Solutions for installation upstream of Variable Frequency Drives (Input Filters)

When / Why

Solution	When	Why
Input Reactor KDR 5% series	• Always • In drive applications where the objective is to reduce voltage and current harmonics when the system harmonics present a minor problem • In applications where it is desired to protect the drive. • For a drive without internal magnetic components (DC link chokes/reactors), the addition of an inductor is the basic solution and minimum necessary for the following reasons:	• Prevent drive Shutdown • Improve true power factor • Protect the Diode Bridge of the VFD • Reduce Nuisance Tripping • Reduce Voltage Notching • Reduce Cross-talk between drives • Improve voltage phase to phase imbalance • Reduce harmonic current, adding an external KDR reactor can reduce harmonic distortion by more than 30%
Harmonic filter HGP series	• Drives represent a Significant Portion of the load • Where the specifications call for limited harmonics such as IEEE 519-2014 • Any application that utilizes sensitive electronic components such as capacitors.	• Reduced harmonic: <5% • Efficiency:> 98% • HGP Harmonic filters when applied at the Drive provide low impedance path for the major harmonic currents demanded by the drive. • SCCR Rating 100kA • Background voltage configuration when Vthd > 2% to maintain optimal filtering • Fuse monitoring option available
Filter, EMI-RFI KRF series	• Must comply economically with directives on electromagnetic compatibility. • The application, installation must comply with the standards: FCC Standard 15, Section J CISPR 11 A and B • The system-equipment must comply to CE directives • Electrical systems using VFD's and where high frequency noise must be kept to a minimum. • Power conversion equipment, typically AC drives are increasing switching frequencies. As switching frequencies increase, we are seeing the same phenomenon with regards to the effective frequencies generated and transmitted on the electrical system	• Provides exceptional protection against "EMI" and "RFI" interference. • Represent an undeniable advantage in the case of applications where sensitive electronic equipment can react to interference, such as radios, computers, control devices, radar, sonar, etc. Some examples include airports, hospitals, factories operating sophisticated automation equipment, pumping stations and commercial buildings. • The emission control of these frequencies is often a critical factor in power quality. Manufacturers, integrators, vendors and drive users may be required to comply with the electromagnetic immunity standards. • High common mode reduction in the critical frequency range of 150 kHz to 30 MHz meant to reduce or eliminate potential interference from AC drives • The KRF filter limits electromagnetic "EMI" disturbances and reduces interference problems associated with related equipment. • To further reduce high frequency noise.

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Solutions for installation downstream of Variable Frequency Drives (Output Filters)
When / Why

Solution	When	Why
Output Reactor KDR 3% series	• Always • Installation where the cable length between the inverter and the motor is **<u>less than 100 feet.</u>**	• The addition of a KDR unit at the output of a drive will dampen overshoot peak voltage, reduce motor heating and audible noise, helping to extend the life of the Motor. • The units will also help prevent inverter instantaneous trips because they provide needed inductance when the load on an inverter has an abnormally high capacitance.
dV/dT Filter V1000 series	• Installation where the cable length between the inverter and the motor is **<u>greater than 100 feet.</u>** • Length of conductors up to 1000 ft for specific applications. Individual results may vary. • Unsuppressed dV/dT and Reflected wave causes motor failures. • Common mode motor bearing current. Common mode voltage occurs when the voltages on the three output lines of the drive do not sum “instantaneously” zero. • The customer wants to have a bearing protection, increased motor life and process up-time.	• Limit peak voltage, increase voltage rise time. • Common mode current reduced by 30%. • Reduce bearings pitting and fluting. • Exceptional motors and cables protection. • The V1000 significantly reduces the motor failures by limiting the peak voltages spikes and slows down the rate of change PWM switching by a factor of three. • The V1000 has demonstrated success in protecting the cables and motor insulation by reducing the damaging effects of reflected wave. The common mode currents, which can lead to bearing pitting and fluting. • Their superior performance increases process uptime and motor life. • Peak voltage on a 480 V system can reach 1200 to 1600 V, causing rapid breakdown of motor insulation, leading to motor failure. • On 600V systems, the peak voltages can easily reach 2100V. If this is left uncontrolled, insulation failure may occur. • The same peak voltages that damage the motor can also damage the cable. Since the V1000 filters are designed to be placed at the output of the drive, these units will also protect the cable runs.
Sine wave filter KMG/MSD series	• Installation where the cable length between the inverter and the motor is **<u>greater than 1000 feet.</u>** Specific applications can reach 4572 m (15,000 ft) • The KMG filter converts the PWM wave form to near sinusoidal wave form, allowing sensitive applications to take advantage of the efficiencies and savings that PWM output power supplies offer. • The specification calls to comply with NEMA standards publication No. MG-1.	• Reduce Common mode Current , • Reduction in bearing currents. • Reduction in instrumentation reference to ground noise. Reduce motor noise, vibration and heat. • Elimination of torque ripple. • Elimination of reflected voltage waves by allowing carriers greater than 2 kHz to effectively be eliminated from the output of the filter. • Provide motor power factor improvement • Limit voltage distortion at <5% (typical) • Allows use of MG1 Part30 motors where Part31 (Inverter duty) motors are otherwise required.