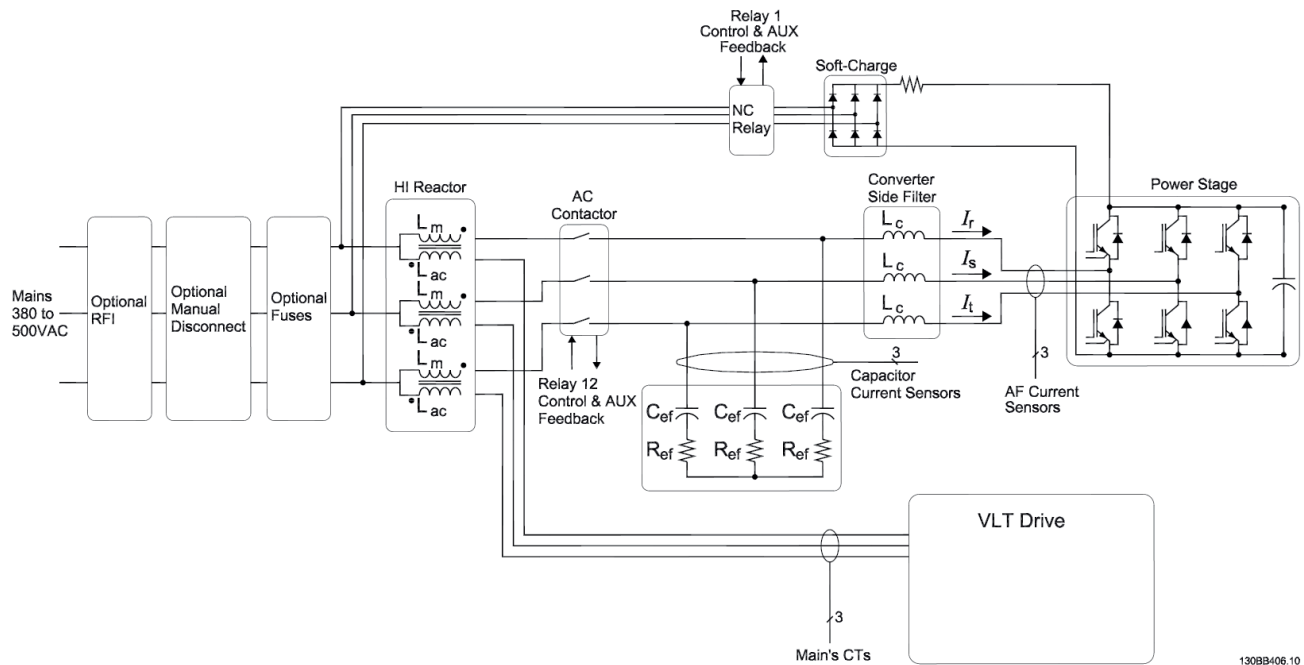


Whitepaper

Danfoss Low Harmonic Drive vs. Multi-Pulse Drives



- IEEE519 Compliant—THiD ~ 5% (regardless of load)
- Back Channel Cooling for more efficient air flow
- Easy installation—3 wires in; 3 wires out
- Sleep mode—when mitigation not needed
- Power Factor correction

Danfoss VLT Low Harmonic Drive and Harmonic Mitigation

The VLT Low Harmonic Drive is a standard Danfoss VLT AQUA Variable Frequency Drive with an integrated active filter. An active filter is a device that actively monitors harmonic distortion levels and injects compensative harmonic current onto the line to cancel out the harmonics.

Low harmonic drives are designed to draw an ideal sinusoidal current waveform from the supply grid with a power factor of 1.0. Where traditional non-linear load draws pulse shaped currents, the low harmonic drive compensates that via the parallel filter path lowering the stress on the supply grid.

The Low Harmonic Drive meets the toughest harmonic standards and has a THiD of **less than 5%** at full load with <3% voltage distortion on a balanced three-phase grid. The unit is designed to meet **IEEE 519** recommendations for $I_{sc}/I_l > 20$ for both uneven and even individual harmonic levels.

The filter portion of the low harmonic drives has a progressive switching frequency which leads to a wide frequency spread thus giving lower individual harmonic levels above the 50th.

Active Solution Advantages:

- Harmonic performance at partial load and with background distortion and phase unbalance.
- Reduced installation cost (wiring for transformer)
- The LHD can be turned off if you do not need the injected performance, which is an improvement in overall efficiency.
- The LHD is much more than just a Harmonic Solution with its ability to selectively remove harmonics and to improve reactive power factor while 12 & 18-pulse drives just correct harmonics.
- Most variable torque applications are never running at full load therefore it is most likely that the 18-pulse is never really below 5% THiD. The LHD will almost always be below 5%.

Illustration 2: The chart below is in percent of running amps. As the load decreases so do the running amps. The harmonic amps do not increase at the rate shown, just the harmonic current percentage. U5 is background voltage distortion that affects harmonic reduction.

