# Considerations for transfer switch selection

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The best way to select a transfer switch is to understand the types of loads connected to the standby system. Consider the characteristics of the connected load, and loads that may be connected in the future.

Here are common switch types, along with their advantages and disadvantages:

## DOUBLE-THROW TRANSFER SWITCHES

This family of transfer switches provides fast load transfer with "break-before-make" action. In their standard form, they assure that the utility and the gen set are never connected simultaneously.

However, double-throw transfer switches should not be used with larger (20-hp and up) motors, compressors and transformers. Voltage in motor devices decays at much longer rates than other loads because the motor continues to rotate and the magnetic flux causes the motor to act like a generator. They will likely be out of phase if power is reconnected too quickly. Out-of-phase start-ups will trip circuit breakers or needlessly stress load and/or generator windings.

## TIME-DELAY NEUTRAL TRANSFER SWITCHES

Circuits serving motors or transformers should be transferred to standby power with time-delay neutral (TDN) transfer switches, which allow flux voltages to decay before these devices are brought back on line.

TDN switch design is simple and reliable. When specifying TDN switches, select units with an adjustable time delay so it can be best set for the application.

Since most facilities with emergency power have HVAC compressors or motors, a TDN transfer switch can meet the needs of lighting and motor circuits.

## IN-PHASE MONITORING SWITCHES

In-phase monitoring (IPM) transfer switches (usually an open transition switch) monitor the phase difference between the load and oncoming source. It is a more expensive transfer switch, since it anticipates the best time to trigger the transfer, or prevent it from happening if the desired power source remains out of phase with the load.

A speed (frequency) difference larger than 0.4 Hz may occur with gen sets equipped with a droop-type governor which may prolong the out of phase condition and prevent a quick transfer to the desired source. In this case, an isochronous engine governor with synchronization should be specified with the IPM to secure a quick transfer.

## CLOSED TRANSITION SWITCHING

Another higher-cost option to consider is a "make-before-break" closed transition switch. It momentarily parallels the two power sources before transfer. Complex safeguards must be added to guarantee that "in-parallel" time be no longer than 100 milliseconds. These systems increase engineering costs because utilities require extensive documentation to assure grid safety. It also increases customer liability.

## RECOMMENDATIONS

The owner usually has one consideration — low cost. However, the overriding goal should be a reliable system with reasonable installation and operating costs over the system life.

Before specifying a double-throw switch, be sure that motors and compressors will not be added to the gen set circuit load in the future. Upgrading to a three-position switch can cost considerably more than installing a three-position switch at initial installation.

We suggest you specify time delay neutral transfer switches with variable and immediate transfer capability. TDN switches are reliable and keep system design simple and flexible.