



Chint Power Systems America
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Date: **March 1, 2021**

Subject: **String Sizing Approval Process**

The legacy method of determining the limits for array input was based on the Isc and Pmp STC ratings of the PV Module compared with inverter limitations. However, by using this methodology the actual array input cannot be accurately characterized by a single static characteristic (STC) of the PV Module. There are many variables that impact array input to the inverter that must also be considered.

1. Array Configuration
 - a. Fixed Tilt Ground Mount – azimuth and tilt
 - b. Roof Top – azimuth and tilt
 - c. Single Axis Tracker
2. Latitude/Geographical
3. Time of Day/Year
4. Ambient Temperature
5. Bifacial/Monofacial

The impact of these variables is significantly different with all the possible combinations. The new CPS String Sizing Tool (V3.00 and above) is an estimation tool that is based on a representative site in each of 12 USA regions with 3 possible “optimal” configurations of the array.

- Step 1: Fill out the String Sizing Tool V3.00. If the “Status Indicators” are ALL green, then the design is automatically approved.
 - If the “Status Indicator” for DC/AC Ratio is yellow, then submit the completed String Sizer to CPS Applications Engineering for further analysis. If only the DC/AC ratio exceeds the limit, then approval is very likely.

The screenshot shows the 'INVERTER DESIGN COMPATIBILITY STATUS' section with the following indicators: High Voc Status (green), Isc Status (green), DC/AC Ratio Status (yellow), and Prompt (grey). A red circle highlights the DC/AC Ratio Status, with a red arrow pointing to the text 'Contact CPS for analysis' below it.

The 'Array Design Options' section includes the following data:

| | MPPT1 | TOTALS | MPPT | Total |
|----------------------------|----------|--------|--------|--------|
| String Length | 26 | | | |
| String Length (Max Min) | 27 24 | | | |
| Number of Strings | 18 | | | |
| Combined Parallel Strings | 1 | | | |
| Connected Wdc(DYNAMIC) | 197499 | 197499 | 187500 | 187500 |
| Connected Isc(DYNAMIC) | 209.3 | 209.3 | 220.0 | 220.0 |
| Connected Voc @TMIN | 1411 | | | 1500 |



- If the status indicator for Isc and/or Voc are RED then the design can be submitted for further evaluation – especially if the excess margin is small.

| INVERTER DESIGN COMPATIBILITY STATUS | | | | |
|--------------------------------------|----------|--------|-----------------------------------|--------------------------|
| High Voc | Status | Prompt | Isc | Status Prompt |
| | | | DC/AC Ratio | Status Prompt |
| Contact CPS for analysis | | | | |
| Array Design Options | | | | |
| | MPPT1 | | | |
| String Length | 28 | | String length will cause High Voc | |
| String Length (Max Min) | 27 24 | | | |
| Number of Strings | 19 | | | |
| Combined Parallel Strings | 1 | | | |
| | MPPT1 | | TOTALS | Limits |
| Connected Wdc(DYNAMIC) | 224507 | | 224507 | MPPT 187500 Total 187500 |
| Connected Isc(DYNAMIC) | 221.0 | | 221.0 | 220.0 220.0 |
| Connected Voc @TMIN | 1519 | | | 1500 |

Voc is an NEC constraint that is the responsibility of the Engineer of Record.

- Step 2 – If the design is submitted for further evaluation, the Tilt and Azimuth for the roof-top and ground mount systems is required.
- Step 3 – As an additional and more accurate alternative if PVSYST simulations are available. The hourly 8760 data can be used along with the V3.0 (and above) String Sizing Tool. The data will need to be in Excel format and include the following data. In addition, the monthly albedo assumptions must be included. For this analysis the albedo assumption is different from the values typically used to predict production (MWhr). The typical albedo values are the average for the month, often dominated by the variable chance of snowfall. The albedo assumptions for inverter compatibility analysis must be based on the probability of ANY snowfall during the month. Albedo for snow should be 0.85. The months where there is little to no probability of snow should be 0.20. So, for the Northeast, March Albedo would be 0.85 and July would be 0.20.

| Month | Day | hour | GlobInc | GlobBak | EArrMPP | EArray | IArray | UArray | EOutInv | T_Amb |
|-------|-----|------|------------------|------------------|---------|--------|--------|--------|---------|-------|
| | | | W/m ² | W/m ² | kW | kW | A | V | kW | °C |

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