



## Manufacturer's Declaration

### Supplementary Information concerning the Fourth Amendment of the Technical Directive "Generating Systems Connected to the Medium-Voltage Grid"

The following information are valid for the power-generating units listed in table 1.

#### Reactive power

For the power share of 0% to 10%  $P_n$ , the amount of reactive power of the power-generating unit (with the respective configuration for the reactive power setpoint) is not higher than 10% of the nominal active power.

To ensure the required reactive power provision without dynamic reduction of the active power for a low-voltage grid in the range of  $\geq 0.95$  of the nominal power ( $V_n$ ), a permanent limitation of the maximum active power in accordance with the table is necessary.

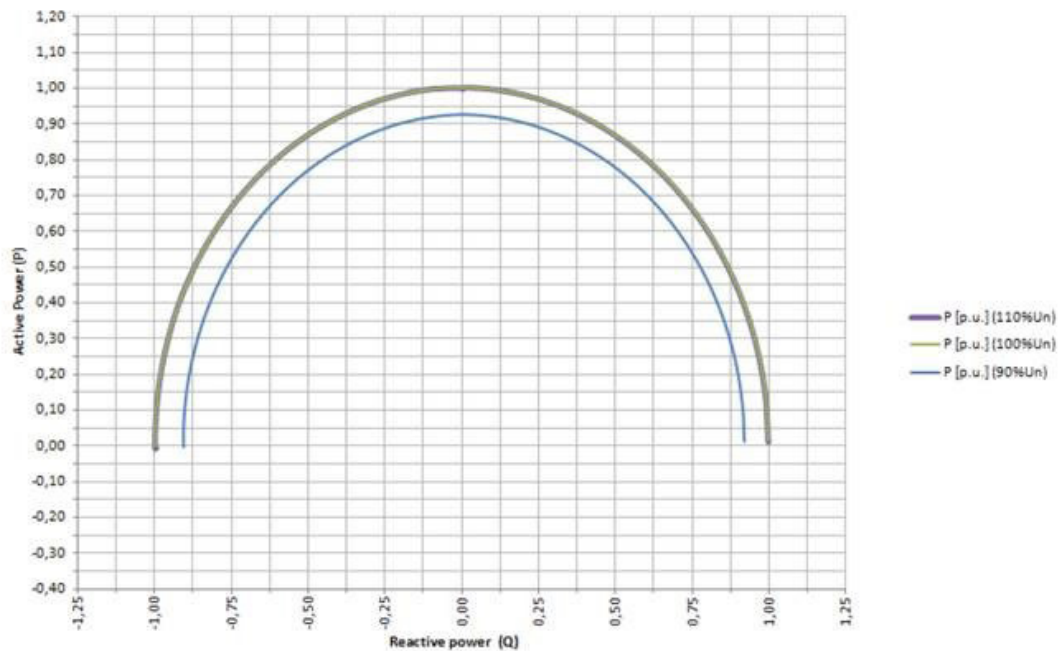
Type of power-generating unit	$\cos \varphi = 1.0$	$\cos \varphi = 0.99$	$\cos \varphi = 0.98$	$\cos \varphi = 0.97$	$\cos \varphi = 0.96$	$\cos \varphi = 0.95$
STP 15000TL-10 / STP 15000TL-30	No change	14 850 W	14 700 W	14 550 W	14 400 W	14 250 W
STP 20000TL-30	19 087 W	18 896 W	18 705 W	18 515 W	18 324 W	18 133 W
STP 25000TL-30	23 826 W	23 587 W	23 349 W	23 111 W	22 873 W	22 634 W
STP 50-40	47 500 W	47 000 W	46 500 W	46 000 W	45 600 W	45 100 W
STP 60-10	57 180 W	56 605 W	56 035 W	55 466 W	54 895 W	54 320 W
SHP 75-10 / STPS 60-10	71 700 W	71 000 W	70 250 W	69 550 W	68 850 W	68 150 W

Table 1: Setting for maximum active power depending on the  $\cos \varphi$  setpoint for grid voltages  $\geq 0.95 V_n$

The required operation of the power-generating unit in the voltage range  $0.9 V_n$  to  $1.1 V_n$  is permanently possible. After limiting the maximum active power in accordance with the table above, the power generating unit may reduce the active power if the grid voltage decreases to a value lower than  $0.95 V_n$  (operation mode prioritizing reactive power).

The following figure from the unit certificate shows the P & Q operating range depending on the grid voltage for the STP 25000TL-30. The P & Q range of the other inverters indicated in the table above can be seen in the respective unit certificate.

The requirements stated in figure 1 and 3 of the fourth amendment of the technical directive "Power-generating systems connected to the medium-voltage grid" are complied with the respective configuration in accordance with table 1.



## Decoupling Protection

Protective functions (internal decoupling protection of the inverter) are independent of open-loop and closed-loop control functions (particularly of the LVRT control/configuration).

With the respective configuration of the AC voltage monitoring, Sunny Tripower inverters can be operated continuously in the range of 160 V to 280 V (L-N voltage) or 277 V to 485 V (L-L voltage) and in a frequency range of 44 Hz to 65 Hz. With the corresponding configuration of the respective disconnection times, the inverter can be disconnected with a delay in order to prevent the dynamic grid support from being disturbed. The defined voltage and frequency range matches the settings for the decoupling protection. Voltages and/or frequencies outside of this range persisting longer than the defined disconnection time results in grid disconnection (self-protection).

A detailed description of the decoupling protection settings and the self-protection is contained in the document "Commissioning Report and Proof of Conformity for PV Systems Connected to the Medium-Voltage Grid with Sunny Tripower Inverters".

The decoupling protection unit and the integrated tie switches of the Sunny Tripower series are supplied with voltage on the DC side (PV energy). A grid voltage failure does not impact the functionality of the integrated decoupling protection unit including the respective tie switch. The following requirements are complied with: the protective device being supplied with auxiliary power which is not purchased from the grid (protective functions are available for at least 3 seconds which is the duration of a grid failure) and the switch being tripped immediately in case the protective device is not supplied with auxiliary power.

The inverters listed in table 1 are equipped with a fail-safe operation decoupling protection that was checked during the certification as defined in the guidelines "Generating systems on the medium voltage grid". This internal protection is accepted by some grid operators as interface protection. However, if an interface protection test is required, one has to consider that such tests are very work-intensive for PV systems with many decentralized power-generating units (with the need to check the protections in each unit). In addition, there is no test connecting terminal plate available. Due to the higher costs for the protection test of each power-generating unit, it is recommended from an economical point of view to install the interface protection as a separate unit with the respective lower costs for the protection test.

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