

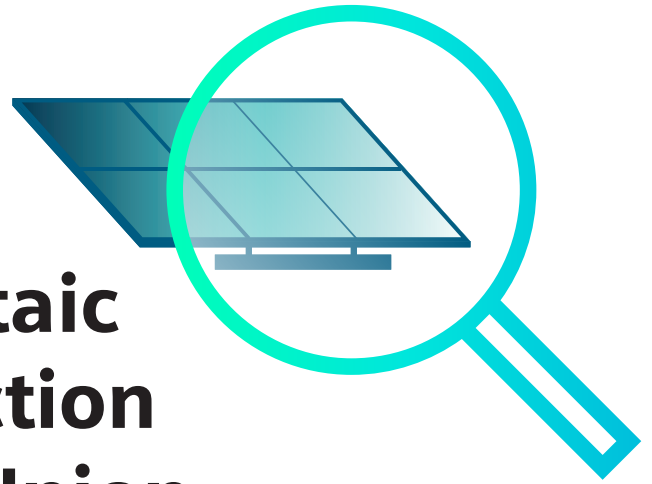


SENTRON protection devices for energy transition in buildings and infrastructure

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Continuously growing **photovoltaic electricity production** in the **European Union**



The European Commission has proposed a solar rooftop mandate for all commercial and public buildings by 2027, and for new residential buildings from 2029, as part of its Rooftop Solar Initiative. Recently, the German state of Baden-Wurttemberg implemented the first rooftop solar mandate in 2022. Making solar mandates a standard for new buildings, should support the deployment of building-integrated photovoltaic (BIPV) in Europe.

Heat pumps are trending

Regardless of whether it is a new building or a modernization: more and more people are relying on renewable energies. A combination of a PV system, energy storage and heat pump is the efficient solution for a sustainable and cost-effective energy supply.

Photovoltaic systems convert solar energy into electricity. In these systems, an inverter converts the direct current generated into standard alternating current, which can be used to operate a heat pump.

The inverter technology installed in most heat pumps can generate residual currents from mixed frequencies in the event of a defect.

Therefore, type A residual current protective devices are not sufficient here!



IEC 60364-7-712 is a specific part of the **IEC 60364** series that covers electrical installations in buildings with PV power supply systems. It provides guidance on the design, installation, and maintenance of PV power supply systems in buildings, including both grid-connected and off-grid systems. It covers all aspects of the PV system, including the PV modules, inverters, batteries, and associated electrical components.

Key requirements on protective devices for the **electrical installation**

Protection on the DC side

“Overcurrent and short-circuit protection

The overcurrent protective devices of the DC side shall be either gPV fuses in accordance with IEC 60269-6 or another device in accordance with IEC 60947 (all parts) or IEC 60898 (all parts).

Where circuit-breakers are used as devices for overload protection, IEC 60364 (all parts) also permits these to fulfil the role of a disconnecting means as required by 712.536.2.101 to 712.536.2.103.”

“Disconnection

Disconnecting means with isolation function shall be provided for the inverter, on both the DC side and the AC side. Disconnecting means with isolation function shall be provided in PV array to isolate circuits and equipment.”

“Protection against transient overvoltage

Where protection against transient overvoltage is required by IEC 60364-4-44:2007, Clause 443, such protection shall also be applied to the DC side of the PV installation. Depending on the distance between the PCE and the origin of the installation, further protection against transient overvoltage may be required on the AC side.”

“Due to the very specific electrical setup of PV installations on the DC side, only SPDs especially dedicated to PV installations shall be used to protect the DC side of such installations.”

The correct selection of the appropriate protection devices is always directly related to the connected electrical load, system design and network type. The manufacturer's specifications for the frequency converter must also be taken into account.

