

Surge Protection made as simple as a Circuit Breaker

Surge protection essentials for Electrician

What's in here for Electrician

Time is of importance.

Through these few pages, we want to share the essentials you need to know about surge protection for applications in residential and small businesses.

For a long time you may have considered surge as a complex topic: we wish to make it simple for you to help save you time.

Electrical installation standards more and more require us to protect installations against surges and we built this document for you to simplify your experience with surge protection device (SPD).

Note: this document is a synthesis of knowledge about surge protection to be installed inside panel board for residential and small businesses (home, restaurant, grocery store...) following applicable international standards. This does not replace local applicable installation standards.

se.com

Benefits

For you as an electrician

- Makes it easy to select the right SPD for residential & small businesses applications
- Helps in being compliant with applicable international installation standards
- Helps you in delighting your customer by delivering surge resistant solutions
- Helps you in differentiate yourself from other electricians being savvy about surge protection

For your customers

- Improve fire prevention because of surge
- Increase life time of their sensitive electronic devices by protecting them from surges
- Limit downtime for small businesses (equipment damage, loss of data ...)



SPD selection recommendation

Surges of atmospheric origin

For building with commercial activity, installation standard IEC 60364-4-44 requires a protection against transient overvoltage.

For cases such as residential, it requires a risk assessment to be performed.

The target is to determine if protection against transient overvoltage of atmospheric origin is required.

If the risk assessment is not performed, the electrical installation shall be provided with protection against transient overvoltage.

Switching surges

According to installation standard, IEC 60364, the requirements regarding protection against transient overvoltages of atmospheric origin normally cover protection against switching overvoltages.

If no protection against disturbances of atmospheric origin is installed, protection against switching overvoltages may be needed.

If your environment is close to industrial zones, or if network utilities is source of transient overvoltages, we recommend to install a surge protection device.

Risk

Assessment - IEC 60364

Here are criteria considered for such risk assessment:

- Building typology and its sensitive equipment
- Lightning ground flash density
- Electric line typology of the 1st km from the building
- Type of area: Rural, urban or suburban

We recommend this assessment to be done by a professional (e.g. design office)

Schneider Electric makes your SPD selection easy!

