

SELECTION GUIDE BACKUP FUSE FOR SPD

How to choose the correct
backup fuse for SPD



FAQ: How to choose the correct backup fuse for SPD

• Why is it required to install a backup fuse?

The need to install a backup fuse upstream of SPD is linked to the end of life of the SPD itself. A SPD composed by varistor elements for phase protection can reach the end of its life in 2 ways: overload or short circuit.

- a.** End of life due to overload: this is the most common case and does not involve any additional risk of short circuit for the system. The SPD at the end of its life behaves as an open circuit.

- b.** End of life due to short circuit: it is a very remote case that occurs in the event of a violent electrodynamic stress inside the device that causes the active wires (phases and neutral) to be constantly in conduction with the earth connection. This causes the prospective short circuit current I_k to be at the point of installation of the SPD.

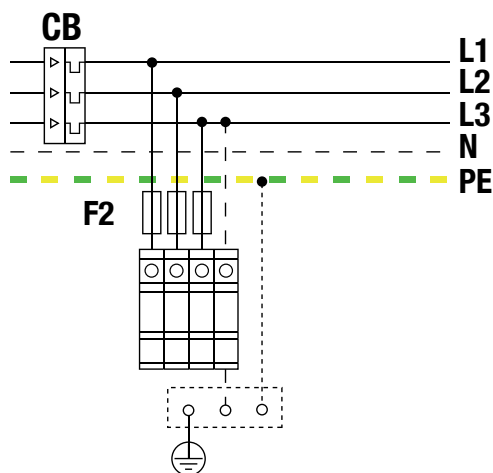
The backup fuse is mandatory to protect the system in the event of the end of life of the SPD due to short circuit.

• Choice of backup fuse

If a backup fuse is required, the choice of fuse depends on:

- Prospective short circuit current I_k
 - Type and size of line protection used in the system.
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a. Line protected by circuit breaker

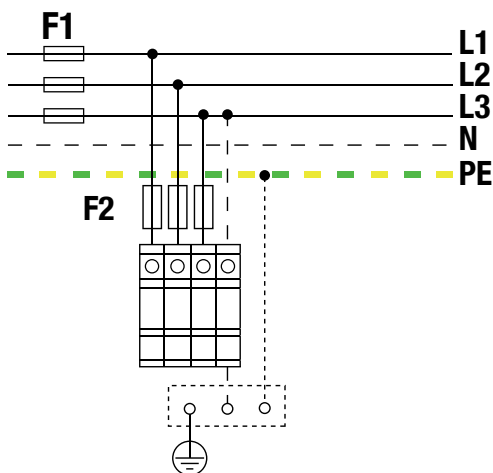


CB=Circuit breaker

F2=Backup fuse

| SPD | Series | Type 1 (Iimp=25kA) | | Type 1 (Iimp=12,5kA) | | | Type 2 (In=20kA) | Type 2 (In=5kA) | | | |
|----------|--------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|----------------------------------|---|----------------------------------|---|
| | | SA1B | | SA0B | | SA0 | SG2 | SG2C | | | |
| | Ik | Ik<=50kA | 50kA<Ik<=100kA | Ik<=50kA | 50kA<Ik<=100kA | Ik<=25kA | Ik<=100kA | Ik<=6kA | | | |
| In CB | <=32A | Backup fuse not needed | | Backup fuse not needed | | Backup fuse not needed | Backup fuse not needed | Backup fuse not needed | | | |
| | 32A<In<=63A | | | | | 125A gG with derating, Iimp=10kA 250A gG without derating | | 125A gG with derating, Iimp=10kA | 125A gG with derating, Iimp=10kA 160A gG without derating | 125A gG with derating, Iimp=10kA | 125A gG with derating, Iimp=10kA 160A gG without derating |
| | 63A<In<=125A | | | | | 125A gG with derating, Iimp=10kA | 125A gG with derating, Iimp=10kA | 125A gG with derating, Iimp=10kA | 125A gG with derating, Iimp=10kA | 125A gG without derating | 125A gG without derating |
| | >125A | 125A gG with derating, Iimp=10kA 250A gG without derating | 125A gG with derating, Iimp=10kA | 125A gG with derating, Iimp=10kA 160A gG without derating | 125A gG with derating, Iimp=10kA | 125A gG with derating, Iimp=10kA 160A gG without derating | 125A gG without derating | 125A gG without derating | | | |
| | N.a. | 125A gG with derating, Iimp=10kA 250A gG without derating | 125A gG with derating, Iimp=10kA | 125A gG with derating, Iimp=10kA 160A gG without derating | 125A gG with derating, Iimp=10kA | 125A gG with derating, Iimp=10kA 160A gG without derating | 125A gG without derating | 125A gG without derating | | | |

