

# Asymmetric Trap Control

## Introduction

Power Factor is a measurement of the cosine of the angle between current and voltage. Ideally, we want the Power Factor to be near unity, however, in many instances, Power Factor falls into the category of either leading or lagging. To achieve Power Factor correction, extra equipment must be installed to assist in bringing the voltage and current into phase,  $PF=1$ .

## Why is Leading Power Factor Harmful?

When the Power Factor is leading, it begins to overexcite the electromagnetic field in a generator. The regulator must then reduce the excitation current in the electromagnet to compensate for this extra reactive current. This causes excess stress on a generator and reduces the lifespan.

When applying a passive harmonic filter to a variable frequency drive, simultaneously controlling harmonics and power factor can be challenging

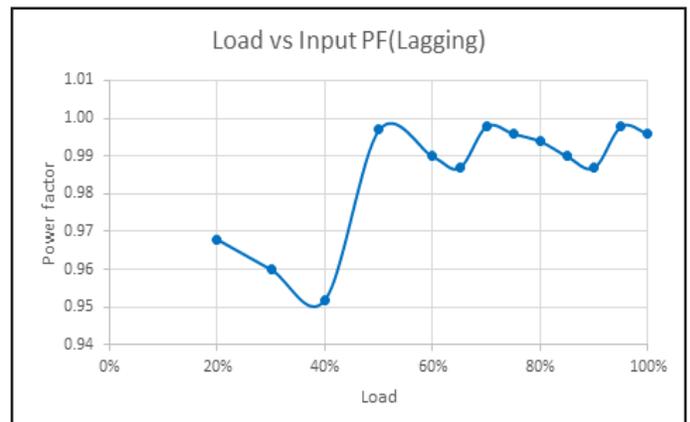
## Asymmetric Trap Controls

Asymmetric trap control is the process of operating multiple tuned trap circuits within a passive harmonic filter, to improve power factor and Total Demand Distortion (TDD) performance at the Point of Common Coupling (PCC).

This is a customizable option that allows the ability to lower the amount of kVAR present in a power circuit, while still filtering harmonics to meet requirements held by IEEE-519. By using an asymmetrical trap control this will avoid leading power factor when if Power Factor Capacitor banks or generators are on the line. Asymmetric Trap controls would also allow for harmonic filtering on a multi staged load application where low load points would be critical.

## How Does It Work?

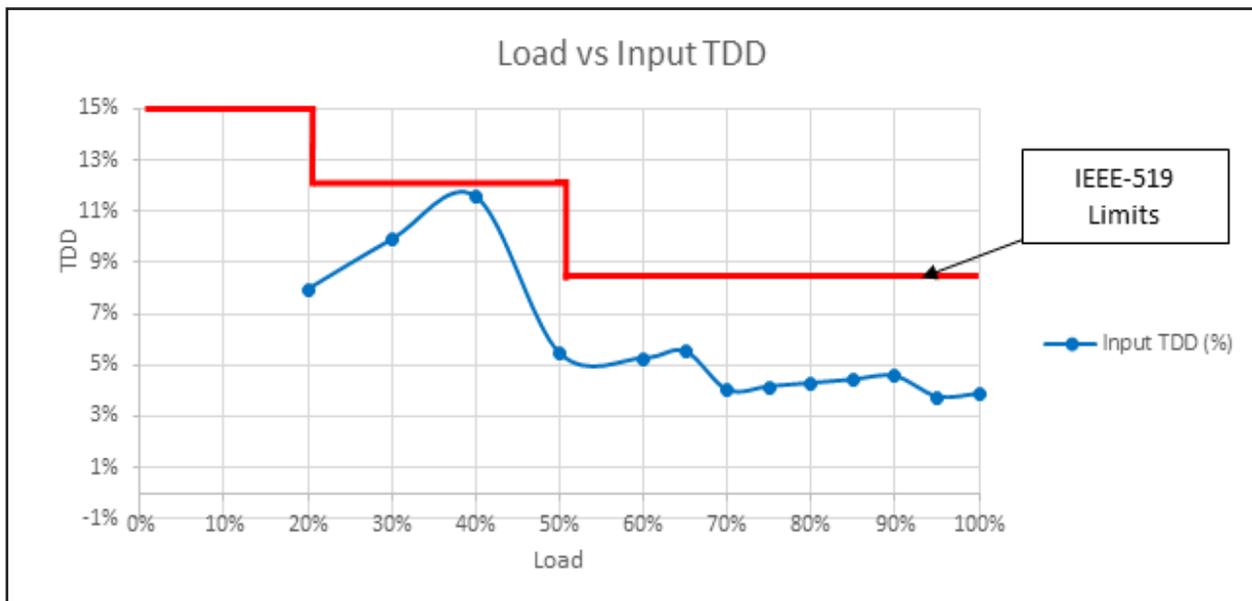
A programmable logic controller, PLC, or programmable controller is a digital computer used for automation of typically industrial electromechanical processes, such as control of machinery on factory assembly lines, amusement rides, or light fixtures.<sup>1</sup> PLC's pull in and out the different tuned trap contactors based off preset load ratings per filter rating. This will ensure the power factor never goes leading and the TDD for the VFD is below IEEE-519.