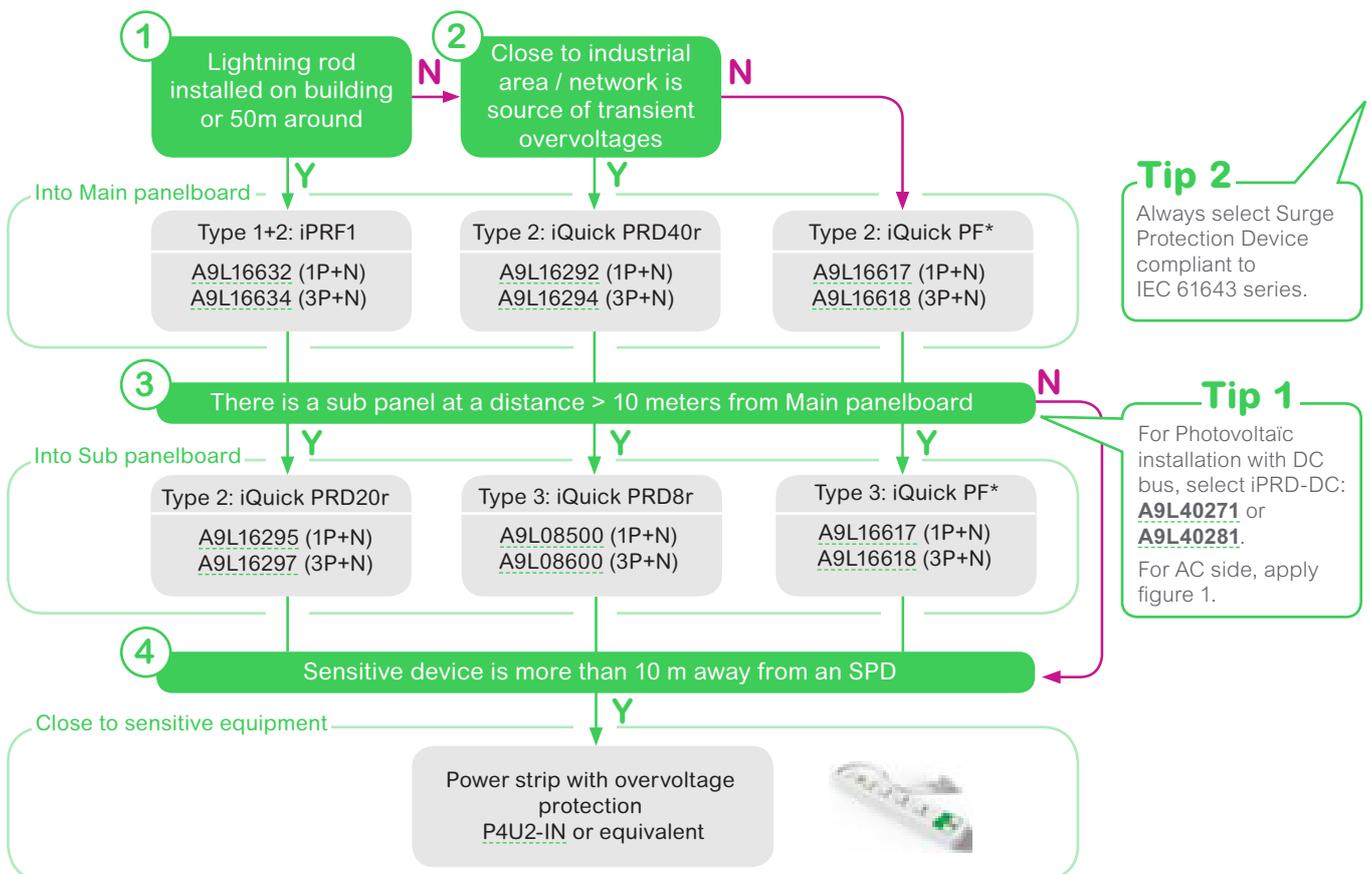


Figure 1: Selection table of appropriate Surge Protection Device

Above table apply for TN-S and TT method of earthing 230V/400V. For other method of earthing, solution is available in Schneider Electric catalogue.

* For residential application, use the Resi9 references: [R9L16610](#) (1P+N) & [R9L16710](#) (3P+N)

Installation recommendations

Surge protection is achieved by cascading devices

Several protection levels of SPD allows the energy to be distributed among several SPDs, as shown in Figure 2 in which the three types of SPD are provided:

- Type 1: protects from very brief and potentially destructive increases in voltage caused by direct lightning strike on the building
- Type 2: limits overvoltages caused by secondary effects of lightning strikes and switching surges
- Type 3: it can be necessary to protect the most sensitive equipment.

Type 1+2 SPD combines the functions of Type 1 and Type 2.

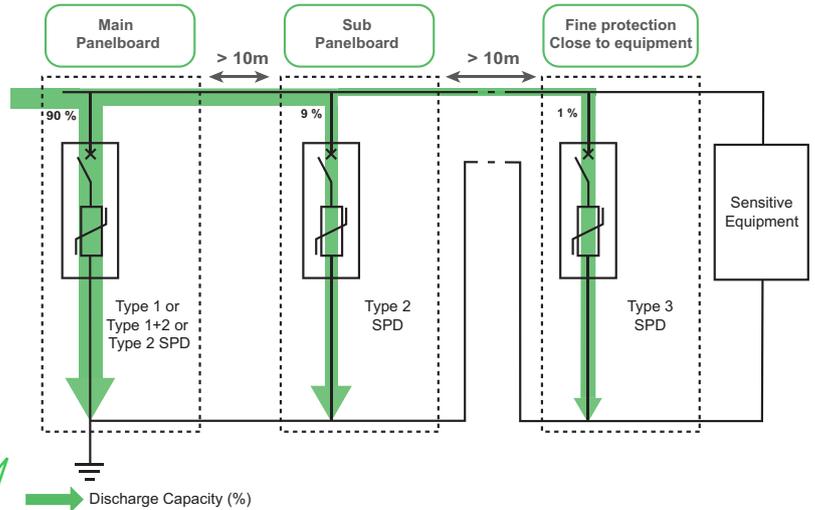


Figure 2: Surge discharge percentage per SPD

Tip
SPD Type 3 is not self sufficient. It's a complement to Type 2.

Dedicated short circuit protection for SPD is recommended

To improve continuity of service, a dedicated short circuit protection device (MCB) should be installed upstream of the SPD to avoid tripping of the main incomer at the end of life of the SPD.

There are two solutions: this short circuit protection can be integrated with the SPD or it can be external.

