



Switching off instead of blowing Make profits with miniature circuit breakers

Power Distribution System without fuses? Good reasons to switch now

For many years the fuse was the best choice to protect man and machine from overcurrent. However, what moved into the switch cabinets of private households over three decades ago, is now also starting to increasingly establish itself – in a more developed form - in industry, business and transport: The miniature circuit breaker

Miniature Circuit Breaker

The miniature circuit breaker (MCB) has been in existence since the 1920s. It is characterised mainly by the feature that it can be switched on again after it has tripped, by simply switching a lever by hand without using any tools.

Furthermore it offers consistent selectivity and tripping characteristics over the whole operating period and therefore constant reliability.



ABB High performance miniature circuit breaker S800

After tripping it can be switched on again with constantly outstanding selectivity and back-up characteristics.

Office complexes, airports, solar parks, high speed trains: there's a good reason why this well thought through and robust solution for the protection of power lines is used increasingly where maximum safety and the highest availability is of paramount importance.

Fuses

The „classic“ amongst current overload protection devices. A fuse offers high levels of switching capacity and good current limiting.

Apart from having good selectivity features when new, they are markedly cheap when initially used to provide fuse links. Add to this the fuse's most significant characteristic: once it has tripped it must be completely exchanged for a new one.





Economy under Full-Load: Industry counts on maximum efficiency. Fast re-connection of miniature circuit breakers is worth actual money.

A miniature circuit breaker can be tested reliably.

It is the nature of the thing: when a fuse is produced only random tests can be carried out and tripping efficiency checked. A function test is impossible, as this would destroy the fuse.

In practice, we can rely only on a spot test when checking the fuse for statistical protection.

However, those who want to check the quality of a overcurrent protective device not only by means of optical inspection, simple continuity tests or shaking, rely correctly on miniature circuit breakers:

These are always tested pole to pole in the factory and are calibrated. The function of an ABB High performance MCB S800 can be checked at any time via the test button, even when built in. This offers maximum safety. In-deed, at any time.

A click for more clarity

Safety for man and machine



Safe when travelling: Coming to a standstill should be the exception in transport. The immediate resetting of the miniature circuit breaker ensures short delays in train times.

Guaranteeing excellent operator safety

Most accidents involving electricity do not have a technical cause! Aluminium foil wrapped around burnt-out fuses, a finger in the fuse socket, the pulling of fuses by force without safety equipment, a discharging metal wrist watch or the common mentality „let’s just leave it“ – all contribute to the findings of the Institute for the Investigation of Electrical Accidents in the Trade Associations Energy, Textiles, Electrics and Media Products, that around 85% of all reported accidents involving electricity even happen to qualified electrical personnel.

Therefore, electrical accidents happen especially often in low-voltage distribution. It is not surprising that arc accidents are named as the third significant cause for electrical accidents considering the recently popular use of fuses in photovoltaic installations. In particular, the high levels of DC current in photovoltaic installations can create dangerous arcs when fuses are inexpertly changed without first operating the disconnecter.

And this happens despite the fact that miniature circuit breakers for the safety of wiring for photovoltaic installations have been available for several years, which can remove this safety risk with a click once and for all. Another benefit of the miniature circuit breaker: It eliminates the risk that a fuse with the wrong current rating is installed – which is quite possible in the fuse sockets of generator junction boxes.

It is a fact that safety guidelines are not always observed when fuses are changed and that safety equipment is often avoided. Furthermore, the everyday practical exchange of fuses always carries a risk – which simply just does not exist when you comfortably switch the toggle of a miniature circuit breaker to remedy a fault.



Disconnecter properties combined with safety

A burnt-out fuse cannot disconnect. A disconnecter must be fitted in front when it is not already integrated into the fuse socket. This takes up more space on the DIN-rail than a miniature circuit breaker with disconnection features – an appliance that can do both: protecting and disconnecting.

