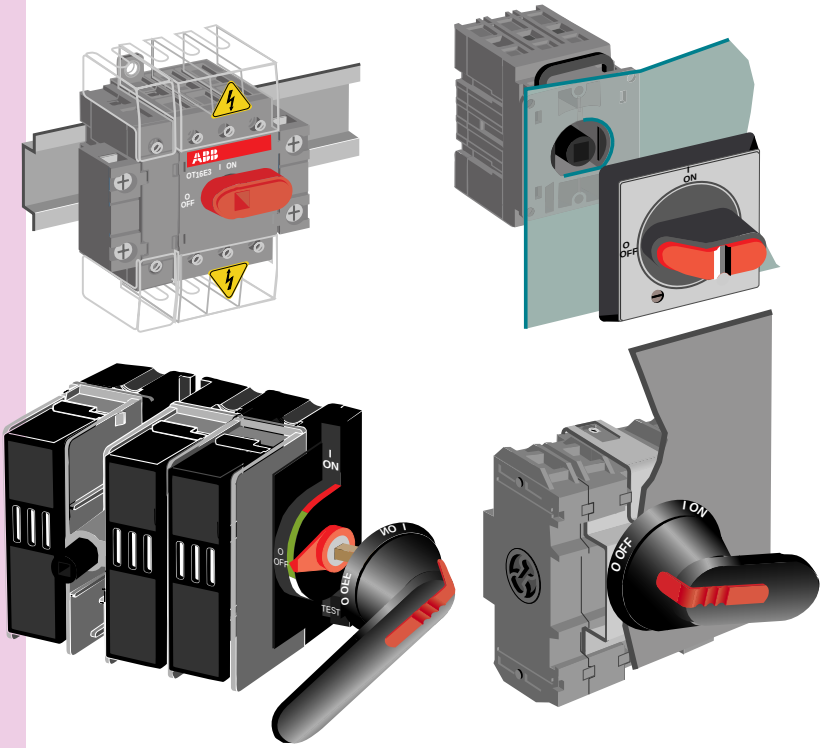
Plates provided with text ”Disconnector” are delivered as accessories.

Versatile mounting possibilities of switches save space and allow easy installation

Versatile mounting variations of SwitchLine switch disconnectors and PowerLine switch fuses allow space saving and easy mounting for every application. The mounting variations include modular, base mounting and front door mounting.

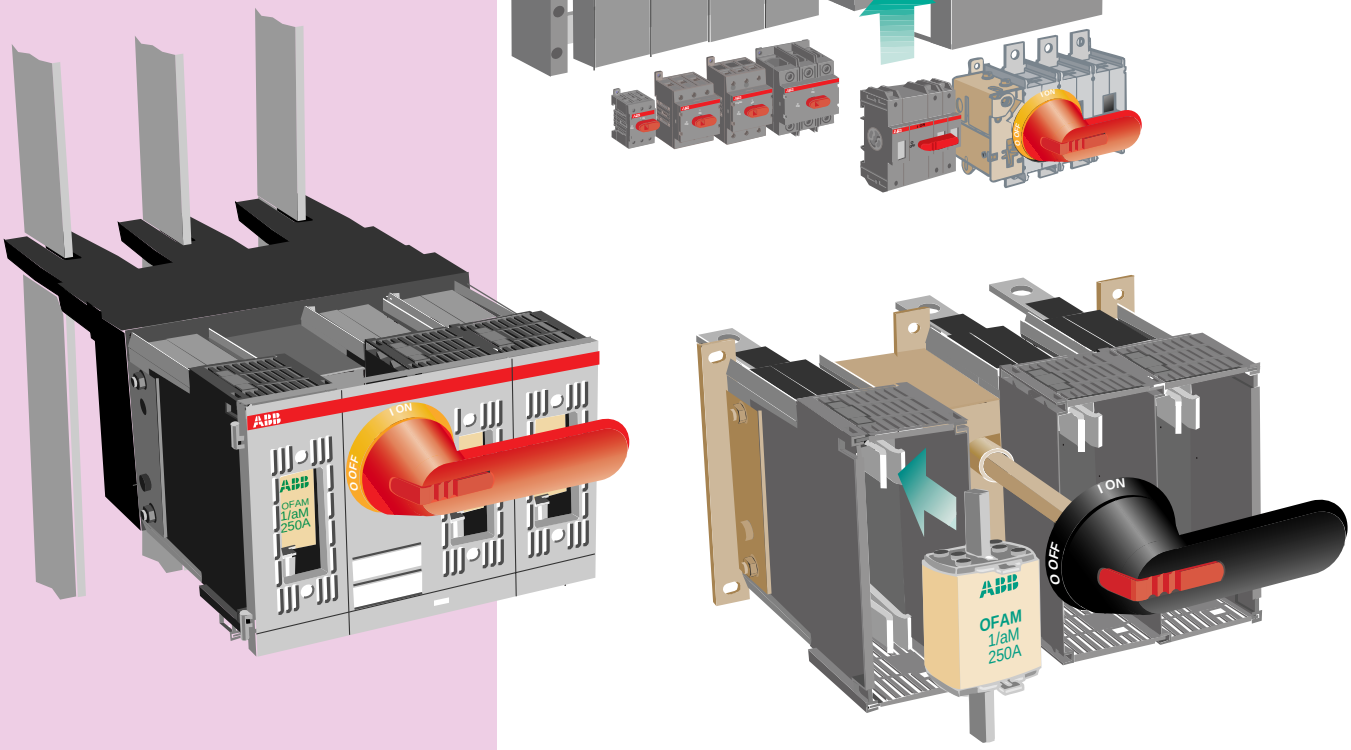
The side wall is often a practical and space saving solution.

