



SYSTEMS DATA SHEET

Generator Set Start Module

Abstract

A reliable standby power system is dependent on the ability of the generator set to quickly start in the instance of a sustained power outage. As almost all generator sets depend on batteries for cranking and control power, battery health is the one of the most vital areas of concern for ensuring a generator set will start when called upon. Batteries fail for many reasons, including defects, environmental issues, and lack of maintenance. Unfortunately, the time you discover a dead starting battery is when you need it the most. The Generator Set Start Module is capable of eliminating the effect of this potential failure and thereby increases the reliability of a standby power system.

The Generator Set Start Module provides reliable supplemental power to the generator set's engine-starting motor by converting 3-phase 380-480 VAC power from the customer's Uninterruptible Power Supply (UPS) into 24 VDC power. The Generator Set Start Module can also be installed in parallel with the engine starting batteries to provide an additional level of redundancy where it is required.

The Generator Set Start Module's simple robust design provides many years of exceptional reliability with minimum maintenance or other recurring costs. The superior, problem free useful life and continuous monitoring capabilities built in to the system increases overall performance of the power system.

Theory of Operations

In a typical generator set installation, the generator set engine is installed with an electric starting motor used to overcome the resting inertia of the engine's rotating assembly. This process is defined as "cranking the engine" and is one of the first steps in engine starting. Once the engine starts to crank, the resistance to rotation is reduced and the load on the starting motor decreases until the engine is capable of sustaining its own motion.

In most generator set installations today, the electric starting motor of the engine receives power from 24 VDC batteries. While these batteries typically have battery chargers installed to maintain the charge, the batteries still lose their capability to hold a charge over time. Eventually, if not properly maintained, the batteries will not have enough stored energy to power the starting motor through the complete cranking cycle and the engine will fail to start.

The Generator Set Start Module converts 3-phase power directly from the customer's Uninterruptible Power Supply (UPS) and makes it available to the engine starting motor. Unlike a battery charger that is still dependent on the batteries ability to store energy, the Generator Set Start Module provides the power directly to the engine starting motor from a constant power source. With the Generator Set Start Module, the batteries take on the role of a backup to the primary starting system, which allows for increased battery life and increased dependability of the generator set starting system.

Configuration Overview

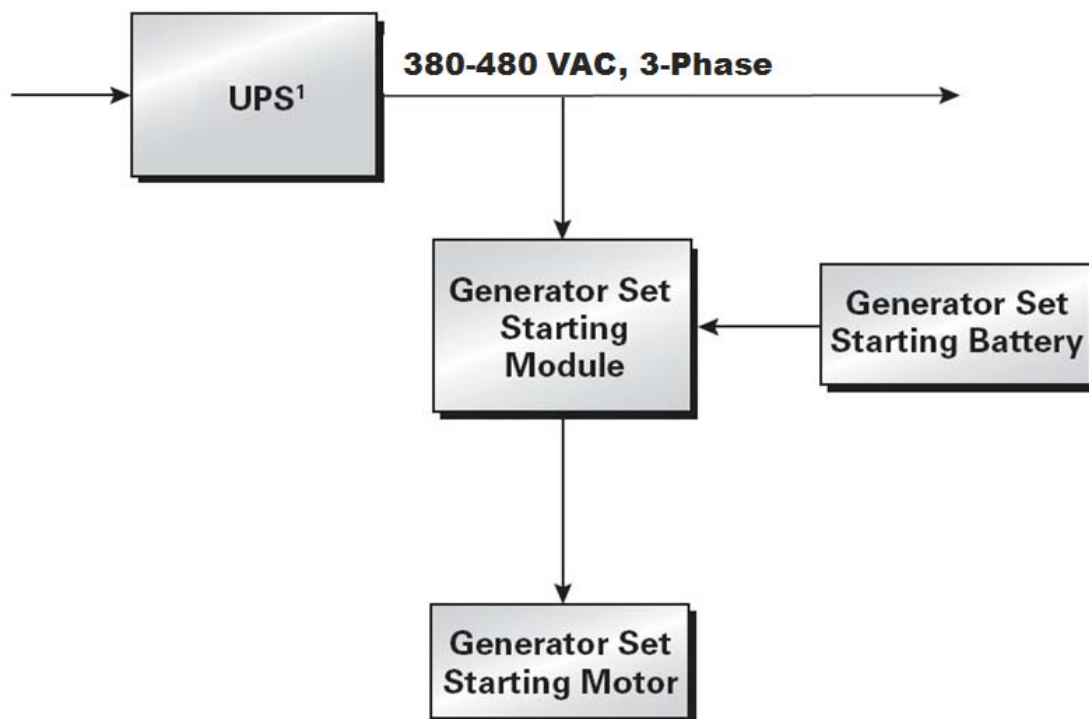
The Generator Set Start Module provides increased reliability without complex enhancements to the standby system. The Generator Set Start Module only requires a continuous 3-phase power source as an input provided from the customer's Uninterruptible Power Supply (UPS). When purchased with the Cat® UPS an optional breaker can be provided in the UPS for connection.

The Generator Set Start Module creates a balanced, three wire, transformer coupled, nonlinear load of about 30 kVA on the UPS when the generator set is cranking. This load lasts about 5 seconds with the first 0.1 seconds being at the full load. A transformer within the Generator Set Start Module steps down the 3-phase 380-480 VAC power, which is rectified and filtered to 24 VDC.

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The generator starting batteries can also be connected in parallel to the 24 VDC output through hardware that is all contained within the Generator Set Start Module's single enclosure. The batteries are isolated from the Generator Set Start Module system by an internal diode to allow continued charging by the typically installed battery charging system. The batteries and continuous power source are combined in the single output of the Generator Set Start Module enclosure to be connected to the starting motor.

The end product of power provided for the Generator Set Start Module ensures that the engine starting motor receives 1725 cold cranking amps at the critical moment when the engine is needed. This translates to a reliable start and increased dependability of your emergency standby system.



¹ Or other continuous 3-phase power source

Installation & Operations

The Generator Set Start Module is easy to install and operate due to its simple self-contained design. The UL rated enclosure is weatherproof to allow for outdoor installation where required. Also, the addition of removable floor stands makes it possible to install the enclosure as a wall mount or floor standing unit. With the addition of a few simple electrical connections, the Generator Set Start Module is ready for operation.

Once installed, the Generator Set Start Module has no special operating procedures or requirements; the system provides reliable operation without intervention. It will operate in -20°C to 50°C ambient temperatures and still



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provide full rated power. If required, the Generator Set Start Module can also supply a continuous load of 30 amps at these temperatures.

Maintenance & Monitoring

The Generator Set Start Module needs no special maintenance. The system is designed to be robust and dependable. A yearly visual inspection should be done during the generator set maintenance, as would be done with any starting system. An input power disconnect handle is provided on the front of the unit for isolation from the continuous source if maintenance is required. During maintenance, the starting motor is still able to draw power from the starting batteries if they are connected in parallel.

The Generator Set Start Module is designed to increase the reliability of the generator set starting system. Therefore, status contacts within the Generator Set Start Module are provided for connection to the building monitoring system, where one is available. The contacts provide status of the output voltage that is provided to the engine starter motor, as well as any upstream component failures where power is removed from the starting motor for any reason.

Summary

The Generator Set Start Module's simple, robust design will provide many years of superior reliability with minimum maintenance or other recurring costs. The superior, problem free useful life and continuous monitoring capabilities built in to the system will increase overall performance of the standby power system.

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