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CPS 3Phs TL String Inverter Parallel Solutions

This inverter application guide addresses various key points which must be taken into account in the planning and implementation of a decentralized large-scale plant. This guide has recommendations solely limited to inverter performance and inverter operation when multiple inverters are installed in parallel. The guidance provided in this document by CPS is in no way comprehensive and does not consider other system level design or reliability requirements. It is the responsibility of the system designer and responsible project engineer to consider any other relevant factors, including but not limited to the reliability of other system components.
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CPS 3Phs TL String Inverters (models CPS SCA23KTL-DO/US-480, CPS SCA28KTL-DO/US-480, CPS CSA 36KTL-DO/US, CPS SCA50KTL-DO/US-480, and CPS SCA60KTL-DO/US-480) may be installed in a parallel AC electrical scheme at a single point of connection to construct a low voltage building block. Such low voltage blocks can then be connected directly to a 480Vac utility grid for the CPS 23kW, 28kW, 36kW, 50kW, and 60kW inverters with or without a step-up transformer. CPS allows a maximum of 70 each 3Phs TL String Inverters paralleled into a single step-up transformer.

The requirements for this building block must be of the following:

1. Utility Grid Voltage
The 480V, 60Hz voltage performance and range for the utility grid must follow the **ANSI C84.1-1995 (R2005)** standard.

2. System Voltage Drop
System voltage drop between the inverter output terminals and the utility grid connection point should be considered and must not affect the grid voltage at Point of Common Coupling (PCC). If the system voltage drop is too high, the inverter may disconnect from the utility grid due to excessive voltage. The voltage drop should be limited to minimize the power loss in the wires.

CPS recommends the **voltage drop is < 2% of Vnom** (nominal AC voltage) at maximum power production.

Temperature rise in the conductors and the ambient temperature should be considered for the voltage drop calculation.

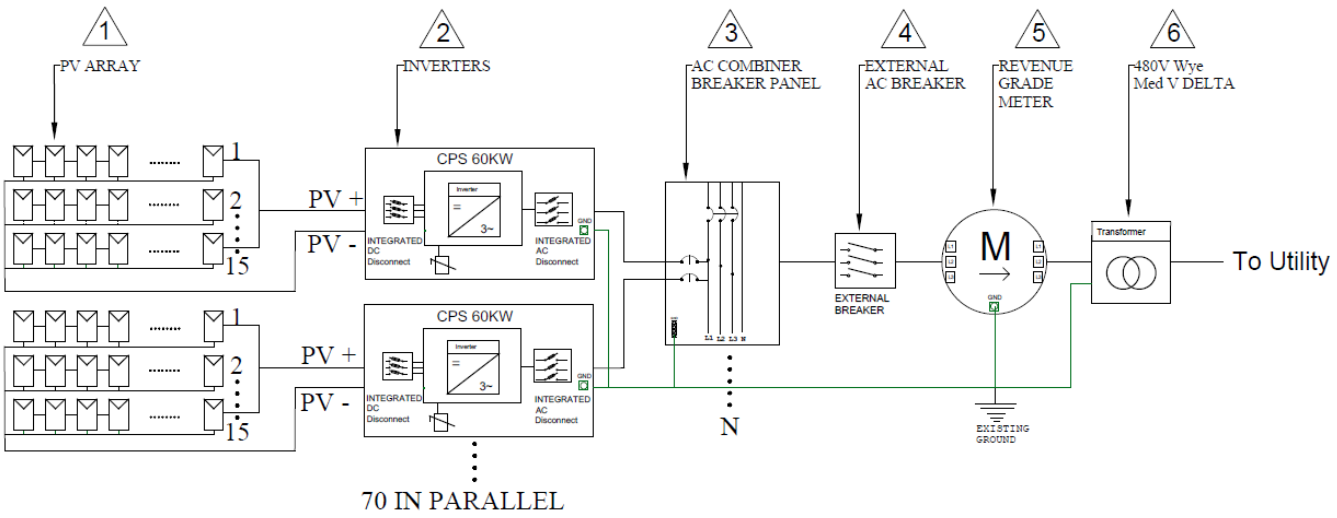
When the connection to the utility grid uses a step-up transformer, then additional requirements include:

3. Transformer Short-circuit Impedance
The short-circuit impedance (Z%) of each transformer is recommended to be **no greater than 6%.**

4. Transformer VA Rating
CPS recommends the **transformer VA rating be at least 105%** of the total power rating of the paralleled inverters before taking into consideration any additional safety margin for the reliability of transformer.

The transformer VA sizing recommendation of 105% of the total paralleled inverter rating is the manufacturers' guidance for PV systems with high ratio of DC power to AC power. This recommendation is purely related to inverter performance and operation and does not take into account other system parameters that system designers should consider. It is the responsibility of the system designer to determine and take in account the reliability of the transformer or other system parameters.

CPS 3Phs TL String Inverters can be paralleled and connected to one common point of connection in a single building block up to 4.2MWac. An example is shown below:



Example: 4.2MW building block with 60kW inverters

A transformer with a **minimum** rating of 4.5MVA should be used with (70) CPS60kW inverters connected in parallel to the secondary winding or low voltage side of this transformer. This transformer rating would need to be adjusted for safety margin according to the operating environment as stated in point 3 & 4 above.
System designs that follow the above rules can utilize many string inverters in parallel. CPS recommends its customers contact CPS Application Engineering to review any projects with complex AC system design or with multiple inverters designed in parallel.

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