Mounting on the door by snap-on technique saves time.



Minimum installation time with the help of system technology

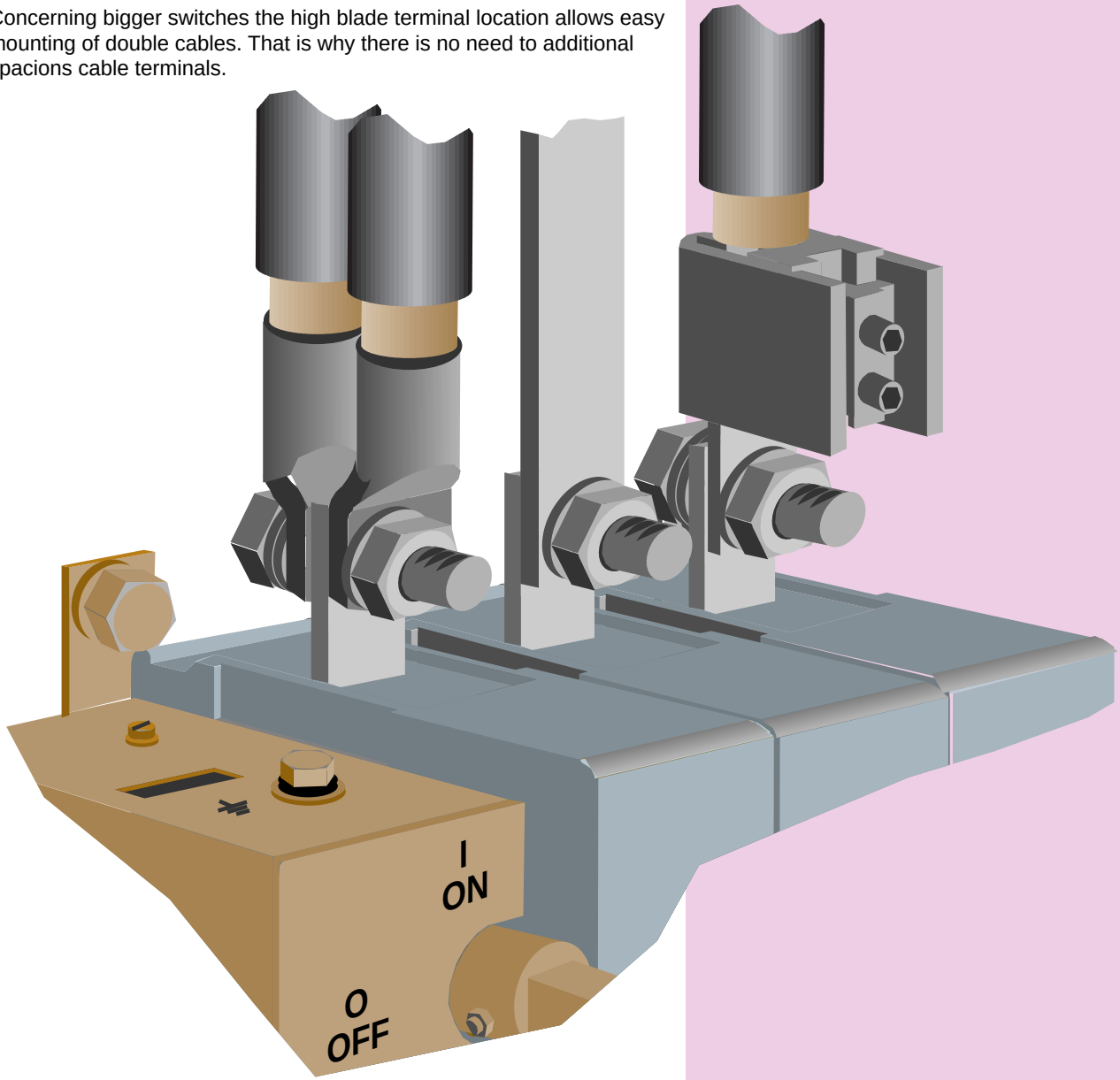
Mounting without screws and adapting mounting allow easy installation while the small dimensions help minimize the volume of a unit while optimizing the connecting.