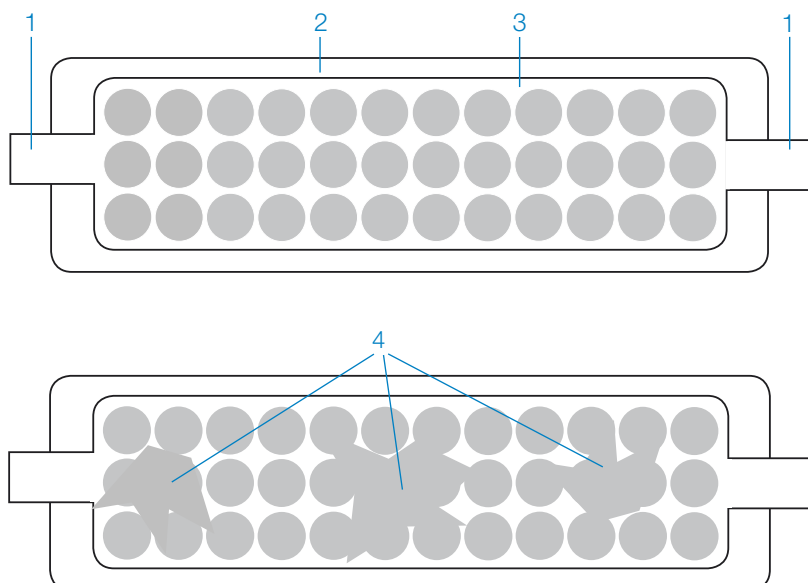
Fuses change their properties

This is often neglected with fuses: they are subject to an aging process. Levels of efficiency with regards to selectivity or Back-Up can only be determined at one point and always only refer to a new fuse – as power surges during its lifetime can change the fuse's ability to react.

A fuse is unreliable, as the fusing process determines the operating time of disconnection. It has been reported that even sudden changes in temperature without overload or short circuit can cause the fuse to blow.

Miniature circuit breaker: Constant efficiency over its lifetime

A miniature circuit breaker guarantees years of consistent efficiency. Each pole is secured individually; in case of faults it switches all poles off and all trigger features remain reliable throughout. Over its entire lifetime.



Elements

- 1 Connection
- 2 Sand filled insulation casing
- 3 Fuse Conductor
- 4 Damage to Fuse Conductor

Efficient and ecologically safe Investment with sustainability factor

Environment friendliness meets cost efficiency

Burnt-out fuses must be disposed of. A triggered miniature circuit breaker can be switched on again, comfortably and safely, when it has tripped - even by remote control, which is invaluable especially for solar power stations and wind farms.

Another plus for the environment is that circuit breaker components can be easily recycled, and that the miniature circuit breaker saves space.

Faster operating, avoiding stoppages and long journeys

A burnt-out fuse must be replaced. You are forced to store an appropriate replacement. If you are lucky you can purchase it, if you are unlucky it is not easily available in the country where the unit is being operated and therefore causes unacceptable delays.

Furthermore, appropriate safety equipment must be available during the exchange which, above all, has to be available. This causes further hold ups in production in these cases.

It is often difficult to ascertain that a fuse has burnt-out. And a burnt-out fuse generally has no remote control tripping signal. This, however, can be easily realised when you use a miniature circuit breaker by installing an auxiliary or signal contact; its switch position is always clear.

Modern miniature circuit breakers such as the High Performance MCB S800 have a 'TRIP' position. Resetting the miniature circuit breaker is also possible by hand without any tools. Modern equipment series also offer remote control units.



High technology to secure new energies: Miniature circuit breakers offer the option of a 'tripped' signal and remote resetting. Priceless value added to wind farms or solar power stations.

Low maintenance costs determine the favourable start-up price

This is a statement often made by electrical planners:

“Installations without fuses are a problem of investment. If the customer does not especially demand a miniature circuit breaker, my competitor will always be cheaper. Everyone wants safety, but does not want to pay more for it.“

The often low initial cost of fuses may make this statement sound correct, at first. However, often neither the cost of the fuse box nor the continuous on-costs during the lifetime of the equipment – the so-called Total Cost of Ownership (TCO) – are considered.



This does not just mean the costs for a certain amount of spare fuses, transport or personal safety equipment. The highest cost difference between miniature circuit breakers and fuses is the much lower downtime of the electrical appliances connected to the circuit. (see table)

Profits lost add up to gigantic sums for companies, especially for commercial and industrial low voltage circuit users. The Internet offers Online-Calculators to work out profits lost due to downtime.

Non-available mobile telephone stations cause losses of profit of over 600 EUR per minute, a stock exchange system that does not function deficits the accounts by more than 120'000 EUR per minute.

Costs, which in the first place don't even occur when a MCB has tripped and its investment cost soon balance out. Circuit protection management with miniature circuit breakers ensures that even in times of low charge returns in a photovoltaic installation the greater cost compared to fuses can be written off within the first hour of the first fault.

