

Redundant Drives

Ensuring continuous HVAC operation with a dual-variable-frequency-drive system

Imagine you are a surgeon in the middle of a major operation. Suddenly, one of the variable-frequency drives (VFDs) in your operating-room air-handling system develops a fault and stops running, introducing the threat of contamination into your carefully controlled environment. What do you do?

Such a scenario could mean life or death. Others are not as critical, but still require proper air or water flow 24/7. For example, in many biotechnology plants, materials are produced in multimillion-dollar batches, with gestation periods lasting weeks and even months. A change in the carefully controlled environment could ruin a batch.

The best way to ensure uninterrupted operation in a closely controlled environment is to employ a dual-VFD system. The typical configuration is two VFDs in a single control panel.

In the event one of its VFDs fails, a redundant system

automatically transfers motor control to the other VFD. The system determines and maintains the proper motor speed. Operation proceeds seamlessly, with no noticeable effect on the HVAC system or the controlled environment.

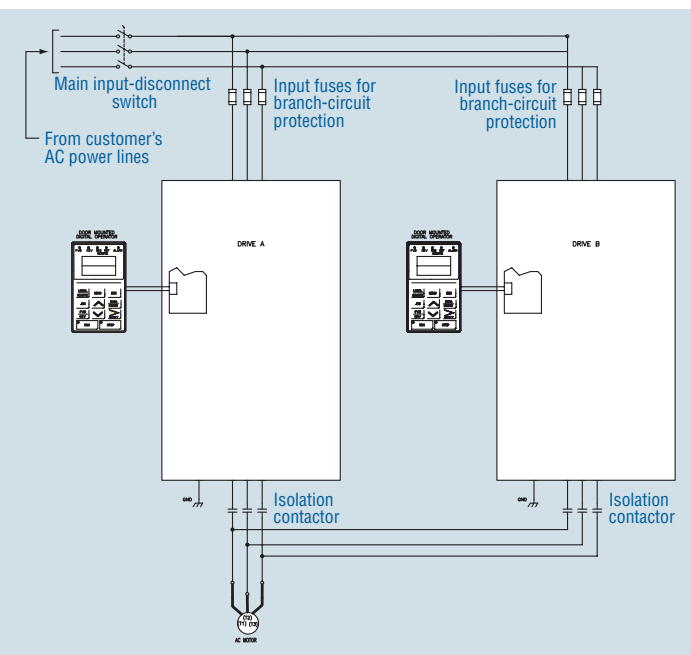
A main input-disconnect switch controls the flow of power to a redundant system. If a circuit breaker were used, it could trip and disconnect power to the system, rendering both VFDs useless. For branch-circuit protection, each VFD is supplied with a set of input fuses.

Hard-wired logic, including a hand/off/auto switch, is provided. In “hand” mode, one of the drives is selected manually and remains in operation at all times, its speed controlled manually via keypad. In “off” mode, neither VFD is selected, and the system is not in operation. In “auto” mode, which is the normal mode of operation, operation switches from one drive to the other, with speed controlled via a process-variable electrical signal.

A unique feature of a redundant system is that, as with a standard VFD, single, rather than dual, wiring points are required for power input, power output to the motor, and control wiring, simplifying the system and saving time and money during installation. All power and signal inputs and outputs are switched automatically within the system, depending on which drive is selected for operation. For example, if Drive A is running on an automatic control loop when a switch occurs, Drive B will utilize the same control loop. All of the normal input-connection points also are switched automatically.

Because both VFDs utilize the same parameters, a copy keypad can be used to quickly program the second VFD after the first is programmed. If network communications are used for monitoring or control, an independent connection must be established for each VFD.

A more cost-effective option for less-critical applications is a single-VFD bypass system. If the VFD in such a system fails, operation transfers automatically to an integrated across-the-line starter that runs the motor at full speed.



Dual-variable-frequency-drive system.

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