INSTALLATION MANUAL FLEXTRON MODULES

ADDENDA

A. Capacitance Leakage on Metal Roofs and Choice of Inverters

Almost all single-phase transformerless invertors, due to their operation, pass half of the mains grid voltage onto the PV modules. Therefore, single-phase transformerless inverters will provide a noise level back to the modules of approximately 115V AC.

The capacitance of the BiPVco FLEXTRON modules to the metal roofing sheet has been measured and is known to be 16nF / M2 in STC.

Allowing for rain / wet conditions and a factor of safety, for illustration purposes, we could assume that under worst-case conditions, it exhibits 30nF / M2 in situ in a real roof condition.

Using the formula 1 / 2*Pi*f*C = XC, the capacitive reactance – AC resistance, we obtain the result 1 / 2 * 3.14159 * 50Hz * 0.000000030nF = 106103 ohms. Using ohms law I = V / R, the resultant leakage current per M2 = 115V / 106103 = 1084 uA / M2.

This information can be used against the characteristics of the inverter to check suitability.

EXAMPLE FOR ILLUSTRATION PURPOSES ONLY:
Taking an inverter that has an acceptable capacitance of 2560nf, the area of BiPVco FLEXTRON modules that it can tolerate is 2560 / 30 = 85 M2.

Using a 120 Watt BiPVco FLEXTRON module as an example, which has an area of 0.934M2, the number of 120 watt modules that can be used with the example inverter = 85 / 0.934 = 91 modules = 91 X 120W = 10.9 KW.

This shows that the characteristics of this transformerless inverter can accommodate 10.9 KW in single phase and 32.7 KW in three-phase applications if the inverter itself has three-phase capability. This is because typically, the noise levels on three phases are attenuated by a third due to the phases and hence less dramatic.

Similar calculations can be done for other transformerless inverters using their respective capacitance limits. The system designer must do this as part of the overall electrical system design. There are other inverters with much higher capacitance tolerances and, hence, higher capacity PV installations.

Please note: The BiPVco FLEXTRON modules do not need direct earthing, but the earthing of the metal roof itself must be done by local regulations and as part of lightning protection, etc.

B. Product Storage and Connecting the Modules

Please refer to the BiPVco FLEXTRON Product Storage guidance available from: ***www.bipvco.com/downloads***

It is advised as best practice that the FLEXTRON modules be connected (i.e. MC4 cable connectors inserted into the Junction Boxes) immediately after installation. Failure to do so could lead to moisture and/or foreign bodies entering the junction box which could result in premature degradation of the junction box contact material.
In instances where a delay between installation and connection is anticipated, the junction box manufacturer (Stäubli) recommend attaching sealing caps to the junction boxes to prevent dust, dirt and moisture from entering the junction box (see Stäubli datasheet: ***PV_MA263-en.pdf (staubli.com)***).

If it is believed that moisture and/or foreign bodies may have entered the junction box, BiPVco advises a visual inspection of the junction box (by shining a torch into the junction box) to check for obvious signs of degradation and/or foreign bodes. The use of a light pressure of compressed air into the junction box will expel anything trapped before then immediately connecting the modules using the MC4 cable connections.

For further assistance please contact ***info@bipvco.com***