

Consultant's Corner: Automatic Transfer Switches



consultants corner

Basics of automatic transfer switches

An automatic transfer switch (ATS) forms the interface between the gen set, utility power and the consuming electrical equipment. It performs three functions:

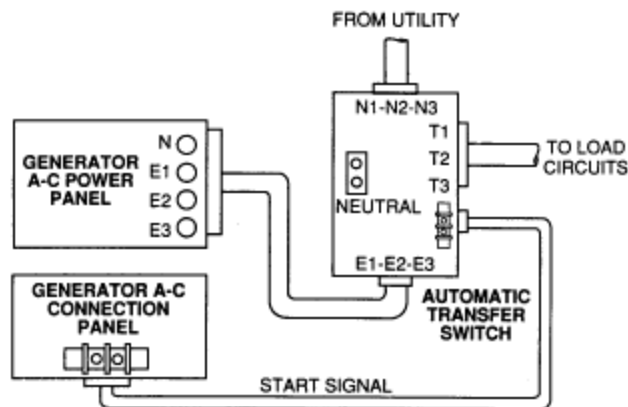
1. It monitors power sources for failure.
2. It transfers load from one power source to another.
3. It can and should be used to exercise the gen set.

Proper transfer switch operation is critical to the whole power system. It provides safety to the gen set operator and protects the electrical service and the utility.

This switch must handle overloads for a short period of time while the proper protective relay begins operation.

Many considerations affect ATS selection. The unit must be sized correctly for the loads it serves as well as have the correct protective devices.

Occasionally, gen set applications require paralleling of generator power with the utility power. Utilities require that customer connected equipment (including gen sets) must not cause disturbances or degrade the quality of service to other customers on the line. The customer also cannot degrade the safety interlocks and protection devices on the power network.



Typical ATS interconnection.

possibility of gen set or motor damage.

Conversely, equipment such as computers with uninterruptible power supply (UPS) systems must also be backed up in case outages exceed the UPS capacity. However, switchover from utility to gen set need not be done immediately. In these cases, an optimum time must be decided upon, depending on the various loads.

ATS types

There are two types of automatic transfer switches, circuit breaker and contactor. The circuit breaker type has two interlocked circuit breakers, so only one breaker can be closed at any anytime.

The contactor type is a simpler design that is electrically operated and mechanically held. It operates faster than circuit breaker transfer switches, which reduces transfer time.

The ATS provides several control functions for gen set operation. It senses when voltage on the utility falls below predetermined limits, then initiates gen set start-up. It transfers loads to the gen set when the engine has sufficiently warmed up and the generator has reached operating voltage and frequency. It also returns the load to the utility line when utility power is restored.

The ATS also provides a timer so the engine runs long enough to warm up fully. It also times a cooldown period when the engine has been under load.

These controls can be either adjusted by the operator or fully preprogrammed at the factory.

ATS sizing factors

Switchgear sizing is determined by four factors: Continuous current, inrush current, interrupt current and withstand current. The main consideration is continuous current, but inrush and interrupt currents are often overlooked.

Type of load determines the inrush current. Motors starting can consume six to ten times normal continuous current, so can tungsten and fluorescent lights.

Resistive heating loads can consume from three to five times rated currents. Provisions must be made for these short duration overloads in the ATS and protective equipment.

Motors, when disconnected from power sources, temporarily maintain voltage because magnetic flux continues to be produced by the spinning rotor. They need time for the flux to decay eliminating the