New Modules - Same Voltage Window

What to do when your module of choice is not on the Fronius Configuration Tool

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Many new modules are being introduced to the market frequently. At Fronius, we do our best to keep our Fronius Configuration Tool up to date to accommodate the new modules. There may be an instance where a module may not have reached the tool yet and let's say it's the weekend and the Fronius Technical Support staff is out volunteering to put out wildfires or rescuing hot panda bears from the zoo, you may need to run some numbers yourself. This article will explain how to run these calculations.

First of all, you must believe in magic! No, seriously it is all about mankind's most useful philosophy…mathematics. Don't worry, it is really basic level math and anyone can figure it out. Here are the details of how to do you own configurin'.

- **Find out the voltage range you can work with**

  For this example we will use the New Fronius IG Plus. The MPP window is 230VmppDC to 500VmppDC but the unit turns on at 245VocDC *but I like to shoot for 290VocDC* and can take a maximum of 600VocDC.

  Ok so here is what we know, we need to guarantee that on the hottest days we can get at least 290VocDC and won't go above 600VocDC on the coldest days

- **Find the Voc and Vmpp of the module we want to use**

  Lets say the Sanyo HIP180 we need the Voc and the Vmpp, also if the temperature Coefficient is available, note it as well.

  Voc = 66.4
  Vmpp = 54.0 *or Vpm as it's called on this spec sheet*
  Temperature coefficient Voc = -0.173/C
  There is often a temperature coefficient for both Voc and Vmpp, we want to know the Voc one because we just don't want the Voc to go above 600V.

  This says that for every degree centigrade we go up we lose .173Voc. This is only kind of cool because we don't use centigrade in America. There are many conversion programs but I prefer a table for this work

because it lets me know exactly how close I can get. Conversion for Temperature

- **Come up with basic string sizes**

  Ok so we need at least 290Voc. 290/66.4 = 4.3 so we need at least 5 modules in a series. It is also really good to make sure that we have the requisite Vmpp. 5*54 = 270Vmpp so we are good here. For the advanced students or the really close cases it may make sense to run the low end calcs just off the Vmpp and use the temperature coefficient, if you have it, from the manufacture. Be sure you are above your power point voltage window on your hot days.

  We can't go above 600Voc either. 600/66.4=9.03 so we can get 9 modules in series, or can we....

- **Refine your calculations with temperature settings**

  Let's say this system is installed in my home town of Santa Clara, CA. I can't remember it getting below 28 degrees Fahrenheit. The easiest way to do this or if you don't get a thermal coefficient is to use the table in the NEC 690.7. So with the NEC table I multiply my voltage by 1.13 - lets see if 9 modules still work. I bet they don't... 600/(66.4*1.13)=7.99 so this means we can only get strings of 5 through 7 up now.

  The NEC guidelines will always work because they are an over estimate and it is my experience that plan checkers and inspectors will use them, but we can get around that. Do you see how we are right on the edge there with that 7.99 I bet we can get strings of eight if we use Sanyo's listed thermal coefficient instead of the NEC. Let's try.

  Ok so 28F is equal to -2.22C. The module is rated at 25C (because it is rated for STC)
  -2.22 – 25 = -27.22. Now we take the thermal coefficient and multiply it by the change in temperature. -27.22* -.173=4.709. This is the added voltage we give each module because of thermal reasons. So now we run the high end voltage calculation again with our corrected value. 600 / (66.4 + 4.709) = 8.43 and, look at that, we could easily go strings of 8 according to the manufacture.

- **Work the Wattages**

  Well since we are using the Sanyo 180W module, we can get strings of 5 to 8, so lets do that. What can we do if we want to use an IG Plus 6.0?

Well we could go with 4 strings of 8 for wattage of 5760STC which would be a nice snug fit for our friends in CO perhaps. But our chums in the Pacific Northwest may be more interested in getting a little more DC behind their inverters on cloudy days, so 6 Strings of 6 may be a good fit with 6480W.

The point is, that you now really get to play around with the numbers and see what works for your location and conditions. So go out side, get your solar powered calculator all juiced up and enjoy the math time, or wish that the Fronius Tech Support team will get back to work soon!

Just a quick side note: For the IG inverter line - the Max Voc it can take is 500V. The Power point window is 150Vmpp – 400Vmpp. I would shoot to have a Voc of 215V.

Now go configure!