Data Flow Systems

ENHANCED BATTERY BACKUP FOR DFS AND OCS PRODUCTS

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Introduction

Recent events have established the need for longer battery life in RTUs in demanding applications. Under normal circumstances, the batteries supplied with our TCU, HSS and RTU products will provide power to those products through power outages lasting minutes or hours. However, longer outages may occur as a result of natural disasters, such as hurricanes and floods. The catastrophic damage wreaked by these events can leave an area without power for days or even weeks.

Many applications require no more backup power than the standard batteries supply. For critical applications, generators can often be used to provide stand-by power. The downside of using generators is that they are costly and require constant maintenance to ensure proper operation. For applications where the standard battery is insufficient and a generator is impractical, a larger capacity battery may be appropriate.

Battery Technologies

Several lead-acid battery technologies are available, but only one – gel-cell – works well with DFS products. For this reason, gel-cell batteries are the standard batteries supplied with our products. This type of battery is charged by constant voltage of about 13.8Vdc. Other battery technologies, including Absorbed Glass Mat (AGM) and flooded lead acid, don't perform well with this type of charging. Although some users might assume that any deep-cycle lead-acid battery should do, this isn't the case. Because of the type of charging involved, only gel-cell lead-acid batteries, which are deep-cycle, will work effectively.

Multiple Batteries

Using multiple batteries in parallel is not a good way of increasing backup power capacity. Batteries can be connected in parallel only if they are of identical age, capacity, and manufacturing lot, and only if they will always remain connected in parallel. If the batteries are ever cycled independently, they should be replaced with another matched pair.

A mismatched pair of batteries connected in parallel and then allowed to sit will pass current back and forth in an effort to balance their charge. If one battery is weaker than the other, the weaker battery will attempt to drain the stronger one. Eventually, one battery will short and the other will then dump all remaining charge into the shorted cell resulting in two dead batteries, or worse, a fire or battery explosion.

Any gain in packaging flexibility or economy isn’t worth compromising your battery backup system. It's there to aide you in a crisis not to create one.

Sizing the Battery

Choosing the right battery for a particular application takes some careful thought. Details that must be considered are the size and cost of the battery, the size and cost of an enclosure for the battery, the amount of time the site must run on battery power, the amount of current typically used at the site, and the environmental conditions the battery will be exposed to. The chart below shows typical DFS equipment, battery sizes, and the amount of time the battery should power the equipment. The amount of time your equipment will run in the field may vary.

Equip	***Battery Capacity Ah***					
	25	***50***	***100***	***150***	***210***	***265***
PCU001	45 hours	89 hours	179 hours	268 hours	375 hours	473 hours
TCU001/T2000	50 hours	100 hours	200 hours	300 hours	420 hours*	530 hours*
HSS001	12 hours	24 hours	49 hours	73 hours	102 hours	129 hours
HSS002-1	12 hours	24 hours	49 hours	73 hours	102 hours	129 hours
HSS002-2	12 hours	24 hours	49 hours	73 hours	102 hours	129 hours
RTU202	50 hours	100 hours	200 hours	300 hours	420 hours	530 hours
RTU204	23 hours	45 hours	91 hours	136 hours	191 hours	241 hours
RTU210	15 hours	29 hours	58 hours	87 hours	122 hours**	154 hours**
RTU216	9 hours	19 hours	37 hours	56 hours	78 hours	98 hours

