

Sizing Service Conductors When Performing a Photovoltaic Supply Side Interconnection

NEC 705.1 discusses the scope of Article 705 and covers “electric power production sources” operating in parallel with a “primary source” of electricity. The informational note states that a utility supply is an example of a primary source. NEC 705.2 defines “power production equipment” as a generating source other than a utility supplied service. The informational note in 705.2 lists photovoltaic systems as an example of power production equipment. With the information obtained from 705.1 and 705.2 we can conclude that a photovoltaic system is an example of an “electric power production source”.

NEC 705.12(A) states that an “electric power production source” is permitted to be connected to the supply side of the service disconnecting means. With the knowledge gained from 705.1 and 705.2 we can conclude that photovoltaic systems are permitted to connect to the supply side of the service disconnecting means. The second sentence in 705.12(A) states “The sum of the ratings of all overcurrent devices connected to the power production sources shall not exceed the rating of the service.” In other words, the sum of the overcurrent devices connected to the photovoltaic system(s) shall not exceed the rating of the service. This means that the rating of the service conductors only needs to be increased when the OCPD connected to the photovoltaic system is greater than the rating of the service.

When the OCPD fed from a photovoltaic system is rated less than or equal to the rating of the service, two possible scenarios exist. The first, shown in Figure A, occurs when the loads fed by the service are at a maximum and the photovoltaic system is producing maximum power. In this case, Kirchhoff’s Current Law tells us that the current from the utility will be reduced by the current from the photovoltaic system and the service conductors will not be overloaded.

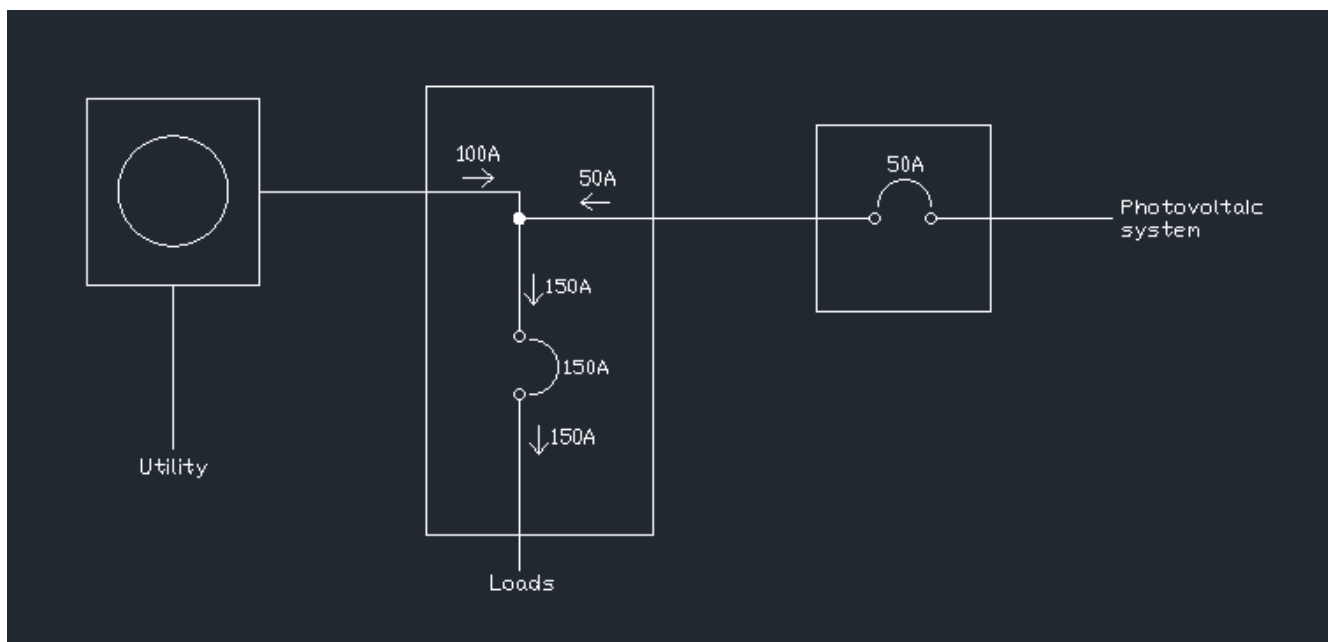


Figure A: Scenario when service loads and photovoltaic generation are at a maximum.