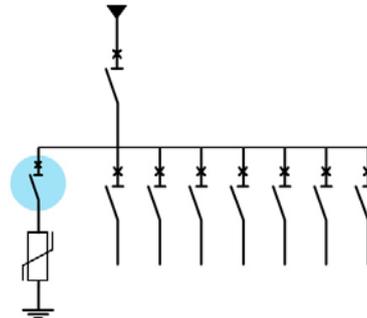


Figure 3: dedicated short circuit protection

Integrated short circuit protection



- It helps in proper coordination with SPD, as the MCB is built-in.
- Easy to install thanks to reduced wiring.

External short circuit protection



Following parameters need to be considered while selecting the external short-circuit protection (MCB):

- Breaking capacity
- Lightning current withstand
- Coordination with upstream protection

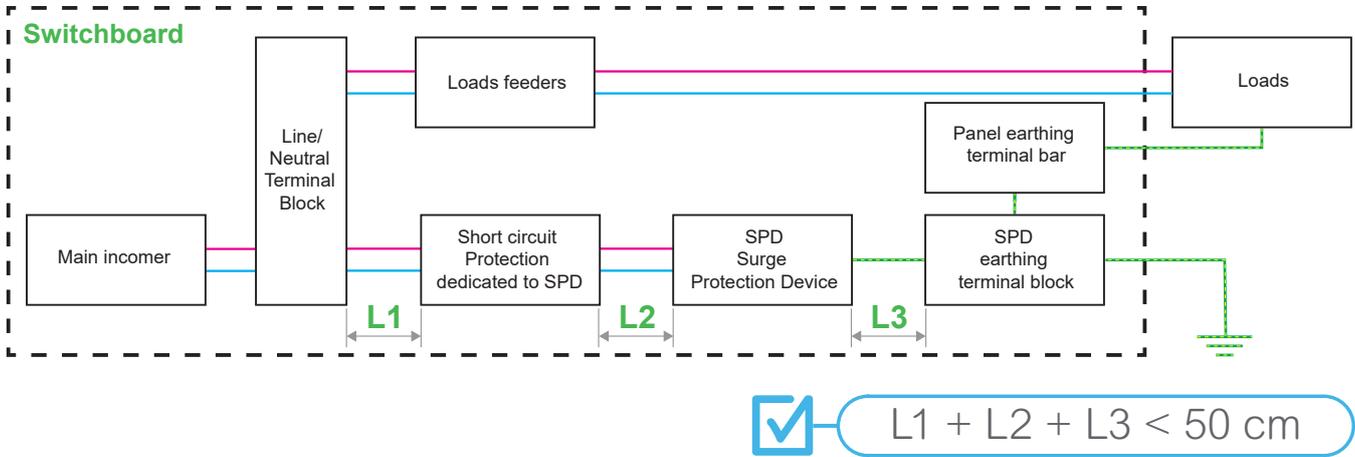
You can easily select the disconnection circuit breaker thanks to this [Design guide](#).



