HARMONIC FILTERS AT-THE-LOAD VS. HARMONIC FILTER BANKS

Harmonic Filters At-The-Load

Advantages

Provides full advantage of improvement in power factor, power quality, and power efficiency
Power factor, power quality, and power efficiency are most improved when a harmonic filter is added to a power system at-the-load. Downstream placement of filters in a power system is essential since improvement occurs upstream through the power system from the point of installation. Furthermore, harmonics, current, and KVA are reduced for the wire, disconnect, bus, feeder lines, feeder switch, and switchgear. This can eliminate overheating, premature failure, and safety hazards. Additionally, downstream I^2R losses in the power system are reduced.

Eliminates drive isolation transformer or line reactor failure due to overheating and skin effect
If applying a filter at-the-load downstream of the isolation transformer or line reactor, then harmonics are not drawn through these devices. This eliminates extra current at higher frequencies flowing through these devices.

Disadvantages

Possible substantial capital investment
Opposed to investing in a single harmonic filter bank, several individual filters may be required to improve the existing power system.

More locations of equipment for maintenance
If a preventative maintenance schedule is developed and employed, there would be a small increase in the cost of maintaining several systems versus only one.

Harmonic Filter Banks

Advantages

Negligible capital investment
Depending on the number of individual traps the bank would be substituting for, the addition of switchgear and disconnecting equipment could raise the total cost higher.

Less locations of equipment for maintenance
If a preventative maintenance schedule is developed and employed there would be a small reduction in the cost of maintaining only one system versus several.

Disadvantages

Improvement in power factor, power quality, and power efficiency but on a smaller scale
When a filter is added to a power circuit, the power factor and power quality are improved and the current is reduced from that point upstream through the power system. When applying a filter downstream at the system transformer, harmonics and KVA are not reduced for the wiring, disconnect, bus, feeder lines, feeder switch, and switchgear. This can cause overheating, premature failure, and safety hazards in these components. Additionally, I^2R losses still exist downstream in the power system.

Causes drive isolation transformers or line reactors to overheat and fail
If applying a filter at the system transformer, the harmonics are literally drawn through any drive isolation transformer or line reactor. This extra current at higher frequencies will overload these devices.

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