COMPARISON OF GESPER TO VFD'S AND VVFD'S

VFD/VVFD are very good units to help lower the consumption of electricity. However, VFD's produce a lot of Harmonics that goes back onto the electrical system. We did a test at Texas Tech on a 100 hp air handler unit that had a VVFD installed. They had taken their KW down from 22 to 10.5 - 12.0 KW. After installing the GESPER on the line side of the disconnect feeding the VVFD, we took the KW consumption down more to 5.0 - 7.5KW. This was analyzed and measured using TexasTech's Dranetz. They did all monitoring and analysis.

We have added the GESPER to many VFD's in the Golf industry and other manufacturing facilities and have helped energy savings on all applications. The GESPER worked on entirely different aspects of electricity that goes to motors than what a VFD/VVFD does.

For example, a variable frequency drive (VFD) is a system for controlling the rotational speed of an alternating current (AC) electric motor by controlling the frequency of the electrical power supplied to the motor. The GESPER maintains the 60 Hz cycle and does not produce Harmonics but helps lower the wasteful energy produced by creating Harmonics. The VFD frequency drive controllers are solid state electronic power conversion devices. The design first converts AC input power to a DC intermediate power using a rectifier bridge. The DC intermediate power is then converted to a quasi-sinusoidal AC power using an inverter switching circuit. The GESPER does not convert AC to DC using a rectifier bridge and then convert it back to AC. In Converting from AC to DC, Harmonics are produced. With the filters in the GESPER, we are able to filter out the harmful harmonics from getting back into the electrical wring of the facility that could make other motors work less efficiently or harm other electronic loads.

AC motor characteristics require the applied voltage to be proportionally adjusted whenever the frequency is changed. For example, if a motor is designed to operate at 460 volts at 60 Hz, the applied voltage must be reduced to 230- volts when the frequency is reduced to 30 Hz. The GESPER maintains and stabilizes the voltage and Hz to produce a continuous steady supply of power, on the Line Side of the Disconnect going to the VVFD/VFD. The VVFD/VFD have taken this stable supply of power and resulted in a better performance of what they are designed to do.

Another application that constricts VFD's is cable length. At 460 volts, the maximum recommended cable distances between VFD's and motors can vary by a factor of 2.5:1. The longer cable distances are allowed at the lower Carrier Switching Frequencies of 2.5 KHz. The lower Carrier Switching Frequencies can produce audible noise at the motors. Shorter cables are allowed at the higher Carrier Switching Frequencies of 20 KHz. The GESPER has been proven to prevent Line Loss over greater distances between the main power and the motor. This is in exact opposite of what VFD's do.

When a VFD starts a motor, it initially applies a low frequency and voltage to the motor. The starting frequency is typically 2 Hz or less. Starting at such a low frequency avoids

the high in-rush current that occurs when a motor is started by simply applying the utility voltage by turning on a switch. When the VFD starts, the applied frequency and voltage are increased at a controlled rate or ramped up to accelerate the load without drawing excessive current. This starting method typically allows a motor to develop 150% of is rated torque while drawing only 50% of its rated current. The GESPER allows the motor to have 100% of the voltage and current, yet with its internal proprietary parts, the motor does not have the in-rush of power as usual. This is done without changing the torque. The demand of in-rush is eliminated without any electronics controlling the voltage or Hz. Supplying a more pure form of clean power, the VFD's have an easier time of controlling the voltage and Hz. Thus, the GESPER helps VVFD/VFD do their job more efficiently and helps them maintain their quasi-sinusoidal output waveform over a longer distance than previous.

I hope this explains in a quick summation of the differences of the VVFD/VFD and the GESPER and how the GESPER can and does help VFD/VVFD do a better job of saving electricity.