Calculate the cost advantages of miniature circuit breakers compared to fuses

	 Miniature Circuit Breaker	 Fuse
Purchase cost of appliance		
Purchase cost of socket		
Appropriate safety equipment		
Additional circuit breakers		
Spare fuses		
Disposal costs during lifetime		
Costs of extended downtime		
Disposal costs at end of lifetime		

Be sure to make a good decision

Good reasons for a miniature circuit breaker



Win-Win-Win-Situation with miniature circuit breakers

The operator of an installation

The operator increases his profits, due to minimised downtimes and a safe installation, with low recurring costs. This allows him to achieve competitive advantages and he can apply his resources to investments, which add value.

The planner or designer of an installation

The planner or designer of an installation advises and consults with good arguments for the miniature circuit breaker – and makes an impact as a partner when recommending miniature circuit breakers. He secures further competitive advantages and follow-up commissions from satisfied customers.

Furthermore, daily work is simplified in as much that the size of the safety switch always remains the same independent of power supply and voltage.

Trade

The uniform, compact size simplifies storage and decreases the otherwise necessary product range. The higher initial costs of the miniature circuit breaker also guarantee turnover. And this, when you consider that the same time is spent as in selling fuses.

And it has clicked

Turn the switch and make a profit

24 strong arguments for the miniature Circuit Breaker

Reliable	Tested and calibrated, pole to pole in the factory. Not just random checks.	Universally safe	Each pole is individually secured
Always testable	Tripping mechanism can be tested at any time	Thorough	Complete shutdown of all poles in case of a fault
Durable	No aging process in the tripping mechanism	Simple to extend	Easily replaced accessories
Ready	Reduced downtime for connected electrical consumers	No disconnecter	No additional costs for an additional disconnecter
Cheap/Efficient	Costs are written off within the first hour of the first fault	Innovative	Simple, remote control tripping signal
Permanently precise	Durable selectivity – not just when new	Comfort Options	Resetting from remote
Universal	Circuit protection and disconnecter properties in one unit	Simply resetting	Spares do not have to be stored
Space Saving	Compact design to save space	Simple operation	No protective equipment is needed
Transparent Costs	No hidden costs for resetting, spares, disposal, transport and personal safety equipment and above all, downtime.	Solid	No bursting
Uncomplicated	You do not have to make a replacement	Clear Indication	Always clear switch indication: ON, OFF, TRIP
No tools	Quick resetting without tools	Simply planned	One size for all currents and voltages
		Environmentally friendly	No waste after tripping and highly recyclable when disposing
		High Quality	ABB as inventor of the miniature circuit breaker represents quality and practicality without compromise

Fast switching

Reasons for circuit protection

Why Circuit Protection?

Circuits are resistors for electric currents. When current flows, losses are incurred. This applies to the following work

$$W = U \cdot I \cdot t$$

The substitution of U by $I \cdot R$, according to Ohm's Law, shows that heat-up occurs by squaring of power

$$W = R \cdot I^2 \cdot t$$

This heat-up does not just affect the conductor itself but also its insulation, which can deteriorate under thermal impact and can cause a fire in the worst of scenarios.

Thermal impact on the conductor must be considered when it is installed and secured to ensure the planned lifetime of an installation.

Apart from choosing appropriate insulating material, junctions and layout when installing an application, an over-current protection device plays a significant part in securing against overheating.

Over-current protection devices ensure the efficiency of appliances over their planned lifetime by switching off quickly, preventing damaging the appliance and providing the highest possible reliability of installations. The miniature circuit breaker achieves this outstandingly.



Safety and efficiency – all the way

ABB High Performance MCBs



ABB High Performance MCB S800S

- Short-circuit control up to 50kA
- Range of rated current: 6–125 A



ABB High Performance MCB S800N

- Safe control of short-circuits up to 36 kA



ABB High Performance MCB S800C

- The attractive solution for application to 25 kA



ABB High Performance MCB S800B

- The cost effective alternative for short-circuits up to 16 kA
- Range of rated current: 32–125 A



ABB High Performance MCB S800U

- Up to 50 kA for the UL-Market
- Approbated according to UL 489



ABB High Performance MCB S800PV

- Outstanding DC-features
- Short circuit protection and disconnecting properties

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