



DX Ducted Systems Technical Services Service Tips Letter

Letter: **ST-004-2019**

Date: March 8, 2019

To: All DX Ducted Systems Service, Sales, and Training Managers
All DX Ducted Systems Distribution Service, Sales, and Training Managers

Subject: **Variable Frequency Drive (VFD) Power Concerns**

Product: Light Commercial

Summary: All Light Commercial products with a VFD

References: NFPA 70, National Electrical Code
Mitsubishi, FR-D700 Instruction Manual

Disclaimer: JCI warrants that the Service/Products will perform substantially in conformance with its Documentation. JCI shall not be liable for warranty nonconformance caused by misuse or negligence or willful misconduct.

Situation

With the addition of VFDs to a wide range of products, it is necessary to determine the power supply of the system before installing the product. Some power supplies may require you to add additional equipment to ensure proper operation of the VFD.

Technical Information

The type of power supply can be identified by measuring the incoming voltage with a voltmeter. The following measurements will help in determining the type of power supply. All measurements referenced are approximate, your actual field measurements may vary slightly from the numbers provided in this bulletin:

3 Phase Wye Power Supply

This type of power supply is the most commonly found and can be detected by measuring incoming power readings as follow:

208V systems

L1 to ground - $\approx$ 120 volts
L2 to ground - $\approx$ 120 volts
L3 to ground - $\approx$ 120 volts

460 V Systems

L1 to ground - $\approx$ 277volts
L2 to ground - $\approx$ 277volts
L3 to ground - $\approx$ 277volts

The 3 Phase Wye power supply will not require further modification to allow the VFD to function properly. However, 208v systems will require Parameter 19 to be changed from 230 to 208.

Corner Grounded Delta Power Supply

Typical incoming power supply measurements:

240 V systems

L1 to ground - $\approx$ 230 volts
L2 to ground - $\approx$ 0 volts
L3 to ground - $\approx$ 230 volts

480 V systems

L1 to ground - $\approx$ 460 volts
L2 to ground - $\approx$ 0 volts
L3 to ground - $\approx$ 460 volts

Note: The leg that reads 0 volts to ground is normally L2. With a Corner Grounded Delta, 2 legs will read voltages to ground that are the same or almost the same and one leg will read 0 volts to ground. This is the “B-Phase.”

Installation of a special transformer is required to operate the VFD in conjunction with Corner Grounded Delta Power Supply. Contact a qualified commercial electrician.

High Leg Power Supply

Also known as wild-leg or stinger-leg is a less common power supply, but does occur in older power systems. Typical voltage readings for High Leg Power:

208/230 V systems

L1 to ground - $\approx$ 120 volts
L2 to ground - $\approx$ 208 volts
L3 to ground - $\approx$ 120 volts

460 V systems

L1 to ground - $\approx$ 277volts
L2 to ground - $\approx$ 415 volts
L3 to ground - $\approx$ 277 volts

Note: Higher voltages are present on one leg with normal voltages on the other 2 legs (Always place the High-Leg on L2 of JCI Commercial equipment).

Installation of a special transformer may be required to operate the VFD in conjunction with High- Leg power supplies. Contact a qualified commercial electrician.

Mack Ware
Associate Product Tech Support Engineer
Johnson Controls DX Ducted Systems
5005 York Drive, Norman OK 73069
Tel: 1-877-874-7378

Bruce Porter
Product Technical Support Manager
Johnson Controls DX Ducted Systems
5005 York Drive, Norman OK 73069