

Starting DC Motor Loads with Stationary Battery Chargers

SCOPE

All SCR/SCRF and AT Series stationary charger products

BACKGROUND

Many dc power systems include dc motors as part of the plant equipment. Both normal and emergency operations of the plant require starting the motors, usually under load. Such loads may include dc oil pumps, etc.

If dc motor starting is a routine part of plant operation, special considerations may be required for interfacing the stationary battery charger to the dc power system.

NORMAL OPERATION

In the normal operation of a dc power plant, the stationary battery charger supplies power to the loads. The charger and battery are both connected to the load; in the event of an ac power failure, or other emergency, the battery continues to provide power to the loads.

Stationary battery chargers are current-limited power sources. If any part of the dc load in the power plant requires more dc current than the charger is able to supply, the remaining current is supplied by the battery. Although a battery cannot supply infinite current, it can normally deliver many times the current available from the battery charger.

When a dc motor is started, it requires an inrush current that may be ten times the normal running current. The battery charger cannot deliver this current. The inrush current must be supplied by the battery. How long the inrush current lasts depends on the ability of the battery to supply the current. A typical inrush lasts about 0.5 second.

Attempting to start a dc motor with the battery charger alone, without a battery connected to the dc power plant, is usually unsuccessful, because the motor cannot develop enough starting torque with the limited current supplied by the charger.

In addition, there is a risk of serious damage to other dc loads when the motor is turned off, because the battery is not present to absorb the inductive energy produced by the dc motor. Do not depend on the battery charger to absorb this energy.

There are additional considerations for battery charger applications in plants with dc motor loads. They are listed to the right for each battery charger product line.

EFFECT OF BATTERY ELIMINATOR FILTERING

Another important point to note is that the filtering level does not affect the ability of a charger to start loads with high inrush current. End users may specify battery eliminator filtering in the belief that this enables them to start a dc motor without a battery. The battery eliminator filtering *only* guarantees a maximum level of output ripple voltage on the dc bus; it has no effect on the ability of the battery charger to deliver large inrush currents.

SPECIAL CONSIDERATIONS

SCR/SCRF Products

SCR/SCRF battery chargers are normally supplied with a fast-acting fuse in the dc output circuit. When a dc motor is started, the battery charger may deliver output current several times its rating for about 0.1 second, until the charger's internal current limit circuit is activated. This high output current may blow the standard dc fuse.

If you have a motor starting application, you should specify the optional motor starting modification. This mod adds a free-wheeling diode to the dc output circuit, and replaces the dc fuse with one that is slightly slower.

AT Series Products

No modification is necessary. The current limit circuit of the AT Series is activated within a few cycles of the power line frequency (15 – 30 milliseconds).