19.2.6 Active Quality Control in the Grid

Since the power factor in modern grid-connected inverters can be adjusted by internal control, this kind of inverters can be used to compensate reactive power flow in the grid, which otherwise must be performed by extra compensation units such as inductors or capacitors. This ability can either be fixed to a constant value or, in case of an appropriate communication system, be controlled by the grid operator according to the actual needs.

As a further means of power quality improvement, high-quality inverters are able to compensate deviations in the sinusoidal voltage of the grid. As shown in Figure 19.49, the inverter injects surplus power into the grid to compensate for the actual deficit in the voltage.

In a later stage of PV use, inverters will have to prevent grid overloading. Grid-connected inverters can easily handle this kind of power control by changing the DC input voltage from the MPP in such a way that the PV generator reduces power production to the desired level. This request may come in a situation in which several hundreds of megawatts of PV power are fed into a local system. To allow for such ability, the grid operator must be able to communicate with these inverters.

As a consequence, it can be stated that high-quality inverters will be able to improve the power quality in the grid by adjusting the power factor, by reducing the THD and by stabilising power flow through power control. To realise these functions, appropriate control and the availability of a communication element becomes necessary. A few inverters in the market already show these features today.

19.2.7 Safety Aspects with Grid-connected Inverters

An important issue for grid-connected systems is associated with islanding protection. Islanding may occur, if a part of the local grid is switched off, for example, for maintenance reasons and if the injected power is equal to the actual load in the separated part of the grid. This situation is shown in Figure 19.50.

The situation described above becomes very unlikely since not only the effective power but the reactive power as well must be equal between production and consumption.

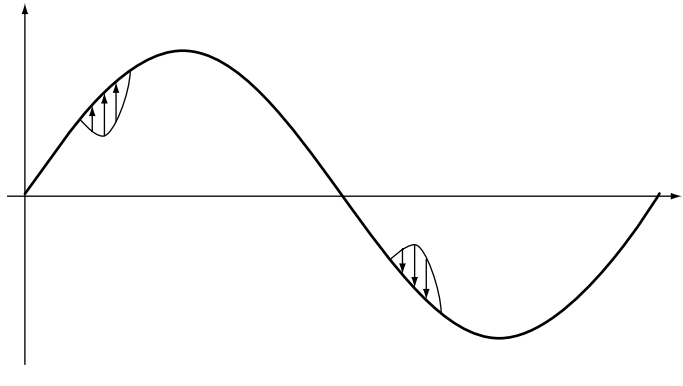

Figure 19.49 Inverter injects surplus power