SQUARE BODY FUSES (SQB) CONNECTED IN PARALLEL

Parallel connection of fuse-links is a common practice to obtain protections with higher rated currents in high power equipment.

However, when connecting square body semiconductor fuses (SQB) in parallel, some rules must be observed to avoid a misapplication:

- Fuse-links must be identical.
- If fuse-bases are used, they must be identical as well.
- The connections must be made in such way that they are symmetrical.
- The total current of paralleled fuse-links is slightly less than the numerical sum of the current of the individual fuses.
- The electrical resistance of the fuse-links must be very similar.
- Mechanical considerations.

Identical fuse-links

Fuse-links must be identical, same characteristics (same part number) and shall be from the same batch number.

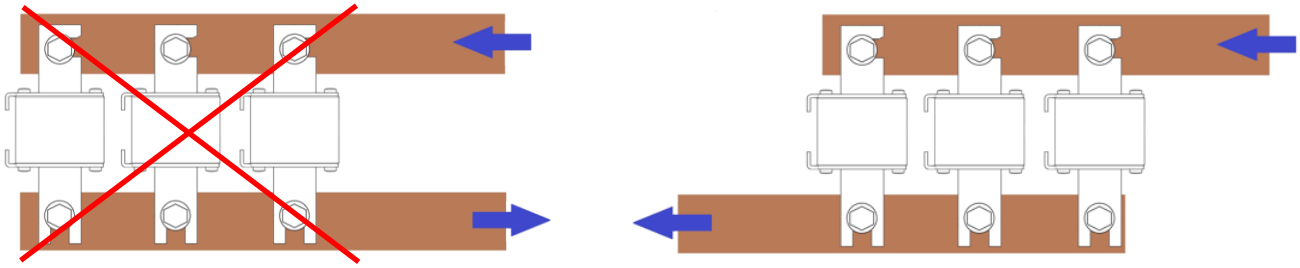
Identical fuse-bases

If any type of base is used, like the fuses, the bases must be identical and preferably from the same manufacturing batch.

Electrical connections

The connections must be made in such a way that the length of the circuit is identical in the different branches of the circuit. This ensures that the electrical resistance is balanced and the current is distributed equally between the different fuses.

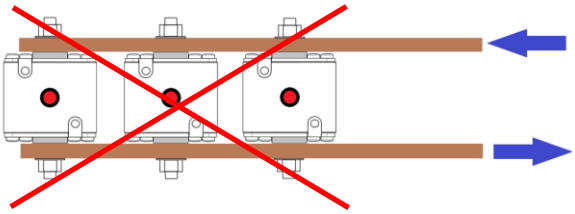
Fuses with bolted blade contact



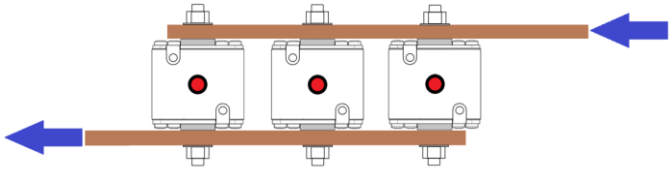
Incorrect connection

Correct connection

Flush end contact fuses



Incorrect connection



Correct connection

Current reduction

Due to the uneven distribution of the current in the fuses, a small reduction coefficient should be applied, which makes the total current of the fuses connected in parallel slightly lower than the sum of the currents of the different fuses.

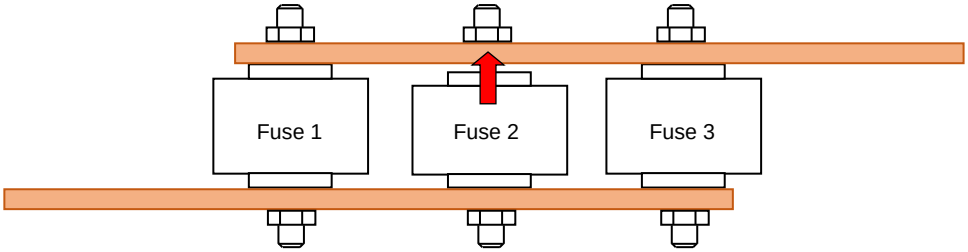
Electrical resistance

To minimize the unequal current distribution between the fuse-links, the electrical resistance values shall be very similar and the difference should be 5% as a maximum.
In the SQB fuse-links, the resistance value is marked on the product label.

Mechanical considerations

An appropriate distance must be maintained between the bodies of fuses to allow heat evacuation.
DF Electric recommend a distance of at least 10 mm.

When 2 or more fuses with flush end contact are connected in parallel, great care must be taken when assembling them. Due to variations in the length of the ceramic body, the length of the fuses may vary slightly. This means that in the event that two rigid busbars are used and one of the fuses is slightly shorter than the others, when tightening the contacts, it is subjected to a tensile stress that can damage it. In addition, problems of poor electrical contact may appear.
To avoid these problems, fuses that have exactly the same length should be chosen, although ideally the connection should be flexible on one side.



MAIN DATA OF FUSES CONNECTED IN PARALLEL

Rated current

Rated current of paralleled fuses will be the rated current of one fuse-link multiplied by the number of fuses and by the derating factor:

Number of fuses	Derating factor
2	0,95
3 - 4	0,90
More than 4	Consult us

Rated voltage

Rated voltage of the paralleled fuses is the same that the rated voltage of fuse-links.

Breaking capacity

Breaking capacity of the paralleled fuses is the same that the rated breaking capacity of fuse-links.

I²t Values

The value of I²t of N fuse-links connected in parallel can be calculated by multiplying the I²t value of a single fuse-link by N².

Peak let-through current

The peak let-through current (cut-off current) of N fuses connected in parallel can be calculated by the formula:

$$Ipk\_total = Ip1 * N^{(2/3)}$$

Where:

Ip1 = Individual fuse peak let-through current obtained from cut-off characteristics in data sheet.
N = number of fuse-links connected in parallel.

Power dissipation

Power dissipation of the paralleled fuses is the sum of the power dissipation of each fuse-link.