

PV Fact Sheet

04 | Extended lifetime of PV installation and combiner box

How can I ensure a long service life for a PV combiner box?

This fact sheet focuses on photovoltaic installations on top of buildings within the European Union. One essential part of such an installation is the combiner box. These boxes are used to combine several strings and to protect against overvoltage and feature many more functions.

The lifetime of a photovoltaic plant today is minimum 20 years which is basically in line with the FIT (feed in tariff) time of 20 years. To ensure the return on investment, all components – from the panels to inverters – should have a lifetime of 20 years. This should also apply for the combiner boxes.

The lifetime calculation starts with the design and ends with the qualification

One main factor in extending the lifetime is the right selection of the enclosure size. The temperature-sensitive components inside the combiner box endure heat only to a certain degree before they either wear out or even get destroyed.

The circumstances (such as environmental temperature and irradiation) of the installation location play an important role in the heat generated inside the box. The power output of the installation also affects the heat inside (mainly via the current flow).

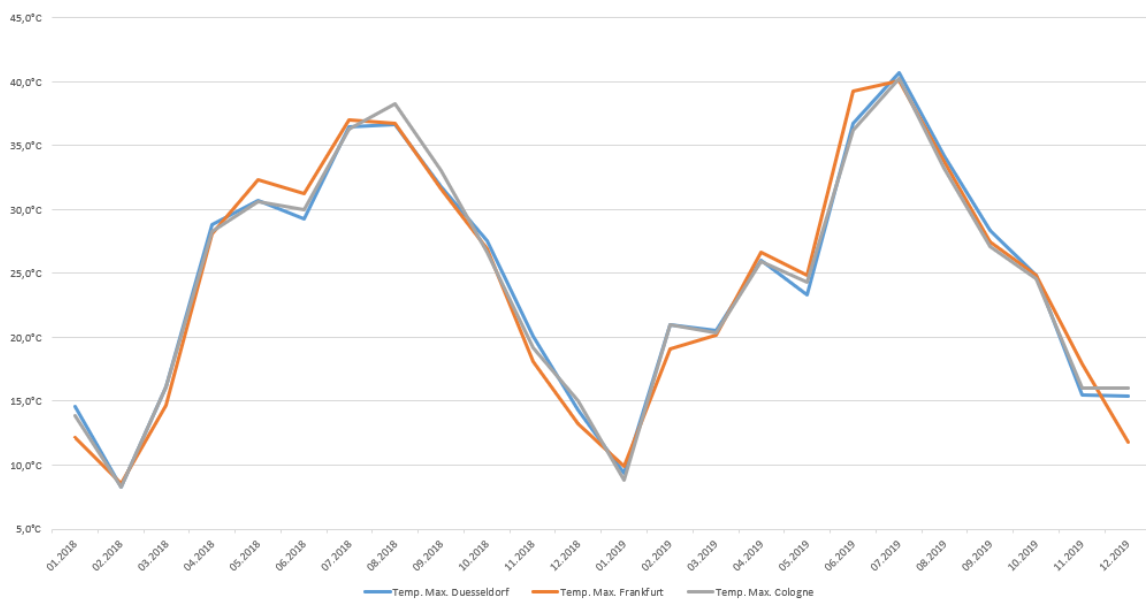


Figure 1: Max. temperatures in three German cities 2018/2019. Source: climatic data from Deutscher Wetterdienst

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The current flow heats up components such as the circuit board, cables and fuses. Knowing this, designers must choose the right cross-section for the cables. To protect components from the heat radiated from neighbouring components, a certain distance needs to be maintained during the design phase. For instance, components such as fuses should not absorb heat. Otherwise, thermal fuses would not fulfil their purpose.

One major advantage of choosing the right enclosure size to suit the individual components is that it eliminates the need for fans. This avoids any negative impact on the sealing, additional power consumption and the use of microelectronic components, which have a high risk of failing during a 20-year lifetime.

When it comes to the validation of the design, the heating test according to EN 61439-1:2011 and the thermal cycle test according to IEC 62093:2005 should be performed as a minimum.

To conclude: The correct selection and design of all components and the subsequent validation of their interaction will result in a long lifetime of the product.

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Advantages of Weidmüller products

PV Next combiner boxes are designed for very good performance over a lifetime of up to 20 years. Our developers and laboratory engineers work in close cooperation to achieve this. In addition, the selection of each component is essential in the designing stage.

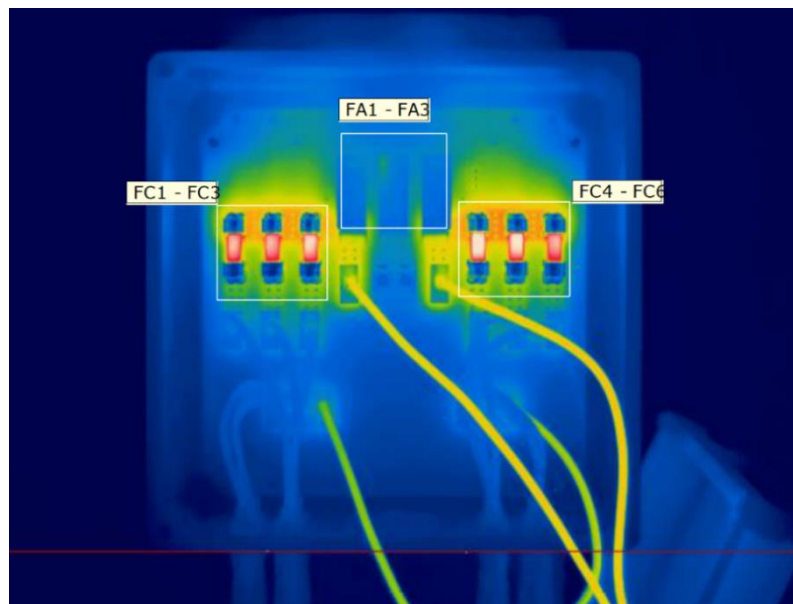


Figure 2: Thermographic image of the thermal radiation of a PV Next combiner box

PV Next combiner boxes are designed for temperatures up to 50°C with a load of 15 A.



Pascal Niggemann

Head of PV Systems Home & Business,
Weidmüller Interface GmbH & Co. KG, Germany

Pascal.Niggemann@weidmueller.com | www.weidmueller.com/pv-rooftop