

VFD E-Bypass 101 The Basics

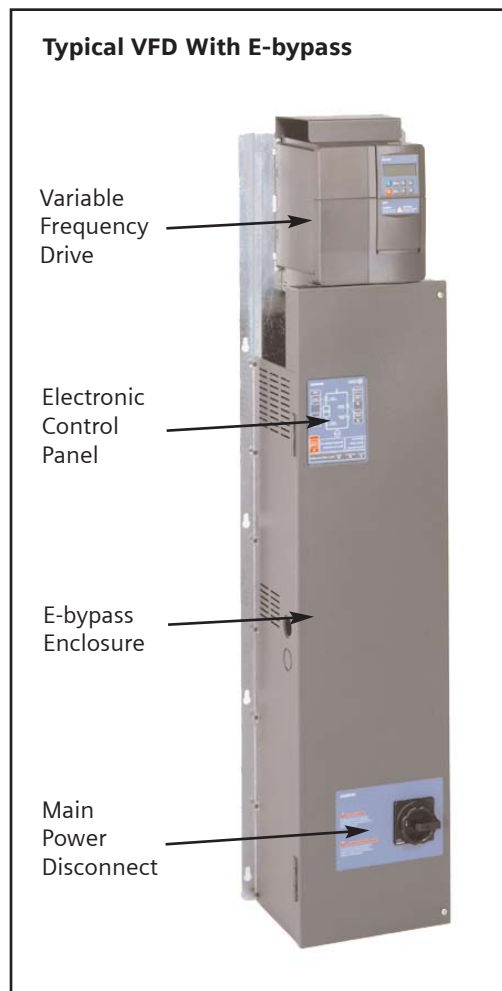
Variable frequency drives (VFDs) offer many benefits to reduce energy costs and extend the life of mechanical equipment essential for consistent building comfort. VFDs allow HVAC system fan and pump motors to run at a variable speeds, based on demand, eliminating the power surge encountered when the device is simply turned 'on' with full electrical current. A VFD bypass assures the customer uninterrupted operation with their HVAC system - the ability to keep their fans and pump running at all times - even if the drive is taken out of the loop for whatever reason.

Electronic & Conventional Bypass: The Differences

For those with little experience in bypass applications, let's start with a few of the basics. As the word indicates, a "bypass" is defined in an engineering spec as a means of taking the drive out of the electrical power loop while keeping the HVAC systems up and running.

This requirement could be needed for a multitude of reasons, but the most common ones include reprogramming or servicing of the drive, or in the rare event of the drive mechanically failing. In the early days of drives, back some 20 years ago, their failure rate was an issue. However, today it is extremely rare for any drive to just mechanically fail. The requirement for a bypass is also critical in applications that demand essential services and smoke purge capabilities, where it is imperative that the motor runs to destruction if necessary.

The bypass enclosure itself is also used to house additional customer required components like line or load reactors and other devices for circuit protection. Line and load reactors are used for conditioning of the power. The other components facilitate the isolation and switching of the control devices.



Up until a few years ago, the only bypass option available to customers was a conventional bypass package. An electronic, intelligent bypass solution, did not exist.

A conventional bypass incorporates push buttons, selector switches and indicator lights to accomplish its primary functions. In comparison to an E-bypass though, a conventional bypass is somewhat limited in capability and function. In addition, a tremendous amount of point-to-point wiring is needed to wire-up control relay devices and components in a conventional bypass. The more point-to-point



wiring used, the greater probability of reliability and trouble-shooting problems occurring down the line.

Electronic Controls Take Over

E-bypass VFDs often feature a touch-sensitive electronic keypad interface for enhanced operator monitoring and diagnostics. An internal electronic control board acts as the brain of the E-Bypass, completely eliminating the heavy control wiring, relay logic, terminal blocks and selector switches in a conventional bypass by replacing them with advanced built-in features accessible from an electronic keypad.

A popular feature is interlock start logic, or built-in damper end switch relay logic. With the interlock start logic feature, a related damper will open, the damper's end-switch will then tell the drive's bypass that it is safe to start the motor. Other notable E-Bypass features include multiple relay outputs, inputs,

safety inputs, common remote start/stop, LED indicators, auto bypass, essential services mode, disconnect options and much more. For the engineering spec, there is no reason not to go with an E-bypass for its advanced capabilities alone. In addition, the price of either the conventional bypass or E-Bypass are essentially the same. Presently there are only four VFD manufacturers that offer electronic or intelligent bypass solutions.

Standard Features vs. The Options Games!

When specifying VFDs, be sure to choose a manufacturer that offers almost every imaginable feature required for an E-Bypass application as a standard feature. Some offer key features like interlock start logic as an add-on or option with additional costs. Be careful not to play the "Options Game" - make sure you get the most standard features for your money!

Often a particular feature or requirement may not be known, or overlooked by the installer at the job-site, which could result in having to remove, re-configure and then re-install the bypass. Make sure the VFD installers are certified by the manufacturer to get the most out of the drives capabilities. Finally, make sure the drives are specified with advanced features as well, such as an integral harmonics reduction capability, which eliminates the need for line reactors to reduce harmonics, thereby reducing the energy and costs savings of the overall VFD package.

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