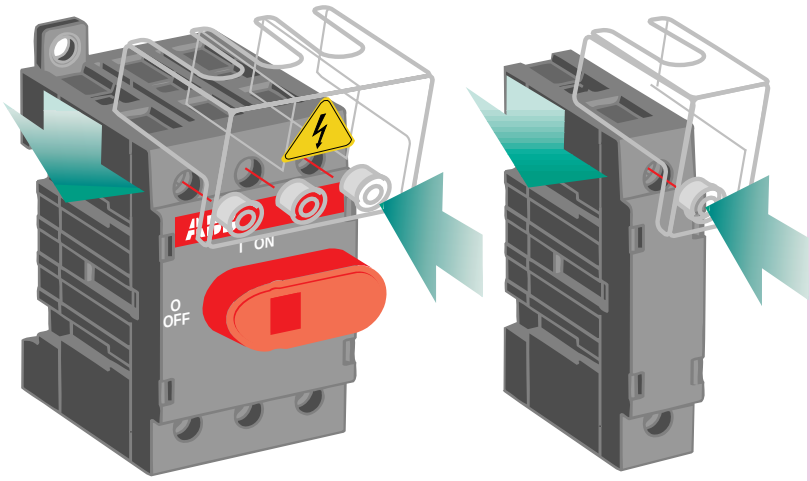


Optimum connecting technology

Optimum connecting technology with protected terminal shrouds allows easy mounting and saves space needed for small switches.

Concerning bigger switches the high blade terminal location allows easy mounting of double cables. That is why there is no need to additional spacions cable terminals.





The snap-on mounting of the protected terminal shrouds

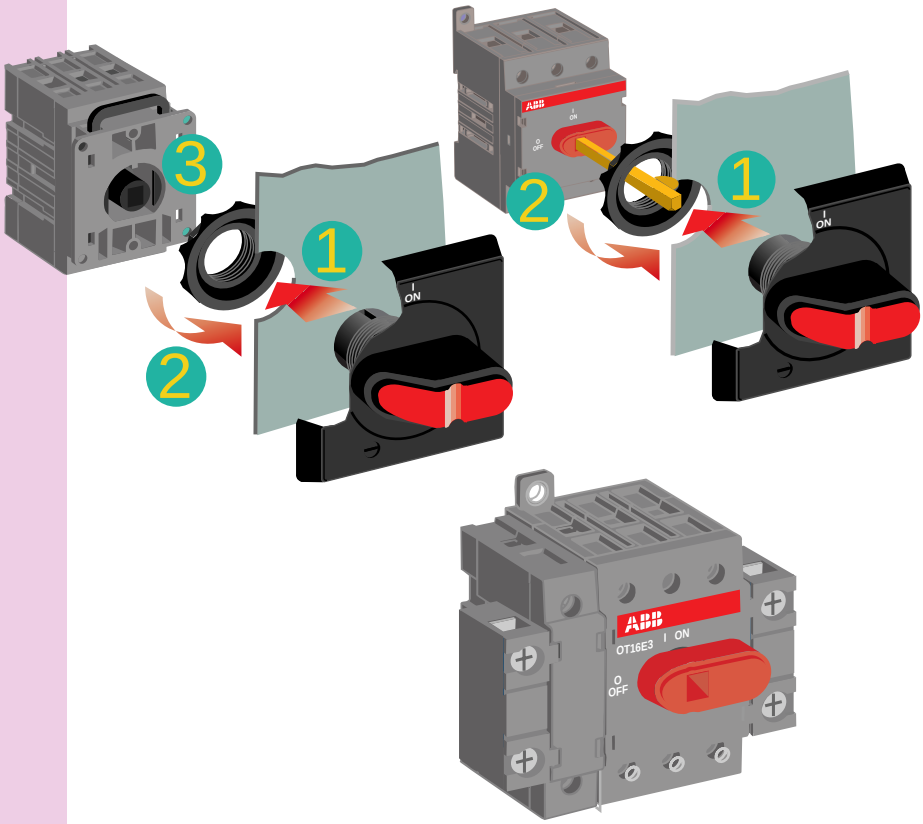
The protected terminal shrouds, which are easily mounted by snap-on technique, increase the safety level and do not require additional isolation space.

