

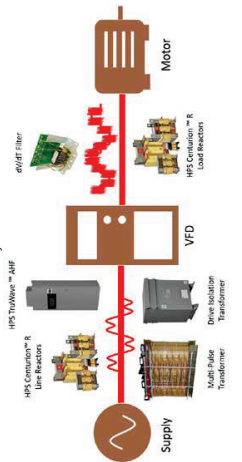


**OUR EXPERIENCE**

The variable frequency drive (VFD) market covers a broad range of applications and is growing rapidly. As a result, VFDs are becoming a critical component in many industrial processes. HPS can provide comprehensive solutions to these costly problems.

Whether it's a standard transformer, reactor, filter or a custom built magnetic, HPS has the experience to provide a solution for your drive application.

**Potential Drive System Solutions from HPS**

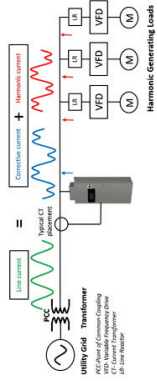


**Line Side Drive Solutions**

**HPS TruWave™ Active Harmonic Filter**

HPS TruWave™ Active Harmonic Filter (AHF) is a comprehensive and flexible solution for harmonic mitigation. It provides advanced control and proven reliability that your facility needs to solve harmonic problems generated by non-linear loads such as variable frequency drives.

The AHF monitors load current and quickly responds to power system distortion as it develops. The AHF injects a corrective current to effectively cancel out harmonics produced by three phase non-linear loads. The result is a reduction in harmonic distortion to below 3%, complying with the IEEE-519 recommendations.



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**Solutions for  
Variable Frequency  
Drive Applications**



power to perform

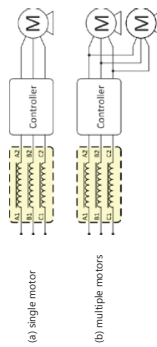
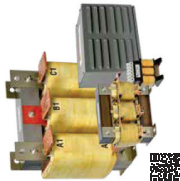
Line Side Drive Solutions Continued

**HPS Centurion™ R Line Reactor**

The HPS Centurion™ R line reactor provides a UL listed solution to many common drive issues. As an input line reactor, the HPS Centurion R offers the following benefits:

- Minimizes harmonic current
- Attenuates voltage and current harmonics to reduce voltage notching
- Improves True Power Factor by reducing overall current distortion
- Mitigates drive nuisance tripping by attenuating voltage transients from sources such as PFC, utility switching and lightning

When coordinated with a HPS TrueWave Active Harmonic Filter, the system can reduce harmonics from variable frequency drives to under 5% THD.



**HPS Drive Isolation Transformer**

HPS Drive Isolation Transformers (DITs) are designed to meet the rugged demands of both AC and DC variable speed drives and also to provide any required voltage change. The harmonic distortion generated by non-linear loads can have damaging effects on the transformer and electrical equipment connected to the circuit.

Drive Isolation Transformers are used for VFD applications to create isolation between the source and loads as well as impedance to the line. DITs offer the following benefits:

- Changes voltage where required
- True electrical isolation and dedicated grounding point
- Limits maximum short circuit current

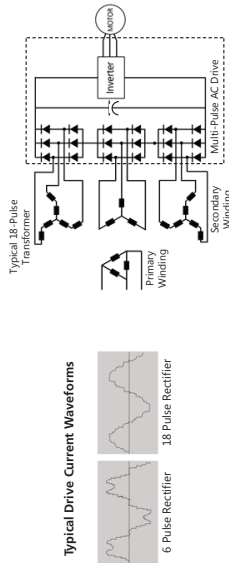
HPS offers both standard efficiency DITs, primarily for the US market, and high efficiency versions required for Canada to meet NRCAN 2019 efficiency regulations.



**HPS Multi-Pulse Transformer**

Multi-Pulse transformers are designed specifically for harmonics, voltage distortion and other unique characteristics associated with individual manufacturer's drive systems. They provide the required supply voltage with the desired phase angle between secondary voltages for VFD systems and converters.

HPS has significant experience with 18, 24, 36, 48 pulse drive/inverter duty transformers and auto-transformers in both low and medium voltage applications.



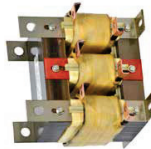
Typical Drive Current Waveforms



**Custom Reactor Solutions**

Through our extensive application and design knowledge we are able to provide both iron and air core reactors as well as chokes for a variety of low and medium voltage solutions:

- DC link chokes
  - Current limiting reactors
- In addition, HPS can supply reactors to be integrated as a component in a variety of filters and harmonic traps.

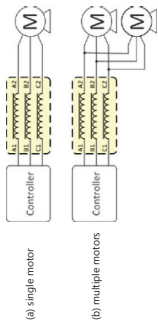


Load Side Drive Solutions

**HPS Centurion™ R Load Reactor**

The HPS Centurion™ R load reactor provides a UL listed solution to many common drive issues, with the following benefits:

- Reduces the motor's operating temperature & audible noise
- Mitigates motor bearing failures and insulation damage as a result of the reflected wave phenomenon
- Enhances the overall performance and life expectancy of the motor



**dV/dt Filter**

The HPS dV/dt filter provides protection for motors by slowing the rate of voltage increase and minimizing the peak voltage that occurs at the motor's terminals and along the cables feeding the motor. It does this by combining the harmonic current limiting ability of an AC line reactor plus a passive capacitor circuit that forms a damped, low pass filter. Long cable lengths (usually where the motor cable length is 100 feet and greater).

Long cable distance between VFD and motor, 750 ft without any dV/dt filter

