

Using Huawei SUN2000 inverters with high DC/AC ratios

When the total Watt-peak (Wp) power of the solar modules exceed the nominal AC power rating of the connected solar inverter, engineers typically refer to such a setup as an “oversized installation”. In these cases, the so-called “DC-to-AC ratio” is larger than 1, or larger than 100%, if you like to use percents rather than fractions.

Huawei inverters are designed to automatically limit the maximum output power stated on their type plate, regardless of how much energy is available from the solar modules. If the solar modules generate more power than the inverter can process, the inverter will automatically shift the operating point on the modules so that the generated power decreases. The excess power will be dissipated by the modules themselves and as a result they will become a few degrees warmer. The energy that is lost due to this power limitation, is referred to as “clipping losses”.

In some datasheets, Huawei refers to a “Recommended maximum PV Power”. Installers should refer to this specification as a guideline rather than a fixed limitation. Using the guideline will result in a good balance between overall investment and annual generation. An oversizing of 120% ~ 140% in the Northwestern parts of Europe is typically ideal, where the clipping losses in summer are well balanced with the extra power generation in winter. Higher DC/AC ratios will incur more clipping losses and the limited extra power generation in winter may not always return the added investment of the modules unless the installation is designed for maximized self-consumption and generation in the winter time, or when it uses a DC-coupled battery system such as the LUNA2000 home energy storage. Similarly, off-grid installations may actually benefit from large DC/AC ratios to sustain their loads in low-light conditions during the winter season.

Huawei has designed the SUN2000 solar inverters such that they can operate in “clipping” mode for sustained periods of time. Therefore, Huawei will not pose firm limits on the DC/AC ratios on its inverters, provided that the design of the system complies with these two requirements:

1. The highest open-circuit string voltage (V_{OC}), calculated for the lowest known module temperature applicable for the location of the plant, shall never be higher than the maximum allowed DC input voltage of the inverter.
2. The combined short-circuit current (I_{SC}) of all strings connected on the same MPPT, shall never be higher than the maximum allowed short-circuit current of the inverter.

Provided that the system is designed with these constraints in mind, high DC/AC ratios will not cause any detrimental effects to the reliability, lifetime or warranty of Huawei SUN2000 inverters.

Frequently Asked Questions

Q: *The datasheet indicates a maximum input voltage of 1100V. Can I really connect so many extra modules?*

A: No, this will not give you any benefits. The inverter will not convert any power at voltages above 1000V. At higher voltages the inverter will issue a warning message and it will cease operation. The 1100V limit indicates the voltage above which the inverter will break down so its recommended to keep a healthy margin here.

Q: *The short circuit current of my string(s) is higher than the maximum MPPT input current of the inverter, but it's below the MPPT "maximum short-circuit current". Is this OK?*

A: Yes, this is OK. The maximum input current stated on the datasheet is the current above which the inverter will start clipping, and as explained in the previous page this is a normal working condition of the inverter. Above the stated maximum short-circuit current, the inverter is at risk of breaking down.

Q: *Will the inverter get hotter when it is clipping or when I connect more modules?*

A: No. The inverter will not get hotter. If there is excess power, it will be dissipated by the PV modules themselves. Also, for the modules this will not have any negative effects on their durability or warranty. It is a normal operating mode.

Q: *Can I have a signed declaration that my warranty isn't void?*

A: There is no need for it. This document fulfils the same task as a general statement. As long as the solar system is designed and built according to the abovementioned constraints Huawei will grant the warranty on all her products.

Q: *The Huawei SmartDesign Tool is showing exclamation marks when I connect more modules. Am I missing something?*

A: Yellow exclamation marks are warnings, and they are likely pointing out that there are high clipping losses. It is important that the designer is aware of these losses. As soon as the Smart Design Tool starts to show red stop signs you are exceeding the design limits and in danger of voiding warranty.