Connection of Converters to a Low and Medium Power DC Network Using an Inductor Circuit

Introduction:

The most important contribution to the energy mix is from wind power and photovoltaic sources. In recent years, how the installation of distributed generation, which has been highly promoted in the country, has been seen to have increased exponentially in medium and low voltage networks. Connections are made to the network using power converters in the majority of applications. It is noteworthy that these forms of energy are increasingly popular and are used in self generation or to generate energy for input to the grid from a residential installation.

Existing system:

Capacitor is usually used in the DC-Link for various reasons. However, we increasingly see the possibility of DC networks where currents converge generation from different energy sources, both low voltage and medium voltage (MVDC). In the DC-link, the real values of capacitors should be recalculated when taking into account that the network can be extended by connecting new generation sources. If a capacitor is sized to all DC side energy storage rating, the cost and the size can be expensive. One of the problems with the connection of power converters to a DC network is that although the average voltage values are equal, the instantaneous values need not be matched, causing short circuits if they are connected directly to the DC-Link. This is usually avoided with the use of capacitors.
Disadvantages:
- Cause short circuits if they are connected directly to DC-Link.
- If converter can be disconnected, supplying current to the DC-Link as this would cause surges and arcs in switch.

Proposed system:
A circuit design based on an inductor to connect the converters to the DC-Link that has no need for the use of a capacitor is presented. The inductor is calculated for each power converter connected to the Dc-Link. The calculation of inductor does not affect the inductors previously connected to the DC-link. A DC-Link diagram where different generation sources may converge is shown in Figure. As can be seen, each converter will have a switch to connect it through to the DCLink. The connection in this scheme may produce a short circuit if there is no capacitor in the DC-Link. This can be resolved by connecting the converters using an inductor for each of the converters. This solution is more flexible because it allows easy expansion and is also more economical because the sizing is carried out for each of the converters.
Advantages:
- Inductor does not affect the inductors previously connected to the DC-link.
- More flexible because it allows easy expansion
- More economical because the sizing is carried out for each of the converters
- To converter disconnection, current-limiting circuit of the inductor by means of two diodes, one of them a zener diode

Applications:
- Wind power and photovoltaic sources.
Block diagram:

Wind supply → Rectifier → Converter 1 → Inverter → Load

Solar or DC supply → Converter 2 → Isolation Circuit

12V DC → Isolation Circuit → Driver Circuit → 12V DC

5V DC → Buffer Circuit → Micro Controller Circuit