



PRODUCT & APPLICATION NEWS NO. 1 - OCTOBER 2007

# Danfoss Solar Inverters offers you the best AC grid robustness in the market

**AC grid disturbances are no longer a problem thanks to new technology.**

With the 'Ride Through' function, Danfoss Solar Inverters stay connected to the AC grid, also in areas with severe AC disturbances. 'Ride Through' continuously monitors the grid and detects grid disturbances. The inverter will only disconnect if the AC grid limits set by authorities are exceeded. In other cases, the

inverter will adjust supply to accommodate the disturbance and continue producing energy. This means stable energy production for the owner and less trouble for the installer.

*Don't let grid disturbances disturb you...*

## Benefits & Advantages

### For the Installer – satisfied customers

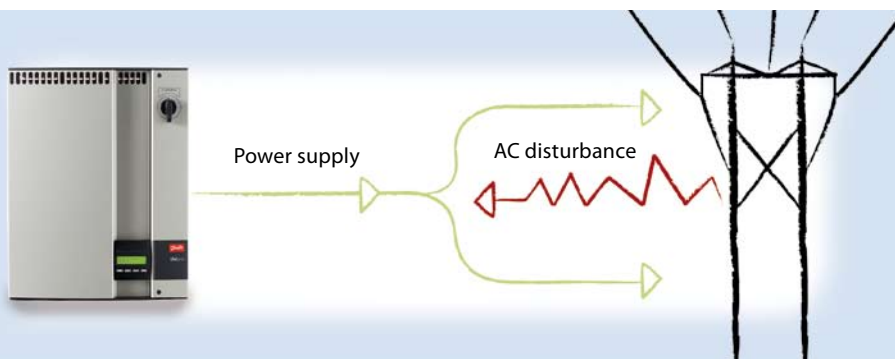
- Best AC grid robustness available in the market
- Less trouble and fewer service calls
- Solves a common problem in solar installations

### For the owner – protection of the investment

- Reliable operation and increased energy production
- No worries – no need to frequently check inverter operation
- Future protection against increased grid instability

### Competitive advantage

- Optimum Yield
- Standard in all inverters
- Automatic – no need for adjustments or changes in inverter settings



# Behind the news – technical information

## Ride Through

Ride Through is a control algorithm incorporated into the inverter software. It enables the inverter to manage AC grid disturbances. The inverter continuously and automatically monitors the grid to detect disturbances. Ride Through is activated if the inverter experiences a disturbance.

## What are grid disturbances?

Typically, grid disturbances are experienced as a sudden reduction of AC grid voltage over a short period of time. It may be caused by starting or stopping large electric machinery, or by powering up electronic equipment connected to the grid. If the AC voltage drops more than 20% for more than 200 milliseconds, the inverter must disconnect due to regulations (in Germany the VDE0126-1-1).

Most disturbances are shorter than 200 milliseconds, and it is important that the inverter can handle the short disturbances without disconnecting from the grid.

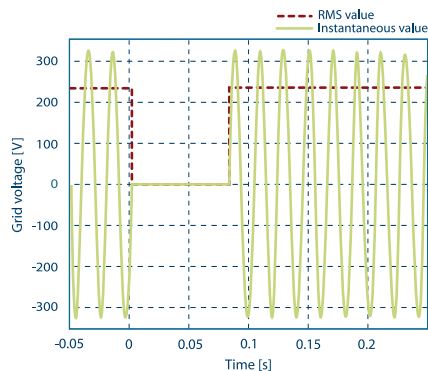


Figure 1: Example of a severe grid disturbance

## Superior Performance

Test results for the Ride Through feature show that the Danfoss Solar Inverter handles disturbances far better than other inverters.

The results have been plotted in a “voltage tolerance curve”.

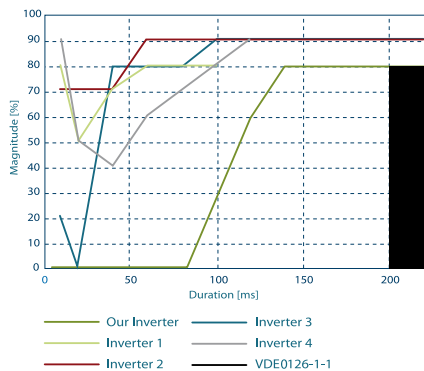


Figure 1: Voltage tolerance curve

Explanation of the voltage tolerance curve:

Magnitude (%) = The magnitude shows the percentage of voltage left on the grid. 20% means that 20% of the nominal voltage is left.

Duration (ms) = Duration is measured in milliseconds and indicates for how long a time the voltage is reduced on the grid.

Regulations lay down specifications on the total disconnection before 200 ms have passed (VDE 126-1-1) if less than 80% is present.

The graph should be understood in the following manner:

If voltage is reduced to 40% for 70 ms, then only the Danfoss Solar Inverter is still connected to the

grid, and is still supplying power. As shown, the Danfoss Solar Inverter does not begin disconnecting before approx. 110 ms.

The other tested inverters have all disconnected and are monitoring the grid to see when reconnection is possible.

These inverters will be able to reconnect once the grid is stable again and normal conditions have been re-established.

The longer the period of heavily reduced voltage, the fewer the number of inverters that are able to maintain their supply to the grid.

If the inverter continues supplying to the grid in periods of grid disturbances, then naturally more energy is produced. Since the Danfoss Solar Inverter will stay on the grid longer than other inverters, it will also provide an increased energy production.

## Field experience

Extensive tests and operating experience at several difficult installations in Germany prove that Ride Through effectively solves grid disturbance problems.

Practical day-to-day operation has shown that Ride Through virtually eliminates grid disconnection caused by grid disturbances. Owners of these solar systems report that they never see unnecessary grid disconnection with the Ride Through function.

## Danfoss Solar Inverters

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