

INSTALLATION COMPARISON CONSIDERATIONS FOR PUMP AND FAN DRIVE SYSTEMS

Considerations	VFD	Dynamatic®
Cable Length	50 feet Most VFD manufacturers recommend no more than 50 feet from the VFD output to motor termination, due to inductance and EMI interference ^[1]	200 feet Factory recommended length up to 200 feet (transmitting only DC voltage) before requiring increase in wire size
External Cooling	Forced Air HVAC or Water Cooling Switching losses in VFDs create heat which must be mitigated through external cooling methods.	Ambient air Total switching losses equal less than 1/10 % of total system power.
Harmonic Mitigation	Input Isolation Transformer Limits current to drive ^[1] and mitigates harmonic interference to peripheral equipment	Input Isolation Transformer 6KVA, 575VAC included in all Dynamatic® controls
	Input Line Reactor Noise mitigation on input side of drive ^[1]	None Required
	Output Harmonic Filters Used to reduce the amplitude of fixed frequency currents to prevent them from entering the rest of the system ^[1]	None Required
Installation Cabling	Factory Recommended Special consideration must be given to the proper installation and operation of the overall system that comprises the VFD, the motor it controls, and the cable that connects them. The way in which VFD-based systems are constructed and operated will have an impact on both the longevity and reliability of all the components of the system, as well as nearby or adjacent systems. ^[2]	None Required No specialty cable requirements, only national electrical code standards apply.
System Grounding	Factory Recommended Complex grounding system due to Pulse Width Modulation ^[2]	None Required No specialty grounding requirements, only national electrical code standards apply.

INSTALLATION COMPARISON CONSIDERATIONS FOR PUMP AND FAN DRIVE SYSTEMS (CONTINUED)

Motor Considerations	VFD	Dynamatic®
Requirements for Inverter Duty Motor	Factory Recommended Pulse Width Modulation can cause voltage transients well above the rated voltage of the motor which can lead to failure of the insulation system in a very short period of time. ^[1]	None Required Standard Class F insulated, Design B motors
Brand Flexibility	Factory Recommended Motor manufacturers limit warranty to select, pre-tested VFDs.	Non-exclusive Dynamatic® systems are compatible with all motor manufacturers.
Bearing Protection	Applicable “Shaft currents” which flow as a result of shaft-to-frame electrical potentials. A major source of the “shaft current” in this class of bearing failure is the potential induced between the rotating element and static element in variable speed electric motors, this potential is associated with the use of solid state gating devices used to generate DC current for DC motors or AC variable frequency (VFD) power for AC motors. ^[3] Installation of shaft bearing protection highly recommended.	None required Due to absence of shaft currents
Anti-Ratcheting	Available Option	Available Option

References

1. Natural Resources Canada (2009). *4 Selection of VFD Drives*. Published by Natural Resources Canada.
2. Shuman, B. (2009). *Building a Reliable VFD System*. Published by Belden, Inc.
3. Boyanton, H. (2010). *Bearing Damage Due to Electric Discharge: Electrical Discharge Due to Machining of Bearings*. Published by Shaft Grounding Systems: Albany, OR.