***Will not fully recharge**
**** Tested as of 3/18/05**

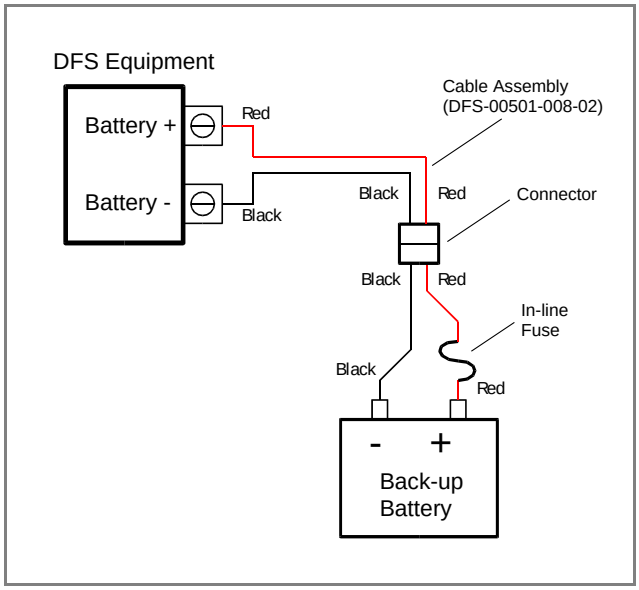
Charging

Large batteries (50+ Ah) may not fully recharge after being depleted due to the limited reserve power capacity of the power supply that is trying to charge the battery. For example, the TCU001 with 210Ah battery is only able to recharge the depleted battery back to ~80% capacity.

Further testing will determine which applications will not fully recharge. However, the customer always has the option to externally recharge the battery. Contact the DFS' Sales Department for suggestions of the appropriate battery for your application. Call 321-259-5009 or email sales@dataflowsys.com.

Wiring

The wiring diagram below shows typical wiring for our equipment with a backup battery. Wires, fuses, and connectors must be rated appropriately for the application. The ampacity of the wire and fuse should be at least 8 amperes to allow proper charging.



A cable assembly (DFS-00501-008-02, shown below) is available from DFS to aide in wiring. It has an 8-amp fast-acting fuse, connectors rated for this application, and a 10 foot pigtail of #12AWG wire.

Fusing

Fusing the connection to the battery can help avoid serious problems in the event of a short circuit. A battery has a large amount of energy that can be discharged in a very short amount of time. This can cause serious damage, and should be avoided at all cost. An in-line fuse installed near the battery is strongly recommended. The fuse should be sized to protect wiring in accordance with NEC standards.

Replacing a Drained Battery with a Freshly Charged Battery

When electrical power is interrupted longer than the capacity of the battery can handle, a freshly charged battery can be swapped for a drained battery to allow continued operation. This requires charged batteries be held in a depot ready for transportation and installation. When transporting or wiring a charged battery, care must be taken to avoid short circuits.

Maintenance

Batteries loose some of their capacity over time. Several factors that will shorten the effective life of the battery include heat, cold, short circuits, vibration, and extreme discharge. Periodic evaluation and replacement of batteries is recommended. Follow the battery manufacturer's recommendations to maximize the batteries life.

Summary

Each DFS/OCS product application should be analyzed to determine the requirements and practicalities of backup power. Users should ask themselves the following questions during analysis:

- How critical is the application?
- Is a standard battery sufficient?
- For critical applications, is it practical to use a generator for backup power or would a large capacity battery be a better solution?

If analysis concludes that a large capacity battery would offer the most benefit, users of DFS/OCS products should purchase and install gel-cell lead-acid batteries. This type of battery performs better with the 13.8Vdc constant charging supplied by DFS/OCS equipment

The type of product to be run on backup battery power and the desired battery life must be considered when selecting appropriate battery size. Also keep in mind that it is safer and more efficient to install an appropriately sized battery than to connect multiple batteries in parallel.