b. Line protected by fuse



F1=Line fuse

F2=Backup fuse

| SPD | Series | Type 1 (Iimp=25kA) | | Type 1 (Iimp=12,5kA) | | | Type 2 (In=20kA) | Type 2 (In=5kA) | | | |
|----------|---------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|----------------------------------|---|----------------------------------|---|
| | | SA1B | | SA0B | | SA0 | SG2 | SG2C | | | |
| | Ik | Ik<=50kA | 50kA<Ik<=100kA | Ik<=50kA | 50kA<Ik<=100kA | Ik<=25kA | Ik<=100kA | Ik<=6kA | | | |
| In F1 | <=63A | Backup fuse not needed | | Backup fuse not needed | | Backup fuse not needed | Backup fuse not needed | Backup fuse not needed | | | |
| | 63A<In<=100A | | | | | 125A gG with derating, Iimp=10kA 250A gG without derating | | 125A gG with derating, Iimp=10kA | 125A gG with derating, Iimp=10kA 160A gG without derating | 125A gG with derating, Iimp=10kA | 125A gG with derating, Iimp=10kA 160A gG without derating |
| | 100A<In<=125A | | | | | 125A gG with derating, Iimp=10kA | 125A gG with derating, Iimp=10kA | 125A gG with derating, Iimp=10kA | 125A gG with derating, Iimp=10kA | 125A gG without derating | 125A gG without derating |
| | 125A<In<=250A | 125A gG with derating, Iimp=10kA | 125A gG with derating, Iimp=10kA | 125A gG with derating, Iimp=10kA 160A gG without derating | 125A gG with derating, Iimp=10kA | 125A gG with derating, Iimp=10kA 160A gG without derating | 125A gG without derating | 125A gG without derating | | | |
| | >250A | 125A gG with derating, Iimp=10kA 250A gG without derating | 125A gG with derating, Iimp=10kA | 125A gG with derating, Iimp=10kA 160A gG without derating | 125A gG with derating, Iimp=10kA | 125A gG with derating, Iimp=10kA 160A gG without derating | 125A gG without derating | 125A gG without derating | | | |
| | N.a. | 125A gG with derating, Iimp=10kA 250A gG without derating | 125A gG with derating, Iimp=10kA | 125A gG with derating, Iimp=10kA 160A gG without derating | 125A gG with derating, Iimp=10kA | 125A gG with derating, Iimp=10kA 160A gG without derating | 125A gG without derating | 125A gG without derating | | | |

• **Examples**

a. Line protected by circuit breaker

SG23NA300R installed in a system with a prospective short circuit current $I_k=50\text{kA}$ and protected upstream by a 160A circuit breaker.

| Series | | Type 2 (Iimp=20kA) |
|--------|------------------------------------|--------------------------|
| | | SG2 |
| Ik | | $I_k \leq 100\text{kA}$ |
| In CB | $\leq 32\text{A}$ | Backup fuse not needed |
| | $32\text{A} < I_n \leq 63\text{A}$ | |
| | $63\text{A} < I_n < 125\text{A}$ | |
| | $> 125\text{A}$ | 125A gG without derating |

Backup fuse needed: **125A class gG**.

SA1B3NA320R installed in a system with prospective short circuit current $I_k=60\text{kA}$ and protected upstream by a 100A circuit breaker.

| Series | | Type 1 (Iimp=25kA) | |
|--------|-------------------------------------|---|---------------------------------------|
| | | SA1B (Isc cr=50kA) | |
| Ik | | $I_k \leq 50\text{kA}$ | $50\text{kA} < I_k \leq 100\text{kA}$ |
| In CB | $\leq 32\text{A}$ | Backup fuse not needed | |
| | $32\text{A} < I_n \leq 63\text{A}$ | | |
| | $63\text{A} < I_n \leq 125\text{A}$ | | |
| | $> 125\text{A}$ | 125A gG with derating, Iimp=10kA 250A gG without derating | 125A gG with derating, Iimp=10kA |

Backup fuse **NOT** needed.

b. Line protected by fuses

SG23NA300R installed in a system with a prospective short circuit current $I_k=50kA$ and protected upstream by a 160A fuse.

| Series | | Type 2 ($I_n=20kA$) | |
|--------|------------------------|--------------------------|--|
| | | SG2 ($I_{sc}cr=50kA$) | |
| I_k | | $I_k \leq 100kA$ | |
| In F1 | $\leq 63A$ | Backup fuse not needed | |
| | $63A < I_n \leq 100A$ | | |
| | $100A < I_n \leq 125A$ | | |
| | $125A < I_n \leq 250A$ | | |
| | $> 250A$ | 125A gG without derating | |

Backup fuse **NOT** needed.

SA1B3NA320R installed in a system with a prospective short circuit current $I_k=25kA$ and protected upstream by a 315A fuse.

| Series | | Type 1 ($I_{imp}=25kA$) | |
|--------|------------------------|---|-------------------------------------|
| | | SA1B ($I_{sc}cr=50kA$) | |
| I_k | | $I_k \leq 50kA$ | $50kA < I_k \leq 100kA$ |
| In F1 | $\leq 63A$ | Backup fuse not needed | |
| | $63A < I_n \leq 100A$ | | |
| | $100A < I_n \leq 125A$ | | |
| | $125A < I_n \leq 250A$ | | |
| | $> 250A$ | 125A gG with derating, limp=10kA 250A gG without derating | 125A gG with derating, limp=10kA |

Backup fuse needed:

- **125A class gG with derating limp=10kA**
- **250A class gG without derating**



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