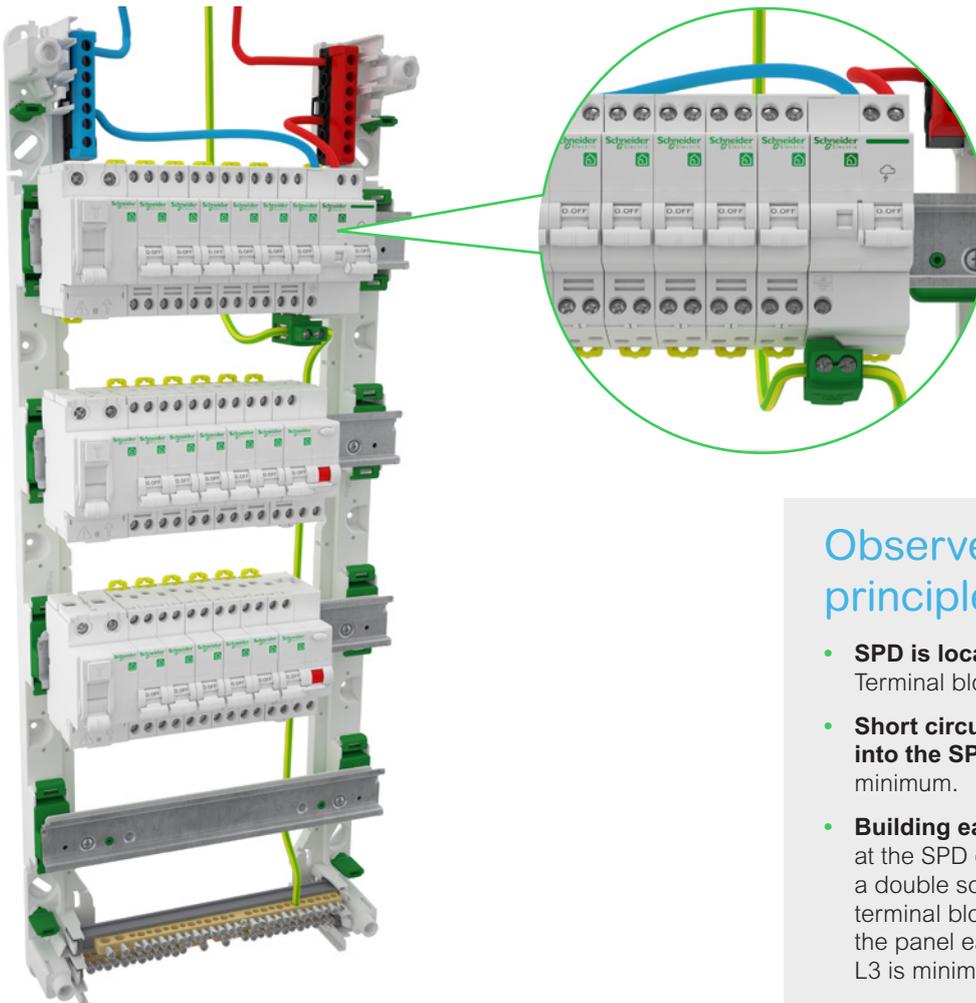
Installation recommendations

Comply with the cable length rule

To optimize the protection of the loads, the SPD must be installed following electrical installation rules in IEC 60354-5-53:



Installation example: Resi9 enclosure



Observe installation principles

- **SPD is located** close to the line/neutral Terminal block in order to minimize L1.
- **Short circuit protection is integrated into the SPD.** L2 is reduced to the minimum.
- **Building earthing connection** is done at the SPD earthing terminal block using a double screw connector. From this terminal block, the earth is distributed to the panel earthing terminal bar. L3 is minimized.

Installation recommendations

Installation example: Pragma enclosure with Linergy terminal block



Observe installation principles

- **SPD is located** close to the line/neutral Terminal block Linergy in order to minimize L1.
- **Short circuit protection is integrated into the SPD.** L2 is reduced to the minimum.
- **Building earthing connection** is done at the SPD earthing terminal block using a double screw connector. From this terminal block, the earth is distributed to the panel earthing terminal bar. L3 is minimized.