The second scenario occurs when the demand from the loads connected to the service is zero and all the current from the photovoltaic system flows back to the utility. From Figure B, we can see that if the OCPD fed by the photovoltaic system is rated less than or equal to the rating of the service conductors, it is not possible to overload the service conductors.

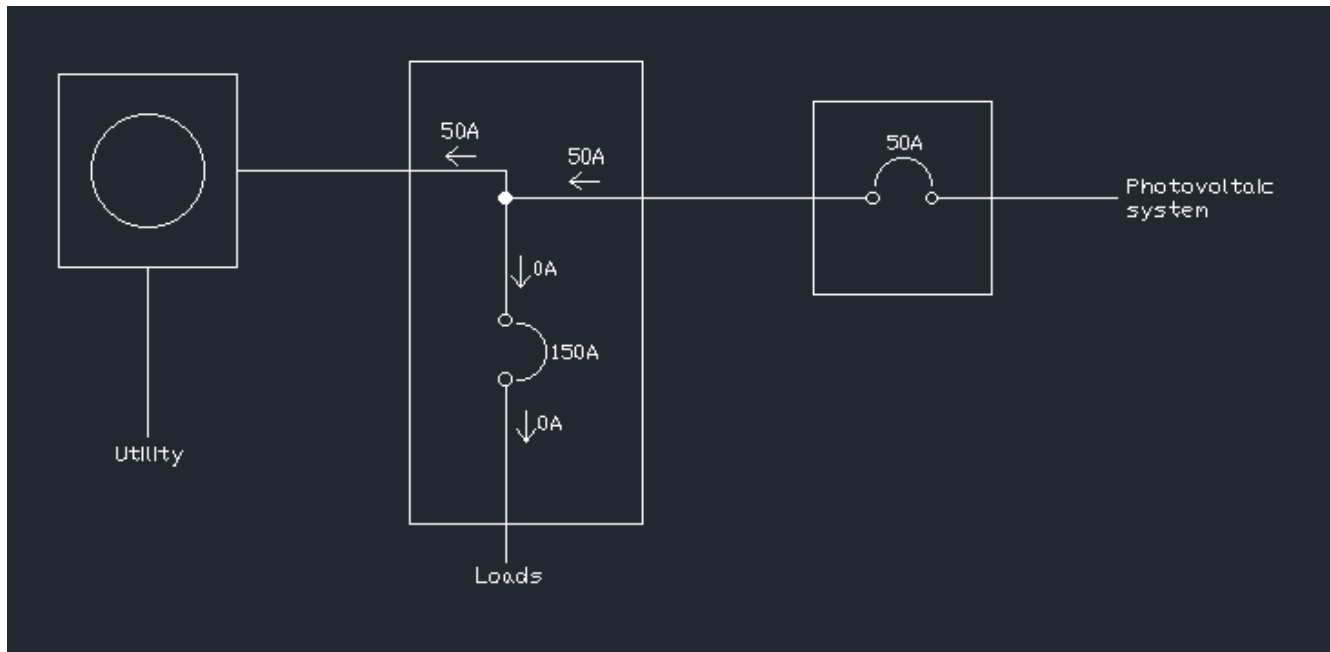
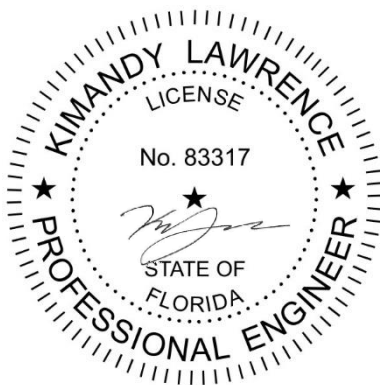


Figure B: Scenario when loads are at a minimum and photovoltaic generation is at a maximum

In conclusion, when a photovoltaic system is connected to the supply side of the main service disconnecting means, it is not possible to overload the service conductors if the OCPD fed by the photovoltaic system is rated less than or equal to the rating of the service conductors. For this reason, NEC 705.12(A) does not require an increase in the size of service conductors if the rating of the OCPD fed by the photovoltaic system is rated less than or equal to the rating of the service.



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