

**Application Note:
Interconnection Guidelines for
Yaskawa – Solectria Solar
PVI 23-60TL Inverters**

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1.0 Interconnection Service Requirements

The Yaskawa – Solectria Solar PVI 23-60TL three-phase string inverters require a Wye service with a neutral connection. The neutral conductor is used by the inverter for voltage sensing and does not carry current. Therefore, the size of the neutral conductor may be reduced to the same size (not smaller) as the EGC. Acceptable service configurations are depicted in the table below.

It is permissible to connect the neutral terminal of the inverter to ground inside the inverter wiring box through the use of a jumper. If terminated properly, this connection will not impact the function of the inverter or create an unsafe condition. Ultimate approval of such configuration lies with the authority having jurisdiction (AHJ). Please contact Yaskawa – Solectria Solar should you have any questions.

Acceptable Service Configurations

Description	Configuration	Inverter Compatibility
Wye w/ Neutral		Compatible (Preferred)
Wye w/ Neutral Jumper		Compatible (Consult Local AHJ)
Other Configurations	All other configurations not mentioned in this document	Not Compatible

2.0 Paralleling Multiple Inverters

2.1 Maximum Numbers of Inverters in Parallel

Yaskawa – Solectria Solar’s three-phase, transformerless string inverters may be connected in parallel to one common point of connection in a single building block up to the following number of inverters:

PVI 23TL, PVI 28TL, PVI 36TL	70 inverters
PVI 50TL, PVI 60TL	70 inverters

Example: 1MW building block with 28kW and 36kW inverters

A transformer with a **minimum** rating of 1.05MVA may be used with (27) PVI 36TL and (1) PVI 28TL inverters connected in parallel to a secondary window or to the 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 points 1 & 2 above.

2.2 Direct Connection to 480VAC

The Yaskawa – Solectria Solar PVI 23-60TL three phase string inverters may be installed in parallel with AC output at a single point of connection creating a low voltage building block. The low voltage blocks may then be connected directly to a 480VAC grid without a step up transformer. The requirements for this set-up are:

1. The grid’s voltage/frequency performance and variation range should follow U.S. grid standard/code.
2. System voltage drop between the inverter’s output and grid connection point should not affect the grid voltage at the inverter. If the system voltage drop is too high, the inverter will disconnect from the grid due to excessive voltage. The AC side wiring voltage drop should be limited to minimize the power loss in the wires. **Therefore, Yaskawa – Solectria Solar recommends the voltage drop be < 2% of Vnom (nominal AC voltage) at maximum power production.** The temperature rise in cables and the ambient temperature should be considered in the voltage drop calculation.

2.3 Connection via Transformer

If the connection to the grid is through a transformer, additional requirements to be considered are:

1. **The short-circuit impedance of each transformer shall be no greater than 6%.**
2. **Each transformer shall be at least 105% of the total kVA rating of paralleled inverters before taking into consideration the additional safety margin for the reliability of the transformer.** The oversizing recommendation of 105% of an inverter rating is the manufacturers' requirement for all systems. This recommendation is related to inverter performance and operation only and does not take other system parameters into account. It is the responsibility of the system designer to determine the reliability of the transformer and other system parameters.

3.0 Conclusion

System designs that follow the above recommendations may utilize multiple string inverters in parallel. Additional requirements for installation of these inverters can be found in their respective Installation and Operation Manuals (<https://www.solectria.com/support/documentation/>). It is recommended that customers contact a Yaskawa – Solectria Solar Application Engineer (appeng@solectria.com) to review any projects with complex AC system designs.

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