Installation example: Pragma enclosure with vertical distribution VDIS

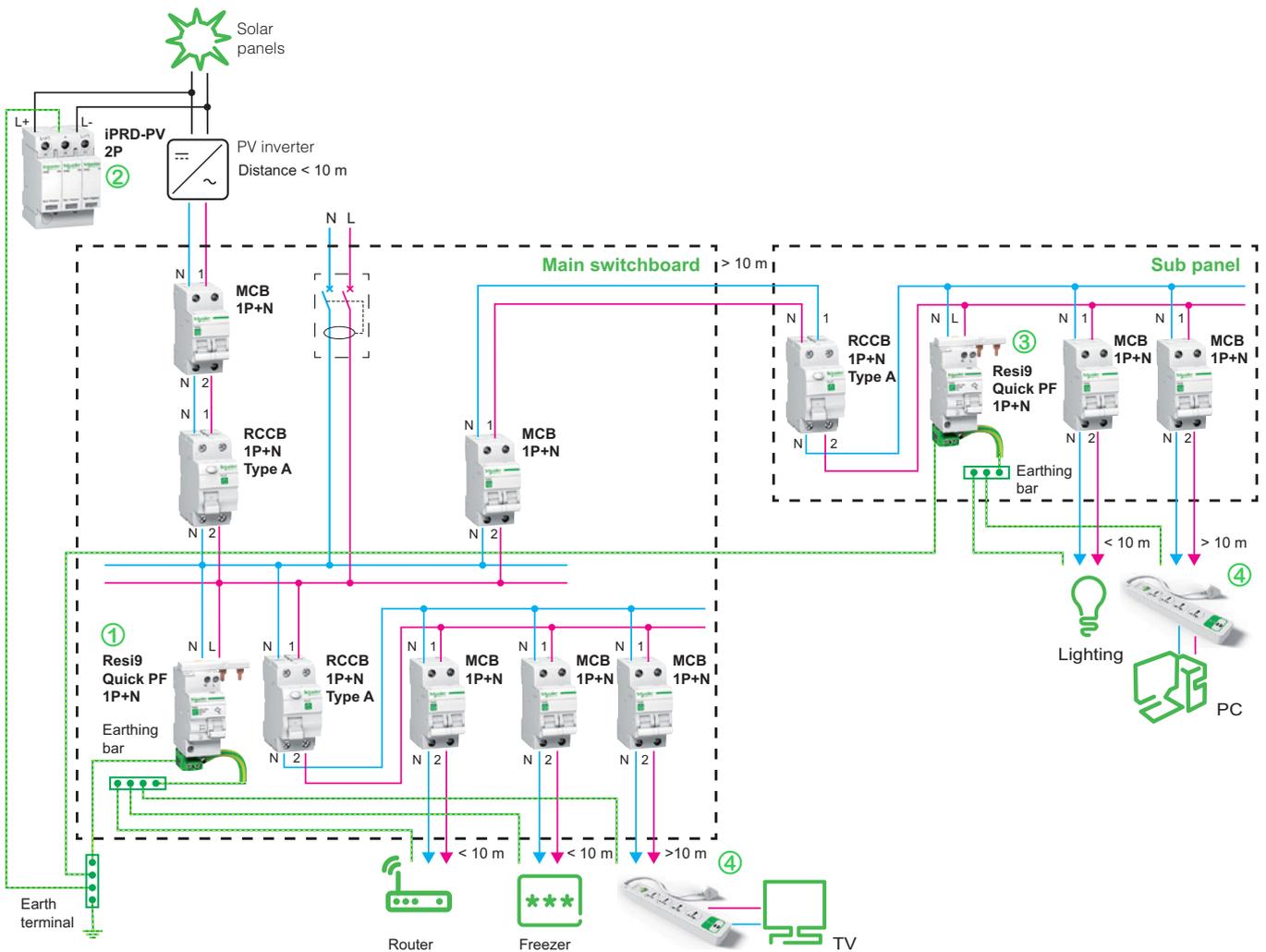


Observe installation principles

- **SPD is located** close to the line/neutral vertical distribution block (VDIS), in order to minimize L1.
- **Short circuit protection is integrated into the SPD.** L2 is reduced to the minimum.
- **Building earthing connection** is done at the SPD earthing terminal block using a double screw connector. From this terminal block, the earth is distributed to the panel earthing terminal bar. L3 is minimized.

Residential Application

Diagram



SPD Details

- ① SPD Type 2 (Resi9 iQuick PF) with integrated short circuit protection.
If a lightning rod is in the neighborhood, install a SPD Type 1+2 (Acti9 iPRF1).
- ② SPD Type 2 (Acti9 iPRD-PV-DC) to protect DC bus of photovoltaic installation.
Short circuit protection for SPD DC is not needed.
In this case there is no need of SPD on AC side because the PV inverter is at a distance below 10 meters from the main switchboard.
- ③ As the sub panel is at a distance above 10 meters from the main switchboard, another SPD Type 2 is recommended (coordinated with the upstream Resi9 iQuick PF in the main switchboard).
- ④ Power strip with overvoltage protection are installed if sensitive load is at a distance above 10 meters from the closest SPD Type 2.