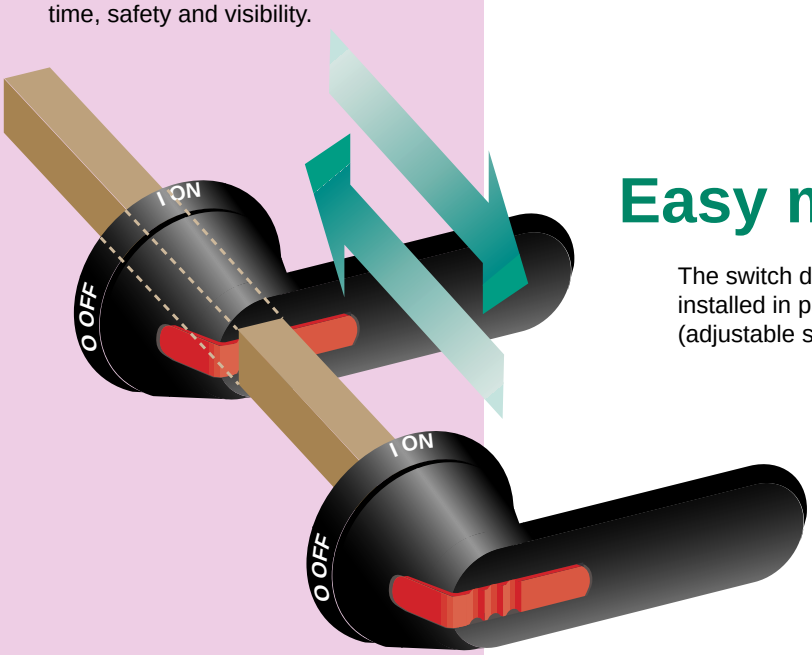
Easy mounting

The uniform auxiliary contacts with snap-on mounting for the whole series decrease the storing and installation costs, which in turn decreases the costs of a mounted disconnector. The maximum amount of auxiliary contacts of a series is from 4 to 18 pieces depending on the type of disconnector. The base mounting shall be done by screws or by DIN-rail fixing.

Mounting on the door shall be done either by screws or by snap-on mounting in order to save installation time.

Neither switch disconnectors or switch fuses need additional space for spark extinguishing. For this reason the switches offer the user more in the areas of connecting space, saving in time, safety and visibility.

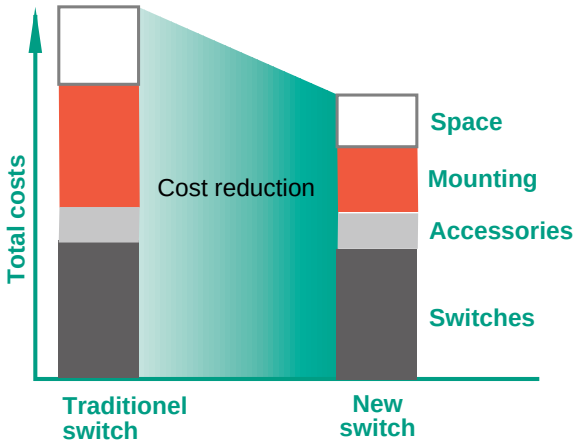




Easy mounting

The switch disconnectors can be easily installed in panels of different depths. (adjustable shaft of telescopic type)