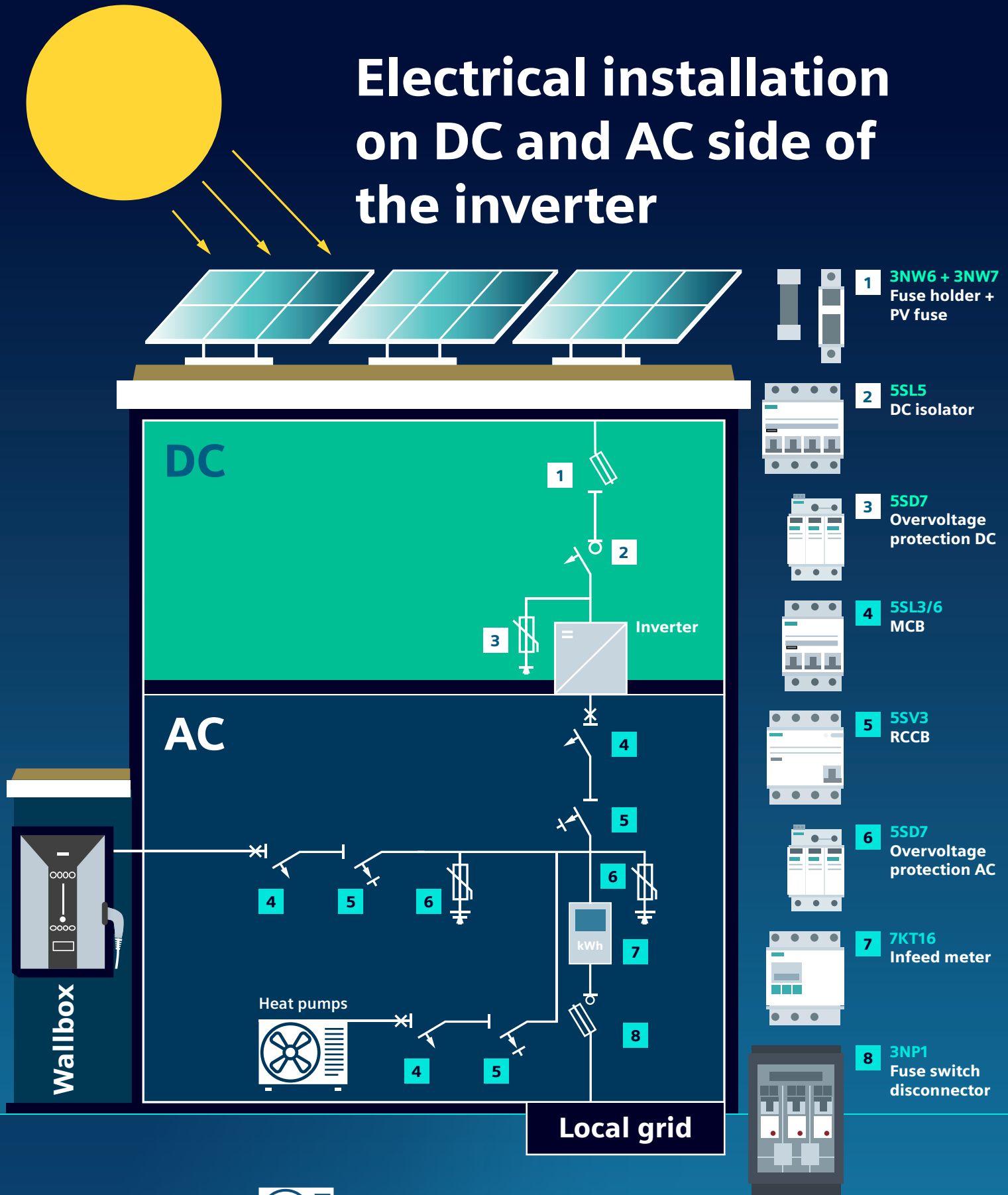
When protecting high rated currents, **3VA molded case circuit breakers** and **3WA air circuit breakers** are recommended.

“Protection on the AC side –

Where an RCD is used for protection of the PV AC supply circuit, the RCD shall be of type B in accordance with IEC 62423, unless the inverter provides simple separation between AC and DC side or is in accordance with IEC 62109-1.”

The PV AC supply cable shall be protected from the effects of short-circuit by an overcurrent protective device installed at the connection to the designated distribution board of the electrical installation.

Electrical installation on DC and AC side of the inverter



Heat pump

- Protection of heating elements:
1x 3-pole MCB B16
- Protection of internal unit: 1x 1-pole MCB B16
- Protection of external unit: 1x 1-pole MCB B16

Ordering information

DC side of the inverter

1) PV fuse + fuse holder

<u>3NW6 + 3NW7</u>	- Protects the photovoltaic DC lines and the photovoltaic modules reliably against short circuits and overloads in particular in the event of return currents - Very compact design (1MW) - Rated operational voltage 1000 V DC - Characteristic gPV - Rated short-circuit strength 30 kA
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2) DC isolator

<u>5SL5432-7RC</u>	- High ambient temperature range: -40 ... +70°C - Rated Voltage: 880 V DC - Maximum operational voltage: 1000 V DC - High endurance cycles: up to 10,000 mechanical operations
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3) Surge arresters Uc DC=1000 V / 600 V

<u>5SD7483-0KK02/01</u>	- Max. continuous voltage 1000 V DC - Highly suitable for larger systems - Match current portfolio - Matching in SPD portfolio in terms of system gradation
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AC side of the inverter

4) Miniature circuit breaker

<u>5SL3/6</u>	- Tripping characteristics: B, C - Rated switching capacity: 4.5/6 kA - Comprehensive range of accessories (e. g. remote-controlled operating mechanism) - Removal from the busbar-mounted assembly requires no tools
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5) Residual current-operated circuit breaker Type B

<u>5SV3...-4</u>	- Detection of sinusoidal AC residual currents and pulsating DC residual currents, as well as smooth DC residual currents (in deviation from type A RCCBs). - Reliable protection for users against electrical accidents. - Available for applications with rated currents between 25 and 80 A. - Super-resistant and short-time delayed, resulting in a reduction of unwanted tripping and ensuring high system availability.
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Ordering information

AC side of the inverter

6) Surge arrester

<u>5SD7</u>	• Protection of the AC installation against overvoltages caused by lightning or switching activity from the mains. • Rated voltage 240/415 V AC • Rated discharge current 20 – 100 kA • Max. discharge current 40 kA • Combination surge arresters type1/2 available
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7) Energy meter

<u>7KT16</u>	• Measuring of energy data for billing purposes thanks to MID certification • 35 mm DIN rail housing, 4 MW (72 mm wide) • Voltage measurement: direct measurement 230 V N-L/400 V L-L, CAT III • Current input: 80 A direct connection
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8) Fuse switch disconnect

<u>3NP1</u>	• Protection against short-circuit and overload • Safe separation and restarting of load systems (e. g. feeding into the public grid) • Switching under load possible (specialist required) • Locking and sealing possibilities
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