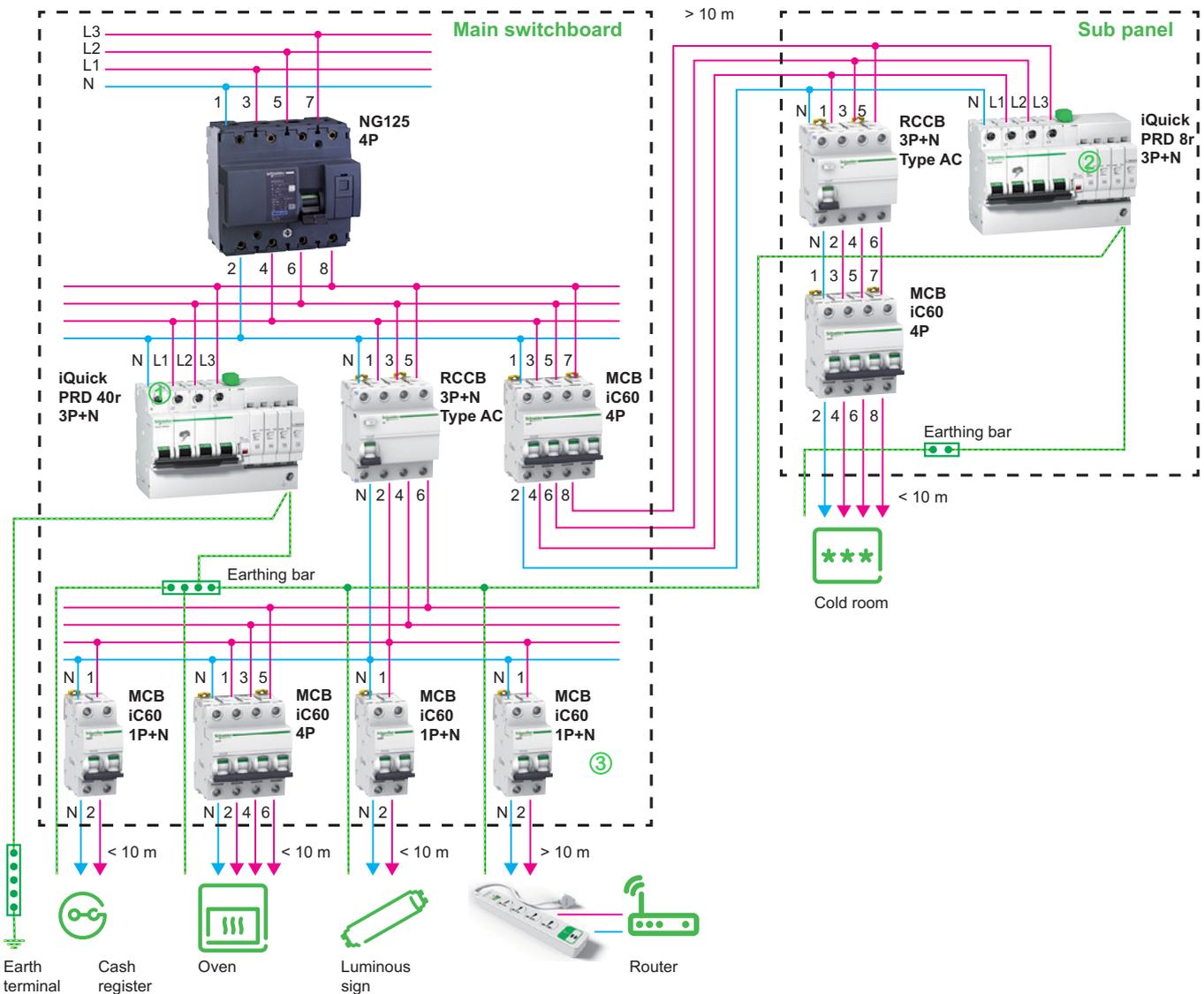
More about SPD



Scan or click on QR code

Small Business Application - Restaurant

Diagram



SPD Details

- ① SPD Type 2 (iQuick PRD 40r) is installed (I_{sc} is between 6kA and 25kA).
If a lightning rod is in the neighborhood, install a SPD Type 1+2 (Acti9 iPRF1).
- ② In sub panel at a distance above 10 meters from main switchboard, SPD Type 3 (iQuick PRD8r) is recommended (coordinated with the SPD in the main switchboard).
- ③ Power strip with overvoltage protection are installed if sensitive load is at a distance above 10 meters from the closest SPD Type 2.

More about SPD



Scan or click
on QR code

Maintenance

There's usually some sort of visual indication on the SPD showing that the device is operational. This is shown by a green or white visual indication window.

Schneider Electric recommends to visit and check status of SPD regularly (once a year).

A red visual indication on the devices informs the user that the SPD is not protecting the electrical installation anymore. It means that the device has reached its "end of life" and needs to be replaced:

- For some products, this will mean replacing the whole unit.
- On other products this can be done simply by replacing the removable cartridge (see pictures).

Refer to instruction sheet of the SPD before any maintenance.



"This document has no contractual value and Schneider Electric cannot be held liable for its content".

se.com

Life Is On

Schneider
Electric

Schneider Electric Industries SAS
35, rue Joseph Monier - CS 30323
F92506 Rueil-Malmaison Cedex

Document Number CA909009E ©2020 Schneider Electric. All Rights Reserved.
Life Is On Schneider Electric is a trademark and the property of Schneider Electric SE, its subsidiaries and affiliated companies