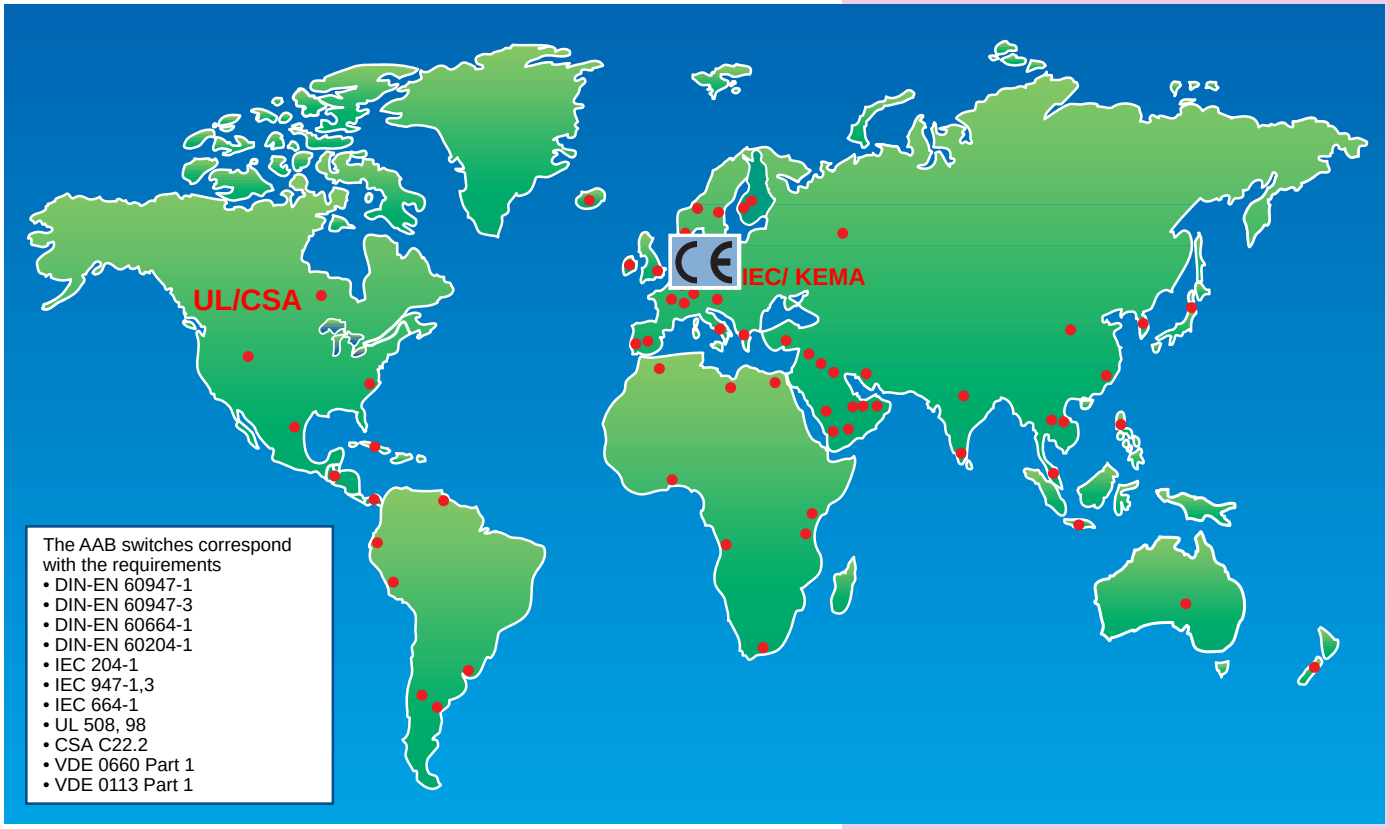
Lower mounting costs



International switches of ABB for a world-wide distribution

The international sales network of ABB takes care of our clients everywhere, where new or replacement switches are needed whether the requirements are of a European, international or American standard.

The SwitchLine switch disconnectors and PowerLine switch fuses as well as SafeLine safety switches are international products. Our world-wide logistics and modern EDI-contacts support our efforts to always see the client as the most important factor.



The series of the SwitchLine switch disconnectors fit for every standard distribution and motor control applications giving optimum value for money in every application.

Rated current A	Isolation voltage U_n max V	Base mounting	Door mounting	Sidewall mounting	Enclosed switches
16	690	X	X	X	X
32	690	X	X	X	X
40	690	X	X	X	X
63	690	X	X	X	X
80	690	X	X	X	X
100	690	X	X	X	X
125	690	X	X	X	X
160	690	X	X	X	X
200	1000	X		X	X
250	1000	X		X	X
315	1000	X		X	X
400	1000	X		X	X
630	1000	X		X	X
800	1000	X		X	X
1000	1000	X			
1250	1000	X			
1600	1000	X			
2500	1000	X			
3150	1000	X			

Approvals

- KEMA
- ASTA
- Underwriter Laboratories (UL)
- Canadian Standards Association (CSA)
- DEMKO
- NEMKO
- SEMKO
- Finnish Electrical Inspectorate
- Germanischer Lloyd
- Lloyd's Register of Shipping
- Polish Register of Shipping
- Det Norske Veritas
- Bureau Veritas

Environmentally-friendly new load break switches and packages

Self-divergent plastic parts are used, where it is technically possible. Heavy metals are avoided in the production process. Cadmium is not used as contact material. Packaging is produced using recycled materials.

ABB Oy

P.O.Box 622
FI-65101 Vaasa
Finland
Tel. +358 10 22 4000
Fax +358 10 22 45708