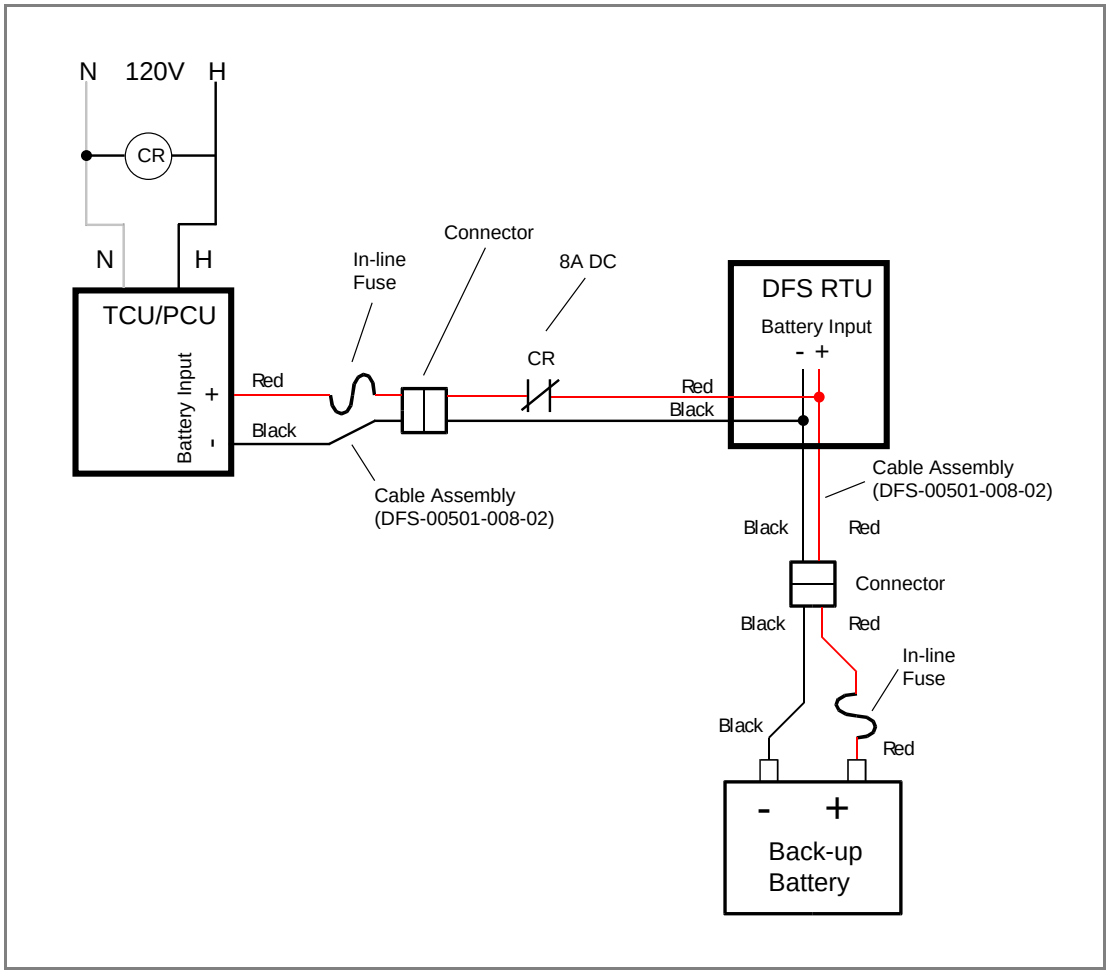
To avoid damage to equipment, batteries must be correctly wired and fused. Note that the effective life of a battery is influenced by environmental factors, therefore it is recommended that batteries by evaluated periodically and replaced when necessary.

This document is intended as a guide. It is important to keep in mind that each individual application is unique; performance will vary depending on the combination of batteries and fuses selected.

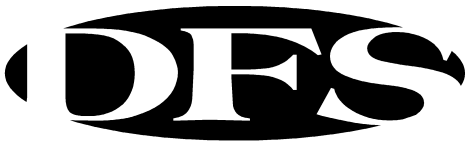
Batteries, fuses, and wiring should be selected and installed by qualified personnel.

RTU with TCU or PCU

There is a specific application that must be addressed. When an RTU is used with a TAC Pack Telemetry Control Unit (TCU) or Pump Control Unit (PCU) and connected by the Bus Extender Module (BEM) interface, the two devices can share one large battery for extended operation. The large battery is connected to the RTU in place of the usual, smaller battery using the wiring guidelines outlined elsewhere in this white paper. The DFS battery cable assembly (DFS-00501-008-02) is recommended. Power is supplied to the TCU through its battery input using an appropriate 2-conductor connector and wire from the RTU. Another DFS battery cable assembly (DFS-00501-008-02) is recommended. The positive wire is switched by the normally-closed contacts of a relay. The coil of that relay is wired in parallel with the power input of the TCU/PCU as shown in the diagram below.



Notes



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