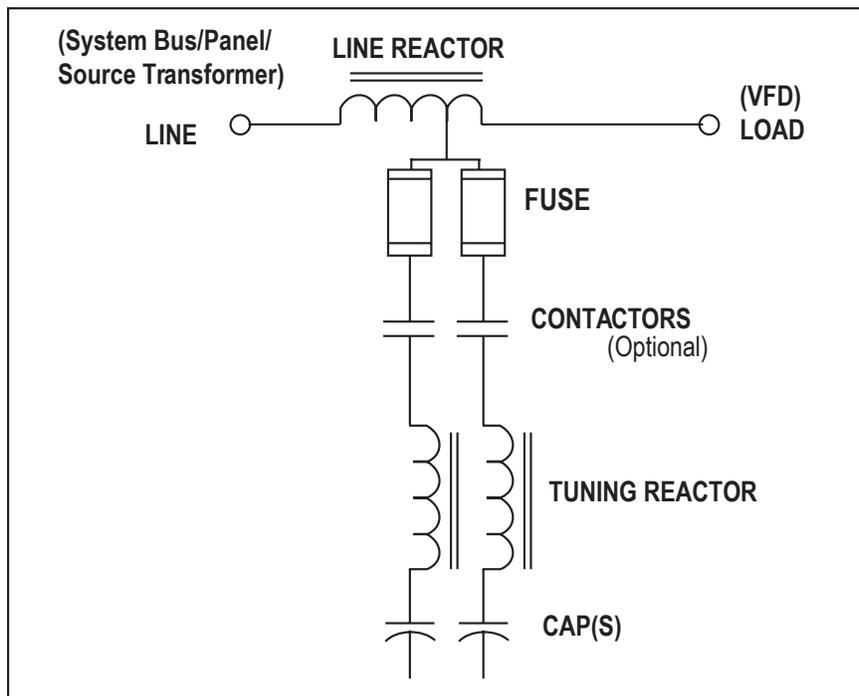
## Applications For Asymmetric Traps

Asymmetric traps can be used on applications such as: HVAC Chillers, wastewater treatment plants, mining, or other machinery that uses vfd's. By adding an asymmetric trap, this will

- Removes harmful harmonic currents and prevents overheating or power equipment.
- Meet IEEE-519 at any load percent
- Improve overall power factor
- Based on load, decrease line capacitance in the presence of generators and cap banks decreasing down time on power equipment
- Avoid leading power factor.



Simulation based off a simulated 950 HP VFD Load



Example of Asymmetric Trap Schematic

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